

City of Merced

2020 Urban Water Management Plan

FINAL

AUGUST 2021

Prepared for:

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**CITY OF MERCED
2020 URBAN WATER MANAGEMENT PLAN**

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Date plan adopted: August 16, 2021

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LIST OF ACRONYMS AND ABBREVIATIONS

2030 General Plan	Merced Vision 2030 General Plan
AB	Assembly Bill
AF	Acre feet
AFY	Acre feet per year
Black Water	Black Water Consulting Engineers, Inc.
BMP	Best Management Practice
CCR	Consumer Confidence Report
CII	Commercial, Industrial, and Institutional sector
CIMIS	California Irrigation Management Information System
City	City of Merced
County	Merced County
CUWCC	California Urban Water Conservation Council
CWC	California Water Code
DMM	Demand Management Measures
DOF	California Department of Finance
DRA	Drought Risk Assessment
DWR	California Department of Water Resources
ETo	Evapotranspiration
gpcd	gallons per capita per day
gpm	gallons per minute
GSA	Groundwater Sustainability Agency
GSP	Groundwater Sustainability Plan
HCF	Hundred Cubic Feet
LAA	Land Application Areas
Legislature	State of California Legislature
MCAG	Merced County Association of Governments
MCL	Maximum Contaminant Level
MG	Million gallons
mgd	Million gallons per day
MID	Merced Irrigation District
MIRWMP	Merced Integrated Regional Water Management Plan Update
MIUGSA	Merced Irrigation-Urban GSA
MMC	Merced Municipal Code
MOU	Memorandum of Understanding
PCE	Perchloroethylene
SB	Senate Bill
SB X7-7	Water Conservation Bill of 2009
SGMA	Sustainable Groundwater Management Act
SOI	Sphere of influence
State Water Board	State Water Resources Control Board
SUDP	Specific Urban Development Plan
SWTP	Surface Water Treatment Plant
TCP	1,2,3-Trichloropropane
UC Merced	University of California at Merced

UWMP	Urban Water Management Plan
UWMP Guidebook	2020 Urban Water Management Plan Guidebook for Urban Water Suppliers
UWMPA	Urban Water Management Plan Act
Water Master Plan	Water Master Plan Update
WMA	Wildlife Management Area
WSCP	Water Shortage Contingency Plan
WWTF	Wastewater Treatment Facility

1 UWMP Introduction and Lay Description

1.1 Background and Purpose

Legal Requirements:

CWC Section 10615:

“Plan” means an urban water management plan prepared pursuant to this part. A plan shall describe and evaluate sources of supply, reasonable and practical efficient uses, reclamation and demand management activities. The components of the plan may vary according to an individual community or area’s characteristics and its capabilities to efficiently use and conserve water. The plan shall address measures for residential, commercial, governmental, and industrial water demand management as set forth in Article 2 (commencing with Section 10630) of Chapter 3. In addition, a strategy and time schedule for implementation shall be included in the plan.

The California Water Code (CWC) requires urban water suppliers within the state to prepare and adopt Urban Water Management Plans (UWMPs) for submission to the California Department of Water Resources (DWR). The UWMPs, which must be filed every five years, must satisfy the requirements of the Urban Water Management Planning Act (UWMPA) of 1983 including amendments that have been made to the Act and other applicable regulations. The UWMPA requires urban water suppliers servicing 3,000 or more connections or supplying more than 3,000 acre-feet (AF) of water annually, to prepare an UWMP.

The purpose of the UWMP is to maintain efficient use of urban water supplies, continue to promote conservation programs and policies, ensure that sufficient water supplies are available for future beneficial use, and provide a mechanism for response during water drought conditions. This plan, which was prepared in compliance with the CWC, and as set forth in the 2020 Urban Water Management Plan Guidebook for Urban Water Suppliers (May 2021) established by DWR (UWMP Guidebook), constitutes the City of Merced (City) 2020 UWMP. This 2020 UWMP was prepared in compliance with the UWMPA and the Water Conservation Bill of 2009 (Senate Bill [SB] X7-7) by Black Water Consulting Engineers, Inc. (Black Water) and the City.

1.2 Previous Urban Water Management Plan

The City previously updated their 2015 UWMP in November 2017. Following adoption, the 2015 UWMP was submitted to and approved by DWR. This 2020 UWMP serves as an update to the 2015 UWMP and complies with all new UWMP requirements and regulations.

1.3 Urban Water Management Planning and the California Water Code

This section summarizes the CWC sections that are applicable to UWMPs.

1.3.1 Urban Water Management Planning Act of 1983

In 1983, State Assembly Bill (AB) 797 modified the CWC Division 6, by creating the UWMPA. Several amendments to the original UWMPA, which were introduced since 1983, have increased the data requirements and planning elements to be included in UWMPs. Initial amendments to the UWMPA required that total projected water use be compared to water supply sources over the next 20 years, in 5-year increments. Recent DWR guidelines also suggest projecting through a 25-year planning horizon to maintain a 20-year timeframe until the next UWMP update has been completed. This is merely a guideline and not a requirement of the UWMPA. Therefore, the use of a 25-year planning horizon as opposed to a 20-year planning horizon is left up to the discretion of the agency. The City has opted to use a 20-year planning horizon for the purposes of this UWMP.

1.3.2 Applicable Changes to the Water Code since 2015 UWMPs

Since the UWMPA was passed, the CWC has undergone significant expansion and revision since the 2015 UWMP was prepared. Prolonged droughts, groundwater overdraft, regulatory revisions, and changing climatic conditions not only affect each Supplier's water reliability determinations, but also the broad picture of statewide water reliability overseen by DWR, the State Water Resources Control Board (State Water Board), and the State of California Legislature (Legislature). Accordingly, the UWMPA has grown to address changing conditions. Applicable changes to the CWC since the completion of the City's 2015 UWMP are summarized in **Table 1-1**.

Table 1-1 – Applicable Changes to the CWC Since 2015

Topic	CWC Sections	Legislative Bill	Summary
Five Consecutive Dry-Year Water Reliability Assessment	10635(a) and (b)	SB 606, 2019	The Legislature modified the dry-year water reliability planning from a “multiyear” time period to a “drought lasting five consecutive water years” designation.
Drought Risk Assessment	10635(b)	SB 606, 2019	The Drought Risk Assessment (DRA) requires a Supplier to assess water supply reliability over a five-year period from 2021 to 2025.
Seismic Risk	10632.5	SB 664, 2016	Requires the UWMP to address seismic risk to various water system facilities and have a mitigation plan.
Energy Use	10631.2(a)	SB 606, 2018	Requires Suppliers to include readily obtainable information on estimated amounts of energy use for their water supply extraction, treatment, distribution, storage, conveyance, and other water uses.
Water Loss Reporting for Five Years	10631(d)	AB 1414, 2019	Requires inclusion of the past five years of water loss audit reports in UWMPs.
Water Shortage Contingency Plan (WSCP)	10632	SB 606, 2019	Suppliers are required to prepare and adopt a WSCP.
Groundwater Supplies Coordination	10631	AB 1414, 2019	Requires UWMPs to be consistent with Groundwater Sustainability Plans (GSPs)
Lay Description	10630.5	SB 606, 2019	Requires inclusion of a simple lay description of how much water the agency has on a reliable basis, how much it needs for the foreseeable future, what the agency’s strategy is for meeting its water needs, the challenges facing the agency, and any other information necessary to provide a general understanding of the agency’s plan.

1.4 UWMPs in Relation to Other Planning Efforts

The City is committed to providing a reliable and high-quality water supply to its customers. To ensure that the City will be able to continue to reliably serve the residents of Merced in the future, the City has conducted/participated in several important planning efforts that relate to water supply planning and are related to the UWMP. Some of the most recent water planning efforts are summarized below:

- Merced Vision 2030 General Plan:** In January 2012, the City adopted an update to its General Plan that guides land use and development for the Merced Planning through the year 2030. The General Plan focuses on the preservation and enhancement of the existing community while guiding urban growth and allowing the continued development of the University of California, Merced (UC Merced).

- **Water Master Plan Update (Water Master Plan):** The City updated its Water Master Plan in 2017, which was previously developed in 2007. The Master Plan Update sets the foundation for the City to expand its water system to meet the needs of its growing population through the planning horizon of the General Plan.
- **Merced Integrated Regional Water Management Plan Update:** The Merced Integrated Regional Water Management Plan Update (MIRWMP) was a collaborative effort to identify water management issues, needs, objectives, actions, and priorities to meet the long-term water needs of the Merced Region.
- **Merced Subbasin Groundwater Sustainability Plan:** The Merced Subbasin Groundwater Sustainability Plan (GSP) was published in November 2019. The goal of the GSP is to bring the Merced Subbasin, which is a DWR-designated critically overdrafted basin, into sustainable groundwater management by 2040.

1.5 UWMP Organization

This 2020 UWMP contains the appropriate sections and tables required per CWC Division 6, Part 2.6 (Urban Water Management Planning Act) and has been prepared based on guidance provided by the DWR 2020 UWMP Guidebook. The required tables are included in the relevant sections and in **Appendix A**.

DWR's UWMP Checklist, as provided in the DWR 2020 UWMP Guidebook, has been completed to demonstrate the UWMP's compliance with applicable requirements. A copy of the completed checklist is included in **Appendix B**. This plan is organized according to the recommended format provided in the DWR's 2020 UWMP Guidebook. The UWMP contains ten chapters, followed by appendices that provide supporting documentation for the information presented in the plan. The chapters are outlined below:

- **Chapter 1 - UWMP Introduction and Lay Description:** This chapter provides background information for the 2020 UWMP and provides a description of the purpose of the plan.
- **Chapter 2 - Plan Preparation:** This chapter includes information on the development of the 2020 UWMP and efforts in coordination and outreach.
- **Chapter 3 - System Description:** This chapter describes the service area, population, and climate; presents an overview of the City's water distribution system; and describes the City's organizational structure and history.
- **Chapter 4 - Water Use Characterization:** This chapter describes and quantifies the current and projected water uses within the City's service area.
- **Chapter 5 - SB X7-7 Baseline and Targets, and 2020 Compliance:** This chapter describes the methods for calculating baseline and target water use consumption in the City. It also includes a calculation of the City's 2020 water use and determination of compliance with the 2020 target water use.
- **Chapter 6 - Water Supply Characterization:** This chapter describes the current and projected sources of water available to the City. A description of potential recycled water use and supply availability is also included in this chapter.
- **Chapter 7 - Water Service Reliability and Drought Risk Assessment:** This chapter describes the reliability of the City's current supply and evaluates the reliability 20 years out, including normal, single-dry years, and five consecutive dry years.
- **Chapter 8 - Water Shortage Contingency Plan:** This chapter references the City's Water Shortage Contingency Plan (WSCP) which is provided as an appendix.

- **Chapter 9 - Demand Management Measures:** This chapter describes the City's efforts to promote conservation, reduce water demand, and describes the City's demand management measures.
- **Chapter 10 - Plan Adoption, Submittal, and Implementation:** This chapter describes the steps taken to adopt and submit the 2020 UWMP and make it publicly available. This chapter will also describe the City's plan to implement the UWMP.

1.6 Lay Description

Legal Requirements:

CWC Section 10630.5:

Each plan shall include a simple lay description of how much water the agency has on a reliable basis, how much it needs for the foreseeable future, what the agency's strategy is for meeting its water needs, the challenges facing the agency, and any other information necessary to provide a general understanding of the agency's plan.

The UWMP describes the City's water system, characterizes water use, describes the water supply sources for the City, and analyzes the reliability of the City's water service for normal, dry, and 5-year drought conditions for the next twenty years. To further improve the reliability of the City's water system, the WSCP identifies strategies to implement during water shortages and describes procedures for identifying the potential of a water shortage in the current year.

The City water system has 20 groundwater wells with a total well capacity of 54,400 gpm. In 2020, the City supplied 20,076 AF of potable water and 4,050 AF of recycled water. Potable water demands are projected to increase to 31,825 AF by 2040 due to increases in the City and UC Merced population. The City's water supply is projected to sufficiently meet expected demands through 2040 through the installation of additional groundwater wells and construction of a 10 million gallon per day (mgd) surface water treatment plant (SWTP). The SWTP is projected to use surface water supplied by Merced Irrigation District (MID) and begin operation by 2030.

The Merced groundwater basin, which is currently the City's only water source, is a high priority basin and is critically overdrafted. The addition of surface water to the City's water portfolio, continued implementation of water conservation measures, and participation in regional activities to address the sustainable management of the groundwater basin, are critical components for the long-term reliability of the City's water system.

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2 Plan Preparation

This chapter presents information on the development of the 2020 UWMP, including coordination and outreach efforts.

2.1 Basis for Preparing a Plan

Legal Requirements:

CWC Section 10617:

“Urban water supplier” means a supplier, either publicly or privately owned, providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually. An urban water supplier includes a supplier or contractor for water, regardless of the basis of right, which distributes or sells for ultimate resale to customers. This part applies only to water supplied from public water systems.

CWC Section 10620:

(b) Every person that becomes an urban water supplier shall adopt an urban water management plan within one year after it has become an urban water supplier.

CWC Section 10621:

(a) Each urban water supplier shall update its plan at least once every five years on or before July 1, in years ending in six and one, incorporating updated and new information from the five years preceding each update.

2.1.1 Public Water Systems

The CWC defines an urban water supplier as “a water supplier, either publicly or privately owned, that directly provides potable municipal water to more than 3,000 end users or supplies more than 3,000 acre-feet (AF) of potable water annually at retail for municipal purposes.” **Table 2-1 (DWR Table 2-1)** documents the number of municipal connections and the volume of water supplied in 2020. The City is considered an urban retail water supplier.

Table 2-1 – Public Water Systems (DWR Table 2-1)

Submittal Table 2-1 Retail Only: Public Water Systems			
Public Water System Number	Public Water System Name	Number of Municipal Connections 2020	Volume of Water Supplied 2020 *
<i>Add additional rows as needed</i>			
CA2410009	Merced, City of	22,969	20,076
TOTAL		22,969	20,076
* Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.			
NOTES:			

2.2 Individual Planning and Compliance

Water agencies are given the option to develop UWMPs individually or collectively as a regional group. While efforts to prepare the UWMP were coordinated with appropriate agencies, this UWMP was developed for the City service area only, and the City is not participating in a Regional UWMP (**Table 2-2**).

Table 2-2 – Plan Identification Type (DWR Table 2-2)

Submittal Table 2-2: Plan Identification		
Select Only One	Type of Plan	Name of RUWMP or Regional Alliance if applicable (select from drop down list)
<input checked="" type="checkbox"/>	Individual UWMP	
<input type="checkbox"/>	Water Supplier is also a member of a RUWMP	
<input type="checkbox"/>	Water Supplier is also a member of a Regional Alliance	
<input type="checkbox"/>	Regional Urban Water Management Plan (RUWMP)	
NOTES:		

2.3 Fiscal or Calendar Year and Units of Measure

Legal Requirements:

CWC Section 10608.20:

(a)(1) Urban retail water suppliers...may determine the targets on a fiscal year or calendar year basis.

The City's 2020 UWMP has been prepared on a calendar year basis and includes planning data for the complete year of 2020. The City's reporting of water volumes in this 2020 UWMP is reported in acre feet (AF). **Table 2-3** summarizes the City's reporting methods for this 2020 UWMP.

Table 2-3 – Supplier Identification (DWR Table 2-3)

Submittal Table 2-3: Supplier Identification	
Type of Supplier (select one or both)	
<input type="checkbox"/>	Supplier is a wholesaler
<input checked="" type="checkbox"/>	Supplier is a retailer
Fiscal or Calendar Year (select one)	
<input checked="" type="checkbox"/>	UWMP Tables are in calendar years
<input type="checkbox"/>	UWMP Tables are in fiscal years
If using fiscal years provide month and date that the fiscal year begins (mm/dd)	
Units of measure used in UWMP * (select from drop down)	
Unit	AF
<i>* Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.</i>	
NOTES:	

2.4 Coordination and Outreach

Legal Requirements:

CWC Section 10631:

(h) An urban water supplier that relies upon a wholesale agency for a source of water shall provide the wholesale agency with water use projections from that agency for that source of water in five-year increments to 20 years or as far as data is available. The wholesale agency shall provide information to the urban water supplier for inclusion in the urban water supplier's plan that identifies and quantifies, to the extent practicable, the existing and planned sources of water as required by subdivision (b), available from the wholesale agency to the urban water supplier over the same five-year increments, and during various water-year types in accordance with subdivision (f). An urban water supplier may rely upon water supply information provided by the wholesale agency in fulfilling the plan informational requirements of subdivisions (b) and (f).

