

APPENDIX F

Water Supply Assessment

UC Villages Water Supply Assessment

PREPARED FOR

City of Merced



PREPARED BY



UC Villages Water Supply Assessment

Prepared for

City of Merced

Project No. 487-60-23-34



Project Manager: Whitney Jones, PE

October 4, 2024

Date

QA/QC Review: Elizabeth Drayer, PE

A handwritten signature in blue ink, appearing to read "Elizabeth Drayer", written over a horizontal line.

October 4, 2024

Date

Table of Contents

Executive Summary	1
Overview.....	1
Projected Water Demands.....	1
Water Supply Availability and Reliability.....	1
Determination of Water Supply Sufficiency.....	2
1.0 Introduction	3
1.1 Legal Requirement for a Water Supply Assessment.....	3
1.2 Need for and Purpose of Water Supply Assessment.....	4
1.3 Water Supply Assessment Preparation, Format, and Organization.....	4
2.0 Description of the Proposed Project	5
2.1 Proposed Project Location.....	5
2.2 Proposed Land Uses.....	5
2.3 Projected Water Demand.....	8
2.4 Projected Water Supply for the Proposed Project.....	9
3.0 Required Determinations	10
3.1 Does SB 610 Apply to the Proposed Project?.....	10
3.2 Does SB 221 Apply to the Proposed Project?.....	11
3.3 Who is the Identified Public Water System?.....	11
3.4 Does the Identified Public Water Supplier have an adopted UWMP and does the UWMP include the projected water demand for the Proposed Project?.....	12
4.0 City of Merced Water System	13
4.1 Water Service Area.....	13
4.2 Population.....	13
5.0 City of Merced Water Demands	14
5.1 Historical and Existing Water Demand.....	14
5.2 Future Water Demand.....	14
5.3 Future Dry Year Water Demand.....	15
6.0 City of Merced Water Supplies	16
6.1 Water Supply Overview.....	17
6.2 Surface Water Supply.....	17
6.3 Groundwater Supply.....	17
6.3.1 Groundwater Basin Description.....	17
6.3.2 Groundwater Management.....	18
6.3.3 Historical and Projected Groundwater Pumping.....	18

Table of Contents

6.4 Recycled Water Supply	18
6.5 Summary of Existing and Additional Planned Future Water Supplies	19
7.0 Water Supply Reliability	20
7.1 Overview of Water Supply Constraints	20
7.2 Summary of Water Supply Reliability.....	21
8.0 Determination of Water Supply Sufficiency Based on the Requirements of SB 610	23
9.0 Verification of Water Supply Sufficiency Based on the Requirements of SB 221.....	25
9.1 Historical Water Deliveries.....	25
9.2 Projected Water Demand by Customer Sector	25
9.3 Water Shortage Contingency Analysis	26
9.4 Future Water Supplies to Serve Future Water Demands.....	26
9.5 Verification of Sufficient Water Supply	27
10.0 Water Supply Assessment Approval Process.....	28
11.0 References	29

LIST OF TABLES

Table 2-1. Projected Water Demand for the UC Villages Project.....	9
Table 3-1. Does the Proposed Project Meet the SB 610 Definition of a “Project”?.....	11
Table 4-1. City of Merced Service Area Existing and Projected Population	13
Table 5-1. City of Merced Service Area Historical Potable Water Demand	14
Table 5-2. City of Merced Projected Future Water Demand - Normal Years.....	15
Table 5-3. City of Merced Projected Future Water Demand – Dry Years	15
Table 6-2. City of Merced Current and Projected Future Water Supplies – Normal Years.....	19
Table 7-2. Projected City of Merced Water Supplies	22
Table 8-1. City of Merced Summary of Water Demand Versus Supply During Hydrologic Normal, Single Dry, and Multiple Dry Years	24
Table 9-1. Actual and Projected Potable Water Demands by Customer Sector	26

LIST OF FIGURES

Figure 2-1. Proposed Project Location	6
Figure 2-2. Proposed Project Land Uses.....	7

Table of Contents

LIST OF APPENDICES

Appendix A. Water Demand Projections Worksheet (Attachment Q)

LIST OF ACRONYMS AND ABBREVIATIONS

2030 General Plan	Merced Vision 2030 General Plan
afy	Acre-Feet Per Year
AWWA	American Water Works Association
Attachment Q	Water Demand Projection Worksheet
BCP	Bellevue Corridor Community Plan
CEQA	California Environmental Quality Act
City	City of Merced
CWC	California Water Code
DWR	State of California Department of Water Resources
EIR	Environmental Impact Report
EPA	Environmental Protection Agency
gpm	Gallons Per Minute
GSA	Groundwater Sustainability Agency
GSP	Groundwater Sustainability Plan
mgd	Million Gallons Per Day
MID	Merced Irrigation District
MIUGSA	Merced Irrigation-Urban Groundwater Sustainability Agency
NOP	Notice of Preparation of a Draft Environmental Impact Report for the UC Villages Project
Project Site	The location of UC Villages
Proposed Project	UC Villages
SB	Senate Bill
sf	Square Feet
SGMA	Sustainable Groundwater Management Act
SWTP	Surface Water Treatment Plant
UC Merced	University of California, Merced
UWMP	Urban Water Management Plan
WMP	Water Master Plan
WSA	Water Supply Assessment
WSCP	Water Shortage Contingency Plan
WWTF	Merced Wastewater Treatment Facility

UC Villages Water Supply Assessment

EXECUTIVE SUMMARY

Overview

This Water Supply Assessment (WSA) has been prepared in accordance with California Water Code sections 10910 through 10915 in connection with UC Villages Project (Proposed Project), as presented in the UC Villages Planned Development Master Plan. The Proposed Project is adjacent to the University of California, Merced, in unincorporated Merced County, to the northeast of the City of Merced (City), at the southwestern corner of the Bellevue Road and Lake Road intersection (Project Site). The Project Site is currently zoned as county agricultural use. The Proposed Project would redevelop the area into the following, with associated park, circulation, and utility improvements:

- Up to 700 multi-family and/or student housing residential units
- Approximately 18,000 square feet (sf) of amenity buildings (recreational center)
- Approximately 30,000 sf of commercial/retail
- Approximately 75,000 sf hotel with up to 200 guest rooms

Projected Water Demands

Indoor and outdoor residential and non-residential water demands for the Proposed Project were estimated based on the proposed number of residential dwelling units, non-residential building square footage, and number of hotel rooms. The projected water demand for buildout of the Proposed Project is 233 acre-feet per year. Potable water is assumed to be used to meet the projected water demands, since no recycled water infrastructure is currently in place or planned for installation near the Project Site.

This WSA references water demand projections for the City as presented in the City's 2020 Urban Water Management Plan (UWMP). As further described in this WSA, based on the water demand projection methods used in the 2020 UWMP, it is assumed that the Proposed Project water demands were included in the projected water demand for the City in the 2020 UWMP. A summary of the availability and reliability of the potable water supplies to serve the Proposed Project is provided below.

Water Supply Availability and Reliability

The availability and reliability of the City's water supplies, as described in this WSA, are based primarily on information contained in the City's 2020 UWMP. The City's 2020 UWMP is incorporated by reference into this WSA. If approved by the City, the Proposed Project would be served from the City's existing and future portfolio of water supplies. The City's existing supplies consist solely of groundwater pumped from the underlying Merced Subbasin. Recycled water is not currently utilized within the City's service area and there are no plans to develop it as a source. Instead, the City plans to use recycled water in the future as a method of exchange to acquire more surface water from Merced Irrigation District. The City is also considering installing new groundwater wells and/or constructing a new surface water treatment plant.



