

Mitigated Negative Declaration and Initial Study for City of Merced 2016 Water Master Plan Update

City of Merced

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City of Merced Water Master Plan Update Mitigated Negative Declaration

Introduction

This Initial Study (IS) and Mitigated Negative Declaration (MND) have been prepared to evaluate the City of Merced's project for compliance with the California Environmental Quality Act (CEQA) and the State CEQA Guidelines. The City of Merced (City) is the lead agency under CEQA and is proposing to adopt an MND for the Water Master Plan Update.

Project Description

The City proposes to implement the 2016 Water Master Plan Update to address the infrastructure requirements and water supply needs to meet growth as described in the 2012 update to the Merced Vision 2030 General Plan (General Plan).

The following water system infrastructure improvements described in the Water Master Plan include:

- Construct up to six new 2,500-gpm wells
- Construct three 3-million gallon (MG) storage tanks
- Construct three booster pump stations (5.0 million gallons per day [MGD]).
- Construct approximately 41 miles of new pipeline.

The exact locations of the proposed improvements are not known. At full buildout under the General Plan, the City proposes to supply up to 44,600 acre-feet of water by 2030. The projected water service area, also known as the Specific Urban Development Plan (SUDP) boundary, is the 2030 growth boundary of the city. The boundary of the SUDP is coterminous with the boundary of the City's sphere of influence (SOI). By 2030, the SUDP/SOI is projected to be 28,730 acres (45 square miles). The Water Master Plan water service area occupies the same areas as the SUDP/SOI. The Water Master Plan identifies a Surface Water Treatment Facility as a potential project. However, the location, footprint, and timing for this facility is not known at this time.

Findings

An IS has been prepared to evaluate impacts of the construction and operation of new infrastructure to satisfy the permitting requirements of the natural resource agencies as well as to identify potentially significant impacts related to air quality, biological resources, cultural resources, noise, and transportation and circulation. Based on the IS, it has been determined that the following infrastructure improvements would have a less than significant impact on the environment with implementation of mitigation measures described below.

- Construction of six new 2,500-gpm wells

- Construction of three 3-million gallon (MG) storage tanks
- Construction of three booster pump stations (5.0 MG per day [MGD])
- Construction of approximately 41 miles of new pipeline

The surface water treatment plant component of the proposed project may have a significant effect on the environment, and an Environmental Impact Report is required.

This conclusion is supported by the following findings:

- The project would have no new impacts or less than significant on agriculture and forestry, geology and soils, greenhouse gas, hazards and hazardous materials, hydrology, land use, minerals, population and housing, public services, recreation, transportation, and utilities.
- The project would have potentially significant impacts on aesthetics, air quality, biological resources, cultural resources, and noise, but mitigation measures would reduce these impacts to less-than-significant levels.
- The project would not substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, reduce the number or restrict the range of a special-status species, or eliminate important examples of California history or prehistory.
- Constructing and operating a surface water treatment plant is a potential significant impact.

Mitigation Measures

Following are the mitigation measures that would be implemented by the City of Merced or its assignees to avoid or minimize potential environmental impacts. Implementation of these mitigation measures would reduce the environmental impacts of the project to less-than-significant levels.

Aesthetics

Mitigation Measure Aesthetics-1

The exterior surface of structures visible to the public shall be painted with a nonreflective earthtone color that provides maximum visual blending with the surroundings of the site. Noninvasive, xeric type or water-efficient vegetation shall be provided as landscaping with the intent of reducing the visual impact of the structures as seen from public and private view. Utilities shall be underground unless undergrounding shall be cost prohibitive. The footprint of facilities and structures shall be maintained in good condition, free of trash, graffiti, weeds, etc.

Effectiveness of Mitigation Measure: Implementing Mitigation Measure Aesthetics-1 will ensure that impacts to the visual character of a project site will **be less than significant** because unsightly mechanical and utility structures will be screened, or painted to blend with the surroundings of the site.

Mitigation Measure Aesthetics-2

The following guidelines shall be followed in selecting and designing any outdoor lighting:

- All outdoor lights including parking lot lights, landscaping, security, path and deck lights should be fully shielded, full cutoff luminaires.

- Complete avoidance of all outdoor uplighting for any purpose.
- Avoidance of tree-mounted lights unless they are fully shielded and pointing down toward the ground or shining into dense foliage. Ensure compliance over time.
- Complete avoidance of uplighting and unshielded lighting in water features such as fountains or ponds.

Air Quality

Mitigation Measure Air Quality-1: Implement Applicable SJVAPCD-Required Construction Mitigation Measures

During project construction activities, the contractor shall comply with all SJVAPCD-required rules and regulations to minimize construction-related emissions. SJVAPCD rules and regulations that would apply to the proposed project's construction activities include, but are not limited to, the following:

San Joaquin Valley Air Pollution Control District Regulation VIII

The City of Merced shall require its contractors to comply with the applicable measures from SJVAPCD's Regulation VIII for all construction-related activities occurring in SJVAPCD, including the following rules:

- Rule 8011—General Requirements
- Rule 8021—Construction, Demolition, Excavation, Extraction, and Other Earthmoving Activities
- Rule 8031—Bulk Materials (handling and storage)
- Rule 8041—Carryout and Trackout (of dirt and other materials onto paved public roads)
- Rule 8051—Open Areas
- Rule 8061—Paved and Unpaved Roads (construction and use)
- Rule 8071—Unpaved Vehicle/Equipment Traffic Areas

Biological Resources

Mitigation Measure Biology-1

Once the exact location and or the footprint of a proposed project identified in Table 2-1 is known, a qualified biologist shall: 1) determine if the location or footprint is within the area covered by the Upland Species of the San Joaquin Valley (Recovery Plan and/or the Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon), and 2) determine if the proposed project would have an impact on a special status species. If there is an impact to a special status species the City shall implement Mitigation Measures Biology-2 through Biology-9.

Mitigation Measure Biology-2: Vernal Pools and Vernal Pool Associates

To protect vernal pools and associated species, surveys shall be conducted to determine the presence of vernal pools prior to or concurrent with site selection for implementing any proposed project improvements identified in Table 2-1 in an area having potential habitat.

Surveys to detect vernal pools are most easily accomplished during the rainy season or during early spring when pools contain water. If vernal pools are found to occur on a project site, the project proponent must consult with and obtain authorizations from, but not limited to, the California Department of Fish and Wildlife (CDFW), the United States Fish and Wildlife Service (USFWS), the Army Corps of Engineers (Corps), and the State Water Resources Quality Control Board (SWRCB).

Consultation and authorizations may require that additional surveys for special-status species be completed. Because there is a federal policy of no net loss of wetlands, mitigation to reduce losses and compensation to offset losses to vernal pools and associated special-status species will be required.

Mitigation Measure Biology-3: Special-Status Plants

To protect special-status plants, the City shall ensure that a botanical survey be conducted for projects containing habitat suitable for special-status plant species. Surveys shall be conducted by a qualified biologist or botanist during the appropriate flowering season for the plants and shall be conducted prior to issuance of a grading or building permit for the project. If special-status plants are found to occur on the project site, the population of plants shall be avoided and protected. If avoidance and protection is not possible, a qualified biologist shall prepare a mitigation and monitoring plan for the affected species. The plan shall be submitted to the CDFW and/or the USFWS for review and comment. Details of the mitigation and monitoring plan shall include, but not be limited to:

- Removing and stockpiling topsoil with intact roots and seed bank in the disturbance area, and either replacing the soil in the same location after construction is complete or in a different location with suitable habitat; or
- Collect plants, seeds, and other propagules from the affected area prior to disturbance. After construction is complete, the affected area shall be replanted with propagules or cultivated nursery stock; or
- These and other mitigations will be considered successful if the populations of the affected species are sustained for a minimum of three years and are of a similar size and quality as the original population.

Mitigation Measure Biology-4: Valley Elderberry Longhorn Beetle

To protect the Valley elderberry longhorn beetle (VELB), the City shall ensure that a survey for elderberry bushes be conducted by a qualified biologist at each project site containing habitat suitable for VELB prior to the issuance of a grading permit or building permit. If elderberry bushes are found, the project proponent shall implement the measures recommended by the biologist, which shall contain the standardized measures adopted by the USFWS.

Mitigation Measure Biology-5: Burrowing Owls

To protect burrowing owls on proposed projects where suitable habitat exists, the following shall be implemented:

- To protect burrowing owls, preconstruction surveys shall be conducted by a qualified biologist at all project sites that contain grasslands, fallowed agricultural fields, or fallow fields along roadsides, railroad corridors, and other locations prior to grading. If, during a preconstruction survey, burrowing owls are found to be present, the project proponent shall implement the measures recommended by the biologist and include the standardized avoidance measures of CDFW.

Mitigation Measure Biology-6: Special-Status Birds

To protect raptors and other special-status birds on proposed projects where suitable habitat exists, the following measures shall be implemented:

- Trees scheduled to be removed because project implementation shall be removed during the nonbreeding season (late September to the end of February).
- Prior to construction, but not more than 14 days before grading, demolition, or site preparation activities, a qualified biologist shall conduct a preconstruction nesting survey to determine the presence of nesting raptors. Activities taking place outside the breeding season (typically March 15 through August 31) do not require a survey. If active raptor nests are present in the construction zone or within 250 feet of the construction zone, temporary exclusion fencing shall be erected at a distance of 250 feet around the nest site. Clearing and construction operations within this area shall be postponed until juveniles have fledged and there is no evidence of a second nesting attempt determined by the biologist.
- If nesting Swainson's hawks are observed during field surveys, consultation with the CDFW regarding Swainson's hawk mitigation guidelines shall be required. The guidelines include, but are not limited to, buffers of up to one quarter mile, monitoring of the nest by a qualified biologist, and mitigation for the loss of foraging habitat.
- To avoid impacts to common and special-status migratory birds pursuant to the Migratory Bird Treaty Act and CDFW codes, a nesting survey shall be conducted prior to construction activities if the work is scheduled between March 15 and August 31. If migratory birds are identified nesting within the construction zone, a 100-foot buffer around the nest site must be designated. No construction activity may occur within this buffer until a qualified biologist has determined that the young have fledged. A qualified biologist may modify the size of the buffer based on site conditions and the bird's apparent acclimation to human activities. If the buffer is modified, the biologist would be required to monitor stress levels of the nesting birds for at least one week after construction commences to ensure that project activities would not cause nest site abandonment or loss of eggs or young. At any time the biologist shall have the right to implement the full 100-foot buffer if stress levels are elevated to the extent that could cause nest abandonment and/or loss of eggs or young.

Mitigation Measure Biology-7: Special-Status Amphibians

To protect California tiger salamander and western spadefoot on proposed projects where suitable habitat exists, the following shall be implemented:

- To protect special-status amphibians, preconstruction surveys shall be conducted by a qualified biologist at all project sites that contain appropriate habitat. If, during a preconstruction survey, special-status amphibians are found to be present, the project proponent shall implement the measures recommended by the biologist and standardized measures adopted by the USFWS or the CDFW.

Mitigation Measure Biology-8: Special-Status Reptiles

To protect western pond turtle and giant garter snake on proposed projects where suitable habitat exists, the following shall be implemented:

- To protect special-status reptiles, preconstruction surveys shall be conducted by a qualified biologist at all project sites that contain appropriate habitat. If, during a preconstruction survey, special-status reptiles are found to be present, the project proponent shall implement the measures recommended by the biologist and standardized measures adopted by the USFWS or the CDFW.

Mitigation Measure Biology-9: Special-Status Mammals

To protect Merced kangaroo rat, western mastiff bat, western red bat, hoary bat, Yuma myotis, San Joaquin pocket mouse, American badger, and San Joaquin kit fox on proposed project sites where suitable habitat exists, the following shall be implemented:

- To protect special-status mammals, preconstruction surveys shall be conducted by a qualified biologist at all project sites that contain appropriate habitat. If, during a preconstruction survey, special-status mammals are found to be present, the project proponent shall implement the measures recommended by the biologist and standardized measures adopted by the USFWS or the CDFW.

Mitigation Measure Biology-10: Streambed Alteration Agreement

To minimize impacts to riparian habitat and other sensitive natural communities, the following the measures shall be implemented:

- The City shall have a qualified biologist map all riparian habitat or other sensitive natural communities within the footprint of the proposed project. To the extent feasible and practicable, all planned construction activity shall be designed to avoid direct effects on these areas.
- In those areas where complete avoidance is not possible, all riparian habitat or other sensitive natural communities shall be mitigated on a no-net-loss basis in accordance with either CDFW regulations and/or a Section 1602 Streambed Alteration Agreement, if required. Habitat mitigation shall be replaced at a location and with methods acceptable to the CDFW.

Mitigation Measure Biology-11: Conduct a delineation of Waters of the U.S. and Wetlands (WOUS/Wetlands) and Obtain Permits.

If Waters of the U.S. occur within the footprint of the proposed project, a delineation of the Waters of the U.S. and wetlands shall be performed and submitted to the Corps for verification prior to finalizing the project site plan. A Section 404 permit and a Section 401 Water Quality Certification or Waiver of Waste Discharge shall be acquired from the Corps and the Regional Water Quality Control Board (RWQCB) and a Section 1602 Streambed Alteration Agreement from CDFW, respectively, prior to the onset of construction-related activities.

Mitigation Measure Biology-12: Replace or Rehabilitate Waters of the U.S. and Wetlands

Any jurisdictional waters that would be lost or disturbed due to implementation of any proposed project described in Table 2-1 of the Water Master Plan shall be replaced or rehabilitated on a no-net-loss basis in accordance with the Corps and the RWQCB mitigation guidelines. Habitat restoration, rehabilitation, and/or replacement if required shall be at a location and by methods agreeable to the Corps, the RWQCB, and the City.

Mitigation Measure Biology-13 Wildlife Corridors

To minimize impacts to nesting, feeding, rearing, and foraging behavior of migratory birds, the City shall implement Mitigation Measure Biology-6.

Mitigation Measure Biology-14 Recover Plans

To minimize conflicts with Upland Species of the San Joaquin Valley Recovery Plan and/or the Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon), The City shall implement Mitigation Measure Biology-1.

Cultural Resources

Mitigation Measure: Culture-1

If prehistoric or historic-era subsurface archaeological features or deposits, including locally darkened soil (“midden”) that could conceal cultural deposits, are discovered during construction-related earthmoving activities, all ground-disturbing activity within 100 feet of the resources shall be halted and the City shall be notified. The City shall consult with a qualified archeologist to assess the significance of the find. If the find is determined to be significant by the qualified archaeologist (i.e., because the find is determined to constitute either an historical resource or a unique archaeological resource), representatives of the City and the qualified archaeologist shall meet to determine the appropriate course of action.

All significant cultural materials recovered shall be subject to scientific analysis, professional museum curation, and a report shall be prepared by the qualified archaeologist according to current professional standards.

If the archaeologist determines that some or all of the affected property qualifies as a Native American Cultural Place, including a Native American sanctified cemetery, place of worship, religious or ceremonial site, or sacred shrine (California Public Resources Code §5097.9) or a Native American historic, cultural, or sacred site, that is listed or may be eligible for listing in the California Register of Historical Resources pursuant to California Public Resources Code §5024.1, including any historic or prehistoric ruins, any burial ground, any archaeological or historic site (California Public Resources Code §5097.993), the archaeologist shall recommend to the City potentially feasible mitigation measures that would preserve the integrity of the site or minimize impacts on it, including any or a combination of the following:

- Avoidance, preservation, and/or enhancement of all or a portion of the Native American Cultural Place as open space or habitat, with a conservation easement dedicated to the most interested and appropriate tribal organization. If such an organization is willing to accept and maintain such an easement, or alternatively, a cultural resource organization that holds conservation easements.
- An agreement with any such tribal or cultural resource organization to maintain the confidentiality of the site location so as to minimize the danger of vandalism to the site or other damage to its integrity.
- Other measures, short of full or partial avoidance or preservation, intended to minimize impacts on the Native American Cultural Place consistent with land use assumptions and the proposed design and footprint of the development project for which the requested grading permit has been approved.

After receiving such recommendations, the City shall assess the feasibility of the recommendations and impose the most protective mitigation feasible.

Mitigation Measure: Culture-2

To minimize potential adverse impacts on unique, scientifically important paleontological resources, the City shall implement the following:

- Before the start of grading or excavation activities, construction personnel involved with earthmoving activities shall be informed of the possibility of encountering fossils, the appearance and types of fossils likely to be seen during construction activities, and proper notification procedures should fossils be encountered.
- This worker training shall be prepared and presented by a qualified paleontologist.
- If paleontological resources are discovered during earthmoving activities, the construction crew shall immediately cease work in the vicinity of the find and shall notify the City planning department. The City shall retain a qualified paleontologist to evaluate the resource and prepare a proposed mitigation plan in accordance with the guidelines established by the Society of Vertebrate Paleontology (SVP) (1995). The proposed mitigation plan may include a field survey, construction monitoring, sampling and data recovery procedures, museum storage coordination.

Mitigation Measure Culture-3

In the event of an accidental discovery or disturbance of the human remains during ground-disturbing activities, there will be no further excavation or disturbance of the site within a 50-foot radius of the location of such discovery, or any nearby area reasonably suspected to overlie adjacent remains. The Merced County Coroner shall be notified and will make a determination as to whether the remains are Native American. If the Coroner determines that the remains are not subject to his authority, he shall notify the Native American Heritage Commission, which will attempt to identify descendants of the deceased Native American. If no satisfactory agreement can be reached as to the disposition of the remains pursuant to State law, then the human remains and items associated with Native American burials on the property shall be re-interred in a location not subject to further subsurface disturbance.

Hydrology

Mitigation Measure: Hydrology-1

The City's Wastewater Treatment Plant currently provides a tertiary level treatment of about 8,155 acre-feet per year (City of Merced 2015). The City shall use recycled (tertiary treated and disinfected) water from its WWTP to recharge the groundwater and offset the deficit. Under full buildout as water use increases the volume of tertiary treated and disinfected wastewater would also increase and provide additional groundwater recharge. The impact will be **less than significant**.

Noise

Mitigation Measure: Noise-1

All work shall be performed between the hours of 7:00 a.m. and 7:00 p.m. Monday through Friday. Exception to the designated work hours would be made for drilling wells. Each well would require approximately 6 to 10 days of continuous work (up to 24 hours per day) in order to protect the integrity of the well structure. Temporary sound curtains, walls, and appropriate muffler devices would be used to mitigate the noise impacts of the drilling operation on the immediately surrounding residences. In addition, the use of impact wrenches would only be allowed between hours of 7:00 a.m. and 7:00 p.m.

Mitigation Measure: Noise-2

Use of construction equipment that cause localized vibrations in excess of 0.2 inches/second peak particle velocity such as a vibrator compactor/roller on the project site is excluded from operating on the project site.

Mitigated Negative Declaration and Decision to Prepare and Environmental Impact Report

Certification by Those Responsible for Preparation of This Document

The City of Merced has been responsible for the preparation of this initial study. I believe this document meets the requirements of the California Environmental Quality Act and provides an accurate description of the project, and that the lead agency has the means and commitment to implement the mitigation measures that will assure the following infrastructure improvements of the project do not have any significant adverse impacts on the environment

- Construction of six new 2,500-gpm wells
- Construction of three 3-MG storage tanks
- Construction of three booster pump stations (5 MGD)
- Construction of approximately 41 miles of new pipeline

Furthermore, I have reviewed and considered all comments received during the public comment period for the document. I find that, after preparation of this initial study, the surface water treatment plant component of the proposed project may have a significant effect on the environment, and an Environmental Impact Report is required.

Name, Title
City of Merced

Date

(*To be signed upon completion of the public review process and preparation of a final project approval package including responses to comments, if any, on the environmental document and any necessary modifications to the mitigation measures.)

I hereby approve this project:

Name, Title
City of Merced

Date

Initial Study

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Acronyms and Other Abbreviations

AFY	acre-feet per year
BAAQMD	Bay Area Air Quality Management District
BMP	best management practice
CAAQS	California ambient air quality standards
CalEEMod	California Emissions Estimator Model
CCIC	Central California Information Center
CCR	California Code of Regulations
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
City	City of Merced
CNDDDB	California Natural Diversity Database
CNEL	community noise equivalent level
CNPS	California Native Plant Society
CO	carbon monoxide
Corps	U.S. Army Corps of Engineers
dB	decibels
EIR	environmental impact report
EPA	U.S. Environmental Protection Agency
FMMP	Farmland Mapping and Monitoring Program
General Plan	Merced Vision 2030 General Plan
GHG	greenhouse gas
gpcd	gallons per capita per day
gpm	gallons per minute
IS	initial study
KDS	Kenneth D. Schmidt and Associates
L _{dn}	day-night average level
L _{eq}	average day sound level
LUFT	leaking underground fuel tanks
MCL	maximum contaminant level
MG	million gallons
MGD	million gallons per day
MEP	maximum extent practicable
Merced CAP	Merced Climate Action Plan
Merced EIR	Merced Vision 2030 General Plan Program Environmental Impact Report
NAAQS	national ambient air quality standards
ND	negative declaration
NO _x	nitrogen oxides
OEHHA	Office of Environmental Health Hazard Assessment
PM _{2.5}	fine particulate matter less than 2.5 micrometers in diameter
PM ₁₀	respirable particulate matter less than 10 micrometers in diameter

PRC	Public Resources Code
ROG	reactive organic gas
RWQCB	Regional Water Quality Control Board
SMAQMD	Sacramento Metropolitan Air Quality Management District
SCH	State Clearinghouse
SJVAB	San Joaquin Valley Air Basin
SJVAPCD	San Joaquin Valley Air Pollution Control District
SLIC	spills, leaks, investigation, and cleanup sites
SMAQMD	Sacramento Metropolitan Air Quality Management District
SOI	sphere of influence
SOV	Society of Vertebrate Paleontology
SR	State Route
SUDP	specific urban development plan
SWMP	storm water management plan
SWPPP	storm water pollution prevention plan
SWRCB	State Water Resources Control Board
TAC	toxic air contaminant
UC	University of California
USFWS	U.S. Fish and Wildlife Service
UWMP	urban water management plan
VELB	Valley elderberry longhorn beetle
WMP	Merced Water Management Plan

Section 1

Introduction

1.1 General

The City of Merced (City), as Lead Agency, has prepared this initial study pursuant to the California Environmental Quality Act (CEQA) as amended and the CEQA Guidelines, to evaluate the potential environmental effects of the proposed City of Merced 2016 Water Master Plan Update. The CEQA Statute is codified as Public Resources Code §21000-21189, and the CEQA Guidelines are contained within California Code of Regulations (CCR), Title 14, Division 6, Chapter 3, §§15000 through 15387.

An initial study is a preliminary analysis prepared by a Lead Agency to determine whether an Environmental Impact Report (EIR) or a Negative Declaration (ND) must be prepared or to identify the significant environmental effects to be analyzed in an EIR. The Lead Agency will determine if a project may have a significant effect on the environment (14 CCR §15063[a]) and, thus, to determine the appropriate environmental document. In accordance with CEQA Guidelines §15070, a “public agency shall prepare...a proposed negative declaration or mitigated negative declaration...when: (a) the Initial Study shows that there is no substantial evidence...that the project may have a significant impact upon the environment....”

1.2 Project Title, Lead Agency, and Contact Person

- Project Title: City of Merced 2016 Water Master Plan Update.
- Lead Agency: City of Merced 678 West 18th Street Merced, CA 95340
- Contact Person: Ken Elwin, PE Director of Public Works ElwinK@cityofmerced.org

1.3 Purpose and Authority

The City proposes to implement the 2016 Water Master Plan Update to address the infrastructure requirements and water supply needs to meet growth as described in the recent update to the Merced Vision 2030 General Plan (General Plan) dated January 3, 2012 (City of Merced 2012a).

This initial study has been prepared under the direction of the City under §§15000, 15040, and 15041 of the *Guidelines for the Implementation of the California Environmental Quality Act* (CEQA Guidelines) §15000, §15040 and §15041 to inform the city council and other government decision makers and the public about the potentially significant environmental effects of a proposed project and to require mitigation measures in order to substantially lessen or avoid significant effects.

This initial study and a Notice of Intent to Adopt a Mitigated Negative Declaration will be circulated for agency and public review for 30 days, pursuant to CEQA Guidelines, §15073(a). This initial study conforms to these requirements and to the content requirements of §15071.

1.4 Organization of Initial Study

- **Section 1 - Introduction:** This section identifies the Lead Agency and contact person and provides information on the purpose and authority under CEQA.

- **Section 2 - Project Description:** This section describes the proposed project, location, environmental setting, and Best Management Practices.
- **Section 3 - Environmental Checklist:** This section summarizes the environmental factors that may be potentially affected by the project, presents the determination of the Lead Agency, and evaluates the environmental impacts of the proposed project.
- **Section 4 - Mitigation Measures and Environmental Permits:** This section recapitulates the mandatory actions that will avoid, minimize, rectify, reduce, or compensate the impacts of the project to a less-than-significant level.
- **Section 5 - Persons and Sources Consulted:** This section lists the names of individuals consulted and documents evaluated for the analysis.
- **Section 6 - List of Preparers:** This section lists the individuals who assisted in preparing this IS.

Section 2

Project Description

2.1 Proposed Project

The City proposes to implement the 2016 Water Master Plan Update (Water Master Plan) to address the infrastructure requirements and water supply needs to meet growth as described in the 2012 update to the General Plan.

2.2 Location

The city is located in Merced County in the central San Joaquin Valley (Figure 2-1). It is 110 miles southeast of San Francisco and 310 miles northwest of Los Angeles and is located along the State Route 99 corridor between the cities of Atwater and Chowchilla.

2.3 Project Description

The Water Master Plan was prepared to document existing and planned water system infrastructure improvements for the City through 2030 and would update the existing infrastructure (Figure 2-2). The following water system infrastructure improvements described in the Water Master Plan include:

- Construct up to six new 2,500-gpm wells
- Construct three 3.0-million gallon (MG) storage tanks
- Construct three booster pump stations (5.0 million gallons per day [MGD]).
- Construct approximately 41 miles of new pipeline.

At full buildout under the General Plan, the City proposes to supply up to 44,600 acre-feet of water by 2030. The projected water service area, also known as the Specific Urban Development Plan (SUDP) boundary, is the 2030 growth boundary of the city. The boundary of the SUDP was expanded in the Merced Vision 2030 General Plan and incorporates UC Merced and UC Village. The boundary of the SUDP is coterminous with the boundary of the City's sphere of influence (SOI) (Figure 2-1). By 2030, the SUDP/SOI is projected to be 28,730 acres (45 square miles). The Water Master Plan water service area occupies the same area as the SUDP/SOI. The Water Master Plan identifies a possible surface water treatment facility as a potential project. However, the location, footprint, and timing for this facility is not known and is not evaluated in this initial study.

Breakdown of proposed improvements are presented in Table 2-1. Although the exact locations are not known, Figure 2-3 illustrates potential locations within the city. Policies and implementing actions found in the General Plan (Appendix A) are hereby incorporated into the project description to avoid or substantially lessen adverse environmental impacts.

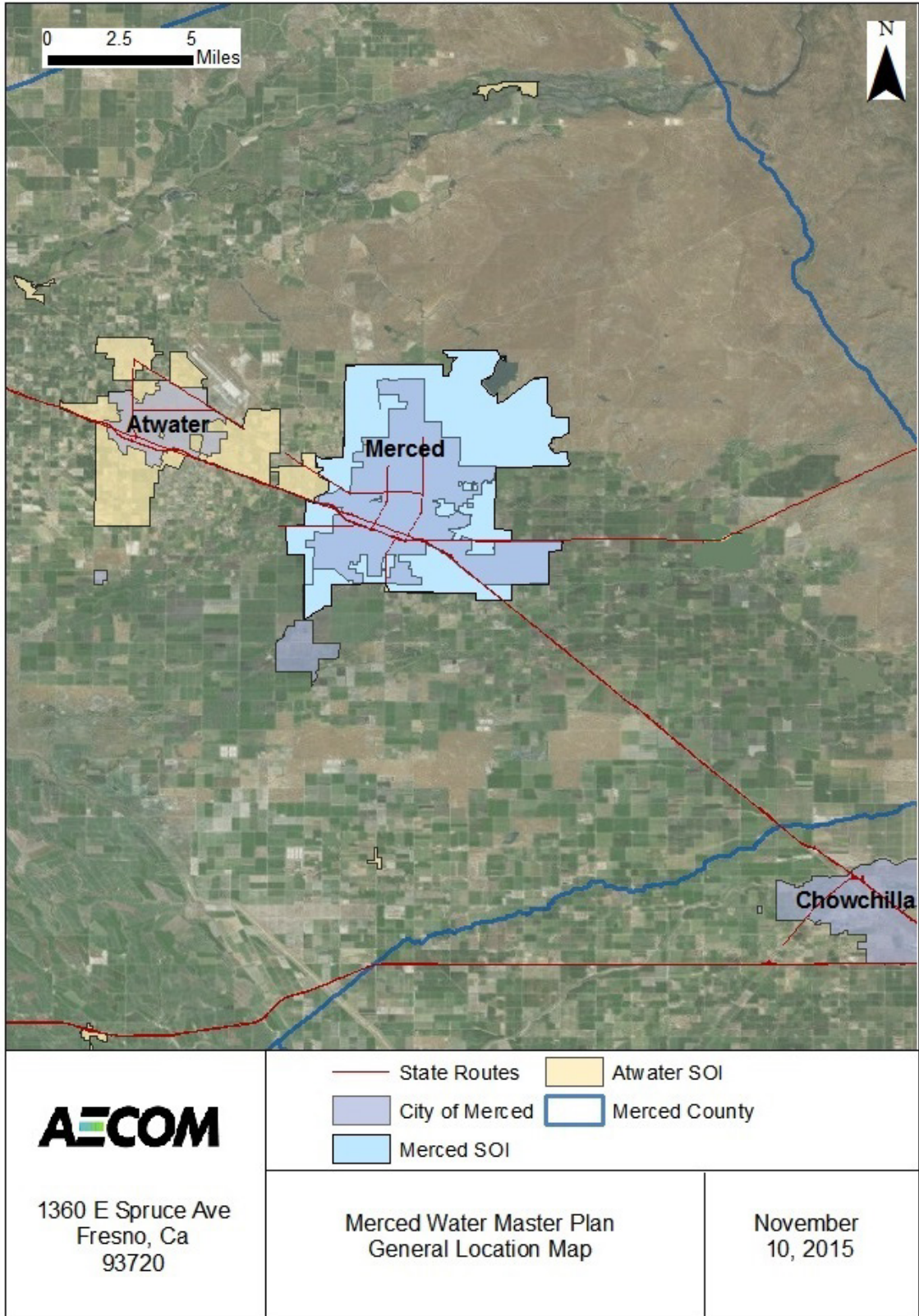


Figure 2-1 General Location Map

Table 2-1 Proposed Water System Improvements

Improvements	Description	Possible Location	Estimated Quantity
Existing System Improvements			
Water Pipelines			
	6" diameter distribution pipeline		400 LF
	8" diameter distribution pipeline		1,700 LF
	16" diameter distribution pipeline		2,800 LF
2030 Improvements			
Groundwater Wells			
Future Well	2,500-gpm new well	Intersection of Thornton Road and Dickenson Ferry Road	1
Future Well	2,500-gpm new well	Intersection of Hwy 59 and Bellevue Road	1
Future Well	2,500-gpm new well	Intersection of Mission Avenue and Kibby Road	1
Future Well	2,500-gpm new well	Intersection of Nevada Street and R Street	1
Future Well	2,500-gpm new well	Intersection of Hwy 59 and Cardella Road	1
Future Well	2,500-gpm new well	Intersection of Cardella Road and Kibby/Miles Road	1
Water Storage Tanks and Booster Pump Stations			
BT-1	3.0-MG tank and 5.0-MG booster pump	Intersection of Lake Road and Farmland Avenue	
BT-2	3.0-MG tank and 5.0-MG booster pump	Intersection of Hwy 140 and Tower Road	
BT-3	3.0-MG tank and 5.0-MG booster pump	Intersection of Lake Road and Yosemite Avenue	
Pressure Sustaining Valves			
PSV-1	Pressure-sustaining valve	Lake Road between Cardella Road and Bellevue Road	
PSV-2	Pressure-sustaining valve	Gardner Road between Cardella Road and Bellevue Road	
PSV-3	Pressure-sustaining valve	Intersection of Bellevue Avenue and G Street	
PSV-4	Pressure-sustaining valve	Nevada Street between G Street and Golf Road	
Water Pipelines			
	12" diameter transmission main		1,800 LF
	16" diameter transmission main		187,000 LF
	18" diameter transmission main		18,500 LF
Surface Water Treatment Plant			
	10-MGD Water Treatment Plant ¹	Potentially Near Lake Yosemite	1

¹ The Water Master Plan identifies a possible surface water treatment facility as a potential project. However, the location, footprint, and timing for this facility is not known and is not evaluated in this initial study.

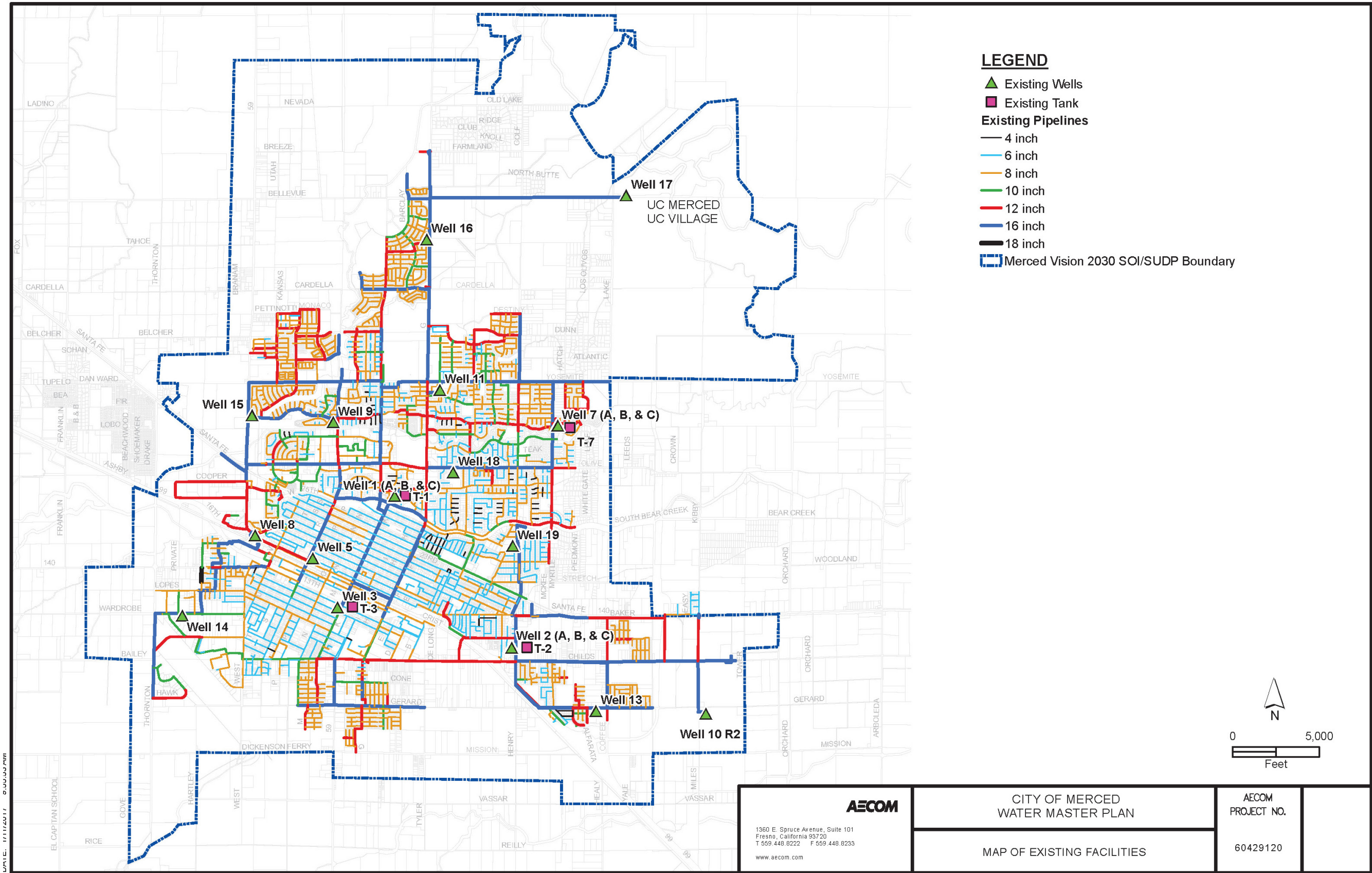


Figure 2-2 Existing Water System Facilities

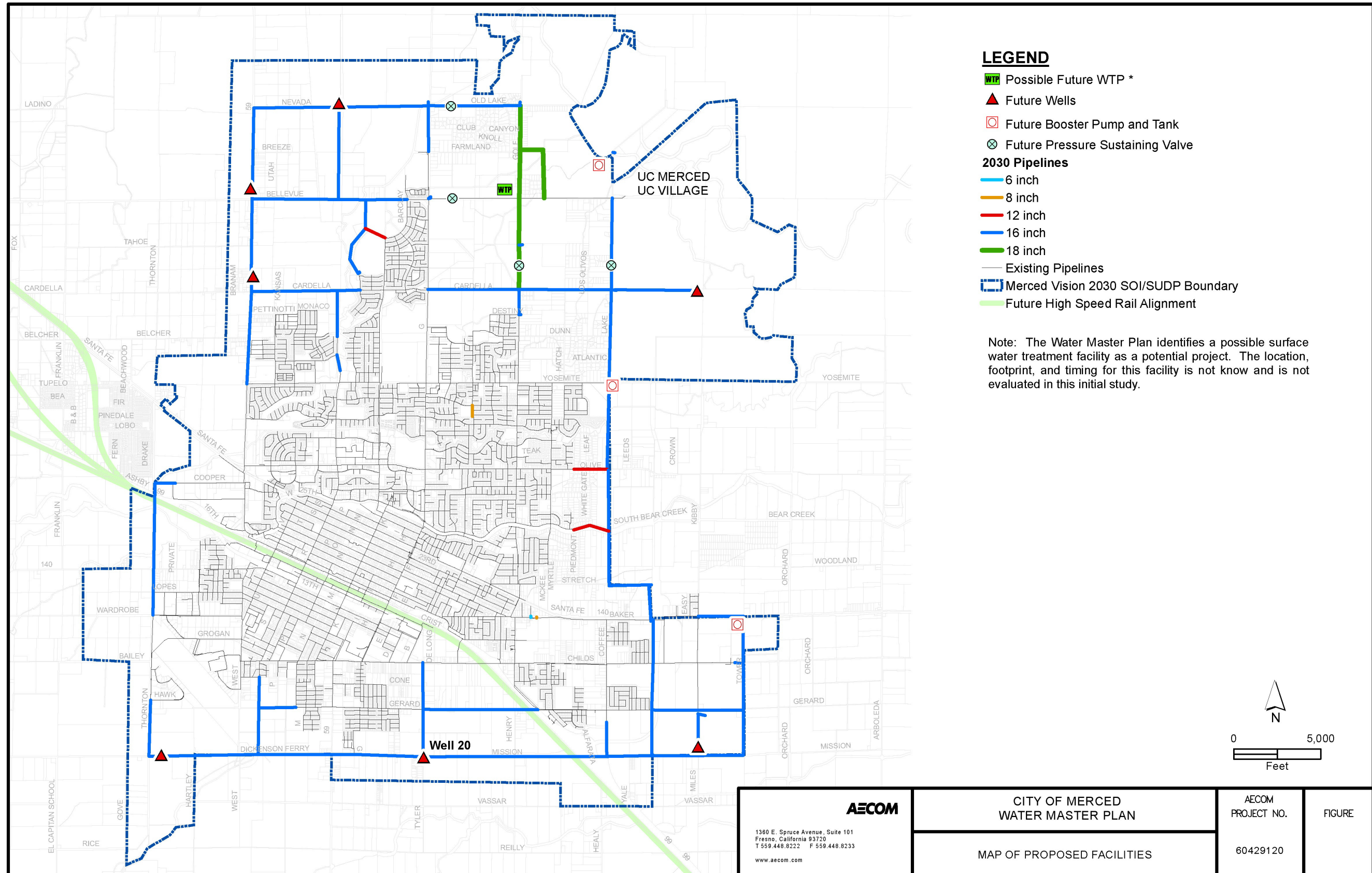


Figure 2-3 Map of Proposed Facilities

Policies and implementing actions of the General Plan are incorporated into this project description. The particular features of the improvements cannot be fully described pending complete design or location. However, the following broadly describes the various components presented in Table 2-1.

