

APPENDIX F

Water Supply Assessment

Water Supply Assessment
Proposed Wal-Mart Regional Distribution Center



Prepared for:
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and Permitting
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Merced, CA 95340

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September 7, 2006

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ACRONYMS

afa	acre-feet per acre
afy	acre-feet per year
APNs	Assessor's Parcel Numbers
CEQA	California Environmental Quality Act
City	city of Merced
DWR	California Department of Water Resources
EIR	environmental impact report
gpd	gallons per day
gpm	gallons per minute
MID	Merced Irrigation District
msl	mean sea level
Project	proposed Wal-Mart Regional Distribution Center
SR 99	State Route 99
SUDP	Specific Urban Development Plan
UWMP	Urban Water Management Plan
Wal-Mart WSA	WSA for the Wal-Mart Regional Distribution Center
WSA	Water Supply Assessment

INTRODUCTION

This report presents the Water Supply Assessment (WSA) prepared for the proposed Wal-Mart Regional Distribution Center (Project) in the City of Merced (City) in eastern Merced County. The Project consists of a 1.1 million square-foot warehouse and distribution center and surrounding supportive operations and parking for the Wal-Mart Corporation on a 230-acre site.

BACKGROUND

The California Water Code requires coordination between land use lead agencies and public water suppliers to ensure that prudent water supply planning has been conducted and that planned water supplies are adequate to meet both existing and planned future project demands. Senate Bill 610 amended state law, effective January 1, 2002, to improve the link between information on water supply availability and certain land use decisions made by cities and counties. The statute requires detailed information regarding water availability to be provided to the city and county decision makers before approval of specified large development projects. The statute also requires this detailed information be included in the administrative record that serves as the evidentiary basis for an approval action by the city or county on such projects.

WATER CODE PART 2.10

Water Code Part 2.10 clarifies the roles and responsibilities of the Lead Agency under CEQA and the water supplier (i.e. public water system) with respect to describing current and future supplies compared to current and future demands, it defines the projects that are required to prepare a WSA, and the Lead Agency's responsibilities related to the WSA. A WSA is required for:

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 development that includes one or more of the uses described above;
7. A development that would demand an amount of water equivalent to or greater than the amount of water required by a 500-dwelling-unit project; and
8. For Lead Agencies with fewer than 5,000 water service connections, any new development that will increase the number of water service connections in the service area by 10% or more.

Under Part 2.10, the Lead Agency must identify the affected water supplier and ask the water supplier whether the new demands associated with the project are included in the suppliers' Urban Water Management Plan (UWMP). If the UWMP includes the demands it may be incorporated by reference in the WSA (Water Code Section 10910[c][2]). If there is no public water system to serve the project, the Lead Agency must prepare the WSA itself. (Water Code Section 10910[b]).

THE URBAN WATER MANAGEMENT PLANNING ACT

The Urban Water Management Planning Act requires a water supplier to document water supplies available during normal, single dry, and multiple dry water years during a 20-year projection and the existing and projected future water demand during a 20-year projection. The act requires that the projected supplies and demands be presented in 5-year increments for the 20-year projection (Water Code Section 10631).

The City finalized its 2005 UWMP in December. The UWMP encompasses the City's entire water service boundary which is bounded by the City limits, the Specific Urban Development Plan (SUDP) boundary, and the UC Merced Campus. The *Merced 2015 Vision General Plan* (City of Merced 1997) describes growth area boundaries, which are referred to as SUDP boundaries or the urban expansion area. The SUDP boundary is recognized as the ultimate growth boundary of the City over the life of the *Merced Vision 2015 General Plan*. For purposes of the City's UWMP, the SUDP boundary was used to describe the future City water system service area. The service area limits, including the SUDP boundary, current city limits, and the UC Merced campus are illustrated in Exhibit 1.

The City is proceeding with environmental review of the Project in conformance with the requirements of the California Environmental Quality Act (CEQA). The environmental review for the proposed project includes an environmental impact report (EIR) and an assessment of the available water supply to serve the project in the form of a WSA. The project is located within the city limits of the city of Merced and the City is identified as both the water supplier and the lead agency for the Project. The City, as the water supplier is required to make a determination through the WSA whether sufficient water supplies are available to meet project demands. Assuming that the WSA makes this determination, the City would adopt the WSA as part of the CEQA documentation prepared for the project.

THE PROPOSED WAL-MART REGIONAL DISTRIBUTION CENTER FACILITY

PROJECT LOCATION

The approximately 230-acre Project site is bounded on the north by Childs Avenue, on the East by Tower Road and on the South by Gerard Avenue. Kibby Road, which heads north from this area, terminates at Childs Avenue at the north end of the Project site. The future Campus Parkway is approximately 975 feet west of the Project site. The site is approximately three miles southeast of downtown Merced and two miles east of State Route 99 (SR 99). The proposed site plan is illustrated in Exhibit 2. The Project location is illustrated in Exhibit 3. The vicinity of the Project is shown in a map in Exhibit 4 and in an aerial photo in Exhibit 5. City and County General Plan land use designations are shown in Exhibit 6.

The site consists of two parcels, Assessor's Parcel Numbers (APNs) 061-250-035 and 061-290-047. The site is located in the northern half of Section 34 and the northern half of Section 35, Township 7 South, Range 14 East, Mt. Diablo Base and Meridian.

EXISTING LAND USE

The Project site is generally flat but gently slopes to the west and ranges from 185 to 190 feet above mean sea level (msl). In the recent past, the site has mainly been used for growing alfalfa, almonds, and walnuts.

The site contains no structures or improvements, except for an irrigation water well. The western one-third of the site contains a walnut orchard, and the eastern two-thirds consist of agricultural fields.

PROPOSED DEVELOPMENT

The primary building on the site is the approximately 1.1 million square foot regional distribution warehouse. The warehouse is primarily a materials handling operation whereby most goods typically are conveyed through the distribution center. There will also be warehouse support space to house administrative offices, the data processing center, and a cafeteria.

The site plan (Exhibit 2) includes the warehouse with related administrative and support functions, truck maintenance, fueling, fire pump house, truck gate and aerosol storage (located within the warehouse). All buildings will be single-story and constructed of pre-engineered steel components with metal panels. Maximum building height will be 40 feet above the finished floor level. On three sides of the building the finished floor will be 4 feet above finished grade. The main office floor will be at finished grade level.

The 17,000-square foot truck maintenance building will be used for routine maintenance of tractor/trailers serving the facility. The building will include a wash bay for trucks and trailers, service bays, break rooms, offices, storage rooms and restrooms.

The 1,600-square foot fire pump house will house the primary and stand-by fire pumps serving the building fire sprinkler systems and site fire hydrants. Adjacent to the fire pump house will be two 300,000-gallon steel ground-level water storage tanks. The tanks are directly connected to the fire pumps to serve as their water source.

The truck gate will be located on the truck driveway serving the site and will contain workspace for two security officers as well as a storage closet and a restroom. This will involve approximately 500 square feet of building floor space.