UC Villages Water Supply Assessment

Determination of Water Supply Sufficiency

This WSA concludes that the City's projected water supplies are sufficient to meet existing and projected future water demands, including future water demands associated with the Proposed Project, over a 20-year period and under normal, single dry, and multiple dry years. These projections account for the City's SB X7-7 2020 per capita water use goal, as well as a 20 percent reduction in per capita water use due to implementation of Stage 2 response actions in the City's Water Shortage Contingency Plan. The City's 2020 UWMP assumed an increase in demand during single dry years to follow the City's historical supply pattern. Similarly for multiple dry years, demands are assumed to follow the historical supply pattern between 2012 and 2016. During that period, the City had 110, 120, 110, 80, and 80 percent of its average supplies available respectively, for each of the five consecutive years. Total supplies are assumed to match total demands because groundwater pumping will be operated to meet demands.



UC Villages Water Supply Assessment

1.0 INTRODUCTION

The UC Villages Project (Proposed Project), as presented in the UC Villages Planned Development Master Plan, proposes an approximately 35.9-acre development located across from the University of California, Merced (UC Merced) campus. The Proposed Project would include up to 700 multi-family and/or student housing residential units with approximately 18,000 square feet (sf) of amenity buildings (recreational centers), approximately 30,000 sf of commercial/retail use, and an approximately 75,000 sf hotel with up to 200 guest rooms.

The purpose of this Water Supply Assessment (WSA) is to support the Environmental Impact Report (EIR) prepared by the City for the Proposed Project.

1.1 Legal Requirement for a Water Supply Assessment

California Senate Bill 610 (SB 610) and Senate Bill 221 (SB 221) amended state law, effective January 1, 2002, to improve the link between information on water supply availability and certain land use decisions made by cities and counties. SB 610 and SB 221 were companion measures which sought to promote more collaborative planning between local water suppliers and cities and counties. Both statutes require detailed information regarding water availability to be provided to the city and county decision-makers prior to approval of specified large development projects. The purpose of this coordination is to ensure that prudent water supply planning has been conducted, and that planned water supplies are adequate to meet existing demands, anticipated demands from approved projects and tentative maps, and the demands of proposed projects.

SB 610 amended California Water Code Sections 10910 through 10915 (inclusive) to require lead agencies conducting environmental review under the California Environmental Quality Act (CEQA) for a proposed development project¹ that meets specified criteria to:

- Identify any public water purveyor that may supply water for the proposed development project
- Request a WSA from the identified water purveyor

The purpose of a WSA is to demonstrate the sufficiency of the purveyor's water supplies to satisfy the water demands of the Proposed Project, while still meeting the water purveyor's existing and planned future uses. Water Code Sections 10910 through 10915 set forth the specific information that must be included in a WSA.

SB 221 amended State law (California Government Code Section 66473.7) to require that approval by a city or county of certain residential subdivisions² requires an affirmative written verification of sufficient water supply. SB 221 was intended as a failsafe mechanism to ensure that collaboration on finding the needed water supplies to serve a new large residential subdivision occurs before construction begins.

¹ The definition of a "project" subject to the requirement to prepare a WSA is provided in Water Code Section 10912(a) and is discussed further in Section 3.1 of this WSA.

² Per Government Code Section 66473.7(a)(1) subdivision means a proposed residential development of more than 500 dwelling units.



UC Villages Water Supply Assessment

1.2 Need for and Purpose of Water Supply Assessment

The purpose of this WSA is to perform the evaluation required by SB 610 (Water Code Sections 10910 through 10915) in connection with the Proposed Project, located within the City of Merced's (City) service area. This WSA does not reserve water, or function as a "will serve" letter or any other form of commitment to supply water (see Water Code Section 10914). The provision of water service will continue to be undertaken in a manner consistent with applicable policies and procedures, consistent with existing law.

1.3 Water Supply Assessment Preparation, Format, and Organization

The format of this WSA is intended to follow Water Code Sections 10910 through 10915 to clearly delineate compliance with the specific requirements for a WSA. This WSA includes the following sections:

- Section 1: Introduction
- Section 2: Description of the Proposed Project
- Section 3: Required Determinations
- Section 4: City of Merced Water System
- Section 5: City of Merced Water Demands
- Section 6: City of Merced Water Supplies
- Section 7: Water Supply Reliability
- Section 8: Determination of Water Supply Sufficiency Based on the Requirements of SB 610
- Section 9: Verification of Water Supply Sufficiency Based on the Requirements of SB 221
- Section 10: Water Supply Assessment Approval Process
- Section 11: References

Relevant citations of Water Code sections 10910 through 10915 are included throughout this WSA in *italics* to demonstrate compliance with the specific requirements of SB 610.



UC Villages Water Supply Assessment

2.0 DESCRIPTION OF THE PROPOSED PROJECT

The following sections describe the Proposed Project, including its location, proposed land uses, and projected water demand.

2.1 Proposed Project Location

The Proposed Project is approximately 35.9 acres and is located in unincorporated Merced County, at the southwest corner of the Bellevue Road and Lake Road intersection (Project Site), as shown on Figure 2-1. The Project Site is surrounded by rural residential and agricultural uses to the north, west, and south. The UC Merced campus lies to the northeast of the Project Site, and agricultural uses are farther to the east. The Project Site is within the Bellevue Corridor Community Plan (BCP) area and is comprised of six parcels that would be annexed into the City (APNs 060-590-016, -017, -019, -025, -026, and 060-020-016).

2.2 Proposed Land Uses

Of the six parcels that comprise the Project Site, only five will be developed (APN 060-590-026 will not be developed). The Notice of Preparation of a Draft Environmental Impact Report (EIR) for the UC Villages Project (NOP; City of Merced Planning Division, 2024) states that the Proposed Project development would include:

- Up to 700 multi-family and/or student housing residential units
- Approximately 18,000 sf of amenity buildings (recreational center)
- Approximately 30,000 sf of commercial/retail use
- An approximately 75,000 sf hotel with up to 200 guest rooms

Figure 2-2 shows the proposed land uses within the Project Site.