2.3.1 Groundwater Well

Each well site could include fuel tank, concrete bins, metal storage building, 8-foot exterior block wall with architectural features to match the surrounding area, gates, security monitors, 20-foot lighting fixtures, 50-foot antenna, transformer and pad, landscaping, drain box, and paved access and parking. Buildings would contain electrical, SCADA, auxiliary generator equipment, restrooms, chemical feed equipment and discharge piping with metering and waste piping. Heating and cooling would be provided for each building. Chemicals, such as chlorine, fluoride, sodium hypochlorite and sodium fluoride, would be stored on site. Each well site would be 2 to 3 acres in size and designed to yield 2,500 gallons per minute. Each well will be connected to the City's existing water supply pipeline. Figure 2-4 is a schematic diagram portraying a typical well site and appurtenant features.

2.3.2 Water Storage Tank and Booster Pump Station

Each water storage tank and booster pump station would be located together on the same site and enclosed by an 8-foot tall CMU block wall with architectural features to match the surrounding area. The water storage tank would be a 30-foot tall concrete tank with a capacity of 3 million gallons. Should the tank exceed zoning height limits, it would be partially recessed into the ground to adhere to these requirements. A paved 20-foot-wide access road would border the circumference of the tank. The pump station would have vertical turbine suction barrel pumps located inside a building that would have paved access and parking. The building would be a CMU block wall or pre-engineered metal building with architectural features to match the surrounding area. Water from the pump station would discharge into an aboveground header pipe located in the building. From the header pipe, the piping would go below-grade and connect to the distribution main in the adjacent road. Additional site features would include a drain line with a valve and blind flange, an overflow line to the storm drain, gravel placed throughout the unpaved portions of the site, gates, security monitors, and 20-foot lighting fixtures.

Figure 2-5 is a schematic diagram portraying a typical water storage tank, booster pump station, and appurtenant features.

2.3.3 Pressure Sustaining Valve

The pressure sustaining valve stations would be contained within a small chain-link fence enclosure approximately 10'x15' in size with vinyl slats. The stations would typically be adjacent to City streets on the back of sidewalks. The stations would consist of 12- to 16-inch piping, a control valve, and some isolation valves, and will be similar to the City's standard backflow prevention devices.

2.3.4 Pipelines

The Water Master Plan estimates that approximately 41 miles of additional 12- to 18-inch-diameter PVC and ductile iron pipelines would be needed to expand the City's water distribution network and serve future growth areas. The pipelines would be located within City streets rights-of-way; partial road closures may be required during construction of the pipelines.

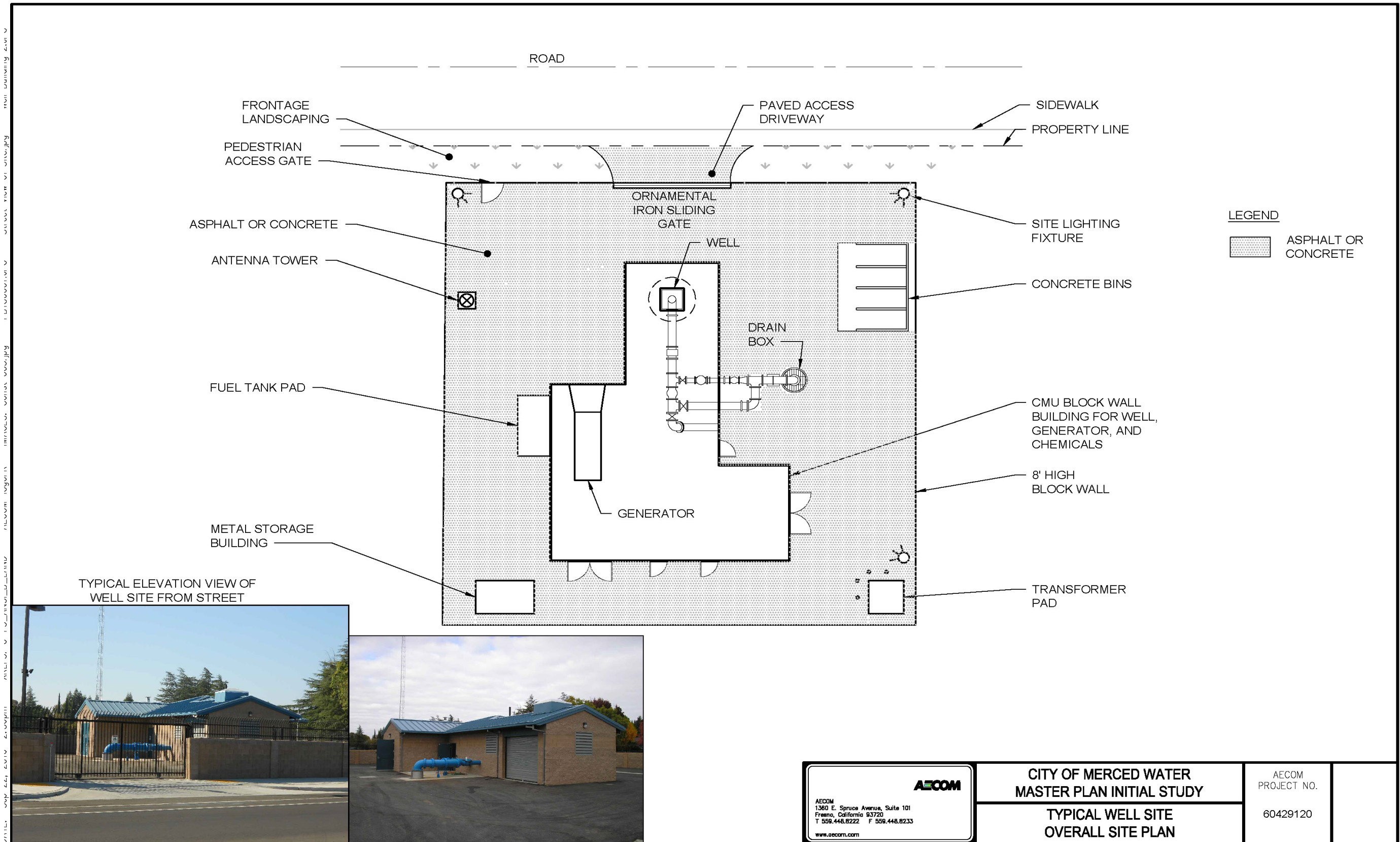


Figure 2-4 Typical Well Site Overall Site Plan

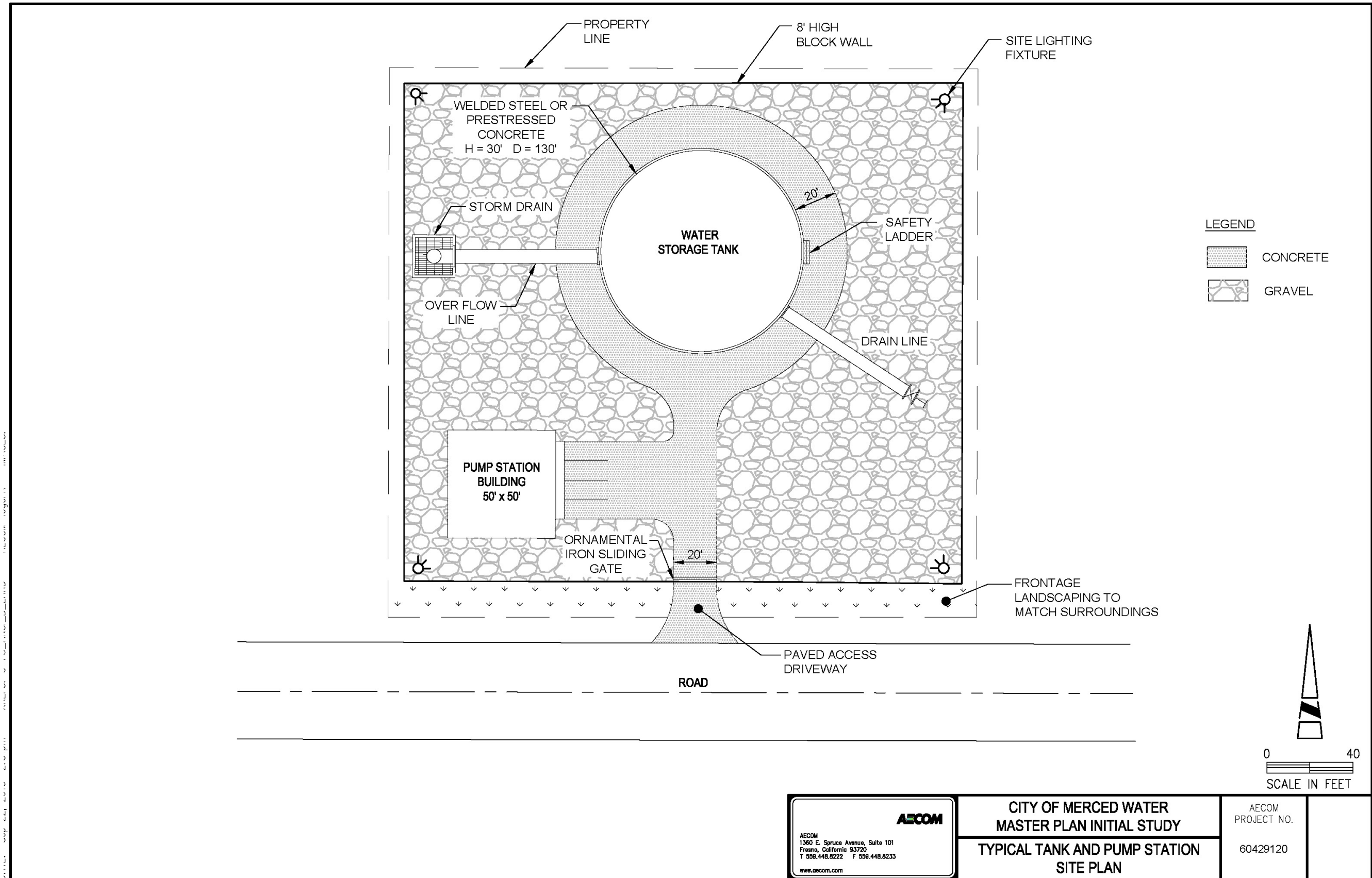


Figure 2-5 Typical Tank and Pump Station Site Plan

AECOM
 AECOM
 1360 E. Spruce Avenue, Suite 101
 Fresno, California 93720
 T 559.448.8222 F 559.448.8233
 www.aecom.com

**CITY OF MERCED WATER
 MASTER PLAN INITIAL STUDY**
**TYPICAL TANK AND PUMP STATION
 SITE PLAN**

AECOM
 PROJECT NO.
 60429120

2.3.5 Construction

Initial construction activities would include trenching, grading, boring, and pipe jacking; placing and jointing pipe, valves, fittings, hydrants, service connections; placing imported pipe bedding and native backfill material; and replacing asphalt pavement and would be completed in steps. The following steps represent a general order for construction.

- Site permitting and preparation
- Drilling, trenching if required
- Installation of project features
- Connection to city infrastructure
- Site restoration



Potential street view of well site



Typical pump and valve

Table 2-2 is a list of typical construction equipment that could be used during construction.

Table 2-2 List of Possible Construction Equipment for Various Water Master Plan Improvements

Water Master Plan Improvements	Typical Equipment
2,500-gpm Well	Bore/Drill Rigs Cranes Excavators Off-Highway Trucks Pavers
Water Pipeline (3 miles)	Tractors/Loaders/Backhoes Compactor/Rollers Off-Highway Trucks Signal Boards Skid Steer Loaders Surfacing Equipment Trenchers
Water Storage Tank/Booster Pump Station	Tractors/Loaders/Backhoes Rollers Cranes Excavators Graders Off-Highway Trucks Signal Boards
Pressure Sustaining Valve	Tractors/Loaders/Backhoes

2.4 Best Management Practices

The following Best Management Practices (BMPs) are drawn from state and local ordinances, and other statutory authorities, or guidelines. They are hereby incorporated into the proposed project description and shall be implemented during project construction and operation as required.

2.4.1 Hazardous Materials

BMP HAZ-1. Construction Site Hazardous Materials and Waste Water Management

- An inventory of all hazardous materials used (and/or expected to be used) at the worksite and the end products that are produced (and/or expected to be produced) after their use shall be maintained by the worksite manager.
- As appropriate, containers shall be properly labeled with a “Hazardous Waste” label and hazardous waste will be properly recycled or disposed of off-site.
- Contact of chemicals with precipitation shall be minimized by storing chemicals in watertight containers with appropriate secondary containment to prevent any spillage or leakage.
- Quantities of toxic materials, such as equipment fuels and lubricants, shall be stored with secondary containment that is capable of containing 110 percent of the primary container(s).
- Petroleum products, chemicals, cement, fuels, lubricants, and non-storm drainage water or water contaminated with the aforementioned materials shall not contact soil and shall not be allowed to enter surface waters or a storm drainage system.

- All toxic materials, including waste disposal containers, shall be covered when they are not in use, and located as far away as possible from a direct connection to the storm drainage system or surface water.
- Sanitation facilities (e.g., portable toilets) shall be placed at least 100 feet away from the bank of a river, water channel, or pond.
- Sanitation facilities shall be regularly cleaned and/or replaced, and inspected daily for leaks and spills.

2.4.2 Hydrology

BMP HYDRO-1. Comply with all Phase II Non-Point Discharge Elimination System (NPDES) Permit requirements for construction that would disturb more than 1 acre. Submit a Notice of Intent (NOI) with the State Water Resource Control Board's (SWRCB) Division of Water Quality.

BMP HYDRO-2. Stormwater pollution prevention BMPs designed to prevent construction-related discharges into surface waters shall be implemented. These BMPs must consider erosion, sedimentation, and pollutant controls during construction and post-construction. These BMPs shall include, but not be limited to, the following:

- Requiring standard erosion control and slope stabilization measures in any area where erosion could lead to sedimentation of a waterbody.
- Performing major vehicle maintenance, repair jobs, and equipment washing at appropriate off-site locations.
- Regularly maintaining equipment to prevent fluid leaks. Any leaks shall be captured in containers until the equipment is moved to a repair location. A spill prevention and response plan shall be prepared prior to construction and shall be implemented immediately for cleanup of fluid or hazardous materials spills.
- Designating one area of the construction-site, well away from streams or storm drain inlets, for auto and equipment parking and routine vehicle and equipment maintenance.
- Cleaning-up spilled dry materials immediately. Spills are not to be "washed away" with water or buried.
- Using the minimum amount of water necessary for dust control.
- Cleaning-up liquid spills on paved or impermeable surfaces using "dry" cleanup methods (e.g. absorbent materials such as cat litter, and/or rags).
- Cleaning-up spills on dirt areas by removing and properly disposing of the contaminated soil.
- Storing stockpiled materials, wastes, containers and dumpsters under a temporary roof or secured plastic sheeting where they cannot enter into or be washed by rainfall or runoff into Waters of the U.S./State or aquatic habitat.
- Properly storing containers of paints, chemicals, solvents, and other hazardous materials in garages or sheds with double containment during rainy periods.

- Applying concrete, asphalt, and seal coat during dry weather. Keeping contaminants from fresh concrete and asphalt out of the storm drains and creeks by scheduling paving jobs during periods of dry weather and allowing new pavement to cure before storm water flows across it.
- Covering catch basins and manholes when applying seal coat, slurry seal and fog seal.
- Operating no equipment in a live stream channel, unless unavoidable.
- Post-construction, all runoff from new improvements shall be retained on-site. Engineered grading and drainage plans shall be prepared to show how additional stormwater will be managed.

2.4.3 Noise

BMP Noise-1. All construction equipment and vehicles used on-site will be maintained and equipped with mufflers and or sound dampening apparatuses.

2.5 Background

The city is located in central San Joaquin Valley and is the largest incorporated community in Merced County. Growth is being driven primarily by the establishment of the 10th campus of the University of California system in Merced (UC Merced) in the fall of 2005 and the revitalization of downtown as an emerging entertainment center of the area. Another important factor of the city's growth is the proposed high-speed rail system. Upon completion, the new rail system will link the city to major metropolitan areas in both the northern and southern portions of the state. This growth will place increasing demand on the city's water system infrastructure.

In 2012, the City updated the Merced Vision 2015 General Plan and approved a new plan, Merced Vision 2030 General Plan. The General Plan anticipated the continuing expansion of UC Merced, the development of a new rail system, and contains policies and strategies for maximizing benefits of growth to the city. The Merced Vision 2030 General Plan Program Environmental Impact Report (Merced EIR) (State Clearinghouse [SCH] No. 2008071069) (City of Merced 2012b) analyzed the impacts of general plan implementation at a programmatic level. Pursuant to the CEQA Guidelines §15150, both the Merced Vision 2030 General Plan and the Merced EIR, in their entirety, are hereby incorporated by reference. Copies of the Merced Vision 2030 General Plan and the EIR are available for public review at the Merced Civic Center at 678 West 18th Street between the hours of 10:00 am and 12:00 pm and between 1:00 pm and 5:00 pm. A summary of the Merced Vision 2030 General Plan goals and policies is provided in Appendix A; a summary of impacts described in the EIR is provided in Appendix B. The existing service area population, including UC Merced, is projected to grow by approximately 94 percent from 87,575 in 2012 to 169,585 by 2030, representing an annual growth rate of approximately 3.7 percent. Of this amount, the UC Merced campus is projected to contribute 32,185 people comprising students, faculty, and staff.

Water demand of the city is anticipated to increase by approximately 72 percent from 2012 to 2030, an increase of approximately 18,697 AFY. The existing and projected water demand by type is presented in Table 2-2.

Table 2-2 Existing and Projected Water Demand, City of Merced

Demand Type	Existing	Proposed
Annual AFY	25,899	44,596
Average Day, gpm	16,057	27,649
Average Day, MGD	23.4	40.3
Maximum Day, MGD ^(a)	44.5	76.6
Peak Hour, gpm ^(b)	44,960	77,417

^(a) Maximum Day Demand is defined as 1.9 times the Average Day Demand.

^(b) Peak Hour Demand is defined as 2.8 times the Average Day Demand.

Section 3

Environmental Checklist

3.1 Aesthetics

This section describes the existing environmental and regulatory setting of the proposed project and analyzes the potential impacts on aesthetics and visual resources that would result from implementing the proposed project.

3.1.1 Environmental Setting

The city is located in the Central Valley of California and is the largest community in Merced County. The city is located approximately 110 miles southeast of San Francisco and 310 miles northwest of Los Angeles. According to the State Department of Finance, the city has a population of about 80,542 and serves as the county seat. Merced is located on Highway 99 (the dominant north-south freeway in California) and is served also by Highways 140 and 59. It is known as the Gateway to Yosemite via State Route 140.

There are 11 Designated Scenic Corridors within the city (General Plan). They are:

- North and South Bear Creek Drive within the city limits.
- N Street from 16th Street to the Merced County Courthouse.
- 21st Street from the Merced County Courthouse to Glen Avenue.
- M Street from Black Rascal Creek to Bellevue Road.
- West 28th Street from Mercy Hospital to G Street.
- Lake Road from Yosemite Avenue to Lake Yosemite.
- R Street (extended) from Black Rascal Creek to Bellevue Road.
- Olive Avenue East of McKee Road.
- M Street from 18th Street to Bear Creek.
- Campus Parkway.
- Bellevue Road from Lake Road to “G” Street (Merced EIR).

There are no state-designated scenic byways or highways within the city limits (Merced EIR).

3.1.2 Regulatory Setting

The regulatory setting pertaining to aesthetic resources can be found in Section 3.1 “Aesthetics” of the Merced EIR.

3.1.3 Impact Assessment Checklist

Would the Project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Have a substantial adverse effect on a scenic vista?				X
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?				X
c) Substantially degrade the existing visual character or quality of the site and its surroundings?			X	
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?		X		

Response a): Scenic vistas may be defined as expansive views of highly valued landscapes from publicly accessible viewpoints. Scenic vistas include views of natural features such as topography, water courses, rock outcrops, and natural vegetation as well as manmade scenic structures. According to the General Plan, land use in the SUDP/SOI will eventually change from open agricultural fields and pasture land to urban development (Merced EIR). However, construction impacts from the implementation of the proposed project would be temporary and would not have a substantial effect on scenic vistas. There is no impact.

Response b): As stated above, there are no state-designated scenic byways or highways within the city limits. There will be no impact to scenic resources including, but not limited to trees, rock outcroppings, and historic buildings within a state scenic highway view shed

Response c): The proposed project includes the construction of six new municipal wells, about 40 miles of new pipelines, water storage tanks, booster pump stations, and a water treatment plant within in the SUDP/SOI area. Locations have not been identified but are contemplated to be sited on vacant lots within the city limits. Implementation of the General Plan will ultimately alter the existing visual character by transforming views to urban, residential, commercial, and industrial vistas. The following policies and implementing actions contained in the General Plan will minimize visual impacts.

- OS-1.2 Preserve and enhance creeks in their natural state throughout the planning area.
- OS-1.3 Promote the protection and enhancement of designated scenic routes.
- OS-1.4 Improve and expand the City's urban forest.
- OS-2.1 Protect agricultural areas outside the City's SUDP/SOI from urban impacts.
- OS-2.2 Relieve pressures on converting areas containing large concentrations of "prime" agricultural soils to urban uses by providing adequate urban development land within the Merced City SUDP/SOI.
- UE-1.1 Designate areas for new urban development that recognize the physical characteristics and environmental constraints of the planning area.

General Plan goals and policies (summarized in Appendix A) will minimize visual impacts that will result from General Plan implementation, particularly within already developed areas and areas planned for future development within the city. However, the presence of new facilities such as water storage tank(s), radio towers, and fences degrade the existing visual character or quality of the project site and its surroundings. The visual character will change over time, the potential impact is **significant**.

Mitigation Measure Aesthetics-1

The exterior surface of structures visible to the public shall be painted with a non-reflective earth tone color that provides maximum visual blending with the surroundings of the site. Noninvasive, xeric type or water efficient vegetation shall be provided as landscaping with the intent of reducing the visual impact of the structures as seen from public and private view. Utilities shall be underground unless undergrounding will be so expensive as to be impracticable.

The footprint of facilities and structures shall be maintained in good condition, free of trash, graffiti, weeds, etc.

Effectiveness of Mitigation Measure: Implementing Mitigation Measure Aesthetics-1 will ensure that impacts to the visual character of a project site will be **less than significant** because unsightly mechanical and utility structures will be screened, or painted to blend with the surroundings of the site.

Response d): Construction of various project components would take place during daylight hours. During construction, water supply infrastructure improvement wells, storage tanks, and booster pump stations could potentially create new sources of light and glare which would adversely affect day or nighttime views in the area. The potential impact is **significant**.

Mitigation Measure Aesthetics-2

The following guidelines shall be followed in selecting and designing any outdoor lighting:

1. All outdoor lights including parking lot lights, landscaping, security, path and deck lights should be fully shielded, full cutoff luminaries.
2. Complete avoidance of all outdoor uplighting for any purpose.
3. Avoidance of tree mounted lights unless they are fully shielded and pointing down towards the ground or shining into dense foliage. Ensure compliance over time.
4. Complete avoidance of uplighting and unshielded lighting in water features such as fountains or ponds.

Effectiveness of Mitigation Measure: Implementing Mitigation Measure Aesthetics-2 will ensure that impacts from new sources of substantial light or glare, or outdoor lighting will be **less than significant** because light fixtures will be fully shielded with full cutoff luminaries and uplighting will be avoided.

3.2 Agricultural and Forestry

This section describes the existing environmental and regulatory setting of the proposed project and analyzes the potential impacts on agricultural and forestry resources that would result from implementing the proposed project.

3.2.1 Environmental Setting

Important Farmland: The Farmland Mapping and Monitoring Program (FMMP) is a farmland classification system that is administered by the California Department of Conservation. The system classifies agricultural land according to its soil quality and irrigation status. The best quality agricultural land is called “Prime Farmland.” Prime Farmland is land that has the best combination of physical and chemical characteristics for the production of crops. It has the soil quality, growing season, and moisture supply needed to produce sustained high yields of crops when treated and managed according to current farming methods. The land must have been used for the production of irrigated crops at least sometime during the two cycles prior to the mapping date to retain designated status.

Important Farmland is land characterized by one or more of the following characteristics: (1) presence of prime agricultural soils, (2) presence of soils of statewide agricultural importance, and (3) active agricultural lands. Figure 3.2-1 in the Merced EIR shows the Prime Farmlands, Unique, and Farmland of Statewide Importance located in and around the SUDP/SOI plan area. At full buildout under the General Plan, 8,750 acres of undeveloped land will be converted to developed urban land within the proposed SUDP/SOI. About 1,898 acres of this undeveloped land is Prime Farmland.

Williamson Act: Since 2005, Merced County has participated in the California Land Conservation Act of 1965 (commonly referred to as the Williamson Act). The purpose of the Williamson Act is to preserve agricultural and open space lands by discouraging premature and unnecessary conversion to urban uses. The Williamson Act--enables local governments to enter into contracts with private landowners for the purpose of restricting specific parcels of land to agricultural or related open space use. In return, landowners receive property tax assessments which are much lower than normal because they are based upon farming and open space uses as opposed to full market value. Within the SUDP/SOI, there are approximately 8,758 acres of land currently designated for agricultural use by the County of Merced, of which approximately 71 acres are subject to Williamson Act Contracts.

3.2.2 Regulatory Setting

The federal, state, and local regulatory setting pertaining to agriculture and forest resources can be found in Section 3.2 “Agriculture and Forest Resources” of the Merced EIR.

3.2.3 Impact Assessment Checklist

Would the Project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to nonagricultural use?				X
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?				X
c) Conflict with existing zoning for, or cause rezoning of forest land (as defined in public Resources Code section 12220(g)), or timberland zoned Timberland Production (as defined by Government Code section 511104(g))?				X
d) Result in the loss of forest land or conversion of forest land to non-forest use?				X
e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to nonagricultural use?				X

Response a): The General Plan includes Policies and Implementing Actions to ensure that the existing farmland within and surrounding the SUDP/SOI is not developed before needed by future growth. Policy UE-1.1 (Appendix A) calls for the City to designate areas for new urban development that recognize the physical characteristics and environmental constraints of the planning area. With Implementing Action 1.1.a, the City shall direct development away from significant concentrations of prime agricultural soils and give priority to the conversion of nonprime agricultural land if reasonable alternatives exist. With Implementing Action 1.1.d, the City shall work with Merced County to establish policies to protect prime agricultural areas around the SUDP/SOI. With Implementing Action 1.1.b, the City shall limit development and development related impacts on agricultural lands along the City’s urban fringe. Policy L-3.2 encourages infill development and a compact urban form. With Implementing Action 3.2.a, the City encourages infill of vacant parcels.

The General Plan includes policies and implementing actions to ensure managed production of farmland within and surrounding the SUDP/SOI is protected. Policy OS-2.1 calls for the City to protect agricultural areas outside the City’s SUDP/SOI from urban impacts. With Implementing Action 2.1.a, the City shall continue to explore the use of Farmland Trusts, exclusive agricultural zoning, and the transfer of development rights to protect prime agricultural areas. Policy OS-2.2 call for the City to relieve pressures on converting areas containing large concentrations of “Prime” Agricultural Soils to Urban Uses by providing adequate urban development land within the Merced City SUDP/SOI. This important policy will be carried out through several implementing actions found in the Land Use, Public Services and Facilities, and Urban Expansion Chapters of the General Plan. Implementation of the policies proposed in the General Plan would ensure that increased demand for additional land associated with an increase in population would minimize the conversion of Prime Farmland, Unique Farmland or Farmland of Statewide Importance (Farmland) to Nonagricultural use. Under the General Plan existing agricultural areas will be re-designated for residential, commercial and public land uses. Such redesignation will indirectly result in the conversion of Farmland to urban uses over time. The impact is not peculiar to the project site and is therefore exempt from further

review for agricultural resources impacts, as described in Public Resource Code §21086.3 and CEQA Guidelines §15183. There is no new impact.

Response b): Growth under the General Plan will directly and indirectly conflict with existing agricultural zoning and Williamson Act Contracts within the SUDP/SOI and may result in the indirect conversion of existing agricultural areas for residential, commercial and public uses over time. The proposed SUDP/SOI will affect approximately 8,758 acres of land currently designated for agricultural use by the County of Merced, of which approximately 71 acres are subject to Williamson Act Contracts. Upon implementation of the Plan, designation of lands under Williamson Act Contract for residential, commercial, and public uses will conflict with the contracts. All 71 acres of land under Williamson Act Contract are currently undergoing the nonrenewal process. These lands will no longer be subject to Williamson Act Contracts over the course of the next 10 years.

The General Plan includes goals, policies, and implementing actions to reduce the impact to farmland conversion. However, in the Merced EIR, impacts to the conversion of farmland to nonagricultural use were determined to be significant and unavoidable. The Merced City Council adopted a Statement of Overriding Considerations for these impacts to conversion of farmland to nonagricultural use in association with the *Merced Vision 2030 General Plan Final Program EIR (City Council Resolution #2011-63)*. As described in Public Resources Code (PRC) §21083.3 and CEQA Guidelines §15183, projects that are consistent with the development density established by a general plan for which an EIR was certified shall not require additional environmental review, except as might be necessary to examine whether there are project-specific significant effects that are peculiar to the project site or its site. This impact is not peculiar to the proposed project, and is therefore exempt from further review for impacts on conversion of farmland to nonagricultural use. No new impact would occur.

Response c): No land within the SUDP/SOI is classified as forest land or timberland. Therefore, the project would not conflict with existing or rezoning of forest land or timberland. There is no new impact.

Response d): The proposed project would not result in the loss of forest land or the conversion of forest land to nonforest use. Therefore, there is no impact.

Response e): The proposed project would not result in other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to nonagricultural use. There is no new impact.

3.3 Air Quality

This section describes the existing environmental and regulatory setting of the proposed project and analyzes the potential impacts on air quality that would result from implementing the proposed project. The proposed project is primarily a construction project for water infrastructure and would involve minimal operational emissions following completion of the Water Management Plan components. Long-term operational activities would include occasional inspections and maintenance, which would not be large or intensive sources of air quality emissions. Therefore, this analysis focuses on short-term construction-related emissions as long-term operational air quality emissions would be nominal and limited to occasional inspection and maintenance activities. Long-term operations would also include use of electricity for water management activities; however, these emissions are further evaluated in the Section 3.7, Greenhouse Gases.

3.3.1 Environmental Setting

The proposed project is located in the city of Merced, which is part of the San Joaquin Valley Air Basin (SJVAB). The SJVAB includes all of Fresno, Kings, Madera, Merced, San Joaquin, and Tulare counties, and the valley portion of Kern County.

Ambient concentrations of air pollutant emissions are determined by the amount of emissions released by sources and the atmosphere's ability to transport and dilute such emissions. Natural factors that affect transport and dilution include terrain, wind, atmospheric stability, and sunlight. Air quality is influenced by such natural factors as topography, meteorology, and climate in addition to the amount of emissions released by existing air pollutant sources.

The California Air Resources Board (ARB) and US Environmental Protection Agency (EPA) currently focus on the following air pollutants as indicators of ambient air quality: ozone, carbon monoxide (CO), nitrogen dioxide (NO₂), sulfur dioxide (SO₂), particulate matter (PM), and lead. Because these are the most prevalent air pollutants known to be deleterious to human health and extensive health-effects criteria documents are available, they are commonly referred to as "criteria air pollutants."

EPA has established primary and secondary national ambient air quality standards (NAAQS) for the following criteria air pollutants: ozone, CO, NO₂, SO₂, respirable particulate matter (PM₁₀), fine particulate matter (PM_{2.5}), and lead. The primary standards protect the public health of the most sensitive populations (e.g., children, elderly, and asthmatics) and the secondary standards protect public welfare (e.g., visibility, vegetation damage). In addition to the NAAQS, ARB has established California ambient air quality standards (CAAQS) for sulfates, hydrogen sulfide, vinyl chloride, visibility-reducing PM, and the above-mentioned criteria air pollutants. In most cases, the CAAQS are more stringent than the NAAQS. Differences in the standards generally are explained by the health-effects studies considered during the standard-setting process and the interpretation of the studies. In addition, the CAAQS incorporate an additional margin of safety to protect sensitive receptors, particularly children and infants.

With respect to the NAAQS, the region is designated as nonattainment for ozone and PM_{2.5}, and either attainment or unclassified for the remaining pollutants. For the CAAQS, the region is designated as nonattainment for ozone, PM₁₀, and PM_{2.5}, and attainment or unclassified for the remaining pollutants.

3.3.2 Regulatory Setting

The federal, state, and local regulatory setting pertaining to air quality can be found in Section 3.3 "Air Quality" of the Merced EIR.

3.3.3 Impact Assessment Checklist

Would the Project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Conflict with or obstruct implementation of the applicable air quality plan?			X	
b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?		X		
c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing any emissions which exceed quantitative thresholds for ozone precursors)?			X	
d) Expose sensitive receptors to substantial pollutant concentrations?			X	
e) Create objectionable odors affecting a substantial number of people?				X

Response a): The San Joaquin Valley Air Pollution Control District (SJVAPCD) regulates regional air quality by enforcing rules and regulations, issuing air quality permits, and developing air quality plans. Air quality plans are developed to attain and maintain ambient air quality standards while accounting for planned growth from city and county general plans. The existing emissions profile and projected growth of a region (based on local general plans) are evaluated along with proposed mitigation measures to determine if the region would attain ambient air quality standards. SJVAPCD has developed regional thresholds of significance for construction and operation, which are considered the allowable emissions limit on a project level to help the region attain and maintain ambient air quality standards and comply with the regional air quality plan. At the time of this writing, the most current regional air quality plan is the 2015 Plan for the 1997 PM_{2.5} Standard, 2012 PM_{2.5} Plan (that addressed the EPA’s 2006 24-hour PM_{2.5} standard of 35 µg/m³), and the 2013 Plan for the Revoked 1-Hour Ozone Standard. Projects that would generate emissions below the SJVAPCD regional thresholds of significance would be considered to be consistent with these regional air quality plans and would have less-than-significant impacts for purposes of this CEQA analysis. In addition, projects that are consistent with the development plans and goals in the City of Merced General Plan would be considered not to conflict or obstruct implementation of the applicable air quality plan. Assumptions and calculations associated with implementation of proposed water systems improvements presented in Table 2-1 are found in Appendix C.

As shown in Table 3-1, the proposed project’s maximum annual construction emissions would not exceed any of SJVAPCD’s thresholds of significance. Because the proposed project’s construction-related emissions would not exceed SJVAPCD thresholds of significance, the proposed project’s construction-related emissions would not conflict with or obstruct implementation of the applicable air quality plan. This impact would be **less than significant**.

Response b): Project construction emissions would be short-term and temporary. Fugitive PM dust emissions are among the pollutants of greatest concern with respect to construction activities. Cut-and-fill operations, along with general site grading operations, are the primary sources of fugitive PM dust emissions from construction activities. Movement of vehicles on unpaved roads also can generate fugitive PM dust emissions by kicking up ground PM dust into the atmosphere. Construction fugitive PM dust emissions can vary greatly, depending on the level of activity, the specific operations taking place, the number and types of

equipment operated, vehicle speeds, local soil conditions, weather conditions, and the amount of earth disturbance (e.g., site grading, excavation, and cut-and-fill).

Table 3-1 Summary of Construction Emissions for Merced Water Management Plan by Component

Water Management Plan Component	Pollutant Emissions (tons/year)			
	ROG	NO _x	PM ₁₀ ¹	PM _{2.5} ¹
2,500-gpm Well ²	0.04	0.44	0.02	0.02
Water Pipeline ³	0.08	0.93	0.05	0.05
Water Storage Tank/Booster Pump Station ⁴	0.09	1.06	0.05	0.04
Pressure Sustaining Valve ⁵	0.00	0.02	0.00	0.00
Maximum Annual Construction Emissions ⁶	0.21	2.49	0.12	0.11
SJVAPCD Thresholds of Significance	10	10	15	15
Exceeds Threshold?	No	No	No	No

Notes: ROG = reactive organic gases; NO_x = oxides of nitrogen; PM₁₀ = particulate matter with aerodynamic diameter less than 10 microns; PM_{2.5} = particulate matter with aerodynamic diameter less than 2.5 microns; GPM = gallons per minute; SJVAPCD = San Joaquin Valley Air Pollution Control District.

¹ Because of the preliminary nature of WMP components, the exact area to be disturbed for each WMP component is unknown at this time. However, it is not anticipated that any of the WMP components would require extensive cut/fill operations. Excavation for pipelines would be limited to the linear path along the proposed pipeline and are not anticipated to be extensive. Nevertheless, emissions for PM₁₀ and PM_{2.5} only represent exhaust-related emissions.

² Assumes that one 2,500-gpm well would be completed in a single construction year.

³ Assumes that a maximum of 1.5 miles of pipelines would be constructed in a single construction year.

⁴ Assumes that a maximum of one water storage tank and one booster pump station would be constructed in a single construction year.

⁵ Assumes that a maximum of one pressure sustaining valve would be constructed in a single construction year.

⁶ A worst-case year could include construction of 1.5 miles of pipelines, a 2,500-GPM well, and a water storage tank/booster pump station.

Sources: AECOM 2016; SJVAPCD 2012

Emissions of ozone precursors, reactive organic gases (ROG), and NO_x are primarily generated from mobile sources (i.e., delivery vehicles, construction worker vehicles) and off-road construction equipment. Generation of these emissions vary as a function of vehicle trips per day associated with delivery of construction materials, the importing and exporting of soil, vendor trips, and worker commute trips; and the types and number of heavy-duty, off-road equipment used and the intensity and frequency of their operation.

The proposed project's construction-related emissions were estimated using emission factors from the SJVAPCD-recommended California Emissions Estimator Model (CalEEMod) Version 2013.2.2 and guidance from the SJVAPCD's 2015 *Guide for Assessing and Mitigating Air Quality Impacts* (GAMAQI) (SJVAPCD 2015). CalEEMod provides air quality and greenhouse gas (GHG) emission factors for off-road construction equipment by construction year. For the purposes of this analysis, the earliest construction year 2016 was used to select emission factors. Project-specific construction parameters were conservatively estimated for each of the WMP's components assuming the maximum number of equipment and operating hours needed for each component. CalEEMod currently only includes on-road emission factors from EMFAC2011, which has been outdated at the time of this analysis. Therefore, for on-road vehicles (i.e., haul trucks, construction worker vehicles), the more current EMFAC2014, which is the most current California Air Resource Board's on-road mobile source emissions model, was used to estimate emissions.

Because the exact timing of each of the WMP components has not yet been determined at the time of this analysis, modeling was conducted assuming each component would occur in the earliest possible construction year, which would result in the maximum emissions. It is anticipated that if construction occurred in future years, emission factors would be less due to advancements in emissions technology and turnover in

the vehicle and equipment fleet. For each component, the maximum amount of construction that could occur in a single year was modeled to estimate maximum annual emissions. Table 3-1 presents the maximum annual construction emissions associated with each WMP component and conservatively assumes that all WMP components would be constructed in a single year.

As shown in Table 3-1, even under a worst-case annual construction scenario, construction-related emissions would not exceed the SJVAPCD thresholds of significance. Projects that would not generate construction or operational emissions that exceed SJVAPCD thresholds of significance would not be considered to generate emissions that could violate an air quality standard or contribute substantially to an existing or projected air quality violation. Therefore, the proposed project's construction emissions would be **less than significant**.

As discussed above, the exact acres to be disturbed and cut/fill operations for the WMP components are not yet known. However, it is anticipated that earth disturbance activities would be relatively minimal and fugitive PM dust emissions would not contribute to an exceedance of SJVAPCD thresholds of significance. Nevertheless, because this analysis cannot model exact grading and earthmoving activities, mitigation has been imposed to address particulate matter emissions even though emissions are not anticipated at this time to exceed the relevant significance thresholds. Therefore, the potential impact of PM dust emission is **significant**.

Mitigation Measure Air Quality-1: Implement Applicable SJVAPCD-Required Construction Mitigation Measures

During project construction activities, the contractor shall comply with all SJVAPCD-required rules and regulations to minimize construction-related emissions. SJVAPCD rules and regulations that would apply to the proposed project's construction activities include, but are not limited to, the following:

San Joaquin Valley Air Pollution Control District Regulation VIII

The City of Merced shall require its contractors to comply with the applicable measures from SJVAPCD's Regulation VIII for all construction-related activities occurring in SJVAPCD, including the following rules:

- Rule 8011—General Requirements
- Rule 8021—Construction, Demolition, Excavation, Extraction, and Other Earthmoving Activities
- Rule 8031—Bulk Materials (handling and storage)
- Rule 8041—Carryout and Trackout (of dirt and other materials onto paved public roads)
- Rule 8051—Open Areas
- Rule 8061—Paved and Unpaved Roads (construction and use)
- Rule 8071—Unpaved Vehicle/Equipment Traffic Areas

The City of Merced shall be responsible for implementing the mitigation measures described above. SJVAPCD's enforcement and compliance department will be responsible to see that the mitigation measures are implemented properly.

