Appendix L

Water Supply Assessment

QK, July 2021

WATER SUPPLY ASSESSMENT

CITY OF MERCED

THE CROSSINGS
MIXED-USE DEVELOPMENT

JULY 2021

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THE CROSSINGS
MIXED-USE DEVELOPMENT

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Project #160188/6.1

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SECTION 1 - INTRODUCTION

1.1 - General

Senate Bill 610 (Chapter 643, Statutes of 2001) and Senate Bill 221 (Chapter 642, Statutes of 2001) amended State law, effective January 1, 2002, improves the link between information on water supply availability and certain land use decisions made by cities and counties. SB 610 and SB 221 are companion measures that seek 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 city and county decisionmakers prior to approval of specified large development projects. Both statues also require this detailed information to be included in the administrative record that serves as the evidentiary basis for an approval action by the city or county on such projects. Both measures recognize local control and decision making regarding the availability of water for projects and the approval of projects.

Under SB 610, water assessments must be furnished to local governments for inclusion in any environmental documentation for certain projects (as defined in Water Code 10912[a]) subject to the California Environmental Quality Act (CEQA). Under SB 221, approval by a city or county of such developments requires an affirmative written verification of sufficient water supply (see Appendix A). However, not every project that is subject to the requirements of SB 610 would also require the mandatory water verification of SB 221. Conversely, not every project that is subject to the requirements of SB 221 would also require the environmental document to contain an SB 610 water assessment.

The Merced Groundwater Subbasin Groundwater Sustainability Plan (SGMA) was adopted in January of 2020 (see Appendix E for the Executive Summary of the Plan). The Plan has deferred consideration and adoption of constraints on urban area water usage until an unspecified date in Plan implementation. It is assumed that such constraints on urban groundwater usage may be imposed. However, the analyses in this water supply assessment will err on the side of caution; they will continue to be based on existing estimated and projected flows.

1.2 - Project Location

The Project is a proposed plan for the development of 28.6 acres near the University of California, Merced to be annexed to the City for development approval and Project implementation.

The location of the Project is depicted on Figures 1-1 and 1-2.

1.3 - Project Description

The Project's proposed land uses are depicted on Figure 1-3. Table 1-1 summarizes the proposed land use categories, numbers of proposed residential units and estimated related population. The land uses include 540 residential units, 111,000 square feet of mixed-use

structures (66,000 square feet of retail and 45,000 square feet of residential), a stormwater retention basin, 1,136 parking spaces, and a clubhouse.

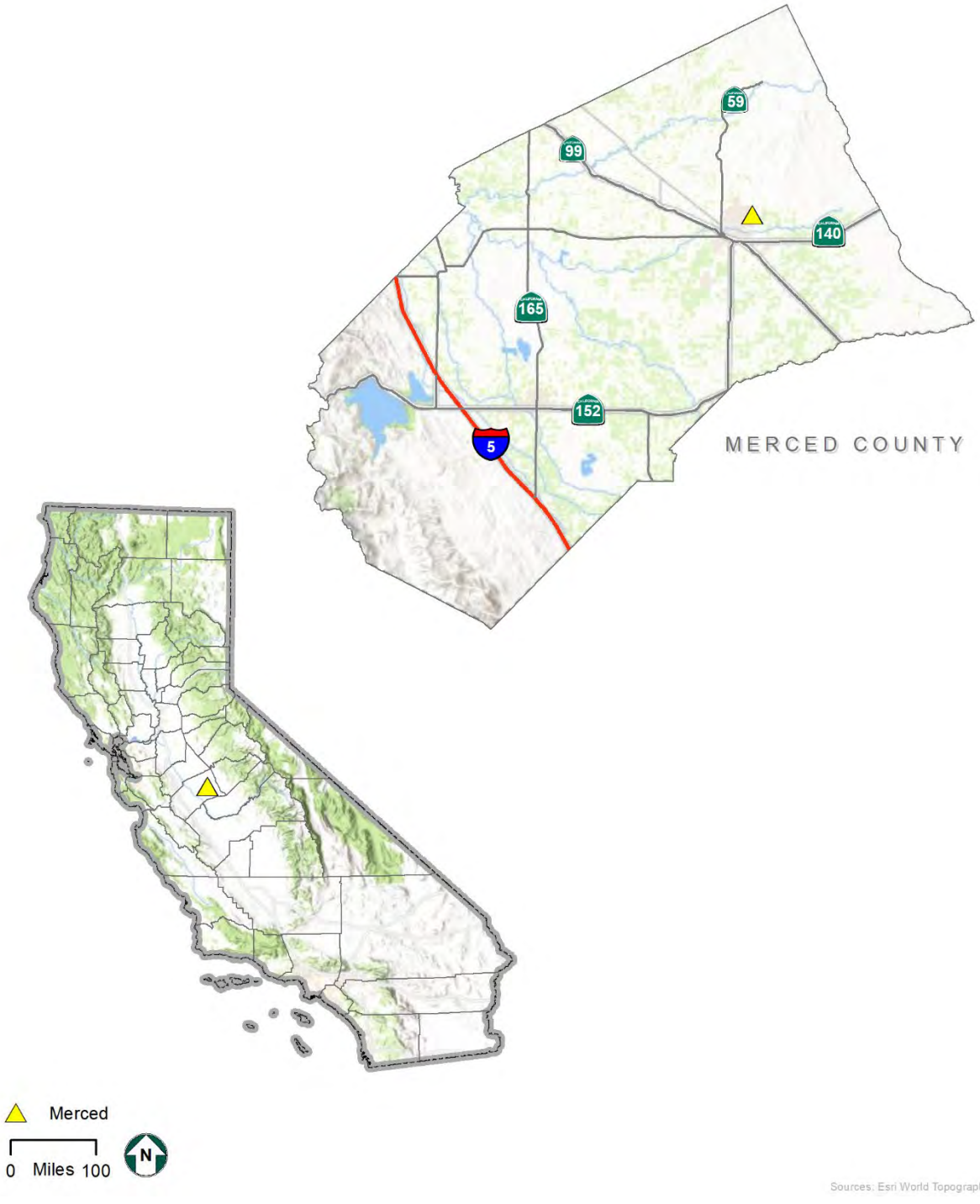


Figure 1-1
Project Location - Regional

Figure 1-2
Project Location in Merced

Figure 1-3
Project Site Plan

Table 1-1
Project Land Uses

Proposed Buildings	Square Footage
Residential	
20 Multi-story Buildings	26,015/bldg.
(540 residential units)	520,300
Clubhouse	13,700
Total	**534,000**
Mixed-Use	
First Floor Total (Commercial/Retail)	66,000
Second Floor Total (Residential)	45,000
30 residential units	
Total	**111,000**
Proposed Parking	**Spaces**
Residential	813
Retail	323
Total	**1,136**

Based on the commonly accepted Valley usage of 65 gallons per capita per day, and the City's average household size of 3.2 people, water usage for each of the 570 dwelling units within the project would be208 gallons per day (3.2 x 65) and the annual water demand for all of the 570 dwelling units would be approximately 133 acre-feet per year [(208 x 570 x 365/1,000,000) x 3.07[1]].

Given the proximity of the project to the University of California, Merced, it is not unreasonable to assume that some of the available units could be occupied by students. The average water usage of 39 gallons per day by students is considerably lower than the typical Valley usage rate of 65 gallons per day. This student usage would result in an annual water demand of approximately 80 acre-feet per year with the occupancy level at 3.2 people per dwelling unit. The operational program for Student Housing provides for the control of the number of people per bedroom at One, were as the people per bedroom in the calculations assumed a greater number based on a residential living unit occupancy level in each bedroom. Therefore, the methodology should be considered maximum usage rather than the realistic usage of the project which would likely be considerably less given some student occupancy.

It is estimated that the Project, when completed, will have 147 full-time employees providing residential landscaping maintenance and, in phase three of the development, retail services. Typically, Valley employees will utilize 40 gallons per day. Assuming a 40-hour work week, such usage would create a demand in the order of (240 days x 40 gallons per day x 147) =

[1] Conversion factor to Acre-Feet

1,411,000 gallons per year, four acre-feet per year. It is assumed, to be conservative, that none of the employees' dwell onsite.

The irrigation of the 10.3 acres of landscaping (the non-impervious surface on the site, non-hard surfaced area) has been calculated to be in conformance with MELO's highest usage to require 24 acre-feet per year.

The total annual Project water usage is therefore calculated as:

Table 1-2
Project Water Usage

Multi-Family Housing/Mixed Use	133 acre ft/yr
Employee water usage	4 acre ft/yr
Landscape irrigation	24 acre ft/yr
Total	**161 acre ft/yr**

This usage, considering that 18.3 acres of the Project site is hard surfaced, is approximately (92.6/28.6) 3.24 acre-feet per acre, a reasonable expectation for an intensive urban development utilizing modern water use reduction measures, compared to 2.5 to 4.0 acre-feet per acre for intensive agricultures.

1.3.1 - WATER INFRASTRUCTURE

There is a 16-inch water main on both Yosemite Avenue and Gardner Avenue. The 16-inch water main on Yosemite Avenue is looped with a 12-inch line going south on Parsons, a 16-inch line going south on McKee, and a 12-inch line going north on Paulson Road. The 16-inch main on Gardner Avenue is looped with a 12-inch line going west on Dunn Road (connecting with the 12-inch line on Paulson Road).

The two 16-inch mains would be utilized to supply the anticipated flow requirements for fire, domestic, and landscape irrigation systems. It is contemplated that a 12-inch onsite "main" will be looped through the Project with a backflow device at each end where it connects to the 16-inch mains. Smaller mains and individual service lines to the various buildings will be fed from the 12-inch onsite loop where appropriate. The number and location/spacing of onsite fire hydrants will be determined during the design phase of the Project in accord with City and code requirements.

As is typical for most three-story buildings in Merced and if there is not sufficient water pressure adjacent to the site, there may be a fire booster pump for the fire sprinkler systems for the three-story housing buildings.

Figure 1-4 depicts Project site-adjacent water distribution.

1.4 - Project Water Supply Assessment Timeline

The Project will be built in five phases. The first phase will be the construction of the clubhouse, maintenance building, and the six most southerly residential buildings. The second phase will be the construction of the next six residential buildings north of the first phase with the third phase completing the final six northerly buildings. Lastly, the fourth and fifth phases will be the construction of mixed use and retail buildings 1, 2 and 3 and then buildings 4 and 5, respectively. These final two phases are dependent on the leasing activity of the first three phases, as phases four and five will be built as key tenants are identified.

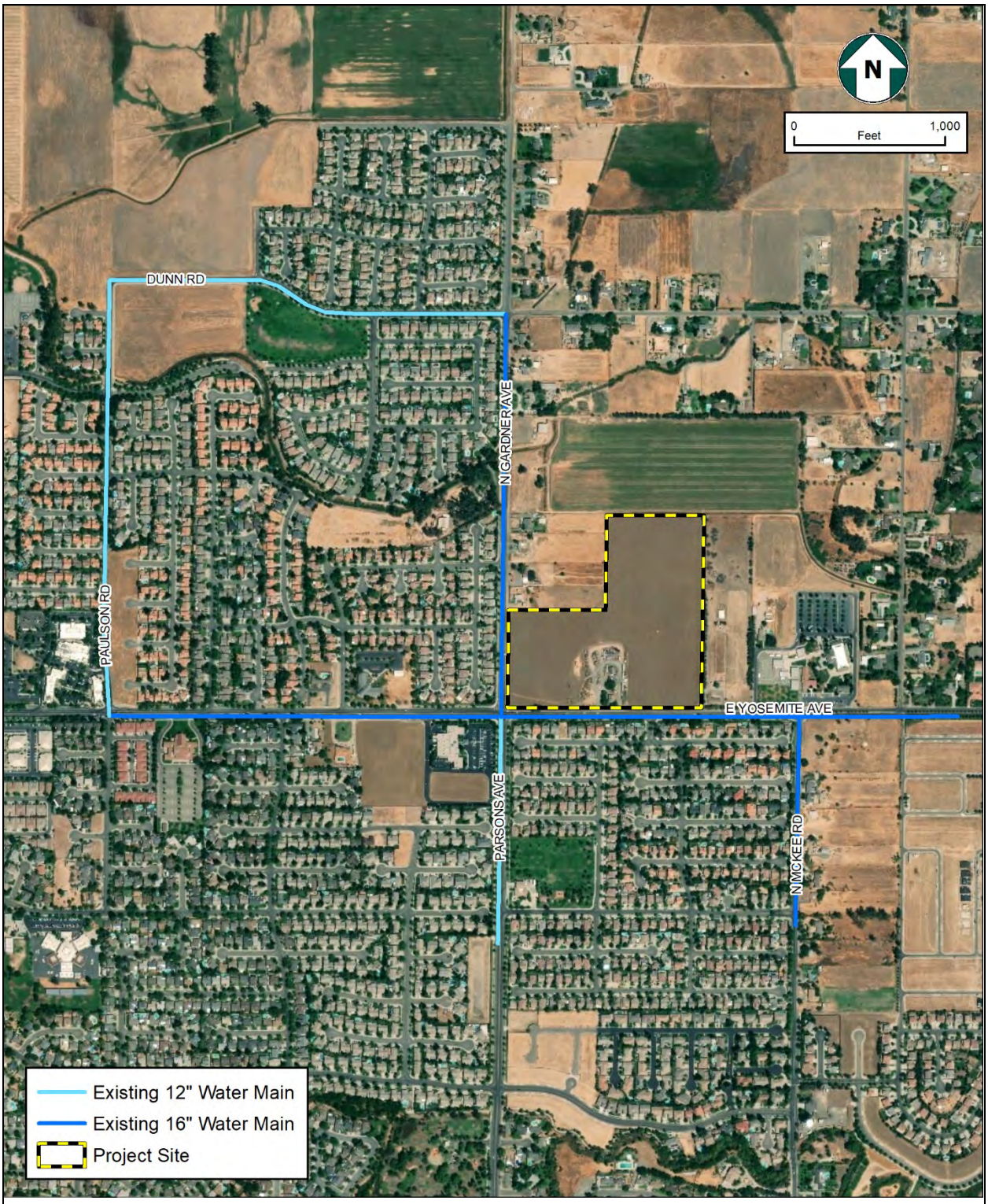


Figure 1-4
City of Merced Water System's Project Water Distribution Facilities

The Project for which this Water Supply Assessment (WSA) is prepared is internally "calendar timeless." Its growth projections are premised upon its total residential and commercial development additions to existing community development, not upon times of such development, for a 20-year period to approximately 2040.

The WSA is similarly unconstrained by the assumed or probable dates of intensification or modification of existing development restrictions or per capita usage requirements. The Water Code requires evaluation over a 20-year period of project water usage; it implies that such usage consider the impacts of full project development on the available water supply during normal rainfall years, "dry" years, and "multiple-dry" years. The possibility that implementation of Project development may be briefly delayed does not change Project water supply analysis criteria.

SECTION 2 - WATER SUPPLY

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, or the city or county if either is required to comply with this part pursuant to subdivision (b), under the existing water supply entitlements, water rights, or water service contracts.

(2) An identification of existing water supply entitlements, water rights, or water service contracts held by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), shall be demonstrated by providing information related to all of the following:

(A) Written contracts or other proof of entitlement to an identified water supply.

(B) Copies of a capital outlay program for financing the delivery of a water supply that has been adopted by the public water system.

(C) Federal, State, and local permits for construction of necessary infrastructure associated with delivering the water supply.

(D) Any necessary regulatory approvals that are required in order to be able to convey or deliver the water supply.

The City of Merced Water Division currently pumps and delivers groundwater to meet the demands of the service area which will include the Project. The City currently has no rights to or contracts for surface water, nor purchases any wholesale water from other agencies with exception to an MOU between the City of Merced and the Merced Irrigation District allowing the purchasing of surface water from Merced Irrigation District. The following sections describe the groundwater subbasin and water supply/water system reliability.

2.1 - Groundwater

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 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 basins that have not been adjudicated, information as to whether the department has identified the basin or basins as over drafted or has been projected that the basin will become over drafted 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…

The area's geohydrologic characteristics are briefly described as:

There are three groundwater aquifers in the Merced Subbasin: an unconfined aquifer, a confined aquifer, and an aquifer in consolidated rocks. The unconfined water body occurs in the unconsolidated deposits above and east of the Corcoran Clay, which underlies the western half of the Subbasin at depths ranging from about 50 to 200 feet, except in the western and southern parts of the area where clay lenses occur and semi-confined conditions exist. The confined aquifer occurs in the unconsolidated deposits below the Corcoran Clay and extends downward to the base of fresh water. The aquifer system in consolidated rocks occurs under both unconfined and confined conditions. The community of Merced is located east of the easterly boundary of the Corcoran Clay. Furthermore, the majority of the wells are located within the City of Merced, however, a portion of the wells are also located within the Corcoran Clay boundary. There is, therefore, no continuous confined aquifer under the community and its well system.

2.2 - Groundwater Usage

The water purveyors in the Merced Subbasin are depicted on Figure 2-1. The Merced Integrated Regional Water Management Plan projected that in 2015 municipalities and urban districts in the Subbasin would pump (all are groundwater-dependent) about 107,000 acre-feet per year; that agricultural district would pump on the order of 400,000 acre-feet per year. These estimates assumed normal precipitation years and surface water usage for agricultural irrigation. They also preceded current reduced community growth rates, and the reductions of per capita per day usage by urban areas which may result from State or SGMA Plan drought-related urban water usage requirements.

Such forecast pumping rates do not reflect actual drought-related pumpage rates (municipality/urban water use reductions, or agricultural water pumpage increases due to surface water source shortage). They more accurately reflect long-term groundwater usage trends as indicators of subbasin water use demands. They are reported here for that purpose only. Estimated pumpage rates reported for 2012 in Merced County's 2030 General Plan Background Report were 54,000 acre-feet of urban demand and 492,000 acre-feet of agricultural pumpage. These rates reflected drought-related reduced urban water use and increased agricultural pumpage because of drought-affected lack of availability of surface water.

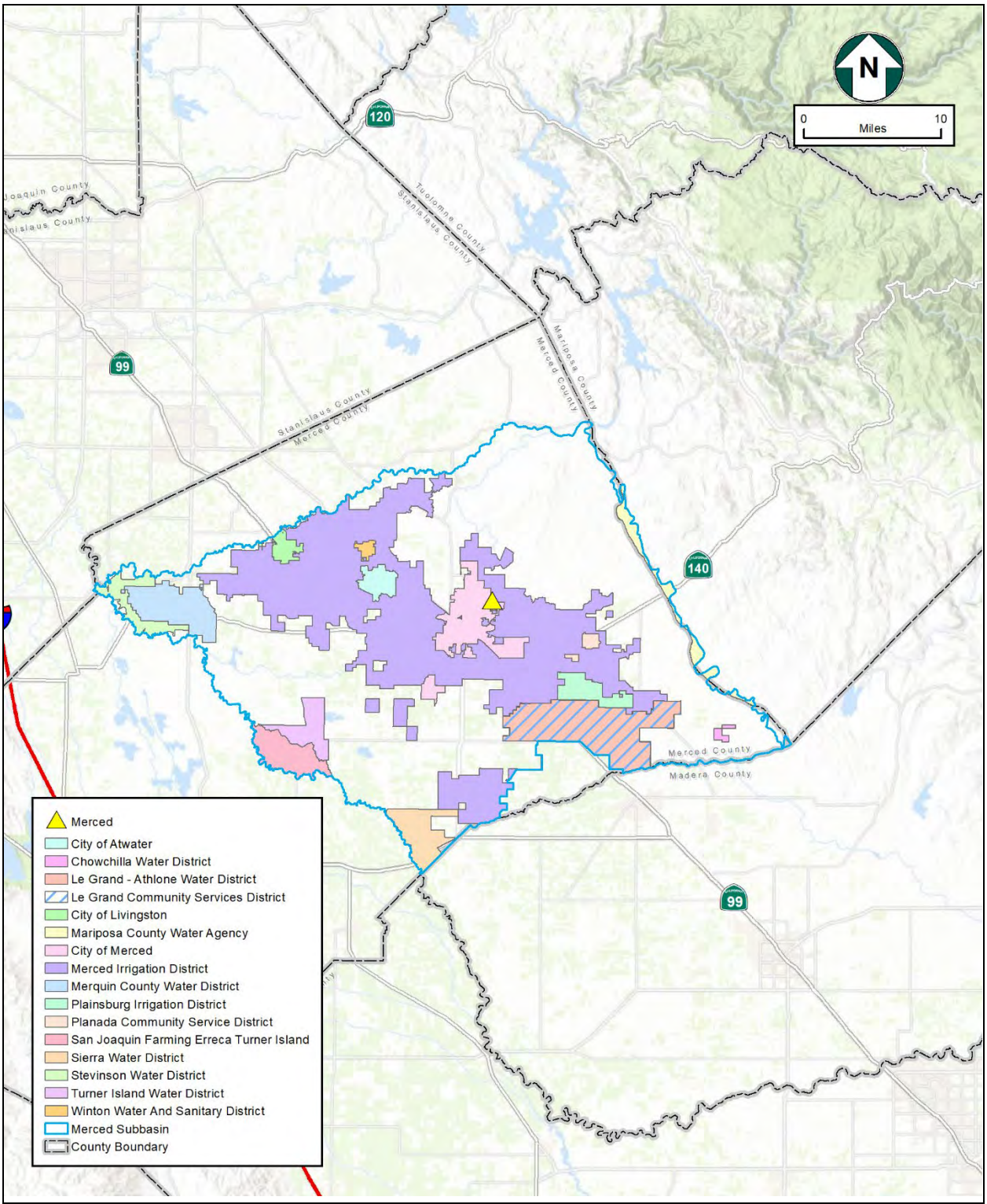


Figure 2-1
Water Purveyors, Merced Subbasin

Agriculture is the dominant land use in Merced County. It is estimated to account for more than 90 percent of all land use. According to the Merced Groundwater Basin Management Plan, most of the water used within the Merced Subbasin has historically been and continues to be used for agricultural purposes (Figure 2-2).

2.3 - Groundwater Subbasin

The Department of Water Resources (DWR) has divided the State into 10 hydrologic regions which have been further divided into basins and subbasins. The Project is located in the San Joaquin Hydrologic Region (Figure 2-3). As described in the 2003 update to Bulletin 118, "California's Groundwater," the Merced Groundwater Basin (MGWB) is a subbasin within the San Joaquin Valley Groundwater Basin of the San Joaquin River Hydrologic Region (Figure 2-4).

The MGWB is located in the San Joaquin Valley, which is surrounded by the Coast Range on the west, the San Emigdio and Tehachapi Mountains on the south, the Sierra Nevada on the east, and the Sacramento-San Joaquin Delta (Delta) and Sacramento Valley on the north. The northern portion of the San Joaquin Valley drains toward the Delta via the San Joaquin River and its tributaries, including the Fresno, Merced, Tuolumne, and Stanislaus Rivers. The southern portion of the Valley is internally drained by the Kings, Kaweah, Tule and Kern Rivers that flow into the Tulare Drainage Basin including the beds of the former Tulare, Buena Vista, and Kern Lakes (DWR, 2003).

The MGWB lies on the eastern side of the San Joaquin Valley, entirely within Merced County, and is generally described as the eastern half of Merced County. For the purposes of this WSA, the northern border of MGWB includes lands south of the Merced River between the San Joaquin River on the west and the crystalline basement rock of the Sierra Nevada foothills on the east. The MGWB boundary on the south and west is the Chowchilla River and the Madera-Merced County line, thence northwest to the San Joaquin River.

Studies undertaken by associations of local water agencies, led by the Merced Irrigation District, have utilized an area only 54 square miles larger than the State, Bulletin 118, MGWB description as more accurately describing the Subbasin from a hydrologic standpoint, terming it the Merced Region. The information provided, and referenced, in this WSA will be based on that Subbasin definition. The terms MGWB and Merced Subbasin will be used interchangeably in the WSA (see Figure 2-2).

The Subbasin has a semi-arid climate, featuring very hot, dry summers and mild, wet winters. Average January temperatures are a maximum of 55 °F and a minimum of 36 °F. Average July temperatures are a maximum of 97.1 °F and a minimum of 60.9 °F. There is an average of 98.7 days with highs of 90 °F (32 °C) or higher and an average of 33.6 days with lows of 32 °F (0 °C) or lower. The record highest temperature of 114 °F was recorded on July 24, 1902, and August 8, 1905. The record lowest temperature of 13 °F was recorded on January 13, 2007.

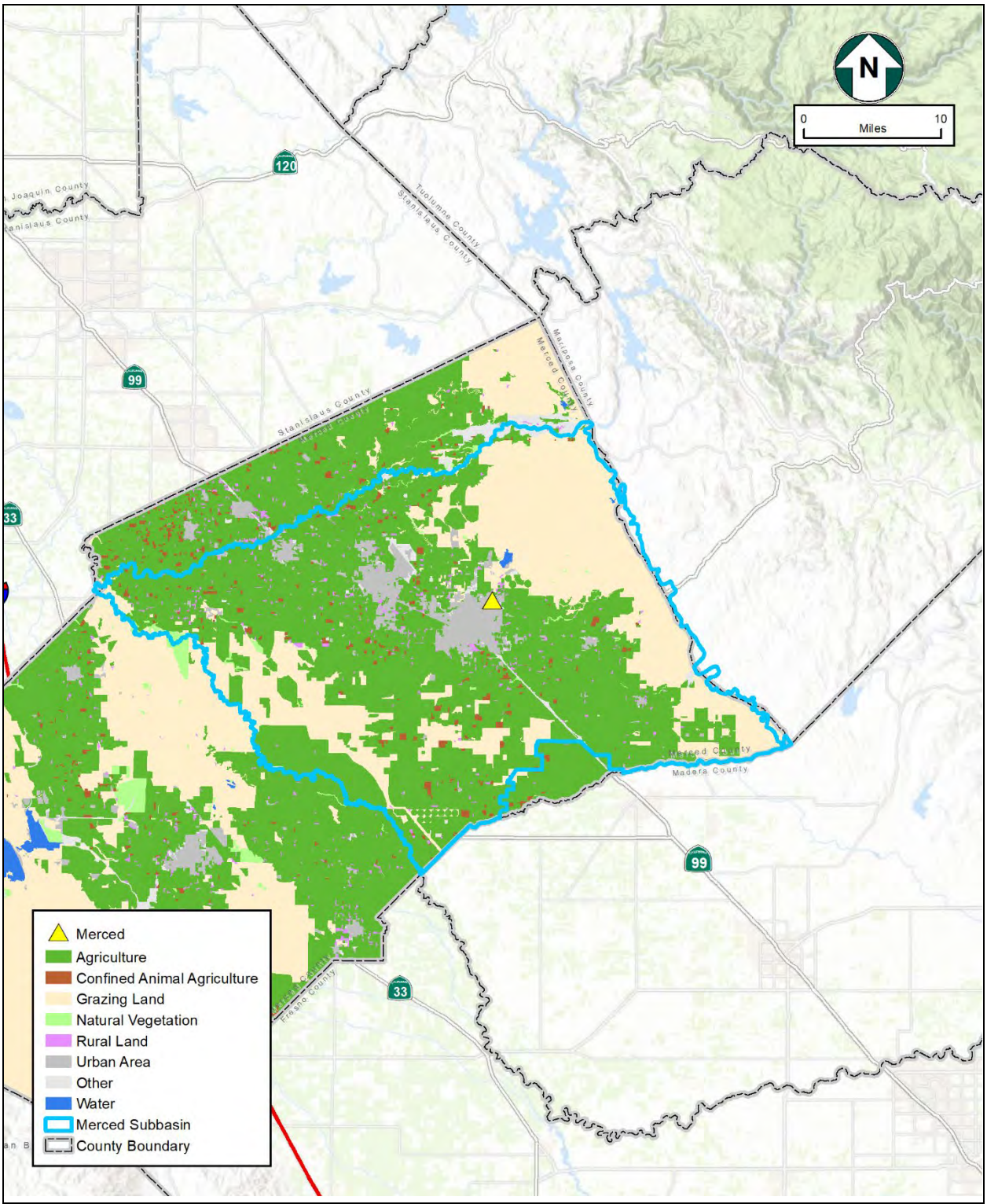


Figure 2-2
Merced Subbasin Land Uses

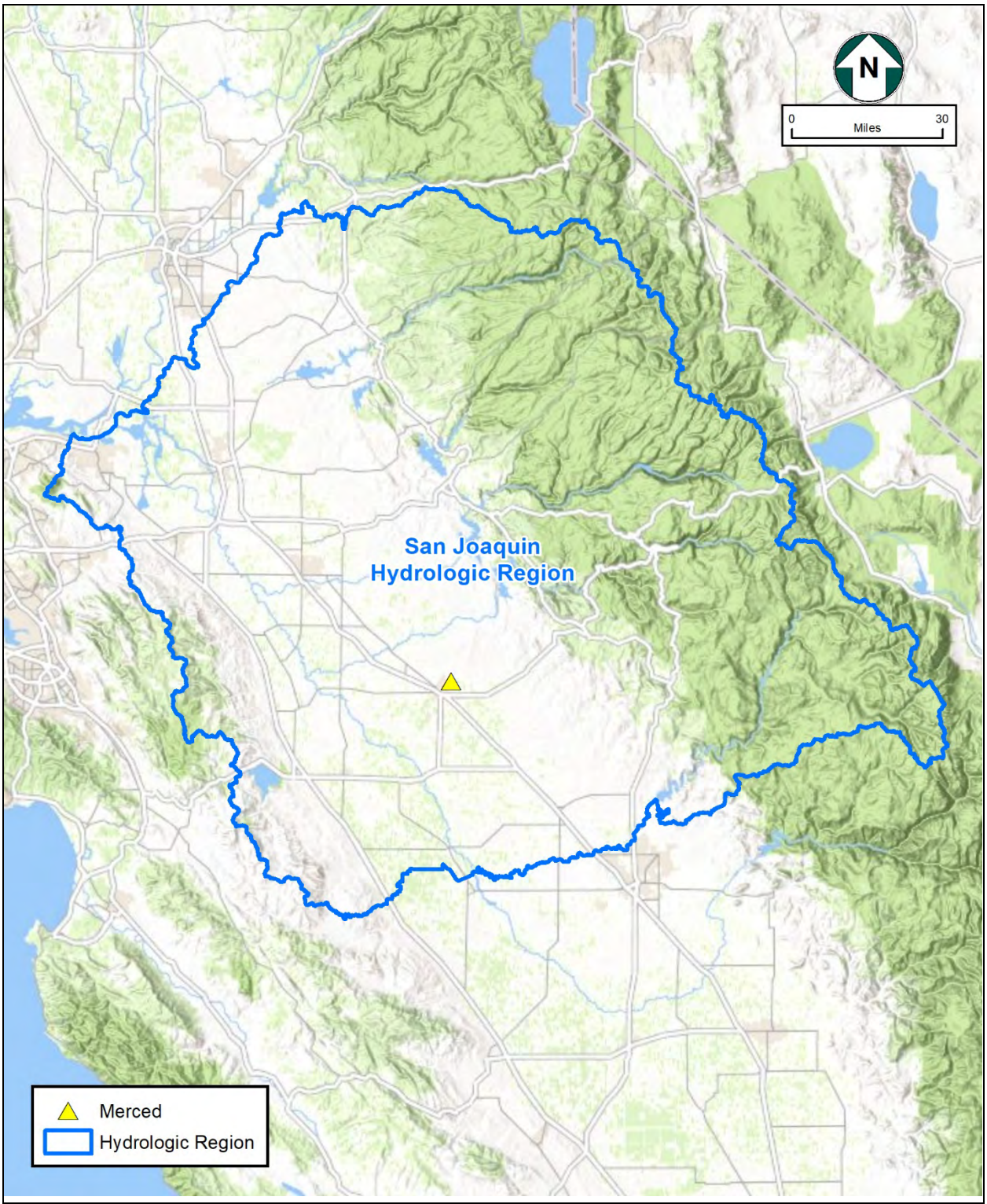


Figure 2-3
Hydrologic Region

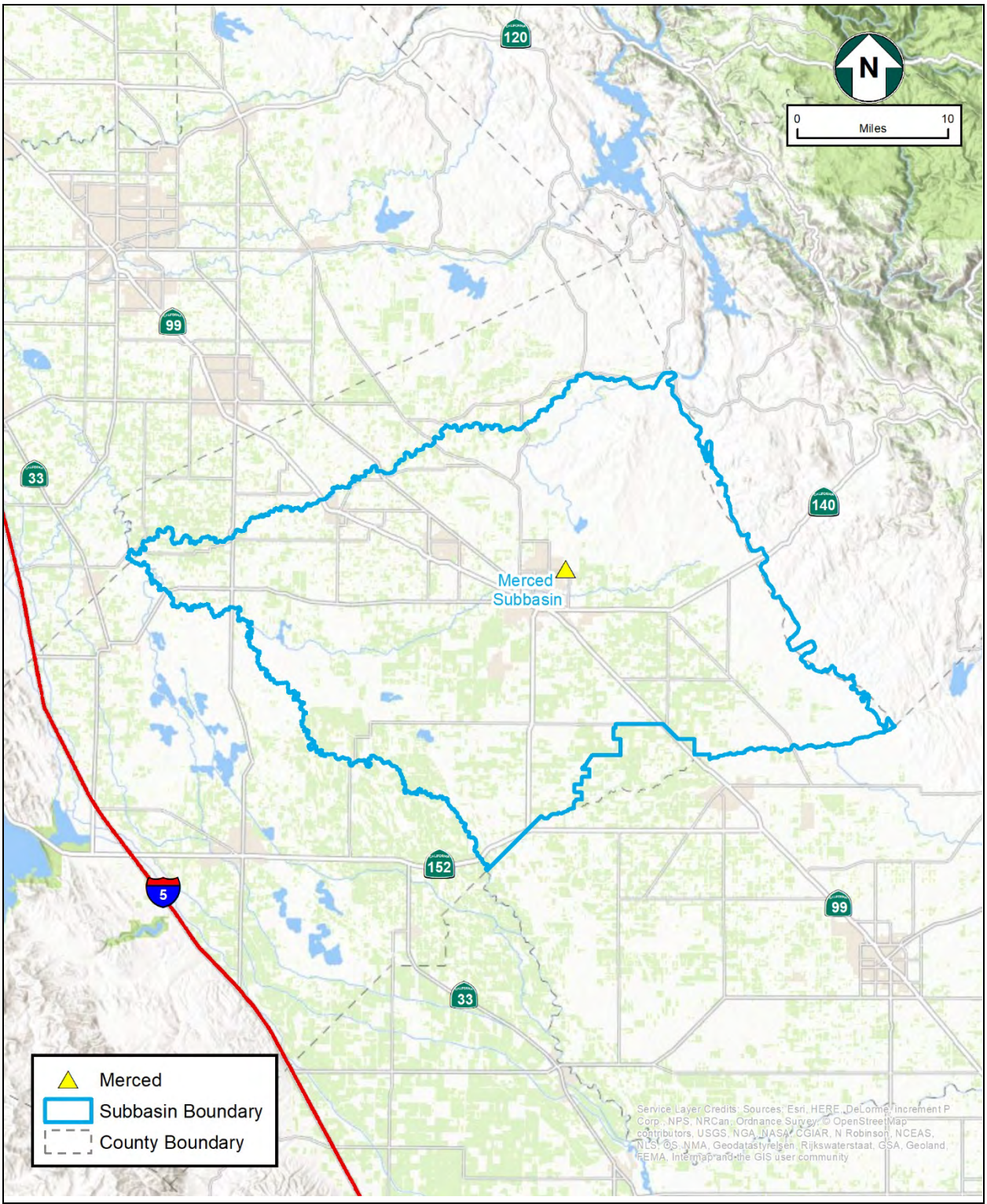


Figure 2-4
Merced Subbasin

Most of the rainfall occurs during the winter and averages 12.21 inches (310 mm) annually. There is an average of 48 days annually with measurable precipitation. The wettest year was 1998 with 21.66 inches (550 mm) and the driest year was 1947 with 5.50 inches (140 mm). The most rainfall in one month was eight inches (203 mm) in January 1909. The most rainfall in 24 hours was 2.20 inches (56 mm), which occurred on January 30, 1911, and March 9, 1911. Although snow is relatively rare in Merced, averaging only 0.6 inches (15 mm) annually, the City's proximity to the Sierra Nevada has resulted in some instances of remarkably heavy snowfall. The record 24-hour snowfall was 13.9 inches (35 cm) on February 16, 1946. The most snowfall in one month was 39.0 inches (99 cm) in December 1906. Table 2-1 depicts climate data.