UC Villages Water Supply Assessment

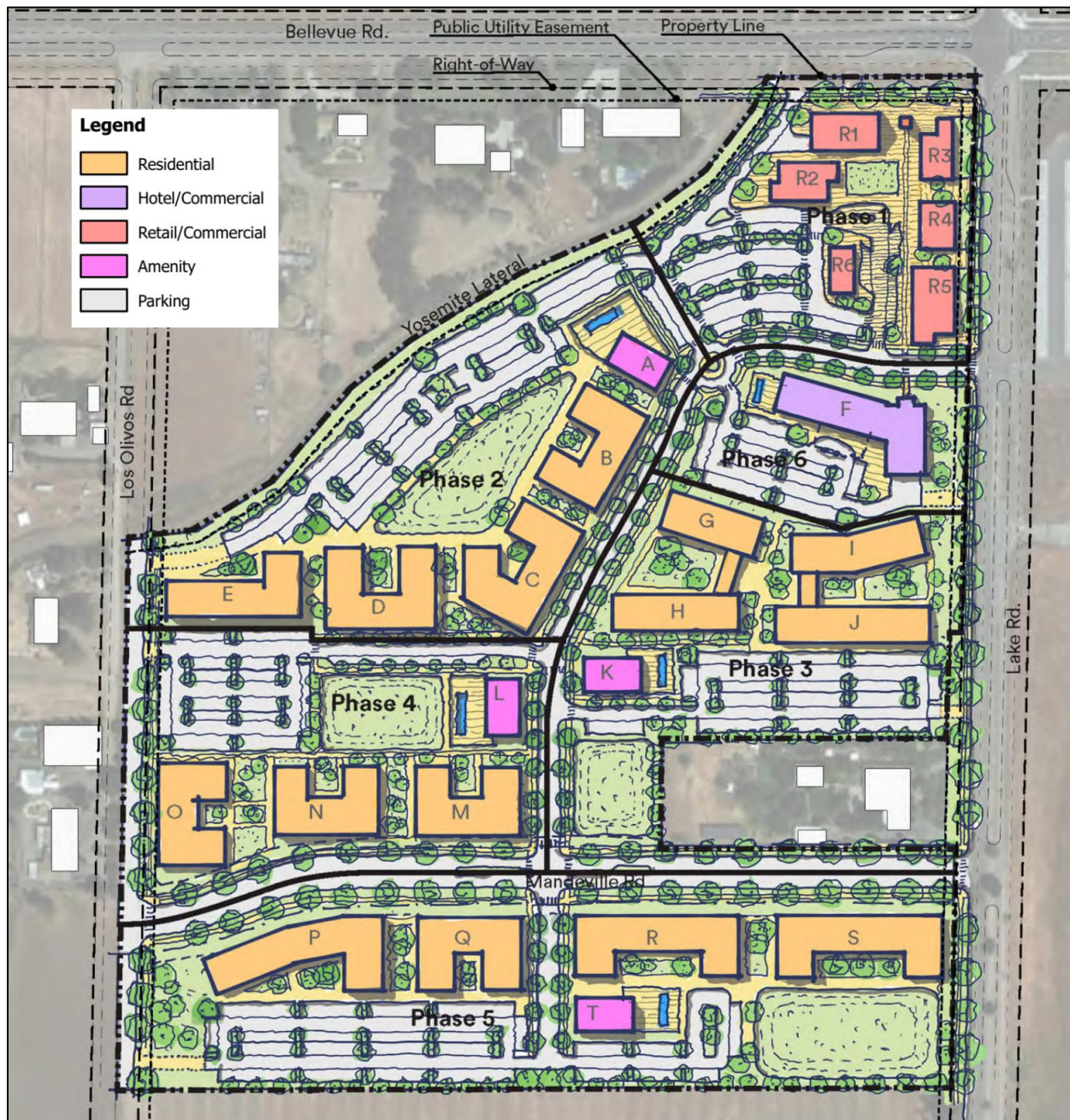


Source: UC Villages Notice of Preparation

Figure 2-1. Proposed Project Location



UC Villages Water Supply Assessment



Source: UC Villages Notice of Preparation

Figure 2-2. Proposed Project Land Uses



UC Villages Water Supply Assessment

2.3 Projected Water Demand

Water demand projections for buildout of the Proposed Project were developed by referencing the project information, such as non-residential square footage and the number of residential dwelling units, presented in Table 1: UC Villages Conceptual Master Plan Program (Table 1) within NOP. Table 1 of the NOP contains more specific information on the non-residential square footage and number of residential dwelling units than the approximations presented above in Section 2.2.

Water use factors were then applied to the project information. The City's latest Water Master Plan (WMP; AECOM, 2014) contains general land use-based unit water use factors, which consider total parcel acreage only. Given that such detailed information is available for the Proposed Project (i.e., non-residential building square footage, number of residential dwelling units, and number of hotel rooms), West Yost did not use the unit water use factors from the WMP. Instead, a Water Demand Projection Worksheet from Redwood City (herein referred to as Attachment Q) was used to estimate demand for the Proposed Project. Attachment Q is presented in Appendix A of this WSA and has been utilized by West Yost in the past to estimate water demand for other projects that are similar to the Proposed Project. Attachment Q separates the water use estimate into indoor and outdoor components for residential and commercial land uses. It also has a separate factor that can be used to estimate water use for hotels, based on the number of rooms.

Table 2-1 summarizes the projected water demand for each land use type. The total projected water demand for the Proposed Project is approximately 233 acre-feet per year (afy). Potable water is assumed to be used to meet the projected water demands, because no recycled water infrastructure is currently in place or planned for installation near the Project Site.



UC Villages Water Supply Assessment

Table 2-1. Projected Water Demand for the UC Villages Project

Land Use	Quantity ^(a)	Units	Water Use Factor ^(b)	Water Use Factor Units	Projected Demand, gpd	Projected Demand, afy
Multi-Family Residential (Indoor)	654 ^(c)	units	180 ^(d)	gpd/unit	117,720	131.9
Multi-Family Residential (Landscape)	1,962 ^(e)	persons	17	gpd/person	33,354	37.4
Commercial (Indoor)	46,680 ^(f)	sf	0.13	gpd/sf	6,068	6.8
Commercial (Landscape)	164,106 ^(g)	sf	0.072 ^(h)	gpd/sf	11,816	13.2
Hotel	200	rooms	195	gpd/room	39,000	43.7
Total Projected Demand					207,958	233
<p>(a) Project quantity details are taken from Table 1 of the UC Villages NOP (City of Merced Planning Division, 2024).</p> <p>(b) Water use factors are from Attachment Q Water Demand Projection Worksheet from Redwood City.</p> <p>(c) Although Section 2.2 of this WSA indicates that up to 700 units may be constructed, Table 1 of the UC Villages NOP contains a specific number of 654.</p> <p>(d) This factor is calculated as (3 persons/unit) x (60 gpd/person), per Attachment Q. For each unit, 3 people are assumed rather than 2.2 due to the proposed student housing, which will include 4 students in one unit and is assumed to be half of the multi-family residential housing.</p> <p>(e) This is calculated as (654 units) x (3 persons/unit), per Attachment Q.</p> <p>(f) Indoor commercial square footage includes the amenity buildings. Although Section 2.2 of this WSA indicates that the project would include up to 48,000 square feet of commercial and amenity buildings, Table 1 of the UC Villages NOP contains a specific number of 46,680 square feet.</p> <p>(g) The non-residential landscape area demand was estimated using the Conceptual Site Map from the UC Villages NOP and considering the gross acres associated with the commercial and amenity buildings.</p> <p>(h) This factor is calculated as (3.5 cuft/sf/year) x (7.841 gal/cuft) / (365 days/year), per Attachment Q.</p> <p>afy = acre-feet per year; gpd = gallons per day; sf = square feet; cuft = cubic feet.</p>						

2.4 Projected Water Supply for the Proposed Project

Water demands for the Proposed Project, if approved by the City, will be served using the City’s existing and future portfolio of water supplies discussed in Section 6.0. The inclusion of existing and planned future water supplies is specifically allowed by the Water Code:

Water Code 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).



UC Villages Water Supply Assessment

3.0 REQUIRED DETERMINATIONS

The following sections describe the required determinations for a WSA.

3.1 Does SB 610 Apply to the Proposed Project?

Water Code Section 10910 (a) Any city or county that determines that a project, as defined in Section 10912, is subject to the California Environmental Quality Act (Division 13 (commencing with Section 21000) of the Public Resources Code) under Section 21080 of the Public Resources Code shall comply with this part.

Water Code Section 10912 (a) "Project" means any of the following:

- (1) A proposed residential development of more than 500 dwelling units.*
- (2) A proposed shopping center or business establishment employing more than 1,000 persons or having more than 500,000 square feet of floor space.*
- (3) A proposed commercial office building employing more than 1,000 persons or having more than 250,000 square feet of floor space.*
- (4) A proposed hotel or motel, or both, having more than 500 rooms.*
- (5) A proposed industrial, manufacturing, or processing plant, or industrial park planned to house more than 1,000 persons, occupying more than 40 acres of land, or having more than 650,000 square feet of floor area.*
- (6) A mixed-use project that includes one or more of the projects specified in this subdivision.*
- (7) A project that would demand an amount of water equivalent to, or greater than, the amount of water required by a 500-dwelling unit project.*

As shown in Table 3-1, the Proposed Project does meet the definition of a "Project" as specified in Water Code section 10912(a), because it contains over 500 residential dwelling units, in addition to non-residential development. The Proposed Project has not been the subject of a previously adopted WSA and has not been included in an adopted WSA for a larger project. Therefore, according to Water Code section 10910(a), a WSA is required for the Proposed Project. The City has also determined that the Proposed Project is subject to the CEQA and that an EIR is required. The EIR for the Proposed Project will utilize the findings of this WSA as appropriate.