The land use associated with the Project is categorized industrial which is consistent with the land use designation in the in the *Merced 2015 Vision General Plan* (City of Merced 1997) (Exhibit 6).

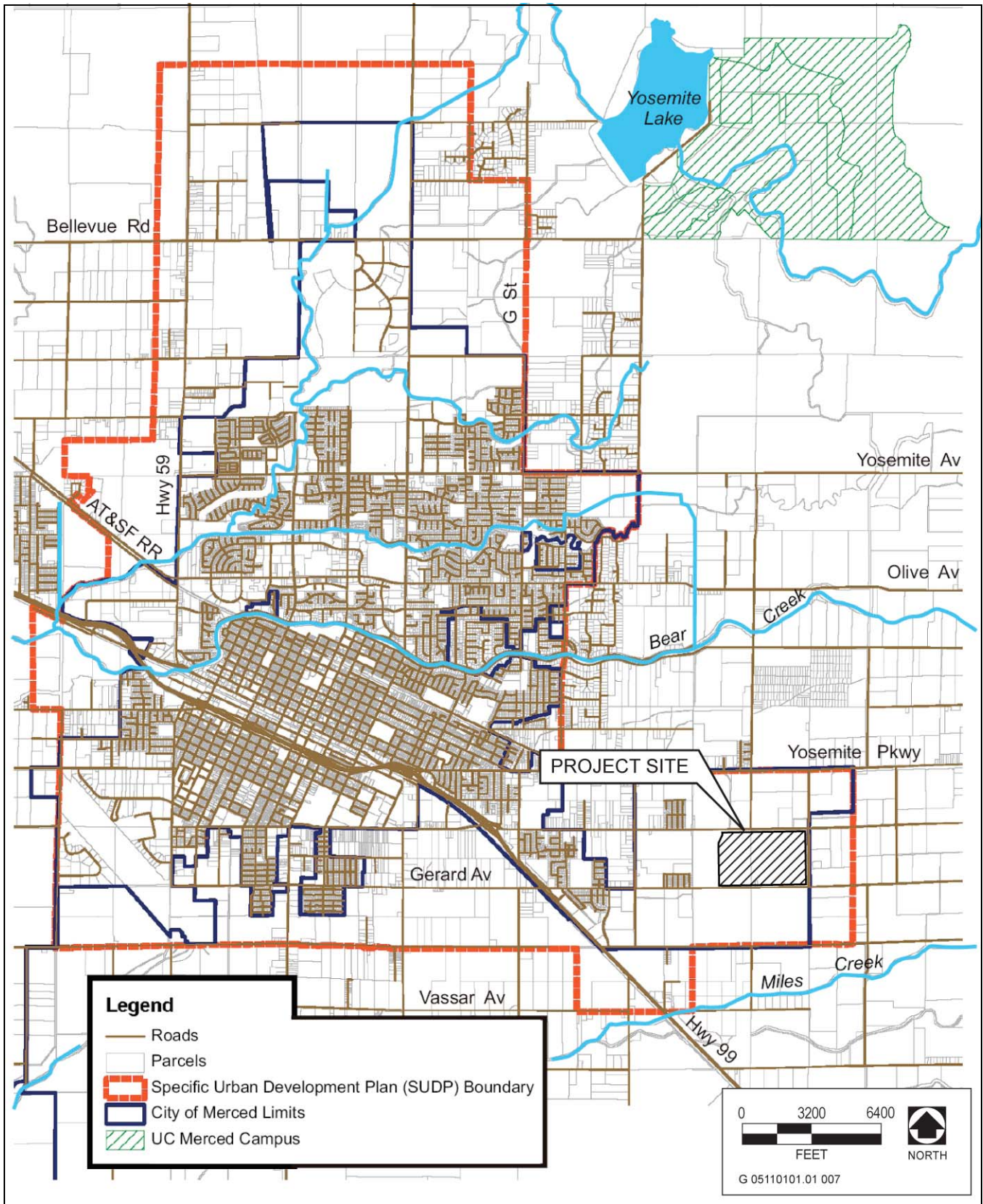
EXISTING AND PROJECTED WATER DEMANDS FOR THE PROJECT SITE

EXISTING WATER DEMANDS

The western one-third of the Project site contains a walnut orchard, and the eastern two-thirds consist of agricultural fields. There is an irrigation well on the Project site. The amount of groundwater pumped annually from this well is unknown.

Unit applied water demand is the amount of water needed to meet the demand of its user. For agriculture, unit applied water demand is the annual amount needed to meet a particular crop type, often expressed as acre-feet of water per acre of land. To calculate the annual water demands for a particular parcel of agriculture land, the unit applied water demand is multiplied by the total parcel size (in acres) to establish an annual water demand.