Agricultural water supplies serving the Region (Figure 2-1) can be grouped into three broad classes.

1. Merced Irrigation District/Stevinson Water District: The largest irrigated area is served by MID with a generally reliable surface water supply available from the Merced River that is adequate to meet customer demands in most years. The MID service area covers about 164,000 acres, of which approximately 140,000 acres are irrigated agricultural land. Some groundwater is pumped within the MID service area by both private landowners and by MID. The category also includes Stevinson Water District, which has a perhaps more reliable surface water source than MID.

2. Other organized agricultural water suppliers: Approximately 72,600 irrigated acres are served by other agricultural water suppliers that rarely, if ever, have adequate surface water supplies to meet agricultural demands. These areas rely on a blend of surface water and groundwater with groundwater being the primary source. The ratio of surface to groundwater supply availability varies widely between these agencies.

3. No organized agricultural water suppliers: Irrigated areas outside the service areas of MID and other agricultural water suppliers rely solely on groundwater supplies for irrigation, with the exception of limited surface water purchases made in some years, subject to availability.

2.4 - Basin Overdraft

Portions of the San Joaquin River Hydrologic Region have been in a state of overdraft for many years. The California Water Plan Update – Bulletin 160-98 estimated annual average groundwater overdraft in the Region to be 239,000 acre-feet at a 1995 level of development. According to the 2008 Merced Area GWMP, Merced Subbasin groundwater levels declined on average approximately 14 feet since 1980, with most of the decline occurring between 1980 and 1996, thus classifying the Subbasin as in a state of mild long-term groundwater level decline. The 2013 IRWMP characterized the Merced Subbasin as being generally in overdraft. In August 2015, the Department of Water Resources defined the Subbasin as being in a state of critical overdraft.

Table 2-1
Merced Subbasin Climate (1899-2016)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Record high °F (°C)	77 (25)	84 (29)	88 (31)	98 (37)	109 (43)	111 (44)	114 (46)	114 (46)	1110 (43)	102 (39)	91 (33)	76 (24)	114 (46)
Average high °F (°C)	54.9 (12.7)	61.6 (16.4)	67.2 (19.6)	74.3 (23.5)	82.6 (28.1)	90.8 (32.7)	97.1 (36.2)	95.3 (35.2)	90.0 (32.2)	79.8 (26.6)	66.2 (19.0)	55.7 (13.2)	76.3 (24.6)
Average low °F (°C)	36.0 (2.2)	38.7 (3.7)	41.2 (5.1)	44.9 (7.2)	50.6 (10.3)	56.4 (13.6)	60.9 (16.1)	58.9 (14.9)	54.8 (12.7)	47.2 (8.4)	39.6 (4.2)	35.6 (2.0)	47.1 (8.4)
Record low °F (°C)	13 (-11)	20 (-7)	20 (-7)	22 (-6)	30 (-1)	37 (3)	39 (4)	35 (2)	32 (0)	28 (-2)	21 (-6)	15 (-9)	13 (-11)
Average precipitation inches (mm)	2.46 (62)	2.17 (55)	1.96 (50)	1.09 (28)	0.44 (11)	0.10 (2.5)	0.01 (0.25)	0.02 (0.51)	0.15 (3.8)	0.60 (15)	1.37 (35)	1.89 (48)	12.27 (312)

Source: Western Regional Climate Center

2.5 - Regional Groundwater Management

The Groundwater Management Act, California Water code (CWC) Section 10753, et. seq., originally enacted as Assembly Bill (AB) 3030, was passed by the State legislature during the 1992 session and became law on January 1, 1993.

The Merced Irrigation District (MID) and the City of Merced prepared a final draft Groundwater Management Plan (GWMP) in 1997 to comply with the legislative requirements of AB 3030. In December 1997, water purveyors within the MGWB signed a Memorandum of Understanding (MOU) creating an association identified as the Merced Area Groundwater Pool Interests (MAGPI) (Appendix B). MAGPI adopted the GWMP in December 1997. The 1997 GWMP served as the initial framework for management of groundwater resources within the MGWB.

In 2002, State Senate Bills (SB) 1938 (Groundwater Management Planning Act of 2002) and SB 1672 (Integrated Regional Water Management Planning Act of 2002) were signed into law. These bills required various changes and additions to existing basin-wide groundwater management plans. In 2008, the 1997 GWMP was adopted and incorporated new components and updates of existing components to address the legislative requirements of SB 1938 and SB 1672. This update incorporated data collected since 1997 and reflected analyses performed subsequent to preparation of the 1997 GWMP.

In 2013 the water purveyors in the Region adopted, and are implementing, the Merced Integrated Regional Water Management Plan (MIRWMP) updating and expanding upon the GWMP.

Since 2019, in compliance with the State's Sustainable Groundwater Management Act, the County of Merced, the Merced Irrigation District, and other agencies are cooperating in formation of State-required Sustainable Groundwater Management Agencies.

The Merced Groundwater Subbasin, as one of the 21 basins in the State of California identified by the California Department of Water Resources as critically overdrafted, is one of 48 basins considered high priority. Thus, consistent with the requirements of the Sustainable Groundwater Management Act (SGMA), water management and land management agencies in the Merced Subbasin have formed three Groundwater Sustainability Agencies (GSAs): The Merced Subbasin Groundwater Sustainability Agency (MSGSA), the Merced Irrigation Urban Groundwater Sustainability Agency (MIUGSA), and the Turner Island Water District Groundwater Sustainability Agency (TIWDGSA). The three GSAs were collaborating on development of one Groundwater Sustainability Plan for the entire Merced Groundwater Subbasin. The combined GSP was completed, adopted, and submitted by January 2020 to the State. (see Figure 2-5 for the inter-Agency boundaries).

The City of Merced is a part of the Merced Irrigation Urban Groundwater Sustainability Agency. It will be a participant in implementing the Plan after its adoption.

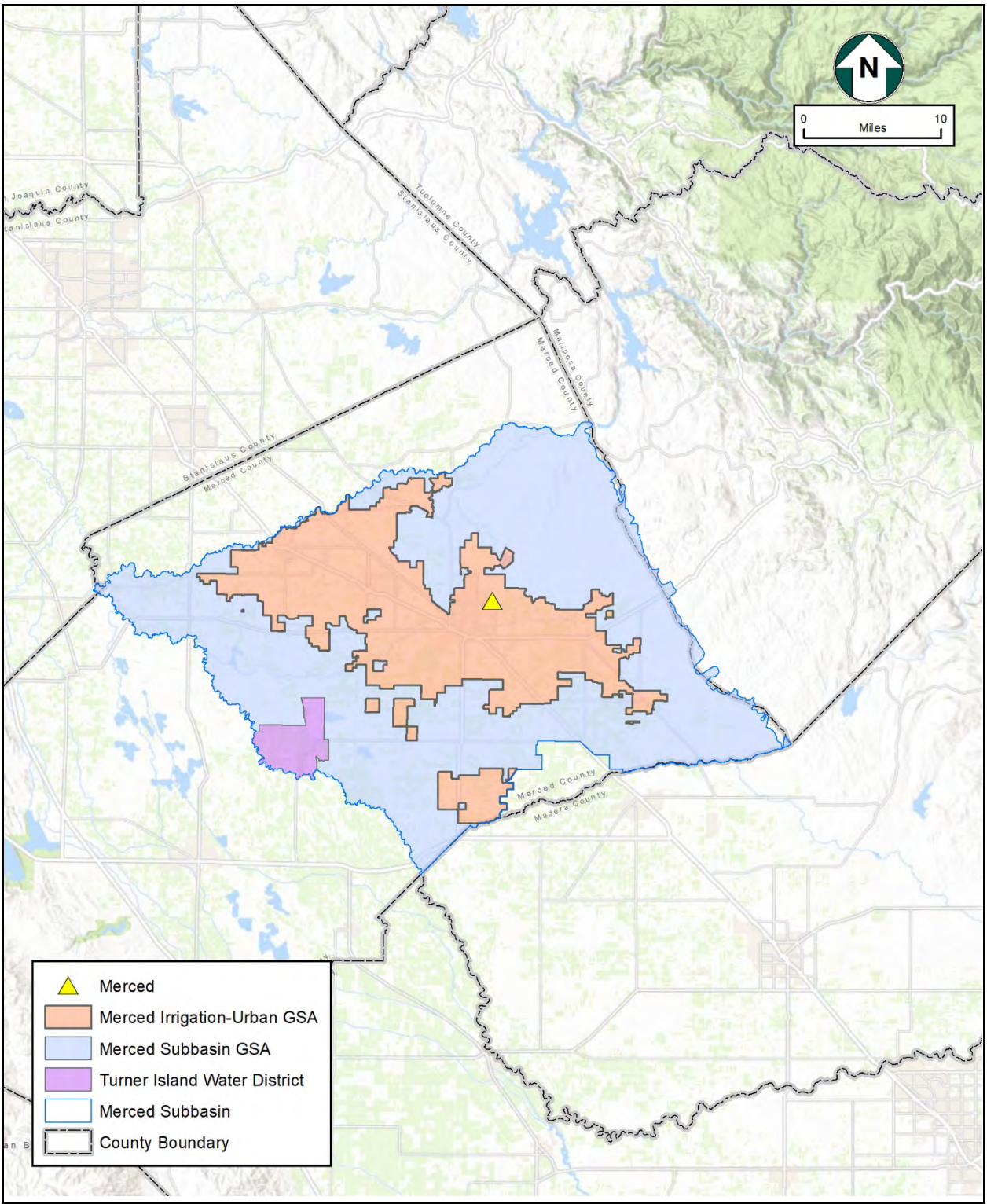


Figure 2-5
Merced Subbasin Groundwater Sustainability Agencies

The draft Plans prepared by the three agencies in the Subbasin have been completed and were circulated for comments and were coordinated prior to the January submittal to the State. Based on the information in the MIUGSA draft it will be necessary to plan and implement groundwater management programs to achieve subbasin groundwater sustainability in the Subbasin, as required by the State, by 2040. The City of Merced is represented on the MIUGSA advisory and governing committees.

2.6 - Reliability of Groundwater Basin Supply

As a prelude to the analysis of water supply sufficiency for the implementation of the proposed Project, which must consider the sufficiency and reliability of the Basin groundwater resources, the Basin is evaluated as:

- Providing adequate groundwater storage resources

  DWR Bulletin 118 cited an estimate of specific yield for the Merced Subbasin, which was developed by the Department of Water Resources (DWR) in 1995. The estimate was based on specific yields determined on a regional basis, which were used to obtain a weighted specific yield conforming to the Subbasin boundary. The estimated specific yield for the Subbasin was nine percent. The estimated storage capacity in the Subbasin was 21,100,000 acre-feet to a depth of 300 feet and 47,600,000 acre-feet to the base of fresh groundwater. These same calculations gave an estimate of 15,700,000 acre-feet of groundwater to a depth of 300 feet as of 1995.

  Although a current detailed budget is not available for this Subbasin, an estimate of groundwater demand has been calculated based on the 1990 normalized year and a water budget spreadsheet to estimate overall applied water demands, agricultural groundwater pumpage, urban pumping demand and other extraction data.

  Natural recharge into the Subbasin is estimated to be 47,000 acre-feet. Values for subsurface inflow have not been determined. There was approximately 243,000 acre-feet of applied water recharge into the Subbasin in 2012. Annual urban and agricultural extractions were at that juncture 54,000 acre-feet and 492,000 acre-feet, respectively. Other extractions equaled approximately 9,000-acre feet.

  Rather than attempting, for the purposes of this WSA, to prepare a detailed water budget, a worst-case assumption of decreased storage in the Subbasin was premised upon the reported average water level decline from 2012 to 2015. The loss in stored groundwater would have been in the order of 7,000,000 acre-feet in the Subbasin above 300 depth [(10'/225' x 15,700,000], 4.5 percent. This estimated loss occurred during severe drought years with reduced surface water availability, increased groundwater pumping and reduction of groundwater levels and storage volume. The Subbasin, despite its 2015 DWR designation as critically over drafted, currently recharges to some degree in normal rainfall/runoff years. With such recharge, and long-term average precipitation and surface water availability, there is no reasonable likelihood of the Subbasin not being able to provide adequate groundwater storage

resources. It is evident from this analysis that the Subbasin water resource, absent incalculable climatic change-related recharge, will remain a reliable source of groundwater supply. However, the adopted SGMA Plan estimates an annual overdraft of 190,000 acre-feet. The Plan proposes that the overdraft be eliminated with implementation of Plan-incorporated projects and groundwater in usage restriction during the Plan implementation goal of 2040.

- Possessing a consistent usage history of both surface water and groundwater resources which document effective usage of the resources.

  The Region's consistent history of planning and implementing groundwater and surface water usage within the framework of the 1997 Groundwater Management Plan and the 2013 Merced Integrated Regional Water Management Plan demonstrate the effective regional usage of available groundwater resources.

- Protected against groundwater resource deterioration by the Region's comprehensive water resource management programs.

  The leadership of the Merced Irrigation District and the County of Merced, in initiating and planning the regionwide effort led by the three aforementioned GSAs within the subbasin (MSGSA, MIUGSA, TIWDGSA) and all will work towards the implementation of the one Merced Groundwater Subbasin Groundwater Sustainability Plan.

SECTION 3 - WATER SYSTEM SUFFICIENCY

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 assessment:

(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, historic 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, historic use records.

3.1 - Water Service Area and Facilities

The City of Merced's water service area includes the University of California, Merced, which is provided with City water for its potable water needs (see Figure 1-4 and Table 1-1) (the SGMA Plan includes a proposed University well to supplement city water supply). The estimated current population of the served community is 82,000; the buildout (2035) population within existing city boundaries is estimated to be 110,000 plus 32,000 University students. Water service for the total community is provided by the City Water Division and will be so provided for the Project area. (The University, however, is proposing, in the adopted SGMA Plan, to acquire some, limited, surface water rights and supply.). Currently, there is a well located in proximity to the University, however, it is owned by the City.

The District's water system is, for a community of this size and age, well designed, staffed and operated. There are 20 active wells, with well design capacities of 1,500 to 1,900 gallons per minute. Services are metered. All water production is chlorinated.

SECTION 4 - WATER SUPPLY SUFFICIENCY

4.1 - Transfer, Exchange, New Water Supply

Water Code Section 10910

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

(3) 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 40 of subdivision (b) of Section 10631.

The City of Merced has discussed with the Merced Irrigation District the usage of tertiary-treated City wastewater and its 'trade' for tertiary wastewater effluent. It is assumed that this will occur during the 20-year SGMA Plan implementation period, supplementing groundwater usage in multiple-dry years. The City, therefore, anticipates using a small amount of surface water from MID to supplement its water supply in the future.

4.2 - Sufficiency Evaluation and Conclusion

Water Code Section 10910, Section 4.5

(c)(3) If the projected water demand associated with the proposed project was not accounted for in the most recently adopted urban water management plan, or the public water system has no urban water management plan, the water supply assessment for the project shall include a discussion with regard to whether the public water system's total projected water supplies available 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 the public water system's existing and planned future uses, including agricultural and manufacturing uses.

The Subbasin water supply resources analyses in Sections 2 and 3 of this WSA demonstrate that the Basin resource, although over drafted, poses no concern regarding its volumetric adequacy during the planning period of this WSA.

The City of Merced has prepared (2015, 2016, and 2017) analyses in Urban Water Master Plan (UWMP) professional evaluations of the sufficiency of its water supply in normal, dry and multiple-dry years. The Urban Water Master Plan provides, as a premise for these

analyses, City-enforced conservation measures during drought years to enable maintenance of the zero-impact conclusions of its supply and demand.

With the exception of multiple-dry years, in which the "trade" of tertiary level reclaimed water to Merced Irrigation District for an allocation of surface water supply is assumed, the City will rely totally upon its groundwater supply.

A brief summary of the basis of water supply availability and of normal year, dry year, and multiple-dry year projection, the following tables have been extracted from the UWMP, and reviewed and accepted for this WSA.

Table 4-1
Bases of Water Year Data

Year Type	Base Year	Volume Applied (AF)	Percent of Average Supply (%)
Average Year	2010	23,658	100
Single-Dry Year	2013	27,470	110
Multiple-Dry Year	2013	27,470	110
Multiple-Dry Year	2014	25,232	100
Multiple-Dry Year	2015	17,855	70

Notes: Percent of average supply is a comparison between the average year and dry year per capita demands.

The required supply/demand analyses premised upon water years availability assumptions are presented in Tables 4-2, 4-3, 4-4, and 4-5.

Table 4-2
Merced Subbasin Availability Status

	2020 (AF)	2025 (AF)	2030 (AF)	2035 (AF)
Groundwater Supply	25,486	27,408	25,901	27,807
Recycled Water Supply	5,774	5,821	5,869	5,869
Surface Water Supply	0	58	4,105	4,153
Supply Total	31,260	33,287	35,875	37,829
Demand Totals	31,260	33,287	35,875	37,829
Difference	0	0	0	0

Notes: Data for supply is from Table 6.12 in Chapter 6, while demands are from Table 4.4 in Chapter 4.

Table 4-3
Normal Dry Year Supply and Demand Comparison

	2020 (AF)	2025 (AF)	2030 (AF)	2035 (AF)
Groundwater Supply	28,035	30,149	28,491	30,588
Recycled Water Supply	5,774	5,821	5,869	5,869
Surface Water Supply	0	64	4,516	4,568
Supply Total	33,809	36,034	38,876	41,025
Demand Totals	33,809	36,034	38,876	41,025
Difference	0	0	0	0

Notes: Groundwater and surface represent a 100% increase of normal years.

Table 4-4
Single Dry Year Supply and Demand Comparison

	Supply	2020 (AF)	2025 (AF)	2030 (AF)	2035 (AF)
First Year	Groundwater	28,035	30,149	28,491	30,588
	Recycled Water	5,774	5,821	5,869	5,869
	Surface Water	0	64	4,516	4,568
	Supply Totals	33,809	36,034	38,876	41,025
	Demand Totals	33,809	36,034	38,876	41,025
	Difference	0	0	0	0

Table 4-5
Multiple Dry Year Supply and Demand Comparison

	Supply	2020 (AF)	2025 (AF)	2030 (AF)	2035 (AF)
First Year	Groundwater	25,486	27,408	25,901	27,807
	Recycled Water	5,774	5,821	5,869	5,869
	Surface Water	0	58	4,105	4,153
	Supply Totals	31,260	33,287	35,875	37,829
	Demand Totals	31,260	33,287	35,875	37,829
	Difference	0	0	0	0
Third Year	Groundwater	17,840	19,226	21,004	22,372
	Recycled Water	5,774	5,821	5,869	5,869
	Surface Water	0	0	0	0
	Supply Totals	23,614	25,047	26,873	28,241
	Demand Totals	23,614	25,047	26,873	28,241
	Difference	0	0	0	0

Notes:
1. Groundwater and surface water for year 1 represent a 110% increase of normal years.
2. Groundwater and surface for year 2 represent the normal years.
3. Groundwater for year 3 represents a 30% decrease of normal year's total groundwater and surface water supply.

4.3 - City Well and Distribution System Adequacy

Based on the review of the data and analyses in Section 3, the City's pumped water supply and distribution system have historically proven reliable. Continued effective operation and maintenance of the system has been demonstrated. District engineering design standards are in place that meet or exceed American Water Works Association Standards, ensuring that system reliability does not diminish as it is expanded. Funds to maintain and expand the system to meet the continued growth in water demand are collected through State and federal grants, water rates and development fees. The District's adequacy of both pumped water supply and water distribution were demonstrated during a recent five-year drought period and during the recent record single-dry year in that period.

In the evaluation of the City's water system's reliability, Sections 2.1 through 2.6 and 3.1 through 3.7 demonstrate its adequacy. The SB 610 Normal Water Year, Single-Dry Water Year, Multiple-Dry Years supply reliability analysis is provided in Sections 4.1 and 4.2 of this WSA. Project engineering analysis will evaluate whether any modifications in the distribution system are required to satisfy Project buildout, water delivery volumes, and pressures. The City will finance any required wells and distribution system modifications with development impact fees, State or federal grants, or rate adjustments.

4.4 - Lead Agency Action

Water Code Section 10911, Section 5

(g)(1) Subject to paragraph (2), the governing body of each public water system shall submit the assessment to the city or county no 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 County of Merced, in concert with the approval of appropriate environmental impact analysis of the Project, must adopt this Water Supply Assessment.

SECTION 5 - REFERENCES

Adopted Groundwater Sustainability Plan, Merced Groundwater Subbasin, November 2019

California's Groundwater, Bulletin 118, Update 2003, Department of Water Resources

Ordinance No. 1930, *An Ordinance to Prevent the Mining and Export of Groundwater Within the Unincorporated Areas of Merced County*, March 2015

2018 Merced Integrated Regional Water Management Plan, Merced Irrigation District

Irrigated Lands Regulatory Program, East San Joaquin Water Quality Coalition, 2018, Central Valley Regional Water Board

Merced County General Plan Update, 2016, County of Merced

Urban Water Management Plan, 2015, City of Merced, 2017

Merced Groundwater Subbasin Groundwater Sustainability Plan, January 2020

APPENDICES

APPENDIX A

SENATE BILL 610
(CHAPTER 643, STATUTES OF 2001)

Chapter 643, Statutes of 2001 (Senate Bill 610)

An act to amend Section 21151.9 of the Public Resources Code, and to amend Sections 10631, 10656, 10910, 10911, 10912, and 10915 of, to repeal Section 10913 of, and to add and repeal Section 10657 of, the Water Code, relating to water. Approved by Governor October 9, 2001. Filed with Secretary of State October 9, 2001.

The people of the State of California do enact as follows:

SECTION 1. (a) The Legislature finds and declares all of the following:
(1) The length and severity of droughts in California cannot be predicted with any accuracy.

(2) There are various factors that affect the ability to ensure that adequate water supplies are available to meet all of California's water demands, now and in the future.

(3) Because of these factors, it is not possible to guarantee a permanent water supply for all water users in California in the amounts requested.

(4) Therefore, it is critical that California's water agencies carefully assess the reliability of their water supply and delivery systems.

(5) Furthermore, California's overall water delivery system has become less reliable over the last 20 years because demand for water has continued to grow while new supplies have not been developed in amounts sufficient to meet the increased demand.

(6) There are a variety of measures for developing new water supplies including water reclamation, water conservation, conjunctive use, water transfers, seawater desalination, and surface water and groundwater storage.

(7) With increasing frequency, California's water agencies are required to impose water rationing on their residential and business customers during this state's frequent and severe periods of drought.

(8) The identification and development of water supplies needed during multiple-year droughts is vital to California's business climate, as well as to the health of the agricultural industry, environment, rural communities, and residents who continue to face the possibility of severe water cutbacks during water shortage periods.

(9) A recent study indicates that the water supply and land use planning linkage, established by Part 2.10 (commencing with Section 10910) of Division 6 of the Water Code, has not been implemented in a manner that ensures the appropriate level of communication between water agencies and planning agencies, and this act is intended to remedy that deficiency in communication.

(b) It is the intent of the Legislature to strengthen the process pursuant to which local agencies determine the adequacy of existing and planned future water supplies to meet existing and planned future demands on those water supplies.

SEC. 2. Section 21151.9 of the Public Resources Code is amended to read:
21151.9. Whenever a city or county determines that a project, as defined in Section 10912 of the Water Code, is subject to this division, it shall comply with Part 2.10 (commencing with Section 10910) of Division 6 of the Water Code.

SEC. 3. Section 10631 of the Water Code is amended to read:
10631. A plan shall be adopted in accordance with this chapter and shall do all of the following:

(a) Describe the service area of the supplier, including current and projected population, climate, and other 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.

(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 as described in subdivision (a). If groundwater is identified as an existing or planned source of water available to the supplier, all of the following information shall be included in the plan:

(1) A copy of 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.

(2) A description of any groundwater basin or basins from which the urban water supplier pumps groundwater. 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 urban water supplier has the legal right to pump under the order or decree. For basins that have 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 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 eliminate the long-term overdraft condition.

(3) A detailed description and analysis of the amount and location 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.

(4) A detailed description and analysis of the location, amount, and sufficiency 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.

(c) Describe the reliability of the water supply and vulnerability to seasonal or climatic shortage, to the extent practicable, and provide data for each of the following:

(1) An average water year.
(2) A single dry water year.
(3) Multiple dry water years.

For any water source that may not be available at a consistent level of use, given specific legal, environmental, water quality, or climatic factors, describe plans to replace that source with alternative sources or water demand management measures, to the extent practicable.

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

(e) (1) 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, identifying the uses among water use sectors, including, but not necessarily limited to, all of the following uses:

(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.

(2) The water use projections shall be in the same five-year increments as described in subdivision (a). (f) Provide a description of the supplier's water demand management measures. This description shall include all of the following:

(1) A description of each water demand management measure that is currently being implemented, or scheduled for implementation, including the steps necessary to implement any proposed measures, including, but not limited to, all of the following:

(A) Water survey programs for single-family residential and multifamily residential customers.
(B) Residential plumbing retrofit.
(C) System water audits, leak detection, and repair.
(D) Metering with commodity rates for all new connections and retrofit of existing connections.
(E) Large landscape conservation programs and incentives.
(F) High-efficiency washing machine rebate programs.
(G) Public information programs.
(H) School education programs.
(I) Conservation programs for commercial, industrial, and institutional accounts.
(J) Wholesale agency programs.
(K) Conservation pricing.
(L) Water conservation coordinator.
(M) Water waste prohibition.
(N) Residential ultra-low-flush toilet replacement programs.

(2) A schedule of implementation for all water demand management measures proposed or described in the plan.

(3) A description of the methods, if any, that the supplier will use to evaluate the effectiveness of water demand management measures implemented or described under the plan.

(4) An estimate, if available, of existing conservation savings on water use within the supplier's service area, and the effect of such savings on the supplier's ability to further reduce demand.

(g) An evaluation of each water demand management measure listed in paragraph (1) of subdivision (f) that is not currently being implemented or scheduled for implementation. In the course of the evaluation, first consideration shall be given to water demand management measures, or combination of measures, that offer lower incremental costs than expanded or additional water supplies. This evaluation shall do all of the following:

(1) Take into account economic and non-economic factors, including environmental, social, health, customer impact, and technological factors.

(2) Include a cost-benefit analysis, identifying total benefits and total costs.

(3) Include a description of funding available to implement any planned water supply project that would provide water at a higher unit cost.

(4) Include a description of the water supplier's legal authority to implement the measure and efforts to work with other relevant agencies to ensure the implementation of the measure and to share the cost of implementation.

(h) 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, other than the demand management programs identified pursuant to paragraph (1) of subdivision (f), that the urban water supplier may implement to increase the amount of the water supply available to the urban water supplier in average, single dry, and multiple dry 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.

(i) Urban water suppliers that are members of the California Urban Water Conservation Council and submit annual reports to that council in accordance with the "Memorandum of Understanding Regarding Urban Water Conservation in California," dated September 1991, may submit the annual reports identifying water demand management measures currently being implemented, or scheduled for implementation, to satisfy the requirements of subdivisions (f) and (g).

SEC. 3.5. Section 10631 of the Water Code is amended to read:
10631. A plan shall be adopted in accordance with this chapter and shall do all of the following:

(a) Describe the service area of the supplier, including current and projected population, climate, and other 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.

(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 as described in subdivision (a). If groundwater is identified as an existing or planned source of water available to the supplier, all of the following information shall be included in the plan:

(1) A copy of 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.

(2) A description of any groundwater basin or basins from which the urban water supplier pumps groundwater. 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 urban water supplier has the legal right to pump under the order or decree. For basins that have 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 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 eliminate the long-term overdraft condition.

(3) 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.

(4) 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.

(c) Describe the reliability of the water supply and vulnerability to seasonal or climatic shortage, to the extent practicable, and provide data for each of the following:

(1) An average water year.

(2) A single dry water year.

(3) Multiple dry water years. For any water source that may not be available at a consistent level of use, given specific legal, environmental, water quality, or climatic factors, describe plans to supplement or replace that source with alternative sources or water demand management measures, to the extent practicable.

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

(e) (1) 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, identifying the uses among water use sectors, including, but not necessarily limited to, all of the following uses:

(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.

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

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

(1) A description of each water demand management measure that is currently being implemented, or scheduled for implementation, including the steps necessary to implement any proposed measures, including, but not limited to, all of the following:

(A) Water survey programs for single-family residential and multifamily residential customers.
(B) Residential plumbing retrofit.
(C) System water audits, leak detection, and repair.
(D) Metering with commodity rates for all new connections and retrofit of existing connections.
(E) Large landscape conservation programs and incentives.
(F) High-efficiency washing machine rebate programs.
(G) Public information programs.
(H) School education programs.
(I) Conservation programs for commercial, industrial, and institutional accounts.
(J) Wholesale agency programs.
(K) Conservation pricing.
(L) Water conservation coordinator.
(M) Water waste prohibition.
(N) Residential ultra-low-flush toilet replacement programs.

(2) A schedule of implementation for all water demand management measures proposed or described in the plan.

(3) A description of the methods, if any, that the supplier will use to evaluate the effectiveness of water demand management measures implemented or described under the plan.

(4) An estimate, if available, of existing conservation savings on water use within the supplier's service area, and the effect of the savings on the supplier's ability to further reduce demand.

(g) An evaluation of each water demand management measure listed in paragraph (1) of subdivision (f) that is not currently being implemented or scheduled for implementation. In the course of the evaluation, first consideration shall be given to water demand management measures, or combination of measures, that offer lower incremental costs than expanded or additional water supplies. This evaluation shall do all of the following:

(1) Take into account economic and noneconomic factors, including environmental, social, health, customer impact, and technological factors.

(2) Include a cost-benefit analysis, identifying total benefits and total costs.

(3) Include a description of funding available to implement any planned water supply project that would provide water at a higher unit cost.

(4) Include a description of the water supplier's legal authority to implement the measure and efforts to work with other relevant agencies to ensure the implementation of the measure and to share the cost of implementation.

(h) 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, other than the demand management programs identified pursuant to paragraph (1) of subdivision (f), that the urban water supplier may implement to increase the amount of the water supply available to the urban water supplier in average, single dry, and multiple dry 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.

(i) Urban water suppliers that are members of the California Urban Water Conservation Council and submit annual reports to that council in accordance with the "Memorandum of Understanding Regarding Urban Water Conservation in California," dated September 1991, may submit the annual reports identifying water demand management measures currently being implemented, or scheduled for implementation, to satisfy the requirements of subdivisions (f) and (g).
SEC. 4. Section 10656 of the Water Code is amended to read:
10656. An urban water supplier that does not prepare, adopt, and submit its urban water management plan to the department in accordance with this part, is ineligible to receive funding pursuant to Division 24 (commencing with Section 78500) or Division 26 (commencing with Section 79000), or receive drought assistance from the state until the urban water management plan is submitted pursuant to this article.

SEC. 4.3. Section 10657 is added to the Water Code, to read:
10657. (a) The department shall take into consideration whether the urban water supplier has submitted an updated urban water management plan that is consistent with Section 10631, as amended by the act that adds this section, in determining whether the urban water supplier is eligible for funds made available pursuant to any program administered by the department.

(b) This section shall remain in effect only until January 1, 2006, and as of that date is repealed, unless a later enacted statute, that is enacted before January 1, 2006, deletes or extends that date.

SEC. 4.5. Section 10910 of the Water Code is amended to read:
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.

(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 in Section 10912, that may supply water for the project. If the city or county is not able to identify any public water system that may supply water for the project, the city or county shall prepare the water assessment required by this part after consulting with any entity serving domestic water supplies whose service area includes the project site, the local agency formation commission, and any public water system adjacent to the project site.

(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).

(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).

(3) If the projected water demand associated with the proposed project was not accounted for in the most recently adopted urban water management plan, or the public water system has no urban water management plan, the water supply assessment for the project shall include a discussion with regard to whether the public water system's total projected water supplies available 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 the public water system's existing and planned future uses, including agricultural and manufacturing uses.

(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.

(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, or the city or county if either is required to comply with this part pursuant to subdivision (b), under the existing water supply entitlements, water rights, or water service contracts.

(2) An identification of existing water supply entitlements, water rights, or water service contracts held by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), shall be demonstrated by providing information related to all of the following:

(A) Written contracts or other proof of entitlement to an identified water supply.

(B) Copies of a capital outlay program for financing the delivery of a water supply that has been adopted by the public water system.

(C) Federal, state, and local permits for construction of necessary infrastructure associated with delivering the water supply.

(D) Any necessary regulatory approvals that are required in order to be able to convey or deliver the water supply.

(e) If no water has been received in prior years by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), under the existing water supply entitlements, water rights, or water service contracts, the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), shall also include in its water supply assessment pursuant to subdivision (c), 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, or the city or county if either is required to comply with this part pursuant to subdivision (b), has identified as a source of water supply within its water supply assessments.

(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 basins that have 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, historic 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, historic 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 supply 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.

(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.

(2) Prior to the expiration of the 90-day period, if the public water system intends to request an extension of time to prepare and adopt the assessment, the public water system shall meet with the city or county to request an extension of time, which shall not exceed 30 days, to prepare and adopt the assessment.

(3) If the public water system fails to request an extension of time, or fails to submit the assessment notwithstanding the extension of time granted pursuant to paragraph (2), the city or county may seek a writ of mandamus to compel the governing body of the public water system to comply with the requirements of this part relating to the submission of the water supply assessment.

(h) Notwithstanding any other provision of this part, if a project has been the subject of a water supply assessment that complies with the requirements of this part, no additional water supply assessment shall be required for subsequent projects that were part of a larger project for which a water supply assessment was completed and that has complied with the requirements of this part and for which the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), has concluded that its water supplies are sufficient to meet the projected water demand associated with the proposed project, in addition to the existing and planned future uses, including, but not limited to, agricultural and industrial uses, unless one or more of the following changes occurs:

(1) Changes in the project that result in a substantial increase in water demand for the project.