Effectiveness of Mitigation Measure: Implementation of Mitigation Measures Air Quality-1 would help minimize construction-related fugitive dust emissions during all WMP construction activities. It is not anticipated that the proposed project's component would require extensive earth disturbance activities; therefore, implementation of Mitigation Measure Air Quality 1 and compliance with SJVAPCD Regulation VIII would reduce construction-related air quality emissions to a less-than-significant level. Accordingly,

the proposed project would not conflict with or obstruct implementation of the applicable air quality plan. This impact would be **less than significant** with mitigation.

Response c): Air quality is inherently a cumulative impact as current emission levels and attainment status are a result of past and present projects. The SJVAB is designated as nonattainment for the state ozone, PM₁₀, and PM_{2.5} standards. Therefore, each additional project within the SJVAB has the potential to cause a net increase in emissions that would contribute to this cumulative air quality impact. Although most projects would result in a net increase in air quality emissions, this impact evaluates whether that net increase in air quality emissions would be considered a cumulatively considerable contribution. SJVAPCD considers projects that would generate air quality emissions that exceed applicable thresholds of significance would be considered to generate emissions above the allowable limit for the region to attain and maintain ambient air quality standards and would be cumulatively considerable (SJVAPCD 2015). As discussed in Question a) and b), the proposed project's construction-related activities would not exceed SJVAPCD threshold of significance. Therefore, the proposed project's construction-related contribution to this significant cumulative impact would not be cumulatively considerable. The potential impact would be **less than cumulatively significant**.

Response d): CO Hotspots

The primary mobile-source pollutant of localized concern would be CO. Local mobile-source CO emissions and concentrations near roadway intersections are a direct function of traffic volume, speed, and delay. Transport of CO is extremely limited because it disperses rapidly with distance from the source under normal meteorological conditions. However, under specific meteorological conditions, CO concentrations near roadways and/or intersections may reach unhealthy levels with respect to local sensitive land uses, such as residential units, hospitals, schools, and childcare facilities.

Intersections that operate at a lower level of service (LOS) (i.e. LOS E or F) would have the potential to cause a CO hotspot, which would be a localized exceedance of the state or federal CO ambient air quality standard. LOS is a measurement of an intersection's performance based on idling time and speed of vehicles as they pass through. Therefore, intersections operating at LOS E or F would result in a greater number of vehicles idling and/or moving slowly through the intersection, thereby increasing the possibility for a CO hotspot.

At the time of this analysis, a detailed traffic study has not been prepared for each project component. Nevertheless, it is important to consider the number of trips that the proposed project's construction activities would contribute to existing intersections and if that contribution would significantly impact local intersections. Sacramento Metropolitan Air Quality Management District (SMAQMD) and Bay Area Air Quality Management District (BAAQMD) have developed screening volumes for intersections to determine if a CO hotspot could potentially occur. These screening thresholds are 44,000 vehicles per hour and 31,600 vehicles per hour at an intersection for the BAAQMD and SMAQMD, respectively. Both BAAQMD and SMAQMD screening criteria also consider the location of intersections such as areas that could limit horizontal or vertical pollutant dispersion (i.e., tunnel, parking garage, urban street canyon, belowgrade roadway) and result in the accumulation of CO concentrations. The proposed project's area would not be located in any of these types of areas that would limit vertical or horizontal dispersion. Because the volumes of local intersections have not been determined through a traffic study, this analysis evaluates the proposed project's contribution to a potential intersection that violates the screening thresholds. It is anticipated that if the project were to make a substantial contribution (i.e., 5%) to these screening volumes, the proposed project could have a potential CO hotspot impact.

Because of the temporary and short-term nature of project construction activities and uncertainty with respect to timing and schedule of construction at this time, a traffic study to evaluate hourly construction-

related traffic volumes at local intersections has not been conducted. However, assuming all WMP components are constructed simultaneously, it is anticipated that construction activities would generate approximately 53 total construction-related vehicle trips per day from construction workers and haul trucks. Even conservatively assuming all daily vehicle trips would arrive at the same intersection simultaneously, the project's construction-related traffic contribution would be less than 1% of the screening level. In reality, these vehicle trips would be distributed throughout the city on various roadways as not all of the WMP components are in the same location. In addition, the project area would not involve travel in limited air mixing areas, and vehicle trips would more likely be distributed throughout the work day to avoid peak hours. Thus, the proposed project is not expected to contribute a substantial amount of traffic to existing intersections and cause a CO hotspot. Therefore, the impact with respect to CO hotspots would be **less than significant**.

Toxic Air Contaminant (TAC) Emissions

Project construction activities would result in the generation of diesel PM emissions from the use of off-road diesel equipment. Diesel PM has been classified as a TAC by ARB; therefore, even acute exposure could have potential health impacts. Construction emissions would occur intermittently at the various construction sites for each WMP component. Diesel PM emissions would vary, depending on what types of activities were occurring each day. However, following construction of the various project elements, all associated diesel PM emissions would cease.

The dose to which receptors would be exposed is the primary factor used to determine health risk and is a function of concentration and duration of exposure. According to the Office of Environmental Health Hazard Assessment (OEHHA), health risk assessments that determine the health risks associated with exposure of residential receptors to TAC emissions should be based on a 30-year exposure period (OEHHA 2015). However, health risk assessments should be limited to the period/duration of activities associated with the emissions activity.

As discussed above, project construction activities would occur intermittently in various areas of the city over a 30-year build out period. The exposure period for any particular receptor would vary depending on their location with respect to proposed construction activities. Some equipment-intensive construction phases would likely generate higher levels of diesel PM emissions, while worker-intensive phases such as connecting conveyance infrastructure would generate much less. Nevertheless, the total exposure period when some level of construction activities and diesel PM emissions would be occurring for nearby residents would be approximately 18 months, which would be approximately 4 percent of the total exposure time for a typical health risk assessment. Other WMP components would involve even lower exposure periods or would involve moving construction activities (e.g., pipelines) that would further limit exposure time. Therefore, considering the highly dispersive nature of diesel PM emissions (Zhu et al. 2002), the relatively low exposure period for any WMP component, and the temporary and intermittent nature of construction emissions, short-term construction activities would not result in the exposure of sensitive receptors to levels that would result in a health hazard or would exceed applicable standards. Therefore, the impact **would be less than significant**.

Response e): The proposed project will not create objectionable odors affecting a substantial number of people. There is no impact.

3.4 Biological Resources

This section describes the existing environmental and regulatory setting of the proposed project and analyzes the potential impacts on biological resources that would result from implementing the proposed project.

3.4.1 Environmental Setting

The Merced EIR identified biological resources with the potential to occur within the expanded SOI¹ described in the General Plan and analyzed the potential impacts to these resources that would result from full buildout by year 2030. The environmental setting described in Section 3.4 of the Merced EIR which includes flora, sensitive plant communities, wetlands, wildlife, and special status species is hereby incorporated by reference.

In summary, the Merced EIR focused on biological communities/habitat types and rare species known as special-status species. Special-status species are defined as:

- Plants and animals listed, proposed for listing, or candidates for listing as threatened or endangered by the U.S. Fish and Wildlife Service (USFWS) under the federal Endangered Species Act.
- Species listed or proposed for listing as rare, threatened, or endangered by the California Department of Fish and Wildlife (CDFW) under the California Endangered Species Act.
- Animals designated as “Species of Special Concern” by CDFW.
- Animals designated “fully protected” by the California Fish and Game Code.
- Migratory birds, including their nests, eggs, and young protected by the federal Migratory Bird Treaty Act.
- Plant taxa cataloged in the California Native Plant Society (CNPS) *Inventory of Rare and Endangered Vascular Plants of California*.

Species also may be considered and listed as “species of local concern” by local agencies (typically cities or counties) because of local or regional scarcity as determined by that agency (per §15380 of the CEQA Guidelines).

For the purpose of this IS, databases were reviewed again in 2015 to determine whether any special-status plant or wildlife species have been observed in the project area that were not identified at the time of preparation of the Merced EIR. The following databases were reviewed:

- California Natural Diversity Database (CNDDB) (CDFW 2015a).
- Results of a data query for the Atwater, El Nido, Haystack Mountain, Merced, Plainsburg, Planada, Sandy Mush, Winton, and Yosemite Lake U.S. Geological Survey 7.5-minute topographic quadrangles.
- CDFW Special Animals List (CDFW 2015b).
- CDFW Special Vascular Plants, Bryophytes, and Lichens List (CDFW 2015c).

¹ The SOI includes the City of Merced Specific Urban Development Plan

- USFWS (2015) list of Endangered and Threatened Species for the Madera, Mariposa, and Merced Counties, California.
- CNPS Online Inventory of Rare and Endangered Vascular Plants of California (CNPS 2015).

The Merced EIR identified 55 special-status species (24 plants and 31 wildlife species) that have a low, moderate, or high potential for occurring within the SUDP/SOI. Updated searches of plant and animal databases determined that the number and composition of special-status species has not changed compared to the results of 2008 searches. Tables 3-2 and 3-3 list special-status plant and wildlife species that have historically occurred in the vicinity of the project site based on these updated database queries.

Table 3-2 Special-Status Plant Species with Potential to Occur in the SUDP/SOI

Species*	Habitat Associations	Status	Potential for Occurrence
Henderson's bent grass (<i>Agrostis hendersonii</i>)	Valley and foothill grassland (mesic); vernal pools	List 3.2	High. Occurrence has been recorded within the SUDP/SOI.
Alkali milk-vetch (<i>Astragalus tener</i> var. <i>tener</i>)	Playas; valley and foothill grassland on adobe clay soil; vernal pools habitats. Grows on alkaline soil.	List 1B.2	Moderate. Potential habitat within the SUDP/SOI. Nearest recorded occurrence within 10 miles.
San Joaquin spearscale (<i>Atriplex joaquiniana</i>)	Chenopod scrub; meadows and seeps; playas; valley and foothill grassland. Alkaline soil	List 1B.2	Moderate. Potential habitat within the SUDP/SOI. Nearest recorded occurrence within 10 miles.
Lesser saltscale (<i>Atriplex minuscula</i>)	Chenopod scrub; meadows and seeps; playas; valley and foothill grassland; vernal pools. Alkaline, sandy soil.	List 1B.1	Moderate. Potential habitat within the SUDP/SOI. Nearest recorded occurrence within 10 miles.
Vernal pool smallscale (<i>Atriplex persistens</i>)	Vernal pools. Alkaline soil.	List 1B.2	High. Occurrence has been recorded within the SUDP/SOI.
Subtle orache (<i>Atriplex subtilis</i>)	Valley and foothill grassland.	List 1B.2	Moderate. Potential habitat within the SUDP/SOI. Nearest recorded occurrence within 10 miles.
Hoover's calycadenia (<i>Calycadenia hooveri</i>)	Cismontane woodland; valley and foothill grassland. Rocky soil.	List 1B.3	Moderate. Potential habitat within the SUDP/SOI. Nearest recorded occurrence within 10 miles.
Succulent owl's-clover (<i>Castilleja campestris</i> ssp. <i>succulenta</i>)	Vernal pools. Often acidic soil.	List 1B.3 FE, CE	High. Occurrence has been recorded within the SUDP/SOI.
Beaked clarkia (<i>Clarkia rostrata</i>)	Cismontane woodland; valley and foothill grassland.	List 1B.3	Moderate. Potential habitat within the SUDP/SOI. Nearest recorded occurrence within 10 miles.
Recurved larkspur (<i>Delphinium recurvatum</i>)	Chenopod scrub, cismontane woodland, valley and foothill grasslands. Alkaline soil.	List 1B.2	Moderate. Potential habitat within the SUDP/SOI. Nearest recorded occurrence within 10 miles.
Dwarf downingia (<i>Downingia pusilla</i>)	Valley and foothill grasslands (mesic); vernal pools. Alkaline soil.	List 2.2	High. Occurrence has been recorded within the SUDP/SOI.
Delta button-celery (<i>Eryngium racemosum</i>)	Riparian scrub (vernally mesic clay depressions)	List 1B.1	Moderate. Potential habitat within the SUDP/SOI. Nearest recorded occurrence within 10 miles.
Spiny-sepaled button-celery (<i>Eryngium spinosepalum</i>)	Valley and foothill grasslands; vernal pools	List 1B.2	High. Occurrence has been recorded within one mile of the SUDP/SOI.
Boggs Lake hedge-hyssop (<i>Gratiola heterosepala</i>)	Marshes and swamps (lake margins); vernal pools. Clay soil.	CE, List 1B.2	Moderate. Potential habitat within the SUDP/SOI. Nearest recorded occurrence within 10 miles.

Species*	Habitat Associations	Status	Potential for Occurrence
Pincushion navarretia (<i>Navarretia myersii</i> ssp. <i>myersii</i>)	Vernal pools. Often acidic soil	List 1B.1	Low. Potential habitat within the SUDP/SOI. Nearest recorded occurrence within 10 miles. Known from less than 20 occurrences.
Shining navarretia (<i>Navarretia nigelliformis</i> ssp. <i>radians</i>)	Cismontane woodlands; valley and foothill grasslands; vernal pools	List 1B.2	High. Occurrence has been recorded within the SUDP/SOI.
Prostrate navarretia (<i>Navarretia prostrata</i>)	Coastal scrub; meadows and seeps; valley and foothill grassland; and vernal pools	List 1B.1	Moderate. Moderate. Potential habitat within the SUDP/SOI. Nearest recorded occurrence within 10 miles.
Colusa grass (<i>Neostapfia colusana</i>)	Vernal pools. Large pools with adobe soil.	List 1B.2	High. Occurrence has been recorded within the SUDP/SOI.
San Joaquin Valley Orcutt grass (<i>Orcuttia inaequalis</i>)	Vernal pools	List 1B.1	High. Occurrence has been recorded within 5 miles of the SUDP/SOI.
Hairy Orcutt grass (<i>Orcuttia pilosa</i>)	Vernal pools	List 1B.1	High. Occurrence has been recorded within the SUDP/SOI.
Merced phacelia (<i>Phacelia ciliate</i> var. <i>opaca</i>)	Valley and foothill grassland. Clay soil, sometimes alkaline.	List 1B.2	High. Occurrence has been recorded within the SUDP/SOI.
Sanford's arrowhead (<i>Sagittaria sanfordii</i>)	Marshes and swamps (assorted shallow freshwater)	List 1B.2	High. Occurrence has been recorded within the SUDP/SOI.
Keck's checkerbloom (<i>Sidalcea keckii</i>)	Cismontane woodlands; valley and foothill grasslands. Serpentinite, clay soil.	List 1B.1	High. Occurrence has been recorded within the SUDP/SOI.
Greene's tuctoria (<i>Tuctoria greenei</i>)	Vernal pools	List 1B.1	Moderate. Potential habitat within the SUDP/SOI. Nearest recorded occurrence within 10 miles.

Abbreviations:

Federal

FE Federal Endangered Species

FT Federal Threatened Species

State

CE California Endangered Species CR California Rare Species

CT California Threatened Species

CNPS

List 1B Species-Plants Categorized as Rare, Threatened, or Endangered in California and Elsewhere

List 2 Plants Rare, Threatened or Endangered in California, but more common Elsewhere

List 3 Plants about which we need more information – Review List

0.1 - Seriously threatened in California (high degree/immediacy of threat)

0.2 - Fairly threatened in California (moderate degree/immediacy of threat)

0.3 - Not very threatened in California (low degree/immediacy of threats or no current threats known)

Table 3-3 Special-Status Wildlife Species with Potential to Occur in the SUDP/SOI

Species*	Habitat Associations	Status	Potential for Occurrence
Invertebrates			
Conservancy fairy shrimp (<i>Branchinecta conservatio</i>)	Seasonal pools and ponds	FE	Moderate. Critical Habitat present with the SUDP/SOI.
Vernal pool fairy shrimp (<i>Branchinecta lynchi</i>)	Seasonal pools and ponds	FT	High. Critical Habitat and occurrence present within the SUDP/SOI.
Midvalley fairy shrimp (<i>Branchinecta mesovallensis</i>)	Seasonal pools and ponds	None	High. Occurrence has been recorded within the SUDP/SOI.
Valley elderberry longhorn beetle (<i>Desmocerus californicus dimorphus</i>)	Elderberry shrubs	FT	Moderate. Elderberry shrubs within the SUDP/SOI.
Vernal pool tadpole shrimp (<i>Lepidurus packardii</i>)	Seasonal pools and ponds	FE	Moderate. Critical Habitat Suitable habitat present within SUDP/SOI.
California linderiella (<i>Linderiella occidentalis</i>)	Seasonal pools and ponds	None	High. Occurrence has been recorded within the SUDP/SOI.
Molestan blister beetle (<i>Lytta molesta</i>)	Vegetation surrounding vernal pools.	None	High. Occurrence has been recorded within the SUDP/SOI.
Fish			
Hardhead (<i>Mylopharodon conocephalus</i>)	Sacramento and San Joaquin river drainages.	CSC	Moderate. Suitable habitat on within the SUDP/SOI. Nearest recorded occurrence within 10 miles.
Amphibians			
California tiger salamander (<i>Ambystoma californiense</i>)	Seasonal pools and ponds	FE, CSC	High. Critical habitat present within the SUDP/SOI.
Western spadefoot toad (<i>Spea hammondi</i>)	Seasonal pools and ponds	CSC	Moderate. Suitable habitat present within the SUDP/SOI. Nearest recorded occurrence within 5 miles.
Reptiles			
Western pond turtle (<i>Actinemys marmorata</i>)	Riverine environments, seasonal pools, and ponds	CSC	Moderate. Suitable habitat present within the SUDP/SOI. Nearest recorded occurrence within 5 miles.
Giant garter snake (<i>Thamnophis gigas</i>)	Streams, marshes, and irrigation ditches with open basking sites	FT, CT	Low. Occurrence has been recorded within the SUDP/SOI.
Birds			
Tricolored blackbird (<i>Agelaius tricolor</i>)	Freshwater marshes and grasslands	CSC, MBTA	Moderate. Suitable habitat present within the SUDP/SOI. Nearest recorded occurrence within 5 miles.
Burrowing owl (<i>Athene cunicularia</i>)	Open, dry grasslands	CSC, MBTA	High. Occurrence has been recorded within the SUDP/SOI.
Ferruginous hawk (<i>Buteo regalis</i>)	Wintering range	WL, MBTA	Low. Suitable wintering foraging habitat present within the SUDP/SOI. Nearest recorded occurrence within 5 miles.
Swainson's hawk (<i>Buteo swainsoni</i>)	Grasslands and riparian areas	CE, MBTA	High. Occurrence has been recorded within the SUDP/SOI.
Mountain plover (<i>Charadrius montanus</i>)	Wintering range	CSC, MBTA	High. Occurrence has been recorded within the SUDP/SOI.

Species*	Habitat Associations	Status	Potential for Occurrence
Northern harrier (<i>Circus cyaneus</i>)	Grasslands, open country, and marshes	CSC, MBTA	High. Observed within the SUDP/SOI.
White-tailed kite (<i>Elanus leucurus</i>)	Open grasslands, marshes, and riparian areas	FP	High. Observed within the SUDP/SOI.
Merlin (<i>Falco columbarius</i>)	Winter range.	WL, MBTA	Low. Uncommon winter visitor to the area.
Bald eagle (<i>Haliaeetus leucocephalus</i>)	Riverine and lake habitats	CE, MBTA	High. Within wintering range. Species observed during field survey.
Loggerhead shrike (<i>Lanius ludovicianus</i>)	Open grasslands	CSC, MBTA	High. Species observed within the SUDP/SOI.
Osprey (<i>Pandion haliaetus</i>)	Wintering range	CSC, MBTA	High. Occurrence has been recorded within the SUDP/SOI.
Mammals			
Merced kangaroo rat (<i>Dipodomys heermanni dixonii</i>)	Grasslands and oak savannah habitats.	None	High. Occurrence has been recorded within the SUDP/SOI.
Western mastiff bat (<i>Eumops perotis californicus</i>)	Riparian woodlands and rocky chaparral. Roosts on cliffs.	CS, C	High. Occurrence has been recorded within the SUDP/SOI.
Western red bat (<i>Lasiurus blossevillii</i>)	Deciduous woodlands and riparian zones. Forages over open areas and along forest edges.	CSC	Moderate. Suitable habitat within the SUDP/SOI.
Hoary bat (<i>Lasiurus cinereus</i>)	Deciduous and coniferous forests. Forages over aquatic features.	None	Moderate. Suitable habitat within the SUDP/SOI. Nearest recorded occurrence within 5 miles.
Yuma myotis (<i>Myotis yumanensis</i>)	Lowland habitat near open water. It roosts in caves, abandoned mine tunnels, and buildings	None	Moderate. Suitable habitat on site. Nearest recorded occurrence within 10 miles.
San Joaquin pocket mouse (<i>Perognathus inornatus inornatus</i>)	Dry grasslands and desert scrub, usually in sandy soils.	None	Moderate. Suitable habitat on site. Nearest recorded occurrence within 10 miles.
American badger (<i>Taxidea taxus</i>)	Dry, open grasslands and the edges of pastures and farmlands.	CSC	Moderate. Suitable habitat within the SUDP/SOI. Nearest recorded occurrence within 10 miles.
San Joaquin kit fox (<i>Vulpes macrotis mutica</i>)	Open, dry, grassland, shrub on the floor of the San Joaquin Valley and surrounding foothills.	FE, CT	Moderate. Suitable habitat on site. Nearest recorded occurrence within 10 miles.
<p>Abbreviations:</p> <p><u>Federal</u></p> <p>FE Federal Endangered Species</p> <p>FT Federal Threatened Species</p> <p>MBTA Species Protected under the auspices of the Migratory Bird Treaty Act</p> <p><u>State</u></p> <p>CE California Endangered Species</p> <p>CT California Threatened Species</p> <p>CSC California Department of Fish and Game Species of Special Concern</p> <p>WL California Department of Fish and Game Watch List</p> <p>FP California Department of Fish and Game Fully Protected Species</p>			

Critical habitat for four federally listed species occur (Conservancy Fairy Shrimp, Vernal Pool Fairy Shrimp, Vernal Pool Tadpole Shrimp and California Tiger Salamander) within the SUDP/SOI (refer to Figures 3.4-7, 3.4-8, 3.4-9, 3.4-10 in the Merced EIR).

3.4.2 Regulatory Setting

Federal Endangered Species Act. The Federal Endangered Species Act (FESA) defines an endangered species as any species or subspecies that is in danger of extinction throughout all or a significant portion of its range. A threatened species is defined as any species or subspecies that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

Once a species is listed, it is fully protected from a “take” unless a take permit is issued by USFWS. A take is defined as the killing, capturing, or harassing of a species. Proposed endangered or threatened species are those species for which a proposed regulation, but not final rule, has been published in the Federal Register.

Critical habitat for several federally listed species and state sensitive species (Tables 3-2 and 3-3) and the potential presence of these species has been recorded within the SUDP/SOI: the Recovery Plan for Upland Species of the San Joaquin Valley, California, and Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon. Both of these recovery plans cover federally listed species that potentially occur within the SUDP/SOI.

Fish and Game Code Sections 2050-2097 - California Endangered Species Act. The California Endangered Species Act (CESA) protects certain plant and animal species when they are of special ecological, educational, historical, recreational, aesthetic, economic, and scientific value to the people of the state. CESA established that it is state policy to conserve, protect, restore, and enhance endangered species and their habitats.

Merced Vision 2030 General Plan. The General Plan contains policies that apply to impacts to biological resources. The specific policies listed below contained in the Open Space and Conservation Element of the General Plan are designed to ensure that biological resource impacts are minimized as development occurs in accordance with the General Plan.

OS-1.1 Identify and mitigate impacts to wildlife habitats which support rare, endangered, or threatened species.

Implementing Action 1.1.b Urban development should occur away from identified sensitive species critical habitat areas unless specific provisions to ensure adequate protection and monitoring exist.

Implementing Action 1.1.g Implement the Memorandum of Understanding (MOU) between the City of Merced and the U.S. Fish and Wildlife Service, dated June 16, 2008, regarding the processing of development applications to ensure compliance with the Federal Endangered Species Act relating to Projects to be Served by the Wastewater Treatment Plant Water Quality Upgrade and Expansion Project.

OS-1.2 Preserve and enhance creeks in their natural state throughout the planning area.

3.4.3 Impact Assessment Checklist

Would the Project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?		X		
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the California Department of Fish and Game or US Fish and Wildlife Service?		X		
c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?		X		
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?		X		
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?				X
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?		X		

Response a): The biotic habitat within the SUDP/SOI, like most of the remaining lands in the region, has been drastically altered from its original form. Human-caused disturbances, such as agricultural activities and land conversion to urban uses within the plan area, may result in loss of foraging and breeding habitat for many of these species. Implementation of the Water Master Plan would indirectly and in combination with full buildout of the General Plan result in land conversion and the loss of habitat. This is a potentially **significant impact** on special-status species. Although the exact footprint of a project identified in Table 2-1 is not known, implementation of the proposed project improvements may result in the modification or loss of habitat or the “take” of species identified in Tables 3-2 and 3-3, or conflict with the provisions in the recovery plans. The impact is **significant**.

Mitigation Measure Biology-1

Once the exact location and or the footprint of a proposed project identified in Table 2-1 is known, a qualified biologist shall: 1) determine if the location or footprint is within the area covered by the Upland

Species of the San Joaquin Valley (Recovery Plan and/or the Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon), and 2) determine if the proposed project would have an impact on a special status species. If there is an impact to a special status species the City shall implement Mitigation Measures Biology-2 through Biology-9.

Effectiveness of Mitigation Measure: Implementation of Mitigation Measures Biology-2 through Biology-9 would minimize and mitigate, to the maximum extent practical, the adverse impacts to a special status species to **less than significant**.

In addition, the following mitigation measure(s) are incorporated from the Merced EIR to avoid impacts to candidate, special-status, or sensitive species and provide protection where appropriate habitat exists within the boundary of a proposed project:

Mitigation Measure Biology-2: Vernal Pools and Vernal Pool Associates

To protect vernal pools and associated species, surveys shall be conducted to determine the presence of vernal pools prior to or concurrent with site selection for implementing any proposed project improvements identified in Table 2-1 in an area having potential habitat.

Surveys to detect vernal pools are most easily accomplished during the rainy season or during early spring when pools contain water. If vernal pools are found to occur on a project site, the pools and a 100-foot-wide buffer around each pool or group of pools will be observed. If the vernal pools and buffer areas cannot be avoided, then the project proponent must consult with and obtain authorizations from, but not limited to, the California Department of Fish and Wildlife, the United States Fish and Wildlife Service, the Army Corps of Engineers (Corps), and the State Water Resources Quality Control Board.

Consultation and authorizations may require that additional surveys for special-status species be completed. Because there is a federal policy of no net loss of wetlands, mitigation to reduce losses and compensation to offset losses to vernal pools and associated special-status species will be required.

Effectiveness of Mitigation Measure: The identification of vernal pools on a project specific basis and, when present on a project site, consultation with regulatory agencies and implementation of mitigation and compensation will ensure that impacts to vernal pools and special-status species associated with vernal pools will be **less than significant**.

Mitigation Measure Biology-3: Special-Status Plants

To protect special-status plants, the City shall ensure that a botanical survey be conducted for projects containing habitat suitable for special-status plant species. Surveys shall be conducted by a qualified biologist or botanist during the appropriate flowering season for the plants and shall be conducted prior to issuance of a grading or building permit for the project. If special-status plants are found to occur on the project site, the population of plants shall be avoided and protected. If avoidance and protection is not possible, then a qualified biologist will prepare a mitigation and monitoring plan for the affected species. The plan shall be submitted to the CDFW and/or the USFWS for review and comment. Details of the mitigation and monitoring plan shall include, but not be limited to:

- Removing and stockpiling topsoil with intact roots and seed bank in the disturbance area, and either replacing the soil in the same location after construction is complete or in a different location with suitable habitat; or

- Collect plants, seeds, and other propagules from the affected area prior to disturbance. After construction is complete, the affected area shall be replanted with propagules or cultivated nursery stock; or
- These and other mitigations will be considered successful if the populations of the affected species are sustained for a minimum of three years and are of a similar size and quality as the original population.

Effectiveness of Mitigation Measure: Conducting a preconstruction survey on project sites that have the potential to provide habitat for special status plant species will ensure populations of plants will be identified, avoided and protected. Implementation of Mitigation Measure Biology-3 will ensure that impacts to special-status plants are reduced to **less than significant**.

Mitigation Measure Biology-4: Valley Elderberry Longhorn Beetle

To protect the Valley elderberry longhorn beetle (VELB), the City shall ensure that a survey for elderberry bushes be conducted by a qualified biologist at each project site containing habitat suitable for VELB prior to the issuance of a grading permit or building permit. If elderberry bushes are found, the project proponent shall implement the measures recommended by the biologist, which shall contain the standardized measures adopted by the USFWS.

Effectiveness of Mitigation Measure: The implementation of this measure will prevent the loss of habitat (elderberry bushes) and prevent the incidental take of VELB. Implementation of these measures will ensure that impacts to elderberry shrubs and elderberry longhorn beetles will be **less than significant**.

Mitigation Measure Biology-5: Burrowing Owls

To protect burrowing owls on proposed projects where suitable habitat exists, the following shall be implemented:

- To protect burrowing owls, preconstruction surveys shall be conducted by a qualified biologist at all project sites that contain grasslands, fallowed agricultural fields, or fallow fields along roadsides, railroad corridors, and other locations prior to grading. If, during a preconstruction survey, burrowing owls are found to be present, the project proponent shall implement the measures recommended by the biologist and include the standardized avoidance measures of CDFW.

Effectiveness of Mitigation Measure: The mitigation measure listed above is a standardized survey protocol and avoidance measure that has been adopted by the CDFW. Implementation of this mitigation measure will prevent disrupting nesting behaviors and ensure nesting success of burrowing owls which may nest in and adjacent to project sites. This will result in impacts from the project being **less than significant**.

Mitigation Measure Biology-6: Special-Status Birds

To protect raptors and other special-status birds on proposed projects where suitable habitat exists, the following measures shall be implemented:

- Trees scheduled to be removed because project implementation shall be removed during the nonbreeding season (late September to the end of February).

- Prior to construction, but not more than 14 days before grading, demolition, or site preparation activities, a qualified biologist shall conduct a preconstruction nesting survey to determine the presence of nesting raptors. Activities taking place outside the breeding season (typically February 15 through August 31) do not require a survey. If active raptor nests are present in the construction zone or within 250 feet of the construction zone, temporary exclusion fencing shall be erected at a distance of 250 feet around the nest site. Clearing and construction operations within this area shall be postponed until juveniles have fledged and there is no evidence of a second nesting attempt determined by the biologist.
- If nesting Swainson's hawks are observed during field surveys, consultation with the CDFW regarding Swainson's hawk mitigation guidelines shall be required. The guidelines include, but are not limited to, buffers of up to one quarter mile, monitoring of the nest by a qualified biologist, and mitigation for the loss of foraging habitat.
- To avoid impacts to common and special-status migratory birds pursuant to the Migratory Bird Treaty Act and CDFW codes, a nesting survey shall be conducted prior to construction activities if the work is scheduled between March 15 and August 31. If migratory birds are identified nesting within the construction zone, a 100-foot buffer around the nest site must be designated. No construction activity may occur within this buffer until a qualified biologist has determined that the young have fledged. A qualified biologist may modify the size of the buffer based on site conditions and the bird's apparent acclimation to human activities. If the buffer is modified, the biologist would be required to monitor stress levels of the nesting birds for at least one week after construction commences to ensure that project activities would not cause nest site abandonment or loss of eggs or young. At any time the biologist shall have the right to implement the full 100-foot buffer if stress levels are elevated to the extent that could cause nest abandonment and/or loss of eggs or young.

Effectiveness of Mitigation Measure: The mitigation measure listed above is a standardized survey protocol and avoidance measure that has been adopted by the CDFW. Implementation of this mitigation measure will prevent disrupting nesting behaviors and ensure nesting success of raptors and migratory birds which may nest in and adjacent to project sites. This will result in impacts from the project being **less than significant**.

Mitigation Measure Biology-7: Special-Status Amphibians

To protect California tiger salamander and western spadefoot on proposed projects where suitable habitat exists, the following shall be implemented:

- To protect special-status amphibians, preconstruction surveys shall be conducted by a qualified biologist at all project sites that contain appropriate habitat. If, during a preconstruction survey, special-status amphibians are found to be present, the project proponent shall implement the measures recommended by the biologist and standardized measures adopted by the USFWS or the CDFW.

Effectiveness of Mitigation Measure: Conducting a preconstruction survey on project sites that have the potential to provide habitat for special status amphibians species will ensure populations will be identified, avoided and protected. Implementation of this Mitigation Measure will ensure that impacts to special-status amphibians are reduced to **less than significant**.

Mitigation Measure Biology-8: Special-Status Reptiles

To protect western pond turtle and giant garter snake on proposed projects where suitable habitat exists, the following shall be implemented:

- To protect special-status reptiles, preconstruction surveys shall be conducted by a qualified biologist at all project sites that contain appropriate habitat. If, during a preconstruction survey, special-status reptiles are found to be present, the project proponent shall implement the measures recommended by the biologist and standardized measures adopted by the USFWS or the CDFW.

Effectiveness of Mitigation Measure: Conducting a preconstruction survey on project sites that have the potential to provide habitat for special status reptile species will ensure populations will be identified, avoided, and protected. Implementation of this mitigation measure will ensure that impacts to special-status reptilian species are reduced to **less than significant**.

Mitigation Measure Biology-9: Special-Status Mammals

To protect Merced kangaroo rat, western mastiff bat, western red bat, hoary bat, Yuma myotis, San Joaquin pocket mouse, American badger, and San Joaquin kit fox on proposed projects where suitable habitat exists, the following shall be implemented:

- To protect special-status mammals, preconstruction surveys shall be conducted by a qualified biologist at all project sites that contain appropriate habitat. If, during a preconstruction survey, special-status mammals are found to be present, the project proponent shall implement the measures recommended by the biologist and standardized measures adopted by the USFWS or the CDFW.

Effectiveness of Mitigation Measure: Conducting a preconstruction survey on project sites that have the potential to provide habitat for special status mammalian species will ensure populations of plants will be identified, avoided, and protected. Implementation of this Mitigation Measure will ensure that impacts to special-status mammalian species are reduced to **less than significant**.

Response b): Riparian habitat and sensitive natural communities, such as vernal pools and critical habitat for species, are protected by the Endangered Species Act occur within the SUDP/SOI. Implementation of the Water Master Plan would indirectly and in combination with full build out of the General Plan result in land conversion and the loss of riparian habitat or sensitive natural communities. This impact is **potentially significant**

The following mitigation measure(s) are incorporated from the Merced EIR to avoid impacts to riparian habitat or to sensitive natural communities and provide protection where habitat exists within the footprint of a component of the proposed project described in Table 2-1. The following mitigation measure along with Mitigation Measure Biology-1 and the goals, policies, and implementation actions of the General Plan will be implemented to reduce potential impacts to riparian habitat and other sensitive natural communities.

Mitigation Measure Biology-10: Streambed Alteration Agreement

To minimize impacts to riparian habitat and other sensitive natural communities, the following the measures shall be implemented:

- The City shall have a qualified biologist map all riparian habitat or other sensitive natural communities within the footprint of the proposed project. To the extent feasible and practicable, all planned construction activity shall be designed to avoid direct effects on these areas.
- In those areas where complete avoidance is not possible, all riparian habitat or other sensitive natural communities shall be mitigated on a “no-net-loss” basis in accordance with either CDFW regulations and/or a Section 1602 Streambed Alteration Agreement, if required. Habitat mitigation shall be replaced at a location and with methods acceptable to the CDFW.

Effectiveness of Mitigation Measure: Mapping riparian habitat and sensitive natural communities within the footprint of a proposed project will ensure these habitats will be identified, avoided, and protected. Implementation of this mitigation measure will ensure that impacts are avoided and reduced to **less than significant**.

Response c): Federally protected wetlands and jurisdictional Waters of the U.S. occur throughout the SUDP/SOI. Impacts from implementing the Water Master Plan may directly or indirectly and in combination with full buildout of the General Plan result in the loss of riparian habitat. This impact is **potentially significant**.

The following mitigation measures will be implemented to reduce potential impacts to federally protected wetlands and Waters of the U.S.

Mitigation Measure Biology-11: Conduct a delineation of Waters of the U.S. and Wetlands (WOUS/Wetlands) and Obtain Permits.

If Waters of the U.S. occur within the footprint of the proposed project, a delineation of the Waters of the U.S. and wetlands shall be performed and submitted to the Corps for verification finalizing the project site plan.

A Section 404 permit and a Section 401 Water Quality Certification or Waiver of Waste Discharge shall be acquired from the Corps and the Regional Water Quality Control Board (RWQCB) and a Section 1602 Streambed Alteration Agreement from DFG respectively prior to the onset of construction-related activities.

Effectiveness of Mitigation Measure: Identifying and delineation Waters of the U.S. will ensure protection of wetlands and jurisdictional waters by identifying these habitats. In turn, impacts to these habitats will be avoided and protected. Implementation of this mitigation measure will ensure that impacts are reduced to **less than significant**.

Mitigation Measure Biology-12: Replace or Rehabilitate Waters of the U.S. and Wetlands

Any jurisdictional waters that would be lost or disturbed due to implementation of any proposed project described in Table 2-1 of the Water Master Plan shall be replaced or rehabilitated on a “no-net-loss” basis in accordance with the Corps and the RWQCB mitigation guidelines. Habitat restoration, rehabilitation, and/or replacement if required shall be at a location and by methods agreeable to the Corps, the RWQCB, and the City.

Effectiveness of Mitigation Measure: Wetlands or jurisdictional Waters of the U.S. that would be lost or disturbed by a proposed action will be replaced or rehabilitated to ensure that there will be no net loss of these habitats. Implementation of this mitigation measure will ensure that impacts to wetland or jurisdictional Waters of the U.S. reduced or rectified to **less than significant**.

Response d): Designated migratory corridors for native wildlife species do not occur within the SUDP/SOI. Wildlife nursery sites are areas where animals concentrate for hatching and/or raising young, such as rookeries and breeding areas. There are no rookeries or breeding areas within the SUDP/SOI. However, construction activity may disturb individual nesting, feeding, rearing, and foraging behaviors of migratory birds if active nests are within or near construction areas and is a **potentially significant** impact.

Mitigation Measure Biology-13 Wildlife Nursery Sites.

To minimize impacts to nesting, feeding, rearing, and foraging behavior of migratory birds, the City shall implement Mitigation Measure Biology-6.

Effectiveness of Mitigation Measure: The mitigation measure listed above is a standardized survey protocol and avoidance measure that has been adopted by the CDFW. Implementation of this mitigation measure will prevent disrupting nesting behaviors and ensure nesting success of raptors and migratory birds which may nest in and adjacent to project sites. This will result in impacts from the project being **less than significant**.

Response e): The General Plan contains the following policies that would maintain and protect Merced's biological resources:

- OS-1.1 Identify and mitigate impacts to wildlife habitats which support rare, endangered, or threatened species.
- OS-1.2 Preserve and enhance creeks in their natural state throughout the planning area.
- OS-1.3 Promote the protection and enhancement of designated scenic routes.
- OS-1.4 Improve and expand the City's urban forest.
- OS-1.5 Preserve and enhance water quality.

Adoption of the Water Master Plan will not conflict with these or any other local policies or ordinances that protect biological resources. There is no impact.

Response f): There are no applicable or pertinent habitat conservation plans or natural community preservation plans affecting the SUDP/SOI. However, the SUDP/SOI is within the area covered by the Upland Species of the San Joaquin Valley Recovery Plan and/or the Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon, Implementation may conflict with the There is a **potential impact**.

Mitigation Measure Biology-14 Recovery Plans

To minimize conflicts with Upland Species of the San Joaquin Valley Recovery Plan and/or the Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon), The City shall implement Mitigation Measure Biology-1.

Effectiveness of Mitigation Measure: Implementation of Mitigation Measures Biology-1 would minimize conflicts with Upland Species of the San Joaquin Valley Recovery Plan and/or the Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon. The impact is **less than significant**.

3.5 Cultural Resources

This section describes the existing environmental and regulatory setting of the proposed project and analyzes the potential impacts on cultural resources that would result from implementing the proposed project.

3.5.1 Environmental Setting

The city lies within the ethnographic territory of the Yokut people. The Yokuts held portions of the San Joaquin Valley from the Tehachapis in the south to Stockton in the north. On the north they were bordered by the Plains Miwok and on the west by the Saclan (or Bay Miwok) and Costanoan peoples. Merced County was first explored by Gabriel Moraga in 1806, when he named the Merced River, “El Rio de Nuestra Señora de la Merced.” Moraga’s explorations were designed to locate appropriate sites for an inland chain of missions. The construction of the Southern Pacific Railroad in 1872 brought major changes to the region. The development of the railroads through the region allowed the establishment of the communities. The completion of the Crocker-Huffman canal system led to the colonization of the territory around the city and resulted in a rapid population expansion.