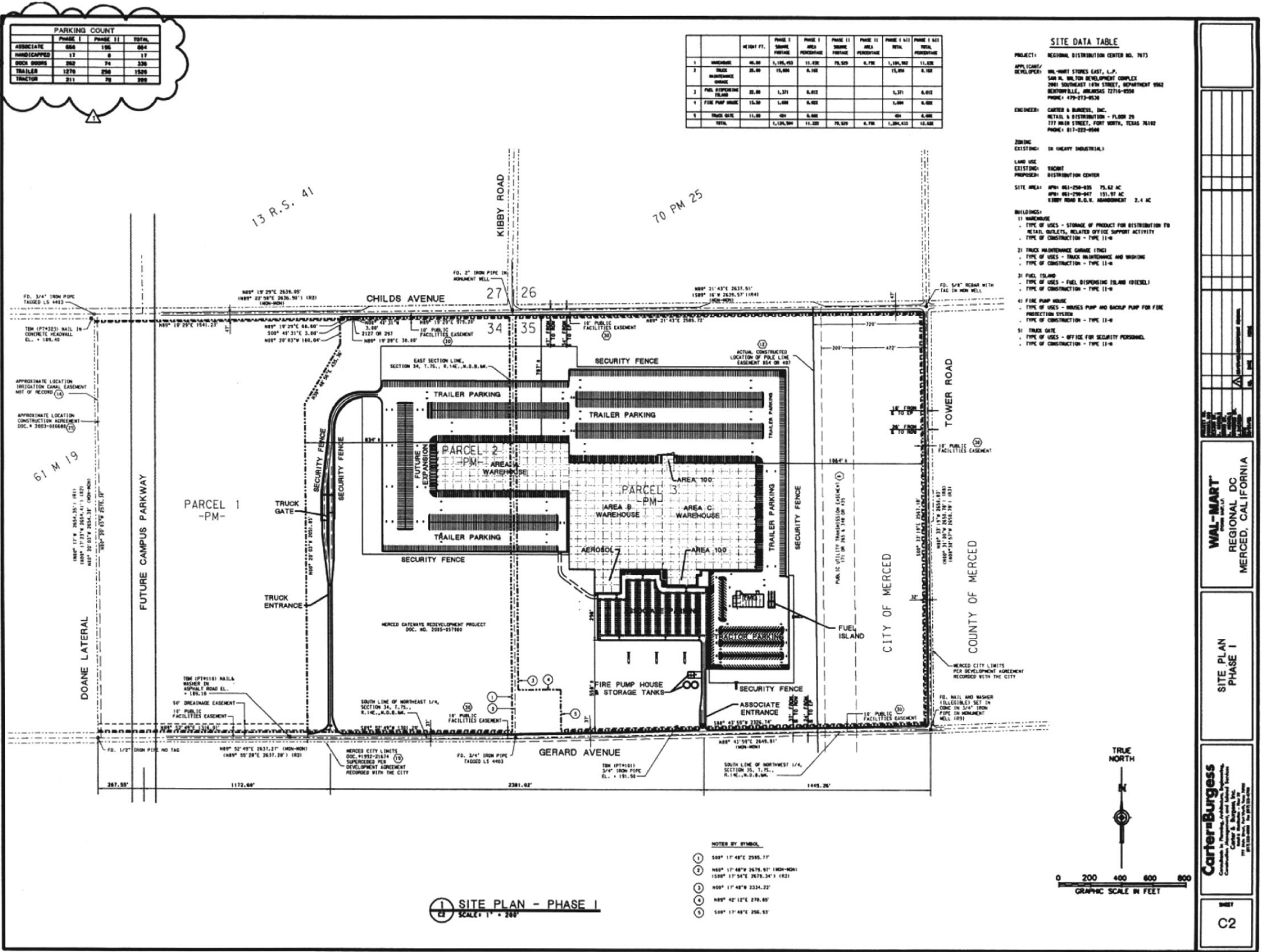
California Department of Water Resources (DWR) estimates that unit applied water demand for deciduous orchards (e.g. walnuts) in the Merced region range from 2.1 acre-feet per acre (afa) to 3.0 afa and unit applied water demand for agricultural fields range from 1.7 afa to 2.4 afa (DWR 1975). The annual water demands for the walnut orchard and agricultural fields are estimated to be approximately 160 acre-feet per year (afy) to 228 afy and 262 afa to 370 afa respectively. Total existing water demands at the Project site would be approximately 422 afa to 598 afa (Table 1).