(2) Changes in the circumstances or conditions substantially affecting the ability of the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), to provide a sufficient supply of water for the project.

(3) Significant new information becomes available which was not known and could not have been known at the time when the assessment was prepared.

SEC. 5. Section 10911 of the Water Code is amended to read:
10911. (a) If, as a result of its assessment, the public water system concludes that its water supplies are, or will be, insufficient, the public water system shall provide to the city or county its plans for acquiring additional water supplies, setting forth the measures that are being undertaken to acquire and develop those water supplies. If the city or county, if either is required to comply with this part pursuant to subdivision (b), concludes as a result of its assessment, that water supplies are, or will be, insufficient, the city or county shall include in its water supply assessment its plans for acquiring additional water supplies, setting forth the measures that are being undertaken to acquire and develop those water supplies. Those plans may include, but are not limited to, information concerning all of the following:

(1) The estimated total costs, and the proposed method of financing the costs, associated with acquiring the additional water supplies.

(2) All federal, state, and local permits, approvals, or entitlements that are anticipated to be required in order to acquire and develop the additional water supplies.

(3) Based on the considerations set forth in paragraphs (1) and (2), the estimated timeframes within which the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), expects to be able to acquire additional water supplies.

(b) The city or county shall include the water supply assessment provided pursuant to Section 10910, and any information provided pursuant to subdivision (a), in any environmental document prepared for the project pursuant to Division 13 (commencing with Section 21000) of the Public Resources Code.

(c) The city or county may include in any environmental document an evaluation of any information included in that environmental document provided pursuant to subdivision (b). The city or county shall determine, based on the entire record, whether projected water supplies will be sufficient to satisfy the demands of the project, in addition to existing and planned future uses. If the city or county determines that water supplies will not be sufficient, the city or county shall include that determination in its findings for the project.

SEC. 6. Section 10912 of the Water Code is amended to read:
10912. For the purposes of this part, the following terms have the following meanings:

(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.

(b) If a public water system has fewer than 5,000 service connections, then "project" means any proposed residential, business, commercial, hotel or motel, or industrial development that would account for an increase of 10 percent or more in the number of the public water system's existing service connections, or a mixed-use project that would demand an amount of water equivalent to, or greater than, the amount of water required by residential development that would represent an increase of 10 percent or more in the number of the public water system's existing service connections.

(c) "Public water system" means a system for the provision of piped water to the public for human consumption that has 3000 or more service connections. A public water system includes all of the following:

(1) Any collection, treatment, storage, and distribution facility under control of the operator of the system which is used primarily in connection with the system.

(2) Any collection or pretreatment storage facility not under the control of the operator that is used primarily in connection with the system.

(3) Any person who treats water on behalf of one or more public water systems for the purpose of rendering it safe for human consumption.

SEC. 7. Section 10913 of the Water Code is repealed.

SEC. 8. Section 10915 of the Water Code is amended to read:
10915. The County of San Diego is deemed to comply with this part if the Office of Planning and Research determines that all of the following conditions have been met:

(a) Proposition C, as approved by the voters of the County of San Diego in November 1988, requires the development of a regional growth management plan and directs the establishment of a regional planning and growth management review board.

(b) The County of San Diego and the cities in the county, by agreement, designate the San Diego Association of Governments as that review board.

(c) A regional growth management strategy that provides for a comprehensive regional strategy and a coordinated economic development and growth management program has been developed pursuant to Proposition C.

(d) The regional growth management strategy includes a water element to coordinate planning for water that is consistent with the requirements of this part.

(e) The San Diego County Water Authority, by agreement with the San Diego Association of Governments in its capacity as the review board, uses the association's most recent regional growth forecasts for planning purposes and to implement the water element of the strategy.

(f) The procedures established by the review board for the development and approval of the regional growth management strategy, including the water element and any certification process established to ensure that a project is consistent with that element, comply with the requirements of this part.

(g) The environmental documents for a project located in the County of San Diego include information that accomplishes the same purposes as a water supply assessment that is prepared pursuant to Section 10910.

SEC. 9.
Section 3.5 of this bill incorporates amendments to Section 10631 of the Water Code proposed by both this bill and AB 901. It shall only become operative if (1) both bills are enacted and become effective on or before January 1, 2002, (2) each bill amends Section 10631 of the Water Code, and (3) this bill is enacted after AB 901, in which case Section 3 of this bill shall not become operative.

SEC. 10.
No reimbursement is required by this act pursuant to Section 6 of Article XIII B of the California Constitution because a local agency or school district has the authority to levy service charges, fees, or assessments sufficient to pay for the program or level of service mandated by this act, within the meaning of Section 17556 of the Government Code.

APPENDIX B

CONSISTENCY WITH DWR GUIDELINES

CONSISTENCY WITH DWR GUIDELINES

Guidelines Section Number and Title (DWR, 2003)	Guidelines Direction	Relevant WSA Section and Response
Section 1.0 (page 2). Does SB 610 or SB 221 apply to the proposed project	Is the project subject to SB 610? Is the project subject to CEQA (Water Code §10910(a))? If yes, continue.	WSA Section 1.1. Yes, the project is subject to SB 610 and CEQA.
	Is it a "project" as defined by Water Code §10910(a) or (b)? If yes, to comply with SB 610 go to Section 2.0, page 4.	WSA Section 1.1. Yes, the project is considered to meet the definition of "project" per Water Code §10912(a) or (b).
	Is the project subject to SB 221? Does the tentative map include a "subdivision" as defined by Government Code §66473.7(a)(1)? If no, stop.	Yes.
Section 2.0 (page 4). Who will prepare the SB 610 analysis?	Is there a public water system ("water supplier") for the project (Water Code §10910(b))? If no, go to Section 3.0, page 6.	WSA Section 1.3.Yes, the project sites will be connected to the City of Merced public water system.
Section 3.0 (page 6). Has an assessment already been prepared that includes this project?	Has this project already been the subject of an assessment (Water Code §10910(h))? If no, got to Section 4.0, page 8.	No, the project has not been the subject of an assessment.
Section 4.0 (page 8). Is there a current Urban Water Management Plan?	Is there an adopted urban water management plan (Water Code §10910(c))? If yes, continue. If yes, the information from the UWMP related to the proposed water demand for the project may also be used for carrying out Section 5.0, Steps 1 and 2, Section 7.0; proceed to Section 5.0, page 10 of the Guidelines.	WSA Section 1.3. Yes, there is an adopted UWMP for the project (the City of Merced). Information continued in the UWMP was used in the preparation of the WSA and cited accordingly.
	Is the project water demand for the project accounted for in the most recent UWMP (Water Code §10910(c)(2)? If no, go to Section 5.0, page 10.	No.
Section 5.0 (page 10). What information should be included in an assessment	Step One (page 13) Documenting wholesale water supplies.	The Project is not a retail water supplier and would not include the use of wholesale water supplies.
	Step Two (page 17). Documenting supply if groundwater is a source.	The Merced Subbasin is the proposed water supply.
	Specify if a groundwater management plan or any other specific authorization for groundwater management for the basin has been adopted and how it affects the water supplier's use of the basin.	WSA Section 2.5, in appropriate detail.

Guidelines Section Number and Title (DWR, 2003)	Guidelines Direction	Relevant WSA Section and Response
	Description and analysis of the amount and location of groundwater pumped by the water supplier for the past five years. Include information on proposed pumping locations and quantities. The description and analysis is to be based on information that is reasonably available, including, but not limited to, historic use records from DWR.	WSA Section 3 provides a description of the City's groundwater usage.
	Analysis of the location, amount, and sufficiency of groundwater that is projected to be pumped by the water supplier.	WSA Section 4. The quantity of water banked in the Merced Subbasin is sufficient for the project.
	Step 3 (page 21). Documenting project demand (Project Demand Analysis).	WSA Section 3.3 and Section 4.2.
	Step 4 (page 26). Documenting dry year(s) supply.	WSA Section 4.2.
	Step 5 (page 31). Documenting dry year(s) demand.	WSA Section 4.2.
Section 6.0 (page 33). Is the projected water supply sufficient or insufficient for the proposed project?		WSA Section 5 concludes that identified water supply/supplies are sufficient for the project.
Section 7.0 (page 35). If the projected supply is determined to be insufficient.	Does the assessment conclude that supply is "sufficient"? If no, continue.	WSA Section 4.3 concludes that sufficient water supplies are available for the project.
Section 8.0 (page 38). Final SB 610 assessment actions by lead agencies.	The lead agency shall review the WSA and must decide whether additional water supply information is needed for its consideration of the proposed project. The lead agency "shall determine, based on the entire record, whether projected water supplies will be sufficient to satisfy the demands of the project, and in addition to existing and planned future uses."	The WSA for the project must be approved prior to or in concurrence with the EIR.
	The description of the groundwater basin may be excerpted from the groundwater management plan, from DWR Bulletin 118, California's Groundwater, or for some other document that has been published and that discusses the basin boundaries, type of rock that constitutes the aquifer,	WSA Sections 2.3 and 2.4 includes the data from and refences to the Urban Water Master Plan's and DWR Bulletin 118's further data.

Guidelines Section Number and Title (DWR, 2003)	Guidelines Direction	Relevant WSA Section and Response
	variability of the aquifer material, and total groundwater in storage (average specific yield times the volume of the aquifer).	
	In an adjudicated basin the amount of water the urban supplier has the legal right to pump should be enumerated in the court decision.	Not applicable; the Basin is not adjudicated.
	The Department of Water Resources has projected estimates of overdraft, or "water shortage," based on projected amounts of water supply and demand (basin management) are projected by the Watermaster Agency (AVEK) in WSA Section 3.2, the hydrologic region level in Bulletin 160, California Water Plan Update. Estimates at the basin or subbasin level will be projected for some basins in Bulletin 118. If the basin has not been evaluated by DWR, data that indicate groundwater level trends over a period of time should be collected and evaluated.	Basin groundwater resources are discussed in WSA Sections 2.4 and 2.5.
	If the evaluation indicates an overdraft due to existing groundwater extraction, or projected increases in groundwater extraction, describe actions and/or programs designed to eliminate the long-term overdraft condition.	WSA Section 2.5. the referenced 2015 Urban Water Master Plan describes in detail the subject actions and programs, as does the currently proposed SGMA Plan.

APPENDIX C

MERCED GROUNDWATER SUBBASIN
GROUNDWATER SUSTAINABILITY PLAN DRAFT REPORT
EXECUTIVE SUMMARY

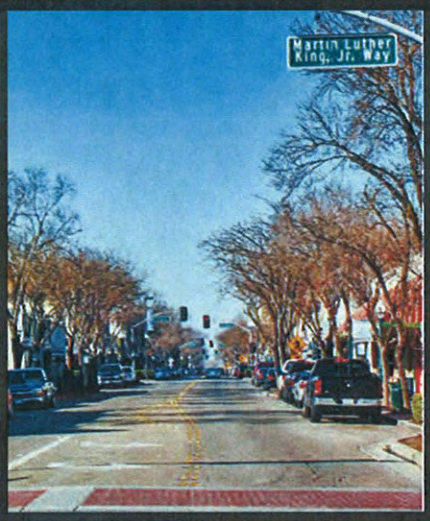
MERCED SGMA

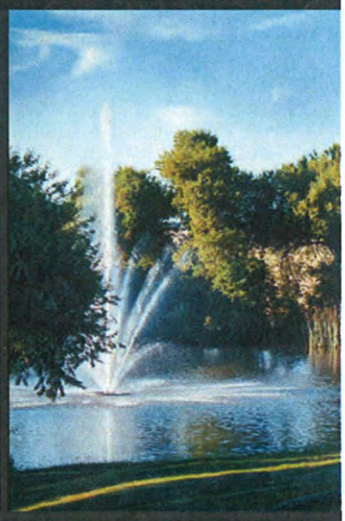
Merced Groundwater Subbasin

GROUNDWATER SUSTAINABILITY PLAN

Draft Report — Executive Summary

Image courtesy Veronica Adrover/UC Merced





July 2019

EXECUTIVE SUMMARY

ES-1. INTRODUCTION AND PLAN AREA

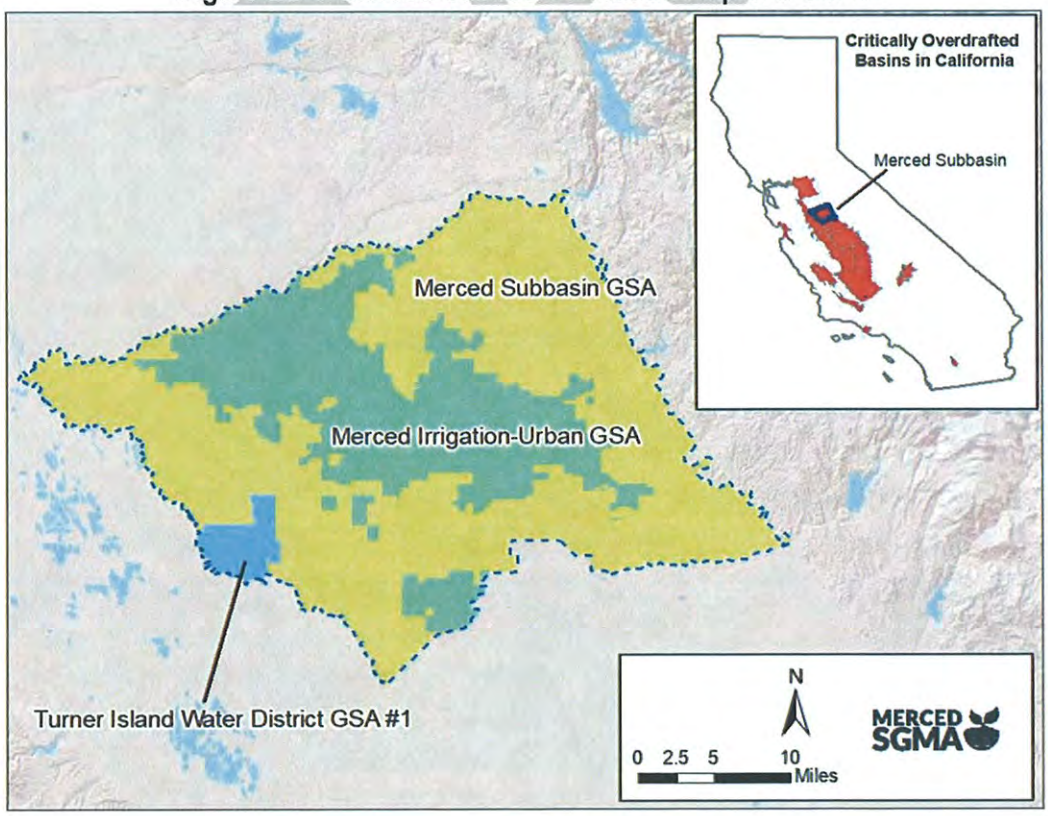
The Sustainable Groundwater Management Act (SGMA), passed in 2014, requires the formation of local Groundwater Sustainability Agencies (GSAs) to oversee the development and implementation of Groundwater Sustainability Plans (GSPs), with the ultimate goal of achieving sustainable management of the State's groundwater basins. The purpose of this Groundwater Sustainability Plan is to bring the Merced Groundwater Basin (Merced Subbasin), a critically overdrafted basin located within the San Joaquin Valley (see Figure ES-1), into sustainable groundwater management by 2040. The Subbasin is heavily reliant on groundwater, and users recognize the basin has been in overdraft for a long period of time.

The County of Merced and water districts and cities within the Merced Subbasin formed three GSAs in accordance with SGMA: Merced Irrigation-Urban Groundwater Sustainability Agency (MIUGSA), Merced Subbasin Groundwater Sustainability Agency (MSGSA), and Turner Island Water District Groundwater Sustainability Agency #1 (TIWD GSA-1) (see Figure ES-1). The three GSAs coordinated efforts to develop this GSP for the Subbasin. With the adoption of this GSP, the GSAs will adopt the following sustainability goal for the Merced Subbasin:

> **"Achieve sustainable groundwater management on a long-term average basis by increasing recharge and/or reducing groundwater pumping, while avoiding undesirable results."**

This goal will be achieved by allocating a portion of the estimated Subbasin sustainable yield to each of the three 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 in the Subbasin.

Figure ES-1: Merced Subbasin Location Map and GSAs



Development of the GSP was guided by a Coordinating Committee composed of members appointed by the GSA Boards to provide recommendations on technical and substantive basin-wide issues. The Coordinating Committee and GSA Boards were also informed by a Stakeholder Advisory Committee, which consisted of a broad group of groundwater beneficial users (also appointed by the GSA Boards) to review groundwater conditions, management issues and needs, and projects and management actions to improve sustainability in the basin. Extensive outreach was also conducted to seek input from additional beneficial users of groundwater through multiple venues including public workshops held in locations specifically selected to provide access to disadvantaged communities. Figure ES-2 illustrates the relationship among the groups described above.

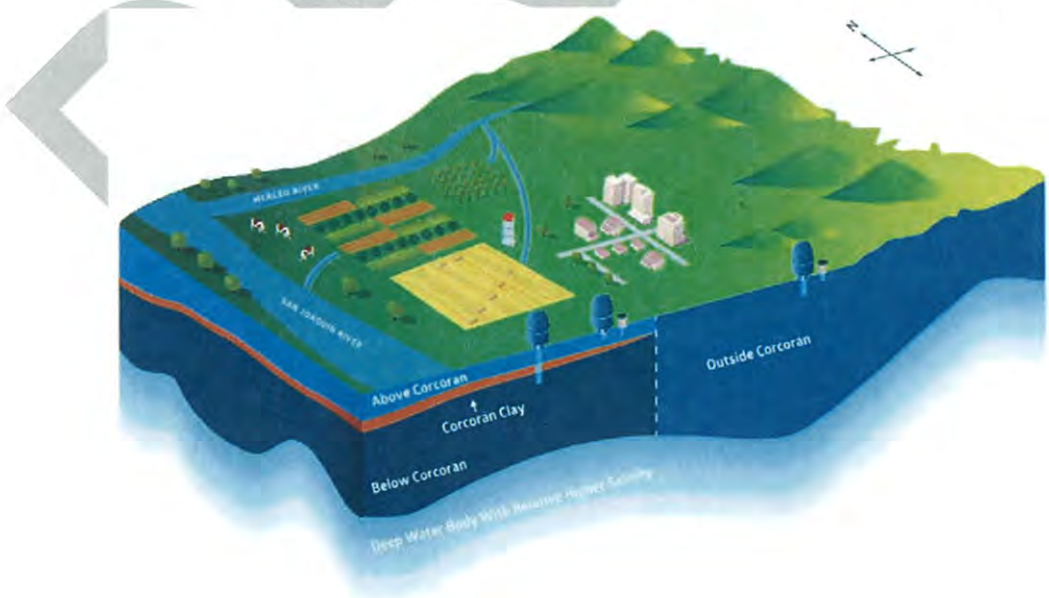
Figure ES-2: Diagram of Levels of Engagement and Decision-Making

ES-2. BASIN SETTING

Hydrogeologic Conceptual Model

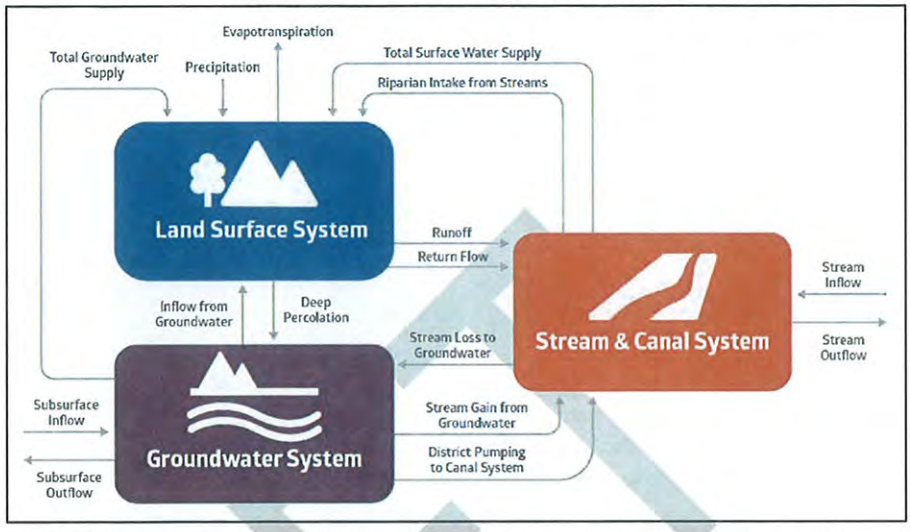
The Merced Subbasin contains three principal aquifers that are defined by their relationship to the Corcoran Clay aquitard, a laterally-extensive silt and clay layer that underlies about half of the western portion of the Subbasin and acts as a significant confining layer. The **Above Corcoran Principal 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 water body with higher salinity relative to the principal aquifers. See Figure ES-3 for a 3D illustration demonstrating the relationship between the principal aquifers and Corcoran Clay aquitard

Figure ES-3: 3D Illustration of Merced Subbasin Principal Aquifers and Aquitard



Water Budget Information

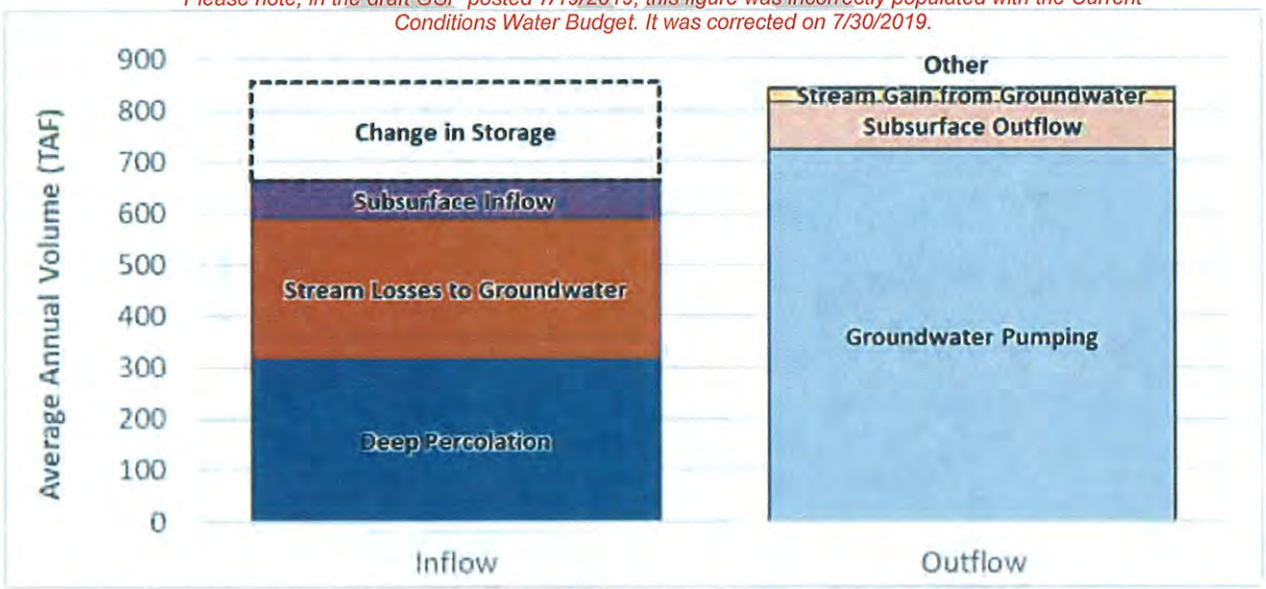
Figure ES-4: Generalized Water Budget Diagram



Water budgets provide quantitative accounting of water entering and leaving the Merced Subbasin and can be used to help estimate the extent of overdraft occurring now and in the future. Consistent with SGMA requirements, water budgets for historical, current, projected, and sustainable conditions were developed for the Merced Subbasin. These water budgets were developed using the Merced Water Resources Model (MercedWRM), a fully integrated surface and groundwater flow model developed and calibrated specifically for the Subbasin. See Figure ES-4 for a conceptual diagram of the inputs and outputs quantified by the model. The historical conditions water budget (see Figure ES-5) shows an annual average rate of overdraft ("Change in Storage") of 192,000 acre-feet per year (AFY) over Water Years 1996 through 2015. In this Figure, the "Change in Storage" represents the average annual decline in storage resulting from the Subbasin outflows, principally groundwater pumping.

Figure ES-5: Historical Conditions Water Budget

Please note, in the draft GSP posted 7/19/2019, this figure was incorrectly populated with the Current Conditions Water Budget. It was corrected on 7/30/2019.

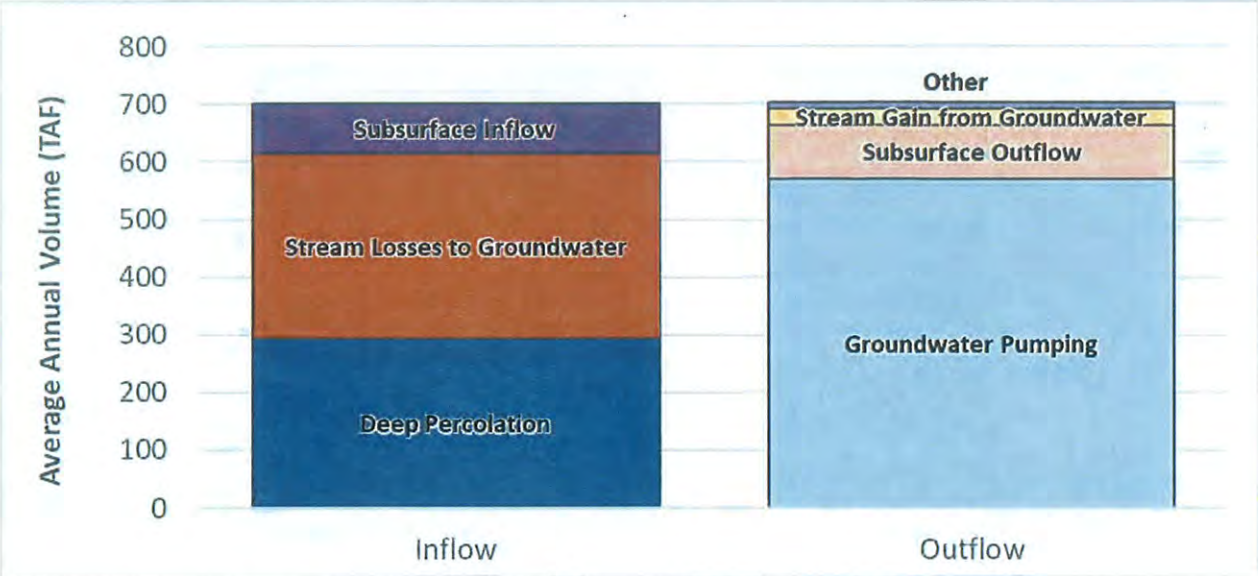


SGMA defines sustainable yield as "the maximum quantity of water, calculated over a base period representative of long-term conditions in the basin and including any temporary surplus, that can be withdrawn annually from a groundwater supply without causing an undesirable result" (California Water Code §10721(w)).

For the Merced Subbasin, sustainable yield was estimated by modifying conditions in the groundwater model to balance out the change in stored water over time. In order to achieve a net-zero change in groundwater storage over a long-term

average condition, current agricultural and urban groundwater demand in the Merced Subbasin would need to be reduced by approximately 10 percent, absent implementation of any new supply-side or recharge projects. Figure ES-6 illustrates the Subbasin water budget under long term sustainable conditions.

Figure ES-6: Groundwater Water Budget under Sustainable Groundwater Management Conditions Long-Term (50-Year) Average Annual



ES-3. SUSTAINABLE MANAGEMENT CRITERIA

SGMA requires consideration of six sustainability indicators. For each indicator, the GSP must define undesirable results for the basin ("significant and unreasonable" negative impacts) and determine if they could occur. For the indicators with the potential for undesirable results, the GSP must establish sustainable management criteria that are intended to prevent undesirable results from occurring and establish a monitoring network.

Sustainable management criteria were developed to be protective of beneficial uses in the Merced Subbasin and to support the Subbasin's sustainability goal. Demonstration by 2040 of stable groundwater elevations on a long-term average basis, combined with the absence of undesirable results, will support a determination that the basin is operating within its sustainable yield, and thus that the sustainability goal has been achieved.

A summary of the sustainable management criteria for the Merced Subbasin is shown in Table ES-1.

Table ES-1: Summary of Sustainable Management Criteria

Sustainability Indicator	Minimum Threshold (MT)	Measurable Objective	Undesirable Result
Groundwater Levels	Depth of shallowest well in a 2-mile radius of each representative well or minimum pre-January 1, 2015, elevation	Projected average future groundwater level under sustainable yield modeling simulation	Greater than 25% of representative wells fall below MT in 2 consecutive wet, above normal, or below normal years
Groundwater Storage	N/A - not present and not expected to occur in the Subbasin due to the significant volumes of freshwater in storage		
Sea Water Intrusion	N/A - not present and not expected to occur due to the distance between the Subbasin and the Pacific Ocean (and Sacramento-San Joaquin Delta)		
Degraded Water Quality	1,000 mg/L TDS	500 mg/L TDS	At least 25% representative wells exceed MT for 2 consecutive years
Land Subsidence	-0.75 ft/year	-0.25 ft/year	Exceedance of MT at 3 or more representative sites for 2 consecutive years
Depletions of Interconnected Surface Waters	Groundwater levels used as a proxy for this sustainability indicator		

There are two sustainability indicators deemed not applicable to the Merced Subbasin. Undesirable results related to significant and unreasonable **depletions of groundwater storage** are not present and not expected to occur in the Subbasin, since historical reductions have been insignificant relative to the total volume of freshwater water storage in the Subbasin. **Seawater intrusion** is not an applicable sustainability indicator because seawater intrusion is not present and is not expected to occur due to the distance between the Subbasin and the Pacific Ocean (and Sacramento-San Joaquin Delta).

For the remaining sustainability indicators, sustainable management criteria were established to be protective of Subbasin beneficial uses as described below.

Minimum thresholds for **declining groundwater levels** were developed based on records of well depth for the shallowest domestic wells within a 2-mile radius of each representative monitoring well, since domestic wells are generally shallower than agricultural and municipal wells and are thus more protective for setting thresholds. Sustainable management criteria for declining groundwater levels were developed with a robust dataset including historical groundwater levels, Merced County's domestic well permitting database, and simulated groundwater levels from the MercedWRM. Groundwater levels are being used as a proxy indicator for depletion of interconnected surface waters.

Degraded water quality is unique among the six sustainability indicators because it is already the subject of extensive federal, state, and local regulations carried out by numerous entities, and SGMA does not directly address the role of

GSAs relative to these other entities (Moran & Belin, 2019). SGMA does not specify water quality constituents that must have minimum thresholds. Groundwater management is the mechanism available to GSAs to implement SGMA. Establishing minimum thresholds for constituents that cannot be managed by increasing or decreasing pumping was deemed inappropriate by the GSAs and basin stakeholders. The major water quality issue being addressed by sustainable groundwater management is the migration of relatively higher salinity water into the freshwater principal aquifers. The nexus between water quality and water supply management exists for the pumping-induced movement of low-quality water from the west and northwest to the east. Other water quality concerns are being addressed through various water quality programs and agencies that have the authority and responsibility to address them.

Within the Merced Subbasin, while **land subsidence** has been recognized by the GSAs as an area of concern, it is not considered to have caused a significant and unreasonable reduction in the viability of the use of infrastructure. However, it is noted that subsidence has caused a reduction in freeboard of the Middle Eastside Bypass over the last 50 years and has caused problems in neighboring subbasins, highlighting the need for ongoing monitoring and management in the Merced Subbasin. Thus, sustainable management criteria were established based on historical rates of subsidence in the Subbasin.

Depletions of interconnected surface waters will be managed using groundwater levels as a proxy due to the challenges associated with directly measuring streamflow depletions and because of the significant correlation between groundwater levels and depletions.

ES-4. MONITORING NETWORKS

Consistent with SGMA requirements, the GSAs plan to establish monitoring networks for each sustainability indicator to monitor trends in the Subbasin and evaluate GSP implementation against sustainable management criteria. The groundwater monitoring network consists of wells from the California Statewide Groundwater Elevation Monitoring (CASGEM) program that were selected to provide representative conditions for groundwater levels across the Subbasin. The groundwater quality network includes a combination of wells in the Subbasin that are part of the East San Joaquin Water Quality Coalition Groundwater Quality Trend Monitoring Program as well as Public Water System wells that report data to the Division of Drinking Water. The subsidence monitoring network relies on control points monitored by the United States Bureau of Reclamation as part of the San Joaquin River Restoration Program. While the monitoring networks reflect a robust history of monitoring Subbasin conditions, data gaps still exist and plans to fill these data gaps for each sustainability indicator are also described in this plan.

ES-5. DATA MANAGEMENT SYSTEM

The Merced Subbasin Data Management System (DMS) was developed to serve as a data sharing portal to enable utilization of the same data and tools for visualization and analysis to support sustainable groundwater management and transparent reporting of data and results. Monitoring data can be manually input by users or batch uploaded via template and is expected to include (but is not limited to) groundwater elevation, groundwater quality, streamflow, and subsidence. All monitoring locations can be viewed spatially (map or list format) and data records per site can be viewed temporally (chart or list format). Ad-hoc queries and standard reports will greatly assist in answering questions about basin characterization, providing input for decision-making, and developing reports to meet annual report submittal requirements.

ES-6. PROJECTS AND MANAGEMENT ACTIONS TO ACHIEVE SUSTAINABILITY GOAL

SGMA requires that GSPs describe the projects and management actions to be implemented as part of bringing the Subbasin into sustainability. The primary means for achieving sustainability in the basin will be implementation of an allocation framework to allocate the sustainable yield of the basin to the GSAs. A water allocation framework has been

the subject of much discussion during GSP development. The GSAs have agreed that they intend to allocate water to each GSA but have not yet reached agreement on allocations or how they will be implemented.

The GSP identifies a shortlist of 12 priority projects that met a series of screening criteria for implementation (see Table ES-2) as well as a longer list of possible future projects that were identified during GSP development. Projects and management actions will either increase surface water supplies to augment the sustainable groundwater yield or will increase groundwater recharge, which will in turn increase the amount of groundwater that may be sustainably used.

Table ES-2: Projects Shortlist for Merced Subbasin Groundwater Sustainability Plan*

Project Name	Current Status	Expected Completion	Estimated Cost
Project 1: Planada Groundwater Recharge Basin Pilot Project	Planning, to be implemented with DWR Grant Funding	12/17/2023	$395,292
Project 2: El Nido Groundwater Monitoring Wells	Planning, to be implemented with DWR Grant Funding	12/31/2019	$400,000
Project 3: Meadowbrook Water System Intertie Feasibility Study	Planning	06/2020	$100,588
Project 4: Merquin County Water District Recharge Basin	Planning/Initial Study	12/15/2021	$1,400,000
Project 5: Merced Irrigation District to Lone Tree Mutual Water Company Conveyance Canal	Conceptual	11/2020	$3-6,000,000
Project 6: Merced IRWM Region Climate Change Modeling	Design	4/30/2021	$250,000
Project 7: Merced Region Water Use Efficiency Program	Design	12/31/2020	$500,000
Project 8: Merced Groundwater Subbasin LIDAR	Planning/Initial Study	12/2020	$150,000
Project 9: Study for Potential Water System Intertie Facilities from MID to LGAWD and CWD	Design Complete	06/01/2020	$100,000
Project 10: Vander Woude Dairy Offstream Temporary Storage	Planning/Initial Study & Conceptual Design	05/2020	$750,000
Project 11: Mini-Big Conveyance Project	Planning	06/2026	$ 6-8,000,000
Project 12: Streamlining Permitting for Replacing Sub-Corcoran Wells	Planning	1/31/2020	$75,000

*Information provided by project proponents.