The UWMPA requires that the UWMP identify the water agency's coordination with appropriate nearby agencies. While preparing the 2020 UWMP, the City coordinated its efforts with relevant agencies to ensure that the data and issues are presented accurately.

2.4.1 Wholesale and Retail Coordination

The City does not receive wholesale water, nor does it plan to in the future (**Table 2-4**).

Table 2-4 – Water Supplier Information Exchange (DWR Table 2-4)

Submittal Table 2-4 Retail: Water Supplier Information Exchange
The retail Supplier has informed the following wholesale supplier(s) of projected water use in accordance with Water Code Section 10631.
Wholesale Water Supplier Name
<i>Add additional rows as needed</i>
N/A
NOTES:

2.4.2 Coordination with Other Agencies and the Community

Legal Requirements:

CWC Section 10620:
(d)(3) Each urban water supplier shall coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practicable.

CWC Section 10642:
Each urban water supplier shall encourage the active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of the plan...

The City solicited participation from other agencies and organizations for the preparation of the 2020 UWMP. **Table 2-5** summarizes how the UWMP preparation was coordinated.

Table 2-5 – UWMP Coordination

Coordinating Agencies	Participated in Developing the Plan	Commented on the Draft	Attended Public Meetings	Was Contacted for Assistance	Was Sent a Copy of the Draft Plan	Was Sent a Notice of Intention to Adopt	Not Involved/ No Information
Merced Irrigation District (MID)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
University of California Merced (UC Merced)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
County of Merced (County)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Merced County Association of Governments (MCAG)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Merced City School District	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
State of California Department of Water Resources	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Merced Union High School District	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
General Public	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2.4.3 Notice to Cities and Counties

Legal Requirements:

CWC Section 10621(b):

Every urban water supplier required to prepare a plan pursuant to this part shall, at least 60 days before the public hearing on the plan required by Section 10642, notify any city or county within which the supplier provides water supplies that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan.

The City also provided formal written notification to Merced County, MID, and other appropriate agencies, that the City's UWMP was being updated. In accordance with the UWMPA, this notification was provided at least 60 days prior to the public hearing of the plan. Electronic copies of the final UWMP will be provided to these agencies no later than 30 days after its submission to the DWR. **Appendix C** contains copies of the outreach documents.

3 System Description

The UWMPA requires that the UWMP include a description of the water purveyor’s service area and various aspects of the area served including climate, population, and other demographic factors. Unless otherwise noted, this UWMP uses the term “service area” to refer to the areas which the City provides potable water service.

3.1 General Description

Legal Requirements:

CWC Section 10631:

(a) Describe the service area of the supplier, including current and projected population, climate, and other social, economic, and demographic factors affecting the supplier’s water management planning. The projected population estimates shall be based upon data from the state, regional, or local service agency population projections within the service area of the urban water supplier and shall be in five-year increments to 20 years or as far as data is available. The description shall include the current and projected land uses within the existing or anticipated service area affecting the supplier’s water management planning. Urban water suppliers shall coordinate with local or regional land use authorities to determine the most appropriate land use information, including, where appropriate, land use information obtained from local or regional land use authorities, as developed pursuant to Article 5 (commencing with Section 65300) of Chapter 3 of Division 1 of Title 7 of the Government Code.

The City is situated in the midst of the agriculturally rich San Joaquin Valley and borders State Route 99, with Highways 140 and 59 also serving as principal access points to the City. Since its incorporation in 1889, Merced has been recognized as the “Gateway to Yosemite.”

Dedicated to promoting planned growth while preserving much of its small-town appeal, the City maintains the largest population within Merced County (County). Completion of UC Merced in 2005 created a significant economic opportunity for the City and the local economy. The City's economic base consists of education, public services, retail sales, and light industrial. Merced is the regional hub for education, culture, and business. The community offers abundant shopping and affordable housing in comparison to other California locations. **Figure 3-1** provides a regional location map for the City.

The San Joaquin Valley’s regional geography is characterized by flat plains, with the City having an average elevation of approximately 171 feet above mean sea level. The City has a long history of agriculture land use. However, agriculture has given way to residential housing and other aspects of urbanization.

The City operates under a Council-Manager form of government. City residents elect a seven-member City Council to serve as the City's legislative and governing body. The City Council provides policy direction to the City Manager, who is responsible for administering City operations. The City's Public Works Department is responsible for many public services within the City, including water service, sewer service, storm drainage, wastewater treatment plant, recycled water service, refuse, streets, parks, street lighting and signals, and fleet maintenance.

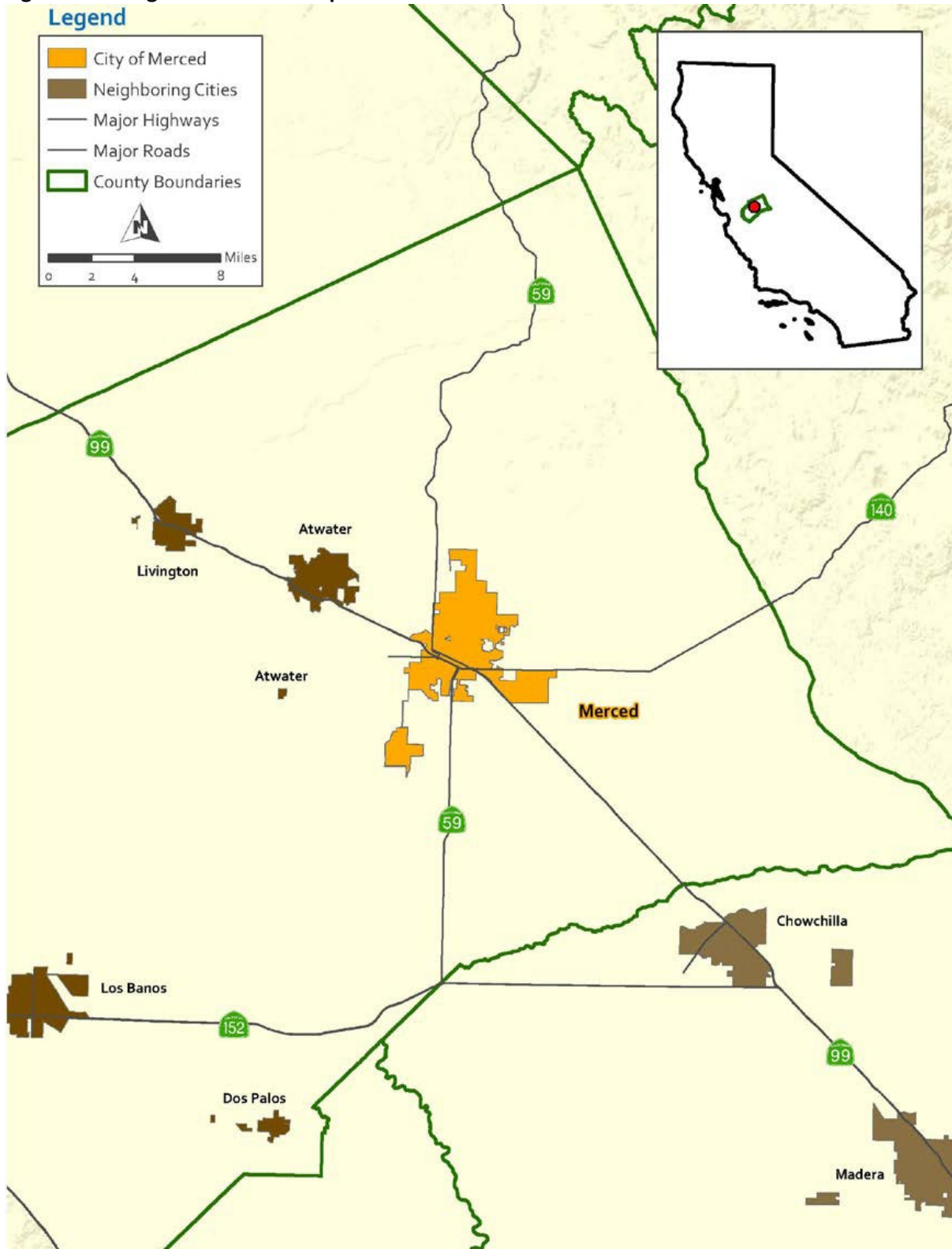
The City's Public Works Department is the only municipal water purveyor in the City and provides service to an estimated total population of 99,100 residents (as of the year 2020), including UC Merced.

3.2 Service Area Boundary Maps

There are three basic boundaries which define the City in relation to the surrounding area. These boundaries include the City limits, the Specific Urban Development Plan (SUDP) boundary, and Sphere of Influence (SOI). The City limits currently encompasses 23.1 square miles. The City's SOI is also the City's SUDP boundary and covers 44.7 square miles.

Figure 3-2 illustrates the boundary of the City's water service area, SOI, and SUDP boundary. The City's water service area is considered the areas to which the City provides potable water service such as the water consumers within the City limits, the UC Merced campus, and some small County islands outside the City limits. **Figure 3-2** will also be submitted to DWR in ArcGIS format with the 2020 UWMP.

Figure 3-1 – Regional Location Map



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Legend

- Major Highways
- ⋯ General Plan Boundary
- - - City Limits
- Merced Water Service Area
- ▭ Parcels



0 0.45 0.9 1.8 Miles

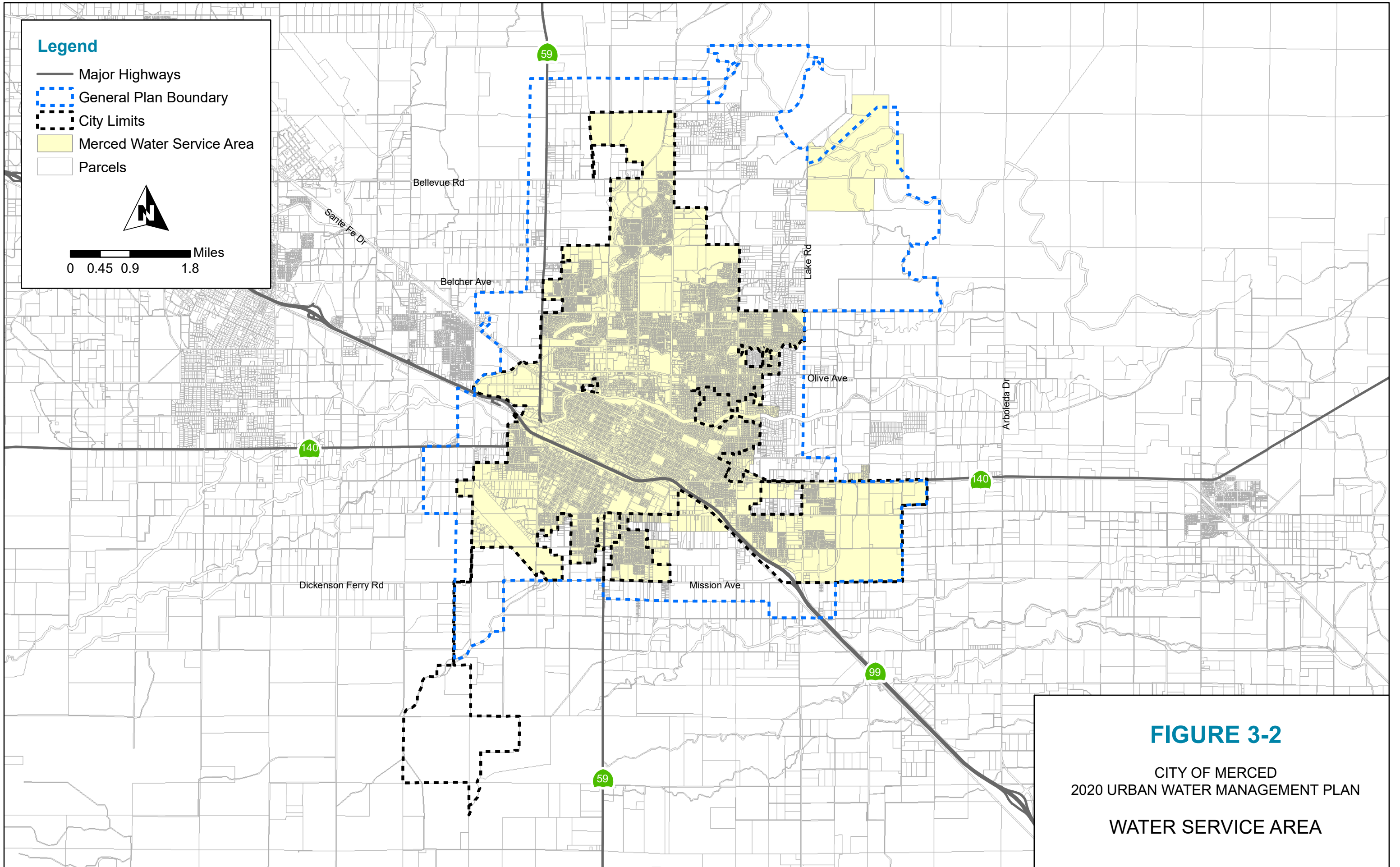


FIGURE 3-2

CITY OF MERCED
2020 URBAN WATER MANAGEMENT PLAN

WATER SERVICE AREA

3.3 Service Area Climate

Legal Requirements:

*CWC Section 10631(a):
A plan shall... Describe the service area of the supplier, including ... climate...*

*CWC Section 10630:
It is the intention of the Legislature, in enacting this part, to permit levels of water management planning... while accounting for impacts of climate change.*

The City of Merced has a Mediterranean climate. Summers are hot and dry while winters are cold and wet, with an annual average precipitation of approximately 12.2 inches. Most of the annual precipitation occurs between November and April. The local annual average maximum daily temperature is 75.7 degrees F° and the annual average minimum daily temperature is 45.7 degrees F°. **Table 3-1** summarizes monthly average evapotranspiration (ETo) rates, rainfall, and temperature. ETo is the water lost through evaporation from the soil and surface water bodies, combined with plant transpiration. Local data was obtained from California Irrigation Management Information System (CIMIS) Station #148, located near East Olive Avenue and North Orchard Drive, east of the City limits.

Table 3-1 – City of Merced Climate Data

Month	Average ETo inches ^(a)	Average Max Temperature °F ^(b)	Average Min Temperature °F ^(b)	Average Rainfall inches ^(b)
January	1.27	56.5	34.7	2.16
February	2	62	36.6	2.11
March	3.64	67.7	40.3	1.82
April	5	72.7	43.9	1.41
May	6.93	81.3	49.5	0.48
June	7.97	89.4	55.1	0.13
July	8.48	94.9	59.2	0.01
August	7.61	93.3	57.6	0
September	5.58	89.2	53.3	0.07
October	3.6	79.1	45.5	0.62
November	1.79	66	38	1.24
December	1.08	56.6	34.4	2.15
Total	54.95	75.7	45.7	12.2

(a) Source: CIMIS Website: www.cimis.water.ca.gov, Station 148 Merced, California, Monthly Average ETo Report, Printed March 2021.
(b) Source: CIMIS Website: www.cimis.water.ca.gov, Station 148 Merced, California, Monthly Average Report, January 2000 – December 2020.

These climate characteristics highly influence the City’s water use. As described in Chapter 4, the City’s water use in the summer months is significantly higher than that in the winter, reflecting increased water use for irrigation purposes during the hot, dry summers.

3.4 Service Area Population and Demographics

3.4.1 Service Area Population

Legal Requirements:

*CWC Section 10631(a):
Describe the service area of the supplier, including current and projected population ...The projected population estimates shall be based upon data from the state, regional, or local service agency population projections within the service area of the urban water supplier and shall be in five-year increments to 20 years or as far as data is available.*

According to California Department of Finance (DOF) Demographic Research Unit Report E-4, the City’s population for the year 2020 was 88,120. UC Merced’s student, faculty, and staff population for 2020 was estimated at 10,980 by the University of California Merced 2020 Long-Range Development Plan [1]. The future of growth for the City will be linked to the continuing expansion of the university and a connection to the state’s proposed future high-speed rail system. Upon completion, the new rail system will link the City to major metropolitan areas in both the northern and southern portions of the state. **Table 3-2 (DWR Table 3-1)** shows the existing and forecasted population for the service area, which will be used to forecast water requirements for the City. **Table 3-3** shows the existing and forecasted population for the City and UC Merced separated. The forecasted population for the City is based on the Merced County Forecast Summary [2]. The forecasted population for UC Merced is based on the University of California Merced 2020 Long-Range Development Plan [1], UC Merced 2020 Long Range Development Plan Final Subsequent Environmental Impact Report [3], and UC Merced Tomorrow Long Range Development Plan [4]. UC Merced is projected to be fully developed by 2045.