Source: City of Merced 2005

City of Merced Service Area Boundaries

Exhibit 1

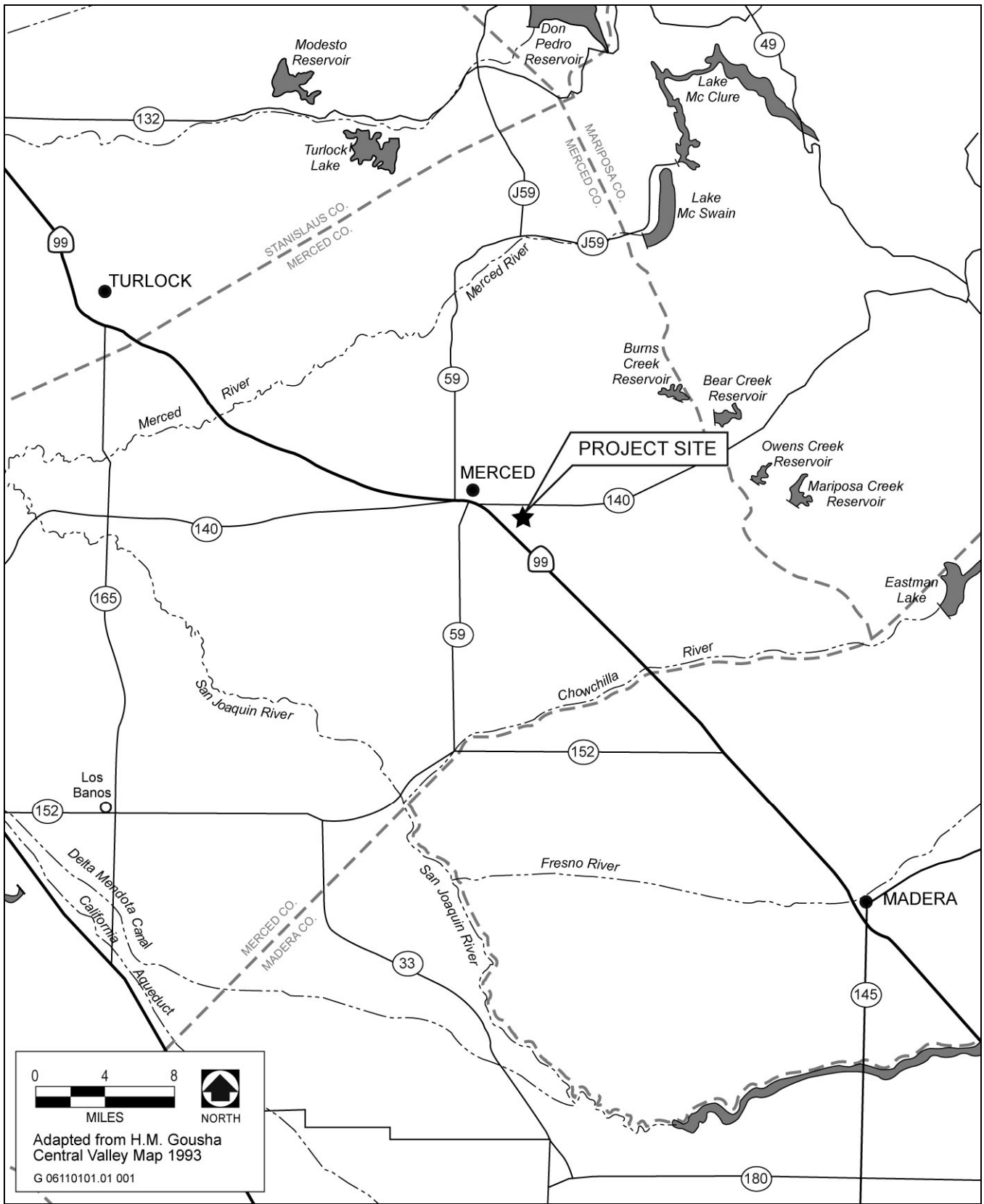


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Source: Carter Burgess 2005

Proposed Project Site Plan

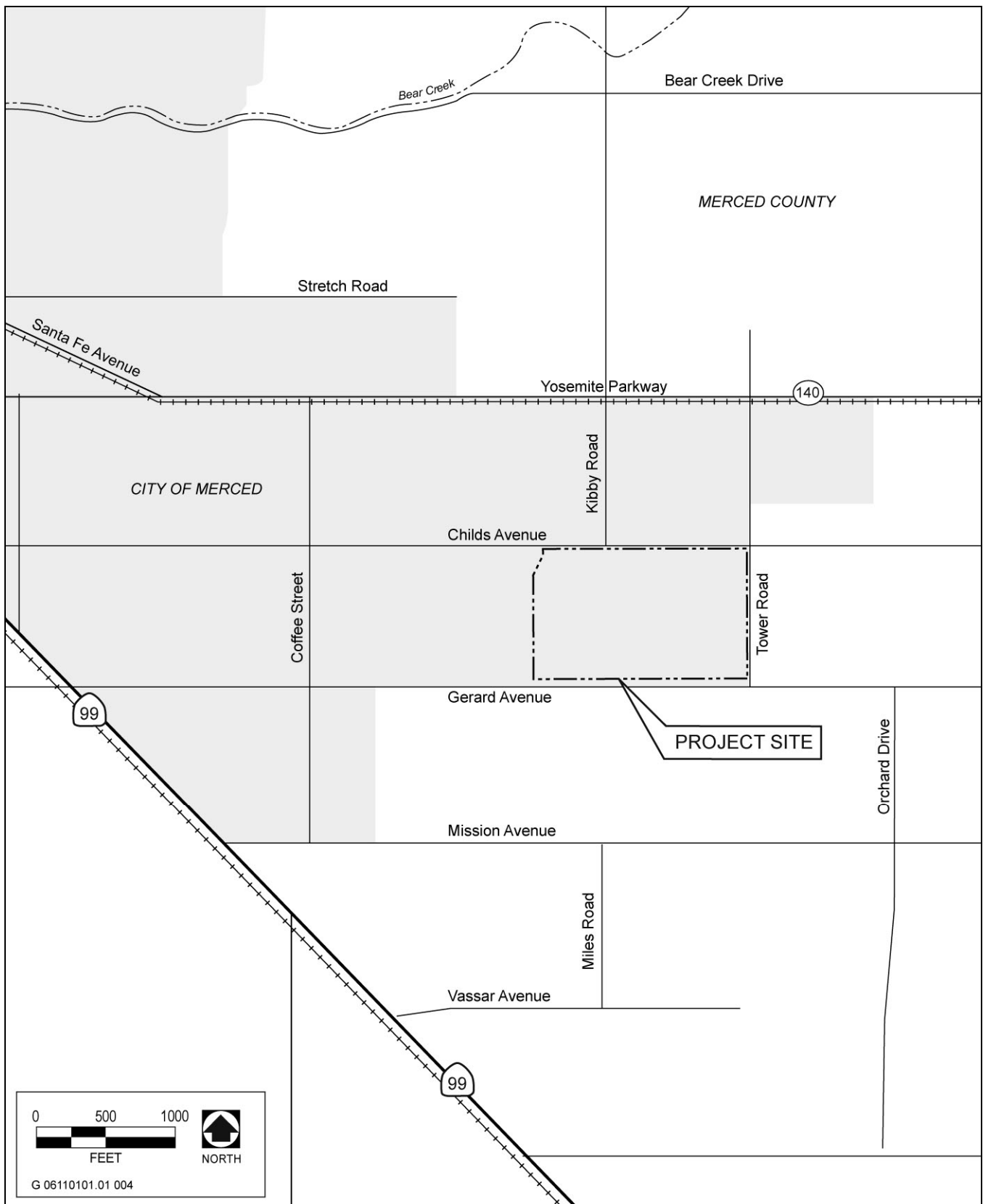
Exhibit 2



Source: EDAW 2006

Regional Location Map

Exhibit 3



Source: EDAW 2006

Local Vicinity Map

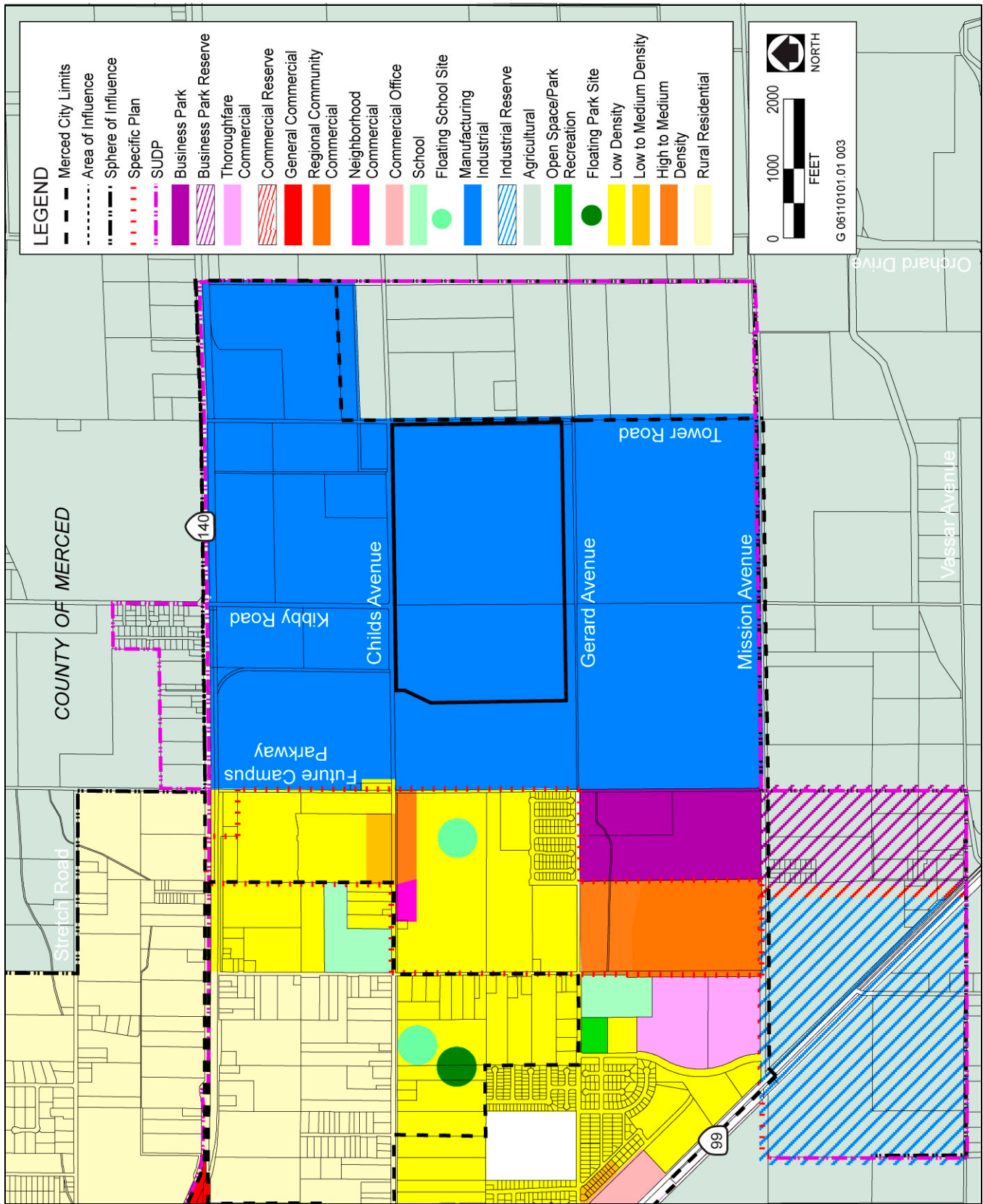
Exhibit 4



Source: EDAW 2006

Aerial Photo of Project Vicinity

Exhibit 5



Source: Merced County Association of Governments 2004

General Plan Designations

Exhibit 6

Land Use	Acreage	Unit Water Demand (afa)	Total Water Demand (afy)
Walnut Orchard	76	2.1–3.0	160–228
Fields	154	1.7–2.4	262–370
Total	230		422–598