ES-7. PLAN IMPLEMENTATION

Implementation of the GSP will be a substantial undertaking that will include implementation of the projects and management actions as well as GSAs administration, public outreach, implementation of the monitoring programs and filling data gaps, development of annual reports, and development of a 5-year update and report. The GSAs have developed an implementation schedule (see Table ES-3) and estimated costs for all activities, as well as potential funding mechanism options. Implementation of the GSP is projected to run between $1.2M and $1.6M per year. Costs for projects and management actions are estimated to be an additional $22.9M in total, with costs for individual projects or management actions ranging between $75K to $8M in total.

Table ES-3: GSP Implementation Schedule

2020	2025	2030	2035	2040
Monitoring and Reporting	**Preparation for Allocations and Low Capital Outlay Projects**	**Prepare for Sustainability**	**Implement Sustainable Operations**	
• Establish Monitoring Network • Install New Groundwater Wells • Reduce/Fill Data Gaps	• GSAs conduct 5-year evaluation/update • Monitoring and reporting continue	• GSAs conduct 5-year evaluation/update • Monitoring and reporting continue	• GSAs conduct 5-year evaluation/update • Monitoring and reporting continue	
• GSAs allocated initial allocations • GSAs establish their allocation procedures and demand reduction efforts • Develop Metering Program	• As-needed demand reduction to reach Sustainable Yield allocation • Metering program continues	• As-needed demand reduction to reach Sustainable Yield allocation	• Full implementation demand reduction as needed to reach Sustainable Yield allocation by 2040	
• Funded and smaller projects implemented	• Planning/ Design/ Construction for small to medium sized projects	• Planning/ Design/ Construction for larger projects begins	• Project implementation completed	
• Extensive public outreach regarding GSP and allocations	• Outreach regarding GSP and allocations continues	• Outreach continues	• Outreach continues	

APPENDIX D

CONSUMER CONFIDENCE REPORT

City Of Merced
Consumer Confidence Report
Reporting Year 2018

Last year, as in years past, your tap water met or surpassed all U.S. Environmental Protection Agency (EPA) and State drinking water health standards. The City of Merced vigilantly safeguards its water supplies and once again, we are proud to report that our system had no violations of maximum contaminant levels or any other water quality standard. This brochure is a snapshot of last year's water quality. Included are details about where your water comes from, what it contains, and how it compares to State Standards. We are committed to providing you with information because informed customers are our best allies.

Este informe contiene información muy mportante sobre su agua potable. Tradúzcalo ó hable con alguien que lo entienda bien.

SOURCE WATER ASSESSMENT

An assessment of the drinking water source for the City of Merced's water system was completed in March 2003. The source is considered vulnerable from the following activities: gas stations (current and historic), dry cleaners, leaking underground storage tanks, sewer collection system, chemical/petroleum pipeline, fertilizer, pesticide/ herbicide application, agricultural drainage, farm chemical distributor/application service, low density septic system, agricultural wells, and irrigation wells. A copy of the complete assessment is available at the City of Merced, Public Works Department at 1776 Grogan Avenue, Merced, CA. You may request a summary of the assessment by contacting the Administration Office at (209) 385-6800.

DRINKING WATER FLUORIDATION

Our water system is treated by adding fluoride to the naturally occurring level to help prevent dental cavities in consumers. State regulations require the fluoride levels in the treated water be at an optimum dose of 0.70ppm (parts per million). Our monitoring showed the fluoride levels in the treated water ranged from 0.10ppm - 1.00ppm with an average of 0.70ppm. Information about fluoridation, oral health, and current issues is available by visiting www.waterboards.ca.gov/drinkingwater/program/ index.shtml.

COMMUNITY PARTICIPATION

The City Council meets every first and third Monday of the month beginning at 6:00 pm at the Civic Center located at 678 W. 18th Street, Merced. The public is encouraged to attend.

PROTECT OUR DRINKING WATER SYSTEM

Tampering with a public water system is a Federal offense. Please report any suspicious activity occurring at any water facility or hydrant to the Merced Police Department at (209) 385-6905.

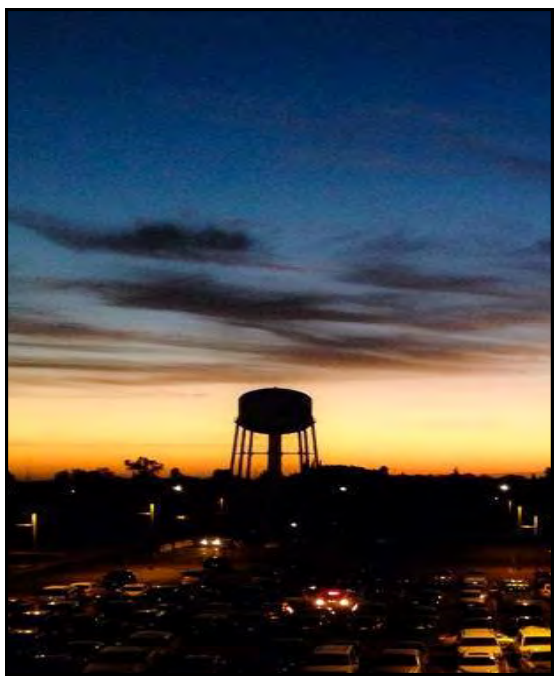
WATER CONSERVATION

To monitor your water use, go to www.eyeonwater.com, where you can check for leaks and view your water usage by the hour, day or month.

WHERE DOES THE CITY OF MERCED GET IT'S WATER?

The City of Merced supplies water through the operation of 20 active wells throughout the City. These wells draw water from the Merced Groundwater Subbasin. Each site can produce over 1,500 gallons per minute. The distribution system is well over 500 miles long, includes over 25,000 service connections, nearly 3,000 fire hydrants and approximately 25,000 water meters, 7,000 main line valves and over 2,100 backflow devices. The system regularly pumps 35 million gallons per summer day needed to supply the 86,000 citizens of Merced.

In 2018, these wells pumped 6.3 billion gallons of water to residents, businesses, and commercial properties. In a continued effort to conserve water, the City of Merced encourages residents to keep an Eye On Water (a water meter software application), and follow the conservation program and water waste ordinance.



THE SAFE DRINKING WATER ACT

The Safe Drinking Water Act (SDWA) was originally passed by Congress in 1974 to protect public health by regulating the nation's public drinking water supply. SDWA authorizes the United States Environmental Protection Agency (US EPA) to set national health-based standards for drinking water to protect against both naturally-occurring and man-made contaminants that may be found in drinking water. US EPA, states, and water systems then work together to make sure these standards are met. The National Primary Drinking Water Regulations set enforceable maximum contaminant levels for particular contaminants, required ways to treat water to remove contaminants as well as testing the water for those contaminants, and specific reporting requirements of the test results.

IMPORTANT HEALTH INFORMATION

Some people may be more vulnerable to contaminants in drinking water than the general population. Immunocompromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/ AIDS or other immune system disorders, some elderly and infants, may be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. The USEPA/Centers for Disease Control and Prevention (CDC) guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and other microbial contaminants are available from the Safe Drinking Water Hotline at (800)426-4791.

CITY OF MERCED WEBSITE

Visit www.cityofmerced.org, Water Dept., for more information on our water system. If you have any questions regarding the content of this report or any other drinking water related topic, please call us at (209) 385-6800.

CROSS CONNECTION CONTROL PROGRAM

The purpose of the cross connection control program (aka backflow) is to reduce the hazards of contamination to the public water system by identifying actual and potential cross connections and taking action to protect the system from these hazards. This is accomplished by installing approved backflow prevention assemblies where hazards are identified; or ensuring that water-using equipment on the premises is installed in accordance with the plumbing code requirements and good practices. To keep your drinking water safe, the City's Cross Connection Specialist surveys the system to ensure compliance with cross connection/backflow requirements. The Specialist tests each primary external backflow prevention assembly annually; in 2018 the City tested 2,174 cross connection backflow assemblies, and found 180 of those needed repair.

SAFETY IN WORK ZONES

Whenever you see traffic cones and/or signs of our employees at work, please obey these signs and slow down. The City of Merced water crews often work in trenches, below the ground level, where repairs to the water main (pipe) may be needed. Their goal is to work as fast and skillfully as possible to get your water back on. Slowing down and following directions will help ensure the safety of our residents, as well as our employees.

LEAD IN HOME PLUMBING

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. We are responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead and want your water tested, call us for information at (209) 385-6800. For information on lead in drinking water, testing methods, and steps you can take to minimize exposure, call the Safe Drinking Water Hotline or visit www.epa.gov/safewater.

SCHOOL LEAD TESTING

In August 2017, the City of Merced took initiative and conducted the required Lead testing of the drinking water at all schools within the public water system service area. With the collaboration of all 30 schools, the Lead testing was completed by October 2017. The Action Level (AL) for Lead is 15 ppb (parts per billion). All schools within the City of Merced public water system tested below the AL.

SAMPLING RESULTS The tables below list all drinking water contaminants that we tested for and detected according to State drinking water requirements. The presence of these contaminants in the water does not necessarily indicate that the water poses a health risk. Unless noted, the data presented in this report are from testing accomplished from January 1, 2018 to December 31, 2018. The State allows us to monitor for some contaminants less than once per year because the concentrations of these contaminants do not frequently change. In these cases, the most recent sample data are included, along with the year in which the samples were collected.

REGULATED CONTAMINANTS WITH PRIMARY DRINKING WATER STANDARDS: Enforceable standards and treatment techniques to protect public health by limiting the levels of contaminants in drinking water.

SUBSTANCE (UNIT OF MEASURE)	YEAR SAMPLED	MCL [MRDL]	PHG (MCLG) [MRDLG]	AVERAGE DETECTED	RANGE LOW-HIGH	VIOLATION	TYPICAL SOURCE
1,2,3 Trichloropropane [TCP] (ppt)	2018	5	0.7	0.1	ND-.65	No	Industrial solvents; cleaning and degreasing agent; paint remover
Arsenic[1] (ppb)	2017	10	0.004	3.9	1.8-8.7	No	Erosion of natural deposits; runoff from orchards; glass and electronics production wastes
Barium (ppm)	2017	1	2	0.23	0.09-0.49	No	Discharges of oil drilling wastes and from metal refineries; erosion of natural deposits
Chlorine (ppm)	2018	[4.0 (as Cl2)]	[4.0 (as Cl2)]	0.69	0.2-1.1	No	Drinking water disinfectant added for treatment
Chromium [Total] (ppm)	2017	50	(100)	3.8	ND-5.3	No	Discharge from steel and pulp mills and chrome plating; erosion of natural deposits
Copper (ppm)	2017	AL=1.3	0.3	0.003	ND-0.016	No	Internal corrosion of household plumbing systems; erosion of natural deposits; leaching from wood preservatives
Fluoride (ppm)	2018	2	1	0.11	ND-0.17	No	Erosion of natural deposits; water additive that promotes strong teeth; discharge from fertilizer and aluminum factories
Gross Alpha Particle Activity (pCi/L)	2017	15	(0)	2.4	ND-12	No	Erosion of natural deposits
Gross Beta Particle Activity[2] (pCi/L)	2017	50	(0)	6.1	ND-11	No	Decay of natural and man-made deposits
Lead (ppb)	2017	AL=15	0.2	0.22	ND-1.2	No	Internal corrosion of household water plumbing systems; discharges from industrial manufacturers; erosion of natural deposits
Nitrate[3] (as N) (ppm)	2018	10	10	2.8	1.2-4.9	No	Runoff and leaching from fertilizer use; leaching from septic tanks and sewage; erosion of natural deposits
Tetrachloroethylene [PCE][4] (ppb)	2018	5	0.06	.07	ND-3.7	No	Discharge from factories, dry cleaners, and auto shops (metal degreaser)
Trichloroethylene [TCE] (ppb)	2018	5	1.7	0.03	ND-1.2	No	Discharge from metal degreasing sites and other factories
Turbidity (NTU)	2017	5	NS	0.08	ND-0.86	No	Soil runoff
Uranium (ppb)	2017	30	0	2.4	ND-8.7	No	Erosion of natural deposits

REGULATED CONTAMINANTS WITH SECONDARY DRINKING WATER STANDARDS: Non-enforceable guidelines regarding contaminants that may cause cosmetic or aesthetic effects. *There are no PHGs, MCLGs, or mandatory standard health effects language for these contaminants because secondary MCLs are set on the basis of aesthetic concerns.

SUBSTANCE (UNIT OF MEASURE)	YEAR SAMPLED	MCL [MRDL]	PHG (MCLG) [MRDLG]	AVERAGE DETECTED	RANGE LOW-HIGH	VIOLATION	TYPICAL SOURCE
Aluminum (ppb)	2017	200	NS	10	ND-220	No	Erosion of natural deposits; residue from some surface water treatment processes
Chloride (ppm)	2017	500	NS	9.5	4.8-15	No	Runoff/leaching from natural deposits; seawater influence
Corrosivity[5] (Units)	2016	Non-corrosive	NS	12	12-13	No	Natural or industrially influenced balance of hydrogen, carbon and oxygen in the water; affected by temperature and other factors
Iron (ppb)	2017	300	NS	0	ND-73	No	Leaching from natural deposits; industrial wastes
Manganese (ppb)	2018	50	NS	0.16	ND-3.6	No	Leaching from natural deposits
Odor (Threshold)	2017	3 Units	NS	.05	ND-1	No	Naturally occurring organic materials
pH, Laboratory	2018	6.5-8.5	NS	7.8	7.2-8.2	No	Low pH: bitter metallic taste, corrosion. High pH: slippery feel, soda taste; deposits
Sulfate (ppm)	2017	500	NS	10.4	6.8-14	No	Runoff/leaching from natural deposits; industrial wastes
Specific Conductance (µS/cm)	2018	1600	NS	310	197-505	No	Substances that form ions when in water; seawater influence
Total Dissolved Solids (ppm)	2017	1,000	NS	263	190-370	No	Runoff/leaching from natural deposits

Tap water samples were collected for lead and copper analyses from sample sites throughout the community

SUBSTANCE (UNIT OF MEASURE)	YEAR SAMPLED	AL	PHG (MCLG)	AVERAGE DETECTED (90TH %TILE)	SITES ABOVE AL/ TOTAL SITES	VIOLATION	TYPICAL SOURCE
Copper (ppm)	2018	1.3	0.3	0.2	0/45	No	Internal corrosion of household plumbing systems; erosion of natural deposits; leaching from wood preservatives
Lead (ppb)	2018	15	0.2	ND	0/45	No	Internal corrosion of household water plumbing systems; discharges from industrial manufacturers; erosion of natural deposits

UNREGULATED AND OTHER SUBSTANCES[6]

SUBSTANCE (UNIT OF MEASURE)	YEAR SAMPLED	AVERAGE DETECTED	RANGE LOW-HIGH
Bromide (ppb)	2018	70	24-170
Calcium (ppm)	2017	30	16-52
Chlorate (ppm)	2014	113	50-240
Chlorodifluoromethane (ppb)	2014	0.14	0.081-0.18
Hardness (Total) as CACO3 (ppm)	2017	126	62-220
Hexavalent Chromium (ppb)	2017	3.5	1.6-4.7
Magnesium (ppm)	2017	12.3	4.7-24
Molybdenum (ppb)	2016	1.5	ND-2.9
Potassium (ppm)	2017	6.3	ND-12
Sodium (ppm)	2017	23.8	14-34
Strontium (ppb)	2014	377	200-660
Toluidine (ppb)	2018	0.0019	ND-.034
Vanadium (ppb)	2014	21	16-28
1,4 Dioxane (ppb)	2014	0.094	0.092-0.095

1) Arsenic results at Well Site 2 for all three wells are within the blending MCL of 10 ppb. While your drinking water meets the Federal and State standard for arsenic, it does contain low levels of arsenic. The arsenic standard balances the current understanding of arsenic's possible health effects against the cost of removing arsenic from drinking water. The U.S. EPA continues to research the health effects of low levels of arsenic, which is a mineral known to cause cancer in humans at high concentrations and is linked to other health effects such as skin damage and circulatory problems.
2) SWRCB considers 50 pCi/L to be the level of concern for beta particles.
3) Nitrate in drinking water at levels above 10 mg/L is a health risk for infants of less than six months of age. Such nitrate levels in drinking water can interfere with the capacity of the infant's blood to carry oxygen, resulting in serious illness; symptoms include shortness of breath and blueness of the skin. Nitrate levels above 10 mg/L may also affect the ability of the blood to carry oxygen in other individuals, such as pregnant women and those with specific enzyme deficiencies. If you are caring for an infant, or you are pregnant, you should ask advice from your health care provider.
4) PCE and TCE were detected well below the MCL at Well Sites 3, 5, and 13. All other City Well Sites reported no detection. While your drinking water meets Federal and State standards, it may contain low levels of contaminants below detection limits and below the Regulatory Action Level. The PCE and TCE standard balances the current understanding of possible health effects against the cost of removing contaminants from the drinking water. The U.S. EPA continues to research the health effects of low levels of PCE and TCE.
5) Corrosivity is not a National Environmental Laboratory Accreditation Program accredited analyte. All sampling results are based and calculated on an average of 20 production wells.
6) Unregulated contaminant monitoring helps the U.S. EPA and the State Water Resources Control Board to determine where certain contaminants occur and whether the contaminants need to be regulated.

SUBSTANCES THAT COULD BE IN WATER

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

In order to ensure that tap water is safe to drink, the U.S. Environmental Protection Agency (U.S. EPA) and the State Water Resource Control Board (State Board/SWRCB) prescribe regulations that limit the amount of certain contaminants in water provided by public water systems. State Board regulations also establish limits for contaminants in bottled water that must provide the same protection for public health. Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk.

More information about contaminants and potential health effects can be obtained by calling the U.S. EPA's Safe Drinking Water Hotline at (800) 426-4791.

Contaminants that may be present in source water include:
Microbial Contaminants, such as viruses and bacteria that may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife;

Inorganic Contaminants, such as salts and metals, that can be naturally occurring or can result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining, or farming.

Pesticides and Herbicides, that may come from a variety of sources such as agriculture, urban stormwater runoff, and residential uses.

Organic Chemical Contaminants, including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, and which can also come from gas stations, urban stormwater runoff, agricultural applications, and septic systems.

Radioactive Contaminants that can be naturally occurring or can be the result of oil and gas production and mining activities.

DEFINITIONS

AL (Regulatory Action Level): The concentration of a contaminant which, if exceeded, triggers treatment or other requirements that a water system must follow.

MCL (Maximum Contaminant Level): The highest level of a contaminant that is allowed in drinking water. Primary MCLs are set as close to the PHGs (or MCLGs) as is economically and technologically feasible. Secondary MCLs (SMCLs) are set to protect the odor, taste and appearance of drinking water.

MCLG (Maximum Contaminant Level Goal): The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are set by the U.S. EPA.

MRDL (Maximum Residual Disinfectant Level): The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

MRDLG (Maximum Residual Disinfectant Level Goal): The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.

ND (Not detected): Indicates that the substance was not found by laboratory analysis.

NS: No standard

NTU (Nephelometric Turbidity Units): Measurement of the clarity, or turbidity, of water. Turbidity in excess of 5 NTU is just noticeable to the average person.

pCi/L (picocuries per liter): A measure of radioactivity.

PDWS (Primary Drinking Water Standard): MCLs and MRDLs for contaminants that affect health along with their monitoring and reporting requirements, and water treatment requirements.

PHG (Public Health Goal): The level of a contaminant in drinking water below which there is no known or expected risk to health. PHGs are set by the California EPA.

ppb (parts per billion): One part substance per billion parts water (or micrograms per liter; ug/L)

ppm (parts per million): One part substance per million parts water (or milligrams per liter; mg/L.)

ppt (parts per trillion): One part substance per trillion parts water (1 ppt = 1000 ppm)

APPENDIX E

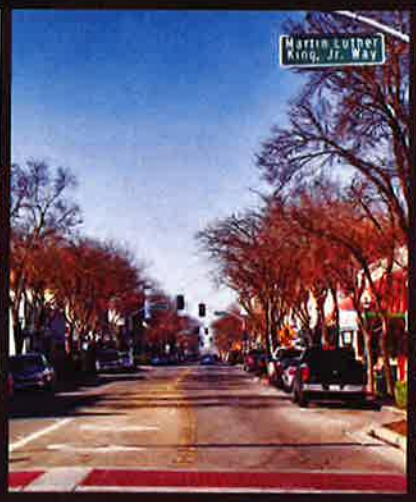
EXECUTIVE SUMMARY,
MERCED GROUNDWATER SUBBASIN SUSTAINABILITY PLAN

MERCED SGMA

Merced Groundwater Subbasin

GROUNDWATER SUSTAINABILITY PLAN

Executive Summary



November 2019

EXECUTIVE SUMMARY

ES-1. INTRODUCTION AND PLAN AREA

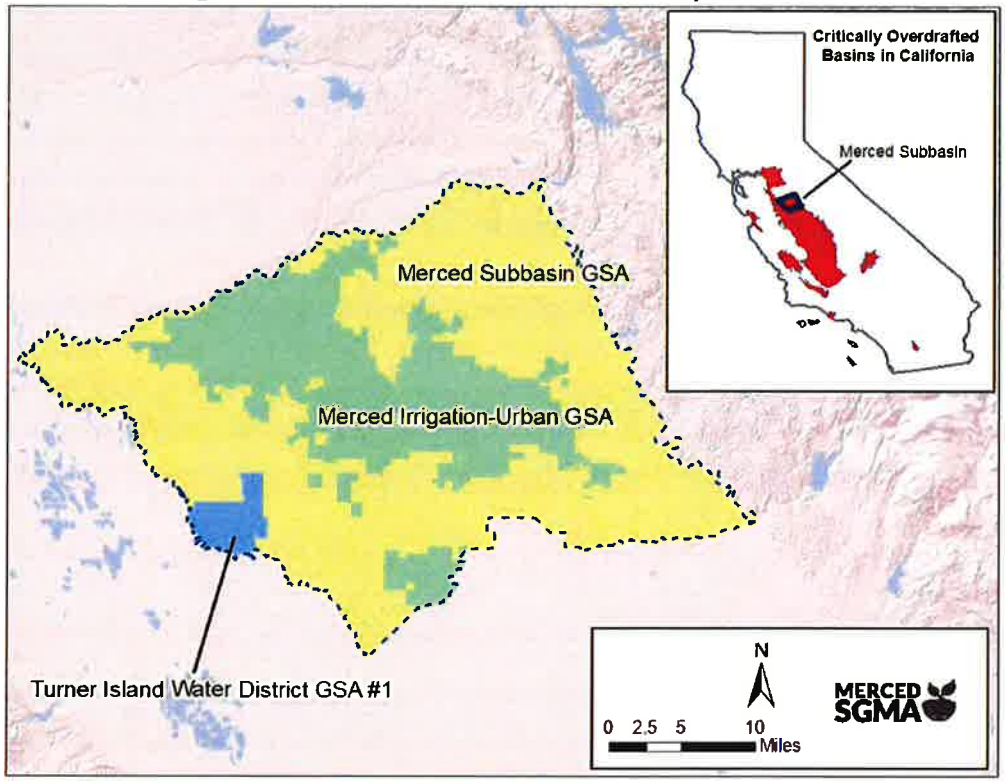
The Sustainable Groundwater Management Act (SGMA), passed in 2014, requires the formation of local Groundwater Sustainability Agencies (GSAs) to oversee the development and implementation of Groundwater Sustainability Plans (GSPs), with the ultimate goal of achieving sustainable management of California's groundwater basins. The purpose of this Groundwater Sustainability Plan is to bring the Merced Groundwater Basin (Merced Subbasin or Subbasin), a critically overdrafted basin located within the San Joaquin Valley (see Figure ES-1), into sustainable groundwater management by 2040. The Subbasin is heavily reliant on groundwater, and users recognize the basin has been in overdraft for a long period of time.

The County of Merced and water districts and cities within the Merced Subbasin formed three GSAs in accordance with SGMA: Merced Irrigation-Urban Groundwater Sustainability Agency (MIUGSA), Merced Subbasin Groundwater Sustainability Agency (MSGSA), and Turner Island Water District Groundwater Sustainability Agency #1 (TIWD GSA-1) (see Figure ES-1). The three GSAs coordinated efforts to develop this GSP for the Subbasin. With the adoption of this GSP, the GSAs will adopt the following sustainability goal for the Merced Subbasin:

> **"Achieve sustainable groundwater management on a long-term average basis by increasing recharge and/or reducing groundwater pumping, while avoiding undesirable results."**

This goal will be achieved by allocating a portion of the estimated Subbasin sustainable yield to each of the three 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 in the Subbasin.

Figure ES-1: Merced Subbasin Location Map and GSAs



Development of the GSP was guided by a Coordinating Committee composed of members appointed by the GSA Boards to provide recommendations on technical and substantive basin-wide issues. The Coordinating Committee and GSA Boards were also informed by a Stakeholder Advisory Committee, which consisted of a broad group of groundwater beneficial users (also appointed by the GSA Boards) to review groundwater conditions, management issues and needs, and projects and management actions to improve sustainability in the basin. Extensive outreach was also conducted to seek input from additional beneficial users of groundwater through multiple venues including public workshops held in locations specifically selected to provide access to disadvantaged communities. Figure ES-2 illustrates the relationship among the groups described above.

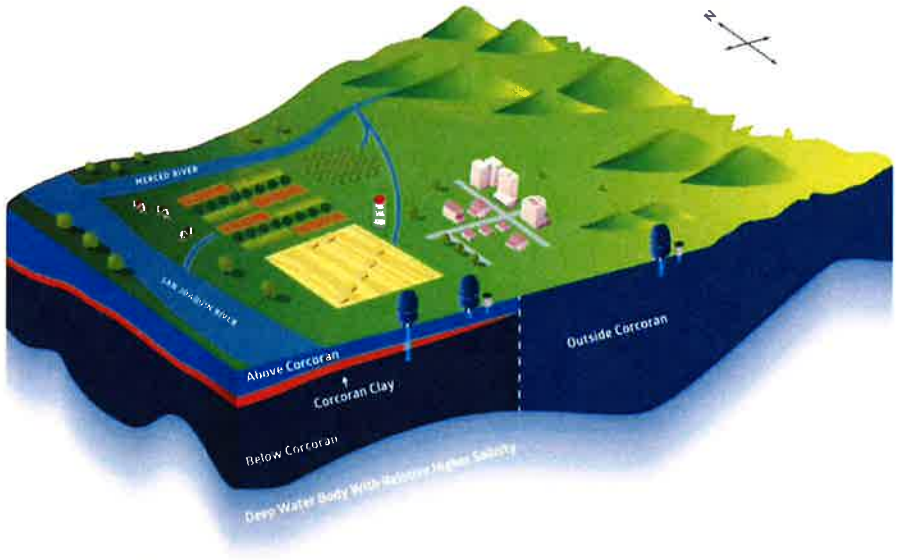
Figure ES-2: Diagram of Levels of Engagement and Decision-Making

ES-2. BASIN SETTING

Hydrogeologic Conceptual Model

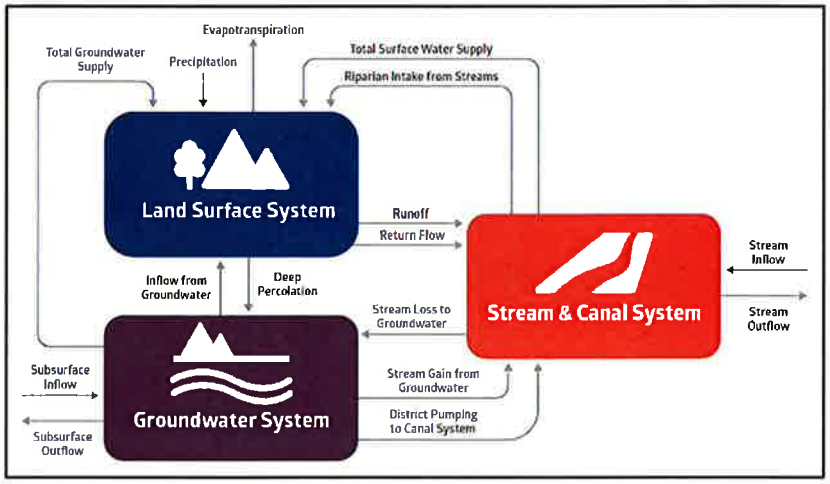
The Merced Subbasin contains three principal aquifers that are defined by their relationship to the Corcoran Clay aquitard, a laterally-extensive silt and clay layer that underlies approximately the western half of the Subbasin and acts as a significant confining layer. The **Above Corcoran Principal 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. See Figure ES-3 for a 3D illustration demonstrating the relationship between the principal aquifers and Corcoran Clay aquitard

Figure ES-3: 3D Illustration of Merced Subbasin Principal Aquifers and Aquitard



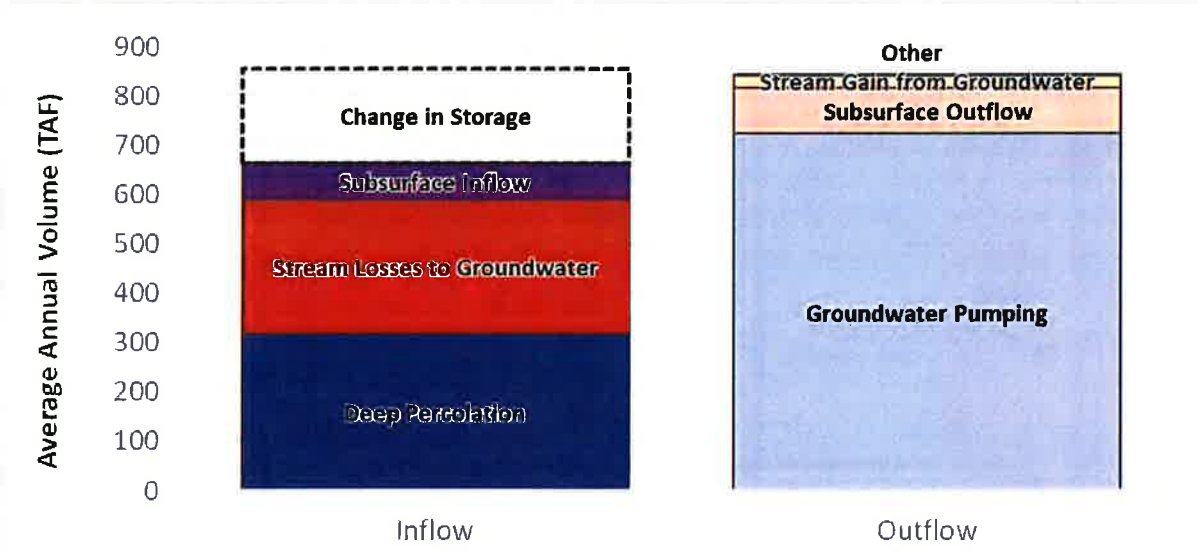
Water Budget Information

Figure ES-4: Generalized Water Budget Diagram



Water budgets provide quantitative accounting of water entering and leaving the Merced Subbasin and can be used to help estimate the extent of overdraft occurring now and in the future. Consistent with SGMA requirements, water budgets for historical, current, projected, and sustainable conditions were developed for the Merced Subbasin. These water budgets were developed using the Merced Water Resources Model (MercedWRM), a fully integrated surface and groundwater flow model developed and calibrated specifically for the Subbasin. See Figure ES-4 for a conceptual diagram of the inputs and outputs quantified by the model. The historical conditions water budget (see Figure ES-5) shows an annual average rate of overdraft ("Change in Storage") of 192,000 acre-feet per year (AFY) over water years 2006 through 2015. In this Figure, the "Change in Storage" represents the average annual decline in storage resulting from the Subbasin outflows, principally groundwater pumping.

Figure ES-5: Historical Conditions Water Budget

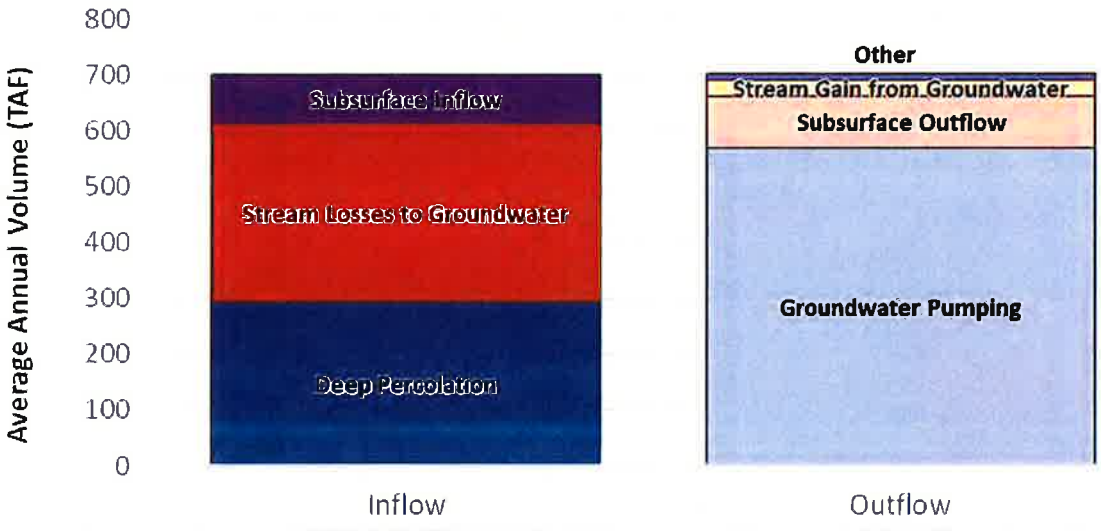


SGMA defines sustainable yield as "the maximum quantity of water, calculated over a base period representative of long-term conditions in the basin and including any temporary surplus, that can be withdrawn annually from a groundwater supply without causing an undesirable result" (California Water Code §10721(w)).

For the Merced Subbasin, sustainable yield was estimated by modifying conditions in the groundwater model to balance out the change in stored water over time. In order to achieve a net-zero change in groundwater storage over a long-term average condition, current agricultural and urban groundwater demand in the Merced Subbasin would need to be

reduced by approximately 10 percent, absent implementation of any new supply-side or recharge projects. Figure ES-6 illustrates the Subbasin water budget under long term sustainable conditions.

Figure ES-6: Groundwater Water Budget under Sustainable Groundwater Management Conditions Long-Term (50-Year) Average Annual



ES-3. SUSTAINABLE MANAGEMENT CRITERIA

SGMA requires consideration of six sustainability indicators. For each indicator, the GSP must define undesirable results for the basin ("significant and unreasonable" negative impacts) and determine if they could occur. For the indicators with the potential for undesirable results, the GSP must establish sustainable management criteria that are intended to prevent undesirable results from occurring and establish a monitoring network.