Table 3-2 – Population – Current and Projected (DWR Table 3-1)

Submittal Table 3-1 Retail: Population - Current and Projected						
Population Served	2020	2025	2030	2035	2040	2045(opt)
	99,100	109,866	120,363	130,461	143,194	155,816
NOTES: Includes UC Merced.						

Table 3-3 – Current and Projected Population by Category

Submittal Table 3-1 Retail: Population - Current and Projected						
Population Served	2020	2025	2030	2035	2040	2045(opt)
City of Merced	88,120	95,670	102,952	109,986	116,864	123,631
UC Merced	10,980	14,196	17,411	20,475	26,330	32,185
Total	99,100	109,866	120,363	130,461	143,194	155,816

NOTES: (1) Service area population is defined as the population served by the distribution system. (2) Source: 2020 City of Merced population based on DOF data. Year 2025, 2030, 2035, 2040, and 2045 population projections for the City are from the Merced County Forecast Summary, July 7, 2016. (3) Source: 2020 and 2030 UC Merced population from UC Merced 2020 Long-Range Development Plan, March 2020. (4) Source: 2035 UC Merced population from UC Merced 2020 Long Range Development Plan Recirculated Draft SEIR, December 2019. (5) UC Merced assumed to be fully developed by 2045. Full development population from UC Merced Tomorrow Long Range Development Plan, Amended April 2017. (6) UC Merced 2040 population estimated using straight line growth assumption for 2035-2045.

3.4.2 Other Social, Economic, and Demographic Factors

Legal Requirements:

CWC Section 10631:
(a) Describe the service area of the supplier, including... other social, economic and demographic factors affecting the supplier’s water management planning.

The City’s median household income is \$45,232, and the poverty rate is 29.3%. The median age in the City is 29.4 years old, significantly lower than the United States’ median age of 38.1. According to the U.S. Census Bureau, over a third of the population in Merced speaks Spanish, and nearly half of the population speaks a language other than English at home. 72.9% of the population has attained a high school diploma.

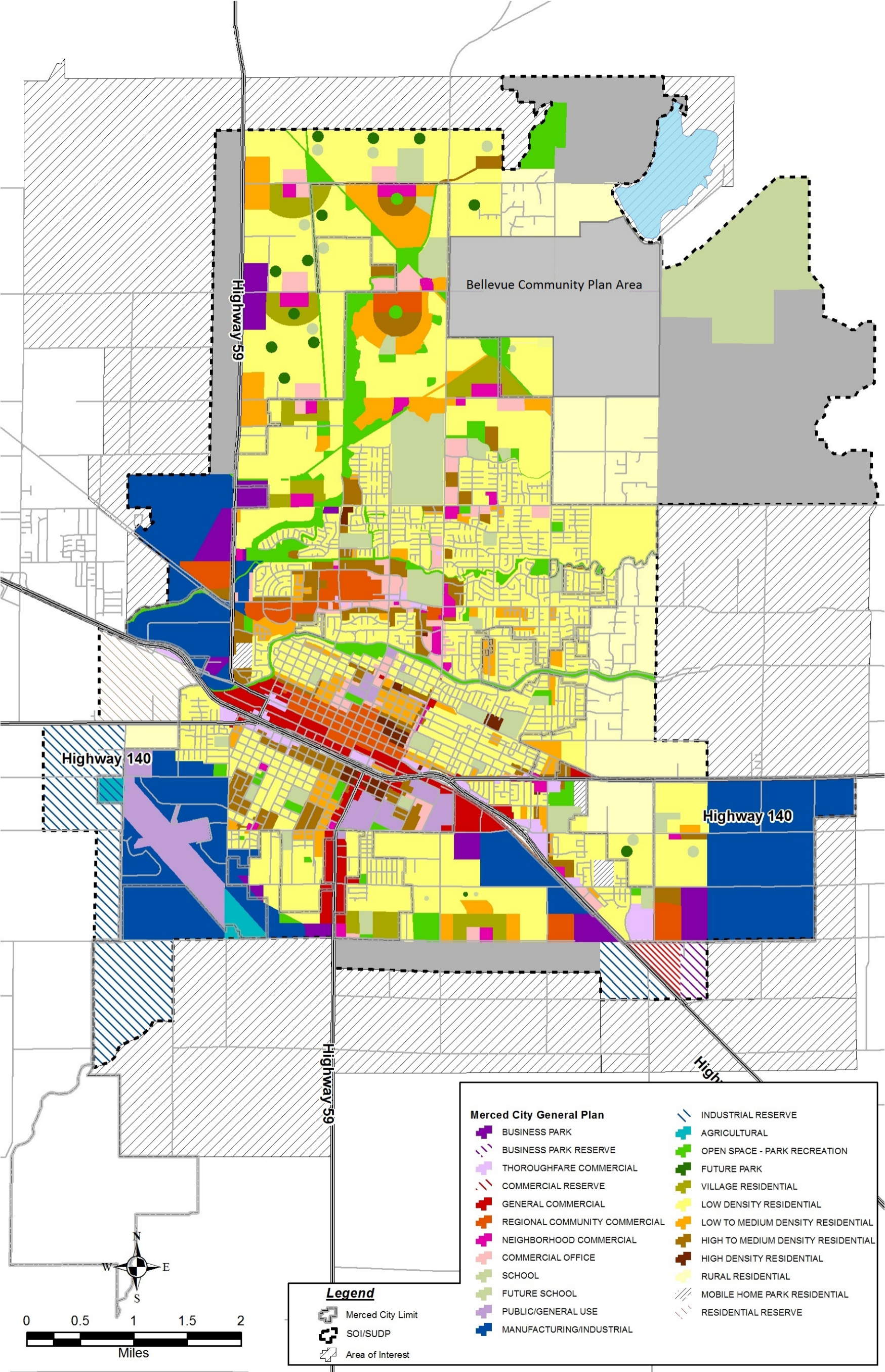
In 2020, approximately 11% of the service area population was comprised of the UC Merced population. 89% of students attending UC Merced are under the age of 25, and most attendees are full-time students. Less than one percent of students are from out of state or a foreign country. Over half of the student population is Hispanic, and the campus ranks high on racial diversity.

3.5 Land Uses within Service Area

Legal Requirements:

CWC Section 10631(a):
The description shall include the current and projected land uses within the existing or anticipated service area affecting the supplier’s water management planning. Urban water suppliers shall coordinate with local or regional land use authorities to determine the most appropriate land use information, including, where appropriate, land use information obtained from local or regional land use authorities...

The City is predominantly comprised of single-family residential land use with commercial, industrial, parks/open space/public uses, and multi-family residential land uses comprising the remaining areas. On January 3, 2012, the City Council adopted the Merced Vision 2030 General Plan (2030 General Plan) [5]. The 2030 General Plan serves as a blueprint for growth and development in the City. **Figure 3-3** shows the 2030 General Plan land use diagram.

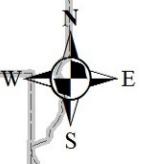
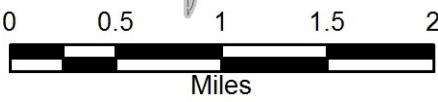


Merced City General Plan

- | | | | |
|--|-------------------------------|--|------------------------------------|
| | BUSINESS PARK | | INDUSTRIAL RESERVE |
| | BUSINESS PARK RESERVE | | AGRICULTURAL |
| | THOROUGHFARE COMMERCIAL | | OPEN SPACE - PARK RECREATION |
| | COMMERCIAL RESERVE | | FUTURE PARK |
| | GENERAL COMMERCIAL | | VILLAGE RESIDENTIAL |
| | REGIONAL COMMUNITY COMMERCIAL | | LOW DENSITY RESIDENTIAL |
| | NEIGHBORHOOD COMMERCIAL | | LOW TO MEDIUM DENSITY RESIDENTIAL |
| | COMMERCIAL OFFICE | | HIGH TO MEDIUM DENSITY RESIDENTIAL |
| | SCHOOL | | HIGH DENSITY RESIDENTIAL |
| | FUTURE SCHOOL | | RURAL RESIDENTIAL |
| | PUBLIC/GENERAL USE | | MOBILE HOME PARK RESIDENTIAL |
| | MANUFACTURING/INDUSTRIAL | | RESIDENTIAL RESERVE |

Legend

- Merced City Limit
- SOI/SUDP
- Area of Interest



4 Water Use Characterization

This chapter describes and quantifies the current and projected water demands within the City’s service area.

4.1 Non-Potable versus Potable Water Use

This chapter addresses demands that are met by potable water sources. Recycled water use is described separately in Chapter 6. The City does not use other non-potable water sources.

4.2 Past, Current, and Projected Water Use by Sector

Legal Requirements:

CWC Section 10635:

(a) Every urban water Supplier shall include, as part of its urban water management plan, an assessment of the reliability of its water service to its customers during normal, dry, and multiple dry water years. This water supply and demand assessment shall compare the total water supply sources available to the water supplier with the long-term total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and a drought lasting five consecutive water years. The water service reliability assessment shall be based upon the information compiled pursuant to Section 10631, including available data from state, regional, or local agency population projections within the service area of the urban water supplier.

CWC Section 10631(d):

(1) For an urban retail water supplier, quantify, to the extent records are available, past and current water use, over the same five-year increments described in subdivision (a), and projected water use, based upon information developed pursuant to subdivision (a), identifying the uses among water use sectors, including, but not necessarily limited to, all of the following...

(2) The water use projections shall be in the same five-year increments described in subdivision (a).

(4)(A) Water use projections, where available, shall display and account for the water savings estimated to result from adopted codes, standards, ordinances, or transportation and land use plans identified by the urban water supplier, as applicable to the service area.

(B) To the extent that an urban water supplier reports the information described in subparagraph (A), an urban water supplier shall do both of the following: (i) Provide citations of the various codes, standards, ordinances, or transportation and land use plans utilized in making the projections. (ii) Indicate the extent that the water use projections consider savings from codes, standards, ordinances, or transportation and land use plans. Water use projections that do not account for these water savings shall be noted of that fact.

The following sections describe past, current, and projected water use within the City for each of the ten water use sectors identified in CWC Section 10631(d).

4.2.1 Water Use Sectors Listed in Water Code

Legal Requirements:

CWC Section 10631(d):

(1) For an urban retail water supplier, quantify, to the extent records are available, past and current water use, over the same five-year increments described in subdivision (a), and projected water use, based upon information developed pursuant to subdivision (a), identifying the uses among water use sectors, including, but not necessarily limited to, all of the following:

(A) Single-family residential.

(B) Multifamily.

(C) Commercial.

(D) Industrial.

(E) Institutional and governmental.

(F) Landscape.

(G) Sales to other agencies.

(H) Saline water intrusion barriers, groundwater recharge, or conjunctive use, or any combination thereof.

(I) Agricultural.

(J) Distribution system water loss.

The water use sectors that are served by the water system include single-family residential, multi-family residential, commercial, and landscape irrigation. These classifications were used to analyze current consumption patterns. These classifications are defined by the DWR 2020 UWMP Guidebook and City as follows:

- **Single-family residential** – A single-family dwelling unit. A lot with a free-standing building containing one dwelling unit that may include an accessory dwelling unit.
- **Multi-family residential** – Multiple dwelling units contained within one building or several buildings within one complex.
- **Commercial** – A water user that provides or distributes a product or service.
- **Landscape** – Water connections supplying water solely for landscape irrigation.
- **Distribution System Water Losses** – Water losses which occur due to distribution system leaks and other unmetered water uses (such as firefighting, main flushing, etc.).

4.2.2 Water Use Sectors in Addition to Those Listed in Water Code

The water system does not serve additional water use sectors.

4.2.3 Past Water Use

The City's past water use for 2016-2019 is shown in **Table 4-1**.

Table 4-1 – Past Water Use (2016-2019)

Year	Water Use (AF)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2016	897	888	978	1,172	1,554	2,078	2,311	2,296	1,996	1,590	1,075	976	17,811
2017	914	821	1,039	1,125	1,816	2,074	2,417	2,336	2,040	1,791	1,229	1,090	18,692
2018	1,002	1,008	1,043	1,259	1,869	2,207	2,536	2,403	2,102	1,746	1,352	960	19,487
2019	919	824	926	1,345	1,673	2,078	2,381	2,420	2,085	1,819	1,449	1,012	18,931

4.2.4 Distribution System Water Loss

Legal Requirements:

CWC Section 10631(d)(1):

For an urban retail water supplier, quantify, to the extent records are available, past and current water use, over the same five-year increments described in subdivision (a), and projected water use, based upon information developed pursuant to subdivision (a), identifying the uses among water use sectors, including, but not necessarily limited to, all of the following...

(J) Distribution system water loss....

CWC Section 10631(d)(3):

(A) The distribution system water loss shall be quantified for each of the five years preceding the plan update, in accordance with rules adopted pursuant to Section 10608.34.

(B) The distribution system water loss quantification shall be reported in accordance with a worksheet approved or developed by the department through a public process. The water loss quantification worksheet shall be based on the water system balance methodology developed by the American Water Works Association.

(C) In the plan due July 1, 2021, and in each update thereafter, data shall be included to show whether the urban retail water supplier met the distribution loss standards enacted by the board pursuant to Section 10608.34.

The last five years of water loss audit reporting are summarized in **Table 4-2 (DWR Table 4-4)**. The water loss audits for 2016-2019 are in **Appendix D**.

Table 4-2 – Last Five Years of Water Loss Audit Reporting (DWR Table 4-4)

Submittal Table 4-4 Retail: Last Five Years of Water Loss Audit Reporting	
Reporting Period Start Date (mm/yyyy)	Volume of Water Loss ^{1,2}
01/2020	1350
01/2019	1290
01/2018	760
01/2017	1740
01/2016	1380
¹ Taken from the field "Water Losses" (a combination of apparent losses and real losses) from the AWWA worksheet. ² Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.	
NOTES: Volume of Water Loss for 2020 was estimated based on water supplied and billed meter data and has not been audited.	

CWC Section 10608.34(i) directs the State Water Board to “adopt rules requiring urban retail water suppliers to meet performance standards for the volume of water losses.” The proposed regulation would require urban water suppliers to meet individual volumetric water loss standards determined through a water system-specific economic model developed by the State Water Board. Pursuant to this law, urban retail water suppliers, such as the City, have annually submitted water loss audits to DWR since October 2017. Pre-rulemaking meetings and workshops were held in 2018-2020 and adoption of the proposed regulation is anticipated to occur in 2021. Once the economic model is finalized, the City can determine their individual volumetric water loss standard.

4.2.5 Current Water Use

Table 4-3 (DWR Table 4-1) shows potable water use for 2020 by water use type.

Table 4-3 – Demands for Potable and Non-Potable Water – Actual (DWR Table 4-1)

Submittal Table 4-1 Retail: Demands for Potable and Non-Potable Water - Actual			
Use Type	2020 Actual		
Drop down list May select each use multiple times These are the only Use Types that will be recognized by the WUEdata online submittal tool	Additional Description (as needed)	Level of Treatment When Delivered Drop down list	Volume*
Add additional rows as needed			
Single Family		Drinking Water	10,303
Multi-Family		Drinking Water	3,257
Commercial		Drinking Water	3,041
Industrial		Drinking Water	411
Landscape		Drinking Water	1,664
Losses		Drinking Water	1,400
TOTAL			20,076
<i>* Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.</i>			
NOTES: Volume of losses does not match estimated water loss audit volume for 2020 shown in Table 4-2 (DWR Table 4-4). Volume of losses includes an additional 50 AF for unbilled, unmetered consumption (equivalent to 2.5% of water production), estimated using the methodology including in the AWWA Water Audit Software.			

4.2.6 Projected Water Use

Legal Requirements:

CWC Section 10635 (a):

Every urban water supplier shall include, as part of its urban water management plan, an assessment of the reliability of its water service to its customers during normal, dry, and multiple dry water years. This water supply and demand assessment shall compare the total water supply sources available to the water supplier with the long-term total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and a drought lasting five consecutive water years. The water service reliability assessment shall be based upon the information compiled pursuant to Section 10631, including available data from state, regional, or local agency population projections within the service area of the urban water supplier.

Water Code Section 10631:

(h) An urban water supplier that relies upon a wholesale agency for a source of water shall provide the wholesale agency with water use projections from that agency for that source of water in five-year increments to 20 years or as far as data is available... The wholesale agency shall provide information to the urban water supplier for inclusion in the urban water supplier’s plan that identifies and quantifies, to the extent practicable, the existing and planned sources of water as required by subdivision (b), available from the wholesale agency to the urban water supplier over the same five-year increments, and during various water-year types in accordance with subdivision (f). An urban water supplier may rely upon water supply information provided by the wholesale agency in fulfilling the plan informational requirements of subdivisions (b) and (f).