A cultural resources records search was conducted by the Central California Information Center (CCIC) at California State University, Stanislaus for the Merced area on November 19, 2008 to identify previously recorded sites and previous cultural resources studies in and near the project area (Merced EIR).

3.5.2 Regulatory Setting

The federal, state, and local regulatory setting pertaining to cultural resources can be found in Section 3.5 “Cultural Resources” of the Merced EIR.

3.5.3 Impact Assessment Checklist

Would the Project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Cause a substantial adverse change in the significance of a historical resource as defined in §15064.5?			X	
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?		X		
c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?		X		
d) Disturb any human remains, including those interred outside of formal cemeteries?			X	

Response a): Within the SUDP/SOI boundary, there are few recorded resources due to a lack of systematic surveys. There could be impacts to cultural and historic resources resulting from development within the SUDP/SOI area. Both prehistoric and historic period resources may be present, with prehistoric period resources more likely to occur along the natural water courses. Future development in accordance with the Water Master Plan would involve earthmoving activities, which have the potential to unearth previously undiscovered historic or cultural resources.

There is no indication that subsurface prehistoric cultural deposits within the SUDP/SOI exist or to have survived past uses of the land; however, the possibility cannot be eliminated. Implementation of the Water Master Plan will be guided by policies in the General Plan.

Policies SD-2.1, SD-2.2 and SD-2.3 call for the City to identify and preserve its archaeological resources; identify and preserve the city's historic and cultural resources; and develop and promote financial incentive programs for historic preservation efforts. Implementing actions of Policy SD-2.1 call for the City to utilize the inventory of known archeological sites maintained by the Central California Information Center for the review of development proposals (2.1.a); utilize standard practices for preserving archeological materials that are unearthed during construction, as prescribed by the State Office of Historic Preservation (2.1.b); and, if appropriate, consider reconstruction of archeological sites in city parks, on school grounds, in open space areas, or other suitable locations where they can serve an educational purpose (2.1.c). Implementing actions of Policy SD-2.2 call for the City to expand its cultural and historic information resources (2.2.a); support community groups and individuals working to preserve, protect, and enhance the City's Historic and Cultural Resources (2.2.b); review and revise as necessary, the City's development/construction regulations to facilitate the preservation of historic structures (2.2.c); support, as feasible, efforts to promote the preservation of historically or architecturally significant structures in the city (2.2.d); and support efforts to designate historic districts within the city (2.2.e).

Implementation of these policies and adherence to federal, state, and local regulations would ensure that impacts to historical and archaeological resources would be reduced to **less than significant**.

Response b): Implementation of the Water Master Plan would involve earthmoving activities, which have the potential to unearth previously undiscovered archaeological resources are unlikely to be present because of prior ground disturbance. However, subsurface archaeological features may be present and inadvertently disturbed during construction-related earthmoving activities. This impact would be **potentially significant**.

In addition to implementing policies in the General Plan (Policies SD-2.1, SD-2.2 and SD-2.3), the City shall implement the following:

Mitigation Measure: Culture-1

If prehistoric or historic-era subsurface archaeological features or deposits, including locally darkened soil ("midden") that could conceal cultural deposits, are discovered during construction-related earthmoving activities, all ground-disturbing activity within 100 feet of the resources shall be halted and the City shall be notified. The City shall consult with a qualified archeologist to assess the significance of the find. If the find is determined to be significant by the qualified archaeologist (i.e., because the find is determined to constitute either an historical resource or a unique archaeological resource), representatives of the City and the qualified archaeologist shall meet to determine the appropriate course of action.

All significant cultural materials recovered shall be subject to scientific analysis, professional museum curation, and a report shall be prepared by the qualified archaeologist according to current professional standards.

If the archaeologist determines that some or all of the affected property qualifies as a Native American Cultural Place, including a Native American sanctified cemetery, place of worship, religious or ceremonial site, or sacred shrine (California Public Resources Code §5097.9) or a Native American historic, cultural, or sacred site, that is listed or may be eligible for listing in the California Register of Historical Resources pursuant to California Public Resources Code §5024.1, including any historic or prehistoric ruins, any burial ground, any archaeological or historic site (California Public Resources Code

§5097.993), the archaeologist shall recommend to the City potentially feasible mitigation measures that would preserve the integrity of the site or minimize impacts on it, including any or a combination of the following:

- Avoidance, preservation, and/or enhancement of all or a portion of the Native American Cultural Place as open space or habitat, with a conservation easement dedicated to the most interested and appropriate tribal organization. If such an organization is willing to accept and maintain such an easement, or alternatively, a cultural resource organization that holds conservation easements.
- An agreement with any such tribal or cultural resource organization to maintain the confidentiality of the site location so as to minimize the danger of vandalism to the site or other damage to its integrity.
- Other measures, short of full or partial avoidance or preservation, intended to minimize impacts on the Native American Cultural Place consistent with land use assumptions and the proposed design and footprint of the development project for which the requested grading permit has been approved.

After receiving such recommendations, the City shall assess the feasibility of the recommendations and impose the most protective mitigation feasible.

Implementing Mitigation Measure Culture-1 would reduce the impact to **less than significant** by requiring that all ground-disturbing activity within 100 feet of the resources to be halted and an assessment made as to the significance of the find.

Effectiveness of Mitigation Measure: Implementing this mitigation measure would minimize the potential damage to prehistoric or historic-era subsurface archaeological features or deposits by ensuring that upon discover of a historic or archaeological resource, all work on a proposed project will stop. A qualified archaeologist will evaluate the resource's significance. If the resource is significant, the City will preserve the site as open space with a conservation easement, and or negotiate an agreement with the appropriate tribal authority.

Response c): Geologic formations, such as the Mehrten Formation, occur within the SUDP/SOI and are known to be paleontologically sensitive because of the large number of fossils that have been recovered therefrom. Implementing projects described in Table 2-1 would involve earthmoving activities that may take place within a paleontologically sensitive rock formation and have the potential to damage or destroy unique paleontological resources. The impact is **potentially significant**.

Mitigation Measure: Culture-2

To minimize potential adverse impacts on unique, scientifically important paleontological resources, the City shall implement the following:

- Before the start of grading or excavation activities, construction personnel involved with earthmoving activities shall be informed of the possibility of encountering fossils, the appearance and types of fossils likely to be seen during construction activities, and proper notification procedures should fossils be encountered.
- This worker training shall be prepared and presented by a qualified paleontologist.
- If paleontological resources are discovered during earthmoving activities, the construction crew shall immediately cease work in the vicinity of the find and shall notify the City planning

department. The City shall retain a qualified paleontologist to evaluate the resource and prepare a proposed mitigation plan in accordance with SVP guidelines (1995). The proposed mitigation plan may include a field survey, construction monitoring, sampling and data recovery procedures, museum storage coordination.

Effectiveness of Mitigation Measure: Implementing this mitigation measure would reduce the impact to a **less-than-significant** level by requiring that all ground-disturbing activity shall be halted and an assessment made by a qualified paleontologist in accordance with SVP guidelines. Implementing this mitigation measure will ensure that unique and scientifically important paleontological resources are not destroyed.

Response d): There is always the possibility that in the normal course of construction and land development, vegetation removal, earth moving, and other alterations could result in the discovery and disturbance of previously unidentified human remains. The potential impact is **significant**.

Mitigation Measure Culture-3

In the event of an accidental discovery or disturbance of the human remains during ground-disturbing activities, there shall be no further excavation or disturbance of the site within a 50-foot radius of the location of such discovery, or any nearby area reasonably suspected to overlie adjacent remains. The Merced County Coroner shall be notified and will make a determination as to whether the remains are Native American. If the Coroner determines that the remains are not subject to his authority, he shall notify the Native American Heritage Commission, which will attempt to identify descendants of the deceased Native American. If no satisfactory agreement can be reached as to the disposition of the remains pursuant to State law, then the human remains and items associated with Native American burials on the property shall be re-interred in a location not subject to further subsurface disturbance.

Effectiveness of Mitigation Measure: Implementing this mitigation measure would ensure the Merced County Coroner will be notified if there is accidental discovery or disturbance to human remains and will make a determination as to whether the remains are Native American. If the Coroner determines that the remains are not subject to his authority, he will notify the Native American Heritage Commission, which will attempt to identify descendants of the deceased Native American.

3.6 Geology and Soils

This section describes the existing environmental and regulatory setting of the proposed project and analyzes the potential impacts on geology and soils that would result from implementing the proposed project.

3.6.1 Environmental Setting

The proposed project is located within the city of Merced SUDP/SOI, along the west side of the San Joaquin Valley. A review of the geologic map indicates that the area around Merced is primarily underlain by the Pleistocene Modesto and Riverbank Formations with Holocene alluvial deposits in the drainages.

Faults and Seismicity: Based on review of geologic maps and reports for the area, there are no known active or potentially active faults, or Alquist-Priolo Earthquake Fault Zones (formerly referred to as a Special Studies Zone) in the Merced SUDP/SOI. Table 3.6-1 of the Merced EIR identified the closest fault is the Segment 9 of the Great Valley Fault located about 30 miles from the city.

Soils: Soils in the SUDP/SOI are generally moderate to deep silty and clayey loams. Some gravely and cobbly loams are also present, primarily concentrated in the stream drainages. The soils listed are not generally considered to be expansive, have a low to moderate erosion potential, and are considered suitable for wastewater disposal using conventional septic systems.

3.6.2 Regulatory Setting

The federal, state, and local regulatory setting pertaining to geological and soil resources can be found in Section 3.6 “Geology and Soils” of the Merced EIR.

3.6.3 Impact Assessment Checklist

Would the Project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:				
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.			X	
ii) Strong seismic ground shaking?			X	
iii) Seismic-related ground failure, including liquefaction?				X
iv) Landslides?				X
b) Result in substantial soil erosion or the loss of topsoil?			X	
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?			X	
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?			X	
e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?				X

Response a.i): Ground shaking is defined as the vibration which radiates from the epicenter of an earthquake. The city of Merced is situated in proximity to several fault groups (Merced EIR); however, it is not located in a delineated Alquist-Priolo Earthquake Fault Zone (California Geological Survey 2007). Isolated portions of Merced County may be subject to strong seismic ground shaking. These locations are

primarily located to the south, east, and west of the city. The nearest faults of major historical significance are the San Andreas Fault 58 miles to the west; the Hayward and Calaveras faults to the northwest; and the White Wolf, Garlock, and Sierra faults to the south. These seem to be the most likely to shake the city of Merced again in the future. The probability of soil liquefaction actually occurring in the County, including within the city, is considered to be a low to moderate hazard; however, detailed geotechnical engineering investigations at a site specific level would be necessary to more accurately evaluate liquefaction potential in specific areas.

Policies included in the General Plan provide for the safety of all residents from earthquake and other geologic hazards including: Policies S-2.1, S-2.2 and S-2.3 which call for the City to reduce the potential danger from earthquake and seismic-related activity from existing buildings where necessary; to encourage the improvement of all public facilities and infrastructure; and restrict urban development in all areas with potential ground failure characteristics. Implementing actions of each of these policies provide further guidance and actions for reducing seismic related hazards in the city of Merced.

As stated above, the City will implement a variety of policies and implementing actions designed to address public health and safety issues resulting from seismic hazards. Therefore, implementation of the proposed water system improvements described in Table 2-1 and adherence to the Alquist-Priolo Act, and enforcement of the California Building Standards Code would result in an impact that is **less than significant**.

Response a.ii): As stated above, the City will implement policies and implementing actions designed to address public health and safety issues resulting from seismic hazards including strong ground shaking. Therefore, implementation of the proposed water system improvements described in Table 2-1 and adherence to the Alquist-Priolo Act, and enforcement of the California Building Standards Code would result in an impact that is **less than significant**.

Response a.iii): The process in which the stiffness and strength of soil or sand is reduced by the shaking of an earthquake is known as liquefaction. This generally causes substantial damage and dangers from vertically aligned infrastructure such as high-rise buildings and housing structures that are a part of the built environment. The project would not expose people to seismic-related ground failure, including liquefaction, since the soils in the area are rather coarse or have high clay content. There is no impact.

Response a.iv): The project site is located on level terrain and is not adjacent to steep, unstable slopes where landslides could occur. There is no impact.

Response b): The city's topography is relatively flat, with soil conditions that exhibit minimal potential for erosion impacts. Erosion-related effects can be minimized through implementation of the policies and implementing actions provided as part of the Open Space, Conservation and Recreation Element of the Merced General Plan. Policy OS-5.2 calls for the City to protect soil resources from the erosive forces of wind and water. Implementing Actions 5.2.a and 5.2.c of Policy OS-5.2 call for the City to reduce the soil erosion potential of new development and maintain adequate vegetation along the banks of urban streams and storm water drainage channels. With implementation of the City's General Plan policies OS-5.2 and S-2.3, and implementing actions, the impact is **less than significant**.

Response c): The city is located in an area that has a low risk for landslides. Landslides are more likely to happen in the mountains and foothills of Merced County. Since soil in the area is too coarse or too high in clay content, the risk of liquefaction is relatively low. The chance of lateral spreading happening near the project area is also relatively low. The west side of the San Joaquin Valley has been recognized as the world's largest area of subsidence due to groundwater withdrawal. Until recently subsidence in Merced County has been limited to the vicinity of Los Banos. However, a new subsidence area has been discovered

near El Nido, about 15 miles south of Merced. Information indicates that land subsidence was about 0.1 foot per year during 2012-2015 (Kenneth D. Schmidt and Associates 2016). Under current conditions no known subsidence has occurred in the Merced planning area or has accommodated groundwater withdrawal. (Merced EIR), Kenneth D. Schmidt and Associates estimates groundwater overdraft is about 4,700 acre-feet per year (Kenneth D. Schmidt and Associates 2016). However, the City's Wastewater Treatment Plant provides a tertiary level treatment of about 8,155 acre-feet per year. Treatment is followed by disinfection and is piped by gravity to discharge into Harley Slough (City of Merced 2015b). Under full buildout as water use increases the volume of tertiary treated and disinfected wastewater would also increase and provide groundwater recharge. There would be no increase in subsidence. The impact is **less than significant**.

Response d): Expansive soils react to moisture changes by shrinking or swelling. Expansive soils can also consist of silty to sandy clay. The extent of shrinking and swelling is influenced by the environment, including the extent of wet or dry cycles, and by the amount of clay in the soil. As discussed in the Merced EIR, the soils listed in the project area are not generally considered to be expansive, and have a generally low to moderate erosion potential. The impact is **less than significant**.

Response e): The Water Master Plan does not propose any septic tanks or alternative wastewater disposal systems. There is no impact.

3.7 Greenhouse Gas

This section describes the existing environmental and regulatory setting of the proposed project and analyzes the potential impacts associated with greenhouse gas materials that would result from implementing the proposed project.

Emissions of greenhouse gases (GHGs) have the potential to adversely affect the environment because such emissions contribute cumulatively to global climate change. The proper context for addressing this issue in an EIR is in an assessment of cumulative impacts; it is unlikely that a single project will contribute significantly to climate change, but cumulative emissions from many projects could affect global GHG concentrations and the climate system. Unlike the locations of criteria air pollutants and TACs, which are pollutants of localized or regional concern, the specific location of GHG emissions are of limited concern. Rather, the total amount and types of GHG emissions ultimately have the most substantial effect on climate change.

3.7.1 Environmental Setting

Certain gases in the Earth's atmosphere, classified as GHGs, play a critical role in determining the Earth's surface temperature. When high-frequency solar radiation (e.g., visible light) enters the Earth's atmosphere from space (i.e., the sun), a portion of the radiation is absorbed by the Earth's surface and a smaller portion of this radiation (infrared radiation) is reflected back toward space. When infrared radiation comes into contact with GHGs in the atmosphere, a portion of that thermal energy can be absorbed by GHG molecules and/or re-radiated back toward the Earth's surface. Both outcomes result in a "trapping" of heat in the Earth's atmosphere. This phenomenon, known as the "greenhouse effect," is responsible for maintaining a habitable climate on Earth. Without the greenhouse effect, Earth would not be able to support life as we know it.

Climate change is a global problem because GHGs are global pollutants, unlike criteria air pollutants and TACs, which are pollutants of regional and local concern. Whereas pollutants with localized air quality effects have relatively short atmospheric lifetimes (about one day), GHGs have long atmospheric lifetimes (one year to several thousand years). GHGs persist in the atmosphere for a long enough time to be dispersed around

the globe. Although the exact lifetime of any particular GHG molecule depends on multiple variables and cannot be pinpointed, currently more CO₂ is emitted into the atmosphere than is sequestered. Carbon dioxide sinks, or reservoirs, include vegetation and the ocean, which absorb CO₂ through photosynthesis and dissolution, respectively. These are two of the most common processes of CO₂ sequestration.

3.7.2 Regulatory Setting

The federal, state, and local regulatory setting pertaining to agriculture and forest resources can be found in Section 3.7 “Greenhouse Gas” of the Merced EIR.

Would the Project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a): Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?			X	
b): Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases?			X	

Response a): Implementation of the proposed project would generate short-term construction GHG emissions and minimal long-term operational emissions. Construction-related GHG emissions would cease following buildout of the proposed project. Construction-related exhaust GHG emissions would be generated from a variety sources during construction of the proposed project including, but not limited to, heavy-duty construction equipment, haul trucks, material delivery trucks, and construction worker vehicles. Similar to air quality emissions, daily GHG emissions would vary depending on the type of construction activities planned for each day. For example, during construction equipment-intensive phases, such as site grading, daily GHG emission would be higher than daily emissions generated during less intensive phases such as material delivery. However, it is essential to understand the total amount of GHG emissions generated because of the longer atmospheric lifetimes of GHG pollutants. Table 3-4 presents the proposed project’s construction-related GHG emissions.

Table 3-4 Average Annual Construction-Related GHG Emissions

Water Management Plan Component	Emissions (MT CO ₂ e)
2,500-gpm Well ¹	479
Water Pipeline ²	5,698
Water Storage Tank/Booster Pump Station ³	554
Pressure Sustaining Valve ⁴	30
Total Construction Emissions	6,767
Annual Average Construction Emissions ⁵	254

Notes: MT CO₂e = metric tons of carbon dioxide equivalent; GPM = gallons per minute
 Totals may not appear to add exactly due to rounding.
¹ Total emissions associated construction of six 2,500-gpm wells.
² Total emissions associated with construction of approximately 40 miles of pipelines.
³ Total emissions associated with construction of three water storage tank/booster pump stations.
⁴ Total emissions associated with one pressure-sustaining valve every 4 years over the 30-year buildout period.
⁵ Annual average construction emissions over the project buildout (30 years).
 Source: AECOM 2016

At the time of this analysis, SJVAPCD has not developed a quantitative threshold of significance for construction-related GHG emissions. However, the neighboring Sacramento Metropolitan Air Quality Management District (SMAQMD) has adopted an annual construction-related GHG threshold of 1,100 metric tons of carbon dioxide equivalent (MT CO₂e/yr) (SMAQMD 2015). Given the lack of an applicable construction-related GHG threshold, the SMAQMD's threshold is used to evaluate the proposed project's construction emissions. Accordingly, the proposed project's annual average construction emissions would not exceed the applicable threshold and therefore the proposed project's construction-related GHG emissions would not be considered a cumulatively considerable contribution to the environment. This impact with respect to construction-related emissions would be **less than cumulatively significant**.

As the proposed WMP components are constructed and become operational, the proposed WMP components would begin to use electricity for water management operations. Electricity consumption would generate indirect GHG emissions associated with electricity production. It is also anticipated that minimal GHG emissions would be generated by occasional maintenance and inspection activities for the proposed WMP infrastructure. However, these emissions would be infrequent and nominal in nature. Therefore, this analysis of operational GHG emissions focuses on the electricity consumption required to operate the proposed WMP infrastructure at full buildout. Table 3-5 presents the proposed project's annual GHG emissions at full buildout.

Table 3-5 Annual Operational GHG Emissions

Water Management Plan Component	Emissions (MT CO ₂ e)
2,500-gpm Well ¹	1,777
Water Pipeline ²	–
Water Storage Tank/Booster Pump Station ³	1,244
Pressure Sustaining Valve ⁴	–
Annual Operational Emissions	3,021

Notes: MT CO₂e = metric tons of carbon dioxide equivalent; GPM = gallons per minute
Totals may not appear to add exactly due to rounding.

¹ Includes operational emissions associated with six 2,500-gpm wells.
² Although pipelines could increase electricity consumption at terminal pump and water treatment stations, it is also possible that water could be gravity-fed and therefore the indirect electricity demand increases were not estimated as part of this analysis.
³ Includes operational emissions associated with three water storage tank/booster pump stations.
⁴ Pressure sustaining valves would require minimal electrical loads and therefore electricity demand
Source: AECOM 2016

SJVAPCD has adopted guidance/policy documents for both land use development projects and stationary sources (the SJVAPD GHG CEQA Guidance). The SJVAPCD has not adopted numerical standards below which a project would be determined not to have an impact. Instead, it has identified a number of Best Performance Criteria Standards (BPS) where a project's impact significance would be determined on the level of implementation of best performance standards that apply to commonly proposed land use development and/or stationary source projects that would achieve a 29% reduction from business-as-usual (BAU). Projects that implement all BPS are assumed to meet a standard of a GHG reduction of 29% of BAU and would have a less-than-significant impact. Projects that cannot implement all required BPS must demonstrate a 29% reduction from BAU to reduce GHG impacts to a less-than-significant level (SJVAPCD 2009).

This method of impact assessment is most accurately applied to residential, commercial, and mixed-use development projects. It would not be directly applicable to a water management infrastructure project such

as the WMP. The proposed project's operational activities are more similar to a stationary source because of the infrastructure-like service and types of emission sources. However, because of the dispersed nature of the WMP components, the proposed project would also not completely fit the mold of a stationary source. Nevertheless, in order to provide a statewide context for the project's level of GHG emissions, the following variously adopted thresholds are presented below:

- Stationary sources that generate greater than 10,000 metric tons carbon dioxide (MT CO₂) per year may be required to participate in the cap-and-trade program through the Western Climate Initiative (WCI 2009).
- The BAAQMD has previously adopted 10,000 MT carbon dioxide equivalent (MT CO₂e) per year as the significance threshold for operational GHG emissions from stationary-source projects (BAAQMD 2010).
- ARB requires operators of selected facility types that generate GHG emissions exceeding 10,000 MT CO₂e per year to comply with their Mandatory Reporting of Greenhouse Gas Emissions regulation (ARB 2015).
- Facilities that generate greater than 25,000 MT CO₂e per year are required to report their emissions as part of EPA's Mandatory Reporting of Greenhouse Gases (EPA 2009).

As shown in Table 3-5, the proposed project's annual operational GHG emissions at full buildout would be substantially less than the contextual thresholds shown above. In addition, the proposed project's electricity-related GHG emissions would continue to decrease over time as the Merced Irrigation District (MID) begins to procure more renewable resources pursuant to statewide measures such as the Renewable Portfolio Standard (see Senate Bills 1078 and 107 and Executive Orders S-14-08 and S-21-09) and Senate Bill 350 (MID 2013). Therefore, as renewable energy sources become more readily available in the project area, renewable technology matures, and MID increases their purchases of renewable energy, the proposed project's electricity-related GHG emissions would continue to decrease. Considering the proposed project's annual emissions at full buildout would be substantially less than all of the contextual thresholds even using the existing electricity emissions intensity, which would decrease over time, it is not anticipated that the proposed project's long-term operational GHG emissions would be considered a cumulatively considerable contribution to the environment. This impact with respect to operational emissions would be **less than cumulatively significant**.

Response b): In 2012, the City's Economic Development Advisory Committee adopted the Merced Climate Action Plan (Merced CAP) (City of Merced 2012). The Merced CAP includes strategies and actions that should be taken to reduce GHG emissions to 1990 levels by 2020, which is consistent with the emission reduction goal of AB 32. One of the main benefits that the Merced CAP aims to maintain while achieving these GHG reductions is increased water supplies and reliability. The current Merced Vision 2030 General Plan projects a 94% increase in population from 2012 to 2030, which would result in an approximate 72% increase in water demand during the same period. Therefore, in order to support planned growth resulting from the expanding university (UC Merced) and a future interstate rail system, the Merced CAP identifies water supply and conservation as its key components. Similarly, the Scoping Plan states its objective is to not only reduce GHG emissions, but to reduce emissions while also providing the same level of service currently available to California residents such as clean water supplies. Furthermore, the AB 32 Scoping Plan Update (Scoping Plan Update), which identifies next steps the state must take to achieve the goals of the original AB 32 Scoping Plan, states that maintaining water supply reliability during drought periods coupled with mandatory conservation measures are essential for the state's climate resiliency. As climate change factors, such as increased temperatures, decreased winter snowfall, and greater rainwater runoff,

threaten water supply, the Scoping Plan Update emphasizes the importance of securing water supply for future population growth and economic development.

The proposed project is not a water conservation project, but rather a water management infrastructure project. All components of the proposed project would be built using the most current technologies, efficiencies, and materials available at the time of construction. Therefore, it is anticipated that the proposed project will provide the city and region with more reliable and efficient water supply infrastructure to meet the demands of future populations and businesses in the area. It is anticipated that all pumps installed as part of the proposed wells and booster pump stations would be new and operate at a high efficiency to minimize the electricity-intensity of water supplied to the city and surrounding areas.

Therefore, the proposed project would provide new water supply infrastructure for groundwater (i.e., wells), water conveyance and distribution (i.e., pipelines), water storage (i.e., storage tank and booster pump station), all of which are essential components for reliable and safe water supply to serve future populations. Although the proposed project would generate short-term construction and long-term operational GHG emissions, the purpose, intent, and design of the proposed project would be consistent with the goals and strategies of the Merced CAP and AB 32 Scoping Plan to strengthen the reliability of the water supply system to serve future population and economic growth, while reducing GHG emissions. Considering the proposed project's consistency with the Merced CAP, the proposed project would not conflict with the applicable plan adopted for the purpose of reducing GHG emissions. This impact would be **less than significant**.

3.8 Hazards and Hazardous Materials

This section describes the existing environmental and regulatory setting of the proposed project and analyzes the potential impacts associated with hazards and hazardous materials that would result from implementing the proposed project.

3.8.1 Environmental Setting

Several sites located within the city are associated with leaking underground fuel tanks (LUFT), are classified as Spills, Leaks, Investigation, and Cleanups sites (SLIC), or are associated with the US Environmental Protection Agency National Priority Listing.

Lists of contaminated sites within the City of Merced are available through the Regional Water Quality Control Board and the Department of Toxic Substance Control. According to information provided by these agencies, several sites located within the city are associated with leaking underground fuel tanks (LUFT) or are classified as Spills, Leaks, Investigation, and Cleanups sites (SLIC). Appendix H of the Merced EIR lists the site name, location, site type, and status of the listings identified.

The GeoTracker website was used to identify possible sites that have contaminated groundwater or have the potential to contaminate groundwater in the area. The website showed a variety of sites that have either been cleaned up or are currently under investigation.

Wildfires: Both urban and wildland fire hazard potential exists in the city and surrounding areas, creating the potential for injury, loss of life, and property damage. Urban fires primarily involve the uncontrolled burning of residential, commercial, or industrial structures due to human activities. Wildland fires affect grassland, brush or woodlands, and any structures on or near these fires. Such fires can result from either human-made or natural causes (Merced EIR).

Airports: The city is impacted by the presence of two airports, the Merced Regional Airport on the southwest corner of the city and Castle Airport is located outside of the SUDP/SOI approximately 3 miles west of the Highway 59 and Bellevue Road intersection. This is the former Castle Air Force Base (Merced EIR). Two private airstrips are located outside of the sphere of influence: the Flying M Ranch Airport and the Hunt Farms Airport located due south and east, respectively.

3.8.2 Regulatory Setting

The federal, state, and local regulatory setting pertaining to hazards and hazardous materials resources can be found in Section 3.8 “Hazards and Hazardous Materials” of the Merced EIR.

3.8.3 Impact Assessment Checklist

Would the Project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?			X	
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?			X	
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?			X	
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?			X	
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?			X	
f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?				X
g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?				X

Would the Project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
h) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?			X	

Response a): The proposed project consists of the implementation and construction of projects described in Table 2-1 of the Water Master Plan Update within the Merced SUDP/SOI area. Commonly used materials (i.e., including oils, lubricants, and gasoline) could be transported via public roads, which are regulated by the California Department of Transportation (Caltrans). The project will not create a significant hazard to the public through routine transport, use, or disposal of hazardous materials. Section 2.5 of this IS contains BMP HAZ-1, Construction Site Hazardous Materials and Waste Management. This BMP has been incorporated into the project description to avoid or substantially lessen adverse environmental impacts. The impacts are **less than significant**.

Response b): The proposed project would not create a significant hazard to the public or the environment. Construction activities associated with the project would use small amounts of hazardous materials, as stated above. Accidental spills associated with the project could happen; however, construction would have to follow BMPs for handling hazardous materials. Section 2.5 of this IS contains BMP HAZ-1, Construction Site Hazardous Materials and Waste Water Management. This BMP has been incorporated into the project description to avoid or substantially lessen adverse environmental impacts. The potential impact would be **less than significant**.

Response c): There are four school districts in the city of Merced: Merced City School District, Weaver Union School District, Merced Union School District, and Merced Community College District. The exact location of the water system improvements described in Table 2-1 have not been determined but could be located within one quarter mile of a school. However, construction would not involve the handling of petroleum projects, hazardous or acutely hazardous materials. The impact is **less than significant**.

Response d): Lists of contaminated sites within the city are available through the Regional Water Quality Control Board and the Department of Toxic Substance Control. According to information provided by these agencies, several sites located within the city are associated with leaking underground fuel tanks (LUFT) or are classified as Spills, Leaks, Investigation, and Cleanups sites (SLIC). Appendix H of the Merced EIR lists the site name, location, site type and status of the listings identified Policies S-7.1 and S-7.2 and implementing actions found in the General Plan (Appendix A) have been incorporated into the project description to avoid or substantially lessen adverse environmental impacts. Future construction and operation of projects described in Table 2-1 of the Water Master Plan Update will be in compliance with. This impact is **less than significant**.

Response e): As stated above, the only public airport located in the city is the Merced Regional Airport. It is located south of State Route 99 and provides general aviation services. Since the exact location of the project has not been identified, it is possible for it to be located within 2 miles of the airport. However, construction would not create a safety hazard for people residing or working in the project area. The impact is **less than significant**.

Response f): Two private airstrips the Flying M Ranch Airport and the Hunt Farms Airport, located due south and east, respectively, are outside of the SUDP/SOI. There is no impact.

Response g): Policy S-1.1 and implementing actions found in the General Plan (Appendix A) have been incorporated into the project description to avoid or substantially lessen adverse environmental impacts. Future construction and operation of projects described in Table 2-1 of the Water Master Plan Update will be in compliance with Policy S-1.1 and implementing actions. The project would not modify or block any evacuation route, nor would it interfere with an emergency response plan. There is no impact.

Response h): Due to the nature of the proposed projects described in Table 2-1, there would be no increase in wildlife hazards or introduction of uses that would be prone to induce wildfire risk. The impact is **less than significant**.

3.9 Hydrology and Water Quality

3.9.1 Environmental Setting

The following section characterizes the existing groundwater basin. Appendix D presents *Groundwater Conditions and Supply Assessment of the City of Merced 2030 General Plan Area* dated April 2016 (Kenneth D. Schmidt and Associates 2016). The report discusses groundwater conditions, geology under the city, and groundwater budget. Information on the city's groundwater quality characteristics is presented in Appendix E *Review of Merced Municipal Well Water Quality Data* dated April, 2016 (AECOM 2016). Below is a summary of the groundwater components of the groundwater study and the water quality memorandum.

Groundwater and Pumping Characteristics

Merced is located in the 2,665-square-mile Middle San Joaquin–Lower Chowchilla watershed (U.S. Geological Survey Hydrologic Unit 18040001), which is part of the San Joaquin River Groundwater Basin. The basin covers approximately 15,200 square miles. The San Joaquin River and its larger tributaries compose the major river system in the basin. The San Joaquin River drains into the Sacramento–San Joaquin Delta, which eventually empties into San Francisco Bay. Groundwater, which is generally supplied by runoff from the foothills and mountains, is currently the sole source of domestic water for the city of Merced.

The geographic units beneath the Merced area are saturated with fresh water to a depth of approximately 1,200 feet, and the city draws its water for domestic applications from the intermediate aquifer. The city's municipal wells are typically 200 to 400 feet deep. Historically, the water quality in the intermediate aquifer within the study area has been good. A few wells have experienced a rare one-time exceedance of the maximum contaminant levels (MCL). Most of the city's wells have low levels of naturally-occurring arsenic, and Wells 2C and 13 have levels approaching the MCL. Groundwater in shallower aquifers in the Merced region is impacted by nitrates from wastewater disposal and agriculture, and water quality is declining. However, the city's wells do not draw groundwater from the shallower aquifers. A more detailed evaluation of the water quality of the city's wells, including a summary of the analytical data for each well from 2011 to 2015, can be found in Appendix E.

Merced currently depends solely on groundwater and has 22 active well sites, although not all 22 sites are actively used. The city also has four elevated storage tanks that provide 1.5 million gallons (MG) of storage. Currently, the City is constructing a new well (Well No. 20). This well is an independent action initiated by the City and is not part of the proposed new facilities.

Per-capita water usage has decreased over the last 30 years. From 1978 to 1985, water usage ranged from 313 to 396 gallons per day per capita (gpcd). From 2005 to 2012, water usage ranged from 255 to

271 gpcd. The City has instituted significant water conservation measures in recent years in response to the prolonged drought and the Governor’s Executive Order to reduce water consumption.

Merced’s total water demand is anticipated to increase by approximately 72% from 2012 to 2030 (an increase of approximately 18,670 acre-feet per year) to accommodate full buildout under the General Plan. Table 3-6 presents existing and projected water demands by type (City of Merced 2015a).

Table 3-6 Existing and Projected Water Demand, City of Merced

Demand Type	Existing	Proposed
Annual Demand, AFY	25,899	44,596
Average day, gpm	16,057	27,649
Average day, MGD	23.4	40.3
Maximum day, MGD ¹	44.5	76.6
Peak hour, gpm ²	44,960	77,417

AFY = acre-feet per year, gpd = gallons per day, MGD = million gallons per day

¹ Maximum-day demand is defined as 1.9 times the average-day demand.

² Peak-hour demand is defined as 2.8 times the average-day demand.

Source: City of Merced 2015a.

Sources of Groundwater Recharge

The predominant sources of recharge to groundwater in the Merced area are seepage from canals and creeks and excess applied irrigation water beyond consumptive use by crops. Additional recharge comes from percolation of sewage effluent (Kenneth D. Schmidt and Associates. 2016), but a significant amount of the existing sewage effluent is delivered outside of the 2030 General Plan boundary.

Subsurface Geologic Conditions

Alluvial deposits comprising alternating layers of sand, gravel, and clay provide water to the wells in the Merced area. Bedrock is indicated to be more than 2,000 feet deep. Highly productive deposits of the Mehrten Formation, known locally as “black sands,” are present at depths over 500 feet deep beneath the Merced area. A regional confining bed (the Corcoran Clay) extends from the west side of the valley to near the western edge of the city. Because of its limited extent and thin nature where present beneath the city, this clay is not considered significant. However, other more extensive clay layers do exist throughout the city and create other confined layers.

Additional information and four geologic cross sections can be found in the *Groundwater Conditions Beneath the City of Merced – 2030 General Plan Boundary Study* (Kenneth D. Schmidt and Associates. 2016).

3.9.2 Regulatory Setting

The city of Merced’s water infrastructure and the Water Master Plan’s findings and recommendations are based on the following codes and regulations:

- City of Merced Standard Designs
- City of Merced Building Department
- California Code of Regulations, Titles 17 and 22.
- American Water Works Association
- State Water Resources Control Board Division of Drinking Water Regulations
- California Health and Safety Code

- California Building Code
- California Fire Code
- National Fire Protection Association
- Insurance Service Office
- Uniform Plumbing Code
- Hydraulic Institute

The Sustainable Groundwater Management Act (Act) became effective on January 1, 2015. The Act provides a framework for improved management of groundwater by local authorities. The legislation provides local agencies with tools to manage groundwater basin in a sustainable manner over a long-term horizon. It also established a definition of sustainable groundwater management, provides local agencies with the ability to develop plans and implement strategies' to sustainably manage groundwater resources, prioritizes basins and sets a timeline for implementation. By January 31, 2020 Groundwater Sustainability Plans (GSP) must be completed for basins in critical overdraft.

In January 2016, Department of Water Resources (DWR) designated the Merced Groundwater Basin as a Critically Overdrafted Basin 2016.

3.9.3 Impact Assessment Checklist

Would the Project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Violate any water quality standards or waste discharge requirements?			X	
b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?		X		
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?				X
d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?				X
e) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?			X	
f) Otherwise substantially degrade water quality?			X	

Would the Project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
g) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?			X	
h) Place within a 100-year flood hazard area structures which would impede or redirect flood flows?				X
i) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?			X	
j) Inundation by seiche, tsunami, or mudflow?			X	

A Statement of Overriding Considerations was previously adopted for these impacts in association with the *Merced Vision 2030 General Plan Final Program EIR (City Council Resolution #2011-63)*.

Response a): The future well sites would be paved with asphalt, creating an impervious surface that would increase the potential of surface runoff. The construction activities associated with the piping projects along city streets may also potentially impact water quality or waste discharges. Increased siltation and sedimentation could result from erosion and storm runoff during project construction. However, Section 3.7 of the City’s General Plan Policy P5-1 states that the City will provide effective storm drainage facilities for future development. Before ground-disturbing construction activities, the City will be responsible for requiring or developing and implementing BMP Hydro-1 and Hydro-2 that will be used to reduce or eliminate pollutants in stormwater discharges from the project sites, which may include use of wattles, silt fencing, and stabilization of construction entrances to minimize trackout. These BMPs would protect water quality. The impact is **less than significant**.

Response b): The Water Master Plan includes construction and operation of new wells to supply water for the city. The city’s groundwater is currently in a state of overdraft, and the planned growth as part of the 2030 General Plan will increase water demands. Operation of new wells would contribute to overdraft conditions.

Existing groundwater conditions were analyzed and the amount of current and ultimate overdraft estimated as part of the water budgeting in a groundwater study (Kenneth D. Schmidt and Associates 2016). The report examined current and future demands (urban and irrigation), sources of water supply (groundwater and surface water), consumptive use, and groundwater recharge activities.

The Kenneth D. Schmidt and Associates 2016 report estimates the water budget for the existing condition is a net deficit of 10,500 AFY, and the water budget under the 2030 scenario is a net deficit of 4,500 AFY. The impact is **significant**.

Mitigation Measure: Hydrology-1

The City’s Wastewater Treatment Plant currently provides a tertiary level treatment of about 8,155 acre-feet per year (City of Merced 2015). The City shall use recycled (tertiary treated and disinfected) water from the city’s WWTP to recharge the groundwater and offset the deficit. Under full buildout as water use increases the volume of tertiary treated and disinfected wastewater would also increase and provide additional groundwater recharge. The impact will be **less than significant**.

Effectiveness of Mitigation Measure: Implementing this mitigation measure would reduce the impact to a **less-than-significant** level because under full buildout as water use increases the volume of tertiary treated and disinfected wastewater would also increase and provide additional groundwater recharge

Response c): General Plan Policy P5-1 states that the City will provide effective storm drainage facilities for future development. Before ground-disturbing construction activities, the City will be responsible for requiring or developing and implementing BMP Hydro-1 and BMP Hydro-2. Construction and operation of proposed projects will not result in substantial erosion or siltation on- or off-site. The projects will have no impact.

Response d): The proposed projects will not significantly increase the rate or amount of surface runoff from the proposed sites that would result in flooding. Stormwater runoff from any of the projects will be retained on-site or diverted into the city's stormwater system. There is no impact.

Response e and f): The proposed projects are located in existing or master planned parts of the city that are or will be designed and constructed to convey stormwater runoff from the proposed project sites. Some of the proposed projects are in areas to be master planned in the future. The design of projects described in the Water Master Plan will also meet the requirements of the City's Storm Water Management Program (SWMP) and limit, to the maximum extent practicable (MEP), the discharge of pollutants into the city's storm sewer system. The SWMP has been developed to meet the terms of the General Permit Number CAS000004, Water Quality Order No. 2003-0005-DWQ and consists of control measures as established by the SWRCB. The impact is **less than significant**.