Sustainable management criteria were developed to be protective of beneficial uses in the Merced Subbasin and to support the Subbasin's sustainability goal. Demonstration by 2040 of stable groundwater elevations on a long-term average basis, combined with the absence of undesirable results, will support a determination that the basin is operating within its sustainable yield, and thus that the sustainability goal has been achieved.

A summary of the sustainable management criteria for the Merced Subbasin is shown in Table ES-1.

Table ES-1: Summary of Sustainable Management Criteria

Sustainability Indicator	Minimum Threshold (MT)	Measurable Objective	Undesirable Result
Groundwater Levels	Depth of shallowest well in a 2-mile radius of each representative well or minimum pre-January 1, 2015, elevation	Projected average future groundwater level under sustainable yield modeling simulation	Greater than 25% of representative wells fall below MT in 2 consecutive wet, above normal, or below normal years[1]
Groundwater Storage	Not applicable - not present and not likely to occur in the Subbasin due to the significant volumes of freshwater in storage		
Seawater Intrusion	Not applicable - not present and not likely to occur due to the distance between the Subbasin and the Pacific Ocean (and Sacramento-San Joaquin Delta)		
Degraded Water Quality	1,000 mg/L TDS	500 mg/L TDS	At least 25% representative wells exceed MT for 2 consecutive years
Land Subsidence	-0.75 ft/year	-0.25 ft/year	Exceedance of MT at 3 or more representative sites for 2 consecutive years
Depletions of Interconnected Surface Waters	Groundwater levels used as a proxy for this sustainability indicator		

There are two sustainability indicators deemed not applicable to the Merced Subbasin. Undesirable results related to significant and unreasonable **depletions of groundwater storage** are not present and not likely to occur in the Subbasin, since historical reductions have been insignificant relative to the total volume of freshwater water storage in the Subbasin. **Seawater intrusion** is not an applicable sustainability indicator because seawater intrusion is not present and is not likely to occur due to the distance between the Subbasin and the Pacific Ocean (and Sacramento-San Joaquin Delta).

For the remaining sustainability indicators, sustainable management criteria were established to be protective of Subbasin beneficial uses as described below.

Minimum thresholds for **chronic declining groundwater levels** were developed based on records of well depth for the shallowest domestic wells within a 2-mile radius of each representative monitoring well. This methodology is intended to be protective against significant and unreasonable dewatering of domestic wells. Since domestic wells are generally shallower than agricultural and municipal, this is also protective of these other well types. Sustainable management criteria for declining groundwater levels were developed with a dataset including historical groundwater levels, Merced County's well permitting database, and simulated groundwater levels from the MercedWRM. Groundwater levels are also being used as a proxy indicator for depletion of interconnected surface waters.

[1] *Water year types based on San Joaquin Valley Water Year Index* (DWR, 2017c)

Degraded water quality is unique among the six sustainability indicators because it is already the subject of extensive federal, state, and local regulations carried out by numerous entities, and SGMA does not directly address the role of GSAs relative to these other entities (Moran & Belin, 2019). SGMA does not specify water quality constituents that must have minimum thresholds. Groundwater management is the mechanism available to GSAs to implement SGMA. Establishing minimum thresholds for constituents that cannot be managed by increasing or decreasing pumping was deemed inappropriate by the GSAs and basin stakeholders. The major water quality issue being addressed by sustainable groundwater management is the migration of relatively higher salinity water into the freshwater principal aquifers. The nexus between water quality and water supply management exists for the pumping-induced movement of low-quality water from the west and northwest to the east. Other water quality concerns are being addressed through various water quality programs and agencies that have the authority and responsibility to address them.

Within the Merced Subbasin, while **land subsidence** has been recognized by the GSAs as an area of concern, it is not considered to have caused a significant and unreasonable reduction in the viability of the use of infrastructure. However, it is noted that subsidence has caused a reduction in freeboard of the Middle Eastside Bypass over the last 50 years and has caused problems in neighboring subbasins, highlighting the need for ongoing monitoring and management in the Merced Subbasin. Thus, sustainable management criteria were established based on historical rates of subsidence in the Subbasin, and the GSAs will continue to coordinate efforts with surrounding subbasins to develop regional or local solutions to subsidence occurring in the Merced, Chowchilla, and Delta-Mendota Subbasins.

Depletions of interconnected surface waters will be managed using groundwater levels as a proxy due to the challenges associated with directly measuring streamflow depletions and because of the significant correlation between groundwater levels and depletions.

ES-4. MONITORING NETWORKS

Consistent with SGMA requirements, the GSAs plan to establish monitoring networks for each sustainability indicator to monitor trends in the Subbasin and evaluate GSP implementation against sustainable management criteria. The groundwater level monitoring network consists of wells from the California Statewide Groundwater Elevation Monitoring (CASGEM) Program that were selected to provide representative conditions for groundwater levels across the Subbasin. The groundwater quality monitoring network includes a combination of wells in the Subbasin that are part of the East San Joaquin Water Quality Coalition Groundwater Quality Trend Monitoring Program as well as public water system wells that report data to the Division of Drinking Water. The subsidence monitoring network relies on control points monitored by the United States Bureau of Reclamation as part of the San Joaquin River Restoration Program. While the monitoring networks reflect a robust history of monitoring Subbasin conditions, data gaps exist, and plans to fill these data gaps for each sustainability indicator are also described in this GSP.

ES-5. DATA MANAGEMENT SYSTEM

The Merced Subbasin Data Management System (DMS) was developed to serve as a data sharing portal to enable utilization of the same data and tools for visualization and analysis to support sustainable groundwater management and transparent reporting of data and results. Monitoring data can be manually input by users or batch uploaded via template and is expected to include groundwater level, groundwater quality, streamflow, and subsidence data. All monitoring locations can be viewed spatially (map or list format) and data records per site can be viewed temporally (chart or list format). Ad-hoc queries and standard reports will greatly assist in answering questions about basin characterization, providing input for decision-making, and developing reports to meet annual report submittal requirements.

ES-6. PROJECTS AND MANAGEMENT ACTIONS TO ACHIEVE SUSTAINABILITY GOAL

SGMA requires that GSPs describe the projects and management actions to be implemented as part of bringing the Subbasin into sustainability. The primary means for achieving sustainability in the basin will be reduction in groundwater pumping achieved through implementation of an allocation framework to allocate the sustainable yield of the basin to the GSAs. A water allocation framework has been the subject of much discussion during GSP development. The GSAs have agreed that they intend to allocate water to each GSA but have not yet reached agreement on allocations or how they will be implemented. Such an agreement will be developed during GSP implementation.

The GSP identifies a shortlist of 12 priority projects that met a series of screening criteria for implementation (see Table ES-2) as well as a longer list of possible future projects that were identified during GSP development. Projects and management actions will either increase surface water supplies to augment the sustainable groundwater yield or will increase groundwater recharge, which will in turn increase the amount of groundwater that may be sustainably used.

Table ES-2: Projects Shortlist for Merced Subbasin Groundwater Sustainability Plan*

Project Name	Current Status	Expected Completion	Estimated Cost
Project 1: Planada Groundwater Recharge Basin Pilot Project	Planning, to be implemented with DWR Grant Funding	12/17/2023	$395,292
Project 2: El Nido Groundwater Monitoring Wells	Planning, to be implemented with DWR Grant Funding	12/31/2019	$400,000
Project 3: Meadowbrook Water System Intertie Feasibility Study	Planning	06/2020	$100,588
Project 4: Merquin County Water District Recharge Basin	Planning/Initial Study	12/15/2021	$1,400,000
Project 5: Merced Irrigation District to Lone Tree Mutual Water Company Conveyance Canal	Conceptual	11/2020	$3-6,000,000
Project 6: Merced IRWM Region Climate Change Modeling	Design	4/30/2021	$250,000
Project 7: Merced Region Water Use Efficiency Program	Design	12/31/2020	$500,000
Project 8: Merced Groundwater Subbasin LIDAR	Planning/Initial Study	12/2020	$150,000
Project 9: Study for Potential Water System Intertie Facilities from MID to LGAWD and CWD	Design Complete	06/01/2020	$100,000
Project 10: Vander Woude Dairy Offstream Temporary Storage	Planning/Initial Study & Conceptual Design	05/2020	$750,000
Project 11: Mini-Big Conveyance Project	Planning	06/2026	$ 6-8,000,000
Project 12: Streamlining Permitting for Replacing Sub-Corcoran Wells	Planning	1/31/2020	$75,000

*Information provided by project proponents.

ES-8. PLAN IMPLEMENTATION

Implementation of the GSP will be a substantial undertaking that will include implementation of the projects and management actions as well as GSAs administration, public outreach, implementation of the monitoring programs and filling data gaps, development of annual reports, and development of a 5-year update and report. The GSAs have developed an implementation schedule (see Table ES-3) and estimated costs for all activities, as well as potential funding mechanism options. Implementation of the GSP is projected to run between $1.2M and $1.6M per year. Costs for projects and management actions are estimated to be an additional $22.9M in total, with costs for individual projects or management actions ranging between $75,000 to $8M in total.

Table ES-3: GSP Implementation Schedule

2020	2025	2030	2035	2040
Monitoring and Reporting	Preparation for Allocations and Low Capital Outlay Projects	Prepare for Sustainability	Implement Sustainable Operations	
• Establish monitoring network • Install new monitoring wells • Reduce/fill data gaps	• Conduct 5-year evaluation/update • Monitoring and reporting continue	• Conduct 5-year evaluation/update • Monitoring and reporting continue	• Conduct 5-year evaluation/update • Monitoring and reporting continue	
• GSAs allocated initial allocations • GSAs establish their allocation procedures and demand reduction efforts • Develop metering program	• As-needed demand reduction to reach Sustainable Yield allocation • Metering program continues	• As-needed demand reduction to reach Sustainable Yield allocation	• Full implementation demand reduction as needed to reach Sustainable Yield allocation by 2040	
• Funded and smaller projects implemented	• Planning/ design/ construction for small to medium sized projects	• Planning/ design/ construction for larger projects begins	• Project implementation completed	
• Extensive public outreach regarding GSP and allocations	• Outreach regarding GSP and allocations continues	• Outreach continues	• Outreach continues	

Appendix M

Transportation Impact Study

DKS, August 2021

UNIVERSITY VILLAGE MERCED

TRAFFIC IMPACT STUDY

AUGUST 2021

PREPARED FOR:

DUDEK

DKS

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VERSION CONTROL

VERSION NUMBER	DATE	DESCRIPTION OF CHANGE	AUTHOR
0-1	01/18/2017	Administrative Draft	David Tokarski James Daisa Bobby Sidhu
0-2	02/10/2017	Revised Administrative Draft responding to client comments	David Tokarski James Daisa
0-3	02/07/2020	Revised project description and factored 2016 counts to reflect growth through 2019.	David Tokarski Benjamin Rady
0-4	8/12/2020	Added VMT Analysis	David Tokarski
0-5	8/13/2021	Revised VMT Analysis (locally serving retail)	David Tokarski

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TRAFFIC IMPACT ANALYSIS

This Traffic Impact Analysis (TIA) describes the existing transportation and circulation environment in the vicinity of the proposed project and potential impacts the project may have on the transportation network. Regulations and policies affecting transportation in the Project vicinity are also discussed in this section.

This TIA includes analysis and discussion responding to comment letters received during the NOP (Notice of Preparation) period. Comments received included concerns about "cut-through" traffic using local residential roadways to avoid delays on more major roadways, as well as concerns regarding Project traffic use of State Highway facilities.

PROJECT DESCRIPTION

The applicant, University Village Merced, LLC, proposes to construct new market rate apartment housing and commercial uses on a site just outside the boundary of the City of Merced. The proposed Project includes the annexation of the subject property, as well as other adjacent properties into the City of Merced. The proposed Project is located on approximately 28.6 acres of land at the northeast corner of the intersection of East Yosemite Avenue and North Gardner Avenue/ North Parsons Avenue. The Project site currently is the only quadrant of the intersection that lies outside the boundary of the City of Merced and is the only quadrant of the intersection lacking improved street frontages.

The proposed Project would consist of 540 market rate apartments, with 27 units (15 one bedroom and 12 two bedroom) housed in each of 20 buildings, a 13,700 square foot clubhouse for use of Project residents, as well as approximately 66,000 square feet of commercial development serving the Project residents and the general public. The retail portion of the project would also include 12 luxury residential apartments and 18 extended stay units. The proposed Project includes a total of 1,223 parking spaces (901 for residential and 323 for mixed use).

Figure 1 illustrates the proposed Project's location within the Study Area.

The proposed Project would implement street improvements along its frontage on East Yosemite Avenue and North Gardner Avenue. The City requires developments fronting on unimproved streets to dedicate the right of way and construct one half of the street's ultimate cross-section designated in the City's General Plan. These frontage improvements complete gaps in the City's circulation system and connect the proposed Project to the surrounding pedestrian and bicycle system.

The General Plan designates East Yosemite Avenue as a minor arterial comprised of four lanes divided by a raised median/left turn lane with bike lanes, sidewalks and park rows on both sides of the street. The Project proposes to provide a public bus stop and turnout on westbound Yosemite Avenue located approximately 720 feet east of Gardner Avenue.

The applicant proposes two access driveways on East Yosemite Avenue: the main driveway located approximately 885 feet east of Gardner Avenue and a secondary driveway serving

the commercial element of the site located approximately 365 feet east of Gardner Avenue, as shown in Figure 3.10-2.

Gardner Avenue is also designated as a minor arterial in the General Plan consisting of four travel lanes divided by a center turn lane, bike lanes, and sidewalks separated from the street by park rows. The applicant proposes two access driveways on Gardner Avenue: the main driveway located about 540 feet north of East Yosemite Avenue, and a secondary driveway serving the commercial element located about 275 feet north of East Yosemite Avenue.

EXISTING SETTING

This section describes the existing transportation conditions in the Project study area, including descriptions of the roadway network and transit, pedestrian and bicycle facilities in the vicinity of the Project site.

INTERSECTIONS STUDIED

Intersection operations were evaluated during the weekday morning (AM) and evening (PM) peak periods. Ten intersections in the vicinity of the Project site were selected for analysis because they are located on streets that would likely be used by Project traffic under both existing and future conditions. Most of the intersections were selected because they are located on primary routes accessing UC Merced and Merced College or routes used by Project-related traffic as access to and from nearby commercial and residential areas and downtown Merced. Some intersections were selected in order to evaluate the potential for Project traffic to use residential streets to bypass arterial streets. The study intersections are shown on **Figure 1** and listed below:

1. G Street / Mercy Avenue
2. G Street / East Yosemite Avenue
3. North Gardner Avenue / East Yosemite Avenue
4. North Gardner Avenue / Dunn Road
5. Hatch Road / Dunn Road
6. Hatch Road / East Yosemite Avenue
7. Lake Road / Dunn Road
8. Lake Road / East Yosemite Avenue
9. McKee Road / East Yosemite Avenue
10. Chaparral Drive / East Yosemite Avenue

FIGURE 1: PROJECT STUDY AREA

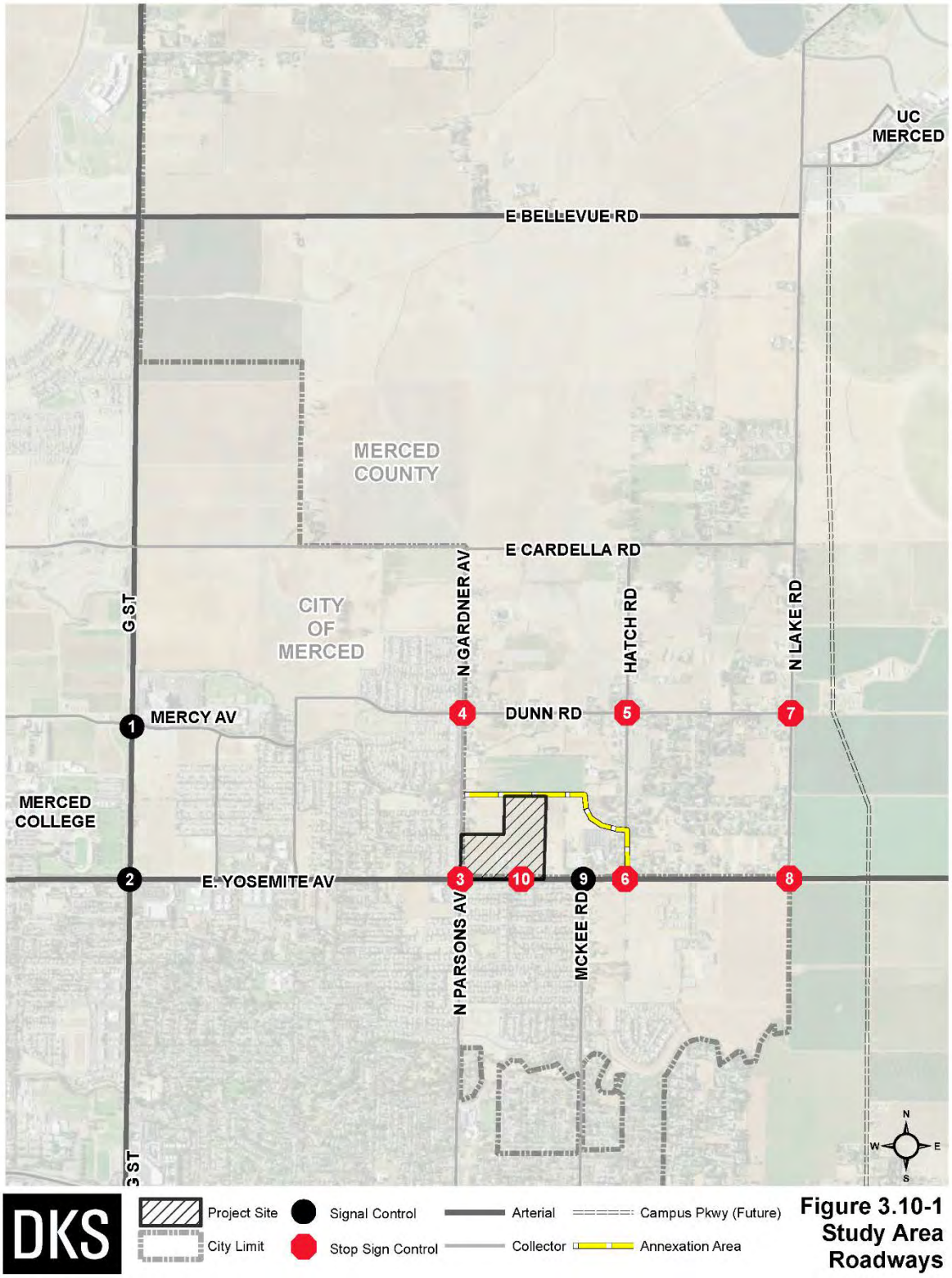


Figure 3.10-1 Study Area Roadways

FIGURE 2: PROJECT SITE PLAN

EXISTING ROADWAY NETWORK

The roadway network in the study area is shown in **Figure 1**. The area surrounding the proposed Project site is largely undeveloped with limited roadway infrastructure in place. The site can be accessed by two-lane rural roads, including Gardner Avenue and Yosemite Avenue. Descriptions of the most important local and regional roadways in the vicinity of the Project are provided below.

G Street is a north-south roadway extending from Highway 99 to La Paloma Road, where it turns into Snelling Road. G Street is a four-lane roadway south of Yosemite Avenue, narrowing to two lanes north of Yosemite Avenue. G Street carries almost 26,000 vehicles per day within the City, and 6,700 daily vehicles north of the city limits.

East Bellevue Road is a two-lane east-west road extending from Fox Road to its eastern terminus at Lake Road. This roadway currently carries approximately 3,700 vehicles per day, west of Lake Road. Bellevue Road provides access between newly developing portions of Merced and the UC Merced campus.

East Yosemite Avenue is a two-lane east-west road extending from R Street to its eastern terminus at Arboleda Drive. This roadway carries between 15,100 vehicles per day east of G Street, decreasing to 2,150 vehicles per day east of Kibby Road. West of G Street, West Yosemite Avenue provides access to Merced College. East of G Street, East Yosemite Avenue provides access to Lake Road and UC Merced to the north.

Lake Road is a two-lane north-south road extending from Yosemite Avenue to its northern terminus at Lake Yosemite. Lake Road becomes a local access road in the future. Campus Parkway replaces its function for through access. Lake Road currently provides primary access to the UC Merced campus.

Mercy Avenue is a two-lane east-west collector street that provides primary access to Mercy Medical Center. Mercy Avenue begins at G Street and continues east to just east of Paulson Road. West of G Street, Mercy Avenue becomes Community College Drive North and provides access to the northern portions of Merced College.

North Parsons Avenue is a north-south two lane minor arterial roadway between East Bear Creek Drive to the south and East Yosemite Avenue to the north. Parsons Avenue becomes North Gardner Avenue north of East Yosemite Avenue.

North Gardner Avenue is currently a two-lane north-south road designated as a minor arterial in the City's General Plan. It currently acts as an extension of Parsons Avenue from East Yosemite Avenue to its terminus approximately one half mile north of Dunn Road. In the future, the City's General Plan designates this street as a four lane minor arterial extending north to connect to East Bellevue Road.

Dunn Road is a two-lane east-west street between Paulson Road to the west and Lake Road to the east. The segment between N. Gardner Avenue and Lake Road is currently in Merced County. Dunn Road serves predominantly rural residential and consists of a narrow (24 feet) unimproved road (without curb, gutter and sidewalk) with moderate to poor

pavement conditions. In the future, the adopted UC Merced Community Plan identifies Dunn Road connecting to the planned Campus Parkway east of Lake Road.

TRAFFIC ANALYSIS METHODOLOGY

Study intersections were analyzed using the 2010 Highway Capacity Manual (HCM) methodologies. Traffic operations were analyzed using the Synchro 9.0 software program, which is based on procedures outlined in the HCM.

The analysis results are presented using a descriptive term known as level of service (LOS), which is a measure of the quality of traffic operating conditions varying from LOS A (indicating free-flow traffic conditions with little or no delay) to LOS F (representing over-saturated conditions where traffic flows exceed capacity resulting in long queues and delays). LOS grades represent the perspective of drivers and are an indication of the comfort and convenience associated with driving.

The LOS is determined differently depending on the type of control at the intersection. For side-street stop-controlled intersections, the LOS rating is based on the weighted average control delay of the side-street. At all-way stop-controlled and signalized intersections, the LOS rating is based on the weighted average control delay of all movements measured in seconds per vehicle. Peak hour traffic volumes, lane configurations, and signal timing plans are used as inputs in the LOS calculations. **Table 1** summarizes the relationship between the average control delay per vehicle and LOS for signalized and unsignalized intersections.

TABLE 1: LEVEL OF SERVICE CRITERIA

LEVEL OF SERVICE (LOS)	AVERAGE CONTROL DELAY (SECONDS/VEHICLE)	
	Stop Controlled[1]	Signalized
A	≤ 10	≤ 10
B	> 10 – 15	> 10 – 20
C	> 15 – 25	> 20 – 35
D	> 25 – 35	> 35 – 55
E	> 35 – 50	> 55 – 80
F	> 50	> 80

[1] Applied to the average intersection delay at stop controlled intersections.

Source: Highway Capacity Manual, 2010, DKS Associates, 2020

EXISTING LEVELS OF SERVICE

Weekday morning (7:00 to 9:00 AM) and evening (4:00 to 6:00 PM) peak period intersection turning movement counts were conducted at the study intersections on clear days with area schools in normal session in November 2016. The 2016 traffic counts are provided in the Technical Appendix. For each intersection, the single hour with the highest traffic volumes during the two count periods was identified. The peak hour volumes and intersection lane configuration and control type are presented on **Figure 3**. Count volumes have been adjusted to represent the time that has elapsed since the counts were conducted in late 2016. Because UC Merced is the most influential land use in the vicinity of the Project, an estimated growth rate of 8.6% between 2016 and 2019 has been assumed. This rate is based on University of California data[1] and has been agreed to by City staff.

Existing operations were evaluated for the weekday AM and PM peak hours at the existing study intersections. The existing traffic volumes were used with current lane configurations and signal phasing/timings as inputs into the LOS calculations. Table 2 summarizes the LOS results. Detailed intersection LOS calculation worksheets are presented in the Technical Appendix.

Two delay values are reported for each unsignalized intersection: (1) intersection average delay and (2) the highest controlled movement delay. LOS D is the limit of acceptable operations in the City of Merced. LOS C is the limit of acceptable operations for intersections in rural portions of the County. For the purposes of this analysis, all Level of Service designations are based on average intersection delay and worst movement delay is presented for informational purposes.

Table 2 shows that all intersections but one currently operate at LOS C or better during both the AM and PM peak hours. One intersection (North Gardner/ East Yosemite) currently operates with an average intersection delay representing LOS D during both AM and PM peak hours, and operates with a worst movement delay representing LOS F during the AM peak hour and LOS E during the PM peak hour.

EXISTING TRANSIT SERVICE

The UC Merced campus is accessible by transit both locally and regionally.

Amtrak provides service to the City of Merced and vicinity on its San Joaquin route. The San Joaquin runs multiple times daily between the San Francisco Bay Area (or Sacramento) and Bakersfield, where Amtrak Thruway buses connect to Southern California destinations. Stops in addition to Merced include Stockton, Modesto, Martinez, and Fresno. The northbound and southbound trains currently stop in Merced 7 times daily. The Amtrak station is located in downtown Merced, approximately 3.5 miles from the proposed project.

The Bus is operated by the Transit Joint Powers Authority for Merced County and provides regular fixed route bus service within Merced County. The Bus currently operates nearly

[1] https://www.universityofcalifornia.edu/news/record-breaking-class-pushes-uc-merced-enrollment-near-8000

thirty bus lines throughout the County, seven of which serve the City of Merced and its surrounding communities. Other routes connect Merced with other cities located further away in the County. Four bus routes provide either direct service or nearly direct service to the proposed project site.

FIGURE 3: EXISTING INTERSECTION GEOMETRICS AND PEAK HOUR VOLUMES

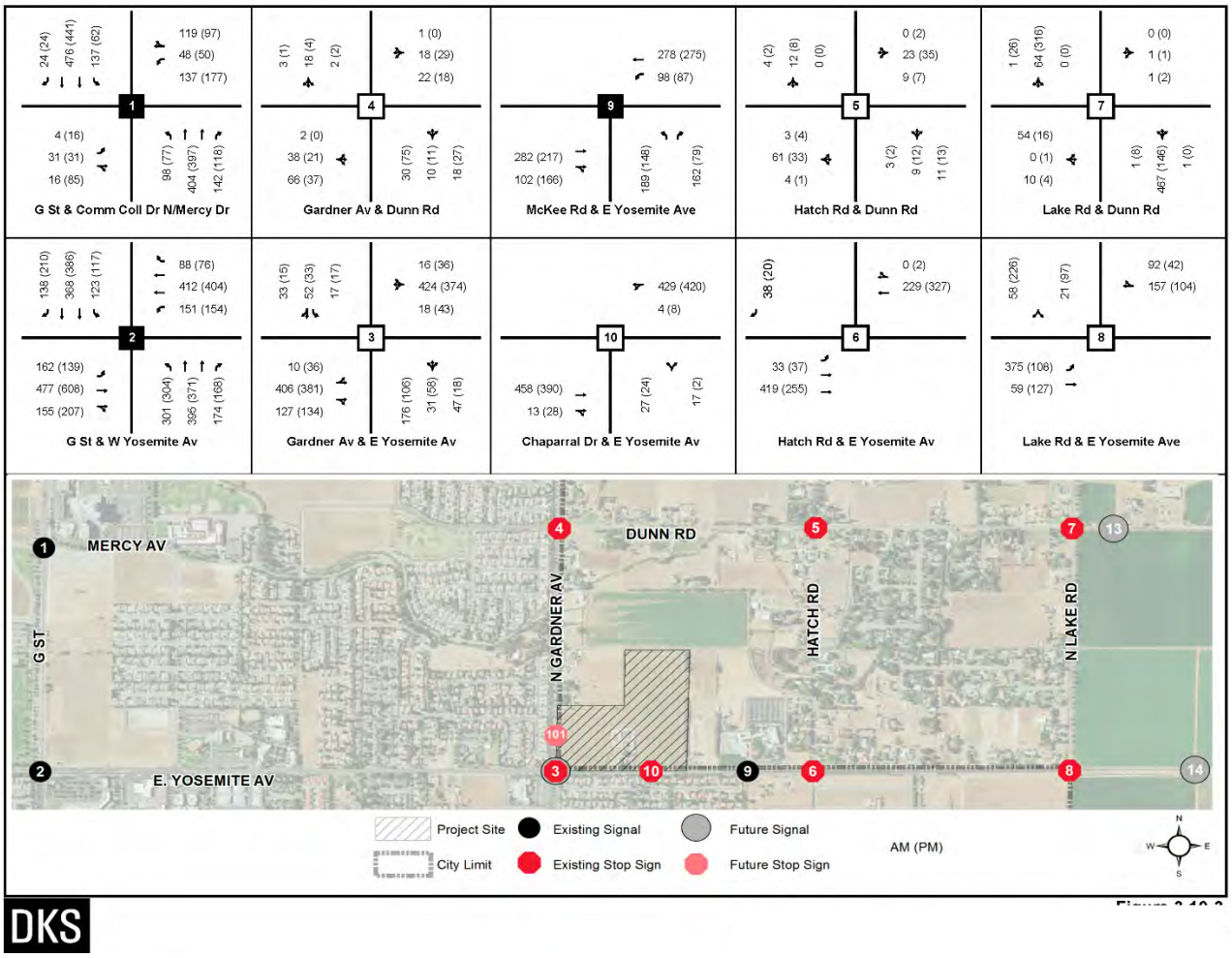


TABLE 2: EXISTING CONDITIONS INTERSECTION LEVEL OF SERVICE

INTERSECTION	JURISDICTION	LOS POLICY	INTER-SECTION CONTROL	EXISTING CONDITIONS			
				AM Peak Hour		PM Peak Hour	
				Delay	LOS	Delay	LOS
G STREET / MERCY AVENUE	City	D	Signal	21.1	C	20.8	C
G STREET / EAST YOSEMITE AVENUE	City	D	Signal	36.2	D	43.0	D
NORTH GARDNER AVENUE / EAST YOSEMITE AVENUE	City	D	AWSC	33.7 (62.2)	D	24.7 (40.4)	C
NORTH GARDNER AVENUE / DUNN ROAD	City	D	TWSC	7.1 (10.1)	A	7.2 (10.9)	A
HATCH ROAD / DUNN ROAD	County	C	TWSC	7.0 (9.6)	A	6.6 (9.4)	A
HATCH ROAD / EAST YOSEMITE AVENUE	City	D	TWSC	0.9 (9.2)	A	0.8 (9.5)	A
LAKE ROAD / DUNN ROAD	County	C	TWSC	1.5 (14.1)	A	0.7 (13.2)	A
LAKE ROAD / EAST YOSEMITE AVENUE	City	D	TWSC	6.2 (16.9)	A	7.9 (14.5)	A
MCKEE ROAD / EAST YOSEMITE AVENUE	City	D	Signal	11.5	B	10.3	B
CHAPARRAL DRIVE / EAST YOSEMITE AVENUE	City	D	TWSC	0.8 (16.9)	A	0.6 (18.0)	A

Notes:
Cells with bold text represent intersection conditions not meeting applicable Level of Service policies.
LOS = Level of Service, Delay = Stopped control in Seconds per vehicle
For TWSC (Two-Way Stop Control) and AWSC (All-Way Stop Control), Average Intersection (Worst Movement) Delay
DKS Associates, 2020.

Route M1 (Merced West) provides access to Merced College and its nearest stop is at the western edge of Merced College (on M Street), approximately 1.5 miles from the project

site. This route operates every 30 minutes throughout the day and provides connections to downtown Merced and other portions of the City of Merced to the south and west.

Route M2 (R Street Shuttle) provides access to Merced College and its nearest stop is at the western edge of Merced College (on M Street), approximately 1.5 miles from the project site. This route operates every 30 minutes throughout the day and provides connections to downtown Merced and other portions of the City of Merced to the south.

Route M3 (M Street Shuttle) provides access to Merced College and Mercy Medical Center and its nearest stop is on East Yosemite Avenue near Paulson Road, approximately ½ mile from the proposed project site. This route operates every 30 minutes throughout the day and provides connections to downtown Merced and other portions of the City of Merced to the south.

Route M4 (G Street Shuttle) provides access to Merced College and Mercy Medical Center and its nearest stop is on East Yosemite Avenue near Paulson Road, approximately ½ mile from the proposed project site. This route operates every 30 minutes throughout the day and provides connections to downtown Merced and other portions of the City of Merced to the south.

Route M6 (Olive Loops) provides access to Merced College and Mercy Medical Center and its nearest stop is on East Yosemite Avenue near Parsons Avenue, across the street from the proposed project site. This route operates every 30 minutes throughout the day.

Route UC (UC Merced) provides access to UC Merced, Merced College, and Mercy Medical Center and its nearest stop is on East Yosemite Avenue near Parsons Avenue, across the street from the proposed project site. This route operates every 30 minutes throughout the day and provides connections to downtown Merced.

CatTracks is a bus system funded by the UC Merced campus. It connects the campus and surrounding areas, including downtown Merced and research facilities located on the closed Castle Air Force base. CatTracks operates a number of routes in the vicinity of the proposed project. A number of CatTracks routes include on-demand stops along East Yosemite Avenue within walking distance of the proposed project.

StaRT (Stanislaus Regional Transit) provides one round trip each direction daily between Modesto, Turlock, and Merced along SR-99. It connects with The Bus in Merced.

YARTS (Yosemite Area Regional Transit) connects the City of Merced to Yosemite National Park.

Figure 4 shows the local Bus routes in the vicinity of the proposed project.

EXISTING PEDESTRIAN AND BICYCLE FACILITIES

The City of Merced has the most extensive bike path system in the county. Merced's bikeway system consists of Class I paths (separated from roadways) and Class II on-street bike lanes. Most of the Class II bike lanes are on streets within the urban area of Merced, while the Class I bike paths run along portions of Black Rascal Creek and Bear Creek. Few dedicated bicycle facilities exist in the unincorporated areas of Merced County.

The County does have one Class I Bike Path (Lake Road) and plans to construct an additional Class I Bike Path along Segments 2 and 3 of Campus Parkway. While overall development of non-motorized facilities is a responsibility of local government, Caltrans provides state-level funds through the Bicycle Transportation Account and Safe Routes to School programs. **Figure 5** shows existing bicycle facilities in the vicinity of the Proposed Project.