CWC Section 10631(d)(4):

(A) Water use projections, where available, shall display and account for the water savings estimated to result from adopted codes, standards, ordinances, or transportation and land use plans identified by the urban water supplier, as applicable to the service area.

(B) To the extent that an urban water supplier reports the information described in subparagraph (A), an urban water supplier shall do both of the following:

(i) Provide citations of the various codes, standards, ordinances, or transportation and land use plans utilized in making the projections.

(ii) Indicate the extent that the water use projections consider savings from codes, standards, ordinances, or transportation and land use plans. Water use projections that do not account for these water savings shall be noted of that fact.

Table 4-4 (DWR Table 4-2) summarizes the projected water use by use type for 2025 through 2040. The water use in **Table 4-4 (DWR Table 4-2)** was calculated using the following assumptions:

- 2020 Target SB X7-7 of 248 gallons per capita per day, further described in Chapter 5
- Population projections presented in **Table 3-2 (DWR Table 3-1)**
- Percentage water use by use type for future years was the same as for 2020
- 20 percent reduction in per capita water use due to implementation of Stage 2 Shortage Responses Actions. Refer to the WSCP. Stage 2 Shortage Response Actions are anticipated to apply to future years due to the overdraft condition of the Merced groundwater basin.

The projections are conservative and do not consider potential water use reductions from codes, standards, ordinances, or transportation and land use plans.

Table 4-4 – Use for Potable and Non-Potable Water – Projected (DWR Table 4-2)

Submittal Table 4-2 Retail: Use for Potable and Non-Potable Water - Projected						
Use Type	Additional Description (as needed)	Projected Water Use*				
<u>Drop down list</u> May select each use multiple times These are the only Use Types that will be recognized by the WUEdata online submittal tool		Report To the Extent that Records are Available				
		2025	2030	2035	2040	2045 (opt)
Add additional rows as needed						
Single Family		12,531	13,729	14,880	16,333	
Multi-Family		3,961	4,340	4,704	5,163	
Commercial		3,699	4,052	4,392	4,821	
Industrial		500	548	594	652	
Landscape		2,024	2,217	2,403	2,638	
Losses		1,703	1,865	2,022	2,219	
TOTAL		24,418	26,751	28,995	31,825	0
* Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.						
NOTES: Projected water use based on population projections from Table 3-1, and an assumed water demand of 248 gpcd, equivalent to the SB X7-7 2020 Target. An additional 20 percent reduction in demand due to implementation of Stage 2 Shortage Response Actions were included. Projected water uses for each use type were proportionally increased based on their percentage of the total water use for 2020.						

Table 4-5 (DWR Table 4-3) summarizes the total projected potable and non-potable water use in five-year increments from 2020 to 2040. The table includes recycled water demand, which will be further described in Chapter 6.

Table 4-5 – Total Water Use (Potable and Non-Potable) (DWR Table 4-3)

Submittal Table 4-3 Retail: Total Water Use (Potable and Non-Potable)						
	2020	2025	2030	2035	2040	2045 (opt)
Potable Water, Raw, Other Non-potable <i>From Tables 4-1R and 4-2 R</i>	20,076	24,418	26,751	28,995	31,825	0
Recycled Water Demand ¹ <i>From Table 6-4</i>	0	0	0	0	0	0
Optional Deduction of Recycled Water Put Into Long-Term Storage ²						
TOTAL WATER USE	20,076	24,418	26,751	28,995	31,825	0
¹ Recycled water demand fields will be blank until Table 6-4 is complete ² Long term storage means water placed into groundwater or surface storage that is not removed from storage in the same year. Supplier <i>may</i> deduct recycled water placed in long-term storage from their reported demand. This value is manually entered into Table 4-3.						
NOTES:						

4.2.7 Characteristic Five-Year Water Use

Legal Requirements:

CWC Section 10635(b):
 Every urban water supplier shall include, as part of its urban water management plan, a drought risk assessment for its water service to its customers as part of information considered in developing the demand management measures and water supply projects and programs to be included in the urban water management plan. The urban water supplier may conduct an interim update or updates to this drought risk assessment within the five-year cycle of its urban water management plan update. The drought risk assessment shall include each of the following...

(3) A comparison of the total water supply sources available to the water supplier with the total projected water use for the drought period. [Emphasis added]

(4) Considerations of the historical drought hydrology, plausible changes on projected supplies and demands under climate change conditions, anticipated regulatory changes, and other locally applicable criteria.

The characteristic five-year water use for the City was calculated using the Planning Tool Use Worksheet provided by the California Department of Water Resources (**Appendix E**). This information will be useful for preparing the five-year Drought Risk Assessment (DRA) in Chapter 7. **Table 4-6** shows the summarized characteristic five-year water use. The projections assume a straight-line population growth between 2020 and 2025 and a water demand of 198 gallons per capita per day (gpcd). The per capita water demand is based on an unconstrained water demand of 248 gpcd, equivalent to the SB X7-7 2020 target water demand shown in **Table 5-1 (DWR Table 5-1)**. A 20-percent reduction due to implementation of Stage 2 shortage response actions described in the Water Conservation Ordinance and WSCP is included in the projections.

Table 4-6 – Characteristic Five-Year Water Use

Description	Year				
	2021	2022	2023	2024	2025
Per capita water use, gpcd ^a	248	248	248	248	248
Population ^b	101,253	103,406	105,560	107,713	109,866
Total unconstrained water use, AF	28,130	28,728	29,326	29,924	30,522
Reduction due to Shortage Level 2 measures ^c	-5,626	-5,746	-5,865	-5,985	-6,104
Total projected water use, AF	22,504	22,982	23,461	23,939	24,418

^a Assumes an unconstrained water demand of 248 gpcd, equivalent to the SB X7-7 2020 target demand from **Table 5-1 (DWR Table 5-1)**

^b Projections assume a straight line increase in population from the 2020 and 2025 population data presented in **Table 3-2 (DWR Table 3-1)**.

^c Reduction due to Shortage Level 2 measures assumed to be 20%.

4.3 Water Use for Lower Income Households

Legal Requirements:

CWC Section 10631.1:

(a) The water use projections required by Section 10631 shall include projected water use for single-family and multifamily residential housing needed for lower income households, as defined in Section 50079.5 of the Health and Safety Code, as identified in the housing element of any city, county, or city and county in the service area of the supplier.

California Health and Safety Code Section 50079.5 (a):

“Lower income households” means persons and families whose income does not exceed the qualifying limits for lower income families... In the event the federal standards are discontinued, the department shall, by regulation, establish income limits for lower income households for all geographic areas of the state at 80 percent of area median income, adjusted for family size and revised annually.

As described above, the UWMP is required to account for lower income household water demands. Lower income households are defined as families with an income less than 80 percent of the area median income, adjusted for family size. U.S. Census data from the 2015-2019 American Community Survey 5-Year Estimates report an average of 3.2 persons per household and approximately 9,967 lower income households within the City, equating to an estimated 31,894 residents. Projected water demands

associated with lower income residential water users through year 2040 are presented in **Table 4-7**. The projections assume the proportion of lower income residents to total residents remains constant and per capita water demands of 181 for 2020 and 198 gpcd for 2025 and beyond.

Table 4-7 – City of Merced Lower Income Household Water Demands

Description	Year				
	2020	2025	2030	2035	2040
Total water use, AF ^a	20,076	24,418	26,751	28,995	31,825
Total population ^b	99,100	109,866	120,363	130,461	143,194
Low-income population ^c	31,894	35,359	38,737	41,987	46,085
Low-income water demand, AF	6,461	6,927	7,589	8,225	9,028

^a Total water use is from **Table 4-4 (DWR Table 4-2)**.

^b Total population is from **Table 3-2 (DWR Table 3-1)**.

^c Lower income population data for 2020 is based on the 2015-2019 American Community Survey 5-Year estimates for median household income, household income distribution, and persons per household. Projected lower income population to total population was assumed to be the same as for 2020.

As shown in **Table 4-8 (DWR Table 4-5)**, lower income demand projections presented in **Table 4-7** are included in the total water use projections provided in **Table 4-5**.

Table 4-8 – Inclusion in Water Use Projections (DWR Table 4-5)

Submittal Table 4-5 Retail Only: Inclusion in Water Use Projections	
Are Future Water Savings Included in Projections? (Refer to Appendix K of UWMP Guidebook) <i>Drop down list (y/n)</i>	Yes
If "Yes" to above, state the section or page number, in the cell to the right, where citations of the codes, ordinances, or otherwise are utilized in demand projections are found.	Stage 2 Shortage Response Actions per the WSCP and Water Conservation Ordinance
Are Lower Income Residential Demands Included In Projections? <i>Drop down list (y/n)</i>	Yes
NOTES:	

4.4 Climate Change Considerations

Legal Requirements:

CWC Section 10630:

It is the intention of the Legislature, in enacting this part, to permit levels of water management planning commensurate with the numbers of customers served and the volume of water supplied, while accounting for impacts from climate change.

CWC Section 10635(b):

Every urban water supplier shall include, as part of its urban water management plan, a drought risk assessment for its water service to its customers as part of information considered in developing the demand management measures and water supply projects and programs to be included in the urban water management plan. The urban water supplier may conduct an interim update or updates to this drought risk assessment within the five-year cycle of its urban water management plan update. The drought risk assessment shall include each of the following...

(4) Considerations of the historical drought hydrology, plausible changes on projected supplies and demands under climate change conditions, anticipated regulatory changes, and other locally applicable criteria.

The 2018 Merced Integrated Regional Water Management Plan Update, adopted in February 2019 [6] (MIRWMP), addressed adaptation to the effects of climate change and mitigation of greenhouse gas emissions. Potential effects of climate change in the region of the City may include warmer temperatures, an increase in the uncertainty of future precipitation conditions, increases in extreme precipitation events, and increased wildfire frequency and severity. According to climate scientists, increases in global greenhouse gas levels are changing climate patterns around the world and, it is speculated, may begin to change at an accelerated pace from what has occurred in the past. An accelerated rate of change could potentially result in impacts to the local climate of the City in the form of higher temperatures, increased droughts and floods, decreased snowpack amounts and durations and other extreme variations in weather.

Previous City documents, such as the City’s Climate Action Plan, adopted in August 2012 and the MIRWMP identified several resource management strategies to mitigate potential impacts on water supply on reliability. The resource management strategies include:

- Reducing water demand
- Improving operational efficiency and transfers
- Increasing water supply through implementation of conjunctive management of surface and groundwater supplies as well as through groundwater storage, recycled water use, and increased surface water storage, as appropriate
- Improving water quality
- Improving flood management
- Practicing resource stewardship
- Public outreach

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5 SB X7-7 Baselines, Targets, and 2020 Compliance

With the adoption of the Water Conservation Act of 2009, also known as the SB X7-7, the State of California was required to reduce urban per capita water use by 20 percent by the year 2020 (i.e., “20 by 2020”). CWC Section 10608.16(a) states: “The state shall achieve a 20-percent reduction in urban per capita water use in California on or before December 31, 2020.” To achieve this statewide objective, the California Legislature required each urban retail water supplier (Retail Supplier) subject to the UWMPA to develop an urban water use target to help the state collectively achieve a 20-percent reduction.

This chapter provides a description of the methodology used to calculate the City’s compliance with SB X7-7 requirements. The SB X7-7 Verification Form from the 2015 UWMP and the SB X7-7 Compliance Form are included in **Appendix F**.

5.1 Baseline and Target Calculations for 2020 UWMPs

Legal Requirements:

CWC Section 10608.20 (g):

(g) An urban retail water supplier may update its 2020 urban water use target in its 2015 urban water management plan required pursuant to Part 2.6 (commencing with Section 10610).

The City calculated their SB X7-7 baselines and targets in their 2015 UWMP and did not have a situation, such as a change to the service area or customer base, to warrant recalculation of the baselines and targets. **Table 5-1 (DWR Table 5-1)** summarizes the SB X7-7 baseline and confirmed 2020 target from the SB X7-7 Verification Form.

Table 5-1 – Baselines and Targets Summary from SB X7-7 Verification Form (DWR Table 5-1)

Submittal Table 5-1 Baselines and Targets Summary From SB X7-7 Verification Form <i>Retail Supplier or Regional Alliance Only</i>				
Baseline Period	Start Year *	End Year *	Average Baseline GPCD*	Confirmed 2020 Target*
10-15 year	1996	2005	310	248
5 Year	2003	2007	282	
*All cells in this table should be populated manually from the supplier's SBX7-7 Verification Form and reported in Gallons per Capita per Day (GPCD)				
NOTES:				

5.2 Methods for Calculating Population and Gross Water Use

This section describes the methods used for calculating population and gross water use for determining 2020 compliance with the SB X7-7 target.

5.2.1 Service Area Population

Legal Requirements:

CWC Section 10608.20(e):

An urban retail water supplier shall include in its urban water management plan due in 2010...the baseline per capita water use...along with the bases for determining those estimates, including references to supporting data.

(f) When calculating per capita values for the purposes of this chapter, an urban retail water supplier shall determine population using federal, state, and local population reports and projections.

CWC Section 10644:

(a)(2) The plan...shall include any standardized forms, tables or displays specified by the department.

To calculate the compliance year gpcd, the population served in 2020 was estimated using DOF Demographic Research Unit Report E-4 data and data from UC Merced planning documents [1, 3, 4]. U.S. Census 2020 decennial data was not available in time for completion of the 2020 UWMP. The service area boundaries for the City water system correspond by 95 percent or more with the boundaries of the City and, therefore, the DOF data for the City could be used for the service area population according to the 2020 DWR Guidebook. The service area population for 2020 is estimated as 99,100, as shown in **Table 3-2 (DWR Table 3-1)**.

5.3 Gross Water Use

Legal Requirements:

CWC Section 10608.12:

(g) "Gross Water Use" means the total volume of water, whether treated or untreated, entering the distribution system of an urban retail water supplier, excluding all of the following:

- (1) Recycled water that is delivered within the service area of an urban retail water supplier or its urban wholesale water supplier*
- (2) The net volume of water that the urban retail water supplier places into long term storage*
- (3) The volume of water the urban retail water supplier conveys for use by another urban water supplier*
- (4) The volume of water delivered for agricultural use, except as otherwise provided in subdivision (f) of Section 10608.24.*

California Code of Regulations Title 23 Division 2 Chapter 5.1 Article Section 596 (a):

An urban retail water supplier that has a substantial percentage of industrial water use in its service area is eligible to exclude the process water use of existing industrial water customers from the calculation of its gross water use to avoid a disproportionate burden on another customer sector.

Gross water use is defined as the measurable amount of water that enters the distribution system over a 12-month period, minus allowable exclusions. The gross water use for 2020 was 20,076 AF, as reported in **Table 4-3 (DWR Table 4-1)** and SB X7-7 Table 4 of the SB X7-7 2020 Compliance Form provided in **Appendix F**.

5.4 2020 Compliance Daily Per-Capita Water Use (GPCD)

Legal Requirements:

<p><i>CWC Section 10608.12:</i> (f) "Compliance daily per-capita water use" means the gross water use during the final year of the reporting period...</p> <p><i>CWC Section 10608.20:</i> (e) An urban retail water supplier shall include in its urban water management plan due in 2010 . . . compliance daily per capita water use, along with the bases for determining those estimates, including references to supporting data.</p>
--

The City has calculated its actual 2020 water use for the 2020 calendar year in accordance with Methodology 3 of DWR’s *Methodologies* document. As shown in **Table 5-2 (DWR Table 5-2)**, per capita water use in 2020 was 181 gpcd, which is below the 2020 target of 248 gpcd.

Table 5-2 – 2020 Compliance (DWR Table 5-2)

Submittal Table 5-2: 2020 Compliance From SB X7-7 2020 Compliance Form Retail Supplier or Regional Alliance Only				
2020 GPCD			2020 Confirmed Target GPCD*	Did Supplier Achieve Targeted Reduction for 2020? Y/N
Actual 2020 GPCD*	2020 TOTAL Adjustments*	Adjusted 2020 GPCD* (Adjusted if applicable)		
181	0	181	248	Yes
*All cells in this table should be populated manually from the supplier's SBX7-7 2020 Compliance Form and reported in Gallons per Capita per Day (GPCD)				
NOTES:				

As detailed in CWC Section 10608.4, there are allowable adjustments that can be made to an agency’s gross water use in 2020 for differences in evapotranspiration and rainfall, substantial changes to commercial or industrial water use, and/or substantial changes to institutional water use. However, because the City’s per capita water use is in compliance, the City did not elect to include the allowable adjustments.

5.5 Regional Alliance

The City has chosen to comply with the requirements of SB X7-7 on an individual basis and is, therefore, not a participant in a regional alliance for SB X7-7 compliance.