UC Villages Water Supply Assessment

Table 3-1. Does the Proposed Project Meet the SB 610 Definition of a “Project”?

SB 610 Project Definition Components	Proposed Project Quantity	Meets the SB 610 Definition of a “Project”?
Residential > 500 dwelling units	654 units	YES
Retail > 1,000 employees or > 500,000 square feet	46,680 sf ^(a)	NO
Commercial Office Building > 1,000 employees or > 250,000 square feet	N/A	NO
Hotel/Motel > 500 rooms	200 rooms	NO
Industrial Plant/Park > 1,000 employees or > 40 acres or > 650,000 square feet	N/A	NO
Mixed Use Project that includes one or more of the above	YES	YES
A Project that would demand the amount of water required by a 500-dwelling unit project	NO	NO
SB 610 Required?	--	YES

(a) This is indoor commercial square footage, including the amenity buildings.

3.2 Does SB 221 Apply to the Proposed Project?

In 2001, SB 221 amended State law to require that approval by a city or county of certain residential subdivisions requires an affirmative written verification of sufficient water supply. Per California Government Code Section 66473.7(a)(1), a subdivision means a proposed residential development of more than 500 dwelling units. The Proposed Project, with 654 new residential dwelling units in the City’s water service area, is subject to the requirements of SB 221.

3.3 Who is the Identified Public Water System?

Water Code Section 10910(b) The city or county, at the time that it determines whether an environmental impact report, a negative declaration, or a mitigated negative declaration is required for any project subject to the California Environmental Quality Act pursuant to Section 21080.1 of the Public Resources Code, shall identify any water system that is, or may become as a result of supplying water to the project identified pursuant to this subdivision, a public water system, as defined by Section 10912, that may supply water for the project...

Water Code Section 10912 (c) “Public water system” means a system for the provision of piped water to the public for human consumption that has 3,000 or more service connections...

The Proposed Project is located within Merced County and was included within the City of Merced’s General Plan Sphere of Influence boundary. The Project Site would be annexed into the City of Merced and served by the City. Therefore, the City of Merced is the identified public water system for the Proposed Project.



UC Villages Water Supply Assessment

3.4 Does the Identified Public Water Supplier have an adopted UWMP and does the UWMP include the projected water demand for the Proposed Project?

Water Code Section 10910(c)(1) The city or county, at the time it makes the determination required under Section 21080.1 of the Public Resources Code, shall request each public water system identified pursuant to subdivision (b) to determine whether the projected water demand associated with a proposed project was included as part of the most recently adopted urban water management plan adopted pursuant to Part 2.6 (commencing with Section 10610).

According to California Water Code (CWC) Section 10617, an urban water supplier is defined as 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 per year. The City meets the definition of an urban water supplier and is therefore required to prepare an Urban Water Management Plan (UWMP). The City's most recently adopted UWMP is the 2020 UWMP, which was adopted in August 2021. The City's 2020 UWMP is incorporated by reference into this WSA.

To determine whether the water demand associated with the Proposed Project was included in the City's 2020 UWMP, the planning data associated with the Project Site was reviewed, as well as the water demand projection methods used in the City's 2020 UWMP. The Proposed Project was included in the Merced Vision 2030 General Plan (2030 General Plan), as part of the BCP area. The 2030 General Plan, which was adopted by the City in 2012, guides land use and development for the City through the year 2030. Although the City's 2020 UWMP estimated future water use through a population-based projection, rather than through land use, it is anticipated that the population projection would have accounted for the growth predicted in the 2030 General Plan, given that the 2030 General Plan is widely acknowledged in the 2020 UWMP as the blueprint for growth for the City. Therefore, with no evidence to the contrary, it is assumed that the Proposed Project is included in the City's 2020 UWMP.



UC Villages Water Supply Assessment

4.0 CITY OF MERCED WATER SYSTEM

The following sections describe the City’s existing water service area, including existing and projected population. The descriptions provided below for the City’s water system have been taken, for the most part, from the City’s 2020 UWMP.

4.1 Water Service Area

The City is located along State Route 99 within California’s San Joaquin Valley, a major agricultural area. The City limits encompass 23.1 square miles, as of 2020. Although UC Merced is outside of City limits, it is still within the City’s water service area. The City’s Public Works Department is the only municipal water purveyor in the City. It provides water service to approximately 99,100 residents, including UC Merced.

Land uses throughout the water service area consist primarily of single-family residential, with commercial, industrial, parks/open space/public uses, and multi-family residential land uses comprising the remaining areas.

4.2 Population

The projected future population of the City’s water service area is shown in Table 4-1 and includes: (1) the future population of the City, which was estimated based on the Merced County Forecast Summary, and (2) the future population of UC Merced, which is based on the UC Merced 2020 Long-Range Development Plan, the Environmental Impact Report (EIR) for that plan, and the UC Merced Tomorrow Long Range Development Plan.

As shown in Table 4-1, the City’s 2020 UWMP indicates that the total population within the City’s service area, including UC Merced, is projected to increase to 155,816 people by 2045, a 57 percent increase from the 2020 population of 99,100 people. The City expects its future growth to be linked to the continued expansion of UC Merced, as well as a connection to California’s proposed future high-speed rail system.

Year	2020	2025	2030	2035	2040	2045
Population Served	99,100	109,866	120,363	130,461	143,194	155,816

(a) Source: City’s 2020 UWMP, Table 3-2. These population numbers include the population associated with UC Merced.



UC Villages Water Supply Assessment

5.0 CITY OF MERCED WATER DEMANDS

Water Code Section 10910(c)(2) If the projected water demand associated with the proposed project was accounted for in the most recently adopted urban water management plan, the public water system may incorporate the requested information from the urban water management plan in preparing the elements of the assessment required to comply with subdivisions (d), (e), (f) and (g).

The descriptions provided below for the City’s water demands are based predominantly on the City’s 2020 UWMP.

5.1 Historical and Existing Water Demand

Table 5-1 shows the City’s water demand for 2016 through 2020, including non-revenue water (water losses), which can occur due to distribution system leaks and other unmetered uses such as firefighting and main flushing. The non-revenue water values come from the City’s water loss audits, which are submitted to Department of Water Resources (DWR) each year. The exception is 2020, which includes additional non-revenue water estimated using the methodology included in American Water Works Association’s (AWWA) water audit software.

Year	Potable Water Use	Non-Revenue Water (Water Loss)	Total Potable Water Demand
2016 ^(a)	17,811	1,380	19,191
2017 ^(a)	18,692	1,740	20,432
2018 ^(a)	19,487	760	20,247
2019 ^(a)	18,931	1,290	20,221
2020 ^(b)	18,676	1,400	20,076

(a) 2016 through 2019 Source: City’s 2020 UWMP, Tables 4-1 and 4-2.
(b) 2020 source: City’s 2020 UWMP, Table 4-3.