PROJECT WATER DEMANDS

Water requirements for the Project are broken into two categories: domestic and fire protection. The domestic water requirements for the project are approximately 55,000 gallons per day (gpd) or 61.6 afy. Domestic water useage is distributed into two categories—domestic plumbing and truck wash. Domestic useage is approximately 20,000 gpd and includes restrooms, sinks, water fountains and the kitchen. The truck wash usage is approximately 25,000 gpd and is for washing company tractors and trailers.

In addition to the domestic water requirements, the Project facility would have two 300,000-gallon (0.9 af) ground-level water storage tanks. The tanks are dedicated to service the facility fire protection system and are not connected to the domestic water system. The total amount of water needed for the tanks would be 600,000 gallons (1.8 af). Because it is not possible to predict when, if ever, these water tanks would be needed for fire protection, it is assumed that the tanks would be flushed and refilled annually, and the amount of water necessary for each tank would be 1.8 afy. Therefore, total annual water demands for the Project would be 61.6 afy for domestic water and 3.6 afy for fire protection, a total of 65.2 afy (Table 2) (Dalferes 2006).

Category	Unit Water Demand		
	gallons per day (gpd)	acre-feet per year (afy)	
Domestic Water	Plumbing	20,000	22.4
	Truck Wash	35,000	39.2
	Total	55,000	61.6
Fire Protection	(2) 300,000 gallon storage tanks flushed and refilled annually	1,200,000 gallons	3.6
Total Water Demands			65.2

Source: Dalferes 2006

Development of the Project would require 65.2 af to be pumped from the groundwater basin annually. The project would therefore result in a reduction in total groundwater basin pumpage because the water demands associated with the proposed conditions (Table 2) are only about 13% of existing water demands associated with agricultural land use (Table 1).

The purpose of this WSA is to demonstrate that the City has planned water supplies to meet the water demands associated with the Project, in addition to meeting the existing and planned future water demands projected for the next 20 years.

CITY OF MERCED WATER SUPPLIES

Groundwater is currently the only water supply source for the City. Nineteen active production wells, with a combined capacity of 49,500 gallons per minute (gpm), make up the City's total water supply. All of the wells pump directly into the distribution system and have chlorination facilities for disinfection. The capacity of the existing wells is summarized in Table 3 and the locations of the groundwater wells and storage facilities are

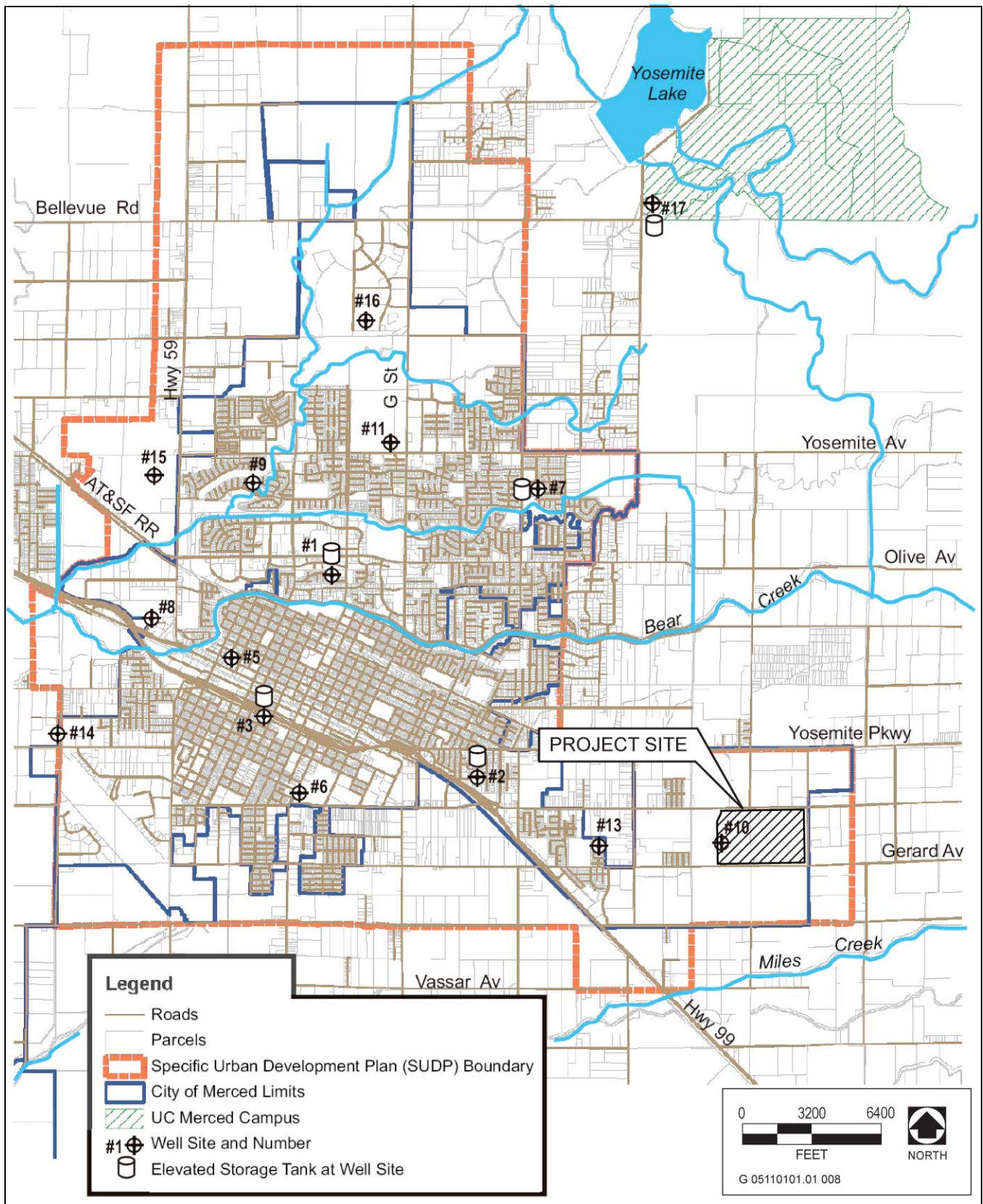
illustrated in Exhibit 7. The active wells are fully operational and used on a regular basis for water supply within the City. Well 10B was taken offline in November 2004 due to a threat of trichloroethene contamination and replaced with Well 10-R2. Water production from Well 10-R2 began in May 2005. Wells 15 and 16 are scheduled to be placed into service in 2006. Well 17 is located within the UC Merced campus and 90% of its supply will be for the campus at first phase build-out with the remaining contributing to the City distribution system. (City of Merced 2005.)