Response g): The exact location of the proposed facilities is not known at this time but would not be located within a 100-year floodplain. Policies of the General Plan's Safety Element direct the City to limit development in hazardous areas and minimize flooding hazards. Implementing Action 3.2.a of the General Plan states that the City will continue to build entryways for all pump stations (both sewer and water) at 1 foot above the 100-year flood elevation and consider additional standards to address flooding caused by dam failure. In addition, Implementing Action 3.2.b states that the City will continue the floodproofing of high-value or important city infrastructure, such as lift stations and signal control functions, as required by the City's Flood Damage Prevention Ordinance. Implementing Actions 3.2.a and 3.2.b of the General Plan are self-mitigating; therefore, this impact would be **less than significant**.

Response h): The proposed facilities would not be located within a 100-year flood hazard area. There is no impact.

Response i): Besides flood hazards associated with 100-year flood zones, another potential hazard for Merced is flood inundation caused by levee or dam failure resulting from a variety of factors. The project area is located within the inundation area of Lake Yosemite Dam. Lake Yosemite Dam is located on a tributary of the Merced River about 9 miles from the northeast corner of the project site. Lake Yosemite Dam is an earthen fill dam, which makes it more flexible, and therefore more earthquake resistant. However, if the dam were overtopped, dam failure could occur.

As stated previously, policies of the General Plan's Safety Element direct the City to limit development in hazardous areas and minimize flooding hazards. Implementing Action 3.2.a of the General Plan states that the City will continue to build entryways for all pump stations (both sewer and water) at 1 foot above the 100-year flood elevation and consider additional standards to address flooding caused by dam failure. In addition, Implementing Action 3.2.b states that the City will continue the floodproofing of high-value or important city infrastructure, such as lift stations and signal control functions, as required by the City's Flood Damage Prevention Ordinance. Implementing Actions 3.2.a and 3.2.b of the General Plan are self-mitigating; therefore, this impact would be **less than significant**.

Response j): Seiches, or waves generated in bodies of water similar to the back-and-forth sloshing of water in a tub, could possibly occur near the project site. Lake Yosemite is subject to seiches in the event of an earthquake. If the seiche were to overtop Lake Yosemite Dam, failure could result. Dam failure would cause flooding in the project area. Given the distance between the lake (9 miles) and any major faults (Segment 9 of Great Valley Segment Fault is 30 miles away), the risk of seiche related effects from Lake Yosemite Dam is extremely low. Yosemite Lake has not experienced a seiche since its construction. This impact would be **less than significant**.

Because of its inland location, Merced is not at risk from tsunamis. Finally, the project site is also not at risk of mudflows because of its relatively flat topography and distance from any hillsides. This impact would be **less than significant**.

3.10 Land Use

This section describes the existing environmental and regulatory setting of the proposed project and analyzes the potential impacts associated with land use and planning that would result from implementing the proposed project.

3.10.1 Environmental Setting

Incorporated in 1889, Merced is the largest city in the county. State Highway 99 is the main access route to Merced. It runs through the central portion of Merced in a general north/south direction, as well as other valley cities. State Highways 140 and 59 also serve the city.

The environmental setting described in Section 3.9 of the Merced EIR contains a number of policies that apply to land use and planning impacts in conjunction with ultimate buildout of the City in accordance with the General Plan. The specific policies are listed in Appendix A of the IS (Urban Expansion, Land Use, Transportation and Circulation, Public Services and Facilities, Urban Design, Open Space, Conservation, and Recreation, Housing, and Safety Elements) are designed to ensure that environmental impacts are minimized as development occurs.

The city contains a typical mix of residential, commercial, industrial, and public land uses. Significant areas in the north remain undeveloped, though they have been annexed. Less new development has occurred in the south portion of the city. The South Merced Community Plan was approved in 2008 and may spur additional development in the area (Merced EIR).

3.10.2 Regulatory Setting

The federal, state, and local regulatory setting for land use and planning can be found in Section 3.9 “Land Use and Planning” of the Merced EIR.

3.10.3 Impact Assessment Checklist

Would the Project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Physically divide an established community?				X
b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the General Plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?			X	
c) Conflict with any applicable habitat conservation plan or natural community conservation plan?				X

Response a): The proposed project consists of the construction of a water infrastructure projects within the Merced SUDP/SOI that would not divide an established community. There is no impact.

Response b): Policies and implementing actions found in the General Plan (Appendix A) have been incorporated into the project description to avoid or substantially lessen adverse environmental impacts. Implementing the Water Master Plan would occur with the SUDP/SOI and be consistent with these policies. This would result in **less-than-significant** land use impacts related to conflicts with other plans, policies, and regulations.

Response c): No Habitat Conservation Plans or Natural Community Conservation Plans have been adopted encompassing the proposed project site. There is no impact.

3.11 Noise

This section describes the existing environmental and regulatory setting of the proposed project and analyzes the potential impacts associated with noise that would result from implementing the proposed project.

3.11.1 Environmental Setting:

Noise is often defined as unwanted sound, and its perception can be characterized as a subjective reaction to a physical phenomenon. Table 3-7 provides examples of maximum or continuous noise levels associated with common noise sources (Merced EIR).

Table 3-7 Noise Levels of Typical Construction Equipment

Equipment Type	Typical Equipment Level (dBA) 50 ft from Source
Air Compressor	81
Backhoe	85
Concrete Pump	82
Concrete Breaker	82
Truck Crane	88
Dozer	87
Generator	78
Loader	84
Paver	88
Pneumatic Tools	85
Water Pump	76
Power Hand Saw	78
Shovel	82
Trucks	88

A common statistical tool to measure the ambient noise level is the average sound level (Leq), which is the sound level corresponding to a steady-state A-weighted sound level in decibels (dB) containing the same total energy as a time-varying signal over a given time period (usually one hour). The Leq, or average sound level, is the foundation for determining composite noise descriptors such as day-night average level (Ldn) and community noise equivalent level (CNEL) (see below), and shows very good correlation with community response to noise. Ldn is defined as the average hourly Leq over a 24-hour day with a +10 decibel weighting applied to nighttime Leq hours, usually between 10:00 p.m. and 7:00 a.m. CNEL is defined as the weighted average hourly Leq over a 24-hour day, except that an additional +4.77 decibel penalty is applied to evening, usually between 7:00 p.m. and 10:00 p.m. (Merced EIR).

3.11.2 Regulatory Setting

The federal, state, and local regulatory setting pertaining to noise can be found in Section 3.11 “Noise” of the Merced EIR.

3.11.3 Impact Assessment Checklist

Would the Project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?		X		
b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?		X		

Would the Project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?			X	
d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?			X	
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?			X	
f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?				X

Response a): The proposed project consists of the construction/implementation of the Water Master Plan within the Merced SUDP/SOI. Although construction activities would be short term and temporary and for the most part occur only during daylight hours, uncontrolled construction noise could still be considered destructive to local residents adjacent to the proposed project. The General Plan states that it is normally acceptable for residential uses to experience in ambient noise level of 55 dBA during the hours of 7:00 a.m. to 10:00 p.m. and 45 dBA during the hours of 10 PM to 7 AM. Activities involved in typical construction would generate maximum noise levels, as indicated in Table 3-7.

Buildout of the Water Master Plan shall be according to the City's Noise Goal N-1 and Policies (Appendix A) and BMP Noise-1, which would ensure noise levels would not be excessive. Implementing actions and policies can be found in Section 3.11.3 of the Merced General Plan EIR. However, project construction would result in a temporary increase in noise levels. Adjacent residences may be sensitive to the construction noise. Activities involved in typical construction would generate maximum noise levels ranging from 80 to 89 decibels maximum noise level (i.e., dB L_{max}) at a distance of 50 feet (Table 3-10) Noise generated during construction of the proposed project could exceed 55 dBA during daytime hours of construction (7:00 a.m. to 10:00 p.m.). The impact is **significant**.

Mitigation Measure: Noise-1

All work shall be performed between the hours of 7:00 a.m. and 7:00 p.m. Monday through Friday. Exception to the designated works hours would be made for drilling wells. Each well would require approximately 6 to 10 days of continuous work (up to 24 hours per day) in order to protect the integrity of the well structure. Temporary sound curtains, walls, and appropriate muffler devices would be used to mitigate the noise impacts of the drilling operation on the immediately surrounding residences. In addition, the use of impact wrenches would only be allowed between hours of 7:00 a.m. and 7:00 p.m.

Effectiveness of Mitigation Measure: Implementing this mitigation measure would minimize the temporary increase in noise to **less than significant** by limiting work hours, duration of continuous work, and employing the use of temporary sound curtains, walls, and muffler devices.

Response b): The General Plan does not include standards for evaluating vibration levels associated construction activities. Certain types of construction activities, such as pile driving and large compacting

equipment, may produce noise and vibration levels which may be excessive and/or result in damage to structures. Table 3-8 shows the potential vibration levels associated with construction activities.

Table 3-8 Vibration Levels for Varying Construction Equipment

Type of Equipment	Peak Particle Velocity @ 25 feet	Approximate Velocity Level @ 25 feet
Large Bulldozer	0.089 (inches/second)	87 (VdB)
Loaded Trucks	0.076 (inches/second)	86 (VdB)
Small Bulldozer	0.003 (inches/second)	58 (VdB)
Auger/drill Rigs	0.089 (inches/second)	87 (VdB)
Jackhammer	0.035 (inches/second)	79 (VdB)
Vibratory Hammer	0.070 (inches/second)	85 (VdB)
Vibratory Compactor/roller	0.210 (inches/second)	94 (VdB)

Source: Federal Transit Administration, Transit Noise and Vibration Impact Assessment Guidelines, May 2006

Table 3-9 shows the effects of vibrations on people and buildings.

Table 3-9 Effects of Vibration on People and Buildings

Peak Particle Velocity inches/second	Human Reaction	Effect on Buildings
0-0.006	Imperceptible by people	Vibrations unlikely to cause damage of any type
.006-0.02	Range of Threshold of perception	Vibrations unlikely to cause damage of any type
0.08	Vibrations clearly perceptible	Recommended upper level of which ruins and ancient monuments should be subjected
0.1	Level at which continuous vibrations begin to annoy people	Virtually no risk of architectural damage to normal buildings
0.2	Vibrations annoying to people in buildings	Threshold at which there is a risk of architectural damage to normal dwellings

Source: Survey of Earth-borne Vibrations due to Highway Construction and Highway Traffic, Caltrans 1976.

Construction related vibration due to the use of vibrator compactor/roller could be a **potentially significant impact** to adjacent residences.

Mitigation Measure: Noise-2

Use of construction equipment that cause localized vibrations in excess of 0.2 inches/second peak particle velocity such as a vibrator compactor/roller on the project site is excluded from operating on the project site.

Effectiveness of Mitigation Measure: Implementing this mitigation measure would minimize the potential impact of ground borne vibration to **less than significant** by excluding the use of vibrator compactor/roller.

Response c): Policies N-1,1, N-1.2, N-1.3, N-1.4, N-1.5, N-1.6 and implementing actions found in the General Plan (Appendix A) and BMP Noise-1 have been incorporated into the project description to avoid or substantially lessen adverse environmental impacts.

Noise from construction activities would add to the noise environment in the immediate vicinity of a water system infrastructure facility. Activities involved in typical construction would generate maximum noise levels, as indicated in Table 3-7, ranging from 76 to 88 dB Lmax at a distance of 50 feet. Noise associated with the

operation of water system facilities (i.e., well pumps) and maintenance activities (i.e., vehicle trips) would also add to the noise environment.

Construction activities would be short term and temporary and would not generate a substantial permanent increase in ambient noise levels in the project vicinity. The impact is **less than significant**.

Response d): Construction activities would not be expected to generate a significant amount of traffic and impacts would be minimal. Construction noise impacts would be temporary and periodically exceed ambient noise levels. The impact is significant. However, implementing Mitigation Measure 3.12-1 would minimize the potential impact to **less than significant**.

Response e): The Merced Regional Airport is the only public airport in the city that provides commercial air and air cargo services. Infrastructure improvements identified in Table 2-1 and as seen on Figure 2-2 may occur along Thornton Avenue adjacent to and west of the Merced Regional Airport and within the identified Noise Contours as seen on Figure 10.6 of the General Plan. Workers involved in construction of water system facilities along Thornton Avenue could be temporarily exposed to noise levels ranging from 60 to 65 CNEL. According to Figure 10.1 in the General Plan, CNEL exposure to 55 to 60 CNEL is normally acceptable, 60 to 65 CNEL is conditionally acceptable, and 70+ CNEL is normally unacceptable for industrial, manufacturing, utilities, agriculture land use. This impact is **less than significant**.

Response f): There are two private airstrips: the Flying M Ranch Airport, located 5 miles south of SR 99, and the Hunt Farms Airport, located 6 miles northeast of SR 99 outside of the SUDP/SOI. No water system improvements would be constructed outside the SUDP/SOI. There is no impact.

3.12 Mineral Resources

This section describes the existing environmental and regulatory setting of the proposed project and analyzes the potential impacts associated with mineral resources that would result from implementing the proposed project.

3.12.1 Environmental Setting

According to the Merced EIR, the City does not contain any mineral resources that require managed production. Very few traditional hardrock mines exist in the county. Mineral resources are comprised of sand and gravel mining operations.

3.12.2 Regulatory Setting

The federal, state, and local regulatory setting pertaining to mineral resources can be found in Section 3.11 “Mineral Resources” of the Merced EIR.

3.12.3 Impact Assessment Checklist

Would the Project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?				X
b) Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?				X

Response a): The proposed project would not result in the loss of availability of known mineral resources valuable to the region and the state. According to the California Geological Survey, Aggregate Availability in California Merced Vision 2030 General Plan August 2010 Draft Environmental Impact Report Page 3.10-3 - Map Sheet 52, Updated 2006 minor aggregate production occurs west and north of the city. There is no impact.

Response b): Implementation of the proposed project would not result in the loss of locally important mineral resource sites. It is not located in a Mineral Resource Zone or mineral resource recovery site. Therefore, there is no impact.

3.13 Population and Housing

This section describes the existing environmental and regulatory setting of the proposed project and analyzes the potential impacts associated with population and housing that would result from implementing the proposed project.

3.13.1 Environmental Setting

The city of Merced’s population is 80,985, as of 2010. According to the General Plan, there will be an estimated 2 percent increase in population per year until 2030. This would increase the city’s population to 116,000, while the County can expect to grow up to 417,000. For a complete list of population trends and demographic information, see Table 3.12.1 of the Merced General Plan EIR (Merced EIR).

3.13.2 Regulatory Setting

The federal, state, and local regulatory setting for utilities and service systems can be found in Section 3.12 Population and Housing of the Merced General Plan EIR (City of Merced 2012b).

3.13.3 Impact Assessment Checklist

Would the Project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?				X
b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?				X
c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?				X

Response a): The purpose of the Water Master Plan is to propose infrastructure improvements regarding the potential water system which will be used to accommodate growth through 2030. This growth would occur even without adoption of the Water Master Plan since the existing 2030 General Plan allows for growth within the city limits and the sphere of influence. The proposed project will not induce substantial population growth, directly or indirectly. There is no impact.

Response b): See Response a. The proposed project will be located within the Merced SUDP/SOI and will not displace substantial numbers of existing housing. There is no impact.

Response c): See response a. The project will not displace a substantial number of people, necessitating the construction of replacement housing. There is no impact.

3.14 Public Services

This section describes the existing environmental and regulatory setting of the proposed project and analyzes the potential impacts associated with public services that would result from implementing the proposed project.

3.14.1 Environmental Setting

Police Protection: Police protection for the entire city is provided by the City of Merced Police Department. The Police Department employs a combination of sworn officers, non-sworn officer positions (clerical, etc.) and unpaid volunteers. In 2010, the Merced Police Department had 111 sworn officers. Based on a population of 80,985, this ratio exceeds the standard of one officer per 1,000 citizens. Merced is divided into three police districts, each with its own police facility and officers. District 1 serves the area north of Bear Creek from the north station on Loughborough Drive. District 2 serves the area between Highway 99 to the south and Bear Creek to the north from the central station at M and 22nd Streets. District 3 serves the area south of Highway 99 from the south station in McNamara Park (Merced EIR).

Fire Protection: The City of Merced Fire Department provides fire protection, rescue, and emergency medical services from five fire stations throughout the urban area. The central fire station is located in the downtown area. There is a station on East 21st Street near Yosemite Park Way, a station north of the Merced Mall on Loughborough Drive, a station on Parsons, and another at the Regional Airport (Merced EIR).

Schools: The public school system is served by four districts, which include elementary schools, middle (junior high) schools, and high schools: Merced City School District (elementary and middle schools), Merced Union High School District, Weaver Union School District (serving a small area in the southeastern part of the city with elementary schools), and McSwain Union Elementary School District (serving a small area in the southwestern part of the city with an elementary school). Merced College and UC Merced are two public colleges located within the city (Merced EIR).

Parks: The city has approximately 187 acres of active parkland, more than 120 acres of linear parkland encompassing the stream corridors where the bike paths are located, and more than 56 acres of undeveloped parkland. The bike trail system is contained in four creek corridors, and currently totals 13 miles. The park facilities include 23 youth softball/baseball fields, 5 adult softball fields (all lighted), 13 soccer fields, 6 tennis courts, and 5,450 square feet of pool space (City of Merced 2012b) .

Other Public Services: Several other public facilities are discussed in Chapter 5 of the Merced EIR which includes libraries, health services, and government facilities (City of Merced 2012b).

3.14.2 Regulatory Setting

The federal, state, and local regulatory setting for utilities and service systems can be found in Section 3.13 Public Services of the Merced General Plan EIR.

3.14.3 Impact Assessment Checklist

Would the Project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:				
i) Fire protection?				X
ii) Police protection?				X
iii) Schools?				X
iv) Parks?				X
v) Other public facilities?				X

Response a.i): The Merced Fire Department is located at 99 E 16th Street in downtown Merced. As stated above, five fires stations are scattered throughout the Merced area, which provide fire protection and medical and rescue services. Implementation of the proposed project would not include construction of residences or businesses that increase the demand for fire protection services. There is no impact.

Response a.ii): As stated above, there are three policing districts within the city of Merced. Implementation of the proposed project would not impact police protection services, nor would any related facilities require

construction. The proposed project would not include construction of residences or businesses that increase the demand for police protection services. There is no impact.

Response a.iii): As stated above, the public schools within the city of Merced are served by four districts, and two colleges are part of the Community College System. The proposed project would not include construction of residences or businesses that increase the demand for schools or educational services. There is no impact.

Response a.iv): The proposed project would not result in adverse physical impacts to parks in the area. There is no impact.

Response a.v): Other public facilities located in the area include the Merced County Library, Mercy Medical Hospital, and Merced County Courthouse. Construction of the water treatment plant would not impact other public facilities, nor would related facilities require construction. There is no impact.

3.15 Recreation

This section describes the existing environmental and regulatory setting of the proposed project and analyzes the potential impacts associated with recreation that would result from implementing the proposed project.

3.15.1 Environmental Setting

Merced has a well-developed network of parks and recreation facilities. The city’s standard is 5 acres of city parkland for every 1,000 residents. In addition, the parks and open space system is supplemented by school grounds, church grounds, Lake Yosemite, and other similar facilities. These supplemental recreation opportunities are not included in the standard (Merced EIR). Tables 3.13-1 and 13.1-2 of the Merced EIR provide a list and detailed description of the types of parks and the number of acres of parks within the city.

3.15.2 Regulatory Setting

The federal, state, and local regulatory setting for recreation can be found in Section 3.13 Recreation of the Merced General Plan EIR (Merced EIR).

3.15.3 Impact Assessment Checklist

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?				X
b) Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?				X

Response a): The Water Master Plan Update’s purpose is to propose improvements regarding the potential water system infrastructure, which will be used to accommodate the city growth through 2030. The Water Master Plan would not increase the use of existing neighborhood parks or other recreational facilities that would cause substantial deterioration. There is no impact.

Response b): The project does not require the construction or expansion of recreational facilities. There is no impact.

3.16 Transportation

This section describes the existing environmental and regulatory setting of the proposed project and analyzes the potential impacts associated with transportation that would result from implementing the proposed project.

3.16.1 Environmental Setting

State Routes 99, 52, and 140 provide access to the city. State Route 99 runs north and south throughout the Central Valley, and passes through Merced. State Route 52 connects North Merced with Snelling. State Route 140 is a two-lane road that runs east and west, and connects I-5 and Yosemite National Park. It provides access to the city of Merced from the west (Merced EIR).

3.16.2 Regulatory Setting

The federal, state, and local regulatory setting for transportation can be found in Section 3.16 Transportation of the Merced EIR (Merced EIR).

3.16.3 Impact Assessment Checklist

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume to capacity ratio on roads, or congestion at intersections)?				X
b) Exceed, either individually or cumulatively, a level of service standard established by the county congestion management agency for designated roads or highways?				X
c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?				X
d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?				X

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
e) Result in inadequate emergency access?				X
f) Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?				X

Response a): As stated in Section 3.3 Air Quality, it is anticipated that construction activities would generate approximately 53 total construction-related vehicle trips per day from construction workers and haul trucks. These vehicle trips would be distributed throughout the city on various roadways as not all of the water system facilities in the Water Master Plan are in the same location. In addition, the project area would not involve travel in limited air-mixing areas, and vehicle trips would more likely be distributed throughout the work day to avoid peak hours. Thus, the proposed project is not expected to contribute a substantial amount of traffic to existing intersections. It would involve transporting construction materials and workers to the site. However, this would not increase congestion. There is no impact.

The proposed project would generate minimal increase in daily traffic. It would involve transporting construction materials and workers to the site. However, this would not increase congestion. There is no impact.

Response b): The proposed project would generate temporary and or intermittent truck traffic during construction and maintenance operations. However, there would not be a cumulatively increase the level of service standard for any roadway. There is no impact.

Response c): As stated earlier, the Merced Regional Airport is located 2 miles south of State Route 99 and provides general aviation services. Though the specific location of the water capital improvement projects identified in Table 2-1 have not been identified, it would not change air traffic patterns that could result in substantial safety risks. There is no impact.

Response d): Project implementation would not require the design of new roadways. There is no increase in hazards due to roadway design features or incompatible vehicle uses. There is no impact.

Response e): Implementation of the Water Master Plan will not result in inadequate emergency access. There is no impact.

Response f): The proposed project will not conflict with transportation policies or other policies supporting all modes transportation, including bicycles, pedestrians, and public transit. There is no impact.

3.17 Utilities and System Services

This section describes the existing environmental and regulatory setting of the proposed project and analyzes the potential impacts associated with utilities and system service materials that would result from implementing the proposed project.

3.17.1 Environmental Setting

Water System: In 2005, the City adopted an Urban Water Management Plan (UWMP), which describes the availability of water, and discusses water use, reclamation, and recycling activities. In addition, the UWMP

identifies a number of conservation practices which, when implemented, will relieve the pressure on groundwater supplies (Merced EIR). Water demand of the city is anticipated to increase by approximately 72 percent from 2012 to 2030 (an increase of approximately 18,697 AFY). The existing and projected water demand by type is presented in Table 2-2.

Wastewater: Wastewater collection and treatment in the Merced urban area is provided by the City. The wastewater collection system handles wastewater generated by residential, commercial, and industrial uses in the city. The city's wastewater treatment facility has a capacity of 11.5 MGD, with an average 2006 flow of 8.5 MGD (Merced EIR).

Solid Waste: The city is served by the Highway 59 Landfill and the Highway 59 Compost Facility. It is located at 6040 North Highway 59, 1.5 miles north of Old Lake Road. In addition to these two landfill sites, there is one private disposal facility, the Flintkote County Disposal Site, at SR 59 and the Merced River. This site is restricted to concrete and earth material (Merced EIR). The Highway 59 Landfill was expanded in 2001, and no further expansion of the facility is currently planned. The landfill permitted capacity after the expansion is 30 million cubic yards, with a maximum permitted disposal rate of 1,500 tons per day. After the expansion, the Highway 59 Landfill had a remaining capacity of 28 million cubic yards, or 93 percent Merced EIR.

Storm Water Drainage: Storm water runoff in the city is managed according to the *City of Merced Storm Drainage Master Plan*. The storm water drainage system consists of Merced Irrigation Facility facilities, including water distribution canals, laterals, drains, and natural channels that traverse the plan area (Merced EIR).

3.17.2 Regulatory Setting

The federal, state, and local regulatory setting for utilities and service systems can be found in Section 3.17 Utilities/Services Systems of the Merced EIR.

3.17.3 Impact Assessment Checklist

Would the Project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?				X
b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	X			
c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?			X	

Would the Project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
d) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?			X	
e) Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?				X
f) Be served by a landfill with sufficient permitted capacity to accommodate the projects solid waste disposal needs?			X	
g) Comply with federal, state, and local statutes and regulations related to solid waste?				X

Response a): No expansion of existing or construction of new wastewater facilities would be required. Therefore, wastewater treatment requirements would not be exceeded. There is no impact.

Response b): The Water Master Plan identifies the need of a new surface water treatment plant. The surface water treatment plant would be used to accommodate future development within the SUDP/SOI, as stated in the General Plan. However, the timing, capacity, conceptual and preliminary design, and exact location of the new surface water treatment plant are not known, and a feasibility study has not been prepared at this time. The impact is **significant**.

Response c): The proposed project would not include the construction or expansion of a storm water drainage facility. The proposed project would not alter the city's current drainage plan or create the need for any new drainage infrastructure. Therefore, this impact would be **less than significant**.

Response d): Implementation of the proposed project would not require new or expanded entitlements for any new groundwater wells. The State of California does not currently limit groundwater pumping, and the proposed project would not require any entitlements for the new groundwater wells. Therefore, this impact would be **less than significant**.

Response e): As noted under a) above, the proposed project would not generate additional demand for wastewater treatment. No impact would occur.

Response f): Project activities would be expected to generate a minimal amount of solid waste. Any solid waste generated during construction would be disposed at the Highway 59 landfill, which is located at 7040 N State Hwy 59, Merced, CA 95348. Moreover, the 2013 CALGreen Code (Title 24, Part 11 of the California Code of Regulations) requires all construction contractors to reduce construction waste and demolition debris by 50% and requires that 100% of trees, stumps, rocks, and associated vegetation and soils, resulting primarily from land clearing to be reused or recycled. The Highway 59 Landfill would be expected to reasonably accommodate the small amount of solid waste generated by the proposed project. This impact would be **less than significant**.

Response g): As discussed under f) above, any solid waste generated by the proposed project would be disposed at the Highway 59 landfill. Transportation and disposal would be conducted in accordance with all applicable federal, state, and local statutes and regulations. There is no impact.

3.18 Mandatory Findings of Significance

Under §15065(a) of the CEQA Guidelines, a finding of significance is required if a project “has the potential to substantially degrade the quality of the environment.” In practice, this is the same standard as a significant effect on the environment, which is defined in §15382 of the CEQA Guidelines as “a substantially adverse change in any of the physical conditions within the area affected by the project including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance.” This IS, in its entirety, addresses and discloses potential environmental effects associated with construction and operations of the proposed Water Master Plan, including direct, indirect, and cumulative impacts in the following resource areas:

Would the Project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Does the project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of an endangered, rare or threatened species; or eliminate important examples of the major periods of California history or prehistory?			X	
b) Does the project have impacts that are individually limited, but cumulatively considerable? (“Cumulatively considerable” means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?			X	
c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?			X	

Response a): Implementation of the Water Master Plan would indirectly and in combination with full buildout of the General Plan result in land conversion and the loss of habitat. This is a potentially **significant impact** on special-status species. Although the exact footprint of a project identified in Table 2-1 is not known, implementation of the proposed project improvements may result in the modification or loss of habitat or the “take” of species identified in Tables 3-2 and 3-3, or conflict with the provisions in the recovery plans. The impact is **significant**. However, implementation of Mitigation Measures Biology-1 through Biology-13 would reduce impacts to **less than significant**.

Response b): Construction of the proposed project would result in temporary impacts that would be limited primarily to the project site. The project would not make a cumulatively considerable incremental contribution to any significant cumulative adverse impacts. The incremental effects of the proposed project would not be cumulatively considerable when viewed in connection with the effects of past, present, and reasonably foreseeable future projects. This impact would be **less than significant**.

Response c): As discussed throughout this initial study, construction and operation of the proposed project would not cause substantial adverse effects on human beings, either directly or indirectly. The project is

intended to serve the growing population of Merced with water. Mitigation measures are provided to reduce the proposed project's potentially significant effects on air quality, biological resources, cultural resources, geology and soils, and hydrology and water quality to a less-than-significant level. Thus, construction, operation, and maintenance of the proposed project would not cause substantial adverse effects on human beings, either directly or indirectly. This impact would be **less than significant**.

Section 4

Mitigation Measures

Section 21081.6 of CEQA, as amended, requires a public agency to adopt a reporting or monitoring program in those cases where the public agency finds that changes or alterations have been required in or incorporated into a project, and that those changes mitigate or avoid a significant effect on the environment. A public agency may delegate the monitoring or reporting responsibilities to another public agency or private entity that accepts the delegation, but the lead agency remains responsible for ensuring that the mitigation measures have been implemented.

Mitigation Measure Aesthetics-1

The following guidelines shall be followed in selecting and designing any outdoor lighting:

1. All outdoor lights including parking lot, landscaping, security, path, and deck lights should be fully shielded, full cutoff luminaries.
2. Complete avoidance of all outdoor uplighting for any purpose.
3. Avoidance of tree-mounted lights unless they are fully shielded and pointing down toward the ground or shining into dense foliage. Ensure compliance over time.
4. Complete avoidance of uplighting and unshielded lighting in water features such as fountains or ponds.

Effectiveness of Mitigation Measure: Implementing Mitigation Measure Aesthetics-1 will ensure that impacts from of new sources of substantial light or glare, or outdoor lighting will be **less than significant** because light fixtures will be fully shielded with full cutoff luminaries and uplighting will be avoided.

Mitigation Measure Air Quality-1: Implement Applicable SJVAPCD-Required Construction Mitigation Measures

During project construction activities, the contractor shall comply with all SJVAPCD-required rules and regulations to minimize construction-related emissions. SJVAPCD rules and regulations that would apply to the proposed project's construction activities include, but are not limited to, the following:

San Joaquin Valley Air Pollution Control District Regulation VIII

The City of Merced shall require its contractors to comply with the applicable measures from SJVAPCD's Regulation VIII for all construction-related activities occurring in SJVAPCD, including the following rules:

- Rule 8011—General Requirements
- Rule 8021—Construction, Demolition, Excavation, Extraction, and Other Earthmoving Activities
- Rule 8031—Bulk Materials (handling and storage)
- Rule 8041—Carryout and Trackout (of dirt and other materials onto paved public roads)
- Rule 8051—Open Areas
- Rule 8061—Paved and Unpaved Roads (construction and use)
- Rule 8071—Unpaved Vehicle/Equipment Traffic Areas

The City of Merced shall be responsible for implementing the mitigation measures described above. SJVAPCD's enforcement and compliance department will be responsible to see that the mitigation measures are implemented properly.

Significance after Mitigation: Implementation of Mitigation Measures Air Quality 1 would help minimize construction-related fugitive dust emissions during all WMP construction activities. It is not anticipated that the proposed project's component would require extensive earth disturbance activities; therefore, implementation of Mitigation Measure Air Quality 1 and compliance with SJVAPCD Regulation VIII would reduce construction-related air quality emissions to a less-than-significant level. Accordingly, the proposed project would not conflict with or obstruct implementation of the applicable air quality plan. This impact would be **less than significant** with mitigation.

Mitigation Measure Biology-1

Once the exact location and or the footprint of a proposed project identified in Table 2-1 is known, a qualified biologist shall: 1) determine if the location or footprint is within the area covered by the Upland Species of the San Joaquin Valley (Recovery Plan and/or the Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon), and 2) determine if the proposed project would have an impact on a special status species. If there is an impact to a special status species the City shall implement Mitigation Measures Biology-2 through Biology-9.

Effectiveness of Mitigation Measure: Implementation of Mitigation Measures Biology-2 through Biology-9 would minimize and mitigate, to the maximum extent practical, the adverse impacts to a special status species to **less than significant**.

In addition, the following mitigation measure(s) are incorporated from the Merced EIR to avoid impacts to candidate, special-status, or sensitive species and provide protection where appropriate habitat exists within the boundary of a proposed project:

Mitigation Measure Biology-2: Vernal Pools and Vernal Pool Associates

To protect vernal pools and associated species, surveys shall be conducted to determine the presence of vernal pools prior to or concurrent with site selection for implementing any proposed project improvements identified in Table 2-1 in an area having potential habitat.

Surveys to detect vernal pools are most easily accomplished during the rainy season or during early spring when pools contain water. If vernal pools are found to occur on a project site, the pools and a 100-foot-wide buffer around each pool or group of pools will be observed. If the vernal pools and buffer areas cannot be avoided, then the project proponent must consult with and obtain authorizations from, but not limited to, the California Department of Fish and Wildlife, the United States Fish and Wildlife Service, the Army Corps of Engineers (Corps), and the State Water Resources Quality Control Board.

Consultation and authorizations may require that additional surveys for special-status species be completed. Because there is a federal policy of no net loss of wetlands, mitigation to reduce losses and compensation to offset losses to vernal pools and associated special-status species will be required.

Effectiveness of Mitigation Measure: The identification of vernal pools on a project specific basis and, when present on a project site, consultation with regulatory agencies and implementation of mitigation and compensation will ensure that impacts to vernal pools and special-status species associated with vernal pools will be **less than significant**.

Mitigation Measure Biology-3: Special-Status Plants

To protect special-status plants, the City shall ensure that a botanical survey be conducted for projects containing habitat suitable for special-status plant species. Surveys shall be conducted by a qualified biologist or botanist during the appropriate flowering season for the plants and shall be conducted prior to issuance of a grading or building permit for the project. If special-status plants are found to occur on the project site, the population of plants shall be avoided and protected. If avoidance and protection is not possible, a qualified biologist shall prepare a mitigation and monitoring plan for the affected species. The plan shall be submitted to the CDFW and/or the USFWS for review and comment. Details of the mitigation and monitoring plan shall include, but not be limited to:

- Removing and stockpiling topsoil with intact roots and seed bank in the disturbance area, and either replacing the soil in the same location after construction is complete or in a different location with suitable habitat; or
- Collect plants, seeds, and other propagules from the affected area prior to disturbance. After construction is complete, the affected area shall be replanted with propagules or cultivated nursery stock; or
- These and other mitigations will be considered successful if the populations of the affected species are sustained for a minimum of three years and are of a similar size and quality as the original population.

Effectiveness of Mitigation Measure: Conducting a preconstruction survey on project sites that have the potential to provide habitat for special status plant species will ensure populations of plants will be identified, avoided and protected. Implementation of Mitigation Measure Biology-3 will ensure that impacts to special-status plants are reduced to **less than significant**.

Mitigation Measure Biology-4: Valley Elderberry Longhorn Beetle

To protect the Valley elderberry longhorn beetle (VELB), the City shall ensure that a survey for elderberry bushes be conducted by a qualified biologist at each project site containing habitat suitable for VELB prior to the issuance of a grading permit or building permit. If elderberry bushes are found, the project proponent shall implement the measures recommended by the biologist, which shall contain the standardized measures adopted by the USFWS.

Effectiveness of Mitigation Measure: The implementation of this measure will prevent the loss of habitat (elderberry bushes) and prevent the incidental take of VELB. Implementation of these measures will ensure that impacts to elderberry shrubs and elderberry longhorn beetles will be **less than significant**.

Mitigation Measure Biology-5: Burrowing Owls

To protect burrowing owls on proposed projects where suitable habitat exists, the following shall be implemented:

- To protect burrowing owls, preconstruction surveys shall be conducted by a qualified biologist at all project sites that contain grasslands, fallowed agricultural fields, or fallow fields along roadsides, railroad corridors, and other locations prior to grading. If, during a preconstruction survey, burrowing owls are found to be present, the project proponent shall implement the measures recommended by the biologist and include the standardized avoidance measures of CDFW.

Effectiveness of Mitigation Measure: The mitigation measure listed above is a standardized survey protocol and avoidance measure that has been adopted by the CDFW. Implementation of this mitigation measure will prevent disrupting nesting behaviors and ensure nesting success of burrowing owls which may nest in and adjacent to project sites. This will result in impacts from the project being **less than significant**.

Mitigation Measure Biology-6: Special-Status Birds

To protect raptors and other special-status birds on proposed projects where suitable habitat exists, the following measures shall be implemented:

- Trees scheduled to be removed because project implementation shall be removed during the nonbreeding season (late September to the end of February).
- Prior to construction, but not more than 14 days before grading, demolition, or site preparation activities, a qualified biologist shall conduct a preconstruction nesting survey to determine the presence of nesting raptors. Activities taking place outside the breeding season (typically February 15 through August 31) do not require a survey. If active raptor nests are present in the construction zone or within 250 feet of the construction zone, temporary exclusion fencing shall be erected at a distance of 250 feet around the nest site. Clearing and construction operations within this area shall be postponed until juveniles have fledged and there is no evidence of a second nesting attempt determined by the biologist.
- If nesting Swainson's hawks are observed during field surveys, consultation with the CDFW regarding Swainson's hawk mitigation guidelines shall be required. The guidelines include, but are not limited to, buffers of up to one quarter mile, monitoring of the nest by a qualified biologist, and mitigation for the loss of foraging habitat.
- To avoid impacts to common and special-status migratory birds pursuant to the Migratory Bird Treaty Act and CDFW codes, a nesting survey shall be conducted prior to construction activities if the work is scheduled between March 15 and August 31. If migratory birds are identified nesting within the construction zone, a 100-foot buffer around the nest site must be designated. No construction activity may occur within this buffer until a qualified biologist has determined that the young have fledged. A qualified biologist may modify the size of the buffer based on site conditions and the bird's apparent acclimation to human activities. If the buffer is modified, the biologist would be required to monitor stress levels of the nesting birds for at least one week after construction commences to ensure that project activities would not cause nest site abandonment or loss of eggs or young. At any time the biologist shall have the right to implement the full 100-foot buffer if stress levels are elevated to the extent that could cause nest abandonment and/or loss of eggs or young.

Effectiveness of Mitigation Measure: The mitigation measure listed above is a standardized survey protocol and avoidance measure that has been adopted by the CDFW. Implementation of this mitigation measure will prevent disrupting nesting behaviors and ensure nesting success of raptors and migratory birds which may nest in and adjacent to project sites. This will result in impacts from the project being **less than significant**.

Mitigation Measure Biology-7: Special-Status Amphibians

To protect California tiger salamander and western spadefoot on proposed projects where suitable habitat exists, the following shall be implemented:

- To protect special-status amphibians, preconstruction surveys shall be conducted by a qualified biologist at all project sites that contain appropriate habitat. If, during a preconstruction survey, special-status amphibians are found to be present, the project proponent shall implement the measures recommended by the biologist and standardized measures adopted by the USFWS or the CDFW.

Effectiveness of Mitigation Measure: Conducting a preconstruction survey on project sites that have the potential to provide habitat for special status amphibians species will ensure populations will be identified, avoided and protected. Implementation of this Mitigation Measure will ensure that impacts to special-status amphibians are reduced to **less than significant**.

Mitigation Measure Biology-8: Special-Status Reptiles

To protect western pond turtle and giant garter snake on proposed projects where suitable habitat exists, the following shall be implemented:

- To protect special-status reptiles, preconstruction surveys shall be conducted by a qualified biologist at all project sites that contain appropriate habitat. If, during a preconstruction survey, special-status reptiles are found to be present, the project proponent shall implement the measures recommended by the biologist and standardized measures adopted by the USFWS or the CDFW.

Effectiveness of Mitigation Measure: Conducting a preconstruction survey on project sites that have the potential to provide habitat for special status reptile species will ensure populations will be identified, avoided, and protected. Implementation of this mitigation measure will ensure that impacts to special-status reptilian species are reduced to **less than significant**.

Mitigation Measure Biology-9: Special-Status Mammals

To protect Merced kangaroo rat, western mastiff bat, western red bat, hoary bat, Yuma myotis, San Joaquin pocket mouse, American badger, and San Joaquin kit fox on proposed projects where suitable habitat exists, the following shall be implemented:

- To protect special-status mammals, preconstruction surveys shall be conducted by a qualified biologist at all project sites that contain appropriate habitat. If, during a preconstruction survey, special-status mammals are found to be present, the project proponent shall implement the measures recommended by the biologist and standardized measures adopted by the USFWS or the CDFW.

Effectiveness of Mitigation Measure: Conducting a preconstruction survey on project sites that have the potential to provide habitat for special status mammalian species will ensure populations of plants will be identified, avoided, and protected. Implementation of this Mitigation Measure will ensure that impacts to special-status mammalian species are reduced to **less than significant**.