6 Water Supply Characterization

Legal Requirements:

CWC Section 10631(b):

Identify and quantify, to the extent practicable, the existing and planned sources of water available to the supplier over the same five-year increments described in subdivision (a), providing supporting and related information, including all of the following:

(1) A detailed discussion of anticipated supply availability under a normal water year, single dry year, and droughts lasting at least five years, as well as more frequent and severe periods of drought, as described in the drought risk assessment. For each source of water supply, consider any information pertinent to the reliability analysis conducted pursuant to Section 10635, including changes in supply due to climate change.

(2) When multiple sources of water supply are identified, a description of the management of each supply in correlation with the other identified supplies.

(3) For any planned sources of water supply, a description of the measures that are being undertaken to acquire and develop those water supplies.

CWC 10631 (h):

An urban water supplier that relies upon a wholesale agency for a source of water shall provide the wholesale agency with water use projections from that agency for that source of water in five-year increments to 20 years or as far as data is available. The wholesale agency shall provide information to the urban water supplier for inclusion in the urban water supplier's plan that identifies and quantifies, to the extent practicable, the existing and planned sources of water as required by subdivision (b), available from the wholesale agency to the urban water supplier over the same five-year increments, and during various water-year types in accordance with subdivision (f). An urban water supplier may rely upon water supply information provided by the wholesale agency in fulfilling the plan informational requirements of subdivisions (b) and (f).

The UWMPA requires that the UWMP include a description of the agency's existing and future water supply sources for the next 20 years. This chapter will provide the following information:

- Existing and planned sources of water
- Projections of the water supplies over five-year increments through 2040
- Description of anticipated availability under normal, single dry, and five-year droughts
- Description of the management of each supply in correlation
- Description of information pertinent to the reliability of the supplies, including considerations for climate change effects

6.1 Narrative Sections for Supplier's UWMP Water Supply Characterization

6.1.1 Purchased or Imported Water

The City does not currently purchase or import water from any other water supply or entity.

6.1.2 Groundwater

Legal Requirements:

CWC Section 10631(b)(4):

If groundwater is identified as an existing or planned source of water available to the supplier, all of the following information:

(A) The current version of any groundwater sustainability plan or alternative adopted pursuant to Part 2.74 (commencing with Section 10720), any groundwater management plan adopted by the urban water supplier, including plans adopted pursuant to Part 2.75 (commencing with Section 10750), or any other specific authorization for groundwater management for basins underlying the urban water supplier's service area.

(B) A description of any groundwater basin or basins from which the urban water supplier pumps groundwater. For basins that a court or the board has adjudicated the rights to pump groundwater, a copy of the order or decree adopted by the court or the board and a description of the amount of groundwater the urban water supplier has the legal right to pump under the order or decree. For a basin that has not been adjudicated, information as to whether the department has identified the basin as a high- or medium-priority basin in the most current official departmental bulletin that characterizes the condition of the groundwater basin, and a detailed description of the efforts being undertaken by the urban water supplier to coordinate with groundwater sustainability agencies or groundwater management agencies listed in subdivision (c) of Section 10723 to maintain or achieve sustainable groundwater conditions in accordance with a groundwater sustainability plan or alternative adopted pursuant to Part 2.74 (commencing with Section 10720).

(C) A detailed description and analysis of the location, amount, and sufficiency of groundwater pumped by the urban water supplier for the past five years. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

(D) A detailed description and analysis of the amount and location of groundwater that is projected to be pumped by the urban water supplier. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

The City's sole source of drinking water is from the groundwater aquifer underlying the community. The following sections describe the current status of the GSP, the groundwater basin from which the City pumps groundwater, and a detailed description and analysis of the location, amount, and sufficiency of historical and projected groundwater pumping.

6.1.2.1 Groundwater Sustainability Plan

In September 2014, Governor Brown signed the Sustainable Groundwater Management Act (SGMA) into law. This legislation is intended to provide a framework for management of groundwater supplies by local agencies and restricts state intervention, if required. The three legislative bills that make up the SGMA are AB 1739, SB 1319, and SB 1168. SGMA required that high-priority basins develop groundwater sustainability agencies (GSAs), develop GSPs, and manage groundwater for long-term sustainability. The Merced Subbasin was classified as a high-priority basin in the SGMA 2019 Basin Prioritization, completed in December 2019.

Water management and land management agencies in the Merced Subbasin formed three GSAs: the Merced Irrigation-Urban GSA (MIUGSA), the Merced Subbasin GSA, and the Turner Island Water District

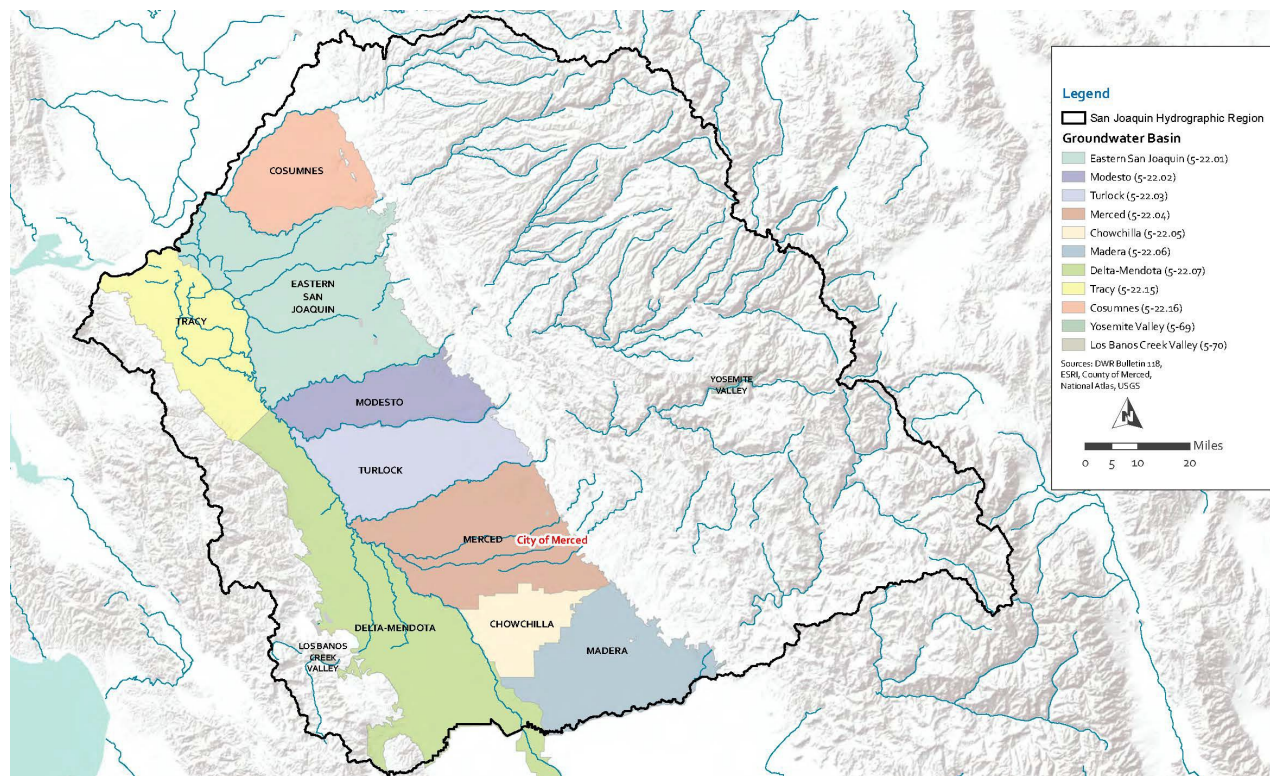
GSA. The three GSAs collaborated on a GSP for the entire Merced Subbasin. The City is a member of the MIUGSA which was formed by a Memorandum of Understanding (MOU) between the MID, City, City of Atwater, City of Livingston, Le Grand Community Services District, Planada Community Services District, and Winton Water and Sanitary District.

The Merced Subbasin GSP was adopted by the MIUGSA in December 2019 and is available to view on the Merced SGMA's website (<http://mercedsgma.org/resources>). With the adoption of the Merced Subbasin GSP, the participating GSAs adopted a goal of achieving sustainable groundwater management on a long-term average basis by increasing recharge and/or reducing groundwater pumping, while avoiding undesirable results. The goal will be achieved by allocating a portion of the estimated Merced Subbasin sustainable yield to each of the three participating GSAs and coordinating the implementation of programs and projects to increase both direct and in-lieu groundwater recharge which will in turn increase the groundwater and/or surface water available. Implementation of the GSP will be a substantial undertaking. The Merced Subbasin GSP implementation schedule for the initial five years (2020-2025) focuses on monitoring and reporting activities, including developing initial GSA allocations, and establishing allocation procedures and demand reduction efforts. The implementation of the GSP will improve the long-term water supply reliability for the City by providing estimates for sustainable groundwater quantities that are available.

6.1.2.2 Groundwater Basin Description

The City is located within the geomorphical province known as the Central Valley, which is divided into the Sacramento Valley and the San Joaquin Valley. The groundwater underlying the City is part of the larger San Joaquin Valley Groundwater Basin within the San Joaquin River Hydrologic Region. The San Joaquin Valley Groundwater Basin is further subdivided into nine subbasins, including the Merced Subbasin. The City lies entirely within the Merced Subbasin (Subbasin 5-22.04), as shown in **Figure 6-1**. The Merced Subbasin (Subbasin 5-22.04) covers a surface area of approximately 491,000 acres (767 square miles).

Figure 6-1 – Groundwater Basins and Subbasins



The Merced Subbasin contains three principal aquifers that are defined by their relationship to the Corcoran Clay aquitard, a laterally-extensive silt and clay layer that underlies approximately the western half of the subbasin and acts as a significant confining layer. The Above Corcoran Principal Aquifer includes all aquifer units that exist above the Corcoran Clay Aquitard and generally contains moderate to large hydraulic conductivities and yields for domestic and irrigation uses. The Below Corcoran Principal Aquifer includes all aquifer units that exist below the Corcoran Clay Aquitard and contains hydraulic conductivities and yields ranging from small to large for irrigation as well as some domestic and municipal uses. The Outside Corcoran Principal Aquifer includes all aquifers that exist outside of the eastern lateral extent of the Corcoran Clay. The Outside Corcoran Principal Aquifer is connected laterally with the Above Corcoran Principal Aquifer at shallower depths and the Below Corcoran Principal Aquifer at deeper depths. Major uses of water in the Outside Corcoran Principal Aquifer include irrigation, domestic, and municipal uses. The Principal Aquifers are underlain by a deep aquifer with higher salinity relative to the principal aquifers.

The groundwater aquifer from which the City obtains its water is not adjudicated. An adjudication consists of a groundwater basin in which all rights to water could be defined by a court. As a non-adjudicated basin, there are no defined legal pumping rights for the City and there are no legal constraints on groundwater pumping.

The Merced Subbasin is a high priority basin and is critically overdrafted. The City and other members of the MIUGSA are in the process of implementing measures from the recently adopted GSP to sustainably manage the groundwater basin, including allocation of the estimated sustainable yield of the basin to the GSAs.

6.1.2.3 Past Five Years

The historical volume of groundwater pumped by the City over the past five years is provided in **Table 6-1 (DWR Table 6-1)**.

Table 6-1 – Groundwater Volume Pumped (DWR Table 6-1)

Submittal Table 6-1 Retail: Groundwater Volume Pumped						
<input type="checkbox"/>	Supplier does not pump groundwater. The supplier will not complete the table below.					
<input type="checkbox"/>	All or part of the groundwater described below is desalinated.					
Groundwater Type <i>Drop Down List</i> <i>May use each category multiple times</i>	Location or Basin Name	2016*	2017*	2018*	2019*	2020*
<i>Add additional rows as needed</i>						
Alluvial Basin	Merced Subbasin	17813	18692	19488	18931	20076
TOTAL		17,813	18,692	19,488	18,931	20,076
<i>* Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.</i>						
NOTES:						

6.1.3 Surface Water

The City does not receive any water supply from surface water.

6.1.4 Stormwater

Stormwater throughout the City is collected by the City’s existing storm drainage facilities, which consist of an underground storm drain system, detention ponds, underground storage pipes, pump stations, and open channels.

The City does not have any existing facilities to recover stormwater for beneficial use such as recharge, irrigation, or reuse. Currently, the City’s infrastructure conveys stormwater into MID’s canals and natural channels.

6.1.5 Wastewater and Recycled Water

Legal Requirements:

CWC Section 10633:

The plan shall provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier. The preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies that operate within the supplier's service area, and shall include all of the following:

(a) A description of the wastewater collection and treatment systems in the supplier's service area, including a quantification of the amount of wastewater collected and treated and the methods of wastewater disposal.

(b) A description of the quantity of treated wastewater that meets recycled water standards, is being discharged, and is otherwise available for use in a recycled water project.

(c) A description of the recycled water currently being used in the supplier's service area, including, but not limited to, the type, place, and quantity of use.

(d) A description and quantification of the potential uses of recycled water, including, but not limited to, agricultural irrigation, landscape irrigation, wildlife habitat enhancement, wetlands, industrial reuse, groundwater recharge, indirect potable reuse, and other appropriate uses, and a determination with regard to the technical and economic feasibility of serving those uses.

(e) The projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years, and a description of the actual use of recycled water in comparison to uses previously projected pursuant to this subdivision.

(f) A description of actions, including financial incentives, which may be taken to encourage the use of recycled water, and the projected results of these actions in terms of acre-feet of recycled water used per year.

(g) A plan for optimizing the use of recycled water in the supplier's service area, including actions to facilitate the installation of dual distribution systems, to promote recirculating uses, to facilitate the increased use of treated wastewater that meets recycled water standards, and to overcome any obstacles to achieving that increased use.

The UWMPA requires that the UWMP address the opportunities for development of recycled water, including the description of existing recycled water applications, quantities of wastewater currently being treated to recycled water standards, limitations on the use of available recycled water, an estimate of projected recycled water use, the feasibility of said projected uses, and practices to encourage the use of recycled water.

6.1.5.1 Recycled Water Coordination

Legal Requirements:

CWC Section 10633:

The plan shall provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier. The preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies that operate within the supplier's service area...

All the City’s wastewater is treated at the Wastewater Treatment Facility (WWTF). The facility produces equivalent disinfected tertiary effluent and is permitted to treat 12.0 million gallons per day (mgd), with plans for future expansions to treat up to 20.0 mgd. Although the facility can produce disinfected tertiary recycled water, use of the effluent as a water source within the City water service area is unlikely due to the remote location of the WWTF and the high cost associated with constructing the necessary infrastructure.

6.1.5.2 Wastewater Collection, Treatment, and Disposal

Legal Requirements:

CWC Section 10633(a):

A description of the wastewater collection and treatment systems in the supplier’s service area, including a quantification of the amount of wastewater collected and treated and the methods of wastewater disposal.

The City collects, treats, and recycles both municipal and process wastewater. Municipal wastewater is generated from a combination of residential, commercial, and industrial sources. The City owns, operates, and maintains the wastewater collection system that serves the City’s water service area. The collection system consists of gravity sewers up to 54-inches in diameter, lift stations, and force mains.

Wastewater is treated at the WWTF to equivalent disinfected tertiary standards. The treated effluent is discharged to Hartley Slough and the Merced Wildlife Management Area (WMA). Effluent is also used to irrigate the Land Application Areas (LAA). The WWTF, WMA, and LAA are located outside of the City water service area.

Tables 6-2 and **6-3** summarize information regarding the wastewater collection, treatment, and discharge within the service area in 2020. The total volume of wastewater collected and treated includes the City’s municipal users and UC Merced.

Table 6-2 – Wastewater Collected within Service Area in 2020 (DWR Table 6-2)

Submittal Table 6-2 Retail: Wastewater Collected Within Service Area in 2020						
<input type="checkbox"/> There is no wastewater collection system. The supplier will not complete the table below.						
Percentage of 2015 service area covered by wastewater collection system (optional)						
Percentage of 2015 service area population covered by wastewater collection system (optional)						
Wastewater Collection			Recipient of Collected Wastewater			
Name of Wastewater Collection Agency	Wastewater Volume Metered or Estimated? <i>Drop Down List</i>	Volume of Wastewater Collected from UWMP Service Area 2020 *	Name of Wastewater Treatment Agency Receiving Collected Wastewater	Treatment Plant Name	Is WWTP Located Within UWMP Area? <i>Drop Down List</i>	Is WWTP Operation Contracted to a Third Party? <i>(optional) Drop Down List</i>
City of Merced	Metered	8,848	City of Merced	Merced Wastewater Treatment Facility	No	No
Total Wastewater Collected from Service Area in 2020:		8,848				
* Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.						
NOTES: Merced Wastewater Treatment Facility is located outside the City water service area limits.						