5.2 Future Water Demand

Table 5-2 shows the City’s projected normal year water demands through 2040, which includes the Proposed Project, as presented in the City’s 2020 UWMP. These projections are based on projected population growth in the City’s service area assuming the SB X7-7 2020 water use target of 248 gallons per capita per day, as well as a 20 percent reduction in per capita water use due to implementation of Stage 2 Shortage Response Actions in the City’s Water Shortage Contingency Plan (WSCP). Potential water use reductions from codes, standards, ordinances, or transportation and land use plans are not included. Non-revenue water is also accounted for in the projection.

Comparing the 2020 demand presented in Table 5-1 to the 2040 demand presented in Table 5-2 indicates that there is an approximately 59 percent increase in water demand projected to occur from 2020 to 2040.



UC Villages Water Supply Assessment

Table 5-2. City of Merced Projected Future Water Demand - Normal Years, afy

Demand Projection Source	2025	2030	2035	2040
2020 UWMP	24,418	26,751	28,995	31,825

Source: City's 2020 UWMP, Table 4-5.

5.3 Future Dry Year Water Demand

Table 5-3 presents the projected future single and multiple dry year water demand, as presented in the City's 2020 UWMP, which includes the Proposed Project. Demands are assumed to increase by 20 percent during single dry years for planning purposes. This demand increase was applied so that demands would follow the historical supply pattern for the City. For the City, the year chosen to represent the lowest water supply availability was 2013, which was the driest year for the City. During 2013, the City had 120 percent of its average supplies available. For the City, average supplies are assumed to be equal to what would occur during a normal year, as presented in Table 5-2 above. Total supplies are assumed to match total demands because groundwater pumping will be operated to meet demands, as further described in Section 6.

Similarly, for multiple dry years, the demands are assumed to increase by 10, 20, and 10 percent for the first, second, and third consecutive dry years, respectively. And they are assumed to decrease by 20 percent during the fourth and fifth consecutive dry years. This follows the historical supply pattern chosen for the City to represent a period of five consecutive dry years, which was during the 2012 to 2016 drought. During that period, the City had 110, 120, 110, 80, and 80 percent of its average supplies available, respectively, for each of the five consecutive years.

Table 5-3. City of Merced Projected Future Water Demand – Dry Years

Hydrologic Condition	Change in Demand from Normal Years	Projected Water Demand, afy			
		2025	2030	2035	2040
Single Dry Year ^(a)	120%	29,301	32,101	34,794	38,190
Multiple Dry Years – Year 1 ^(b)	110%	26,860	29,426	31,895	35,008
Multiple Dry Years – Year 2 ^(b)	120%	29,301	32,101	34,794	38,190
Multiple Dry Years – Year 3 ^(b)	110%	26,860	29,426	31,895	35,008
Multiple Dry Years – Year 4 ^(b)	80%	19,534	21,401	23,196	25,460
Multiple Dry Years – Year 5 ^(b)	80%	19,534	21,401	23,196	25,460

(a) Source: City's 2020 UWMP, Table 7-3.
 (b) Source: City's 2020 UWMP, Table 7-4.



UC Villages Water Supply Assessment

6.0 CITY OF MERCED WATER SUPPLIES

Water Code Section 10910(d)(1) The assessment required by this section shall include an identification of any existing water supply entitlements, water rights, or water service contracts relevant to the identified water supply for the proposed project, and a description of the quantities of water received in prior years by the public water system...under the existing water supply entitlements, water rights, or water service contracts.

Water Code Section 10910(e) If no water has been received in prior years by the public water system...under the existing water supply entitlements, water rights, or water service contracts, the public water system...shall also include in its water supply assessment...an identification of the other public water systems or water service contract holders that receive a water supply or have existing water supply entitlements, water rights, or water service contracts, to the same source of water as the public water system.

Water Code Section 10910(f) If a water supply for a proposed project includes groundwater, the following additional information shall be included in the water supply assessment.

- (1) A review of any information contained in the urban water management plan relevant to the identified water supply for the proposed project.*
- (2) A description of any groundwater basin or basins from which the proposed project will be supplied. For those basins for which 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 public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), 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 or basins as overdrafted or has projected that the basin will become overdrafted if present management conditions continue, in the most current bulletin of the department that characterizes the condition of the groundwater basin, and a detailed description by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), of the efforts being undertaken in the basin or basins to eliminate the long-term overdraft condition.*
- (3) A detailed description and analysis of the amount and location of groundwater pumped by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), for the past five years from any groundwater basin from which the proposed project will be supplied. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historical use records.*
- (4) A detailed description and analysis of the amount and location of groundwater that is projected to be pumped by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), from any basin from which the proposed project will be supplied. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historical use records.*
- (5) An analysis of the sufficiency of the groundwater from the basin or basins from which the proposed project will be supplied to meet the projected water demand associated with the proposed project. A water assessment shall not be required to include the information required by this paragraph if the public water system determines, as part of the review required by paragraph (1), that the sufficiency of groundwater necessary to meet the initial and projected water demand associated with the project was addressed in the description and analysis required by paragraph (4) of subdivision (b) of Section 10631.*

The descriptions provided below for the City's water supplies are based predominantly on the City's 2020 UWMP.



UC Villages Water Supply Assessment

6.1 Water Supply Overview

The City's water system relies solely on local groundwater, which the City pumps from the Merced Subbasin aquifer using groundwater extraction wells. Recycled water is not currently utilized within the City's service area and there are no plans to develop it as a source. Thus, potable water is assumed to meet all the Proposed Project's water demands. However, in the future, the City plans to use recycled water as a method of exchange to acquire more surface water from Merced Irrigation District (MID). The City is also considering installing new groundwater wells and/or constructing a new surface water treatment plant, which would allow for conjunctive use of surface and groundwater to meet future demands.

6.2 Surface Water Supply

The City does not currently have any surface water supplies. In the future, the City plans to transfer and exchange surface water with MID for irrigation. To accomplish this, the City will need to construct a surface water treatment plant to treat the surface water from MID. Refer to Section 6.5 for a discussion of the planned transfer and exchange.

6.3 Groundwater Supply

Groundwater accounted for 100 percent of the City's potable water supply in 2020 and will continue to be the City's primary source of potable water for the foreseeable future. The City's well system consists of 20 production wells and local water treatment facilities at the wells. These wells have a total capacity of 54,400 gallons per minute (gpm).

6.3.1 Groundwater Basin Description

The City pumps groundwater from the Merced Subbasin (Subbasin 5-22.04), which underlies the City and is one of nine subbasins located in the San Joaquin Groundwater Basin. The San Joaquin Groundwater Basin is located within the San Joaquin River Hydrologic Region, which itself is a part of the geomorphical province known as the Central Valley. The entire production of the City's well system is derived from the Merced Subbasin, which is the primary groundwater aquifer underlying the City and covers a surface area of approximately 491,000 acres (767 square miles).

The Merced Subbasin contains three principal aquifers:

1. 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.
2. The 'Below Corcoran Principal Aquifer' includes all aquifer units that exist below the Corcoran Clay Aquitard and contains small to large hydraulic conductivities and yields for irrigation, and some domestic and municipal uses.
3. The 'Outside Corcoran Principal Aquifer' includes all aquifers that exist outside of the eastern lateral extent of the Corcoran Clay Aquitard and is connected laterally to the other two principal aquifers. Its major uses include irrigation, domestic, and municipal uses.

The principal aquifers are underlain by a deep aquifer with higher salinity relative to the principal aquifers. Additional discussion of the groundwater conditions and groundwater management is provided in the City's 2020 UWMP.