Mitigation Measure Biology-10: Streambed Alteration Agreement

To minimize impacts to riparian habitat and other sensitive natural communities, the following the measures shall be implemented:

- The City shall have a qualified biologist map all riparian habitat or other sensitive natural communities within the footprint of the proposed project. To the extent feasible and practicable, all planned construction activity shall be designed to avoid direct effects on these areas.
- In those areas where complete avoidance is not possible, all riparian habitat or other sensitive natural communities shall be mitigated on a “no-net-loss” basis in accordance with either CDFW regulations and/or a Section 1602 Streambed Alteration Agreement, if required. Habitat mitigation shall be replaced at a location and with methods acceptable to the CDFW.

Effectiveness of Mitigation Measure: Mapping riparian habitat and sensitive natural communities within the footprint of a proposed project will ensure these habitats will be identified, avoided, and protected. Implementation of this mitigation measure will ensure that impacts are avoided and reduced to **less than significant**.

Mitigation Measure Biology-11: Conduct a Delineation of Waters of the U.S. and Wetlands (WOUS/Wetlands) and Obtain Permits.

If Waters of the U.S. occur within the footprint of the proposed project, a delineation of the Waters of the U.S. and wetlands shall be performed and submitted to the Corps for verification prior to annexation finalizing the project site plan.

A Section 404 permit and a Section 401 Water Quality Certification or Waiver of Waste Discharge shall be acquired from the Corps and the Regional Water Quality Control Board (RWQCB) and a Section 1602 Streambed Alteration Agreement from DFW respectively prior to the onset of construction-related activities.

Effectiveness of Mitigation Measure: Identifying and delineation Waters of the U.S. will ensure protection of wetlands and jurisdictional waters by identifying these habitats. In turn, impacts to these habitats will be avoided and protected. Implementation of this mitigation measure will ensure that impacts are reduced to **less than significant**.

Mitigation Measure Biology-12: Replace or Rehabilitate Waters of the U.S. and Wetlands

Any jurisdictional waters that would be lost or disturbed due to implementation of any proposed project described in Table 2-1 of the Water Master Plan shall be replaced or rehabilitated on a no-net-loss basis in accordance with the Corps and the RWQCB mitigation guidelines. Habitat restoration, rehabilitation, and/or replacement if required shall be at a location and by methods agreeable to the Corps, the RWQCB, and the City.

Effectiveness of Mitigation Measure: Wetlands or jurisdictional Waters of the U.S. that would be lost or disturbed by a proposed action will be replaced or rehabilitated to ensure that there will be no net loss of these habitats. Implementation of this mitigation measure will ensure that impacts to wetland or jurisdictional Waters of the U.S. reduced or rectified to **less than significant**.

Mitigation Measure Biology-13 Wildlife Nursery Sites.

To minimize impacts to nesting, feeding, rearing, and foraging behavior of migratory birds, the City shall implement Mitigation Measure Biology-6.

Effectiveness of Mitigation Measure: The mitigation measure listed above is a standardized survey protocol and avoidance measure that has been adopted by the CDFW. Implementation of this mitigation measure will prevent disrupting nesting behaviors and ensure nesting success of raptors and migratory

birds which may nest in and adjacent to project sites. This will result in impacts from the project being **less than significant**.

Mitigation Measure Biology-14 Recovery Plans

To minimize conflicts with Upland Species of the San Joaquin Valley Recovery Plan and/or the Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon), The City shall implement Mitigation Measure Biology-1.

Effectiveness of Mitigation Measure: Implementation of Mitigation Measures Biology-1 would minimize conflicts with Upland Species of the San Joaquin Valley Recovery Plan and/or the Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon. The impact is **less than significant**.

Mitigation Measure: Culture-1

If prehistoric or historic-era subsurface archaeological features or deposits, including locally darkened soil (“midden”) that could conceal cultural deposits, are discovered during construction-related earth-moving activities, all ground-disturbing activity within 100 feet of the resources shall be halted and the City shall be notified. The City shall consult with a qualified archeologist to assess the significance of the find. If the find is determined to be significant by the qualified archaeologist (i.e., because the find is determined to constitute either an historical resource or a unique archaeological resource), representatives of the City and the qualified archaeologist shall meet to determine the appropriate course of action.

All significant cultural materials recovered shall be subject to scientific analysis, professional museum curation, and a report shall be prepared by the qualified archaeologist according to current professional standards.

If the archaeologist determines that some or all of the affected property qualifies as a Native American Cultural Place, including a Native American sanctified cemetery, place of worship, religious or ceremonial site, or sacred shrine (California Public Resources Code §5097.9) or a Native American historic, cultural, or sacred site, that is listed or may be eligible for listing in the California Register of Historical Resources pursuant to California Public Resources Code §5024.1, including any historic or prehistoric ruins, any burial ground, any archaeological or historic site (California Public Resources Code §5097.993), the archaeologist shall recommend to the City potentially feasible mitigation measures that would preserve the integrity of the site or minimize impacts on it, including any or a combination of the following:

- Avoidance, preservation, and/or enhancement of all or a portion of the Native American Cultural Place as open space or habitat, with a conservation easement dedicated to the most interested and appropriate tribal organization. If such an organization is willing to accept and maintain such an easement, or alternatively, a cultural resource organization that holds conservation easements.
- An agreement with any such tribal or cultural resource organization to maintain the confidentiality of the site location so as to minimize the danger of vandalism to the site or other damage to its integrity.
- Other measures, short of full or partial avoidance or preservation, intended to minimize impacts on the Native American Cultural Place consistent with land use assumptions and the proposed design and footprint of the development project for which the requested grading permit has been approved.

After receiving such recommendations, the City shall assess the feasibility of the recommendations and impose the most protective mitigation feasible.

Implementing Mitigation Measure Culture-1 would reduce the impact to **less than significant** by requiring that all ground-disturbing activity within 100 feet of the resources to be halted and an assessment made as to the significance of the find.

Mitigation Measure: Culture-2

To minimize potential adverse impacts on unique, scientifically important paleontological resources, the City shall implement the following:

- Before the start of grading or excavation activities, construction personnel involved with earthmoving activities shall be informed of the possibility of encountering fossils, the appearance and types of fossils likely to be seen during construction activities, and proper notification procedures should fossils be encountered.
- This worker training shall be prepared and presented by a qualified paleontologist.
- If paleontological resources are discovered during earthmoving activities, the construction crew shall immediately cease work in the vicinity of the find and shall notify the City planning department. The City shall retain a qualified paleontologist to evaluate the resource and prepare a proposed mitigation plan in accordance with SVP guidelines (1995). The proposed mitigation plan may include a field survey, construction monitoring, sampling and data recovery procedures, museum storage coordination.

Implementing Mitigation Measure Culture-2 would reduce the impact to a less-than-significant level by requiring that all ground-disturbing activity shall be halted and an assessment made as to the significance of the find.

Mitigation Measure: Hydrology-1

The City's Wastewater Treatment Plant currently provides a tertiary level treatment of about 8,155 acre-feet per year (City of Merced 2015). The City shall use recycled (tertiary treated and disinfected) water from the city's WWTP to recharge the groundwater and offset the deficit. Under full buildout as water use increases the volume of tertiary treated and disinfected wastewater would also increase and provide additional groundwater recharge. The impact will be **less than significant**.

Mitigation Measure: Noise-1

All work shall be performed between the hours of 7:00 a.m. and 7:00 p.m. Monday through Saturday. Exception to the designated works hours would be made for drilling wells. Each well would require approximately 6 to 10 days of continuous work (up to 24 hours per day) in order to protect the integrity of the well structure. Temporary sound curtains, walls, and appropriate muffler devices would be used to mitigate the noise impacts of the drilling operation on the immediately surrounding residences. In addition, the use of impact wrenches would be allowed only between the hours of 7:00 a.m. and 7:00 p.m.

Effectiveness of Mitigation Measure: Implementing this mitigation measure would minimize the temporary increase in noise to **less than significant** by limiting work hours, duration of continuous work, and employing the use of temporary sound curtains, walls, and muffler devices.

Mitigation Measure: Noise-2

Use of construction equipment that cause localized vibrations in excess of 0.2 inches/second peak particle velocity such as a vibrator compactor/roller on the project site is excluded from operating on the project site.

Effectiveness of Mitigation Measure: Implementing this mitigation measure would minimize the potential impact of ground borne vibration to **less than significant** by excluding the use of vibratorb compactor/roller.

Section 5

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Section 6

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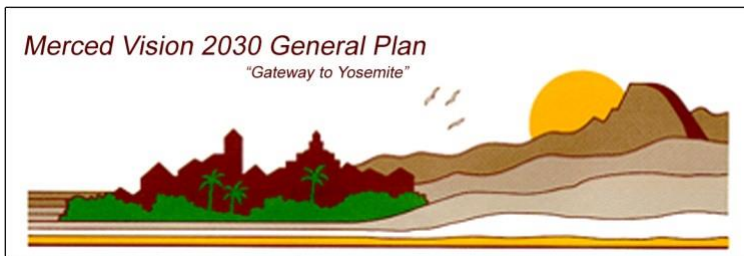
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Appendix A

Merced Vision 2030 General Plan Goals and Policies



Chapter II

Goals and Policies Summary

Chapter 2 -- Urban Expansion

Goal Area UE-1: Urban Expansion

GOALS

- „ A Compact Urban Form
- „ Preservation of Agriculturally Significant Areas
- „ Efficient Urban Expansion

POLICIES

- UE-1.1** Designate areas for new urban development that recognize the physical characteristics and environmental constraints of the planning area.
- UE-1.2** Foster compact and efficient development patterns to maintain a compact urban form.
- UE-1.3** Control the annexation, timing, density, and location of new land uses within the City's urban expansion boundaries.
- UE-1.4** Continue joint planning efforts on the UC Merced and University Community plans.
- UE-1.5** Promote annexation of developed areas within the City's Specific Urban Development Plan (SUDP)/Sphere of Influence (SOI) during the planning period.
- UE-1.6** Consider expansion of the City's SUDP/SOI boundary for areas within the Area of Interest when certain conditions are met.

Chapter 3 -- Land Use

Goal Area L-1: Residential & Neighborhood Development

GOALS

- „ Housing Opportunities in Balance with Jobs Created in the Merced Urban Area
- „ A Wide Range of Residential Densities and Housing Types in the City
- „ Preservation and Enhancement of Existing Neighborhoods
- „ Quality Residential Environments

„ Mixed-use, Transit and Pedestrian-Friendly Residential Environments

„ Ensure Adequate Housing is Available to All Segments of the Population

POLICIES

L-1.1 Promote balanced development which provides jobs, services and housing.

L-1.2 Encourage a diversity of building types, ownership, prices, designs, and site plans for residential areas throughout the City.

L-1.3 Encourage a diversity of lot sizes in residential subdivisions.

L-1.4 Conserve residential areas that are threatened by blighting influences.

L-1.5 Protect existing neighborhoods from incompatible developments.

L-1.6 Continue to pursue quality single-family and higher density residential development.

L-1.7 Encourage the location of multi-family developments on sites with good access to transportation, shopping, employment centers, and services.

L-1.8 Create livable and identifiable residential neighborhoods.

L-1.9 Ensure connectivity between existing and planned urban areas.

Goal Area L-2: Economic & Business Development

GOALS

„ Increased Employment Opportunities for the Citizens of Merced

„ A Diverse and Balanced Merced Economy

„ Preservation and Expansion of the City’s Economic Base [Quintero]

„ High Quality Industrial Areas, Including Technology Parks

„ More High-Quality Research &Development Parks

„ Ready Access to Commercial Centers and Services Throughout the City

„ A Distinguished Downtown

POLICIES

L-2.1 Encourage further development of appropriate commercial and industrial uses throughout the City.

L-2.2 Locate new or expanded industrial, research & development, technology, and business parks in appropriate areas.

L-2.3 Promote the retention and expansion of existing industrial and commercial businesses.

L-2.4 Provide a range of services adjacent to and within industrial areas to reduce auto trips.

L-2.5 Maintain attractive industrial areas and business parks.

L-2.6 Provide neighborhood commercial centers in proportion to residential development in the City.

- L-2.7** Locate and design new commercial development to provide good access from adjacent neighborhoods and reduce congestion on major streets.
- L-2.8** Encourage a mixture of uses and activities and reinvestment that will maintain the vitality of the downtown area.
- L-2.9** Identify locations and develop standards for campus-type research and development parks.
- L-2.10** Encourage well-planned freeway-oriented developments

Goal Area L-3: Urban Growth and Design

GOALS

- „ Living Environments which Encourage People to Use a Variety of Transportation Alternatives**
- „ A Compact Urban Village Design for New Growth Areas**
- „ Self-sustaining, Mixed-Use, Pedestrian-Friendly Neighborhoods**
- „ Transit-Oriented Development Adjacent to the High Speed Rail Station**

POLICIES

- L-3.1** Create land use patterns that will encourage people to walk, bicycle, or use public transit for an increased number of their daily trips.
- L-3.2** Encourage infill development and a compact urban form.
- L-3.3** Promote site designs that encourage walking, cycling, and transit use.
- L-3.4** Build identity, character, and enhanced community design in the South Merced Community Plan area.
- L-3.5** Develop a Transit-Oriented Development Overlay Zone Adjacent to the Planned High Speed Rail Station in Downtown Merced
- L-3.6** Require community plans for large new development areas within the City’s SUDP prior to development.
- L-3.7** Implement policies and principles to conform to the intent of the San Joaquin Valley Regional Blueprint.

Chapter 4.0 -- Transportation and Circulation

Goal Area T-1: Streets and Roads

GOALS

- „ 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 Circulation System that Minimizes Adverse Impacts upon the Community**

„ A Comprehensive System of “Complete Streets” Which Address All Modes of Transportation

POLICIES

- 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.
- 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 adverse impacts on the environment from existing and proposed road systems.
- T-1.7** 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.

Goal Area T-2: Bicycles, Pedestrians, and Public Transit

GOALS

- „ 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 Convenient Pedestrianways**
- „ A Comprehensive System of “Complete Streets” Addressing All Modes of Transportation**

POLICIES

- T-2.1** Provide for and maintain a major transitway 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.

Goal Area T-3: Air and Rail Services

GOALS

„ **Air and Rail Systems that Provide Safe and Convenient Service to the Community**

POLICIES

AIR

T-3.1 Preserve the Merced Regional Airport and its protective zones from incompatible encroachment and incompatible development within the Airport Industrial Park.

T-3.2 Promote and encourage the orderly and timely development of commercial and general aviation facilities.

T-3.3 Provide adequate ground transportation systems that complement air transportation facilities.

RAIL

T-3.4 Reduce rail system impacts on circulation within the urban area.

T-3.5 Support enhanced railroad passenger service and high speed rail service for Merced.

T-3.6 Retain and expand as needed rail facilities serving industrial development.

Chapter 5 -- Public Services & Facilities

Goal Area P-1: Public Facilities and Services

GOALS

„ **Maintenance and Improvement of Merced's Existing Infrastructure**

„ **New Development Which Includes a Full Complement of Infrastructure and Municipal Public Facilities**

„ **Efficient and Cost-Effective Public Service Delivery**

POLICIES

P-1.1 Provide adequate public infrastructure and municipal services to meet the needs of future development.

P-1.2 Utilize existing infrastructure and public service capacities to the maximum extent possible and provide for the logical, timely and economically efficient extension of municipal infrastructure and services where necessary.

P-1.3 Require new development to provide or pay for its fair share of public facility and infrastructure improvements.

Goal Area P-2: Police and Fire Protection Services

GOAL

„ **Maximum Crime and Fire Protection Services**

POLICY

P-2.1 Maintain and enhance public protection facilities, equipment, and personnel to the maximum extent feasible within the resource constraints of the City to serve the City's needs.

Goal Area P-3: Water

GOAL

„ **An Adequate Water Source, Distribution and Treatment Infrastructure System in Merced**

POLICIES

P-3.1 Ensure that adequate water supply can be provided within the City's service area, concurrent with service expansion and population growth.

P-3.2. In cooperation with the County and the Merced Irrigation District, work to stabilize the region's aquifer.

Goal Area P-4: Wastewater

GOAL

„ **An Adequate Wastewater Collection, Treatment and Disposal System in Merced**

POLICIES

P-4.1 Provide adequate wastewater collection, treatment and disposal capacity for existing and projected future needs.

P-4.2 Consider the use of reclaimed water to reduce non-potable water demands whenever practical.

Goal Area P-5: Storm Drainage and Flood Control

GOAL

„ **An Adequate Storm Drainage Collection and Disposal System in Merced.**

POLICIES

P-5.1 Provide effective storm drainage facilities for future development.

P-5.2 Integrate drainage facilities with bike paths, sidewalks, recreation facilities, agricultural activities, groundwater recharge, and landscaping.

Goal Area P-6: Solid Waste

GOAL

- „ **Solid Waste Management Services That Accommodate the Local Population Without Causing Significant Damage to Environmental Resources**

POLICIES

- P-6.1** Establish programs to recover recyclable materials and energy from solid wastes generated within the City.
- P-6.2** Minimize the potential impacts of waste collection, transportation and disposal facilities upon the residents of Merced.

Goal Area P-7: Schools

GOAL

- „ **Adequate School Facilities for All Students in the Merced Urban Area**
- „ **Excellent Cooperative Relationships between the City, the School Districts, and the Development Community**

POLICIES

- P-7.1** Cooperate with Merced area school districts to provide elementary, intermediate and high school sites that are centrally located to the populations they serve and adequate to serve community growth.
- P-7.2** Support higher educational opportunities.

Goal Area P-8: Cultural and Community Services

GOAL

- „ **Support for Cultural and Community Services that Improve and Maintain the Quality of Life for the Residents of Merced**

POLICIES

- P-8.1** The City will support the cultural and health related needs of the community by incorporating such facilities and services in development and redevelopment proposals.
- P-8.2** The City will promote consolidation of complementary or support services to avoid duplication of programs.
- P-8.3** Work with others to study innovative ways of delivering library services at the neighborhood level to promote community education and provide a focus for community activity and cultural development.

Goal Area P-9: Telecommunications

GOAL

„ **Development of Infrastructure and Service to Allow All Merced Residents to Utilize New Technologies to Communicate with the Region, the Nation, and the World**

POLICIES

P-9.1 Develop City standards for telecommunications infrastructure and encourage its installation in all new development.

P-9.2 Make information regarding City government and decision-making, local services, and opportunities to participate in City governance available to Merced citizens in electronic form.

P-9.3 Make use of telecommunications services to increase public safety.

Chapter 6 -- Urban Design

Goal Area UD-1: Transit Ready Development or Urban Villages

GOALS

„ **An Integrated Urban Form**

„ **Transit-Ready Community Design**

„ **Pedestrian- and Bicycle-Compatible Neighborhoods**

POLICIES

UD-1.1 Apply Transit-Ready Development or Urban Village design principles to new development in the City's new growth areas.

UD-1.2 Distribute and design Urban Villages to promote convenient vehicular, pedestrian, and transit access.

UD-1.3 Promote and facilitate Core Commercial design principles in Village commercial areas.

UD-1.4 Promote and facilitate Urban Village residential area design principles.

UD-1.5 Design and develop public and quasi-public buildings and uses utilizing Transit-Ready Development or Urban Village principles.

Goal Area UD-2: Overall Community Appearance

GOALS

„ **A Unique Community Image**

„ **Attractive Neighborhoods and Districts**

„ **Attractive and Memorable Public Streets**

POLICIES

UD-2.1 Use Urban Village design concepts in neighborhood revitalization programs.

UD-2.2 Maintain and enhance the unique community appearance of Merced.

Chapter 7-- Open Space, Conservation, and Recreation

Goal Area OS-1: Open Space for the Preservation of Natural Resources

GOALS

- „ Maintenance of Merced’s Biological Resources
- „ A High-Quality, Expanding Urban Forest
- „ Preservation of Scenic Corridors and Resources
- „ Improvement and Enhancement of Water Quality

POLICIES

- OS-1.1** Identify and mitigate impacts to wildlife habitats which support rare, endangered, or threatened species.
- OS-1.2** Preserve and enhance creeks in their natural state throughout the planning area.
- OS-1.3** Promote the protection and enhancement of designated scenic routes.
- OS-1.4** Improve and expand the City’s urban forest.
- OS-1.5** Preserve and enhance water quality.

(Notes: The preservation and protection of important soil resources is addressed under Conservation [erosion], Open Space for the Managed Production of Resources [agricultural preservation policies], and the Urban Expansion Chapter of this General Plan, where the issue of growth impacts on prime soils is addressed.)

Goal Area OS-2: Open Space for the Managed Production of Resources

GOAL

- „ Protection of Regional Agricultural Resources

POLICIES

- OS-2.1** Protect agricultural areas outside the City’s SUDP from urban impacts.
- OS-2.2** Relieve pressures on converting areas containing large concentrations of “prime” agricultural soils to urban uses by providing adequate urban development land within the Merced City SUDP.

Goal Area OS-3: Open Space for Outdoor Recreation

GOALS

- „ High-Quality Recreational Open Space
- „ Adequate Public Recreation Facilities
- „ Comprehensive Urban Trail and Bike Path System

POLICIES

- OS-3.1 Provide high-quality park and open space facilities to serve the needs of a growing population.
- OS-3.2 Maintain and expand the City's Bikeway and Trail System.
- OS-3.3 Maintain the City's existing high-quality open space facilities.
- OS-3.4 Develop a diverse and integrated system of park facilities throughout Merced.

Goal Area OS-4: Open Space for Public Health and Safety

GOAL

- „ A Safe Environment For Merced’s Citizens

POLICY

- OS-4.1 Preserve open space areas which are necessary to maintaining public health and safety.

Goal Area OS-5: Conservation of Resources

GOALS

- „ Conservation of Water Resources
- „ Preservation and Protection of Soil Resources

POLICIES

- OS-5.1 Promote water conservation throughout the planning area.
- OS-5.2 Protect soil resources from the erosive forces of wind and water.

Chapter 8 -- Sustainable Development

Goal Area SD-1: Air Quality and Climate Change

GOALS

- „ Clean Air with Minimal Toxic Substances and Odor
- „ Clean Air with Minimal Particulate Content
- „ Effective and Efficient Transportation Infrastructure
- „ Coordinated and Cooperative Inter-Governmental Air Quality Programs
- „ Reduction in the Generation of Greenhouse Gases (GHG) from New Development

POLICIES:

- SD-1.1 Accurately determine and fairly mitigate the local and regional air quality impacts of projects proposed in the City of Merced.
- SD-1.2 Coordinate local air quality programs with regional programs and those of neighboring jurisdictions.

SD-1.3	Integrate land use planning, transportation planning, and air quality planning for the most efficient use of public resources and for a healthier environment.
SD-1.4	Educate the public on the impact of individual transportation, lifestyle, and land use decisions on air quality.
SD-1.5	Provide public facilities and operations which can serve as a model for the private sector in implementation of air quality programs.
SD-1.6	Reduce emissions of PM10 and other particulates with local control potential.
SD-1.7	Develop and implement a Climate Action Plan for the City.
SD-1.8	Implement Policies in Other General Plan Chapters to Address Air Quality and Greenhouse Gas Emissions Reduction Goals

Goal Area SD-2: Cultural Resources

GOALS:

- „ **A Diverse And Rich Historic and Cultural Resource Environment**
- „ **A Long-Term Community Historic Preservation/Improvement Program**

POLICIES:

- SD-2.1** Identify and preserve the City's archaeological resources.
- SD-2.2** Identify and preserve the City's historic and cultural resources.
- SD-2.3** Develop and promote financial incentive programs for historic preservation efforts.

Goal Area SD-3: Energy Resources

GOAL

- „ **Sustainable Energy Resource Use in the City of Merced**

POLICIES

- SD-3.1** Promote the use of Solar Energy technology and other Alternative Energy Resources.
- SD-3.2** Encourage the use of energy conservation features, low-emission equipment, and alternative energy sources for all new residential and commercial development.

Goal Area SD-4: Healthy Communities

GOALS

- „ **Healthy Lives for Community Residents**
- „ **A Healthy Environment for All Residents**

POLICIES

- SD-4.1** Create a healthy built environment.
- SD-4.2** Encourage increased physical activity of residents and healthier food choices.

Chapter 9 -- Housing

Note: The Housing Element is due to be updated per the schedule in State Law and is NOT included in the comprehensive General Plan Update.

Chapter 10 -- Noise

Goal Area N-1: Noise

GOALS

- „ **To Protect City residents from the Harmful and Annoying Effects of Exposure to Excessive Noise.**
- „ **To Protect the Economic Base of the City by Preventing Incompatible Land Uses from Encroaching upon Existing or Planned Noise-Producing Uses.**
- „ **To Encourage the Application of State of the Art Land Use Planning Methodologies in Areas of Potential Noise Conflicts.**

POLICIES

- N-1.1** Minimize the impacts of aircraft noise.
- N-1.2** Reduce surface vehicle noise.
- N-1.3** Reduce equipment noise levels.
- N-1.4** Reduce noise levels at the receiver where noise reduction at the source is not possible.
- N-1.5** Coordinate planning efforts so that noise-sensitive land uses are not located near major noise sources.
- N-1.6** Mitigate all significant noise impacts as a condition of project approval for sensitive land uses.

Chapter 11 -- Safety

Goal Area S-1: Disaster Preparedness

GOAL

- „ **General Disaster Preparedness**

POLICY

- S-1.1** Develop and maintain emergency preparedness procedures for the City.

Goal Area S-2: Seismic Safety

GOAL

- „ **Reasonable Safety for City Residents from the Hazards of Earthquake and Other Geologic Activity**

POLICIES

- S-2.1 Reduce the potential danger from earthquake and seismic-related activity from existing buildings where necessary.
- S-2.2 Encourage the improvement of all public facilities and infrastructure such as natural gas, fuel, sewer, water, electricity, and railroad lines and equipment with up-to-date seismic safety features.
- S-2.3 Restrict urban development in all areas with potential ground failure characteristics.

Goal Area S-3: Flooding

GOAL

„ A City Free From Other Than Street Flooding

POLICIES

- S-3.1 Implement Protective Measures for Areas in the City and the SUDP/SOI, Within the 200-Year Floodplain.
- S-3.2 Maintain essential City services in the event of flooding or dam failure.

Goal Area S-4: Fire Protection

GOAL

„ Fire and Hazardous Material Safety for the Residents of the City and For Those Working in Fire Suppression

POLICIES

- S-4.1 Promote the concept of fire protection master planning with fire safety goals, missions, and supporting objectives for the community.
- S-4.2 Maintain a reasonable level of accessibility and infrastructure support for fire suppression, disaster, and other emergency services.

Goal Area S-5: Airport Safety

GOAL

„ A Safe Airport Environment Both Above and On the Ground

POLICIES

- S-5.1 Continue to protect approach areas and control zones for both existing and future runway systems through land use regulations and property acquisition where necessary.
- S-5.2 Prevent the encroachment of potential hazards to flight within the Airport's airspace.

Goal Area S-6: Crime

GOAL

„ **Reduced Criminal Activity and An Increased Feeling of Safety and Security in the Community**

POLICIES

S-6.1 Provide superior community-based police services within the resource constraints of the City.

S-6.2 Provide services and personnel necessary to maintain community order and public safety.

Goal Area S-7: Hazardous Materials

GOAL

„ **Hazardous Materials Safety for City Residents**

POLICIES

S-7.1 Prevent injuries and environmental contamination due to the uncontrolled release of hazardous materials.

S-7.2 Ensure that hazardous materials are cleaned up before a property is developed or redeveloped.

Appendix B

Merced EIR Summary of Impacts

EXECUTIVE SUMMARY

Introduction

Under the California Environmental Quality Act (CEQA), when discretionary projects are undertaken by public agencies, an Environmental Impact Report (EIR) is required if the Lead Agency determines that the project may cause a significant environmental impact. This was concluded by the Notice of Preparation (NOP) prepared and published for this project in July 2008). Comments received during the public review of the Notice of Preparation follow in Appendix A. The purpose of an EIR is to provide full disclosure of the potentially significant environmental effects of the project to the public and their decision-makers and explore means to mitigate (i.e., reduce, avoid, or eliminate) those impacts through special mitigation measures or alternatives to the project. CEQA intends the preparation of an EIR to be a public process that provides meaningful opportunities for public input with regard to potential environmental effects.

The project evaluated in this EIR involves the adoption of the *Merced Vision 2030 General Plan* for the City of Merced.

It is the intent of the Executive Summary to provide the reader with a clear and simple description of the proposed project and its potential environmental impacts. Section 15123 of the CEQA Guidelines requires that the summary identify each significant impact, and recommend mitigation measures and alternatives that would minimize or avoid potential significant impacts. The summary is also required to identify areas of controversy known to the lead agency, including issues raised by agencies and the public, and issues to be resolved, including the choice among alternatives and whether or how to mitigate significant impacts. This section focuses on the major areas of the proposed project that are important to decision-makers and utilizes non-technical language to promote understanding.

This EIR will be used as a Program EIR. The City of Merced is the Lead Agency for the preparation of this Program EIR. Further environmental review may be required for specific activities resulting from the proposed Merced Vision 2030 General Plan's adoption. Section 15168 of the CEQA Guidelines defines a Program EIR as:

An EIR which may be prepared on a series of actions that can be characterized as one large project and are related either:

- 1) Geographically,
- 2) As logical parts in the chain of contemplated actions,
- 3) In connection with issuance of rules, regulations, plans, or other general criteria to govern the conduct of a continuing program, or

- 4) As individual activities carried out under the same authorizing statutory or regulatory authority and having generally similar environmental effects which can be mitigated in similar ways.

Project Description

The proposed project includes an update of the City of Merced’s General Plan. California state law requires each city and county to adopt a general plan “for all the physical development of the county or city, and any land outside its boundaries which bears relation to its planning” (§65300). The General Plan will include Urban Expansion, Land Use, Transportation & Circulation, Public Facilities & Services, Urban Design, Open Space, Conservation & Recreation, Sustainable Development, Housing, Noise and Safety Elements. The Housing Element has been previously adopted and certified by the California Department of Housing and Community Development. The Housing Element (last updated in 2003 with minor revision in 2004) has a set schedule for review, generally every five years, based on State law. The Housing Element is currently being updated by the City and will be included in the General Plan document after its adoption. Figure 2-4 shows the proposed 2030 Land Use and Circulation Map for the General Plan. The expansion of the urban land use designations define the limits for extending City services and infrastructure so as to accommodate new development anticipated within the 2010-2030 time-frame of the General Plan. Policies in the proposed General Plan limit leap-frog development and provide for an orderly transition from rural to urban land uses.

The Plan includes Guiding Principles, developed during Community Workshops, described below. [Table ES-1](#) shows the acreage of General Plan land use designations for both the current and proposed General Plans (City limits and Specific Urban Development Planning Area (SUDP)).

**Table ES-1
Existing & Proposed General Plan Land Use Comparison Within the City Limits and SUDP/SOI (Acres)**

Land Use	City Limits	Existing SUDP	Total	Proposed SUDP/SOI	All Land in new SUDP/SOI
RR (Rural Residential)	15.25	280.84	296.09	2004.91	2301.00
AG (Agriculture)	92.33	21.51	113.84	0	113.84
Total Ag Res	107.58	302.35	409.93	2004.91	2414.84
LD (Low-Density Residential)	5516.28	2981.05	8497.33	274.08	8771.41
LMD (Low-Medium Density)	824.05	305.48	1129.53	46.96	1176.49
Total Single-Family Res	6340.33	3286.53	9626.86	321.04	9947.90
HMD (High-Medium Density)	745.08	61.84	806.92	25.35	832.27
HD (High Density Residential)	92.44	0	92.44	23.56	116.00
RMH (Residential Mobile Home)	79.34	0.18	79.52	0	79.52

Land Use	City Limits	Existing SUDP	Total	Proposed SUDP/SOI	All Land in new SUDP/SOI
Total Multi-Family	916.86	62.02	978.88	48.91	1027.79
P/G (Public/Government)	533.16	5.30	538.46	39.82	578.28
CO (Commercial Office)	341.74	132.32	474.06	0	474.06
Total Office	874.90	137.62	1012.52	39.82	1052.34
IND (Industrial)	1882.22	994.73	2876.95	0	2876.95
IND-R (Industrial Reserve)	0	150.40	150.40	1072.34	1222.74
Total Industrial	1882.22	1145.13	3027.35	1072.34	4099.69
BP (Business Park)	128.59	453.35	581.94	77.43	659.37
BP-R (Business Park Reserve)	2.94	85.27	88.21	0	88.21
Total Business Park	131.53	538.62	670.15	77.43	747.58
CG (General Commercial)	321.55	172.04	493.59	0	493.59
CN (Neighborhood Commercial)	200.75	51.71	252.46	22.84	275.30
CT (Thoroughfare Commercial)	212.89	292.01	504.90	173.92	678.82
RC (Regional/Community)	475.46	42.37	517.83	0	517.83
Total Commercial	1210.65	558.13	1768.78	196.76	1965.54
OS-PK (Open Space/Park)	786.85	167.24	954.09	152.91	1107.00
Total Open Space	786.85	167.24	954.09	152.91	1107.00
Total School	677.91	68.32	746.23	994.18	1740.41
Other Lands					
COM-R (Commercial Reserve)	7.15	83.18	90.33	0	90.33
RES-R (Residential Reserve)		360.34	360.34	0	360.34
PARK-F (Park-Future)	5.83	65.18	71.01	0	71.01
SCHOOL-F (School-Future)	5.83	42.78	48.61	0	48.61
VR (Village Residential)	238.67	205.11	443.78	0	443.78
Total Other Lands	257.48	756.59	1014.07	0	1014.07
Total Community Plan Areas*	0	389.14	389.14	7956.00	8345.14
Overall Total	13186.31	7411.69	20598.00	12864.30	33462.30

* Shown as "Reserve" in Merced Vision 2015 General Plan.

Source: Quad Knopf, City of Merced, 2010

Guiding Principles:

- Expansion of the Sphere of Influence and City boundary with phasing of development to avoid premature conversion of agricultural land and to plan for cost-effective extension of municipal services.
- Foster compact and efficient development patterns.

- Connectivity between existing and planned urban areas. Examples include the northeast area toward UCM, the University Community, and South Merced.
- Merced as the single municipal service provider in the expanded sphere of influence.
- New development provides or pays its fair share of public services and facilities to avoid burdening existing city residents (in short, new growth pays for itself).
- Mixed-use, transit and pedestrian friendly urban villages in growth areas with direct access to commercial cores from surrounding neighborhoods.
- Commercial nodes in new growth areas to avoid the aesthetic and circulation issues associated with more common “strip commercial”.
- Circulation: Recognition of the cost and importance of the arterial street system and protect capacity with access standards. Designs that encourage all modes of transportation.
- Build community quality. High community standards for Merced’s services, infrastructure, and private development as a strategy for attracting business and industry and to benefit the City’s residents.
- Planning well in advance for industrial/business park uses and for the infrastructure needed to support such development.
- A diversity of housing types and opportunities.
- Encouraging Sustainable and “Green” Development.
- Planning for the provision of infrastructure ahead of development.
- Maintaining Merced’s high quality of life and keeping it a nice place to live.
- Encouraging new research parks and the use of new technologies.
- Protection of the Merced Regional Airport as an important community asset.
- Maintaining a quality educational environment for pre-school, K-12, and higher education.
- Maintaining our quality parks and recreation systems, including the bike path system.
- Encouraging a healthy community through improved medical facilities, air quality, parks & recreation opportunities, etc.

MERCED SPECIFIC URBAN DEVELOPMENT PLANNING (SUDP) AREA

Merced's current SUDP (adopted in 1997 as part of the Merced Vision 2015 General Plan) is based on policy contained in the *Merced County Year 2000 General Plan*. The Plan utilizes an

“urban centered” concept to focus population growth in defined urban areas. The goal of the plan is *“to provide for intensive urban development and to protect agricultural and open space land from uncontrolled sprawling urban development.”* The current SUDP is approximately 20,000 acres.

The County of Merced (County) applies the “urban centered” concept through the designation of Specific Urban Development Plans (SUDP), Rural Residential Centers (RRC), Highway Interchange Centers (HIC), and Agricultural Services Centers (ASC). Of these, only SUDP's and RRC's relate to Merced's planning efforts. Specific Urban Development Plans are intended to accommodate all classifications of urban land use (residential, commercial, industrial, and institutional).

An SUDP has a boundary line which is recognized as the ultimate growth boundary of the community over the life of the Plan, and all land within the SUDP is planned for eventual development in a mixture of urban and urban-related uses. (*Merced County Year 2030 General Plan*)

Each of the County's six incorporated cities, as well as eighteen unincorporated communities, are presently designated as SUDP's. The City of Merced General Plan proposes to expand its SUDP and combine it with the Sphere of Influence (see below) to 52.4 square miles to provide sufficient developable area to accommodate future growth through the Year 2030 and beyond.

PROPOSED MERCED SPECIFIC URBAN DEVELOPMENT PLAN BOUNDARY (SUDP)/SPHERE OF INFLUENCE (SOI)

The proposed Merced SUDP would result in a coterminous Sphere of Influence (SOI) and SUDP boundary. The proposed SUDP/SOI boundary would also reduce the current SOI boundary in the northeast to reflect the revised location of the U.C. Merced campus. The proposed SUDP/SOI contains approximately 33,463 acres (52.4 square miles of land area); almost the same area as the 1997 Sphere of Influence.

- 1) Approximately 3,995 acres will be added in Northwest Merced. The new SUDP/SOI boundary would generally move to Franklin Road on the west, north of Old Lake Road, and south to Santa Fe Drive. This area is proposed for industrial and business park uses along Highway 59 and a large mixed-use community north of Bellevue Road. This area will be able to accommodate a significant amount of the residential growth in the City for the next 20 years.

The business park and industrial areas along Highway 59 are included in order to provide a better “jobs-housing” balance in North Merced, as well as alleviate circulation and air quality concerns. Most existing employment opportunities in Merced are located Downtown and south of Highway 99.

- 2) The second area of expansion consists of approximately 3,824 acres. It would move the SUDP/SOI south of Highway 99 to the vicinity of McNamara Road and west to a line 1/4 mile west of Thornton Road. South of the Merced Regional Airport, a large community plan

has been proposed. Although impacted by airport land use restrictions, the proposal includes significant residential and recreational growth.

- 3) The third area to be included encompasses 6,748 acres and moves the SUDP/SOI boundary to take in the property between the current City limit/SUDP, and the U.C. Merced campus and community. These will be brought within the SOI as well.

Inclusion of this area within the SUDP/SOI will form a more logical urban boundary, which will ultimately facilitate the provision of City services to the University.

These areas referenced above represent logical expansion areas for the City, primarily because they are adjacent to major road improvements (Merced-Atwater Expressway, Mission/Highway 99 Interchange, etc.). They also encompass areas needed for long-term commercial and industrial development. The residential areas included in this expansion were for the most part large tracts with significant planning efforts currently underway. Given the environmental and physical limitations elsewhere around the City, these are the most logical areas for the next phase of expansion. These areas will give the City enough land to accommodate expected growth over the next 20 to 40 years.

Potential Areas of Controversy and Issues to be Resolved

The following issues could produce controversy in reviewing and considering the proposed project:

AESTHETICS:

- The proposed project could have a cumulatively adverse effect on aesthetic resources including the generation of light and glare

AGRICULTURE AND FOREST RESOURCES:

- Directly or indirectly result in conversion of Prime Farmland, Unique Farmland or Farmland of Statewide Importance (Farmland) to non-agricultural use
- Conflict with existing zoning for agricultural use, or a Williamson Act contract
- Have a cumulatively adverse affect on agricultural resources

AIR QUALITY:

- Development and operation under the General Plan would result in emissions of criteria pollutants, ozone precursors, and other pollutants caused by mobile source activity, area sources, and stationary sources.

NOISE:

- Buildout of the General Plan may contribute to increased traffic noise levels, and a significant increase in overall traffic noise levels at existing sensitive receptors.

TRANSPORTATION/TRAFFIC:

- Cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system and/or exceed, either individually or cumulatively, a level of service standard established by the county congestion management agency for designated roads or highways.

GREENHOUSE GAS EMISSIONS (GLOBAL CLIMATE CHANGE):

- Development of the Project could potentially result in a cumulatively considerable incremental contribution to the significant cumulative impact of global climate change.

Alternatives to the Project

Section 15126.6 of the State CEQA Guidelines requires the EIR to describe a reasonable range of alternatives to the project or to the location of the project which would reduce or avoid significant impacts, and which could feasibly accomplish the basic objectives of the proposed project, and to evaluate the comparative merits of the alternatives. Alternatives that would reduce or avoid significant impacts represent an environmentally superior alternative to the proposed project. However, if the environmentally superior alternative is the “no project” alternative, the EIR must also identify an environmentally superior alternative among the other alternatives. Based on Chapter Four, Table 4-1 and the analyses developed in this EIR, the Reduced Project Area Alternative is the environmentally superior alternative because it reduces more potential impacts than other alternatives relative to the proposed General Plan and serves to reduce the severity of three significant cumulative impacts (agriculture, air quality, and transportation/traffic). The No Project alternative (existing General Plan) is environmentally inferior to the proposed General Plan and the other alternatives because it fails to achieve the objectives of the plan update.