FIGURE 4: MAP OF MERCED TRANSIT ROUTES

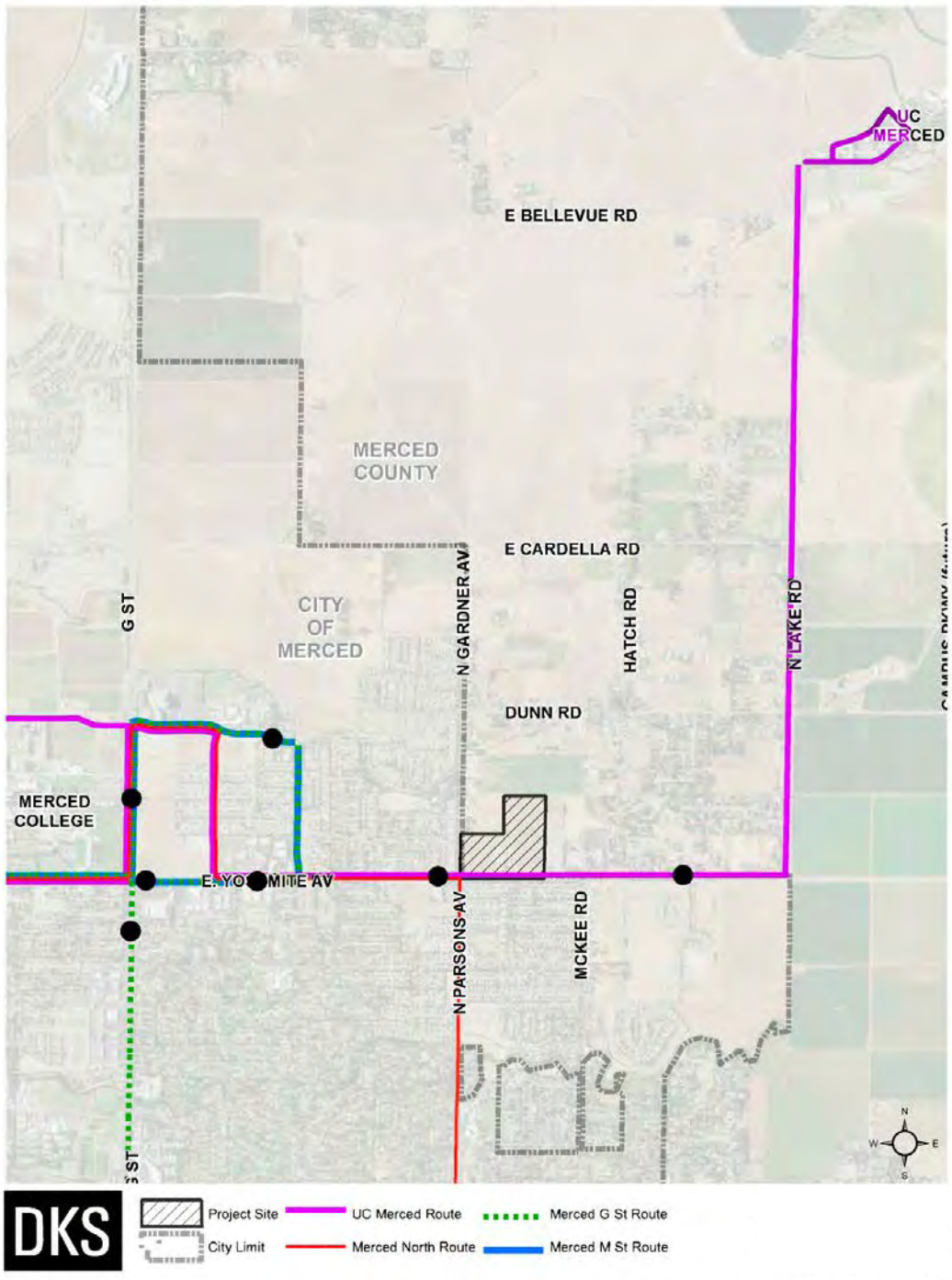
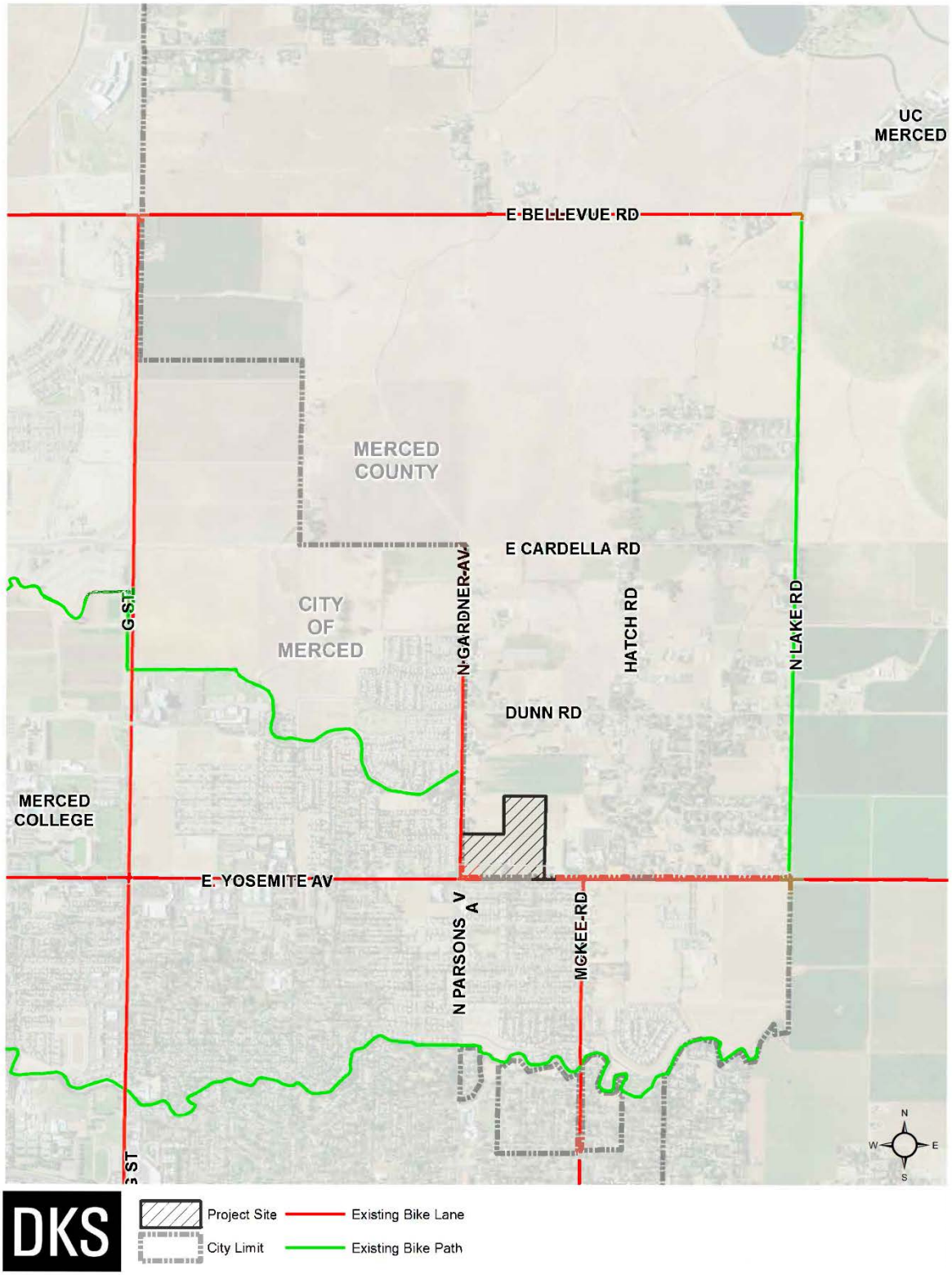


FIGURE 5: MAP OF EXISTING BIKEWAYS



REGULATORY SETTING

This section summarizes the planning and policy documents that relate to the provision of transportation services in Merced County. This information provides a context for the impact discussion related to the 2030 General Plan's consistency with applicable regulatory conditions. These documents include a number of planned improvements that could benefit the project. Some of the key documents include:

- Merced Vision 2030 General Plan, City of Merced
- Merced County Year 2030 General Plan, Merced County
- UC Merced Long Range Development Plan 2020
- 2018 Regional Transportation Plan & Sustainable Communities Plan, Merced County Association of Governments
- Merced County Regional Commuter Bicycle Plan, Merced County Association of Governments, 2008
- Technical Advisory on Evaluating Transportation Impacts in CEQA: California Governor's Office of Planning and Research (OPR) – April 2018

Merced Vision 2030 General Plan

The City of Merced adopted its *Merced Vision 2030 General Plan* in January 2012, superseding the *Merced Vision 2015 General Plan*. The Transportation and Circulation chapter of the 2030 General Plan includes goals and policies intended to plan for circulation while enhancing the community and protecting the environment. The Plan's goals and objectives include roadways and vehicular access, active transportation, and the coordination of land use planning and circulation. The Plan identifies a one mile grid system of arterial roadways, which will be extended to serve Merced's new growth areas in the area between the proposed project and the UC Merced campus.

Some of the goals and policies contained in the Vision 2030 General Plan relevant to this analysis include the following:

- **Goal Area T-1: Streets and Roads**
  - An integrated Road System that is safe and efficient for motorized and non-motorized uses
  - A circulation System that is accessible, convenient, and flexible
  - A comprehensive System of "complete streets" which address all modes of transportation
- **Policies T-1**
  - T-1.1 Design streets consistent with circulation function, affected land uses, and all modes of transportation
  - T-1.2 Coordinate circulation and transportation planning with pertinent regional, State, and Federal agencies
  - T-1.3 Design major roads to maximize efficiency and accessibility

        - 1.3a Adhere, to the greatest possible extent, to the standards adopted for spacing streets that intersect arterials and higher order roadways
            - Identifies intersection spacing of ¼ to ½ mile for major arterials, arterials, and divided arterials, and 1/8 to ¼ mile for minor arterials
        - 1.3b Improve traffic flow of arterials and other major roadways whenever possible by avoiding or eliminating on-street parking
        - 1.3c Work to ensure that land use fronting major streets have shared access across adjacent properties and provide sufficient on-site parking to avoid depending upon on-street parking
        - 1.3d Continue to require the provision of on-site visitor parking in multi-family projects
        - 1.3f Whenever feasible avoid, or eliminate, unnecessary or poorly placed median openings and consider limiting left turns at uncontrolled intersections during peak hours on arterials
        - 1.3k Approve driveway access locations only if consistent with approved minimum acceptable distances from major intersections, except in unusual circumstances
    - T-1.4 Promote traffic safety for all modes of transportation
    - T-1.5 Minimize unnecessary travel demand on major streets and promote energy conservation
    - T-1.6 Minimize street system impacts on residential neighborhoods and other sensitive land uses
    - T-1.8 Use a minimum peak hour Level of Service (LOS) "D" as a design objective for all new streets in new growth areas and for most existing City streets except under special circumstances:
        - 1.8a Traffic studies will be conducted as needed to determine the traffic impacts and to apply appropriate mitigation measures for new development projects
        - 1.8b Use peak-hour Level of Service "D" ("Tolerable Delays") as the design standard for new streets and intersections in new growth areas
        - 1.8c Establish minimum LOS standards for existing roadways and intersections that reflect the special circumstances of the surrounding area.
- **Goal Area T-2: Bicycles, Pedestrians, and Public Transit**
    - An Efficient and Comprehensive Public Transit System
    - A Comprehensive System of Safe and Convenient Bicycle Routes (Within the Community and Throughout the Urban Area).
    - A Comprehensive System of Safe and Efficient Pedestrian Facilities.
    - A Comprehensive System of "Complete Streets" Addressing All Modes of Transportation.
- **Policies T-2**

- T-2.1 Provide for and maintain a major transit way along "M" Street and possibly along the Bellevue Road/Merced-Atwater Expressway and Campus Parkway corridors
- T-2.2 Support and enhance the use of public transit
- T-2.3 Support a safe and effective public transit system
- T-2.4 Encourage the use of bicycles
- T-2.5 Provide convenient bicycle support facilities to encourage bicycle use
- T-2.6 Maintain and expand the community's existing bicycle circulation system
- T-2.7 Maintain a pedestrian-friendly environment
- T-2.8 Improve planning for pedestrians
- T-2.9 Ensure that new development provides the facilities and programs that improve the effectiveness of Transportation Control Measures and Congestion Management Programs

Merced County Year 2030 General Plan

Merced County adopted its *2030 Merced County General Plan* in December 2013. The Transportation and Circulation Element of the General Plan provides the policy context for Merced County to achieve its vision for the safe and efficient circulation of people, vehicles, and goods throughout the County. The element was written to establish goals and policies for the circulation system in order to balance the varying needs of motorists, bicyclists, pedestrians as well as the unique needs for the movement of farm equipment and agricultural commodities.

- **Goal CIR-1** Maintain an efficient roadway system for the movement of people and goods that enhances the physical, economic, and social environment while being safe, efficient, and cost-effective.
  - Policy CIR-1.5: County Level of Service Standards (RDR)
    - Implement a Countywide roadway system that achieves the following level-of-service (LOS) standards during peak traffic periods:
      a) For roadways located within rural areas: LOS "C" or better
      b) For roadways located outside Urban Communities that serve as connectors between Urban Communities: LOS of "D" or better
      c) For roadways located within Urban Communities: LOS of "D" or better
  - Policy CIR-1.6: Level of Service "E" Exception (RDR)
    - Allow a level of service "E" or worse only on a minor component of the circulation system (such as a left turn movement from a local roadway) if the major component of the circulation system (such as a through movement on a collector or arterial roadway) would be significantly compromised in the process of improving the level of service of the minor component
- **Goal CIR-2** Maintain an efficient roadway system for the movement of people and goods that enhances the physical, economic, and social environment while being safe, efficient, and cost-effective.

- **Goal CIR-3** Maintain a public transit system that provides an alternative to automobile travel, supports ridesharing, and meets the needs of the entire community.
- **Goal CIR-4** Maintain and expand a safe, continuous, and easily accessible bicycle and pedestrian circulation system.

2018 Regional Transportation Plan & Sustainable Communities Plan (RTP/SCS)

The goals and objectives for the 2018 RTP/SCS were established to meet the regulatory requirements of the FAST Act, the Clean Air Act, Title VI of the Civil Rights Act, SB 375, the California Complete Streets Act, and the California Environmental Quality Act. They were tailored specifically to the unique needs of Merced County and the feedback that was received from the public during the planning process. Each goal was associated with specific performance measures to compare different planning alternatives against current conditions.

- **Goal 1. Highways, Streets, and Roads:** Provide a safe and efficient regional road system that accommodates the demand for movement of people and goods.
- **Goal 9. Land Use Strategies:** Provide economical, long-term solutions to transportation problems by encouraging community designs that encourage walking, transit, and bicycling.
- **Goal 12. Sustainable Communities:** Reduce per capita greenhouse gas emissions by coordination compact growth with alternative transportation strategies. Protect and enhance the natural environment. Support vehicle electrification and the provision of electrification infrastructure in public and private parking facilities and structures.
- **Goal 17. Social Equity and Environmental Justice:** Promote and provide equitable transportation and housing options for all populations and ensure that all populations share in the benefits of transportation investments.

Technical Advisory on Evaluating Transportation Impacts in CEQA – California OPR

California Senate Bill 743 (SB 743) was signed in 2013 and later incorporated into the California Environmental Quality Act (CEQA) in 2018. Starting July 1, 2020, all new land-use development and transportation projects will be expected to evaluate transportation impacts under CEQA using vehicle miles traveled (VMT) instead of Level of Service (LOS). While LOS requires the estimation of traffic volumes on the roadway, typically conducted by manual surveys or tube counts, calculating baseline VMT for SB 743 requires data on the amount of vehicle trips, trip lengths, and vehicle occupant classification (resident vs. employee).

This technical advisory is one in a series of advisories provided by the Governor's Office of Planning and Research (OPR) as a service to professional planners, land use officials, and CEQA practitioners. OPR issues technical assistance on issues that broadly affect the practice of land use planning and the California Environmental Quality Act (CEQA). The advisory contains technical recommendations regarding assessment of VMT, thresholds of significance, and mitigation measures.

ROADWAY DEFICIENCIES AND CONDITIONS OF APPROVAL

ANALYSIS SCENARIOS

The following scenarios are evaluated in this study:

1. Existing – Existing (November 2016) conditions based on traffic counts. This scenario establishes baseline conditions for evaluating Project-specific deficiencies on the existing transportation system.
2. Existing Plus Project - This scenario identifies current Project-specific deficiencies on the existing transportation system.
3. Existing with Approved Projects – Existing conditions with traffic from development that has been approved by the City of Merced but not yet built. This scenario establishes baseline conditions for evaluating near-term Project deficiencies in combination with other development.
4. Existing with Approved projects Plus Project – Existing conditions with traffic from development that has been approved by the City of Merced but not yet built plus Project traffic. This scenario identifies the Project's contribution to deficiencies that might occur once approved developments are built and adding traffic to the surrounding transportation system.
5. Cumulative 2030 No Project – This scenario establishes baseline conditions for evaluating long-term Project contribution to deficiencies that might occur with build out of the City of Merced's General Plan to the year 2030.
6. Cumulative 2030 Plus Project – This scenario identifies the Project's contribution to long-term deficiencies that might occur with build out of the City of Merced's General Plan to the year 2030.

STANDARDS OF SIGNIFICANCE FOR TRANSPORTATION

Standards of significance are quantitative criteria used to determine if the Project would cause an impact to the transportation system considered "significant" enough to require the Project to mitigate its impact to a level of "insignificance". Standards of significance are based on the guidance from the Office of Planning and Research for vehicle miles traveled and from policies contained within the Transportation and Circulation chapters of the Merced Vision 2030 General Plan and the Merced County 2030 General Plan for General Plan consistency.

As of July 1, 2020, all standards of significance based on roadway and intersection Level of Service (LOS) no longer apply for identifying impacts under the California Environmental Quality Act (CEQA). These impacts are, however applied as they relate to local jurisdictions' transportation and circulation policies.

Transportation related impacts under CEQA are now based on the project's relative impact to vehicle miles traveled (VMT) in the vicinity of the proposed project.

VEHICLE MILES OF TRAVEL

Given that the City of Merced and the County of Merced (the project is currently located in unincorporated Merced County but would be annexed to the City of Merced) have not yet

developed comprehensive policies or standards of significance to determine significant impacts based on VMT, the consultant team will follow OPR's guidance on project screening criteria (to establish whether a VMT analysis is even warranted) or determining VMT impacts for development projects. While the guidance presented by OPR gives local jurisdictions leeway in their interpretation of the recommended screening criteria and impact thresholds, it does specify the thresholds that local jurisdictions may apply to determine impacts of development project. The guidance identifies separate recommendations for residential portions and employment portions of a proposed project. VMT per capita (per resident) and VMT per employee of the proposed project are to be compared to existing development. The definition of "existing development" is left to the discretion of the lead agency. In this case, discussions with the City of Merced resulted in "existing development" being designated as the entirety of Merced County. In its guidance, OPR states the following *"OPR finds that in most instances a per capita or per employee VMT that is fifteen percent below that of existing development may be a reasonable threshold."*

For the purposes of this analysis, a project (residential or non-residential) would be screened from having to perform a VMT analysis if:

- Project generates less than 110 daily trips
- Project is a residential development that consists of 100% non-market rate housing units (i.e., low-income housing)
- Project is within a ½ mile of two or more high quality transit lines
- Is located in a low VMT area

For the purposes of this analysis, an VMT impact would be considered significant if:

- The project cannot be "screened out" based on the above criteria; AND,
  - VMT per capita for the residential portion of the proposed project would exceed 85 percent of the regional (in this case Merced County) average; OR,
  - VMT per office employee for the non-residential portion of the proposed project would exceed 85 percent of the regional (in this case Merced County) average; OR,
  - Net VMT increases due to project-added "regional commercial" development.
  - Net VMT increases due to project-added retail development.

ROADWAY SYSTEM

Traffic deficiencies would be considered inconsistent with the General Plan if:

- The Project would cause the deterioration in the operation of a signalized intersection from operating at a LOS D or better under no project conditions to operating at a LOS E or LOS F under with project conditions; or if a signalized intersection is already operating at a LOS E or F without the project and the addition of project traffic causes an increase in the intersection's average delay of five or more seconds.
- The Project would substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g. farm equipment).

- The Project would result in inadequate emergency access to the Project site.
- The Project would conflict with adopted policies, plans, or programs supporting alternative modes of transportation.

TRANSIT SYSTEM

Transit impacts would be considered significant if:

- The Project or any Project-related mitigation measure disrupts existing transit services or facilities. This includes disruptions caused by proposed Project driveways on transit streets, impacts to transit stops/shelters, and impacts to transit operations from traffic improvements proposed by, or resulting from, the Project.
- The Project would interfere with planned transit services or facilities.
- The Project would create a demand for public transit services above that which is provided or planned.
- The Project would conflict with, or create inconsistencies with, adopted transit system plans, guidelines, policies or standards.

BICYCLE SYSTEM

Bicycle impacts would be considered significant if:

- The Project disrupts existing bicycle facilities.
- The Project interferes with planned bicycle facilities. This includes failure to dedicate right-of-way for planned on- and off-street bicycle facilities included in an adopted Bicycle Master Plan or the General Plan.
- The Project conflicts with, or creates inconsistencies with, adopted bicycle system plans, guidelines, policies or standards.

PEDESTRIAN SYSTEM

Pedestrian impacts would be considered significant if:

- The Project disrupts existing pedestrian facilities. This can include adding new vehicular, pedestrian or bicycle traffic to an area experiencing pedestrian safety concerns.
- The Project interferes with planned pedestrian facilities.
- The Project conflicts with, or creates inconsistencies with, adopted pedestrian system plans, guidelines, policies or standards.

STOP-CONTROLLED INTERSECTION SIGNIFICANCE CRITERIA AND TRAFFIC SIGNAL WARRANTS

The Transportation and Circulation chapters of the Merced Vision 2030 General Plan and the Merced County 2030 General Plan do not contain specific criteria or standards for determining deficiencies at stop-controlled or unsignalized intersections. Stop-controlled

intersections operate, and are evaluated, differently than signalized intersections and, therefore, the standards are applied in a manner that reflects these differences.

This study uses the following methodology for identifying deficiencies at stop-controlled intersections:

- Conduct a peak hour LOS analysis of the intersection using either the 2000 or 2010 Highway Capacity Manual procedures. This study presents the average intersection LOS (all movements) and the LOS for the worst individual stop-controlled movement. The worst movement LOS is reported for informational purposes only.
- Identify impacts based on the same standards of significance for signalized intersections but for stop-controlled intersections, the intersection must also meet warrants for installation of a traffic signal for the Project to cause a significant impact.

To assess the need for signalization of stop-controlled intersections, the 2014 California Manual of Uniform Traffic Control Devices presents eight signal warrants or tests. Warrants 1, 2 and 3 (the 8-Hour Volume, 4-Hour Volume and Peak Hour Volume) were used in this study to determine if a traffic signal is warranted and, combined with the findings of the LOS analysis, to identify a potentially significant impact caused by the addition of Project traffic.

PROJECT TRIP GENERATION AND DISTRIBUTION

For the purpose of estimating trip generation, the proposed Project is divided into two components: a residential component comprised of 540 apartments and a 13,700 square foot clubhouse for use of Project residents; and a commercial component comprised of 66,000 square feet of retail development serving the Project residents and the general public, twelve residential apartments, and eighteen extended stay units. The proposed Project includes a total of 1,223 parking spaces.

Table 3 shows the estimated trip generation for the proposed Project, including the residential and commercial components, based on the Institute of Transportation Engineers (ITE) *Trip Generation Manual, 10th Edition*. The table includes reduction factors applied to each land use where appropriate. A five percent reduction was applied to the trip generation of the residential to reflect the site's proximity to public transit lines and the UC Merced and Merced College campuses.

A forty percent "pass-by" reduction was applied to the retail uses within the commercial component of the Project, based on data from ITE's *Trip Generation Handbook* for estimating trip generation for commercial developments. Pass-by trips are traffic already on the way from an origin to a primary destination that make an intermediate stop at the site while passing by on an adjacent street. Pass-by trips are considered existing traffic because they would have been passing by the site regardless of the new development. Pass-by trips make up a large share of the trip generation for convenience stores, gas stations, and restaurants.

Trip generation for both the residential and the commercial components of the Project site were adjusted for internal capture. Internal capture are trips estimated as part of the total trip generation of each individual land use within multi-use developments, but are trips between one land use and another land use on the same site (e.g., between residential and retail or restaurant). Internal capture trips can be made on the site by walking or by vehicles using internal roadways without using the major street system and thus can be subtracted from the total site trip generation. A twelve percent and ten percent internal capture reduction was applied to the residential and commercial components of the Project respectively.

TABLE 3: ESTIMATED PROJECT TRIP GENERATION

LAND USE	NUMBER OF UNITS	VEHICLE TRIPS						
		AM Peak			PM Peak			Daily
		In	Out	Total	In	Out	Total	Total
LOW-RISE APARTMENT RESIDENTIAL (ITE CODE 220)	552 Dwelling Units	56	186	242	170	100	270	4,132
COMMERCIAL (ITE CODE 820)	66,000 Square Feet	38	24	62	120	131	251	5,184
EXTENDED STAY HOTEL (ITE CODE 311)	18 Rooms	4	3	7	3	4	7	90
COMMERCIAL RESIDENTIAL (ITE CODE 220) [1]	12 Dwelling Units	3	3	6	3	3	6	80
TOTAL UNADJUSTED TRIPS		**174**	**259**	**433**	**365**	**311**	**676**	**8,744**
RESIDENTIAL TRIP REDUCTIONS	5% Transit 12% Internal Capture	-9	-31	-40	-28	-16	-44	-678
COMMERCIAL TRIP REDUCTIONS	40% Pass-By 10% Internal Capture	-19	-12	-31	-57	-62	-118	-2,421
TOTAL ADJUSTED RESIDENTIAL TRIPS		47	155	202	142	84	226	3,454
TOTAL ADJUSTED COMMERCIAL TRIPS		22	15	37	66	72	139	2,843
GRAND TOTAL PROJECT TRIPS		**69**	**170**	**239**	**209**	**156**	**365**	**6,297**

DKS Associates, 2020

It should be noted that the transit and pass-by trip reductions are applied first and the internalization reduction is applied to the resultant trips, therefore the reductions are not necessarily equal to the two percentages added together. The table shows that the proposed Project would generate approximately 239 trips during the AM peak hour, 365 trips during the PM peak hour, and 6,297 trips on an average weekday.

Project trip distribution was estimated based on existing traffic patterns and likely destinations for Project traffic. Trip distribution is expected to be quite different between the residential and commercial components of the Project. A large proportion of the AM and PM peak hour residential trips are traveling to and from the UC Merced and Merced College campuses, with a smaller percentage of traffic traveling to other destinations of Merced. Non-school related trips (e.g., shopping, social, recreational, etc.) generated by the residential component of the proposed Project would typically have destinations within a couple miles of the site with a relatively high percentage of these trips to/from the commercial component of the Project for convenience (e.g., internal capture).

Figure 6 shows the assumed distribution of trips for both the residential and commercial portions of the proposed Project and **Figure 7** shows the AM and PM peak hour volumes added to each study intersection

FIGURE 6: PROJECT TRIP DISTRIBUTION

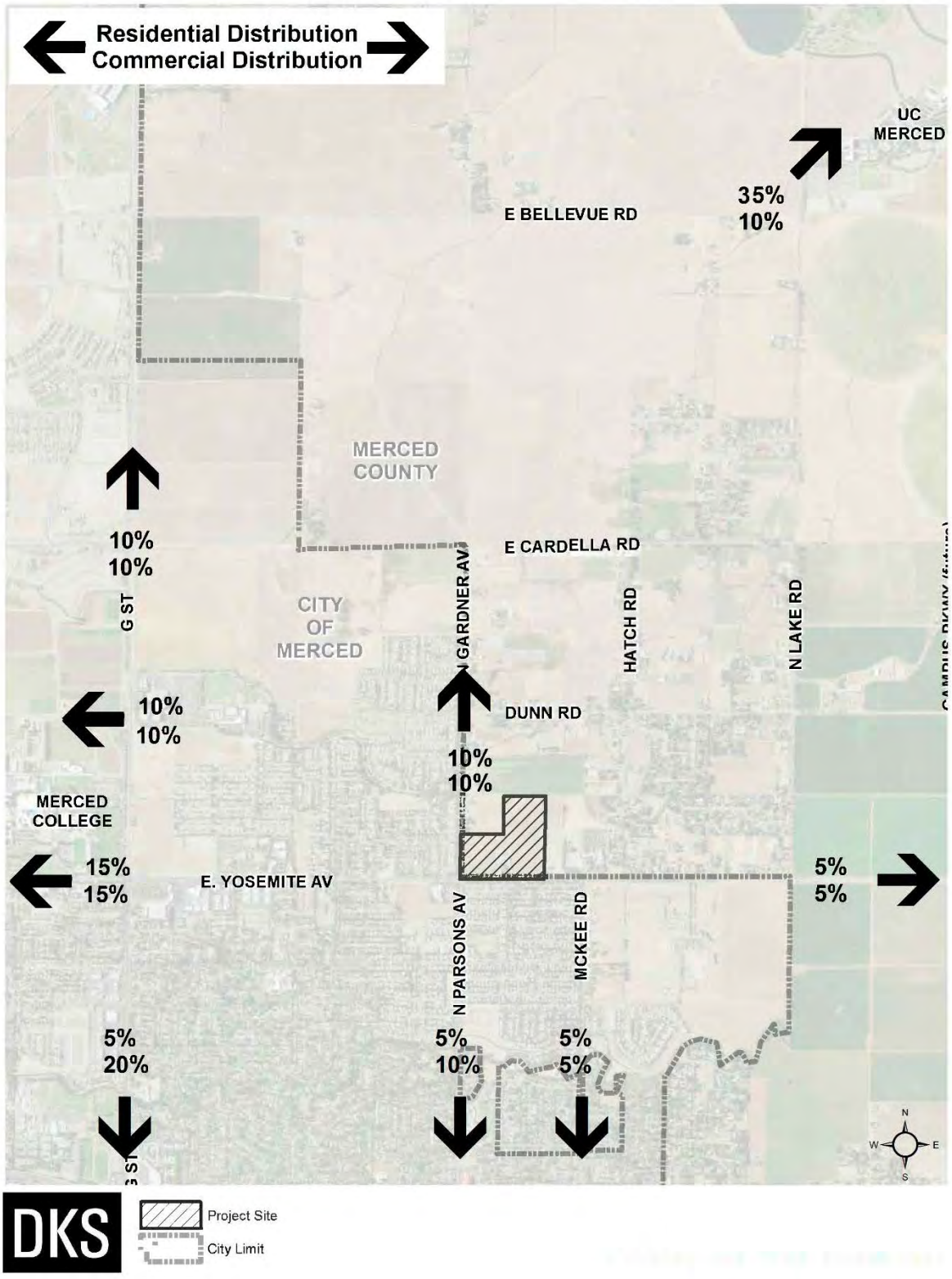
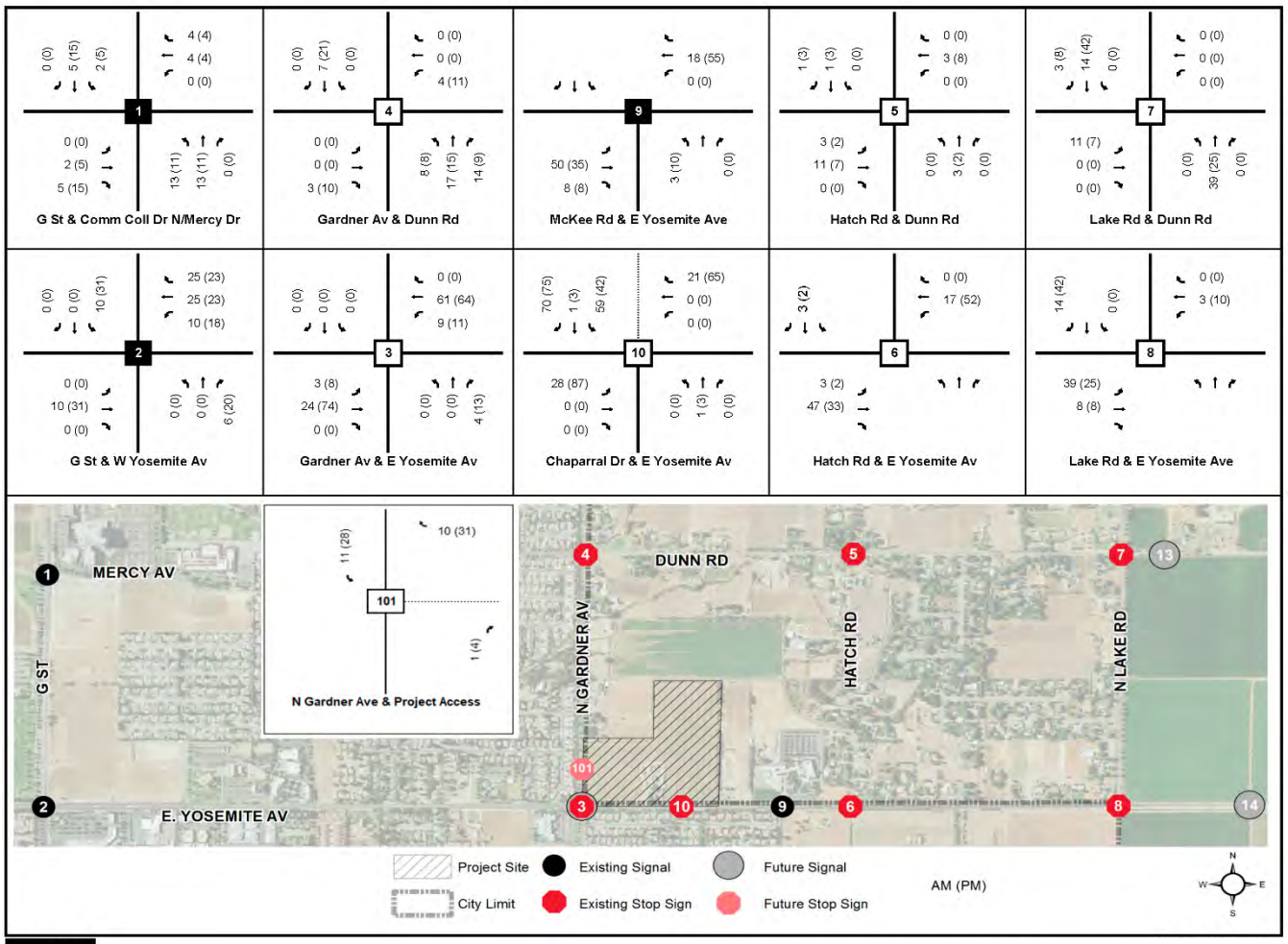


FIGURE 7: PROPOSED PROJECT ADDED PEAK HOUR VOLUMES



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VEHICLE MILES OF TRAVEL PER CAPITA (RESIDENTIAL DEVELOPMENT)

Project Impact 1: The residential portion of the proposed Project would cause increases in Vehicle Miles Traveled in the vicinity of the project site. This impact is considered to be *less than significant*.

The proposed project would add residents and employees to the study area. Vehicles driven by residents of the proposed apartments and employees of the proposed commercial square footage would be added to the existing environment. Whereas CEQA impacts on study area roadways used to be based on roadway volumes and resultant Level of Service (LOS) changes, the passage and implementation of Senate Bill 743 (SB 743) has resulted in CEQA impacts now being based on changes in vehicle miles traveled (VMT) as discussed in sections above. Changes in VMT lead in turn to impacts to mobility, greenhouse gas emissions (GHG) and public health.