Table 3 City of Merced System Wells	
Well ID	Well Capacity (gpm)
1A	2,500
1B	2,200
1C	2,200
2A	2,500
2B	2,500
2C	3,000
3C	3,200
5B	3,000
6	1,000
7A	2,000
7B	2,200
7C	3,500
8	2,000
9	1,700
10B	-
10-R2	3,000
11	3,000
13	3,000
14	4,000
15 (online in 2006)	3,000
16 (online in 2006)	3,000
17	3,000
Total Well Capacity	55,500
Source: City of Merced 2005	

CITY OF MERCED PROJECTED WATER USE

The City's UWMP projects future potable water demands to ensure that the future needs of residents and businesses in the City's SUDP are planned for and adequately addressed. The water demands are based on population projections. In 1990 the population in the SUDP was approximately 60,900. It is estimated that the 2005 population in the SUDP is approximately 82,763. Of this total, approximately 90% are served by the City water system. The SUDP population is expected to reach 131,763 by 2025. Population within the SUDP is expected to grow at an annual average growth rate of about 2.5% to 3% from years 2005 through 2025. (City of Merced 2005.)

Unit water use factors, and total water demands are developed to estimate future water needs based on the housing and employment projections within the SUDP. Water demands were projected for three water year scenarios; normal year, single-dry year and multiple-dry years. Projected normal water year demands are presented in Table 4.



Source: City of Merced 2005

City of Merced Water Supply Facilities

Exhibit 7

Table 4 Projected Normal Year Water Demands by Water Use Sector in SUDP					
Sector	2005	2010	2015	2020	2025
(acre-feet per year)					
Single family	12,954	14,729	16,166	17,454	18,584
Multi-family	3,344	3,811	4,188	4,526	4,823
Commercial/Industrial/Institutional	10,080	11,029	12,247	15,109	18,129
Landscape Irrigation	10	58	105	153	200
Water sales	0	0	0	0	0
Saline barriers	0	0	0	0	0
Groundwater recharge	0	0	0	0	0
Conjunctive use	0	0	0	0	0
Raw water	0	0	0	0	0
Recycled water for urban use	0	50	133	217	300
UC Merced campus	718	3,236	4,889	6,481	8,073
Unaccounted-for water ¹	3,012	3,657	4,192	4,882	5,568
Total	30,118	36,570	41,920	48,822	55,677
Percent of Year 2005	100	121	139	162	185
Notes: ¹ Unaccounted-for water assumed to be 10% of total water production					
Source: City of Merced 2005					

COMPLIANCE WITH PROVISIONS OF THE WATER CODE

RESPONSIBILITIES OF THE LEAD AGENCY

The City of Merced is the CEQA Lead Agency responsible for evaluating the environmental impacts of the project in compliance with CEQA, certifying the EIR, and issuing the associated entitlements.

The City would be the water purveyor for the project and would be the agency responsible for preparation and approval of the WSA. In preparing the WSA, The City must do the following:

- ▶ Determine the sufficiency of the supply to meet the project demands under normal, single dry and multiple dry years over a 20-year projection.
- ▶ Identify existing water supply entitlements and water rights for the proposed project and quantify water received in prior years pursuant to these existing entitlements and rights.
- ▶ Describe the groundwater basin from which the proposed project will be supplied, if applicable. The description must include information regarding overdraft in the basin. The amount and location of groundwater pumped by the City must be quantified, based on reasonably available information.
- ▶ Describe and analyze the amount and location of groundwater projected to be pumped by the City from the basin from which the project will be supplied. The assessment must include an analysis of the sufficiency of groundwater from the basin to meet the projected water demand associated with the proposed project.

REQUIREMENTS OF THE WSA

The California Water Code Sections 10910–10915 require that a WSA for a project include the following information:

- ▶ A description and quantification of the existing and planned water sources.
- ▶ A description of the reliability and vulnerability of the water supply to seasonal or climatic shortages in the average water year, single dry water year, and multiple dry water year during a 20-year projection.
- ▶ Contingency plans including demand management and conjunctive use potential.
- ▶ A description of current and projected water demands
- ▶ A description of all water supply projects and water supply programs that may be undertaken by the City to meet the total projected water use.

In addition, because the City uses groundwater as one of its supply sources, the WSA should include:

- ▶ A description of any groundwater basin (or basins) from which the City pumps groundwater.
- ▶ Information that characterizes the condition of the groundwater basin and a description of the measures currently being taken by the City to minimize any potential for overdraft conditions to occur.
- ▶ A detailed description and analysis of the amount and location of groundwater pumped by the City for the past five years from any groundwater basin from which the proposed project will be supplied.
- ▶ An analysis of the location, amount, and 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.

The following analysis presents the WSA for the Wal-Mart Regional Distribution Center (Wal-Mart WSA) in compliance with the requirements of the Water Code. The Wal-Mart WSA is structured accordingly.

DETERMINE WHETHER PROJECT IS SUBJECT TO THE CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA). [WATER CODE SECTION 10910(A)]

The City has made the determination that the Wal-Mart Regional Distribution Center Facility is subject to CEQA and is a “project” as defined by Water Code Section 10910(a) because it would result in the construction of an 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.

IDENTIFY THE PUBLIC WATER SYSTEM THAT WILL SUPPLY WATER FOR THE PROJECT [WATER CODE SECTION 10910(B)]

The City of Merced Development Services Department—Planning Division has identified the City of Merced—Public Works Department as the responsible public water system purveyor for the Project.

IS THERE AN ADOPTED URBAN WATER MANAGEMENT PLAN (UWMP)? ARE THE PROJECTED WATER DEMANDS ASSOCIATED WITH THE PROPOSED PROJECT ACCOUNTED FOR IN THE MOST RECENTLY ADOPTED URBAN WATER MANAGEMENT PLAN? [WATER CODE SECTION 10910(C)]

The City has adopted an UWMP dated December 2005.

As described above, the projected water demand associated with industrial land use for the Project site was accounted for in the most recently adopted UWMP. Therefore, pursuant to Section 10910(c)(2), the relevant sections of the UWMP may be incorporated by reference into this WSA to comply with subsections (d), (e), (f), and (g) of Water Code section 101910. The City’s UWMP (without appendices) is attached hereto as Appendix A and incorporated in this WSA to satisfy the above referenced requirements in addition to the information provided below.