Table 6-3 – Wastewater Treatment and Discharge within Service Area in 2020 (DWR Table 6-3)

Submittal Table 6-3 Retail: Wastewater Treatment and Discharge Within Service Area in 2020											
<input checked="" type="checkbox"/> No wastewater is treated or disposed of within the UWMP service area. The supplier will not complete the table below.											
Wastewater Treatment Plant Name	Discharge Location Name or Identifier	Discharge Location Description	Wastewater Discharge ID Number (optional) 2	Method of Disposal <i>Drop down list</i>	Does This Plant Treat Wastewater Generated Outside the Service Area? <i>Drop down list</i>	Treatment Level <i>Drop down list</i>	2020 volumes 1				
							Wastewater Treated	Discharged Treated Wastewater	Recycled Within Service Area 3	Recycled Outside of Service Area	Instream Flow Permit Requirement
Total							0	0	0	0	0
1 Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.											
2 If the Wastewater Discharge ID Number is not available to the UWMP preparer, access the SWRCB C W Q S regulated facility website at https://ciwqs.waterboards.ca.gov/ciwqs/readOnly/CiwqsReportServlet?inCommand=reset&reportName=RegulatedFacility											
NOTES: Wastewater treatment and discharge for the City occurs outside of the City water service area.											

6.1.5.3 Recycled Water System Description

Legal Requirements:

CWC Section 10633 (c):

A description of the recycled water currently being used in the supplier’s service area, including, but not limited to, the type, place, and quantity of use.

The City uses recycled water to create a series of percolation and evaporation ponds at the WMA and to irrigate crops grown on the LAA. These areas are located outside of the City’s water service area.

6.1.5.4 Potential, Current, and Projected Recycled Water Uses

Legal Requirements:

CWC Section 10633:

(b) A description of the quantity of treated wastewater that meets recycled water standards, is being discharged, and is otherwise available for use in a recycled water project.

(d) A description and quantification of the potential uses of recycled water, including, but not limited to, agricultural irrigation, landscape irrigation, wildlife habitat enhancement, wetlands, industrial reuse, groundwater recharge, indirect potable reuse, and other appropriate uses, and a determination with regard to the technical and economic feasibility of serving those uses.

(e) The projected use of recycled water within the supplier’s service area at the end of 5, 10, 15, and 20 years, and a description of the actual use of recycled water in comparison to uses previously projected pursuant to this subdivision.

The WWTF treats all the wastewater to equivalent disinfected tertiary recycled water standards. A portion of the effluent is discharged to Hartley Slough and could potentially be used in a recycled water project in the future. Because the effluent meets disinfected tertiary recycled water standards, potential uses include agricultural irrigation, landscape irrigation, wildlife habitat enhancement, wetlands, industrial reuse, and other uses allowed by applicable recycled water standards. The technical and economic feasibility of these uses could be evaluated by the City as potential recycled water opportunities are identified. Currently, agriculture and wildlife habitat enhancement are the main recipients of recycled water and are projected to remain as the main users in the future. **Tables 6-4 (DWR Table 6-4 R) and 6-5 (DWR Table 6-5 R)** summarize the City’s 2020 and projected recycled water use.

Table 6-4 – Current and Projected Recycled Water Direct Beneficial Uses Within Service Area (DWR Table 6-4 R)

Submittal Table 6-4 Retail: Recycled Water Direct Beneficial Uses Within Service Area											
<input checked="" type="checkbox"/> Recycled water is not used and is not planned for use within the service area of the supplier. The supplier will not complete the table below.											
Name of Supplier Producing (Treating) the Recycled Water:											
Name of Supplier Operating the Recycled Water Distribution System:											
Supplemental Water Added in 2020 (volume) <i>include units</i>											
Source of 2020 Supplemental Water											
Beneficial Use Type <i>additional rows if needed.</i>	<i>insert</i> Potential Beneficial Uses of Recycled Water (Describe)	Amount of Potential Uses of Recycled Water (Quantity) <i>include volume units¹</i>	General Description of 2020 Uses	Level of Treatment <i>Drop down list</i>	2020 ¹	2025 ¹	2030 ¹	2035 ¹	2040 ¹	2045 ¹ (opt)	
Total:					0	0	0	0	0	0	0
2020 Internal Reuse											
¹ Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.											
NOTES: Recycled water is used outside of the City water service area. In 2020, 2,359 AF of recycled water was used for agricultural irrigation and 1,691 AF of recycled water was used for wetlands or wildlife habitat.											

Table 6-5 – 2015 UWMP Recycled Water Use Projection Compared to 2020 Actual (DWR Table 6-5 R)

Submittal Table 6-5 Retail: 2015 UWMP Recycled Water Use Projection Compared to 2020 Actual		
<input type="checkbox"/> Recycled water was not used in 2015 nor projected for use in 2020. The supplier will not complete the table below. If recycled water was not used in 2020, and was not predicted to be in 2015, then check the box and do not complete the table.		
Beneficial Use Type	2015 Projection for 2020 ¹	2020 Actual Use ¹
<i>Insert additional rows as needed.</i>		
Agricultural irrigation	3,500	2,359
Landscape irrigation (exc golf courses)	58	0
Wetlands or wildlife habitat	2,215	1,691
Other (Description Required)	1	
Total	5,774	4,050
¹ Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.		
NOTE: Recycled water is used outside of the City service area.		

6.1.5.5 Actions to Encourage and Optimize Future Recycled Water Use

Legal Requirements:

CWC Section 10633:
*The plan shall provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier... and shall include the following:
 (g) A plan for optimizing the use of recycled water in the supplier's service area, including actions to facilitate the installation of dual distribution systems, to promote recirculating uses, to facilitate the increased use of treated wastewater that meets recycled water standards, and to overcome any obstacles to achieving that increased use.*

The City supports the use of recycled water in the service area where economically feasible. Most of the potential use of recycled water consists of agricultural demands and minimal application is planned for urban reuse due to the remote location of the WWTF. The main method identified for expanding future recycled water use is through a water exchange with MID. **Table 6-6 (DWR Table 6-6)** summarizes methods to expand future recycled water use.

Table 6-6 – Methods to Expand Future Recycled Water Use (DWR Table 6-6)

Submittal Table 6-6 Retail: Methods to Expand Future Recycled Water Use			
<input type="checkbox"/>	Supplier does not plan to expand recycled water use in the future. Supplier will not complete the table below but will provide narrative explanation.		
	Provide page location of narrative in UWMP		
Name of Action	Description	Planned Implementation Year	Expected Increase in Recycled Water Use *
<i>Add additional rows as needed</i>			
MID Exchange	Exchange of recycled water for surface water.	2020-2030	60
Total			60
*Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.			
NOTES:			

6.1.6 Desalinated Water Opportunities

Legal Requirements:

CWC Section 10631(g):
Describe the opportunities for development of desalinated water, including, but not limited to, ocean water, brackish water, and groundwater, as a long-term supply.

Because the City is not located in a coastal area, seawater desalination is not applicable to the City and is not currently considered technically or economically feasible. In addition, the groundwater that underlies the City is not brackish in nature and does not require desalination. As such, the City does not have any plans to incorporate desalinated or treated brackish water into its supply portfolio.

6.1.7 Water Exchanges and Transfers

Legal Requirements:

CWC Section 10631(c):

Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis.

The UWMPA requires that the UWMP address the opportunities for transfers or exchanges.

6.1.7.1 Exchanges

The City has considered long term exchange opportunities with MID. In exchange for recycled water, MID could provide surface water to supplement the City’s water supply in the future. According to the MIRWMP, MID deliveries are projected to be 60 AF per year (AFY) initially, potentially rising to 15,000 AFY in 2030 [6].

6.1.7.2 Transfers

UC Merced’s Long Range Development Plan identifies the need for the campus to consider the use of recycled water for irrigation and industrial use. The plan recognizes the City as a source for recycled water. However, the City and UC Merced do not have any plans to implement the transfer of recycled water. Therefore, any transfers between the City and UC Merced have not been considered for the planning period.

The City’s 2017 Water Master Plan identifies the need to increase the water supply in the future and outlines alternatives to address the potential supply deficiency. The recommended alternative includes the construction of a 10-mgd Surface Water Treatment Plant (SWTP) and would require delivery of raw surface water from MID. An average of 4,000 AFY is estimated to be provided to the City from the SWTP.

6.1.8 Future Water Projects

Legal Requirements:

CWC Section 10631 (f):

Include a description of all water supply projects and water supply programs that may be undertaken by the urban water supplier to meet the total projected water use, as established pursuant to subdivision (a) of Section 10635. The urban water supplier shall include a detailed description of expected future projects and programs that the urban water supplier may implement to increase the amount of the water supply available to the urban water supplier in normal and single dry water years and for a period of drought lasting five consecutive water years. The description shall identify specific projects and include a description of the increase in water supply that is expected to be available from each project. The description shall include an estimate with regard to the implementation timeline for each project or program.

To alleviate groundwater reliance, the Water Master Plan recommends the conjunctive use of surface and groundwater to meet future water demands. The construction of a 10-mgd SWTP and six additional wells with a capacity of 2,500 gpm each is identified as the most reliable approach to meeting future demands. These projects are recommended to be implemented by the year 2030. The existing well capacity of the City is 54,400 gpm. With the addition of the six wells and the SWTP, the maximum rated capacity would

increase to 73,400 gpm. A summary of expected future water supply projects is in **Table 6-7 (DWR Table 6-7)**. The City also intends to pursue groundwater recharge projects and will continue efforts along with their partnering agencies through the GSP.

Table 6-7 – Expected Future Water Supply Projects or Program (DWR Table 6-7)

Submittal Table 6-7 Retail: Expected Future Water Supply Projects or Programs						
<input type="checkbox"/>	No expected future water supply projects or programs that provide a quantifiable increase to the agency's water supply. Supplier will not complete the table below.					
<input type="checkbox"/>	Some or all of the supplier's future water supply projects or programs are not compatible with this table and are described in a narrative format.					
	Provide page location of narrative in the UWMP					
Name of Future Projects or Programs	Joint Project with other suppliers?		Description (if needed)	Planned Implementation Year	Planned for Use in Year Type <i>Drop Down List</i>	Expected Increase in Water Supply to Supplier* <i>This may be a range</i>
	<i>Drop Down List (y/n)</i>	<i>If Yes, Supplier Name</i>				
<i>Add additional rows as needed</i>						
Surface Water Treatment Plant	Yes	MID	Alternative to increased wells	2030	All Year Types	4,000
New Wells	No		Required to meet future water demands	2030	All Year Types	8,642
*Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.						
NOTES:						

6.1.9 Summary of Existing and Planned Sources of Water

Legal Requirements:

CWC Section 10631:

(b) Identify and quantify, to the extent practicable, the existing and planned sources of water available to the supplier over the same five-year increments described in subdivision (a), providing supporting and related information, including all of the following...

(b)(2) When multiple sources of water supply are identified, a description of the management of each supply in correlation with the other identified supplies.

(h) An urban water supplier that relies upon a wholesale agency for a source of water shall provide the wholesale agency with water use projections from that agency for that source of water in five-year increments to 20 years or as far as data is available. The wholesale agency shall provide information to the urban water supplier for inclusion in the urban water supplier's plan that identifies and quantifies, to the extent practicable, the existing and planned sources of water as required by subdivision (b), available from the wholesale agency to the urban water supplier over the same five-year increments, and during various water-year types in accordance with subdivision (f). An urban water supplier may rely upon water supply information provided by the wholesale agency in fulfilling the plan informational requirements of subdivisions (b) and (f).

This section describes the types of water that is supplied to the City and the quantity supplied by each water source.

6.1.9.1 Description of Supplies

Currently, the City exclusively uses groundwater for its potable water supply. In the future, if the SWTP is constructed, the City will use the contractual amount of surface water available and supplement the remaining demand with groundwater. Recycled water is supplied by the City for agricultural and wetland use.

6.1.9.2 Quantification of Supplies

The actual (2020) water supplies for the City are summarized in **Table 6-8 (DWR Table 6-8)**. The projected water supplies for the City are summarized in **Table 6-9 (DWR Table 6-9)**.

Table 6-8 – Water Supplies – Actual (DWR Table 6-8)

Submittal Table 6-8 Retail: Water Supplies — Actual				
Water Supply	Additional Detail on Water Supply	2020		
Drop down list May use each category multiple times. These are the only water supply categories that will be recognized by the WUEdata online submittal tool		Actual Volume*	Water Quality Drop Down List	Total Right or Safe Yield* (optional)
Add additional rows as needed				
Groundwater (not desalinated)	Merced Subbasin	20,076	Drinking Water	
Total		20,076		0
<i>*Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.</i>				
NOTES: This table does not include recycled water produced and used by the City because the recycled water is used outside of the City water service area.				

Table 6-9 – Water Supplies – Projected (DWR Table 6-9)

Submittal Table 6-9 Retail: Water Supplies – Projected											
Water Supply Drop down list May use each category multiple times. These are the only water supply categories that will be recognized by the WU Eddata online submittal tool	Additional Detail on Water Supply	Projected Water Supply * Report To the Extent Practicable									
		2025		2030		2035		2040		2045 (opt)	
		Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)
Add additional rows as needed											
Groundwater (not desalinated)	Merced Subbasin	24,418		26,691		24,935		27,765			
Recycled Water	Wetlands & agriculture	0		0		0		0			
Exchanges	MID for irrigation			60		60		60			
Transfers	MID for SWTP					4,000		4,000			
	Total	24,418	0	26,751	0	28,995	0	31,825	0	0	0
<i>*Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.</i>											
NOTES											

6.1.10 Special Conditions

Numerous special conditions may affect water supplies. The potential impacts of climate change on the City water supplies were discussed in Section 4.4. Regulatory conditions and other locally applicable criteria are not anticipated to affect the City’s water supply.

6.2 Energy Use

Legal Requirements:

CWC Section 10631.2. (a):
In addition to the requirements of Section 10631, an urban water management plan shall include any of the following information that the urban water supplier can readily obtain:

- (1) An estimate of the amount of energy used to extract or divert water supplies.*
- (2) An estimate of the amount of energy used to convey water supplies to the water treatment plants or distribution systems.*
- (3) An estimate of the amount of energy used to treat water supplies.*
- (4) An estimate of the amount of energy used to distribute water supplies through its distribution systems.*
- (5) An estimate of the amount of energy used for treated water supplies in comparison to the amount used for nontreated water supplies.*
- (6) An estimate of the amount of energy used to place water into or withdraw from storage.*
- (7) Any other energy-related information the urban water supplier deems appropriate.*

The City uses energy to pump groundwater through a wellhead perchloroethylene (PCE) treatment system at one well and from well sites into the distribution system. Energy intensity was calculated using the tables provided by DWR. DWR Table O-1B was selected for reporting the water delivery product energy usage. The energy use tables for retail water delivery, wastewater, and recycled water are provided in **Appendix G**.

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7 Water Service Reliability and Drought Risk Assessment

The UWMPA requires that the UWMP address the reliability of the City's long term water supplies. This includes a description of supply constraints which may impact the supply. Also included is a comparison between the City's supply and demand for a normal year, single-dry year, and five-consecutive year drought.

7.1 Water Service Reliability Assessment

Legal Requirements:

CWC Section 10635(a):

Every urban water supplier shall include, as part of its urban water management plan, an assessment of the reliability of its water service to its customers during normal, dry, and multiple dry water years. This water supply and demand assessment shall compare the total water supply sources available to the water supplier with the long-term total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and a drought lasting five consecutive water years. The water service reliability assessment shall be based upon the information compiled pursuant to Section 10631, including available data from state, regional, or local agency population projections within the service area of the urban water supplier.

Expected water service reliability pursuant to Section 10631 of the Water Code is assessed in the following sections.

7.1.1 Service Reliability – Constraints on Water Sources

Legal Requirements:

CWC Section 10631 (b)(1):

A detailed discussion of anticipated supply availability under a normal water year, single dry year, and droughts lasting at least five years, as well as more frequent and severe periods of drought, as described in the drought risk assessment. For each source of water supply, consider any information pertinent to the reliability analysis conducted pursuant to Section 10635, including changes in supply due to climate change.

Given there are a variety of circumstances that can render a source inconsistent, determining the supply reliability for the City is difficult because of the complex factors that accompany a water source. These factors include legal issues, environmental constraints, water quality, and climatic variations.

7.1.1.1 Legal

The supplies the City relies upon are neither in the process of adjudication nor the subject of any new legislation limiting them. Therefore, the City does not anticipate legal factors influencing the reliability of groundwater within the near term. However, that could change in the future, with the implementation of the SGMA.