Various methodologies exist to estimate project VMT statistics and compare it to that of the existing environment, including travel demand models, tabulation of existing known trip lengths for the proposed project, and "Big Data" sources. For the purposes of this analysis, a "Big Data" source (provided by Streetlight Data[2]) was utilized to estimate project VMT per capita and compare it to the existing environment. Streetlight Data was used to determine existing VMT per capita and VMT per employee for the project site and adjacent areas. In simple terms, the anonymized personal trip data provided by Streetlight Data is based on a large sample size of mobile location sources, including mobile phones and other location-enabled devices. Streetlight Data uses trip patterns to determine home and work locations for each device, and then can approximate daily trip patterns for that device. Sampled devices and people are anonymized and then factored to determine total trips and trip lengths per resident and employee, and results are then summarized by a specific geography, in this case Census Block Groups. The data set obtained for the purposes of this study consisted of ten Census Block Groups, including the Block Group where the project is located, and nine others in the immediate vicinity of the project site.

Figure 8 shows the locations of the ten Block Groups for which data was obtained and summarized, based on input on Block Group choice from City of Merced staff. Block Groups are color coded by their relative VMT per capita compared to the overall VMT per capita of Merced County. Block Groups that have VMT per capita more than 15% below the Merced County average are shown in green. Block Groups that have VMT per capita less than 15% below the Merced County average are shown in yellow. Block Groups that have VMT per capita greater than the Merced County average are shown in orange and red. Relative population based on the American Community Survey (ACS) are labeled for each Block Group for reference. The figure shows that of the ten Block Groups, seven have VMT per capita more than 15% below that of the County average, while one is less than 15% below

[2] https://www.streetlightdata.com/sb-743-vmt-solutions/

the County average, and two are greater than the County average. The Block Group where the project site is located (Block Group 060470018011) shows VMT per capita that is approximately 55.4% of the Merced County Average. This result is significantly lower than the threshold of 15% below the Countywide average (or 85% of the Countywide average). While it would be simple to assume the proposed project would have similar trip length and therefore similar VMT per capita characteristics of the Block Group in which it will be located, there are two factors that limit the appropriateness of this assumption. First, Block Group 060470018011 is unique in that it includes a majority of the University of California (UC) Merced campus, and therefore its trip characteristics are skewed by the large number of University students living in the Block Group. University students are more likely to have fewer and shorter daily vehicle trips, as much of their daily routine is centered around the university campus and many may not own or drive cars. Second, the project site is located on the border of three Census Block Groups, and it is therefore less likely that its travel characteristics would identify significantly greater with one area over the others. Therefore, for the purposes of this analysis, a weighted average (weighted by relative population in each Block Group) has been calculated for the three Block Groups that either contain or are directly adjacent to the project site. For informational purposes, a similar weighted average has been calculated for all ten Block Groups for which VMT per capita data was obtained.

Table 4 shows the relative weighted VMT per capita (compared to the County as a whole) for the single Block Group the project is located within, the three Block Groups adjacent to the proposed project, and the ten Block Groups for which data was obtained. The table shows that each of these three options yields weighted VMT per capita more than 15% below the countywide average.

Therefore, based on the residential VMT per capita rates presented above, the project's residential impact on Vehicle Miles Traveled is considered to be **less than significant**.

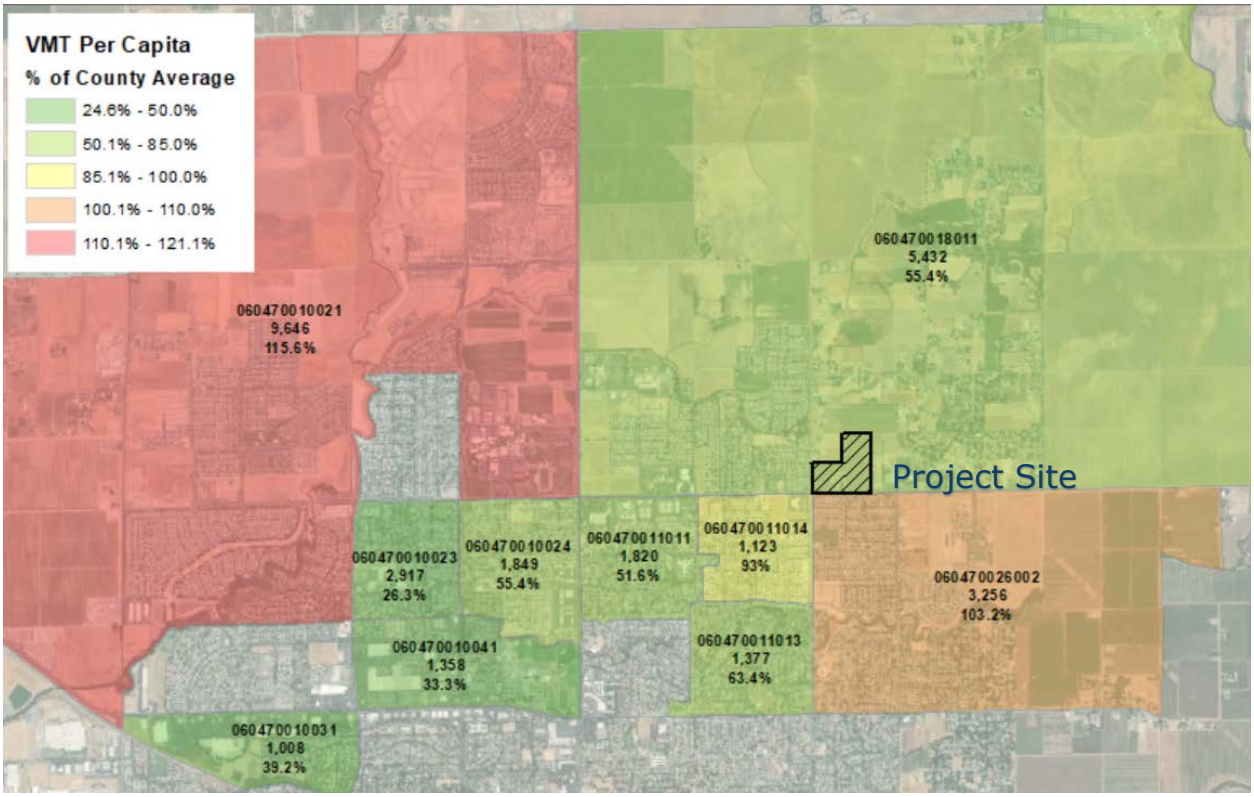
Mitigation Measure: **None Required**

TABLE 4: VMT PER CAPITA BY CENSUS BLOCK GROUP

	COUNTYWIDE	PROJECT BLOCK GROUP (060470018011)	THREE ADJACENT BLOCK GROUPS	ALL TEN BLOCK GROUPS
TOTAL POPULATION	269,075	5,432	8,375	29,786
RESIDENT AVERAGE TRIP LENGTH	10.6 mi	8.0 mi	8.0 mi	8.1 mi
WEIGHTED VMT PER CAPITA	18.6	10.3	11.1	14.4
AS PERCENT OF COUNTYWIDE	100%	55.4%	59.6%	77.3%

Source: Streetlight Data, 2020

FIGURE 8: VMT PER CAPITA BY CENSUS BLOCK GROUP (COMPARED TO MERCED COUNTY AVERAGE)



VEHICLE MILES OF TRAVEL (COMMERCIAL DEVELOPMENT)

Project Impact 2: The commercial portion of the proposed Project has been identified to be "locally-serving" commercial. This impact is considered to be *less than significant*.

In addition to the residential apartment units, includes approximately 66,000 square feet of retail development. Again, as with residential development, the City of Merced has not yet adopted specific thresholds for VMT associated with commercial development. According to the OPR guidance:

"By adding retail opportunities into the urban fabric and thereby improving retail destination proximity, local-serving retail development tends to shorten trips and reduce VMT. Thus, lead agencies generally may presume such development creates a less-than-significant transportation impact. Regional-serving retail development, on the other hand, which can lead to substitution of longer trips for shorter ones, may tend to have a significant impact. Where such development decreases VMT, lead agencies should consider the impact to be less-than-significant."

The OPR guidance suggests that a reasonable amount of square footage to determine whether retail project (or portion of a project) is regional in nature is that retail projects over 50,000 square feet can be considered regional in nature. Therefore, based strictly on the OPR guidance, the 66,000 square feet of commercial would represent retail that is regionally commercial in nature, and thus be considered an impact of it results in any increase in regional VMT. However, given the proposed land use designation of Neighborhood Commercial, the location of this project, the limited amount of retail development in the immediate vicinity, and the proximity to UC Merced and local housing, the City of Merced has determined that the commercial development proposed as part of the project would be local-serving in nature and would likely be occupied by locally serving businesses.

Therefore, based on the retail component of the project being identified by the local agency as local-serving retail, the project's impact on Vehicle Miles Traveled is considered to be **less than significant**.

Mitigation Measure: None Required

ACTIVE TRANSPORTATION MODES

Project Impact 3: The proposed Project could cause potentially significant impacts to study area transit operations. This impact is considered to be *less than significant*.

The proposed Project includes the provision of a public bus stop on East Yosemite Avenue directly in front of the Project. The proposed project will likely increase ridership on the route(s) using the stop and will help increase fare box recovery for area transit providers. It is not anticipated that the proposed project would result in over-capacity conditions on local bus routes.

Mitigation Measure: None Required

Project Impact 4: The proposed Project could cause potentially significant impacts to study area bicycle facilities. This impact is considered to be *less than significant*.

The proposed Project site is served by existing bike lanes on both East Yosemite Avenue and North Gardner Street. The City of Merced 2013 Bicycle Transportation Plan includes proposed bikeway improvements adjacent to the proposed Project, including the following:

- Extend bike lane along Yosemite Avenue (on north side) between McKee Road and Parsons Avenue (this improvement is part of the frontage improvements required of the Project).
- Extend bike lanes on Gardner Avenue north of East Yosemite Avenue (this improvement, in part on the east side of Gardner Avenue, is part of the frontage improvements required of the Project).

The proposed Project would provide bicycle facilities that connect to the existing bicycle transportation system as well as construct portions of the City's planned bicycle system. The Project would not hinder any planned bicycle facility nor conflict with any General Plan policy or standard and, therefore, would not cause any significant impacts.

Mitigation Measure: **None Required**

Project Impact 5: The proposed Project could cause potentially significant impacts to study area pedestrian facilities. This impact is considered to be *less than significant*.

The proposed project site is located at a corner that currently lacks pedestrian improvements on the east side of North Gardner Avenue and the north side of East Yosemite Avenue. The proposed Project would include new sidewalk facilities on both of these roadways closing gaps in the existing pedestrian network. Along with the required frontage improvements to North Gardner Avenue and East Yosemite Avenue, the applicant should consider adding crosswalks to the north and east legs of this all-way stop controlled intersection to provide pedestrian access to points west of the Project site. Refer to the diagram located in **Appendix B: Recommended Near Term Configuration of Project Frontage Improvements at Gardner / Yosemite Intersection.**

Mitigation Measure: **None Required**

Project Impact 6: The proposed Project could cause potentially significant neighborhood intrusion impacts to study area streets. This impact is considered to be *less than significant*.

There is a potential for Project-related traffic to utilize existing collector and/or local streets to bypass arterial streets that have real or perceived slower travel times, or because prohibited movements from the Project's Gardner Avenue access point divert Project traffic through adjacent neighborhoods.

Merced's Vision 2030 General Plan adopted polices to reduce the impacts of new development on residential neighborhoods, particularly where street design encourages traffic to "cut-through" existing neighborhoods as a real or perceived shortcut. Specifically, Policy T-1.7 (Minimize Street System Impacts on Residential Neighborhoods and Other Sensitive Land Uses) contains two implementing actions relevant to this potential impact:

- Implementing Action 1.7.a To the greatest extent feasible, maintain a distinct hierarchy of streets that will provide for major roadways between neighborhoods rather than through neighborhood areas.
- Implementing Action 1.7.b Whenever feasible, approve street circulation patterns that discourage exterior traffic from driving through neighborhoods.

The design of the Project's internal circulation and access points are consistent with the City's policy. The Project's circulation is entirely self-contained within the site property and its access points are located on designated minor arterials, not local or collector streets. The design of the Project itself would not encourage Project-related traffic to drive through adjacent neighborhoods, but implementation of City standards regarding intersection spacing and prohibited movements in combination with a perceived out of direction route required to access the Project's primary associated destination (the UC Merced campus) might cause Project generated traffic to seek alternative routes.

The circumstances described above might occur under the Existing + Project, EPAP + Project, or 2030 Cumulative conditions:

A. Drivers of automobiles generated by the student residential component of the Project who are destined to UC Merced and typically exit the site at the main Yosemite Avenue driveway and travel on Yosemite Avenue to Lake Road may perceive the route as longer than if they exited the site on the Gardner Avenue driveway and used Gardner Avenue to Dunn Road to Lake Road. This would result in undesirable traffic on Dunn Road which, once annexed into the City of Merced, would be classified as either a local residential street or residential collector.

B. Once Gardner Avenue is fully built to the City's standards for minor arterials, drivers of automobiles generated by the student residential or the commercial component of the Project who are destined to any external location and typically exit the site at the Gardner Avenue driveway would be required to turn right on Gardner Avenue[3].

   i. If these drivers are destined to the UC Merced campus or any location to the east of the Project site, they may perceive using Dunn Road to Lake Road as a more convenient route than exiting the Project site via the main driveway on Yosemite Avenue and traveling on Yosemite Avenue to Lake Road.

   ii. If these drivers are destined to the Merced College campus or any location to the west of the Project site, they may perceive using the residential streets of Hunters Drive to White Dove Avenue to Yosemite Avenue as a more convenient route than exiting the Project site via the main driveway on Yosemite Avenue and traveling on Yosemite Avenue through Gardner Avenue.

Determining the potential for significant impacts caused by cut-through traffic on residential streets uses the following procedure:

1. Compare the travel times for the desired and the potential cut-through routes[4]. Determine if there is a difference in travel times such that:
   a. if the desired route is substantially faster (greater than 60 seconds difference) then conclude the impact is negligible;
   b. if the desired and cut-through route have similar travel times (less than 60 seconds difference) then assume a certain proportion of Project trips will use the cut-through route (for this study

[3] The City's design standard for minor arterials includes a raised median and prohibition of full access minor intersections or driveways within 1/8th mile from any arterial/arterial intersection such as Yosemite Avenue and Gardner Avenue. Under these standards, the proposed Project's main driveway on Gardner Avenue would be restricted to right turns in / right turns out, and left turns in only, and the secondary driveway on Gardner Avenue would be restricted to right turns in / right turns out only.

[4] Travel times were estimated using actual route distance and average speeds, and accounting for delays at intersections along the route during peak hours.

a conservative 40% was assumed) and then analyze the cut-through route using the TIRE Index[5].

Table 5 summarizes the findings of the analysis process for the potential cut-through routes identified above.

TABLE 5: SUMMARY OF POTENTIAL NEIGHBORHOOD INTRUSION IMPACTS

POTENTIAL CUT-THROUGH ROUTE	TRAVEL TIME DIFFERENCE FROM DESIRED ROUTE (SEC) [1]	PEAK HOUR PROJECT TRAFFIC USING CUT-THROUGH ROUTE	WITHOUT PROJECT	WITH PROJECT
			Average Daily Traffic	Average Daily Traffic [2]
			TIRE Index	TIRE Index [3]
GARDNER TO DUNN TO LAKE	39	20	900	1,100
			3.0	3.0
GARDNER TO HUNTERS TO WHITE DOVE TO YOSEMITE	62	0	Negligible Impact	

Notes:
[1] A difference in travel time between the desired and cut-through route greater than sixty seconds in favor of the desired route is considered to have a negligible impact.
[2] Project traffic estimated to use the potential cut-through route is estimated assuming 40% of the outbound peak hour trips would use the route. For use in the TIRE Index, the peak hour volume is converted to an average daily volume assuming a 10% peak to daily ratio.
[3] Traffic Infusion on Residential Environments (TIRE) index. "TIRE" is a numerical representation of a resident' s perception on the effect of street traffic. The TIRE index is not required by CEQA as part of the environmental review process, but it is often used in traffic studies to evaluate the effects of changes in traffic volumes on quality of life issues such as walking, cycling, playing and daily tasks such as maneuvering a car out of a residential driveway. Streets are designated with a TIRE index (on a scale of 1.5 to 5) based on the existing daily traffic volume. Streets with TIRE indices above 3.6 are considered to be traffic-dominated, while those below 3.6 are better suited for residential activities. Cut-through traffic volumes causing a +0.1 change in the TIRE Index when the Index without the cut-through traffic is already above 3.0 is considered an impact.

DKS Associates, 2020.

Mitigation Measure: None Required

[5] The effects of the volume changes on residential streets can be assessed using the Traffic Infusion on Residential Environments (TIRE) index. See Table 3.10-14 for a complete description of the index and its usage.

NON-CEQA ROADWAY DEFICIENCIES

EXISTING PLUS PROJECT CONDITIONS

Existing Plus Project conditions represents a scenario where the proposed development project is added to the existing environment.

Table 6 and **Table 7** compare intersection LOS at the study intersections under Existing conditions and Existing Plus Project conditions during the AM and PM peak hours, respectively. The tables show that intersection LOS would remain acceptable based on City standards (or County standards, where applicable) for all study intersections under this scenario. The main Project driveways (on East Yosemite Avenue at Chaparral Drive and on North Gardner Avenue north of East Yosemite Avenue) would both operate at LOS A.

The all-way stop controlled intersection of North Gardner Avenue/East Yosemite Avenue would continue to operate at a LOS D or better (with a slight improvement in delay) during both the AM and PM peak hours, based on average intersection delay. The LOS with the Project assumes Project-related improvements to westbound East Yosemite Avenue. Construction of the proposed Project would include the required frontage improvements on the Project's side of East Yosemite Avenue and North Gardner Avenue (see Project Description). Implementing the frontage improvements on East Yosemite Avenue would result in the westbound approach of this intersection providing an exclusive left turn lane, a through lane and a shared through-right turn lane. These required improvements result in the slight improvement in the average intersection delay presented in the tables.

Project Issue 6: The proposed project would increase average intersection delay and potentially cause deficiencies to study area intersections under Existing plus Project conditions.

As stated above, traffic from the proposed Project added to existing conditions would increase delay at several study area intersections and reduce delay at intersections where Project-related improvements would occur. However, none of the increases in delay would increase average delay at a study intersection enough to result in a substantial degradation in level or service, nor cause a significant operational issue.

Mitigation Measure: None Required

TABLE 6: EXISTING PLUS PROJECT CONDITIONS INTERSECTION LEVEL OF SERVICE – AM PEAK HOUR

INTERSECTION	JURISDICTION	LOS POLICY	INTERSECTION CONTROL	AM PEAK HOUR			
				Existing		Plus Project	
				Delay	LOS	Delay	LOS
G STREET / MERCY AVE	City	D	Signal	21.1	C	21.5	C
G STREET / EAST YOSEMITE AVENUE	City	D	Signal	36.2	D	37.5	D
NORTH GARDNER AVENUE / EAST YOSEMITE AVENUE	City	D	AWSC	33.7 (62.2)	D	28.3 (31.7)	D
NORTH GARDNER AVENUE / DUNN ROAD	City	D	TWSC	7.1 (10.1)	A	6.4 (10.6)	A
HATCH ROAD / DUNN ROAD	County	C	TWSC	7.0 (9.6)	A	7.1 (9.7)	A
HATCH ROAD / EAST YOSEMITE AVENUE	City	D	TWSC	0.9 (9.2)	A	0.9 (9.3)	A
LAKE ROAD / DUNN ROAD	County	C	TWSC	1.5 (14.1)	A	1.8 (15.7)	A
LAKE ROAD / EAST YOSEMITE AVENUE	City	D	TWSC	6.2 (16.9)	A	6.7 (18.2)	A
MCKEE ROAD / EAST YOSEMITE AVENUE	City	D	Signal	11.5	B	11.7	B
CHAPARRAL DRIVE / PROJECT ACCESS / EAST YOSEMITE AVENUE	City	D	TWSC	0.8 (16.9)	A	3.6 (25.5)	A
NORTH GARDNER AVENUE / PROJECT ACCESS	City	D	TWSC	Not Applicable		1.0 (8.6)	A

Notes:
Cells with bold text represent intersection conditions not meeting applicable Level of Service policies.
LOS = Level of Service, Delay = Stopped control in Seconds per vehicle
For TWSC (Two-Way Stop Control) and AWSC (All-Way Stop Control), average Intersection and (worst movement) delay are reported.
DKS Associates, 2020.

TABLE 7: EXISTING PLUS PROJECT CONDITIONS INTERSECTION LEVEL OF SERVICE – PM PEAK HOUR

INTERSECTION	JURISDICTION	LOS POLICY	INTERSECTION CONTROL	PM PEAK HOUR			
				Existing		Plus Project	
				Delay	LOS	Delay	LOS
G STREET / MERCY AVENUE	City	D	Signal	20.8	C	21.7	C
G STREET / EAST YOSEMITE AVENUE	City	D	Signal	43.0	D	46.8	D
NORTH GARDNER AVENUE / EAST YOSEMITE AVENUE	City	D	AWSC	24.7 (40.4)	C	23.1 (27.7)	C
NORTH GARDNER AVENUE / DUNN ROAD	City	D	TWSC	7.2 (10.9)	A	6.5 (11.7)	A
HATCH ROAD / DUNN ROAD	County	C	TWSC	6.6 (9.4)	A	6.6 (9.5)	A
HATCH ROAD / EAST YOSEMITE AVENUE	City	D	TWSC	0.8 (9.5)	A	0.7 (9.6)	A
LAKE ROAD / DUNN ROAD	County	C	TWSC	0.7 (13.2)	A	0.9 (14.2)	A
LAKE ROAD / EAST YOSEMITE AVENUE	City	D	TWSC	7.9 (14.5)	A	8.8 (16.1)	A
MCKEE ROAD / EAST YOSEMITE AVENUE	City	D	Signal	10.3	B	10.4	B
CHAPARRAL DRIVE / PROJECT ACCESS / EAST YOSEMITE AVENUE	City	D	TWSC	0.6 (18.0)	A	3.8 (36.9)	A
NORTH GARDNER AVENUE / PROJECT ACCESS	City	D	TWSC	Not Applicable		2.0 (9.1)	A

Notes:
Cells with bold text represent intersection conditions not meeting applicable Level of Service policies
Cells with shaded text represent Project-related impacts
LOS = Level of Service, Delay = Stopped control in Seconds per vehicle
For TWSC (Two-Way Stop Control) and AWSC (All-Way Stop Control), average Intersection and (worst movement) delay are reported.
DKS Associates, 2020.

EXISTING PLUS APPROVED PROJECTS (EPAP) CONDITIONS

Existing Plus Approved Projects (EPAP) conditions represents a near-term scenario where approved development identified by the City of Merced have been developed and add traffic to the study area intersections. For this study, the City of Merced has provided the consultant team with a list of four approved projects to include in the analysis:

- **Moraga Subdivision Buildout –** This single-family residential subdivision generally southeast of the intersection of East Yosemite Avenue and Hatch Road/ Whitewater Way is currently partially developed. Approximately 38 homes and a small park have been built, along with most of the roadways required for completion of the subdivision. The City of Merced has requested that EPAP conditions assume buildout of the entire subdivision, including the parcel to the east. Buildout consists of 306 units for the Moraga subdivision and 234 units on the large parcel to the east. Subtracting the 38 currently built units results in 502 additional units.
- **Northview Medical Offices –** This approved project (also known as the Lakireddy project) is located at the southwest corner of Mercy Avenue and Mansionette Drive. This project would consist of approximately 85,250 square feet of general office and medical office facilities. This project is proposed on a site that was originally zoned for 28 single family housing units. A Conditional Use Permit (CUP #1183) has been approved to construct the first phase at the northwest corner of the site.
- **Wathen Commercial –** This approved project is located at the northeast corner of East Yosemite Avenue and G Street. It consists of approximately 110,000 square feet of office space, a bank, a restaurant, a pharmacy, and a hotel.
- **Shoppes at University Village –** This approved project is located at the southeast corner of East Yosemite Avenue and McKee road. This project consists of a shopping center totaling 64,000 square feet.

Trips to and from buildout of the Moraga subdivision were estimated using the Institute of Transportation Engineers (ITE) Trip Generation 9th Edition trip rates. Based on the published trip rates, the additional 502 homes would generate approximately 377 trips during the AM peak hour and 502 trips during the PM peak hour. Trips to and from the three remaining projects were generated and distributed consistent with the traffic studies prepared for the projects provided by the City. In cases where the individual study area for a project was different than the study area being used in this analysis the distribution of the approved project's trips was extrapolated.

Figure 9 shows the locations of approved projects and **Figure 10** shows the added AM and PM peak hour volumes associated with the approved projects at each of the study intersections. **Table 8** and **Table 9** compare study intersection LOS under Existing and Existing Plus Approved Projects (EPAP) conditions, during the AM and PM peak hour, respectively. The tables show that the peak hour volumes added with the approved projects would increase delay at a number of intersections.

FIGURE 9: LOCATIONS OF APPROVED PROJECTS

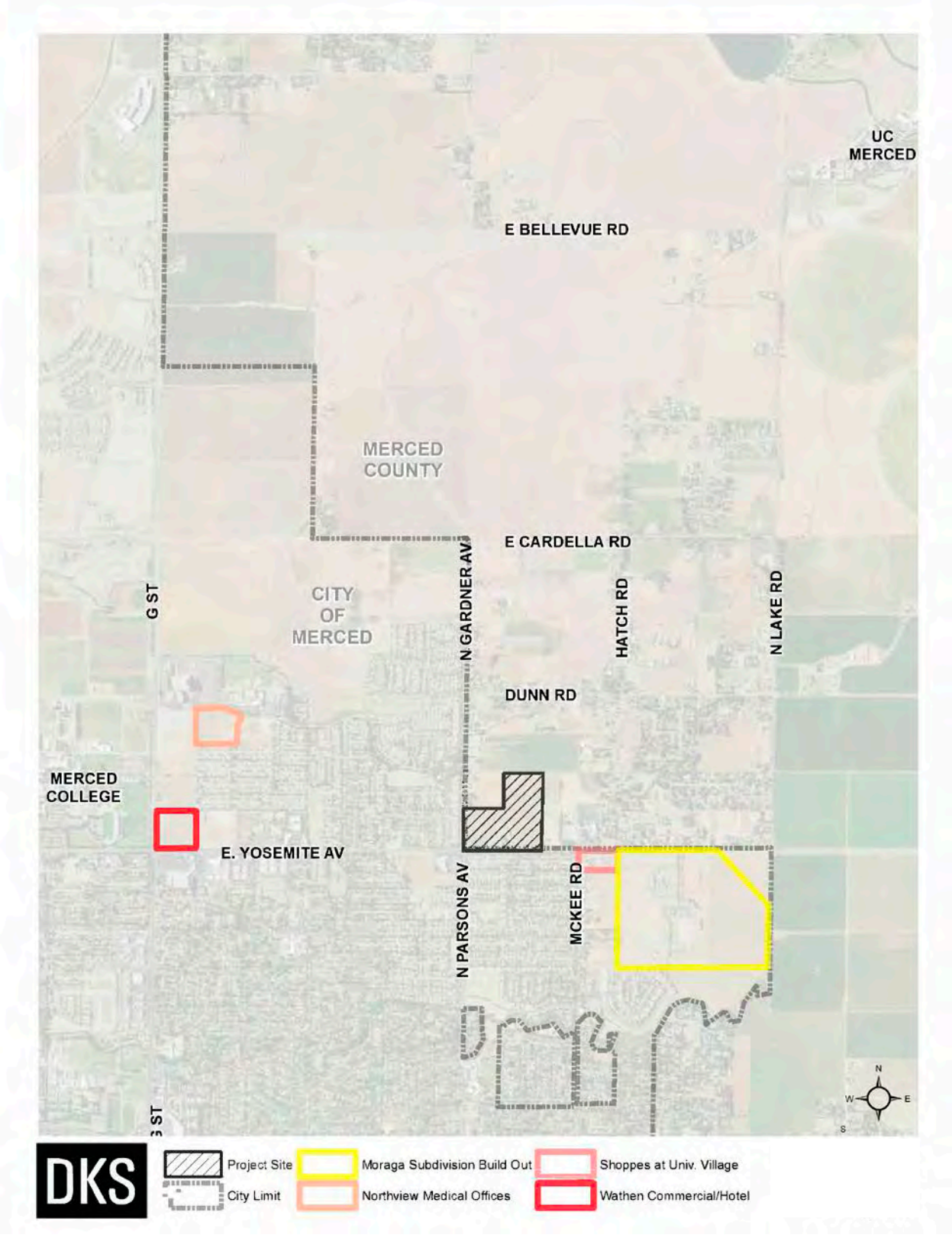


FIGURE 10: APPROVED PROJECTS PEAK HOUR ADDED VOLUMES

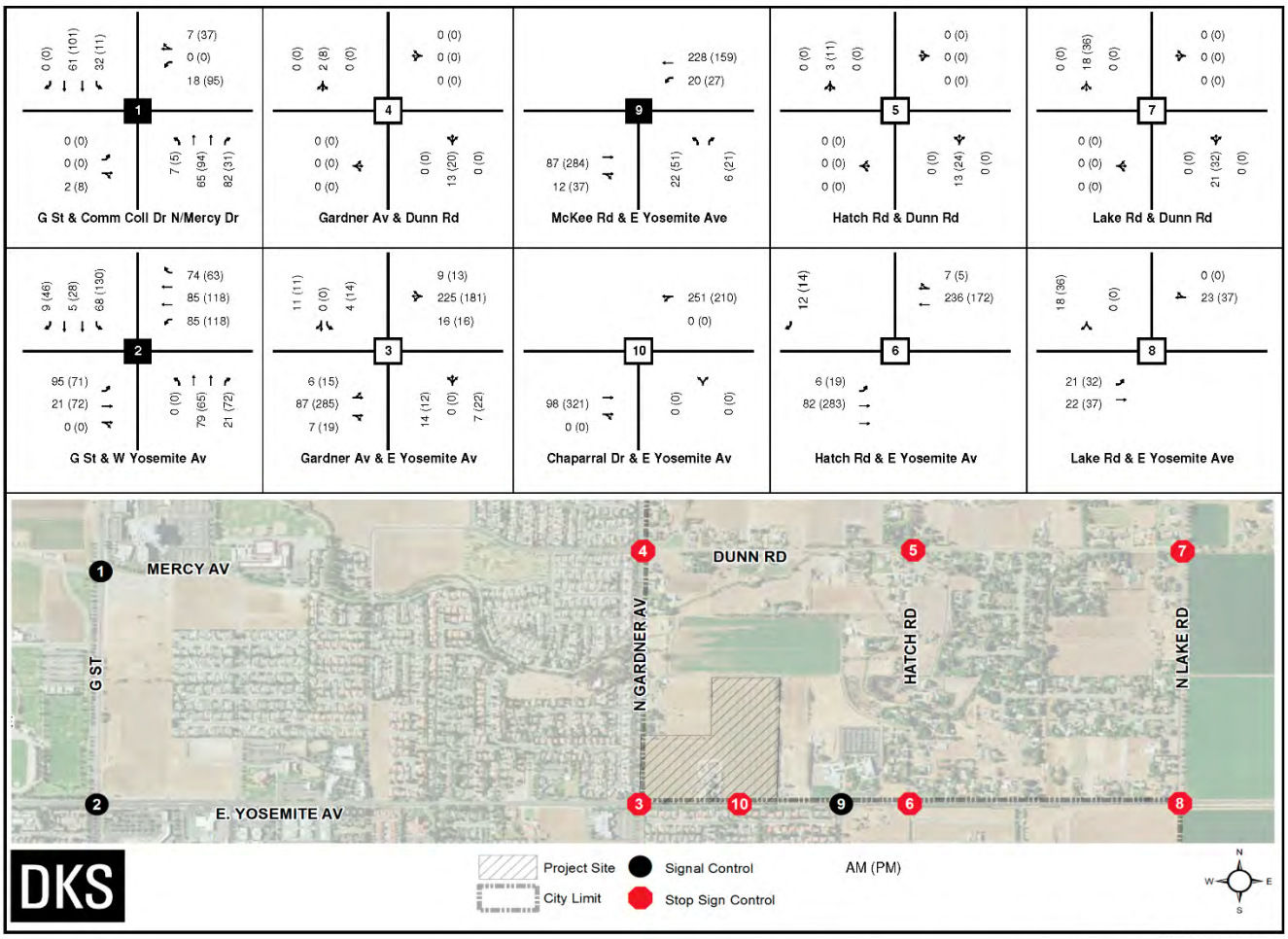


TABLE 8: EXISTING PLUS APPROVED PROJECTS CONDITIONS INTERSECTION LEVEL OF SERVICE – AM

INTERSECTION	JURISDICTION	LOS POLICY	INTERSECTION CONTROL	AM PEAK HOUR			
				Existing		EPAP	
				Delay	LOS	Delay	LOS
G STREET / MERCY AVENUE	City	D	Signal	21.1	C	23.6	C
G STREET / EAST YOSEMITE AVENUE	City	D	Signal	36.2	D	47.3	D
NORTH GARDNER AVENUE / EAST YOSEMITE AVENUE	City	D	AWSC	33.7 (62.2)	D	**132.5 (288.2)**	**F**
NORTH GARDNER AVENUE / DUNN ROAD	City	D	TWSC	7.1 (10.1)	A	6.7 (10.2)	A
HATCH ROAD / DUNN ROAD	County	C	TWSC	7.0 (9.6)	A	6.4 (9.7)	A
HATCH ROAD / EAST YOSEMITE AVENUE	City	D	TWSC	0.9 (9.2)	A	0.8 (10.2)	A
LAKE ROAD / DUNN ROAD	County	C	TWSC	1.5 (14.1)	A	1.5 (14.8)	A
LAKE ROAD / EAST YOSEMITE AVENUE	City	D	TWSC	6.2 (16.9)	A	6.4 (17.8)	A
MCKEE ROAD / EAST YOSEMITE AVENUE	City	D	Signal	11.5	B	12.2	B
CHAPARRAL DRIVE / EAST YOSEMITE AVENUE	City	D	TWSC	0.8 (16.9)	A	0.9 (26.2)	A

Notes:
Cells with bold text represent intersection conditions not meeting applicable Level of Service policies
Cells with shaded text represent Project-related impacts
LOS = Level of Service, Delay = Stopped control in Seconds per vehicle
For TWSC (Two-Way Stop Control) and AWSC (All-Way Stop Control), average Intersection and (worst movement) delay are reported.
DKS Associates, 2020.

During the AM peak hour, the all-way stop controlled intersection of North Gardner Avenue and East Yosemite Avenue degrades to LOS F (based on both average intersection delay and worst movement delay). Average intersection delay increases to more than 100 seconds per vehicle and worst movement delay increases to more than 200 seconds per vehicle. During the PM peak hour, this same intersection degrades from LOS C (based on average and worst movement delay) to LOS F (based on both average intersection delay and worst movement delay). Average intersection delay increases to more than 80 seconds per vehicle and worst movement delay increases to more than 170 seconds per vehicle.

In addition, the signalized intersection of G Street and East Yosemite Avenue degrades from LOS D to LOS E with the addition of traffic from approved projects in the PM peak hour.