IDENTIFY EXISTING WATER SUPPLIES FOR THE PROJECT [WATER CODE SECTION 10910(D)]

Section 10910(d) requires identification of existing water supply entitlements, water rights, or water service contracts relevant to the Project and a description of the quantities of water obtained by the City pursuant to these water supply entitlements, water rights, or water service contracts in previous years. The City does not currently receive surface water supplies from any sources. The Merced groundwater basin is not adjudicated and the City is not limited to a specific withdrawal amount.

DOES THE SUPPLY INCLUDE GROUNDWATER AS A SOURCE? [WATER CODE SECTION 10910(F)]

The water demands for the proposed project would be met solely with groundwater. Consequently, Section 10910(f) requires the following additional information.

Water Code Section 10910(f)(1) Requires a Review of Any Information Contained in the Urban Water Management Plan Relevant to the Identified Water Supply for the Proposed Project.

A description of the City’s groundwater wells and distribution system is described above. The City’s UWMP concludes that the groundwater supply will be sufficient to meet the increased demand identified for build out of the SUPD through 2025. The City acknowledges however that they, along with Merced Irrigation District (MID) are cooperating on a long-range plan to stabilize groundwater levels and to investigate the potential of groundwater recharge with imported surface water from the Merced River (City of Merced 2005). The City has adequate groundwater supply to provide water supply during single-dry and multiple-dry years, which is discussed in more detail below.

Water Code Section 10910(f)(2) Requires a Description of the Groundwater Basin and the Efforts Being Taken to Prevent Long-Term Overdraft.

The UWMP describes the groundwater basin extensively in Chapter 4 (City of Merced 2005).

Description of Basin

The local groundwater basin is referred to as the Merced Groundwater Basin. The Merced Groundwater Basin (groundwater subbasin number 5-22.04) is a subbasin of the San Joaquin Valley Groundwater Basin (DWR 2003).

The Merced subbasin 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 subbasin boundary on the south stretches westerly along the Madera-Merced County line (Chowchilla River) and then between the boundary of the Le Grand-Athlone Water District and the Chowchilla Water District. The boundary continues west along the northern boundaries of Chowchilla Water District and El Nido Irrigation District. The southern boundary then follows the western boundary of El Nido I.D. south to the northern boundary of the Sierra Water District, which is followed westerly to the San Joaquin River. Average annual precipitation is 11 to 13 inches, increasing eastward.

Geologic units in the Merced Subbasin consist of consolidated rocks and unconsolidated deposits. The consolidated rocks include the Ione Formation, the Valley Springs Formation, and the Mehrten Formation. In the eastern part of the area, the consolidated rocks generally yield small quantities of water to wells except for the Mehrten Formation, which is an important aquifer.

The unconsolidated deposits were laid down during the Pliocene to present. From oldest to youngest, these deposits include continental deposits, lacustrine and marsh deposits, older alluvium, younger alluvium, and floodbasin deposits. The continental deposits and older alluvium are the main water-yielding units in the unconsolidated deposits. The lacustrine and marsh deposits (which include the Corcoran, or "E-" Clay), and the floodbasin deposits yield little water to wells, and the younger alluvium in most places probably yields only moderate quantities of water to wells.

There are three ground water bodies in the area: an unconfined water body, a confined water body, and the water body 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 between about 50 and 200 feet (DWR 1981), except in the western and southern parts of the area where clay lenses occur and semi-confined conditions exist. The confined water body occurs in the unconsolidated deposits below the Corcoran Clay and extends downward to the base of fresh water. The water body in consolidated rocks occurs under both unconfined and confined conditions.

Groundwater flow is primarily to the southwest, following the regional dip of basement rock and sedimentary units. DWR (2000) data show two groundwater depressions south and southeast of the city of Merced during 1999.

Changes in groundwater levels are based on annual water level measurements by DWR and cooperators. Water level changes were evaluated by quarter township and computed through a custom DWR computer program using geostatistics (kriging). On average, the subbasin water level has declined nearly 30 feet from 1970 through 2000. The period from 1970 through 1978 showed steep declines totaling about 15 feet. The 10-year period from 1978 to 1988 saw stabilization and a rebound of about 10 feet. 1988 through 1995 again showed steep declines, bottoming out in 1996 with water levels rising from 1996 to 2000. Water level declines have been more severe in the eastern portion of the subbasin.

Estimations of the total storage capacity of the subbasin and the amount of water in storage as of 1995 were calculated using an estimated specific yield of 9.0% and water levels collected by DWR and cooperators. According to these calculations, the total storage capacity of this subbasin is estimated to be 21,100,000 af to a depth of 300 feet and 47,600,000 af to the base of fresh groundwater. These same calculations give an estimate of 15,700,000 af of groundwater to a depth of 300 feet stored in this subbasin as of 1995 (DWR 1995). According to published literature, the amount of stored groundwater in this subbasin as of 1961 is 37,000,000 af to a depth of < 1,000 feet (Williamson 1989).

Groundwater Basin Management

While groundwater has provided the City a reliable water supply for many years, rapid growth has motivated the City to evaluate its groundwater supply. In 1992, the City and MID entered into a Memorandum of Understanding to develop a long-range water resources plan (City of Merced 2005). In response, the *Merced Water Supply Plan*

was completed in 1995, which included goals for managing groundwater resources and to provide high quality, reliable water supply for cities.

1995 Merced Water Supply Plan

The City of Merced and the MID jointly commissioned a water supply study that would identify urban, agricultural, and environmental water needs through the year 2030. The result of the joint study was the 1995 Merced Water Supply Plan. The goals of the 1995 Plan included the management of groundwater resources, and the provision of high quality, reliable supply of water for the cities within Merced County. Two key water demand and supply conclusions were important in the development of the 1995 Plan and for long-term water management throughout MID's sphere of influence (500,000 acres including the City). (City of Merced and MID 1995.)

- ▶ Agricultural water needs, currently met by surface water deliveries and pumped groundwater, will remain the dominant water factor; while the demand is projected to decline by 10% by 2030, nearly two-thirds of water use will be for agricultural uses.
- ▶ Urban water demands will increase three to four times by 2030 (100% of the demand supplied from groundwater). Several alternatives and strategies were examined to achieve the goals of the 1995 Plan. To manage the groundwater resources, the recommended strategy was to ensure that groundwater elevations are returned to and stabilized at 1992 levels. The activities/facilities needed to do this were to provide for phased construction of direct recharge facilities throughout the region (focusing first on areas with more serious declines).

In 1996, MID launched a major surface water/groundwater program to help care for and recharge the aquifer as a result of the 1995 Plan. The overall project, called the Surface/Groundwater Optimization Program (SUGWOP), is designed to both improve the in-District delivery systems and encourage surface and groundwater conservation practices. MID committed \$10.2 million to be expended through the year 2004. Components of the SUGWOP include increasing water conservation, meeting water quality challenges, improving water accounting, canal automation, eliminating "tail-end" water delivery concerns, incentive funds to assist growers in conversion from groundwater to surface water.