The alternatives identified for consideration are as follows:

EXISTING GENERAL PLAN (NO PROJECT) ALTERNATIVE

In accordance with Section 15126.6(e)(3)(B) of the State CEQA Guidelines, the No Project Alternative consists of a description of an analysis of the circumstances under which the proposed project does not proceed. This alternative entails a general discussion of what can reasonably be expected to occur on the project site in the foreseeable future if the proposed project is not approved, based on the existing general plan land use designations, zoning, and available infrastructure and services.

Under this alternative, the 2030 General Plan would not be adopted, and the existing Merced Vision 2015 General Plan would remain in effect. Future development would occur as allowed under the existing LAFCO approved SOI with the same General Plan Land Use Diagram in effect (reference Figure 2-3).

REDUCED PROJECT AREA ALTERNATIVE

The Reduced Project Area Alternative would update the General Plan elements but would restrict growth to a smaller area. In this Alternative, the two Community Plan areas identified in the northwest and southwest corners of the 2030 Plan area are deleted from the proposed Plan. This alternative was considered feasible because the City could grow at a slower pace than is being planned for. Further, the potential population of the Project exceeds that projected for 2030. Figure 4-1 shows the Reduced Project Area Alternative.

CONCENTRATED GROWTH ALTERNATIVE

The Concentrated Growth Alternative assumes the same number of residential units at buildout as the proposed project, as well as the same goals, objectives, and policies. However, the density of residential development would increase to reduce the amount of land needed to provide the same growth capacity. Residential land use densities would be increased significantly (25-50%), and minimum densities would be imposed. As a result, more of the land in the proposed SUDP/SOI would be left in agricultural use.

Summary of Impacts and Mitigation Measures

Section 15123(b)(1) of the Guidelines for Implementation of the CEQA Guidelines provides that the summary shall identify each significant effect with proposed mitigation measures that would reduce or avoid that effect. This information is summarized in [Table ES-2](#), Summary of Impacts and Mitigation Measures.

**Table ES-2
Summary of Impacts and Mitigation Measures**

Impact #	Impact	Significance	Mitigation #	Mitigation Measure	Significance After Mitigation
3.1 Aesthetics					
3.1-1	Substantial adverse effect on a scenic vista	Less Than Significant		No mitigation measures are required.	Less Than Significant
3.1-2	Substantially damage scenic resources, including but not limited to trees, rock outcroppings, and historic buildings within a state scenic highway	No Impact		No mitigation measures are required.	No Impact
3.1-3	Substantially degrade the existing visual character or quality of the site and its surroundings	Less Than Significant		No mitigation measures are required.	Less Than Significant
3.1-4	Create a new source of substantial light or glare that would adversely affect day or night views in the area	Potentially Significant	3.1-4	The following guidelines will be followed in selecting and designing any outdoor lighting: <ol style="list-style-type: none"> 1. All outdoor lights including parking lot lights, landscaping, security, path and deck lights should be fully shielded, full cutoff luminaries. 2. Complete avoidance of all outdoor up-lighting for any purpose. 3. Avoidance of tree mounted lights unless they are fully shielded and pointing down towards the ground or shining into dense foliage. Ensure compliance over time. 4. Complete avoidance of up-lighting and unshielded 	Less Than Significant

Impact #	Impact	Significance	Mitigation #	Mitigation Measure	Significance After Mitigation
				lighting in water features such as fountains or ponds.	
3.1-5	The proposed project could have a cumulatively adverse effect on aesthetic resources including the generation of light and glare	Potentially Significant and Cumulatively Considerable		No mitigation measures are available.	Significant, Cumulatively Considerable, and Unavoidable
3.2 Agriculture and Forest Resources					
3.2-1	Directly or indirectly result in conversion of Prime Farmland, Unique Farmland or Farmland of Statewide Importance (Farmland) to non-agricultural use	Potentially Significant	3.2-1	The City will encourage property owners outside the City limits but within the SUDP/SOI to maintain their land in agricultural production until the land is converted to urban uses. The City will also work cooperatively with land trusts and other non-profit organizations to preserve agricultural land in the region. This may include the use of conservation easements. Infill development will be preferred and encouraged over fringe development. Sequential and contiguous development is also preferred and encouraged over leap-frog development.	Significant and Unavoidable
3.2-2	Conflict with existing zoning for agricultural use, or a Williamson Act contract	Potentially Significant		No mitigation measures available.	Significant and Unavoidable
3.2-3	Conflict with existing zoning for, or cause rezoning of, forest land (as defined by Public Resources Code section 1220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by	No Impact		No mitigation measures are required.	No Impact

Impact #	Impact	Significance	Mitigation #	Mitigation Measure	Significance After Mitigation
	Government Code section 51104(g))				
3.2-4	Result in the loss of forest land or conversion of forest land to non-forest use	No Impact		No mitigation measures are required.	No Impact
3.2-5	Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use.	No Impact		No mitigation measures are required.	No Impact
3.2-6	Have a cumulatively adverse effect on agricultural resources	Significant, Unavoidable, and Cumulative		No mitigation measures are available.	Significant, Cumulatively Considerable, and Unavoidable
3.3 Air Quality					
3.3-1	Construction activities associated with development under the Merced Vision 2030 General Plan would result in criteria pollutants, ozone precursors, and other pollutants.	Potentially Significant	3.3-1a	For any phase of construction in which an area greater than 22 acres, in accordance with Regulation VIII of the SJVAPCD, will be disturbed on any one day, the project developer(s) shall implement the following measures: 1. Basic fugitive dust control measures are required for all construction sites by SJVAPCD Regulation VIII. 2. Install sandbags or other erosion control measures to prevent silt runoff to public roadways from sites with	Less Than Significant

Impact #	Impact	Significance	Mitigation #	Mitigation Measure	Significance After Mitigation
				<p>a slope greater than one percent.</p> <p>3. Traffic speeds on unpaved roads shall be no greater than 15 mph.</p> <p>4. Install wind breaks at windward side(s) of construction areas.</p>	
		Potentially Significant	3.3-1b	<p>To reduce emissions and thus reduce cumulative impacts, the City of Merced shall consider adoption of an ordinance requiring the following measures to be implemented in conjunction with construction projects within the City:</p> <ol style="list-style-type: none"> 1. The idling time of all construction equipment used in the plan area shall not exceed ten minutes when practicable. 2. The hours of operation of heavy-duty equipment shall be minimized when practicable. 3. All equipment shall be properly tuned and maintained in accord with manufacturer's specifications when practicable. 4. When feasible, alternative fueled or electrical construction equipment shall be used at the project site. 5. The minimum practical engine size for construction equipment shall be used when practicable. 6. When feasible, electric carts or other smaller 	Less Than Significant

Impact #	Impact	Significance	Mitigation #	Mitigation Measure	Significance After Mitigation
				<p>equipment shall be used at the project site.</p> <p>7. Gasoline-powered equipment shall be equipped with catalytic converters when practicable.</p>	
3.3-2	Development and operation under the General Plan would result in emissions of criteria pollutants, ozone precursors, and other pollutants caused by mobile source activity, area sources, and stationary sources.	Significant and Cumulative	3.3-2	<p>The following BACT (Best Available Control Technology) installations and mitigation shall be considered for new discretionary permits, to the extent feasible as determined by the City:</p> <ul style="list-style-type: none"> • Trees shall be carefully selected and located to protect building(s) from energy consuming environmental conditions, and to shade paved areas when it will not interfere with any structures. Trees should be selected to shade paved areas that will shade 50% of the area within 15 years. Structural soil should be used under paved areas to improve tree growth. • If transit service is available to a project site, development patterns and improvements shall be made to encourage its use. If transit service is not currently available, but is planned for the area in the future, easements shall be reserved to provide for future improvements such as bus turnouts, loading areas, route signs and shade structures. • Multi-story parking facilities shall be considered instead of parking lots to reduce exposed concrete surface and save green space. • Sidewalks and bikeways shall be installed throughout as much of any project as possible, in 	Significant, Cumulative, and Unavoidable

Impact #	Impact	Significance	Mitigation #	Mitigation Measure	Significance After Mitigation
				<p>compliance with street standards, and shall be connected to any nearby existing and planned open space areas, parks, schools, residential areas, commercial areas, etc., to encourage walking and bicycling.</p> <ul style="list-style-type: none"> • Projects shall encourage as many clean alternative energy features as possible to promote energy self-sufficiency. Examples include (but are not limited to): photovoltaic cells, solar thermal electricity systems, small wind turbines, etc. Rebate and incentive programs are offered for alternative energy equipment. <p>As many energy-conserving features as possible shall be included in the individual projects. Energy conservation measures include both energy conservation through design and operational energy conservation. Examples include (but are not limited to):</p> <ul style="list-style-type: none"> • Increased energy efficiency (above California Title 24 Requirements) • Energy efficient windows (double pane and/or Low-E) • Use Low and No-VOC coatings and paints • High-albedo (reflecting) roofing material • Cool Paving. “Heat islands” created by development projects contribute to the reduced air quality in the valley by heating ozone precursors 	

Impact #	Impact	Significance	Mitigation #	Mitigation Measure	Significance After Mitigation
				<ul style="list-style-type: none"> • Radiant heat barrier • Energy efficient lighting, appliances, heating and cooling systems • Install solar water-heating system(s) • Install photovoltaic cells • Install geothermal heat pump system(s) • Programmable thermostat(s) for all heating and cooling systems • Awnings or other shading mechanism for windows • Porch, patio and walkway overhangs • Ceiling fans, whole house fans • Utilize passive solar cooling and heating designs (e.g. natural convection, thermal flywheels) • Utilize daylighting (natural lighting) systems such as skylights, light shelves, interior transom windows etc. • Electrical outlets around the exterior of the unit(s) to encourage use of electric landscape maintenance equipment • Bicycle parking facilities for patrons and employees in a covered secure area. Bike storage should be located within 50' of the project's entrance. 	

Impact #	Impact	Significance	Mitigation #	Mitigation Measure	Significance After Mitigation
				<p>Construct paths to connect the development to nearby bikeways or sidewalks</p> <ul style="list-style-type: none"> • On-site employee cafeterias or eating areas • Low or non-polluting landscape maintenance equipment (e.g. electric lawn mowers, reel mowers, leaf vacuums, electric trimmers and edger's, etc.) • Pre-wire the unit(s) with high speed modem connections/DSL and extra phone lines • Natural gas fireplaces (instead of wood-burning fireplaces or heaters) • Natural gas lines (if available) and electrical outlets in backyard or patio areas to encourage the use of gas and/or electric barbecues • Low or non-polluting incentives items should be provided with each residential unit (such items could include electric lawn mowers, reel mowers, leaf vacuums, gas or electric barbecues, etc.) 	
3.3-3	Development and Operation under the General Plan would Expose Sensitive Receptors to Pollutant Concentration.	Less Than Significant		No mitigation measures are required.	Less Than Significant
3.3-4	Implementation of the General Plan Update Would Create Odor Impact	Less Than Significant		No mitigation measures are required.	Less Than Significant

Impact #	Impact	Significance	Mitigation #	Mitigation Measure	Significance After Mitigation
3.4 Biological Resources					
3.4-1	Result in substantial adverse impacts on candidate, special-status, or sensitive species.	Potentially Significant	3.4-1a	<p>Vernal Pools and Vernal Pool Associates</p> <p>To protect vernal pools and species associated with vernal pools including vernal pool smallscale, succulent owl's-clover, pincushion navarretia, Colusa grass, hairy Orcutt grass, spiny-sepaled button celery, San Joaquin Orcutt grass, Greene's tuctoria, Conservancy fairy shrimp, vernal pool fairy shrimp, Midvalley fairy shrimp, vernal pool tadpole shrimp, California linderiella, and Molestan blister beetle, surveys shall be conducted to determine the presence of vernal pools prior to or concurrent with application for annexation in areas identified as having potential habitat.</p> <p>Surveys to detect vernal pools are most easily accomplished during the rainy season or during early spring when pools contain water. If vernal pools are found to occur on a project site, the pools and a 100 foot-wide buffer around each pool or group of pools will be observed. If the vernal pools and buffer areas cannot be avoided, then the project proponent must consult with and obtain authorizations from, but not limited to, the California Department of Fish and Game, the United States Fish and Wildlife Service, the Army Corps of Engineers, and the State Water Resources Quality Control Board. Consultation and authorizations may require that additional surveys for special-status species be completed. Because there is a federal policy of no net loss of wetlands, mitigation to reduce losses and compensation to offset losses to vernal pools and associated special-status species will be required.</p>	Less Than Significant

Impact #	Impact	Significance	Mitigation #	Mitigation Measure	Significance After Mitigation
		Potentially Significant	3.4-1b	<p>Special-Status Plants</p> <p>To protect special-status plants, the City shall ensure that a botanical survey be conducted for projects containing habitat suitable for special-status plant species. Surveys shall be conducted by a qualified biologist or botanist during the appropriate flowering season for the plants and shall be conducted prior to issuance of a grading or building permit for the project. If special-status plants are found to occur on the project site, the population of plants shall be avoided and protected. If avoidance and protection is not possible, then a qualified biologist will prepare a mitigation and monitoring plan for the affected species. The plan shall be submitted to the CDFG and/or the USFWS for review and comment. Details of the mitigation and monitoring plan shall include, but not be limited to:</p> <ul style="list-style-type: none"> • Removing and stockpiling topsoil with intact roots and seed bank in the disturbance area, and either replacing the soil in the same location after construction is complete or in a different location with suitable habitat; or • Collect plants, seeds, and other propogules from the affected area prior to disturbance. After construction is complete, then the restored habitat will be replanted with propogules or cultivated nursery stock; or • These and other mitigations will only be considered successful if the populations of the affected species are sustained for a minimum of three years and are of 	Less Than Significant

Impact #	Impact	Significance	Mitigation #	Mitigation Measure	Significance After Mitigation
				a similar size and quality as the original population.	
		Potentially Significant	3.4-1c	<p>Valley Elderberry Longhorn Beetle</p> <p>To protect the Valley elderberry longhorn beetle (VELB), the project proponent shall ensure that a survey for elderberry bushes be conducted by a qualified biologist at each project site containing habitat suitable for VELB prior to the issuance of a grading permit or building permit. If elderberry bushes are found, the project proponent shall implement the measures recommended by the biologist, which shall contain the standardized measures adopted by the USFWS.</p>	Less Than Significant
		Potentially Significant	3.4-1d	<p>Burrowing Owls</p> <p>To protect burrowing owls on proposed projects where suitable habitat exists, the following shall be implemented:</p> <ul style="list-style-type: none"> To protect burrowing owls, preconstruction surveys shall be conducted by a qualified biologist at all project sites that contain grasslands, fallowed agricultural fields, or fallow fields along roadsides, railroad corridors, and other locations prior to grading. If, during a pre-construction survey, burrowing owls are found to be present, the project proponent shall implement the measures recommended by the biologist and include the standardized avoidance measures of CDFG. 	Less Than Significant

Impact #	Impact	Significance	Mitigation #	Mitigation Measure	Significance After Mitigation
		Potentially Significant	3.4-1e	<p>Special-Status Birds</p> <p>To protect raptors and other special-status birds on proposed projects where suitable habitat exists, the following measures shall be implemented:</p> <ul style="list-style-type: none"> • Trees scheduled to be removed because project implementation shall be removed during the non-breeding season (late September to the end of February). • Prior to construction, but not more that 14 days before grading, demolition, or site preparation activities, a qualified biologist shall conduct a preconstruction nesting survey to determine the presence of nesting raptors. Activities taking place outside the breeding season (typically February 15 through August 31) do not require a survey. If active raptor nests are present in the construction zone or within 250-feet of the construction zone, temporary exclusion fencing shall be erected at a distance of 250-feet around the nest site. Clearing and construction operations within this area shall be postponed until juveniles have fledged and there is no evidence of a second nesting attempt determined by the biologist. • If nesting Swainson’s hawks are observed during field surveys, then consultation with the CDFG regarding Swainson’s hawk mitigation guidelines shall be required. The guidelines include, but are not limited to, buffers of up to one quarter mile, monitoring of the nest by a qualified biologist, and 	Less Than Significant

Impact #	Impact	Significance	Mitigation #	Mitigation Measure	Significance After Mitigation
				<p>mitigation for the loss of foraging habitat.</p> <ul style="list-style-type: none"> To avoid impacts to common and special-status migratory birds pursuant to the Migratory Bird Treaty Act and CDFG codes, a nesting survey shall be conducted prior to construction activities if the work is scheduled between March 15 and August 31. If migratory birds are identified nesting within the construction zone, a 100-foot buffer around the nest site must be designated. No construction activity may occur within this buffer until a qualified biologist has determined that the young have fledged. A qualified biologist may modify the size of the buffer based on site conditions and the bird's apparent acclimation to human activities. If the buffer is modified, the biologist would be required to monitor stress levels of the nesting birds for at least one week after construction commences to ensure that project activities would not cause nest site abandonment or loss of eggs or young. At any time the biologist shall have the right to implement the full 100-foot buffer if stress levels are elevated to the extent that could cause nest abandonment and/or loss of eggs or young. 	
		Potentially Significant	3.4-1f	<p>Special-Status Amphibians</p> <p>To protect California tiger salamander and western spadefoot on proposed projects where suitable habitat exists, the following shall be implemented:</p> <ul style="list-style-type: none"> To protect special-status amphibians, preconstruction surveys shall be conducted by a qualified biologist at 	Less Than Significant

Impact #	Impact	Significance	Mitigation #	Mitigation Measure	Significance After Mitigation
				all project sites that contain appropriate habitat. If, during a pre-construction survey, special-status amphibians are found to be present, the project proponent shall implement the measures recommended by the biologist and standardized measures adopted by the USFWS or the CDFG.	
		Potentially Significant	3.4-1g	<p>Special-Status Reptiles</p> <p>To protect western pond turtle and giant garter snake on proposed projects where suitable habitat exists, the following shall be implemented:</p> <ul style="list-style-type: none"> To protect special-status reptiles, preconstruction surveys shall be conducted by a qualified biologist at all project sites that contain appropriate habitat. If, during a pre-construction survey, special-status reptiles are found to be present, the project proponent shall implement the measures recommended by the biologist and standardized measures adopted by the USFWS or the CDFG. 	Less Than Significant
		Potentially Significant	3.4-1h	<p>Special-Status Fish</p> <p>To protect special-status fish, including hardhead, on proposed projects where suitable habitat exists, the following shall be implemented:</p> <ul style="list-style-type: none"> To protect special-status fish, preconstruction surveys shall be conducted by a qualified fish biologist at all project sites that contain appropriate habitat. If, during a pre-construction survey, special status fish are found to be present, the project 	Less Than Significant

Impact #	Impact	Significance	Mitigation #	Mitigation Measure	Significance After Mitigation
				proponent shall implement the measures recommended by the biologist and standardized measures adopted by the USFWS, National Marine Fisheries Service (NMFS) or the CDFG.	
		Potentially Significant	3.4-1i	<p>Special-Status Mammals</p> <p>To protect Merced kangaroo rat, western mastiff bat, western red bat, hoary bat, Yuma myotis, San Joaquin pocket mouse, American badger, and San Joaquin kit fox on proposed projects where suitable habitat exists, the following shall be implemented:</p> <ul style="list-style-type: none"> To protect special-status mammals, preconstruction surveys shall be conducted by a qualified biologist at all project sites that contain appropriate habitat. If, during a pre-construction survey, special-status mammals are found to be present, the project proponent shall implement the measures recommended by the biologist and standardized measures adopted by the USFWS or the CDFG. 	Less Than Significant
3.4-2	Result in substantially adverse affect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, and regulations or by the CDFG or USFWS.	Potentially Significant	3.4-2	<p>Streambed Alteration Agreement</p> <p>To minimize impacts to riparian habitat and other sensitive natural communities, the following the measures shall be implemented when streambed alterations are proposed:</p> <ul style="list-style-type: none"> The project proponent shall have a qualified biologist map all riparian habitat, or other sensitive natural communities. To the extent feasible and practicable, all planned construction activity shall be designed to 	Less Than Significant

Impact #	Impact	Significance	Mitigation #	Mitigation Measure	Significance After Mitigation
				<p>avoid direct effects on these areas.</p> <ul style="list-style-type: none"> In those areas where complete avoidance is not possible, then all riparian habitat, or other sensitive natural communities, shall be mitigated on a “no-net-loss” basis in accordance with either CDFG regulations and/or a Section 1602 Streambed Alteration Agreement, if required. Habitat mitigation shall be replaced at a location and with methods acceptable to the CDFG. 	
		Potentially Significant	3.4-1a	See Mitigation Measure #3.4-1a above.	Less Than Significant
3.4-3	Result in substantially adverse affect on federally protected wetlands through direct removal, filling, hydrological interruption, or other means.	Potentially Significant	3.4-3a	<p>Conduct a delineation of Waters of the U.S. and Wetlands (WOUS/Wetlands) and Obtain Permits.</p> <p>In order to determine if there are wetlands or waters of the U.S. on a proposed project site which fall under the U.S. Army Corps of Engineers (Corps) jurisdictional authority under Section 404 of the CWA, a delineation of the Waters of the U.S. and wetlands shall be performed and submitted to the Corps for verification prior to annexation.</p> <p>A Section 404 permit and a Section 401 Water Quality Certification or Waiver of Waste Discharge shall be acquired from the Corps and the Regional Water Quality Control Board (RWQCB) and a Section 1602 Streambed Alteration Agreement from DFG respectively prior to the onset of construction related activities.</p>	Less Than Significant

Impact #	Impact	Significance	Mitigation #	Mitigation Measure	Significance After Mitigation
		Potentially Significant	3.4-3b	Any jurisdictional waters that would be lost or disturbed due to implementation of any proposed project within the plan area shall be replaced or rehabilitated on a “no-net-loss” basis in accordance with the Corps’ and the RWQCB mitigation guidelines. Habitat restoration, rehabilitation, and/or replacement if required shall be at a location and by methods agreeable to the Corps, the RWQCB, and the City of Merced. The project applicant shall abide by the conditions of any executed permits.	Less Than Significant
3.4-4	Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors or impede the use of native wildlife nursery sites.	Potentially Significant	3.4-1e	See Mitigation Measure #3.4-1e above.	Less Than Significant
3.4-5	Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.	No Impact		No mitigation measures are required.	No Impact
3.4-6	Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.	No Impact		No mitigation measures are required.	No Impact

Impact #	Impact	Significance	Mitigation #	Mitigation Measure	Significance After Mitigation
3.5 Cultural Resources					
3.5-1	Cause a substantial adverse change in the significance of a historic or archaeological resource	Less Than Significant		No mitigation measures are required.	Less Than Significant
3.5-2	Potentially disturb human remains or destroy a unique paleontological resource, site, or geologic feature	Less Than Significant		No mitigation measures are required.	Less Than Significant
3.6 Geology and Soils					
3.6-1	Expose people or structures to potential substantial adverse effects from seismic hazards	Less Than Significant		No mitigation measures are required.	Less Than Significant
3.6-2	The proposed project would not result in substantial soil erosion or the loss of topsoil	Less Than Significant		No mitigation measures are required.	Less Than Significant
3.6-3	The proposed project would not be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on-or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse	Less Than Significant		No mitigation measures are required.	Less Than Significant
3.6-4	The proposed project could be located on expansive soils creating substantial risks to life or property	Less Than Significant		No mitigation measures are required.	Less Than Significant

Impact #	Impact	Significance	Mitigation #	Mitigation Measure	Significance After Mitigation
3.6-5	Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water	Less Than Significant		No mitigation measures are required.	Less Than Significant
3.7 Hazards and Hazardous Materials					
3.7-1	Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials	Less Than Significant		No mitigation measures are required.	Less Than Significant
3.7-2	Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment	Less Than Significant		No mitigation measures are required.	Less Than Significant
3.7-3	Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school	Less Than Significant		No mitigation measures are required.	Less Than Significant
3.7-4	Would the proposed project be located on a site, or proximate to a site, that is included on a list of hazardous materials	Less Than Significant		No mitigation measures are required.	Less Than Significant

Impact #	Impact	Significance	Mitigation #	Mitigation Measure	Significance After Mitigation
	sites compiled pursuant to Government Code Section 65962.5 and, as a result, create a significant hazard to the public or the environment				
3.7-5	Would the proposed project be located within an airport land use plan, or within two miles of a public airport or private airstrip, creating a safety hazard for people residing or working in the project area	Less Than Significant		No mitigation measures are required.	Less Than Significant
3.7-6	Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan	Less Than Significant		No mitigation measures are required.	Less Than Significant
3.7-7	Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residence are intermixed with wildlands	Less Than Significant		No mitigation measures are required.	Less Than Significant
3.8 Hydrology and Water Quality					
3.8-1	Violation of water quality standards or waste discharge requirements or otherwise	Less Than Significant		No mitigation measures are required.	Less Than Significant

Impact #	Impact	Significance	Mitigation #	Mitigation Measure	Significance After Mitigation
	substantially degrade water quality				
3.8-2	The proposed project could substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table.	Significant		No mitigation measures are available.	Significant
3.8-3	The proposed project could substantially alter the existing drainage pattern of the area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site or substantially increase the rate or amount of surface runoff in a manner, which would result in on- or offsite flooding.	Less Than Significant		No mitigation measures are required.	Less Than Significant
3.8-4	The proposed project could create or contribute runoff water which would exceed the capacity of existing stormwater drainage systems or provide substantial	Less Than Significant		No mitigation measures are required.	Less Than Significant

Impact #	Impact	Significance	Mitigation #	Mitigation Measure	Significance After Mitigation
	additional sources of polluted runoff.				
3.8-5	The proposed project could place housing or other structures within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary, Flood Insurance Rate Map, or other flood hazard delineation map or place within a 100-year flood hazard area structures which could impede or redirect flood flows.	Less Than Significant		No mitigation measures are required.	Less Than Significant
3.8-6	The proposed project could expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam, or inundation by seiche, tsunami or mudflow.	No Impact		No mitigation measures are required.	No Impact
3.9 Land Use and Planning					
3.9-1	Physically divide an established community	Less Than Significant		No mitigation measures are required.	Less Than Significant
3.9-2	Conflict with any applicable land use plan, policy, or regulation	Less Than Significant		No mitigation measures are required.	Less Than Significant

Impact #	Impact	Significance	Mitigation #	Mitigation Measure	Significance After Mitigation
3.9-3	Conflict with any applicable habitat conservation plan or natural community conservation plan.	No Impact		No mitigation measures are required.	No Impact
3.10 Mineral Resources					
3.10-1	The proposed project could adversely affect the availability of a known mineral resource of value to the region and/or residents of the state	No Impact		No mitigation measures are required.	No Impact
3.10-2	The proposed project could adversely affect the availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan	No Impact		No mitigation measures are required.	No Impact
3.11 Noise					
3.11-1	Buildout of the General Plan may contribute to increased traffic noise levels, and an exceedance of the City's noise standards and resulting in potential noise impacts to new sensitive receptors.	Less Than Significant		No mitigation measures are required.	Less Than Significant
3.11-2	Buildout of the General Plan may contribute to increased traffic noise levels, and a	Potentially Significant		No mitigation measures are available.	Significant and Unavoidable

Impact #	Impact	Significance	Mitigation #	Mitigation Measure	Significance After Mitigation																				
	significant increase in overall traffic noise levels at existing sensitive receptors.																								
3.11-3	Buildout of the General Plan will result in construction activities which will contribute to the overall ambient noise environment.	Less Than Significant		No mitigation measures are required.	Less Than Significant																				
3.11-4	Proposed General Plan Buildout will result in construction activities which could contribute to vibration levels at building facades.	Potentially Significant	3.11-4	<p>Table 3.11-13 provides criteria for evaluating construction vibration impacts. If construction activities include the use of pile drivers or large vibratory compactors, an analysis of potential vibration impacts should be conducted. The vibration impacts should not exceed a peak particle velocity of 0.1 inches/second.</p> <p>Table 3.11-13 Effects of Vibration on People and Buildings</p> <table border="1"> <thead> <tr> <th>Peak Particle Velocity inches/second</th> <th>Peak Particle Velocity mm/second</th> <th>Human Reaction</th> <th>Effect on Buildings</th> </tr> </thead> <tbody> <tr> <td>0-.006</td> <td>0.15</td> <td>Imperceptible by people</td> <td>Vibrations unlikely to cause damage of any type</td> </tr> <tr> <td>.006-.02</td> <td>0.5</td> <td>Range of Threshold of perception</td> <td>Vibrations unlikely to cause damage of any type</td> </tr> <tr> <td>.08</td> <td>2.0</td> <td>Vibrations clearly perceptible</td> <td>Recommended upper level of which ruins and ancient monuments should be subjected</td> </tr> <tr> <td>0.1</td> <td>2.54</td> <td>Level at which continuous vibrations begin to annoy people</td> <td>Virtually no risk of architectural damage to normal buildings</td> </tr> </tbody> </table>	Peak Particle Velocity inches/second	Peak Particle Velocity mm/second	Human Reaction	Effect on Buildings	0-.006	0.15	Imperceptible by people	Vibrations unlikely to cause damage of any type	.006-.02	0.5	Range of Threshold of perception	Vibrations unlikely to cause damage of any type	.08	2.0	Vibrations clearly perceptible	Recommended upper level of which ruins and ancient monuments should be subjected	0.1	2.54	Level at which continuous vibrations begin to annoy people	Virtually no risk of architectural damage to normal buildings	Less Than Significant
Peak Particle Velocity inches/second	Peak Particle Velocity mm/second	Human Reaction	Effect on Buildings																						
0-.006	0.15	Imperceptible by people	Vibrations unlikely to cause damage of any type																						
.006-.02	0.5	Range of Threshold of perception	Vibrations unlikely to cause damage of any type																						
.08	2.0	Vibrations clearly perceptible	Recommended upper level of which ruins and ancient monuments should be subjected																						
0.1	2.54	Level at which continuous vibrations begin to annoy people	Virtually no risk of architectural damage to normal buildings																						

Impact #	Impact	Significance	Mitigation #	Mitigation Measure				Significance After Mitigation
				0.2	5.0	Vibrations annoying to people in buildings	Threshold at which there is a risk of architectural damage to normal dwellings	
				1.0	25.4		Architectural Damage	
				2.0	50.4		Structural Damage to Residential Buildings	
				6.0	151.0		Structural Damage to Commercial Buildings	
				<i>Source: Survey of Earth-borne Vibrations due to Highway Construction and Highway Traffic, Caltrans 1976.</i>				
3.11-5	Proposed General Plan Buildout could expose new noise-sensitive receptors to railroad noise levels.	Less Than Significant		No mitigation measures are required.				Less Than Significant
3.11-6	The Proposed General Plan Buildout may include stationary noise sources such as automotive and truck repair facilities, tire installation centers, car washes, loading docks, corporation yards, parks, and play fields may create noise levels in excess of the City standards.	Less Than Significant		No mitigation measures are required.				Less Than Significant
3.11-7	Proposed General Plan Buildout could expose new noise sensitive receptors to aircraft operations noise levels.	Less Than Significant		No mitigation measures are required.				Less Than Significant

Impact #	Impact	Significance	Mitigation #	Mitigation Measure	Significance After Mitigation
3.12 Population and Housing					
3.12-1	Induce substantial population growth in an area, either directly or indirectly	Less Than Significant		No mitigation measures are required.	Less Than Significant
3.12-2	Displace a substantial number of people or existing housing, necessitating the construction of replacement housing elsewhere	Less Than Significant		No mitigation measures are required.	Less Than Significant
3.13 Recreation					
3.13-1	Increase the use of existing neighborhood and regional parks or other recreational facilities or require the construction or expansion of recreational facilities.	Less Than Significant		No mitigation measures are required.	Less Than Significant
3.13-2	Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment.	Less Than Significant		No mitigation measures are required.	Less Than Significant
3.14 Public Services					
3.14-1	Result in a substantial adverse physical impact to the continued provision of law enforcement services in the City	Less Than Significant		No mitigation measures are required.	Less Than Significant

Impact #	Impact	Significance	Mitigation #	Mitigation Measure	Significance After Mitigation
3.14-2	Result in a substantial adverse physical impact to the continued provision of fire protection services in the City	Less Than Significant		No mitigation measures are required.	Less Than Significant
3.14-3	Result in a substantial adverse physical impact to the continued provision of school services in the City	No Impact		No mitigation measures are required.	Less Than Significant
3.14-4	Result in a substantial increase in the demand for other public services and facilities	Less Than Significant		No mitigation measures are required.	Less Than Significant
3.15 Transportation/Traffic					
3.15-1	Cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system and/or exceed, either individually or cumulatively, a level of service standard established by the county congestion management agency for designated roads or highways.	Potentially Significant	3.15-1a	<p>Table 3.15-4 indicates the recommended number of travel lanes for several of the road segments analyzed to keep traffic levels-of-service at the City’s preferred LOS “D” at General Plan buildout. Implementation of the following projects will permit the City to manage its traffic volumes at Level of Service “D”, or better:</p> <ol style="list-style-type: none"> 1. SR 59 from 16th to Olive (2 lanes to 6 lanes) Existing LOS=F / Future LOS=D 2. SR 59 from Olive to Yosemite (2 lanes to 6 lanes) Existing LOS=C+ / Future LOS=D 3. SR 59 from Yosemite to Cardella (2 lanes to 4 lanes) Existing LOS=C+ / Future LOS=D 4. SR 59 from Cardella to Bellevue (2 lanes to 4 lanes) Existing LOS=C+ / Future LOS=D 	Significant and Unavoidable

Impact #	Impact	Significance	Mitigation #	Mitigation Measure	Significance After Mitigation
				<p>5. SR 59 from Bellevue to Old Lake (2 lanes to 6 lanes) Existing LOS=C+ / Future LOS=C</p> <p>6. SR 59 from Old Lake to Castle Farms (2 lanes to 6 lanes) Existing LOS=C+ / Future LOS=D</p> <p>7. "R" Street from Old Lake to Area of Influence Boundary (Future Extension 0 lanes to 2 lanes) Existing LOS= none / Future LOS=C+</p> <p>8. "M" Street from Cardella to Bellevue (Future Extension 0 lanes to 4 lanes) Existing LOS=none / Future LOS = C+</p> <p>9. "M" Street from Bellevue to Old Lake (Future Extension 0 lanes to 4 lanes) Existing LOS=none / Future LOS = C+</p> <p>10. Martin Luther King Jr. Way/South SR 59 from Roduner to Mission (2 lanes to 4 lanes) Existing LOS=C+ / Future LOS=D</p> <p>11. Martin Luther King Jr. Way/South SR 59 from Mission to Gerard (2 lanes to 4 lanes) Existing LOS=C+ / Future LOS=D</p> <p>12. "G" Street from Yosemite to Cardella (2 lanes to 4 lanes) Existing LOS=C+ / Future LOS=C+</p> <p>13. "G" Street from Cardella to Bellevue (2 lanes to 4 lanes) Existing LOS=C+ / Future LOS=D</p>	

Impact #	Impact	Significance	Mitigation #	Mitigation Measure	Significance After Mitigation
				<p>14. "G" Street from Bellevue to Old Lake (2 lanes to 6 lanes) Existing LOS=C+ / Future LOS=D</p> <p>15. "G" Street from Old Lake to Snelling (2 lanes to 4 lanes) Existing LOS=C+ / Future LOS=C</p> <p>16. Parsons/Gardner from Childs to SR 140 (2 lanes to 4 lanes) Existing LOS=D / Future LOS=D</p> <p>17. Parsons/Gardner from Bear Creek to Olive (2 lanes to 4 lanes) Existing LOS=C+ / Future LOS=D</p> <p>18. Parsons/Gardner from Olive to Yosemite (2 lanes to 6 lanes) Existing LOS=D / Future LOS=D</p> <p>19. Parsons/Gardner from Yosemite to Cardella (2 lanes to 4 lanes) Existing LOS=C+ / Future LOS=D</p> <p>20. Parsons/Gardner from Cardella to Bellevue (Future Extension 0 lanes to 4 lanes) Existing LOS= none / Future LOS=D</p> <p>21. Parsons/Gardner from Bellevue to Old Lake (Future Extension 0 lanes to 4 lanes) Existing LOS= none / Future LOS=C+</p> <p>22. Parsons/Gardner from Old Lake to Golf Club (Future Extension 0 lanes to 2 lanes) Existing LOS= none / Future LOS=D</p> <p>23. Campus Parkway SR 99/Mission to Childs (Future Extension 0 lanes to 6 lanes) Existing LOS= none / Future LOS=D</p>	

Impact #	Impact	Significance	Mitigation #	Mitigation Measure	Significance After Mitigation
				<p>24. Campus Parkway from Childs to SR 140 (Future Extension 0 lanes to 4 lanes) Existing LOS= none / Future LOS=D</p> <p>25. Campus Parkway from SR 140 to Olive (Future Extension 0 lanes to 4 lanes) Existing LOS= none / Future LOS=D</p> <p>26. Campus Parkway from Olive to Yosemite (Future Extension 0 lanes to 4 lanes) Existing LOS= none / Future LOS=D</p> <p>27. Campus Parkway from Yosemite to Cardella (Future Extension 0 lanes to 4 lanes) Existing LOS= none / Future LOS=D</p> <p>28. Campus Parkway from Cardella to Bellevue (Future Extension 0 lanes to 4 lanes) Existing LOS= none / Future LOS=D</p> <p>29. Tyler Road from Childs to Mission (Future Extension 0 lanes to 2 lanes) Existing LOS= none / Future LOS=D</p> <p>30. Old Lake Road SR 59 to "R" Street (Future Extension 0 lanes to 4 lanes) Existing LOS= none / Future LOS=C+</p> <p>31. Old Lake Road "R" Street to "M" Street (Future Extension 0 lanes to 4 lanes) Existing LOS= none / Future LOS=C</p>	

Impact #	Impact	Significance	Mitigation #	Mitigation Measure	Significance After Mitigation
				<p>32. Old Lake Road “M” Street to “G” Street Future Extension 0 lanes to 4 lanes) Existing LOS= none / Future LOS=C</p> <p>33. Bellevue Road from Atwater/Merced Expressway to Thornton (2 lanes to 8 lanes Existing LOS=C+ / Future LOS=C+</p> <p>34. Bellevue Road from Thornton to SR 59 (2 lanes to 8 lanes Existing LOS=C+ / Future LOS=D</p> <p>35. Bellevue Road from Parsons/Gardner to Campus Parkway (2 lanes to 6 lanes) Existing LOS=C+ / Future LOS=D</p> <p>36. Cardella Road from SR 59 to “R” Street (Future Extension 0 lanes to 4 lanes) Existing LOS= none / Future LOS=D</p> <p>37. Cardella Road from “M” Street to “G” Street (2 lanes to 4 lanes) Existing LOS= C+ / Future LOS=D</p> <p>38. Cardella Road from “G” Street to Parsons/Gardner (Future Extension 0 lanes to 4 lanes) Existing LOS= none / Future LOS=D</p> <p>39. Cardella Road from Parsons/Gardner to Campus Parkway (Future Extension 0 lanes to 4 lanes) Existing LOS= none / Future LOS=D</p> <p>40. Yosemite Avenue from Parsons/Gardner to Campus Parkway (2 lanes to 4 lanes) Existing LOS=D / Future LOS=D</p>	

Impact #	Impact	Significance	Mitigation #	Mitigation Measure	Significance After Mitigation
				<p>41. Olive Avenue West of Hwy 59 (Santa Fe Avenue) (4 lanes to 6 lanes) Existing LOS=C+ / Future LOS=C</p> <p>42. SR 99 from Atwater/Merced Expressway to Mariposa (4 lanes to 6 lanes through Merced) Existing LOS=C+ and D / Future LOS=C+ and D</p> <p>43. Childs Avenue from SR 59 to Tyler (2 lanes to 4 lanes) Existing LOS=C+ / Future LOS=D</p> <p>44. Childs Avenue from Parsons/Gardner to Coffee (2 lanes to 4 lanes) Existing LOS=C+ / Future LOS=D</p> <p>45. Childs Avenue from Coffee to Campus Parkway (2 lanes to 4 lanes) Existing LOS=D / Future LOS=D</p> <p>46. Childs Avenue from Campus Parkway to Tower (Future Extension 0 lanes to 4 lanes) Existing LOS=none / Future LOS=C+</p> <p>47. Dickerson Ferry/Mission Avenue from Thornton to West Avenue (2 lanes to 4 lanes) Existing LOS=C+ / Future LOS=D</p> <p>48. Dickerson Ferry/Mission Avenue from West Avenue to SR 59 (2 lanes to 6 lanes) Existing LOS=C+ / Future LOS=C+</p> <p>49. Dickerson Ferry/Mission Avenue from SR 50 to Tyler (2 lanes to 6 lanes) Existing LOS=C+ / Future LOS=C+</p>	