UC Villages Water Supply Assessment

6.3.2 Groundwater Management

The Merced Subbasin was classified as a high-priority basin in the Sustainable Groundwater Management Act (SGMA) 2019 Basin Prioritization. Three groundwater sustainability agencies (GSAs) were formed to manage the Merced Subbasin: the Merced Irrigation-Urban GSA (MIUGSA), the Merced Subbasin GSA, and the Turner Island Water District GSA. The City is a member of the MIUGSA. All three GSAs collaborated on the Merced Subbasin groundwater sustainability plan (GPS), which was adopted by the MIUGSA in December 2019. It was subsequently updated in July 2022 to address comments and recommendations from DWR.

The groundwater aquifers from which the City obtains its water are not adjudicated, and because of this there are no defined legal pumping rights for the City and there are no legal constraints on groundwater pumping. However, the Merced Subbasin is a high priority basin and is critically overdrafted. Therefore, the City and other members of the MIUGSA are implementing measures from its adopted GSP to sustainably manage the groundwater basin, including allocation of the estimated sustainable yield of the basin and increasing recharge. The City intends to pursue groundwater recharge projects as part of implementation of the GSP to improve the long-term water supply reliability of the subbasin for the City.

6.3.3 Historical and Projected Groundwater Pumping

Table 6-1 below shows the actual volume pumped from the City’s wells from 2016 to 2020. The average annual volume pumped over this period is approximately 19,000 afy.

Location or Basin Name	2016	2017	2018	2019	2020
Merced Subbasin	17,813	18,692	19,488	18,931	20,076

Source: City’s 2020 UWMP, Table 6-1.

6.4 Recycled Water Supply

The City’s wastewater is treated at the Merced Wastewater Treatment Facility (WWTF), which treats approximately 12 million gallons per day (mgd) and produces an effluent that meets disinfected tertiary recycled water standards. This means the effluent could potentially be used for agricultural irrigation, landscape irrigation, industrial reuse, and other applicable recycled water uses. However, recycled water from the WWTF is not used as a source of supply within the City’s service area, owing to its remote location. Instead, its effluent water is discharged to Hartley Slough and the Merced Wildlife Management Area. The effluent is also used to irrigate crops grown in land application areas located outside of the City’s service area. It is unlikely that recycled water will be used within the City’s service area in the foreseeable future, due to the high cost associated with constructing the necessary infrastructure to bring recycled water to customers. Therefore, the City’s future water demands, including those associated with the Proposed Project, are assumed to be supplied by potable water only.



UC Villages Water Supply Assessment

6.5 Summary of Existing and Additional Planned Future Water Supplies

As discussed above, the City does not currently have plans to use recycled water within its service area. However, it has still identified methods for expanding future recycled water use, including a future water exchange with MID, where the City would provide MID with recycled water to irrigate crops, and MID would provide surface water for the City to use. MID deliveries are projected to be 60 afy starting in 2030 but could potentially expand up to 15,000 afy in the future.

In addition, the City’s 2017 WMP identified the need to increase the City’s water supply in the future and the recommended alternative to address the supply deficiency was construction of a 10-mgd Surface Water Treatment Plant (SWTP), which would require delivery of raw surface water from MID. This alternative would alleviate the City’s reliance on groundwater, allowing it to diversify its supply portfolio. The City could also implement conjunctive use of surface water and groundwater to meet future water demands. It is estimated that construction of the SWTP could provide an average of 4,000 afy, starting in 2035. Lastly, the City has identified that it could install six additional groundwater wells with a capacity of 2,500 gpm each (15,000 gpm or 24,200 afy total) to help meet future demands and increase redundancy.

Table 6-2 provides a summary of the City’s current and projected future normal year supplies as presented in the City’s 2020 UWMP. As shown in Table 6-2, the projected groundwater supply is less than the total existing capacity (54,000 gpm or 88,000 afy) and future capacity (73,000 gpm or 118 afy) of the City’s groundwater wells. This is because in the City’s 2020 UWMP, projected future water supplies are assumed to be equivalent to projected future water demands. The City chose to present supplies in this manner because the City only operates groundwater wells as needed to meet water demands, even though the City’s wells could provide more supply.

The availability and reliability of the City’s water supplies in dry years is discussed in Section 7 of this WSA.

Water Source	Water Supply, afy				
	2020 Actual ^(a)	2025 ^(b)	2030 ^(b)	2035 ^(b)	2040 ^(b)
Groundwater – Merced Subbasin	20,076	24,418	26,691	24,935	27,765
Recycled Water	-	-	-	-	-
Merced Irrigation District (MID) Exchange	-	-	60	60	60
Surface Water Treatment Plant (SWTP) using raw water from MID	-	-	-	4,000	4,000
Total	20,076	24,418	26,751	28,995	31,825

(a) Source: City’s 2020 UWMP, Table 6-8.
 (b) Source: City’s 2020 UWMP, Table 6-9.



UC Villages Water Supply Assessment

7.0 WATER SUPPLY RELIABILITY

Water Code Section 10910(c)(4) If the city or county is required to comply with this part pursuant to subdivision (b), the water supply assessment for the project shall include a discussion with regard to whether the total projected water supplies, determined to be available by the city or county for the project during normal, single dry, and multiple dry water years during a 20-year projection, will meet the projected water demand associated with the proposed project, in addition to existing and planned future uses, including agricultural and manufacturing uses.

This section includes a description of constraints that may impact supply, as well as a discussion of the City's supply reliability during normal, single dry, and multiple dry years. The discussion presented in this chapter reflects Chapter 7 of the City's 2020 UWMP and includes more recent updates where information was available.

7.1 Overview of Water Supply Constraints

Determining the supply reliability for the City is difficult because of the complex factors that accompany its water supply sources. These factors have the potential to become water supply constraints, and include legal, environmental, water quality and climatic factors, as summarized below:

- **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 continued implementation of SGMA.
- **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 be passed, it could potentially impact the City's available supply. The recent water supply reductions in the Delta are an example of environmental water needs competing with community water supplies. The City does not anticipate environmental factors influencing groundwater reliability.
- **Water Quality:** 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 a variety of sources. Contaminants in the area include groundwater salinity, nitrate, iron, manganese, arsenic, radio-nucleotides, bacteria, petroleum hydrocarbons, pesticides, trichloroethylene, and perchloroethylene. 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 affecting 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.
- **Climate Factors:** Climate change adds additional uncertainties to water supply planning. Changes to temperatures and precipitation patterns may impact water demands and supply availability. For the City, resource management strategies are being implemented to mitigate potential impacts due to climate change. The strategies include reducing water demand, improving operational efficiency and transfers, and public outreach.



UC Villages Water Supply Assessment

7.2 Summary of Water Supply Reliability

The City relies solely on groundwater for its potable water supply, which is not as susceptible to annual runoff fluctuations as surface water. The City's wells pump from a non-adjudicated groundwater basin (Merced Subbasin) with no limits on pumping. However, the Merced Subbasin has been identified as a high priority basin and is critically overdrafted. Therefore, the future reliability of the groundwater supply for the City will depend on the long-term balance of groundwater extraction and recharge for the subbasin as a whole. The City does have plans to address the overdraft condition, which are discussed in Section 6.3.2.

Table 7-2 shows the City's projected supplies during normal, single dry, and multiple dry years through 2040. As indicated in Table 7-2, the projected supply fluctuates depending on which year and hydrologic condition is considered. The normal year analysis is based on 2009, which was selected by the City to be representative of average conditions based on rainfall records from 2000 to 2020. As shown in Table 7-2, during a normal year, 100 percent of average water supplies are estimated to be available.