7.1.1.2 Environmental

The status of environmental regulation in California is routinely changing due to new legislation, endangered species statuses, and other factors. Should new environmental legislation come into existence, it could potentially impact the City's available supply. The recent water supply reductions in the Delta are an example of environmental water needs versus community water supplies. The City does not anticipate environmental factors influencing groundwater reliability.

7.1.1.3 Water Quality

Water quality testing, as summarized in the City's Consumer Confidence Reports for 2016 – 2019 (provided in **Appendix H**) show that the City consistently meets or surpasses all U.S. Environmental Protection Agency (EPA) and State drinking water health standards. Although the quality of the existing groundwater is expected to be adequate for potable water, previous assessments have concluded that groundwater quality is vulnerable from: gas stations (current and historic), dry cleaners, leaking underground storage tanks, leaks from the sewer collection system, chemical/petroleum pipelines, fertilizer, pesticide/herbicide application, agricultural drainage, farm chemical distributor/application service, low density septic systems, agricultural wells, and irrigation wells. Contaminants in the area include groundwater salinity, nitrate, iron, manganese, arsenic, radio-nucleotides, bacteria, petroleum hydrocarbons, pesticides, trichloroethylene, and perchloroethylene. Arsenic, PCE, methyl tert-butyl ether (MTBE), and nitrate have been historically detected in one or more City wells. However, the City has been able to achieve drinking water standards by either blending or taking wells offline.

The City does not anticipate groundwater quality effecting groundwater reliability within the planning period. Nevertheless, as testing methods become more discerning and regulations become more stringent, it can be expected that sources will need additional treatment in the future to stay in compliance.

7.1.1.4 Climatic Factors

Climate change adds uncertainties to water supply planning. Changes to temperatures and precipitation patterns may impact water demands and supply availability. As discussed in Section 4.4, resource management strategies are being implemented to mitigate the effects of the potential impacts due to climate change.

7.1.2 Service Reliability – Year Type Characterization

This section addresses the reliability of the City's water supply in average, single dry, and multiple dry water years. The City uses the following water year definitions from the DWR 2020 Guidebook:

- **Normal Year:** a year, or an averaged range of years, that most closely represents the average water supply available to the agency. For the purposes of this UWMP, the terms "normal" and "average" are used interchangeably.
- **Single Dry Year:** the year that represents the lowest water supply available to the agency.
- **Five-Consecutive-Year Drought:** the driest five-year historical sequence for the Supplier (Water Code Section 10612).

The City relies on groundwater as its sole source for supply, which is not as susceptible to annual runoff fluctuations as surface water. The single dry year and five-consecutive-year drought supplies are representative of annual groundwater pumping during the recent 2012-2016 drought. Rainfall data indicates that 2013 was the driest year for the City and is considered representative of the single dry year condition. The average year supply was estimated based on rainfall records from 2000 to 2020. From this data, 2009 was determined to be a representative average year.

Table 7-1 (DWR Table 7-1) summarizes the base years for the average, single dry, and five-consecutive-dry year periods. In addition, the available supply volume, and percent relative to the ten-year average (average year) is listed. The average year was selected by evaluating the ten-year per capita water use and determining the year that best represents the average. For the five-consecutive-dry year scenario, the available supply for the first and second years (2012 and 2013) was higher than the average year due to increased water usage to compensate for the lack of precipitation. In 2015, California enacted conservation measures, which required the City to reduce their usage relative to 2013.

Table 7-1 – Basis of Water Year Data (DWR Table 7-1)

Submittal Table 7-1 Retail: Basis of Water Year Data (Reliability Assessment)			
Year Type	Base Year If not using a calendar year, type in the last year of the fiscal, water year, or range of years, for example, water year 2019-2020, use 2020	Available Supplies if Year Type Repeats	
		<input type="checkbox"/>	Quantification of available supplies is not compatible with this table and is provided elsewhere in the UWMP. Location _____
		<input checked="" type="checkbox"/>	Quantification of available supplies is provided in this table as either volume only, percent only, or both.
		Volume Available *	% of Average Supply
Average Year	2009	23,306	100%
Single-Dry Year	2013	27,470	120%
Consecutive Dry Years 1st Year	2012	25,898	110%
Consecutive Dry Years 2nd Year	2013	27,470	120%
Consecutive Dry Years 3rd Year	2014	25,232	110%
Consecutive Dry Years 4th Year	2015	17,855	80%
Consecutive Dry Years 5th Year	2016	17,813	80%
<p><i>Supplier may use multiple versions of Table 7-1 if different water sources have different base years and the supplier chooses to report the base years for each water source separately. If a Supplier uses multiple versions of Table 7-1, in the "Note" section of each table, state that multiple versions of Table 7-1 are being used and identify the particular water source that is being reported in each table.</i></p>			
<p>*Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.</p>			
<p>NOTES: Volume available was estimated based on the volume pumped for the base year listed. % of Average Water Supply is rounded to the nearest 10%. Data does not accurately reflect available supply because volume pumped is not necessarily equivalent to available water supply. When available, sustainable yield information from the Merced Subbasin GSP activities will be used in the future.</p>			

7.1.3 Service Reliability – Supply and Demand Comparison

Legal Requirements:

*CWC Section 10635(a):
Every urban water supplier shall include, as part of its urban water management plan, an assessment of the reliability of its water service to its customers during normal, dry, and multiple dry water years. This water supply and demand assessment shall compare the total water supply sources available to the water supplier with the long-term total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and a drought lasting five consecutive water years. The water service reliability assessment shall be based upon the information compiled pursuant to Section 10631, including available data from state, regional, or local agency population projections within the service area of the urban water supplier.*

7.1.3.1 Water Service Reliability – Normal Year

The availability of the City’s water supplies in normal years are described in Chapter 6 and summarized in **Table 7-2 (DWR Table 7-2)**. As shown in **Table 7-2 (DWR Table 7-2)**, the City’s normal year supplies are adequate to meet projected normal year demands. The information in the table is taken from information presented previously in **Tables 4-5 and 6-9 (DWR Tables 4-3 and 6-9)**.

Table 7-2 – Normal Year Supply and Demand Comparison (DWR Table 7-2)

Submittal Table 7-2 Retail: Normal Year Supply and Demand Comparison					
	2025	2030	2035	2040	2045 (Opt)
Supply totals (autofill from Table 6-9)	24,418	26,751	28,995	31,825	0
Demand totals (autofill from Table 4-3)	24,418	26,751	28,995	31,825	0
Difference	0	0	0	0	0
NOTES:					

7.1.3.2 Water Service Reliability – Single Dry Year

The City’s water supply and demand for the single dry year are assumed to be twenty percent higher than normal year supply and demand for planning purposes, as shown in **Table 7-1 (DWR Table 7-1)**. The projected single dry year supply and demand for 2020 through 2040 is presented in **Table 7-3 (DWR Table 7-3)**. The projections indicate that the City’s single dry year supplies are adequate to meet projected single dry year demands.

Table 7-3 – Single Dry Year Supply and Demand Comparison (DWR Table 7-3)

Submittal Table 7-3 Retail: Single Dry Year Supply and Demand Comparison					
	2025	2030	2035	2040	2045 (Opt)
Supply totals*	29,301	32,101	34,794	38,190	
Demand totals*	29,301	32,101	34,794	38,190	
Difference	0	0	0	0	0
<i>*Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.</i>					
NOTES: Supply total is equal to projected Normal Year supply multiplied by 120% per DWR Table 7-1 estimates. Supply total is assumed to match with Demand total because groundwater pumping will operate to meet demands.					

7.1.3.3 Water Service Reliability – Five-Consecutive-Year Drought

Per CWC Section 10612, the five-consecutive-year drought is the driest five-year historical sequence for the Supplier. The City’s water supply and demand for the five-consecutive-year drought are assumed to follow the pattern presented in **Table 7-1 (DWR Table 7-1)**. As shown in **Table 7-4 (DWR Table 7-4)**, the City’s five-consecutive-year drought supplies are adequate to meet projected demands.

Table 7-4 – Multiple Dry-Year Supply and Demand Comparison (DWR Table 7-4)

Submittal Table 7-4 Retail: Multiple Dry Years Supply and Demand Comparison						
		2025*	2030*	2035*	2040*	2045* (Opt)
First year	Supply totals	26,860	29,426	31,895	35,008	
	Demand totals	26,860	29,426	31,895	35,008	
	Difference	0	0	0	0	0
Second year	Supply totals	29,301	32,101	34,794	38,190	
	Demand totals	29,301	32,101	34,794	38,190	
	Difference	0	0	0	0	0
Third year	Supply totals	26,860	29,426	31,895	35,008	
	Demand totals	26,860	29,426	31,895	35,008	
	Difference	0	0	0	0	0
Fourth year	Supply totals	19,534	21,401	23,196	25,460	
	Demand totals	19,534	21,401	23,196	25,460	
	Difference	0	0	0	0	0
Fifth year	Supply totals	19,534	21,401	23,196	25,460	
	Demand totals	19,534	21,401	23,196	25,460	
	Difference	0	0	0	0	0
Sixth year (optional)	Supply totals					
	Demand totals					
	Difference	0	0	0	0	0
<p><i>*Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.</i></p> <p>NOTES: Supply totals are equal to projected Normal Year supply multiplied by % Average Supply Factors in DWR Table 7-1. Supply total is assumed to match with Demand total because groundwater pumping will operate to meet demands.</p>						

7.1.4 Description of Management Tools and Options

Legal Requirements:

CWC Section 10620(f):

An urban water supplier shall describe in the plan water management tools and options used by that entity that will maximize resources and minimize the need to import water from other regions.

The City is implementing water management tools and options that will maximize local resources and minimize the need to import water from other regions. These tools and options include being a member of the MIUGSA and participating in the implementation of the GSP, resource management strategies described in the City’s Climate Action Plan and the MIRWMP, and shortage response actions/demand mitigation measures to address the overdraft condition in the groundwater basin. These tools and options are described in other sections of the UWMP.

Because groundwater is currently the sole source of water for the City and is projected to be a major source of water in the future, **Tables 7-2 through 7-4 (DWR Tables 7-2 through 7-4)** show water supply matching water demands. Groundwater wells will only be operated as needed to meet water demands, even though the groundwater supply could provide more water. This assumption should be updated when GSA allocations for the City are determined.

7.2 Drought Risk Assessment

Legal Requirements:

CWC Section 10635(b):

Every urban water supplier shall include, as part of its urban water management plan, a drought risk assessment for its water service to its customers as part of information considered in developing the demand management measures and water supply projects and programs to be included in the urban water management plan. The urban water supplier may conduct an interim update or updates to this drought risk assessment within the five-year cycle of its urban water management plan update. The drought risk assessment shall include each of the following:

- (1) A description of the data, methodology, and basis for one or more supply shortage conditions that are necessary to conduct a drought risk assessment for a drought period that lasts five consecutive water years, starting from the year following when the assessment is conducted.*
- (2) A determination of the reliability of each source of supply under a variety of water shortage conditions. This may include a determination that a particular source of water supply is fully reliable under most, if not all, conditions.*
- (3) A comparison of the total water supply sources available to the water supplier with the total projected water use for the drought period.*
- (4) Considerations of the historical drought hydrology, plausible changes on projected supplies and demands under climate change conditions, anticipated regulatory changes, and other locally applicable criteria.*

This section provides a DRA based on the five driest consecutive years on record and plausible changes in climate, regulations, and other locally applicable criteria. A description of the data and methods used, basis for the supply shortage conditions, determination of the reliability of each source, and comparison of total water supplies and uses during a drought is provided below.

7.2.1 DRA Data, Methods, and Basis for Water Shortage Conditions

The data used for the DRA is historical well data for 2012-2016, the driest five-year historical sequence for the City, and other historical records regarding the water system. Additional information is available in the Merced Subbasin GSP.

7.2.2 DRA Water Source Reliability

Based on historical well production data for 2012-2016, well production was not affected by drought conditions. Therefore, this DRA assumes that the total water supply is projected to meet demands during a five-year drought period. Recent water quality issues, potential regulations regarding new contaminants, and changes to the aquifer conditions may have adverse impacts on the water supply and should be monitored closely.

7.2.3 DRA Total Water Supply and Use Comparison

The total water supply and use comparison was performed using the Planning Tool Worksheet and is shown in **Table 7-5 (DWR Table 7-5)**. The water supply and use assume the City will continue to implement Stage 2 shortage reduction actions because the groundwater basin is critically overdrafted. The comparison indicates that the City has sufficient water supply to meet projected demands during a five-year drought. The WSCP discusses measures for reducing water demands in case of water shortage conditions.

Table 7-5 – Five-Year Drought Risk Assessment Tables (DWR Table 7-5)

2021		Total
Total Water Use		24,754
Total Supplies		24,754
Surplus/Shortfall w/o WSCP Action		0
Planned WSCP Actions (use reduction and supply augmentation)		
WSCP - supply augmentation benefit		
WSCP - use reduction savings benefit		
Revised Surplus/(shortfall)		0
Resulting % Use Reduction from WSCP action		0%

2022		Total
Total Water Use		27,579
Total Supplies		27,579
Surplus/Shortfall w/o WSCP Action		0
Planned WSCP Actions (use reduction and supply augmentation)		
WSCP - supply augmentation benefit		
WSCP - use reduction savings benefit		
Revised Surplus/(shortfall)		0
Resulting % Use Reduction from WSCP action		0%

2023		Total
Total Water Use		25,807
Total Supplies		25,807
Surplus/Shortfall w/o WSCP Action		0
Planned WSCP Actions (use reduction and supply augmentation)		
WSCP - supply augmentation benefit		
WSCP - use reduction savings benefit		
Revised Surplus/(shortfall)		0
Resulting % Use Reduction from WSCP action		0%

2024		Total
Total Water Use		19,152
Total Supplies		19,152
Surplus/Shortfall w/o WSCP Action		0
Planned WSCP Actions (use reduction and supply augmentation)		
WSCP - supply augmentation benefit		
WSCP - use reduction savings benefit		
Revised Surplus/(shortfall)		0
Resulting % Use Reduction from WSCP action		0%

2025		Total
Total Water Use		19,534
Total Supplies		19,534
Surplus/Shortfall w/o WSCP Action		0
Planned WSCP Actions (use reduction and supply augmentation)		
WSCP - supply augmentation benefit		
WSCP - use reduction savings benefit		
Revised Surplus/(shortfall)		0
Resulting % Use Reduction from WSCP action		0%

8 Water Shortage Contingency Plan

In response to the severe drought of 2012-2016, legislation was adopted in 2018 mandating that the UWMP include a WSCP that provides a detailed proposal for assessing water supply availability and response actions to water shortage conditions. The WSCP is to be a stand-alone document which will allow for amending the plan without amending the 2020 UWMP. The City WSCP is provided in **Appendix I**. Refer to the WSCP for the following DWR Tables:

- DWR Tables 8-1: WSCP Levels
- DWR Tables 8-2: Demand Reduction Actions
- DWR Tables 8-3: Supply Augmentation and Other Actions

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9 Demand Management Measures

This section provides a comprehensive description of the water conservation programs that the City has implemented, is currently implementing, and plans to implement in order to meet its urban water use reduction targets.

9.1 Existing Demand Management Measures for Retail Suppliers

Legal Requirements:

CWC Section 10631:

(e) Provide a description of the supplier's water demand management measures. This description shall include all of the following:

(1)(A) For an urban retail water supplier, as defined in Section 10608.12, a narrative description that addresses the nature and extent of each water demand management measure implemented over the past five years. The narrative shall describe the water demand management measure that the supplier plans to implement to achieve its water use targets pursuant to Section 10608.20.

(B) The narrative pursuant to this paragraph shall include descriptions of the following water demand management measures:

(i) Water waste prevention ordinances.

(ii) Metering.

(iii) Conservation pricing.

(iv) Public education and outreach.

(v) Programs to assess and manage distribution system real loss.

(vi) Water conservation program coordination and staffing support.

(vii) Other demand management measures that have a significant impact on water use as measured in gallons per capita per day, including innovative measures, if implemented.

The City has a water conservation and recycling program in place. The City takes water conservation very seriously and considers implementation of Demand Management Measures (DMM) as a necessity to achieve the goals of the conservation program.

The UWMPA presents two distinct methods for providing information related to DMM. One method is to be a signatory to the California Urban Water Conservation Council (CUWCC) MOU regarding urban water conservation. The MOU requires the preparation of an annual report, which can be used to fulfill the DMM requirements of the UWMP. The City is not a signatory to the MOU, and therefore this method of compliance cannot be used in the UWMP.