A signal warrant analysis of the intersection of North Gardner Avenue and East Yosemite Avenue indicates that, under existing conditions, this intersection carries sufficient traffic to meet the 8-hour volume signal warrant. Therefore, this intersection also meets signal warrants under EPAP conditions.

TABLE 9: EXISTING PLUS APPROVED PROJECTS CONDITIONS INTERSECTION LEVEL OF SERVICE – PM

INTERSECTION	JURISDICTION	LOS POLICY	INTERSECTION CONTROL	PM PEAK HOUR			
				Existing		EPAP	
				Delay	LOS	Delay	LOS
G STREET / MERCY AVENUE	City	D	Signal	20.8	C	27.2	C
G STREET / EAST YOSEMITE AVENUE	City	D	Signal	43.0	D	**72.8**	**E**
NORTH GARDNER AVENUE / EAST YOSEMITE AVENUE	City	D	AWSC	24.7 (40.4)	C	**104.0 (217.3)**	**F**
NORTH GARDNER AVENUE / DUNN ROAD	City	D	TWSC	7.2 (10.9)	A	6.5 (11.2)	A
HATCH ROAD / DUNN ROAD	County	C	TWSC	6.6 (9.4)	A	5.2 (9.6)	A
HATCH ROAD / EAST YOSEMITE AVENUE	City	D	TWSC	0.8 (9.5)	A	0.8 (10.2)	A
LAKE ROAD / DUNN ROAD	County	C	TWSC	0.7 (13.2)	A	0.7 (14.1)	A
LAKE ROAD / EAST YOSEMITE AVENUE	City	D	TWSC	7.9 (14.5)	A	8.8 (17.5)	A
MCKEE ROAD / EAST YOSEMITE AVENUE	City	D	Signal	10.3	B	12.3	B
CHAPARRAL DRIVE / EAST YOSEMITE AVENUE	City	D	TWSC	0.6 (18.0)	A	0.8 (38.9)	A

Notes:
Cells with bold text represent intersection conditions not meeting applicable Level of Service policies
Cells with shaded text represent Project-related impacts
LOS = Level of Service, Delay = Stopped control in Seconds per vehicle
For TWSC (Two-Way Stop Control) and AWSC (All-Way Stop Control), average Intersection and (worst movement) delay are reported.
DKS Associates, 2020.

EXISTING PLUS APPROVED PROJECTS (EPAP) PLUS PROJECT CONDITIONS

Table 10 and **Table 11** show the LOS changes resulting from adding the proposed Project to EPAP conditions, during the AM and PM peak hours, respectively. The main Project driveways (on East Yosemite Avenue at Chaparral Drive and on North Gardner Avenue north of East Yosemite Avenue) would both operate at LOS A. Intersections operating at a LOS E or LOS F include:

- **North Gardner Avenue and East Yosemite Avenue.** This all-way stop controlled intersection would operate at a LOS F without and with the proposed Project under EPAP Plus Project conditions in both the AM and PM peak hours. However, the average intersection delay with the Project is substantially lower than under EPAP conditions alone. This is because the LOS with the Project assumes Project-related improvements to westbound East Yosemite Avenue. As stated earlier, construction of the proposed Project would include the required frontage improvements on the Project's side of the East Yosemite Avenue and North Gardner Avenue (see Project Description). Implementing the frontage improvements on East Yosemite Avenue would result in the westbound approach of this intersection providing a exclusive left turn lane, a through lane and a shared through-right turn lane. These required improvements result in the improvement in the average intersection delay presented in the tables.
- **G Street and East Yosemite Avenue.** This signalized intersection would operate at LOS D in the AM peak hour with minimal change in delay with the addition of Project traffic to EPAP conditions, meeting City of Merced LOS standards. Minor adjustments were made to signal timing with the addition of project trips to EPAP conditions in the PM peak hour. By reducing the cycle length from 190 seconds (EPAP no build cycle length) to 140 seconds, there is minimal change in delay when Project traffic is added to EPAP conditions. In the PM peak hour, this intersection fails to meet the City of Merced's LOS standards under both EPAP and EPAP Plus Project conditions.
- **East Yosemite Avenue/ Chaparral Drive.** This side-street stop controlled intersection would serve as the main project entry and exit point. It would operate at LOS A without and with the proposed Project, during both the AM and PM peak hours. The delay for the worst movement (the existing northbound approach of Chaparral Drive) would increase substantially during the AM and PM peak hours. The worst movement increases by over 30 seconds (LOS F) in the AM peak hour and by over 165 seconds (LOS F), during the PM peak hour. However, this intersection does not meet traffic signal warrants under Existing or EPAP conditions with or without the Project, and therefore the added minor/side street delay is not be considered a significant operational issue.

TABLE 10: EPAP PLUS PROJECT CONDITIONS INTERSECTION LEVEL OF SERVICE – AM

INTERSECTION	JURISDICTION	LOS POLICY	INTERSECTION CONTROL	AM PEAK HOUR			
				EPAP		Plus Project	
				Delay	LOS	Delay	LOS
G STREET / MERCY AVENUE	City	D	Signal	23.6	C	24.1	C
G STREET / EAST YOSEMITE AVENUE	City	D	Signal	47.3	D	46.9	D
NORTH GARDNER AVENUE / EAST YOSEMITE AVENUE	City	D	AWSC	**132.5 (288.2)**	**F**	**76.3 (111.9)**	**F**[1]
NORTH GARDNER AVENUE / DUNN ROAD	City	D	TWSC	6.7 (10.2)	A	6.1 (10.7)	A
HATCH ROAD / DUNN ROAD	County	C	TWSC	6.4 (9.7)	A	6.6 (9.8)	A
HATCH ROAD / EAST YOSEMITE AVENUE	City	D	TWSC	0.8 (10.2)	A	0.8 (10.3)	A
LAKE ROAD / DUNN ROAD	County	C	TWSC	1.5 (14.8)	A	1.8 (16.6)	A
LAKE ROAD / EAST YOSEMITE AVENUE	City	D	TWSC	6.4 (17.8)	A	6.9 (19.5)	A
MCKEE ROAD / EAST YOSEMITE AVENUE	City	D	Signal	12.2	B	12.4	B
CHAPARRAL DRIVE / PROJECT ACCESS / EAST YOSEMITE AVENUE	City	D	TWSC	0.9 (26.2)	A	6.6 (57.7)	A
NORTH GARDNER AVENUE / PROJECT ACCESS	City	D	TWSC	Not Applicable		0.9 (8.7)	A

Notes:
Cells with bold text represent intersection conditions not meeting applicable Level of Service policies
Cells with shaded text represent Project-related impacts
LOS = Level of Service, Delay = Stopped control in Seconds per vehicle
For TWSC (Two-Way Stop Control) and AWSC (All-Way Stop Control), average Intersection and (worst movement) delay are reported.[1]
Under EPAP + Project conditions, the north and east legs (westbound approach and northbound departure) of intersection assumed built out per proposed Project frontage improvement requirements as specified in the General Plan.
DKS Associates, 2020.

TABLE 11: EPAP PLUS PROJECT CONDITIONS INTERSECTION LEVEL OF SERVICE – PM

INTERSECTION	JURISDICTION	LOS POLICY	INTERSECTION CONTROL	PM PEAK HOUR			
				EPAP		Plus Project	
				Delay	LOS	Delay	LOS
G STREET / MERCY AVENUE	City	D	Signal	27.2	C	29.1	C
G STREET / EAST YOSEMITE AVENUE	City	D	Signal	**72.8**	**E**	**74**	**E**
NORTH GARDNER AVENUE / EAST YOSEMITE AVENUE	City	D	AWSC	**104.0 (217.3)**	**F**	**100.4 (152.5)**	**F**[1]
NORTH GARDNER AVENUE / DUNN ROAD	City	D	TWSC	6.5 (11.2)	A	6.1 (12.1)	A
HATCH ROAD / DUNN ROAD	County	C	TWSC	5.2 (9.6)	A	5.5 (9.7)	A
HATCH ROAD / EAST YOSEMITE AVENUE	City	D	TWSC	0.8 (10.2)	A	0.8 (10.5)	A
LAKE ROAD / DUNN ROAD	County	C	TWSC	0.7 (14.1)	A	0.8 (15.3)	A
LAKE ROAD / EAST YOSEMITE AVENUE	City	D	TWSC	8.8 (17.5)	A	10.6 (21.3)	B
MCKEE ROAD / EAST YOSEMITE AVENUE	City	D	Signal	12.3	B	12.6	B
CHAPARRAL DRIVE / PROJECT ACCESS / EAST YOSEMITE AVENUE	City	D	TWSC	0.8 (38.9)	A	19.7 (205.4)	C
NORTH GARDNER AVENUE / PROJECT ACCESS	City	D	TWSC	Not Applicable		1.7 (9.2)	A

Notes:
Cells with bold text represent intersection conditions not meeting applicable Level of Service policies
Cells with shaded text represent Project-related impacts
LOS = Level of Service, Delay = Stopped control in Seconds per vehicle
For TWSC (Two-Way Stop Control) and AWSC (All-Way Stop Control), average Intersection and (worst movement) delay are reported.
[1] Under EPAP + Project conditions, the north and east legs (westbound approach and northbound departure) of intersection assumed built out per proposed Project frontage improvement requirements as specified in the General Plan.
DKS Associates, 2020.

Project Impact 7: The proposed Project could cause potentially significant impacts to study area intersections under Existing plus Approved Projects plus Project conditions. This impact is considered to be *significant and unavoidable*.

As stated above, the proposed Project traffic added to EPAP conditions would increase delay at study area intersections, however none of these increases in delay would increase average delay at a study intersection enough to result in significant operational issues based on the City of Merced and County of Merced criteria.

Mitigation Measure: None Required

CUMULATIVE (2030) CONDITIONS

For this analysis, a horizon year of 2030 has been chosen based on the horizon years of the City and County general plans, as well as other projects that have been approved in recent years. The Merced Vision 2030 General Plan includes an expansion of the City's Specific Urban Development Plan (SUDP) area and Sphere of Influence to include the University Community area east of Lake Road.

The General Plan also includes a number of roadway improvements in the vicinity of the proposed project, as depicted in **Figure 11**. The figure shows that a number of existing study area roadways would be widened, including the following roadways:

- East Yosemite Avenue
- North Parsons Avenue
- East Cardella Road
- East Bellevue Avenue
- G Street, and North Gardner Avenue

The figure also shows a number of new roadways to be constructed, including:

- Campus Parkway from its current terminus to the UC Merced campus
- North Gardner Avenue from its current terminus to East Bellevue Road
- East Cardella Road to Campus Parkway
- Dunn Road to Campus Parkway

The General Plan also assumes that with the construction of Campus Parkway, Lake Road, which is currently a collector roadway connecting East Yosemite Avenue to East Bellevue Road and the UC Merced campus, would be downgraded to a local roadway providing local access only. Therefore Campus Parkway would essentially replace Lake Road as the primary north-south access to the UC Merced campus.

It is assumed that existing stop sign controlled intersections would be signalized under cumulative conditions where they include four lane arterial roadways in both directions. This assumption is made for the intersection of East Yosemite Avenue and North Gardner Avenue, directly adjacent to the proposed Project. It is also assumed that new intersections connecting roadways with four or more lanes would also be signalized. This includes intersections along Campus Parkway and the extension of North Gardner Avenue.

Cumulative (2030) traffic volumes forecasts are based on traffic volumes contained in the EIR/EIS from the *UC Merced and University Community Project Long Range Development Plan (LRDP)* approved in 2009 and updated in 2013. The forecast volumes in this analysis are not the same turning movement volumes presented on the previous analysis for UC Merced. Instead, the volumes have been re-estimated using the peak hour counts conducted for this analysis in 2016 and adjusting those movements using a "furness" method to generally match segment approach and departure volumes contained in the 2030 sections of the UC Merced and University Community documents. **Figure 12** shows the resultant Cumulative (2030) No Project AM and PM peak hour volumes and assumed lane geometrics and intersection control at study intersections. It should be noted that intersections along Lake Road have been replaced with new intersections along Campus Parkway for the Cumulative analysis.

There is a lack of information regarding the intersection lane configurations on streets which will be constructed in the future. As a result, this study was required to make assumptions about the number of through and turning lanes at intersections on streets that have not yet been designed. For purposes of this study, the number of lanes necessary to achieve a reasonably acceptable LOS have been assumed in both the 2030 No Project and 2030 With Project scenarios.

Table 12 shows the Cumulative No Project Level of Service during the AM and PM peak hour without the proposed project. As stated previously the intersection of East Yosemite Avenue and North Gardner Avenue is assumed to be signalized, with both roadways being four lanes. Two new intersections along Campus Parkway (at East Yosemite Ave and Dunn Road) have been added to the analysis and replace the previous intersections along Lake Road.

The table shows that based on average intersection delay, most intersections operate at LOS D or better with the following exceptions:

- **G Street / East Yosemite Avenue** operates at LOS E during the AM peak hour and LOS F during the PM peak hour.
- **North Gardner Avenue / East Yosemite Avenue** operates at LOS E during the PM peak hour.

The table also shows that two intersections operate at LOS D or better based on average intersection delay but have individual movements with higher than desired level of delay:

- **North Gardner Avenue / Dunn Road** operates at LOS A but has greater than 100 seconds of delay for westbound left turning vehicles on Dunn Road during the PM peak hour.
- **East Yosemite Avenue / Chaparral Drive** operates at LOS A but has 34.5 seconds of delay for northbound left turning vehicles during the PM peak hour.

FIGURE 11: ASSUMED GENERAL PLAN ROADWAY IMPROVEMENTS

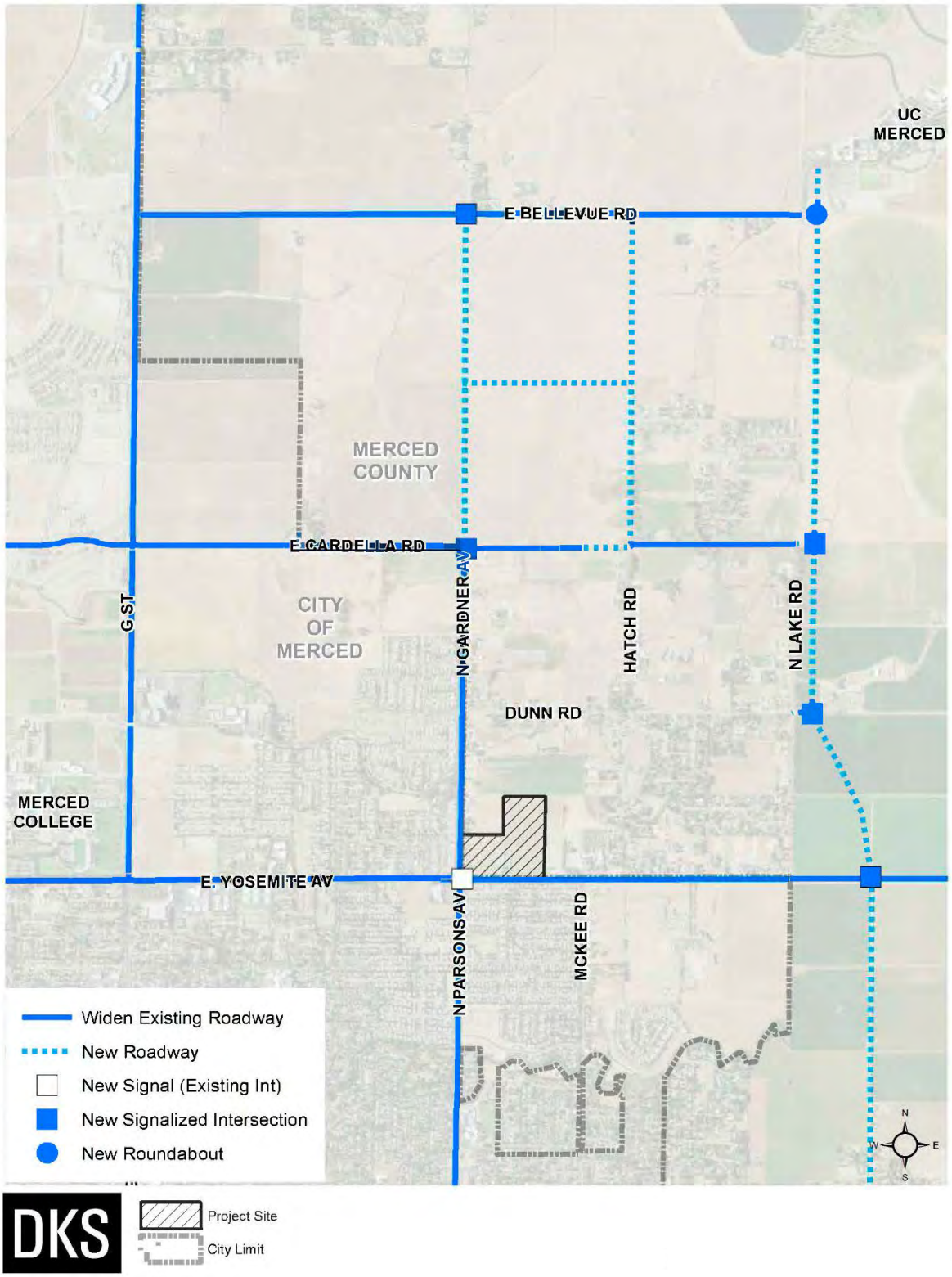


FIGURE 12: CUMULATIVE (2030) INTERSECTION VOLUMES, GEOMETRICS AND CONTROL

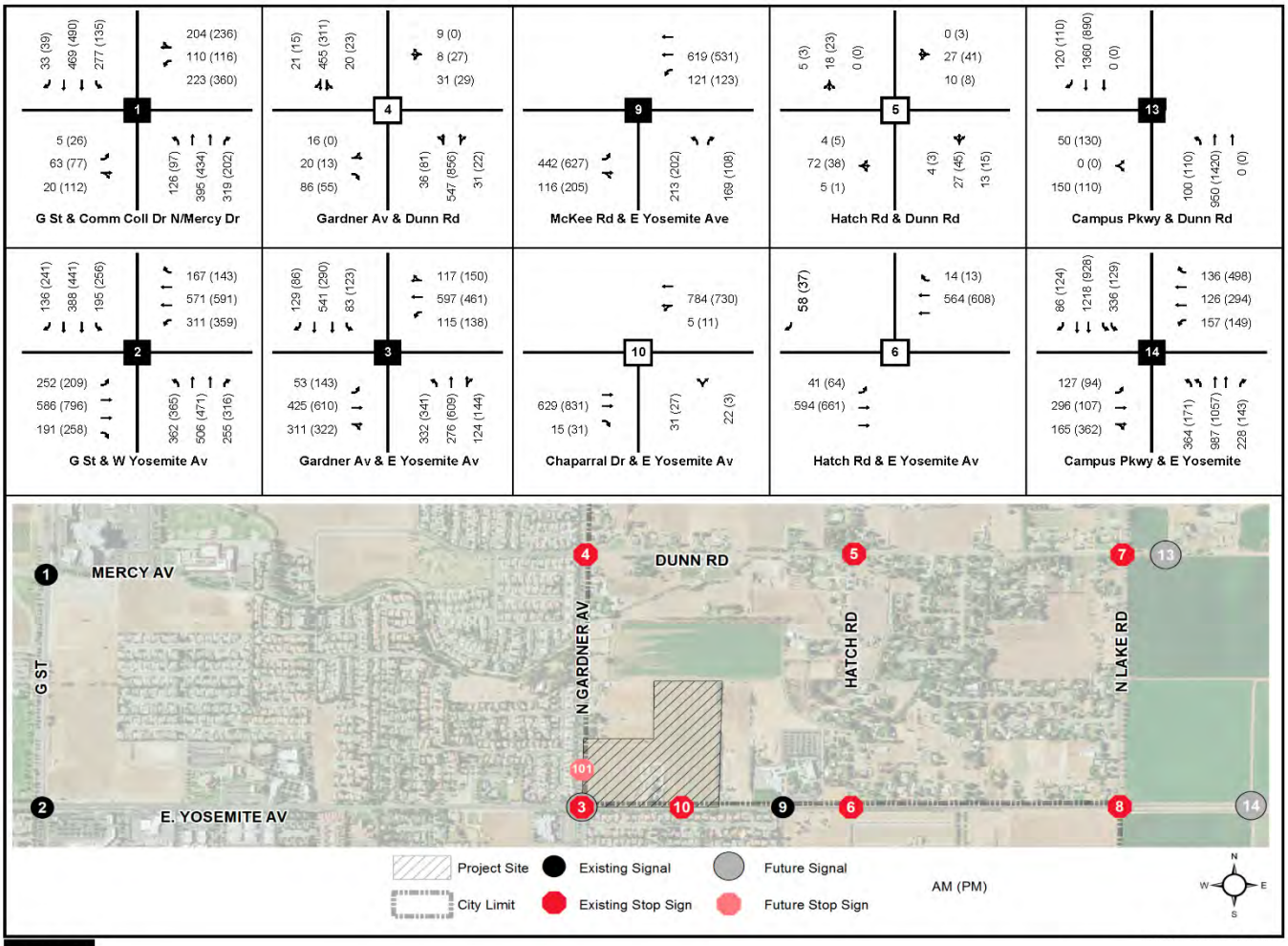


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TABLE 12: CUMULATIVE (2030) CONDITION INTERSECTION LEVEL OF SERVICE

INTERSECTION	JURISDICTION	LOS POLICY	CUMULATIVE (2030) NO PROJECT CONDITIONS				
			Intersection Control	AM Peak Hour		PM Peak Hour	
				Delay	LOS	Delay	LOS
G STREET / MERCY AVENUE	City	D	Signal	37.5	D	36.0	D
G STREET / EAST YOSEMITE AVENUE	City	D	Signal	**56.5**	**E**	**82.6**	**F**
NORTH GARDNER AVENUE / EAST YOSEMITE AVENUE	City	D	Signal	41.5	D	**56.0**	**E**
NORTH GARDNER AVENUE / DUNN ROAD	City	D	TWSC	3.5 (35.0)	A	6.5 (119.4)	A
HATCH ROAD / DUNN ROAD	County	C	TWSC	6.4 (9.9)	A	5.2 (9.8)	A
HATCH ROAD / EAST YOSEMITE AVENUE	City	D	TWSC	0.8 (10.8)	A	0.8 (10.8)	A
MCKEE ROAD / EAST YOSEMITE AVENUE	City	D	Signal	11.5	B	12.4	B
CHAPARRAL DRIVE / EAST YOSEMITE AVENUE	City	D	TWSC	0.8 (21.3)	D	0.7 (34.5)	A
CAMPUS PARKWAY / DUNN ROAD	County	C	Signal	7.7	A	8.1	A
CAMPUS PARKWAY / EAST YOSEMITE AVENUE	County	C	Signal	**43.7**	**D**	**51.2**	**D**

Notes:
Cells with bold text represent intersection conditions not meeting applicable Level of Service policies
LOS = Level of Service, Delay = Stopped control in Seconds per vehicle
For TWSC (Two-Way Stop Control) and AWSC (All-Way Stop Control), average Intersection and (worst movement) delay are reported.
DKS Associates, 2020.

CUMULATIVE (2030) PLUS PROJECT CONDITIONS

Table 13 and **Table 14** show the LOS changes resulting from adding the proposed project to Cumulative conditions, during the AM and PM peak hours, respectively. The tables show that all but one intersection operate at LOS D or better during the AM peak hour and all but two intersections operate at LOS D or better during the PM peak hour under both Cumulative No Project and Cumulative Plus Project conditions. The following intersections are projected to operate at LOS E or LOS F:

- **G Street and East Yosemite Avenue** operates at LOS E during the AM peak hour and LOS F in the PM peak hour under both Cumulative No Project and Cumulative Plus Project conditions. Average delay increases by less than 3 seconds in both peak hours.
- **North Gardner Avenue and East Yosemite Avenue** operates at LOS E during the PM peak hour and LOS in the PM peak hour under both Cumulative No Project and Cumulative Plus Project conditions. Average delay increases by approximately 3 seconds in both peak hours.

The table also shows that two intersections operate at LOS D or better based on average intersection delay but have individual movements with higher than desired level of delay:

- **North Gardner Avenue/ Dunn Road** operates at LOS B but has greater than 200 seconds of delay for westbound left turning vehicles on Dunn Road during the PM peak hour.
- **East Yosemite Avenue/ Chaparral Drive** operates at LOS C but has 200 seconds of delay for northbound left turning vehicles during the PM peak hour.

Project Issue 8: The proposed project could potentially cause operational issues to study area intersections under cumulative (2030) plus project conditions. This issue is not considered *significant.*

As stated above, the proposed Project traffic added to cumulative conditions would increase delay at study area intersections, however none of these increases in delay would increase average delay at a study intersection enough to result in a operational issue based on the City of Merced and County of Merced criteria.

Mitigation Measure: None Required

STATE HIGHWAY FACILITIES

Project Impact 9: The proposed project could potentially cause operational issues to State Highway facilities. This issue is not considered *significant*.

The proposed Project is distant from the State Highway facilities providing regional access to the Merced Area. State highway interchanges in the vicinity of the proposed project include the following:

- SR 140 and Santa Fe Avenue (3.1 miles away)
- SR 140 and Kibby Road (4.4 miles away)
- SR 59 and West Yosemite Avenue (3.1 miles away)
- SR 59 and Santa Fe Avenue/ Olive Avenue (4.1 miles)

- SR 59 and 16th Street (5.0 miles)
- Interchanges along SR 99 (5+ miles)

While the proposed Project is not designed specifically as student housing, it is anticipated that a fairly large percentage of the residents of the project would either work at or attend one of the two local colleges. It can be assumed that some resident trips will travel west and north toward the State Highways, the project's relatively long distance from the State Highway system will likely result in relatively low numbers of trips extending all the way to the State Highway system.

TABLE 13: CUMULATIVE (2030) PLUS PROJECT CONDITION INTERSECTION LEVEL OF SERVICE - AM

INTERSECTION	JURISDICTION	LOS POLICY	AM PEAK HOUR				
			Intersection Control	No Project		Plus Project	
				Delay	LOS	Delay	LOS
G STREET / MERCY AVENUE	City	D	Signal	37.5	D	40.0	D
G STREET / EAST YOSEMITE AVENUE	City	D	Signal	**56.5**	**E**	**59.3**	**E**
NORTH GARDNER AVENUE / EAST YOSEMITE AVENUE	City	D	Signal	41.5	D	44.7	D
NORTH GARDNER AVENUE / DUNN ROAD	City	D	TWSC	3.5 (35.0)	A	3.9 (42.1)	A
HATCH ROAD / DUNN ROAD	County	C	TWSC	6.4 (9.9)	A	6.6 (10.0)	A
HATCH ROAD / EAST YOSEMITE AVENUE	City	D	TWSC	0.8 (10.8)	A	0.8 (10.9)	A
MCKEE ROAD / EAST YOSEMITE AVENUE	City	D	Signal	11.5	B	11.8	B
CHAPARRAL DRIVE / PROJECT ACCESS / EAST YOSEMITE AVENUE	City	D	TWSC	0.8 (21.3)	D	5.8 (50.7)	A
CAMPUS PARKWAY / DUNN ROAD	County	C	Signal	7.7	A	8.0	A
CAMPUS PARKWAY / EAST YOSEMITE AVENUE	County	C	Signal	**43.7**	**D**	**44.9**	**D**
NORTH GARDNER AVENUE / PROJECT ACCESS	City	D	TWSC	Not Applicable		0.2 (9.8)	A

Notes:
Cells with bold text represent intersection conditions not meeting applicable Level of Service policies
Cells with shaded text represent Project-related impacts
LOS = Level of Service, Delay = Stopped control in Seconds per vehicle
For TWSC (Two-Way Stop Control) and AWSC (All-Way Stop Control), average Intersection and (worst movement) delay are reported.
DKS Associates, 2020.

TABLE 14: CUMULATIVE (2030) PLUS PROJECT CONDITION INTERSECTION LEVEL OF SERVICE - PM

INTERSECTION	JURISDICTION	LOS POLICY	PM PEAK HOUR				
			Intersection Control	No Project		Plus Project	
				Delay	LOS	Delay	LOS
G STREET / MERCY AVENUE	City	D	Signal	36.0	D	37.9	D
G STREET / EAST YOSEMITE AVENUE	City	D	Signal	**82.6**	**F**	**84.0**	**F**
NORTH GARDNER AVENUE / EAST YOSEMITE AVENUE	City	D	Signal	**56.0**	**E**	**59.3**	**E**
NORTH GARDNER AVENUE / DUNN ROAD	City	D	TWSC	6.5 (119.4)	A	11.2 (208.5)	B
HATCH ROAD / DUNN ROAD	County	C	TWSC	5.2 (9.8)	A	5.4 (9.9)	A
HATCH ROAD / EAST YOSEMITE AVENUE	City	D	TWSC	0.8 (10.8)	A	0.8 (11.0)	A
MCKEE ROAD / EAST YOSEMITE AVENUE	City	D	Signal	12.4	B	12.9	B
CHAPARRAL DR / PROJECT ACCESS / EAST YOSEMITE AVENUE	City	D	TWSC	0.7 (34.5)	A	22.2 (207.2)	C
CAMPUS PARKWAY / DUNN ROAD	County	C	Signal	8.1	A	8.5	
CAMPUS PARKWAY / EAST YOSEMITE AVENUE	County	C	Signal	**51.2**	**D**	**53.3**	**D**
NORTH GARDNER AVENUE / PROJECT ACCESS	City	D	TWSC	Not Applicable		0.7 (12.4)	A

Notes:
Cells with bold text represent intersection conditions not meeting applicable Level of Service policies
Cells with shaded text represent Project-related impacts
LOS = Level of Service, Delay = Stopped control in Seconds per vehicle
For TWSC (Two-Way Stop Control) and AWSC (All-Way Stop Control), average Intersection and (worst movement) delay is reported.
DKS Associates, 2020.

In addition, the proposed commercial portion of the site is not likely to induce large amounts of long distance travel outside of Merced. The location and size of the commercial portion of the Project are best suited to local serving uses, and a large percentage of vehicles entering and exiting the commercial development are likely to be "pass-by" trips (motorists that are already passing the site and choosing to stop at the site as an interim stop along the route to their ultimate destination).

Of the approximately 239 AM peak hour trips and the 365 PM peak hour trips, five percent are estimated to travel down McKee Road, the main access between the Project site and SR 140. If all of that traffic were to continue onto SR 140, this would represent approximately six trips during the AM peak hour and seventeen trips during the PM peak hour accessing SR 140 by way of Santa Fe Avenue or Kibby Road. It is more likely that most of this five percent of trips would be destined to places within Merced prior to the connections with SR 140.

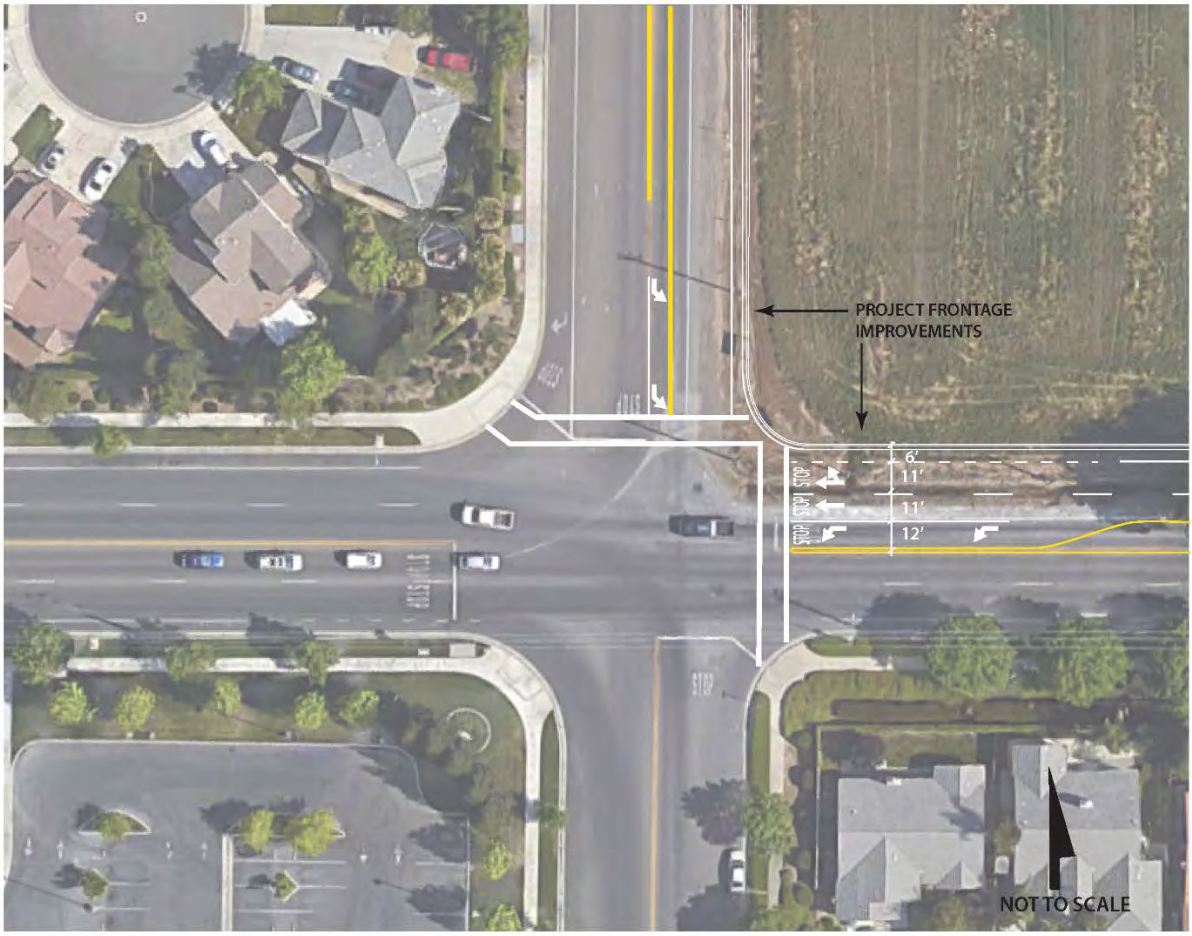
Approximately twenty percent of the trips are estimated to travel south on either Parsons Avenue or G Street. If all of these trips were to continue onto SR 99, this would represent approximately twenty four trips during the AM peak hour and sixty eight trips during the PM peak hour. It is more likely that a high percentage of these trips would be accessing businesses in downtown Merced, including restaurants, bars, and shopping such as Costco. A much smaller percentage of these trips would be expected to access SR 99 for longer distance trips.

Approximately twenty percent of the Project trips are estimated to travel west from the Project site to destinations west of G Street. Of these, the predominant destination would be the Merced College campus. Other destinations west of Merced College, but still east of SR 59, include Walmart, movie theaters, restaurants, and other establishments. It is unlikely that more than a handful of trips would travel further west to destinations west of or on SR 59.

Mitigation Measure: None Required

Appendix A
Level of Service Calculation Sheets

Appendix B
Recommended Near Term Configuration of Project Frontage Improvements at Gardner/ Yosemite Intersection



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Appendix B
Recommended Near-Term Configuration
of Project Frontage Improvements at Gardner / Yosemite Intersection