In 1997 as part of the implementation of the Merced Water Supply Plan, MID adopted a Groundwater Management Plan for the District, including a Groundwater Management Program to conjunctively manage the region's surface and groundwater supplies to meet local and regional water needs reliably. The Groundwater Management Program involves a variety of measures, including Monitoring, Water Quality Protection, Conjunctive Use, and Public Involvement and Information. Groundwater monitoring measures include: groundwater production, levels and storage, inflows and outflows, as well as water quality. In particular, the Conjunctive Use Measures include:

- ▶ Water Conservation. These measures involve voluntary adoption of on-farm water conservation practices and establishment of flexibility in MID delivery schedules that facilitate efficient on-farm water use.
- ▶ Groundwater Recharge and Extraction. Recharge activities may include in-lieu groundwater recharge through strategic use of available surface water, incidental recharge accomplished through use of existing MID facilities, and intentional recharge accomplished through construction and operation of new recharge facilities or modification of existing facilities.
- ▶ Cooperation with Sphere-of-Influence Pumpers. Voluntary cooperative relationships with non-MID groundwater users within the MID sphere-of-influence.
- ▶ Reduction in Groundwater Outflow. Cooperative relationships to manage groundwater outflows.

- ▶ **Pumping Restrictions.** If necessary, MID may consider imposing pumping restrictions, subject to the approval of a majority of MID landowners.
- ▶ **Groundwater Extraction Fees.** Although not anticipated, if existing revenues are not adequate to implement the Groundwater Management Program, MID would levy groundwater extraction fees or assessments, subject to the approval of a majority of MID landowners.

Updates to the 1995 Merced Water Supply Plan

The 1995 Plan was updated and a Final Status Report was published in September 2001 (Updated Plan). The planning horizon for the Updated Plan goes through 2040, and the goals of the 1995 plan have not changed. Some of the strategies used in the development of planning scenarios have been revised, including stabilizing the groundwater elevation at 1999 levels (which are similar to the 1992 levels). The study area that the Updated Plan now covers is approximately 582,000 acres, approximately 16% more area than covered in the 1995 Plan.

The projected demand for urban water use in 2040 has declined slightly to approximately 118,000 afy (as compared to 121,000 afy in the 1995 Plan). The projected agricultural demand for 2030 identified in the Updated Plan will increase to 1,042,000 afy, as compared to 788,000 afy projected in the 1995 Plan. Most of the increase is due to agricultural demands outside MID. In part, this increase can be attributed to the increased acreage considered in the Updated Plan area. While trends over the last 30 years indicate that private groundwater pumping has increased in MID’s service area, MID is currently offering incentive programs to encourage growers to use MID surface water for irrigation rather than groundwater when surface water is available.

Agricultural and urban uses were estimated to demand a total of approximately 931,000 afy in 1990. The vast majority of this demand comes from agriculture, with urban uses making up only 40,000 afy of the demand. Although groundwater wells within MID are capable of pumping approximately 100,000 afy, and in 1976 the District pumped as much as 186,000 af, before the 1987–1992 drought, MID pumped an average of 27,000 af in “normal” surface water supply years. Since 1993 when MID instituted a series of surface irrigation system improvements, education of the distribution system operators, and better management of the water conveyance system, average groundwater pumping has dropped to 9,350 af, a groundwater savings of 17,650 afy. This reduction in groundwater pumping has been the result of a concerted effort of water supply planning and management undertaken by the District in conjunction with the City, and other participants including Merced County. (CH2M Hill 2001).

Water Code Section 10910(f)(3) requires a description of the volume and geographic distribution of groundwater extractions from the basin for the last five years.

The City has historically been able to meet all water demands with available groundwater supplies. Exhibit 7 shows the geographical distribution of the City’s groundwater wells. The City’s historical groundwater production from 1978 through 2005 is presented in Table 5.

Year	Average Water Production (afy)
1978	11,500
1979	13,500
1980	14,000
1981	15,500
1982	17,000

Table 5 (continued)	
City of Merced Historical Water Production	
Year	Average Water Production (afy)
1983	17,000
1984	19,500
1985	17,500
1986	17,000
1987	15,000
1988	16,000
1989	16,500
1990	16,500
1991	14,500
1992	16,000
1993	16,500
1994	18,000
1995	18,494
1996	20,649
1997	22,689
1998	20,990
1999	23,906
2000	21,018
2001	23,633
2002	23,659
2003	22,428
2004	23,779
2005	30,118

Source: City of Merced 2005

Water Code Section 10910(f)(4) Requires a 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 from the Basin from Which the Proposed Project Will Be Supplied. The Description and Analysis Shall Be Based on Historical Data and Include a Description of the Projected Volume and Geographic Distribution of Groundwater Extractions from the Basin.

The project water demands of 65.2 afy will be met using groundwater. The City of Merced currently exercises and will continue to exercise its rights as a groundwater appropriator to extract groundwater from the groundwater basin underlying the City for delivery to the Project and its other existing and future customers. This is described in more detail in the City’s UWMP which is incorporated herein by reference and attached as Appendix A.

Water Code Section 10910(f)(5) Requires 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.

The City’s UWMP concludes that although groundwater levels have declined at a greater rate during drought periods, the annual quantity of groundwater available does not vary significantly in relation to wet or dry years. The reliability of the City’s water supply does not change due to seasonal or climatic shortages and groundwater quality is assumed to be generally unaffected by short-term drought conditions. Water quality issues with respect to the groundwater are not anticipated to have significant impact on water supply reliability (City of Merced 2005). Table 6 presents the City’s water supply reliability for 2025.

	Normal Year (afy)	Single-dry Year (afy)	Multiple Dry Years (afy)		
			Year 1	Year 2	Year 3
Sustainable Water Supply					
Surface Water	200	200	200	200	200
Groundwater	56,000	56,000	56,000	56,000	56,000
Recycled Water	0	0	0	0	0
Desalinated Water	0	0	0	0	0
Total Supply	56,200	56,200	56,200	56,200	56,200
2025 Demand	55,677	55,677	55,677	55,677	55,677
Surplus/ (Deficit)	523	523	523	523	523
Source: City of Merced 2005					

Groundwater is a consistent source, so no replacement plan is needed. However, as discussed above, the City and MID are cooperating on a long-range plan to stabilize groundwater levels and to investigate the potential of recharge with imported surface water from the Merced River. As shown in Table 6, the City has adequate groundwater supply to meet anticipated 2025 demands during single-dry and multiple-dry years. The water shortage contingency plan which was implemented in 1993 in response to the drought in the late 1980s remains in effect. Water demand management measures would reduce water demands and thereby reduce water supply needs.

DETERMINATION OF SUFFICIENCY

The City’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 Project in addition to existing and planned future uses. Based upon the analysis undertaken by the City in its UWMP, and the groundwater management and planning efforts being undertaken by the City and MID, including the implementation of the Surface/Groundwater Optimization Program, the City has concluded that it can continue to provide potable water to future development included in the SUDP, including the Project. In light of this determination, the City is not required to develop plans for acquiring additional supplies pursuant to Water Code Section 10911.

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