The single dry year analysis is based on 2013, which according to rainfall data was the driest year for the City. As shown in Table 7-2, during a single dry year, 120 percent of average water supplies are estimated to be available to the City, which is based on the supply utilized during 2013, the historical dry year. The multiple dry year analysis is based on the period from 2012 to 2016, which was a recent drought, and is the driest five-year historical sequence for the City. As shown in Table 7-2, during the first, second, and third consecutive dry years, 110 to 120 percent of average water supplies are available to the City. The higher than average supplies are due to increased water usage that occurred during the first several years of the 2012 to 2016 drought, to compensate for the lack of precipitation. During the fourth and fifth consecutive dry years, 80 percent of average water supplies are available to the City, which reflects conservation measures enacted in 2015, requiring the City to reduce their usage.

For all hydrologic conditions, the percent of average supply available (80 to 120 percent) is applied to normal year projected future water supplies previously presented in Table 6-2, to achieve the projected water supply numbers shown in Table 7-2. Additional information regarding the reliability of the City's supplies is provided in the City's 2020 UWMP.



UC Villages Water Supply Assessment

Table 7-2. Projected City of Merced Water Supplies

Hydrologic Condition	Percent of Average Supply Available	Projected Water Supply, afy ^(a)			
		2025	2030	2035	2040
Normal Year ^(b)	100%	24,418	26,751	28,995	31,825
Single Dry Year ^(c)	120%	29,301	32,101	34,794	38,190
Multiple Dry Years – Year 1 ^(d)	110%	26,860	29,426	31,895	35,008
Multiple Dry Years – Year 2 ^(d)	120%	29,301	32,101	34,794	38,190
Multiple Dry Years – Year 3 ^(d)	110%	26,860	29,426	31,895	35,008
Multiple Dry Years – Year 4 ^(d)	80%	19,534	21,401	23,196	25,460
Multiple Dry Years – Year 5 ^(d)	80%	19,534	21,401	23,196	25,460

(a) Includes groundwater pumped from the Merced Subbasin, exchanges with MID of 60 afy starting in 2030, and 4,000 afy from the SWTP starting in 2035. Refer to Table 6-9 of the City's 2020 UWMP for details.

(b) Source: City's 2020 UWMP, Table 7-2.

(c) Source: City's 2020 UWMP, Table 7-3.

(d) Source: City's 2020 UWMP, Table 7-4.



UC Villages Water Supply Assessment

8.0 DETERMINATION OF WATER SUPPLY SUFFICIENCY BASED ON THE REQUIREMENTS OF SB 610

Water Code Section 10910(c)(4) If the city or county is required to comply with this part pursuant to subdivision (b), the water supply assessment for the project shall include a discussion with regard to whether the total projected water supplies, determined to be available by the city or county for the project during normal, single dry, and multiple dry water years during a 20-year projection, will meet the projected water demand associated with the proposed project, in addition to existing and planned future uses, including agricultural and manufacturing uses.

Table 8-1 summarizes the projected availability of the City's existing and planned future potable water supplies compared with projected water demands in normal, single dry, and multiple dry years through 2040. Table 8-1 indicates that no supply shortfalls are projected to occur under all scenarios. This is due to the high reliability of the City's groundwater supply, which the City can pump even during a prolonged drought, as described in Section 6.

Pursuant to Water Code Section 10910(c)(4) and based on the technical analysis described in this WSA, the total projected water supplies determined to be available for the Proposed Project during normal, single dry, and multiple dry years during a 20-year projection will meet the projected water demand associated with the Proposed Project, in addition to existing and planned future uses. As stated in Section 3.4, the Proposed Project's water demands were included in future water demand projections presented in the 2020 UWMP and are included in Table 8-1.



UC Villages Water Supply Assessment

Table 8-1. City of Merced Summary of Water Demand Versus Supply During Hydrologic Normal, Single Dry, and Multiple Dry Years

Hydrologic Condition		Supply and Demand Comparison, AF			
		2025	2030	2035	2040
Available Water Supply ^(a)		24,418	26,751	28,995	31,825
Total Water Demand ^(b)		24,418	26,751	28,995	31,825
Potential Surplus (Deficit)		0	0	0	0
Percent Shortfall of Demand		-	-	-	-
Available Water Supply ^(a)		29,301	32,101	34,794	38,190
Total Water Demand ^(c)		29,301	32,101	34,794	38,190
Potential Surplus (Deficit)		0	0	0	0
Percent Shortfall of Demand		-	-	-	-
Multiple-Dry Year 1	Available Water Supply ^(a)	26,860	29,426	31,895	35,008
	Total Water Demand ^(c)	26,860	29,426	31,895	35,008
	Potential Surplus (Deficit)	0	0	0	0
	Percent Shortfall of Demand	-	-	-	-
Multiple-Dry Year 2	Available Water Supply ^(a)	29,301	32,101	34,794	38,190
	Total Water Demand ^(c)	29,301	32,101	34,794	38,190
	Potential Surplus (Deficit)	0	0	0	0
	Percent Shortfall of Demand	-	-	-	-
Multiple-Dry Year 3	Available Water Supply ^(a)	26,860	29,426	31,895	35,008
	Total Water Demand ^(c)	26,860	29,426	31,895	35,008
	Potential Surplus (Deficit)	0	0	0	0
	Percent Shortfall of Demand	-	-	-	-
Multiple-Dry Year 4	Available Water Supply ^(a)	19,534	21,401	23,196	25,460
	Total Water Demand ^(c)	19,534	21,401	23,196	25,460
	Potential Surplus (Deficit)	0	0	0	0
	Percent Shortfall of Demand	-	-	-	-
Multiple-Dry Year 5	Available Water Supply ^(a)	19,534	21,401	23,196	25,460
	Total Water Demand ^(c)	19,534	21,401	23,196	25,460
	Potential Surplus (Deficit)	0	0	0	0
	Percent Shortfall of Demand	-	-	-	-

(a) From Table 7-2 of this WSA.
 (b) From Table 5-2 of this WSA.
 (c) From Table 5-3 of this WSA.



UC Villages Water Supply Assessment

9.0 VERIFICATION OF WATER SUPPLY SUFFICIENCY BASED ON THE REQUIREMENTS OF SB 221

The Proposed Project may also be subject to the requirements of SB 221 (Government Code section 66473.7). SB 221 applies to residential development projects of more than 500 dwelling units (such as the Proposed Project) and requires that the water supplier (the City) provide a written verification that the water supply for the Project is sufficient.

Verification must demonstrate supply sufficiency by showing that water supplies available during normal, single dry, and multiple dry years within a projected 20-year period will meet the projected demand associated with the Proposed Project, in addition to existing and planned future uses, including, but not limited to, agriculture and industrial uses. Per the requirements of SB 221, the following must be considered:

- Historical water deliveries for the previous 20 years
- Supply reduction for specific water use sectors
- Urban water shortage contingency analysis prepared for the UWMP
- Amount of water expected from specified supply projects

The 2020 UWMP and this WSA for the Proposed Project provide the documentation required to comply with SB 221 and demonstrate that the City's supplies are sufficient to meet the projected demand associated with the Proposed Project, in addition to existing and planned future uses. The specific considerations to be evaluated for the SB 221 verification are described below and reference applicable sections of the MPMW 2020 UWMP and this WSA.

9.1 Historical Water Deliveries

The City's historical and current water supplies are summarized in Section 6 of this WSA and described in detail in Chapter 6 of the City's 2020 UWMP. The use of these supplies will continue into the future, as shown in Table 6-2 of this WSA.

Water supply availability and reliability during normal, single dry, and multiple dry years is summarized in Section 7 of this WSA and described in detail in Chapter 7 of the City's 2020 UWMP.

9.2 Projected Water Demand by Customer Sector

Projected potable water demands in the City's service area are described in Section 5 of this WSA and are largely based on information provided in Chapter 4 of City's 2020 UWMP. Projected potable water demand by customer sector within the City's service area is documented in the City's 2020 UWMP and is summarized in Table 9-1.