The other method for a water supplier who is not member of the CUWCC is to describe their current water conservation programs and demonstrate how they comply with the DMM specified in CWC Section 10631. The UWMPA was amended in 2014 to streamline DMM from 14 specific measures to six more general requirements and an "other" category.

9.1.1 Water Waste Prohibition Ordinances

Chapter 15.42 of the City of Merced Municipal Code (MMC), also referred to as the Water Conservation Ordinance prohibits the waste of water through prohibition of the following activities:

- Washing of sidewalks, driveways, and other outdoor surfaces
- Washing of the exterior of dwellings, buildings, and structures
- Non-recirculating fountains
- Use of water from the City’s distribution system for non-domestic purposes when another adequate source of water is available
- External washing of trailers, trailer houses, mobile homes, and home exteriors unless in conjunction with painting
- The washing of boats or motor vehicles with a hose that is not fitted with an automatic shut-off device
- The indiscriminate running of water or washing with water not otherwise prohibited above which is wasteful and without reasonable purpose
- Watering landscape during and within 48 hours of measurable rainfall
- All car wash fundraising must be held at an established car wash facility that collects and recycles the runoff water before it enters the City’s sewer system
- The serving of drinking water other than upon request in eating or drinking establishments
- Operators of hotels shall provide guests with the option of choosing not to have towels and linens laundered daily

The ordinance also includes mandatory conservation measures, replacement of broken plumbing fixtures and sprinklers, limited irrigation hours, and restrictions for outdoor irrigation by day of week (based on odd and even street address). The ordinance levies fines and penalties for noncompliance with the City’s water waste prohibition. The penalties include termination of water service and financial penalties. A copy of the Water Conservation Ordinance is provided in **Appendix J**.

9.1.2 Metering

Legal Requirements:

CWC Section 526:

(a) Notwithstanding any other provisions of law, an urban water supplier that, on or after January 1, 2004, receives water from the federal Central Valley Project under a water service contract or subcontract... shall do both of the following:

(1) On or before January 1, 2013, install water meters on all service connections to residential and nonagricultural commercial buildings... located within its service area.

Water Code section 527

(a) An urban water supplier that is not subject to Section 526 shall do both the following:

(1) Install water meters on all municipal and industrial service connections located within its service area on or before January 1, 2025.

In 2015, the City was awarded the 2014 Water Energy Grant and received \$2.5 million to install water meters on remaining customers still on a flat water rate. The City is fully metered for all customer classes,

including separate meters for single family residential, commercial, and industrial and schools. Multiple family customers are metered but not necessarily individually by living unit.

9.1.3 Conservation Pricing

On October 15, 2018, the City adopted a multi-year water rate program (**Appendix K**). Each metered customer pays a base rate according to meter size, plus a charge per one hundred cubic feet (HCF). **Table 9-1** summarizes the latest rate structure for the City.

Table 9-1 – Water Rate Schedule

Meter Size	Included HCF	Effective in July 2019	Effective in July 2020	Effective in July 2021
¾"	20	\$31.00	\$31.62	\$32.25
1"	20	\$31.00	\$31.62	\$32.25
1 ½"	40	\$61.53	\$62.76	\$64.02
2"	64	\$98.16	\$100.12	\$102.12
3"	128	\$195.85	\$199.77	\$203.77
4"	200	\$305.76	\$311.88	\$318.12
6"	400	\$611.04	\$623.36	\$635.73
8"	640	\$977.38	\$996.93	\$1,016.87
10"	960	\$1,465.84	\$1,495.16	\$1,525.06
12"	1350	\$2,061.15	\$2,102.37	\$2,144.42
Volumetric Charge:		\$0.74 / HCF	\$0.75 / HCF	\$0.77 / HCF

9.1.4 Public Education and Outreach

The City distributes public information in its utility bills, press releases via radio and newspaper, school curriculum, educational flyers, commercials on television and in theatres, water conservation suggestions and videos on its webpage, and providing economical water conservation kits. The City also staffs a water conservation booth with their water conservation coordinator for many public events.

The outdoor watering schedule is available on the City’s website, and is available in English, Spanish, and Hmong. The City’s website has included a page which discusses water conservation and has information about ongoing rebates and assistance programs. The City is committed to its public information program as an ongoing effort.

9.1.5 Programs to Assess and Manage Distribution System Real Loss

The City conducts a water audit using software provided by American Water Works Association (AWWA) annually. **Appendix D** contains a copy of water audits for 2015-2019. The results from the water audits were previously discussed in Chapter 4. Water audits are performed on an annual basis to identify leakage trends and to determine if/when corrective action to address leakage may be warranted.

9.1.6 Water Conservation Program Coordination and Staffing Support

The City has a full-time staff person as the water conservation coordinator for the City. This position is responsible for coordinating water conservation activities as well as issuing informational handouts, notices, and citations to customers for violating the City's water conservation ordinances.

9.1.7 Other Demand Management Measures

The City supports additional programs that provide rebates and promote water conservation. These programs are further discussed in the subsequent sections.

9.1.7.1 Residential Plumbing Retrofit

The City offers free low-flow shower heads and other types of low flow retrofit kits to customers at no cost to provide an incentive for their use. These are available to customers at the Finance and Public Works counter upon request. The City will continue to make these retrofit devices available for customers.

9.1.7.2 Washing Machine Rebate

This program provides financial incentives, typically in the form of rebate offers, to qualifying customers who install high-efficiency washing machines in their homes. While clothes washer rebates are available through other local utility providers, the City is not specifically implementing this Best Management Practice (BMP).

However, MID operates a high efficiency washing machine rebate program for their electricity customers. The program offers a \$75 rebate for purchase of an energy saving clothes washing machine or dishwasher. While the program is a part of MID's energy conservation rebate program, MID estimates the washing machines provide a water conservation savings of 40 percent when compared to conventional clothes washing machines.

9.1.7.3 Commercial, Industrial, and Institutional Conservation Programs

Commercial, industrial, and institutional (CII) customers are treated the same as residential customers. As a result, any demand reduction measures which are available and marketed to residential customers are also available for commercial, industrial, and institutional customers. For example, surveys, plumbing retrofits, toilet replacements, and public information programs are equally available to these customers and have not been tracked separately. All commercial and industrial projects are reviewed by the City for conformance with the City's water efficient landscape ordinance. Separate water meters are always either recommended or required depending on the size of landscape areas at commercial, industrial, and institutional sites. All landscape projects on commercial sites are required to conform to the City's Water Efficient Landscape Ordinance.

9.1.7.4 Turf Replacement Initiative

DWR offered a rebate for single family residents and CII to remove their existing turf and replace it with landscape that requires little water. The City is seeking grant opportunities to fund a similar type of program in the future.

9.2 Reporting Implementation

9.2.1 Implementation over the Past Five Years

Legal Requirements:

CWC Section 10631:

(e) Provide a description of the supplier's water demand management measures. This description shall include all of the following:

(1)(A) ...a narrative description that addresses the nature and extent of each water demand management measure implemented over the past five years.

All DMM discussed in Section 9.1 were implemented and will continue to be implemented by the City. In 2016-2017, the City was awarded an Institutional Turf Replacement award to convert an area in a City park.

9.2.2 Implementation to Achieve Water Use Targets

Legal Requirements:

CWC Section 10631:

(f)(1)(A) For an urban retail water supplier, as defined in Section 10608.12, a narrative description that addresses the nature and extent of each water demand management measure implemented over the past five years. The narrative shall describe the water demand management measure that the supplier plans to implement to achieve its water use targets pursuant to Section 10608.20.

The City implemented the DMM discussed in Section 9.1 and was able to achieve the SB X7-7 2020 target as shown in **Table 5-2**.

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10 Plan Adoption, Submittal, and Implementation

This chapter provides information regarding the addressing of the CWC requirements for public hearing, the UWMP adoption process, submitting and adopting the UWMP and making the document available to the public, plan implementation, and the process for amending an adopted UWMP.

10.1 Inclusion of All 2020 Data

As indicated in Chapter 2, the City uses a calendar year for water supply and demand accounting. This 2020 UWMP includes data through December 2020.

10.2 Notice of Public Hearing

10.2.1 Notice to Cities and Counties

Legal Requirements:

CWC Section 10621:

(b) Every urban water supplier required to prepare a plan shall...at least 60 days prior to the public hearing on the plan...notify any city or county within which the supplier provides water supplies that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan.

Water Code Section 10642

...The urban water supplier shall provide notice of the time and place of hearing to any city or county within which the supplier provides water supplies. A privately owned water supplier shall provide an equivalent notice within its service area...

The City has provided formal written notification to Merced County, MID, and other appropriate agencies that the City's UWMP was being updated for 2020. As shown in **Table 10-1 (DWR Table 10-1)**, this notification was provided at least 60 days prior to the public hearing of the plan. Copies of the Final UWMP will be provided to Merced County and MID no later than 30 days after its submission to DWR. Copies of notification letters are included in **Appendix C**.

Table 10-1 – Notification to Cities and Counties (DWR Table 10-1)

Submittal Table 10-1 Retail: Notification to Cities and Counties		
City Name	60 Day Notice	Notice of Public Hearing
<i>Add additional rows as needed</i>		
County Name <i>Drop Down List</i>	60 Day Notice	Notice of Public Hearing
<i>Add additional rows as needed</i>		
Merced County	Yes	Yes
<p>NOTES: Merced Irrigation District, Univeristy of California, Merced, Merced College, Self Help Enterprises, the Leadership Counsel for Justice and Accountability, Weaver Union School District, Merced Union High School District, Merced City School District, and the Merced County Association of Governments were also provided with a notice of at least 60 days.</p>		

10.2.2 Notice to the Public

Legal Requirements:

CWC Section 10642:
...Prior to adopting either [the plan or water shortage contingency plan], the urban water supplier shall make both of the plan and the water shortage contingency plan available for public inspection and shall hold a public hearing or hearings thereon. Prior to any of these hearings, notice of the time and place of the hearing shall be published within the jurisdiction of the publicly owned water supplier pursuant to Section 6066 of the Government Code [see below]. The urban water supplier shall provide notice of the time and place of a hearing to any city or county within which the supplier provides water supplies. Government Code section 6066
Publication of notice pursuant to this section shall be once a week for two successive weeks. Two publications in a newspaper published once a week or oftener, with at least five days intervening between the respective publication dates not counting such publication dates, are sufficient. The period of notice commences upon the first day of publication and terminates at the end of the fourteenth day, including therein the first day.

The City is committed to encouraging the active involvement of diverse social, cultural, and economic elements of its citizenry. On August 5, 2021 and August 12, 2021, the City placed a notice in the local

newspaper stating that its UWMP was being updated and a WSCP was prepared and that a public hearing would be conducted to take testimony from members of the community. A copy of this notification is included in **Appendix C**. The Draft 2020 UWMP and Draft WSCP were made available for public inspection at the City of Merced Public Works Department, located at 1776 Grogan Avenue. In addition, the City also posted a copy of the Draft 2020 UWMP and Draft WSCP on its website (www.cityofmerced.org). The notice of public hearing to the public is included in **Appendix C**.

10.3 Public Hearing and Adoption

Legal Requirements:

CWC Section 10642:

...Prior to adopting either, the [plan or water shortage contingency plan], the urban water supplier shall make both the plan and the water shortage contingency plan available for public inspection and shall hold a public hearing or hearings thereon.

Water Code Section 10608.26

(a) In complying with this part, an urban retail water supplier shall conduct at least one public hearing to accomplish all of the following:

- (1) Allow community input regarding the urban retail water supplier's implementation plan for complying with this part.*
- (2) Consider the economic impacts of the urban retail water supplier's implementation plan for complying with this part.*
- (3) Adopt a method, pursuant to subdivision (b) of Section 10608.20 for determining its urban water use target.*

10.3.1 Public Hearing

A public hearing for the UWMP and WSCP was held on August 16, 2021, at the City Council Chamber. The hearing provided an opportunity for the City's customers, residents, and employees to learn and ask questions about the current and future water supply of the City. The plan adoption by City Council occurred on August 16, 2021. The City Resolution is included in **Appendix L**.

10.3.2 Adoption

Legal Requirements:

CWC Section 10642:

...After the hearing or hearings, the plan or water shortage contingency plan shall be adopted as prepared or as modified after the hearing.

This UWMP was adopted by the City Council on August 16, 2021. The WSCP was adopted by the City Council on August 16, 2021. A copy of the adopted resolutions is provided in **Appendix L**.

10.4 Plan Submittal

Legal Requirements:

CWC Section 10621:

(e) Each urban water supplier shall update and submit its 2020 plan to the department by July 1, 2021...

CWC Section 10644:

(a)(1) An urban water supplier shall submit to the department, the California State Library, and any city or county within which the supplier provides water supplies a copy of its plan no later than 30 days after adoption.

CWC Section 10635:

(c) The urban water supplier shall provide that portion of its urban water management plan prepared pursuant to this article to any city or county within which it provides water supplies no later than 60 days after the submission of its urban water management plan.

10.4.1 Submitting a UWMP and Water Shortage Contingency Plan to DWR

A copy of this 2020 UWMP will be submitted electronically to DWR within 30 days of adoption.

10.4.2 Electronic Data Submittal

Legal Requirements:

CWC Section 10644 (a)(2):

The plan, or amendments to the plan, submitted to the department ... shall be submitted electronically and shall include any standardized forms, tables, or displays specified by the department.

This 2020 UWMP, including the WSCP, and associated data will be submitted electronically to DWR using the WUEdata submittal tool.

10.4.3 Submitting a UWMP, including WSCP, to the California State Library

The 2020 UWMP, including the WSCP, will be submitted on CD or hardcopy format to the California State Library within 30 days of adoption.

10.4.4 Submitting a UWMP to Cities and Counties

The 2020 UWMP will be submitted in electronic format to the Merced County and MID within 30 days of adoption.

10.5 Public Availability

Legal Requirements:

CWC Section 10645:

(a) Not later than 30 days after filing a copy of its plan with the department, the urban water supplier and the department shall make the plan available for public review during normal business hours.

(b) Not later than 30 days after filing a copy of its water shortage contingency plan with the department, the urban water supplier and the department shall make the plan available for public review during normal business hours.

Within 30 days of submitting the UWMP to DWR, the adopted UWMP will be available for public review during normal business hours at the City of Merced Public Works Department. The City will also post a copy of the adopted UWMP on its website (www.cityofmerced.org).

10.6 Notification to Public Utilities Commission

Legal Requirements:

CWC Section 10621 (c):

An urban water supplier regulated by the Public Utilities Commission shall include its most recent plan and water shortage contingency plan as part of the supplier's general rate case filings.

The City is not regulated by the California Public Utilities Commission.

10.7 Amending an Adopted UWMP or Water Shortage Contingency Plan

Legal Requirements:

CWC Section 10621:

(d) The amendments to, or changes in, the plan shall be adopted and filed in the manner set forth in Article 3 (commencing with Section 10640).

CWC Section 10644:

(a)(1) Copies of amendments or changes to the plans shall be submitted to the department, the California State Library, and any city or county within which the supplier provides water supplies within 30 days after adoption.

10.7.1 Amending a UWMP

The plan may be updated at any time when the urban water supplier believes significant changes have occurred in population, land use, and/or water sources that may affect the contents of the plan. If major changes are made to this 2020 UWMP, the City will hold an additional public hearing and City Council will re-adopt the plan. Copies of amendments or changes to the plan shall be submitted to DWR, the California State Library, Merced County, and MID within 30 days of adoption.

10.7.2 Amending a Water Shortage Contingency Plan

Legal Requirements:

CWC Section 10644 (b):

If an urban water supplier revises its water shortage contingency plan, the supplier shall submit to the department a copy of its water shortage contingency plan prepared...no later than 30 days after adoption, in accordance with protocols for submission and using electronic reporting tools developed by the department.

If the City revises the WSCP after DWR has approved the 2020 UWMP, copies of amendments or changes to the plans will be submitted electronically to DWR through the WUEdata Portal within 30 days of its adoption.

Copies of the amended WSCP will also be sent to the California State Library, Merced County, and MID within 30 days of adoption.

11 References

- [1] University of California Merced 2020 Long-Range Development Plan, March 2020.
- [2] Merced County Forecast Summary, Eberhardt School of Business Center for Business & Policy Research, July 7, 2016.
- [3] UC Merced 2020 Long Range Development Plan Final Subsequent Environmental Impact Report, March 2020.
- [4] UC Merced Tomorrow Long Range Development Plan, Amended April 2017.
- [5] Merced General Plan 2030, Final, January 2012.
- [6] 2018 Merced Integrated Regional Water Management Plan Update, Woodard & Curran, February 2019.
- [7] California's Groundwater Update 2020, Bulletin 118, Draft, March 2021.
- [8] City of Merced Water Master Plan, AECOM, 2017.

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