UC Villages Water Supply Assessment

Table 9-1. Actual and Projected Potable Water Demands by Customer Sector

Water Use Type	Water Demand, AF				
	2020 (Actual) ^(a)	2025 ^(b)	2030 ^(b)	2035 ^(b)	2040 ^(b)
Single Family	10,303	12,531	13,729	14,880	16,333
Multi-Family	3,257	3,961	4,340	4,704	5,163
Commercial	3,041	3,699	4,052	4,392	4,821
Industrial	411	500	548	594	652
Landscape	1,664	2,024	2,217	2,403	2,638
Losses	1,400	1,703	1,865	2,022	2,219
Potable Water Demand Total	20,076	24,418	26,751	28,995	31,825

(a) City's 2020 UWMP, Table 4-3.
 (b) City's 2020 UWMP, Table 4-4.

9.3 Water Shortage Contingency Analysis

The City's WSCP, included as Appendix I of the City's 2020 UWMP, describes the City's strategic plan in preparation for and response to water shortages. It includes water shortage levels and associated actions that will be implemented in the event of a water supply shortage, including situations when catastrophic water supply interruptions occur due to a regional power outage, earthquake, or other disasters; and when drought occurs. The City's legal authorities, communication protocols, compliance and enforcement, and monitoring and reporting are included in the WSCP. Merced Municipal Code Chapter 15.42 supports the City's WSCP actions.

The six standard water shortage levels outlined in the City's WSCP are intended to promote the proper management and distribution of water supplies during a drought or emergency situation. Each of the six shortage levels corresponds to a specific water demand reduction goal, based on the potential supply cutbacks during times of drought, with up to and greater than a 50 percent supply reduction as mandated by the UWMP Act. Each shortage level describes specific actions to be taken to achieve those goals.

If an emergency or drought condition were to occur that requires the City to implement its WSCP, all of the City's customers, including those within the Proposed Project, would be subject to the same water conservation and water use restrictions included in the 2020 WSCP.

9.4 Future Water Supplies to Serve Future Water Demands

As described in this WSA, the following water supplies will be used to serve the projected City water demands, including the projected water demands associated with buildout of the Proposed Project:

- **Groundwater from the Merced Subbasin** – Groundwater will be pumped from the City's existing 20 production wells with a total capacity of 54,400 gpm. In the future, groundwater may also be pumped from the City's six future groundwater wells, which are planned to have a total capacity of 15,000 gpm.



UC Villages Water Supply Assessment

- **Merced Irrigation District Exchange** – MID may provide 60 afy of surface water for the City to use in exchange for the City providing recycled water to MID for use irrigating crops.
- **Surface Water Treatment Plant** – Construction of a 10-mgd SWTP would require delivery of raw surface water from MID. If constructed, it is estimated that the SWTP could provide an average of 4,000 afy, starting in 2035.

The availability and reliability of these supplies are described in Section 7 of this WSA.

9.5 Verification of Sufficient Water Supply

As described in Section 8 of this WSA, the total projected water supplies determined to be available for the Proposed Project during normal, single dry, and multiple dry years during a 20-year projection will meet the projected water demand associated with the Proposed Project, in addition to existing and planned future uses, including, but not limited to, agricultural and industrial uses.



UC Villages Water Supply Assessment

10.0 WATER SUPPLY ASSESSMENT APPROVAL PROCESS

10910 (g)(1) Subject to paragraph (2), the governing body of each public water system shall submit the assessment to the city or county not later than 90 days from the date on which the request was received. The governing body of each public water system, or the city or county if either is required to comply with this act pursuant to subdivision (b), shall approve the assessment prepared pursuant to this section at a regular or special meeting.

The Merced City Council must approve this WSA at a regular or special meeting. This WSA will be included in the Draft EIR being prepared for the Proposed Project.



UC Villages Water Supply Assessment

11.0 REFERENCES

AECOM, 2014. *City of Merced Water Master Plan*. January 2014.

Black Water Consulting Engineers, Inc., 2021. *City of Merced 2020 Urban Water Management Plan*. August 2021.

City of Merced Planning Division, 2024. *Notice of Preparation of a Draft Environmental Impact Report (EIR) for the UC Villages Project*. March 29, 2024.

Water Demand Projections Worksheet (Attachment Q)

ATTACHMENT Q (1 of 3)

WATER DEMAND PROJECTION WORKSHEET

JOB TITLE _____
JOB NUMBER _____
JOB LOCATION _____

CAL. BY _____
CHKD. BY _____
DATE _____

INDOOR WATER DEMAND PROJECTION

A. RESIDENTIAL

1. Multi - Family
_____ Units X 2.2 Persons = _____ Persons

2. Single Family
_____ Units X 3.4 Persons = _____ Persons

_____ Persons X 60* GPD = _____ GPD Projected

B. OFFICE/COMMERCIAL

_____ sqft X 0.13 gpd/sqft = _____ GPD Projected

C. HOTEL

_____ rooms X 195 gpd/room = _____ GPD Projected

D. RESTAURANTS

_____ seats X 30 gpd/seat = _____ GPD Projected

E. ALL OTHERS SEE PAGE 3: = _____ GPD Projected

LANDSCAPING WATER DEMAND PROJECTION

A. RESIDENTIAL

17 gpd X _____ persons = _____ GPD Projected

B. COMMERCIAL

_____ sqft X 3.5 cuft of water /sqft of
landscape per year = _____ CUFT/YR

To convert to GPD:

_____ cuft/yr X 7.48 gal/ X 1 yr/ = _____ GPD Projected
cuft 365 days

TOTAL DOMESTIC WATER DEMAND PROJECTION

INDOOR + LANDSCAPING PROJECTION = _____ GPD Projected

* From SFPUC Demand Study by URS, " Projected Water Usage for BAWSCA Agencies " ,
Tech Memo of August 2006.

ATTACHMENT Q (2 of 3)

WATER DEMAND PROJECTION WORKSHEET OCCUPANT LOADS

JOB TITLE _____
JOB NUMBER _____
JOB LOCATION _____

CAL. BY _____
CHKD. BY _____
DATE _____

DESIGNED USE OF THE FACILITY	OCCUPANT LOAD OF FLOOR AREA
A. SCHOOL/CLASSROOM	20 sqft/person
B. HEALTH CLUB	50 sqft/person/shift (3 shifts per day)
C. MANUFACTURING AREAS	200 sqft/person
D. NURSERIES (DAY-CARE)	35 sqft/person
E. STORAGE FACILITIES	300 sqft/person

ATTACHMENT Q (3 of 3)

WATER DEMAND PROJECTION WORKSHEET UNIT LOADS

JOB TITLE _____
JOB NUMBER _____
JOB LOCATION _____

CAL. BY _____
CHKD. BY _____
DATE _____

TYPE OF ESTABLISHMENT

VOLUME OF CONSUMPTION/DAY

Assembly Halls	2 gal per seat
Bowling Alley	75 gal per lane
Churches	7 gal per seat
Dance Halls	2 gal per person
General Hospitals	0.27 gal per sqft
Health Clubs	25 gal per person
Laundries	400 gal per machine
Manufacturing (excluding industrial usage)	30 gal per person/shift
Motels with bath, toilet and kitchen wastes	170 gal per room
Nursing homes/Daycare	75 gal per person
Medical Offices (other than hospitals)	0.18 gal per sqft
Research and Development	0.21 gal per sqft
Schools	35 gal per person
Service Station	750 gal per bay
Storage facilities	1 gal per person
Stores (Retail type)	450 gal per 25 ft frontage
(Food -- non-restaurant type)	900 gal per 25 ft frontage
Trailer parks or tourist camps (with built-in bath)	50 gal per person