Impact #	Impact	Significance	Mitigation #	Mitigation Measure	Significance After Mitigation
				<p>50. Dickerson Ferry/Mission Avenue from SR 99 to Coffee (Future Campus Parkway)(2 lanes to 6 lanes) Existing LOS=C+ / Future LOS=C+</p> <p>51. Dickerson Ferry/Mission Avenue from Tyler to Henry (2 lanes to 6 lanes) Existing LOS=C+ / Future LOS=D</p> <p>52. Dickerson Ferry/Mission Avenue from Coffee to Tower (2 lanes to 4 lanes) Existing LOS=C+ / Future LOS=C+</p> <p>53. Thornton from Dickerson Ferry/Mission to SR 140 (2 lanes to 4 lanes) Existing LOS=C+ / Future LOS=D</p>	
		Potentially Significant	3.15-1b	<p>Traffic studies should be performed to satisfy the requirements of the California Environmental Quality Act (CEQA) for all proposed General Plan Amendments which intensify development, proposed specific plans, annexations, and other projects at the discretion of the Development Services Department. Future traffic studies should generally conform to any guidelines established by the City. The studies should be performed to determine, at a minimum, opening-day impacts of proposed projects and as confirmation or revision of the General Plan. The studies should address queue lengths and (at a minimum) peak-hour traffic signals warrants in addition to LOS and provide appropriate mitigations. At the discretion of the City, a complete warrant study in accordance with the most recent edition of the California Manual on Uniform Traffic Control Devices may be required to evaluate the need for traffic signals.</p>	Significant and Unavoidable

Impact #	Impact	Significance	Mitigation #	Mitigation Measure	Significance After Mitigation
3.15-2	Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks	Less Than Significant		No mitigation measures are required.	Less Than Significant
3.15-3	Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)	Less Than Significant		No mitigation measures are required.	Less Than Significant
3.15-4	Result in Inadequate Emergency Access	Less Than Significant		No mitigation measures are required.	Less Than Significant
3.15-5	Result in Inadequate Parking Capacity	No Impact		No mitigation measures are required.	No Impact
3.15-6	Conflict with Adopted Policies Supporting Alternative Transportation	No Impact		No mitigation measures are required.	No Impact
3.16 Utilities/Services					
3.16-1	The proposed project would result in the exceedance of wastewater treatment requirements of the CVRWQCB	Less Than Significant		No mitigation measures are required.	Less Than Significant
3.16-2	The proposed project would require or result in the construction of new water or wastewater treatment facilities	Less Than Significant		No mitigation measures are required.	Less Than Significant

Impact #	Impact	Significance	Mitigation #	Mitigation Measure	Significance After Mitigation
	or expansion of existing facilities, the construction of which could cause significant environmental effects				
3.16-3	The proposed project would require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects	Less Than Significant		No mitigation measures are required.	Less Than Significant
3.16-4	The proposed project would require new or expanded water supply entitlements	Less Than Significant		No mitigation measures are required.	Less Than Significant
3.16-5	Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	Less Than Significant		No mitigation measures are required.	Less Than Significant
3.16-6	The proposed project would increase demand for solid waste disposal services	Less Than Significant		No mitigation measures are required.	Less Than Significant

Impact #	Impact	Significance	Mitigation #	Mitigation Measure	Significance After Mitigation
3.16-7	Will the proposed project comply with federal, state, and local statutes and regulations related to solid waste?	Less Than Significant		No mitigation measures are required.	Less Than Significant
3.17 Greenhouse Gas Emissions (Global Climate Change)					
3.17-1	Development of the Project could potentially result in a cumulatively considerable incremental contribution to the significant cumulative impact of global climate change	Significant, Cumulatively Considerable, and Unavoidable		No mitigation measures are available.	Significant, Cumulatively Considerable, and Unavoidable
3.17-2	Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	Less Than Significant		No mitigation measures required.	Less Than Significant
3.17-3	Climate Change could potentially result in an impact on City of Merced water resources	Less Than Significant		No mitigation measures required.	Less Than Significant

Appendix C

Assumptions and Air Quality Emission Calculations
for Merced Water Master Plan Update

Merced Water Management Plan (WMP)
Construction Emissions Summary

Phase and Vehicle Type	Total Emissions (tons)				Metric Tons
	ROG	NO _x	PM ₁₀	PM _{2.5}	CO ₂ e
Well No. 6	0.00	0.04	0.00	0.00	6.31
Equipment	0.00	0.03	0.00	0.00	2.93
Construction Workers	0.00	0.00	0.00	0.00	1.02
Haul Trucks	0.00	0.01	0.00	0.00	2.37
2,500-gpm Well	0.04	0.44	0.02	0.02	479.48
Equipment	0.03	0.33	0.01	0.01	36.52
Construction Workers	0.00	0.03	0.00	0.00	24.45
Haul Trucks	0.00	0.08	0.00	0.00	18.94
Water Pipeline (1.5 miles)	0.08	0.93	0.05	0.05	5697.56
Equipment	0.07	0.66	0.04	0.04	63.33
Construction Workers	0.00	0.02	0.00	0.00	36.68
Haul Trucks	0.01	0.25	0.01	0.00	113.65
Water Storage Tank/Booster Pump Station	0.09	1.06	0.05	0.04	554.22
Equipment	0.07	0.76	0.04	0.03	79.01
Construction Workers	0.01	0.05	0.01	0.01	48.90
Haul Trucks	0.01	0.25	0.01	0.00	56.82
Pressure Sustaining Valve	0.00	0.02	0.00	0.00	29.67
Equipment	0.00	0.01	0.00	0.00	0.57
Construction Workers	0.00	0.00	0.00	0.00	1.02
Haul Trucks	0.00	0.01	0.00	0.00	2.37
Surface Water Treatment Plant	0.60	6.74	0.33	0.30	843.53
Equipment	0.55	5.82	0.29	0.26	526.35
Construction Workers	0.03	0.15	0.03	0.02	146.71
Haul Trucks	0.03	0.76	0.02	0.01	170.47
SJVAPCD Thresholds of Significance (tons/yr)	10	10	15	15	
Worst-Case Scenario (tons/yr)	0.82	9.18	0.46	0.40	7,611

Merced Water Management Plan (WMP)
Construction On-Road Assumptions

Phase and Vehicle Type	Total Days	Number Per Day	One-Way Distance (miles)	Total VMT	Pollutants (tons/year)				MT/yr
					ROG	NO _x	PM ₁₀	PM _{2.5}	CO ₂ e
Well No. 6	22								
Construction Workers		2	30	2,640	0.000	0.001	0.000	0.000	1.019
Haul Trucks		1	30	1,320	0.000	0.011	0.000	0.000	2.368
2,500-gpm Well	176								
Construction Workers		6	30	63,360	0.005	0.026	0.005	0.003	24.451
Haul Trucks		1	30	10,560	0.003	0.084	0.002	0.002	18.942
Water Pipeline (3 miles)	264								
Construction Workers		6	30	95,040	0.007	0.039	0.007	0.005	36.677
Haul Trucks		4	30	63,360	0.018	0.507	0.014	0.009	113.650
Water Storage Tank/Booster Pump Station	264								
Construction Workers		8	30	126,720	0.010	0.051	0.010	0.006	48.902
Haul Trucks		2	30	31,680	0.009	0.253	0.007	0.005	56.825
Pressure Sustaining Valve	22								
Construction Workers		2	30	2,640	0.000	0.001	0.000	0.000	1.019
Haul Trucks		1	30	1,320	0.000	0.011	0.000	0.000	2.368
Surface Water Treatment Plant	396								
Construction Workers		16	30	380,160	0.029	0.154	0.029	0.018	146.707
Haul Trucks		4	30	95,040	0.027	0.760	0.020	0.014	170.475

Vehicle Class	Emission Factors (g/mile)				
	ROG	NO _x	PM ₁₀	PM _{2.5}	CO ₂
Construction Workers	0.08	0.41	0.08	0.05	366.61
Haul Trucks	0.29	8.00	0.21	0.15	1,704.03

**Merced Water Master Plan
Operations**

Project Component	Annual Electricity Consumption (kWh/yr)	Total Number (units or miles)	Annual Electricity Consumption (WMP Buildout) (MWh/yr)	Emissions (MT CO₂e/yr)
Well No. 6	0	1	-	-
2,500-gpm well	1,000,000	6	6,000	1,777
Booster Pump Station	1,400,000	3	4,200	1,244
Surface WTP	5,000,000	1	5,000	1,480
Pipelines	0	40	-	-
Total			15,200	4,501

Emission Factors

Pollutant	Emission Factor	Units	GWP
CO ₂	650.31	lb/MWh	1
CH ₄	31.12	lb/GWh	25
N ₂ O	5.67	lb/GWh	298
CO ₂ e	652.78	lb/MWh	

IPCC 4th Assessment
IPCC 4th Assessment
IPCC 4th Assessment

Source: CAMX, WECC California Region, eGRID2012

https://www.epa.gov/sites/production/files/2015-10/documents/egrid2012_summarytables_0.pdf

EMFAC2014 (v1.0.7) Emission Rates

Region Type: County

Region: Merced

Calendar Year: 2016

Season: Annual

Vehicle Classification: EMFAC2011 Categories

Units: miles/day for VMT, trips/day for Trips, g/mile for RUNEX, PMBW and PMTW, g/trip for STREX, HTSK and RUNLS, g/vehicle/day for IDLEX, RESTL and DIURN

Region	CalYr	VehClass	MdlYr	Speed	Fuel	Population	VMT	Trips	ROG_RUNEX	NOx_RUNEX	CO2_RUNEX	PM10	PM10_RUNEX	PM10_PMTW	PM10_PMBW	PM2.5	PM2_5_RUNEX	PM2_5_PMTW	PM2_5_PMBW	SOx_RUNEX	SOx_IDLEX	SOx_STREX
Merced	2016	LDA	Aggregate	Aggregate	GAS	91343.54	3742873	569746.8	0.029446186	0.10972783	322.1306352	0.046619	0.001868845	0.008000002	0.036750011	0.01947098	0.001720975	0.002000001	0.015750005	0.003235	0	0.000751
Merced	2016	LDA	Aggregate	Aggregate	DSL	629.2662	28568.86	3814.745	0.04102996	0.315238593	300.5968443	0.070805	0.026055331	0.008000002	0.036750011	0.042678194	0.024928189	0.002000001	0.015750005	0.00287	0	0
Merced	2016	LDA	Aggregate	Aggregate	ELEC	418.729	25603.56	2716.876	0	0	0	0.044475	0	0.008000002	0.036750011	0.017750005	0	0.002000001	0.015750005	0	0	0
Merced	2016	LDT1	Aggregate	Aggregate	GAS	9535.7	313695.4	56181.73	0.115160234	0.361735186	374.3812432	0.049521	0.004770487	0.008000002	0.036750011	0.022154422	0.004404416	0.002000001	0.015750005	0.003799	0	0.000953
Merced	2016	LDT1	Aggregate	Aggregate	DSL	23.98832	546.4923	119.103	0.199231765	1.360182482	395.3362781	0.197454	0.152704012	0.008000002	0.036750011	0.163848109	0.146098104	0.002000001	0.015750005	0.003774	0	0
Merced	2016	LDT1	Aggregate	Aggregate	ELEC	3.872471	145.6206	24.013	0	0	0	0.044475	0	0.008000002	0.036750011	0.017750005	0	0.002000001	0.015750005	0	0	0
Merced	2016	LDT2	Aggregate	Aggregate	GAS	32965.74	1307368	204395	0.047195857	0.22869735	434.657827	0.046895	0.002145225	0.008000002	0.036750011	0.019727021	0.001977016	0.002000001	0.015750005	0.004368	0	0.001025
Merced	2016	LDT2	Aggregate	Aggregate	DSL	29.38643	1602.998	188.9784	0.01890076	0.055088483	372.5781378	0.051269	0.006519206	0.008000002	0.036750011	0.023987193	0.006237188	0.002000001	0.015750005	0.003557	0	0
Merced	2016	T7 single c	Aggregate	Aggregate	DSL	290.1016	22737.45	0	0.28877247	7.999502206	1704.027904	0.213478	0.11573751	0.036000001	0.061740018	0.146190767	0.110730757	0.009000003	0.026460008	0.016257	0.033728	0

Appendix D

Groundwater Conditions and Supply Assessment
of the City of Merced 2030 General Plan Area

GROUNDWATER CONDITIONS AND SUPPLY ASSESSMENT
OF THE CITY OF MERCED 2030 GENERAL PLAN AREA

REVISED REPORT

Prepared for
AECOM
Fresno, California

By
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Groundwater Quality Consultants
Fresno, California

April 2016

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GROUNDWATER CONDITIONS AND SUPPLY ASSESSMENT
OF THE CITY OF MERCED 2030 GENERAL PLAN AREA

INTRODUCTION

Information on regional groundwater conditions in the Merced area is available from Page and Balding (1973), the Merced Irrigation District (2003), WRIME (2007), and Nolte (2009). This information was supplemented by data obtained from the City of Merced, the Merced Irrigation District (MID), the California Department of Water Resources, and the U.S. Geological Survey. In this report, subsurface geologic conditions and water levels are first discussed. Well pumpage and sources of recharge are then discussed. Aquifer characteristics and groundwater quality are discussed. Lastly, water budget items for existing conditions and full development of the lands within the 2030 general plan boundary are discussed. The purpose of this report is to provide information on groundwater conditions and a groundwater supply assessment for the City for existing conditions and full development of the 2030 General Plan Area. This assessment is based on an evaluation of existing data. The area evaluated is primarily within the City of Merced 2030 General Plan Area boundary.

SUBSURFACE GEOLOGIC CONDITIONS

Alluvial deposits comprised of alternating layers of sand, gravel, and clay provide water to wells in the Merced area. Bedrock is indicated to be more than 2,000 feet deep beneath the City. Many private domestic wells in the vicinity are less than 200 feet deep, and tap sand and gravel that are termed herein the upper aquifer. Older MID wells were often completed to depths ranging from about 100 to 200 feet, whereas many MID wells drilled or deepened since the mid-1960's are from 300 to 400 feet deep. Prior to 1987, most City of Merced wells ranged from about 200 to 350 feet in depth. Highly productive deposits of the Mehrten Formation, known locally as the "black sands", are present at depth beneath the Merced area, and many large capacity City wells drilled since the early 1990's tap these deposits. A regional confining bed, the Corcoran Clay, extends from the west side of the valley to near the west edge of the City. Because of its limited extent and thin nature, where present, this clay is not considered significant beneath the City of Merced. However, other more extensive and thicker clays that are present are discussed in this report.

As part of this evaluation, four subsurface geologic cross sections were prepared (Figure 1). The alluvial deposits in the Merced area dip to the southwest. Two cross sections (A-A' and

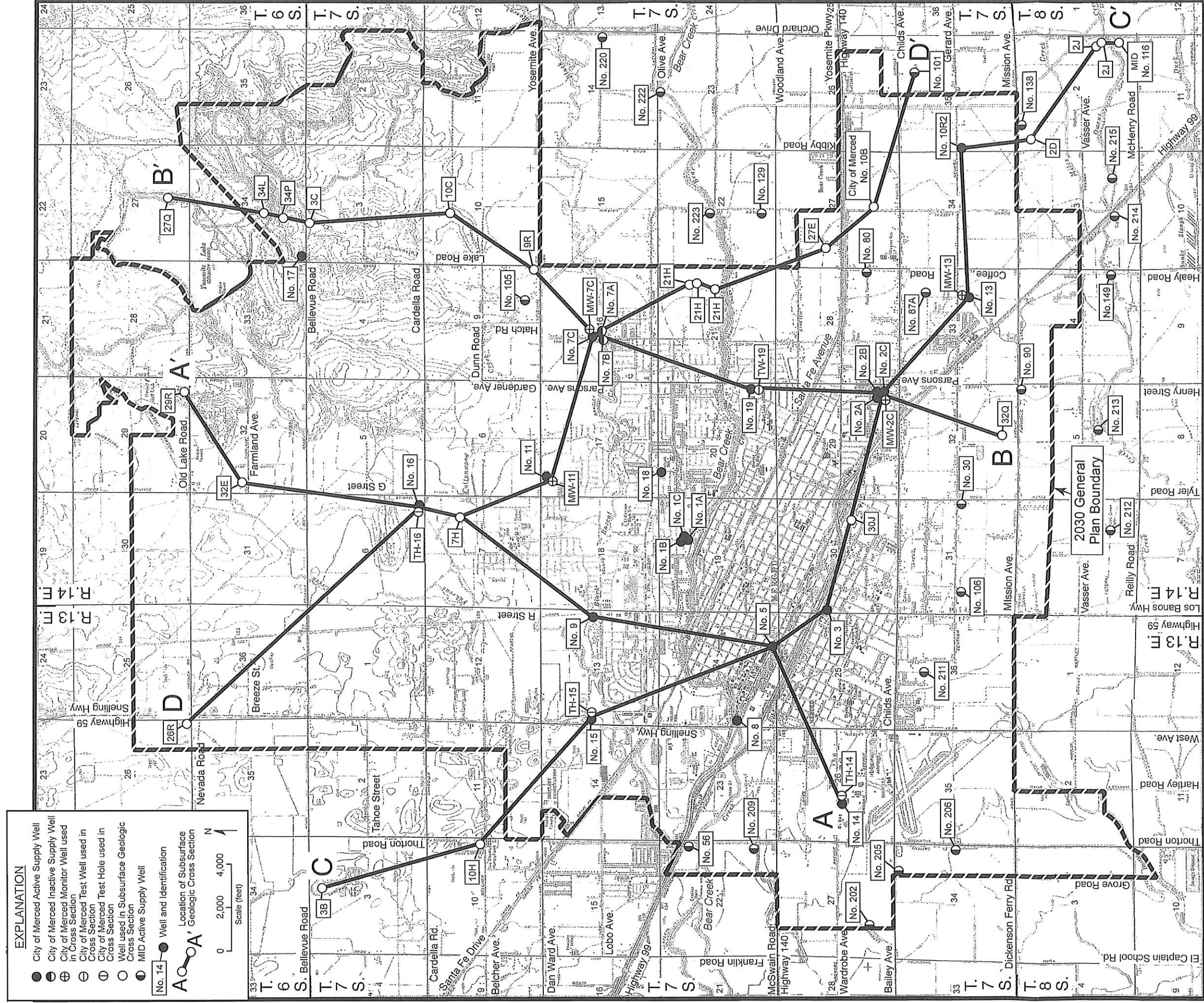


FIGURE 1 - LOCATION OF SELECTED WELLS AND SUBSURFACE GEOLOGIC CROSS SECTIONS

B-B') were developed to extend from the northeast to the southwest, generally along the inferred dip of the deposits. Two other cross sections (C-C' and D-D') were developed to extend from the northwest to southeast, generally perpendicular to the inferred dip of the deposits.

Subsurface Geologic Cross Section A-A'

Cross Section A-A' (Figure 2) extends from near Old Lake Road and Golf Road (west of Yosemite Lake) to the south-southwest through four City wells to just north of the Merced Municipal Airport. The uppermost deposits (above depths ranging from about 150 to 250 feet) are termed herein the upper aquifer. These deposits thin to the northeast along Cross Section A-A'. The Corcoran Clay was apparently encountered at Well No. 14 in two layers between about 100 feet and 160 feet in depth. The lower layer apparently extends to the northeast to City Well No. 5. The top of the black sands ranges from about 530 feet in depth to the northeast at well 29R to about 830 feet deep to the southwest at City of Merced Well No. 14. Deposits of the Mehrten Formation are indicated to be about 150 feet thick at City of Merced Well No. 16, but were apparently not fully penetrated by any other well along this section.

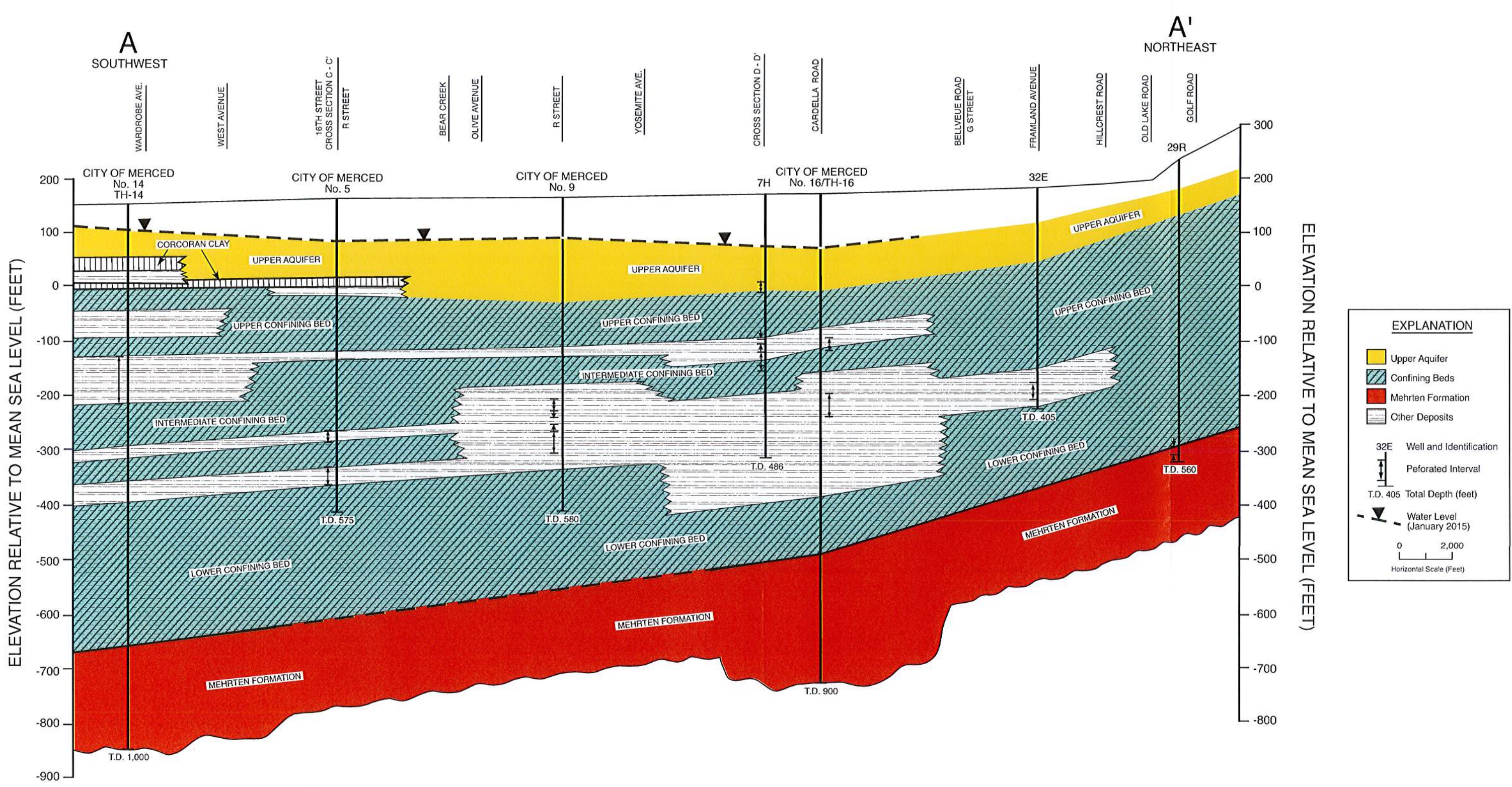


FIGURE 2 - SUBSURFACE GEOLOGIC CROSS SECTION A - A'

Two or more significant confining beds are indicated on the cross section. One overlies the Mehrten Formation, and ranges from about 100 feet thick at City Well No. 16 to about 270 feet thick at City Well No. 14. Another significant confining bed is present just beneath the upper aquifer, and averages about 70 to 80 feet in thickness along most of the section. Coarse-grained productive strata (commonly gravel) are present below the upper confining bed, often at a depth of about 250 feet. Sands or gravel are also indicated above the top of the lower confining bed. Northeast at Well 29R, one thick confining bed appears to be present above the Mehrten Formation, and to extend up to a depth of about 100 feet.

Subsurface Geologic Cross Section B-B'

Cross Section B-B' (Figure 3) extends from adjacent to Yosemite Lake on the north to the south-southwest, through several City wells to a well near Mission Avenue, between Tyler Road and Henry Street. The base of the upper aquifer ranges from about 150 to 200 feet deep, and this aquifer thickens to the south-southwest along the section. The top of the Mehrten Formation ranges from about 400 feet deep at Well 34P to about 600 feet deep at City Well No. 2C. A vertical fault, downthrown on the south side, was indicated between City of Merced Well No. 7A and Well 10C. The Mehrten Formation appears to range from about 130 feet thick near the north edge of

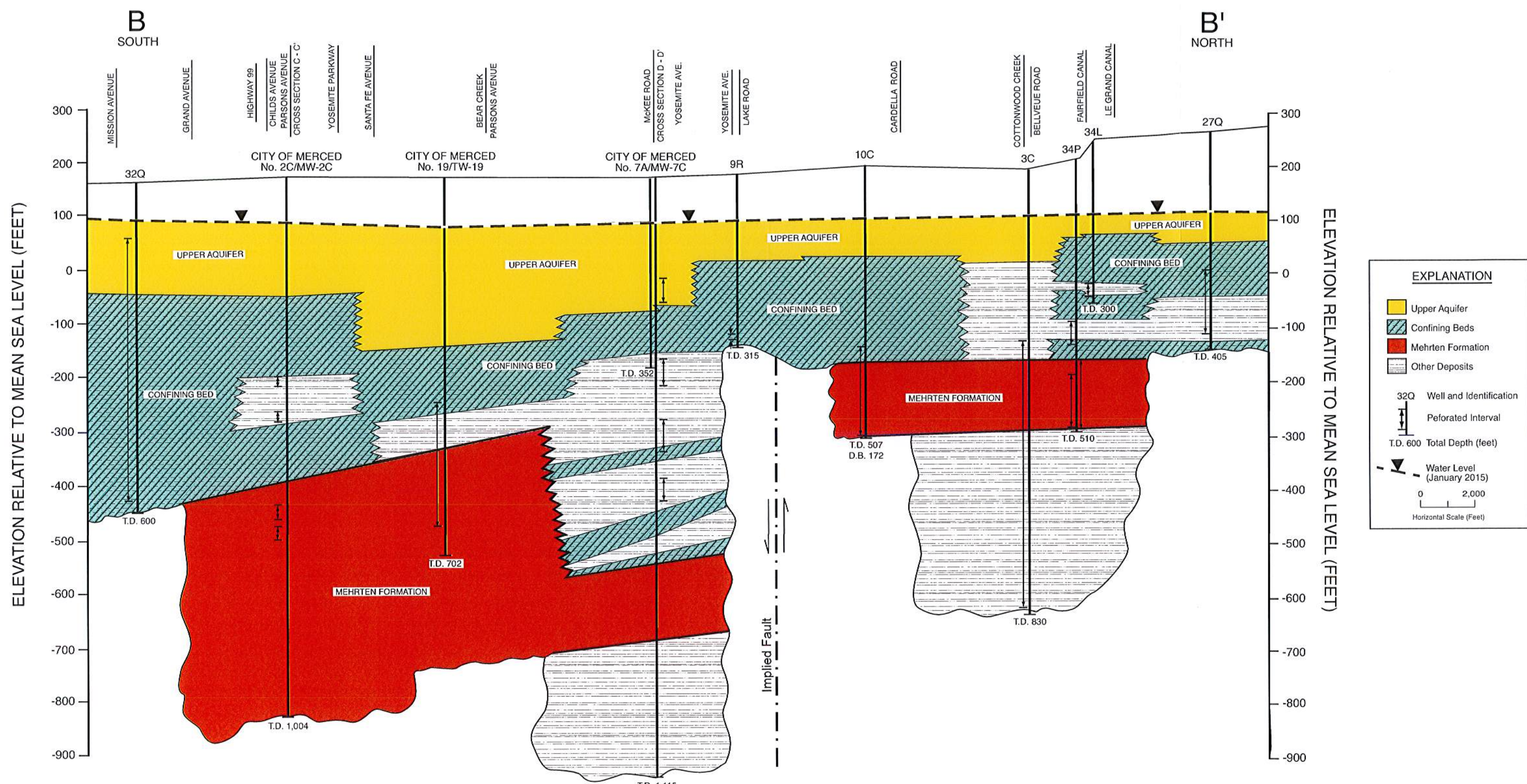


FIGURE 3 - SUBSURFACE GEOLOGIC CROSS SECTION B - B'

the section to more than 300 feet thick at City Well No. 2C. Essentially, one confining bed appears to be present along most of the section, and it ranges from about 120 to 370 feet thick. This confining bed is located between the upper aquifer and the Mehrten Formation. At some locations, productive sand and gravel layers are present between the upper aquifer and the Mehrten Formation and yield water to supply wells.

Subsurface Geologic Cross Section C-C'

Subsurface Cross Section C-C' (Figure 4) extends from the northwest, south of Bellevue Road between Franklin and Thorton Roads, to the southeast through City Wells No. 15, 5, 3, thence to the east to MW-2C, Wells No. 13 and 10R2, to near Owens Creek and Orchard Drive. The base of the upper aquifer ranges from about 200 to more than 300 feet deep along the section and is indicated to be the deepest at City Well 15. This well taps strata of the upper aquifer and additional coarse-grained strata between about 450 to 600 feet in depth (above the Mehrten Formation). The top of the Mehrten Formation is above 600 to 700 feet deep along this section. These deposits are indicated to range from about 200 to 350 feet thick along the section. City Wells 2C and 10R2 tap both the Mehrten Formation and some overlying deposits. A thick confining bed is present between the upper aquifer and the Mehrten

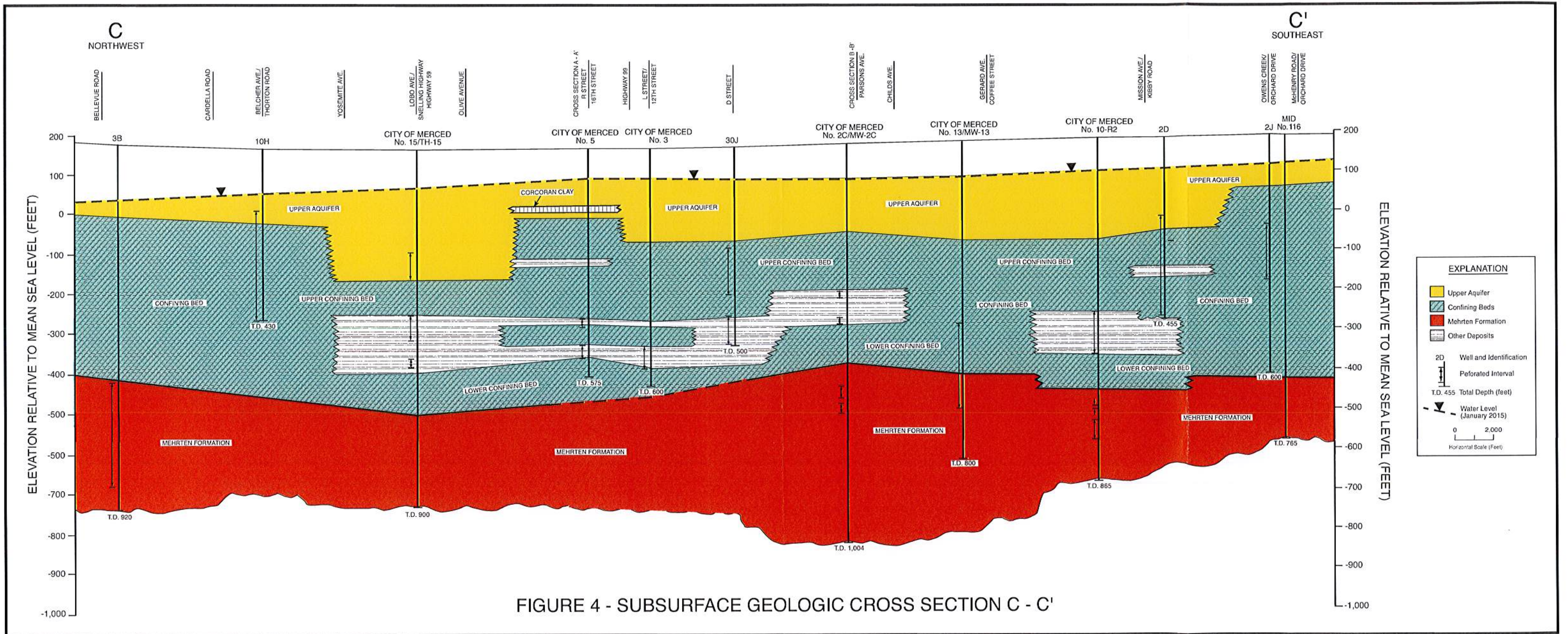


FIGURE 4 - SUBSURFACE GEOLOGIC CROSS SECTION C - C'

Formation. This thick bed is separated into two layers at City Wells No. 15, 5, 3, 2C, and 10-R2.

Subsurface Geologic Cross Section D-D'

Cross Section D-D' (Figure 5) extends from a well near Nevada Road and Highway 59 on the northwest, to the southeast through City Wells No. 16, 11, 7C, thence to the south-southwest through MID No. 101. The Mehrten Formation was encountered by three City of Merced wells or test holes along this section (No. 16, 7, and 10). The upper aquifer ranges from about 100 feet thick near the southeast edge of the section to about 250 feet thick at City MW-7. The top of the Mehrten Formation is about 700 to 800 feet deep along this section. The Mehrten Formation is apparently at least 230 feet thick at City Well No. 16. Two or more confining beds are indicated to be present between the upper aquifer and the Mehrten Formation along most of this section. City of Merced Wells No. 10B and 11 tap several coarse-grained strata between the uppermost confining bed and the lower confining bed. City of Merced Well No. 10B tapped several coarse-grained strata below the uppermost confining bed, including part of the Mehrten Formation. The lower confining bed is relatively thick along part of this section, ranging from about 100 feet thick at City Well No. 16 to more than 400 feet thick at City Well No. 10B.

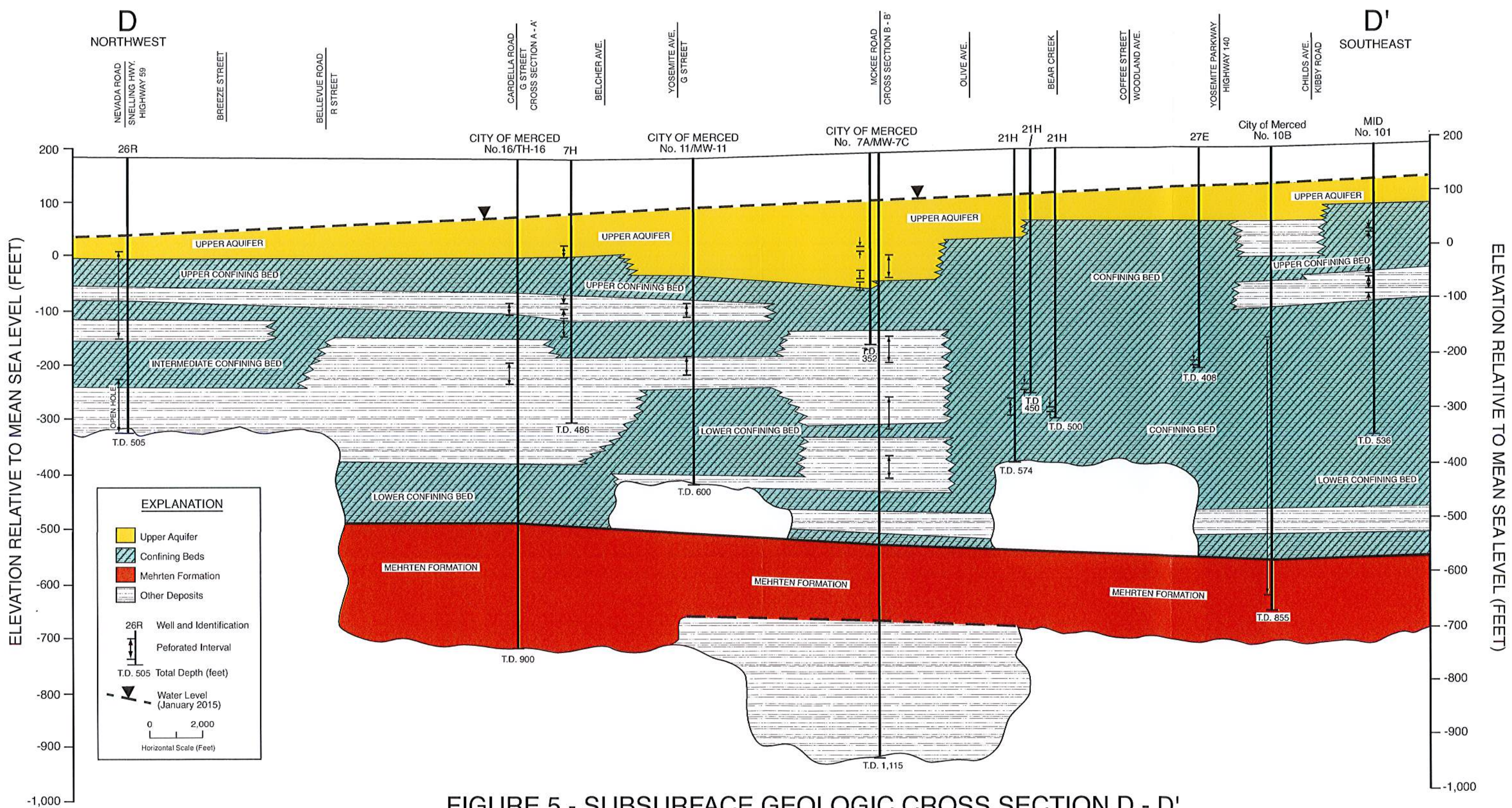


FIGURE 5 - SUBSURFACE GEOLOGIC CROSS SECTION D - D'

SUPPLY WELL DATA

City of Merced Wells

Figure 1 shows the locations of active City of Merced wells and Table 1 shows construction data for these. There are multiple City wells at three locations: Sites No. 1, 2, and 7. Two of the wells (7-A and 7-B) are presently inactive due to high nitrate concentrations. Prior to the 1980's, most City wells were less than 300 feet deep, and these wells primarily tapped the upper aquifer. In the 1980's several deeper wells were constructed, ranging in depth from about 420 to 550 feet. These wells primarily tapped coarse-grained strata below the upper aquifer. Starting in the early 1990's, the City began to have deep test holes drilled, normally extending to or below the Mehrten Formation. Based on water sampling of nested monitor wells at some of these sites, a number of deep wells were subsequently installed. These deeper wells were completed to depths ranging from about 600 to 800 feet, and deposits of the upper aquifer and some deeper coarse-grained strata were sealed off, in order to obtain good quality groundwater. Eleven active City of Merced wells have annular seals extending from the surface to at least 270 feet in depth.

TABLE 1-CONSTRUCTION DATA FOR CITY OF MERCED WELLS

Well No.	Date Drilled	Total Depth (feet)	Cased Depth (feet)	Diameter (inches)	Perforated Interval (feet)	Annular Seal (feet)
1 A	11/59	243	174	20	141 - 170	N/A
1 B	01/51	270	126	20	98 - 126	N/A
1 C	01/53	230	156	20	123 - 156	N/A
2 A	09/50	251	184	20	132 - 184	N/A
2 B	09/50	161	144	20	O.B.	N/A
2 C	06/91	690	346	18	-	0-350
			680	16	370 - 675	
3	04/87	662	574	18	502-554	0-350
5	08/87	575	546	18	481 - 526	0-270
7 A	02/63	344	268	20	175 - 268	N/A
7 B	04/68	339	266	20	174 - 266	N/A
7 C	07/92	610	300	18	-	N/A
			605	16	335 - 600	
8	1974	294	294	18	102 - 294	N/A
9	07/85	495	482	N/A	230 - 470	0-80
10 R2	03/03	860	770	20	440 - 760	0-310
11	06/87	430	418	20	266 - 398	0-225
13	07/90	702	672	18	457 - 672	0-365
14	10/90	375	271	18	-	0-271
			370	16	275 - 365	
15	01/04	580	570	20	255 - 560	0-180
16	07/04	600	500	20	263 - 412	0-224
17	08/06	642	632	18	314 - 622	0-290
18	03/07	652	632	18	314 - 622	0-290
19	04/09	670	670	16	415 - 650	0-370

O. B. is open bottomed. Data from drillers logs and well completion reports. Perforations are for the tops and bottoms of the perforated intervals.

Merced Irrigation District Wells

Figure 1 shows the location of Merced Irrigation District (MID) wells in the vicinity of the City and Table 2 provides construction data for these. Historically, shallow groundwater was present near Merced and the MID constructed a number of shallow wells (about 100 feet deep or shallower) to help lower these levels, particularly in the area west of Highway 99. In the 1960's, several wells that had been developed by the cable-tool method were deepened to depths ranging from about 220 to 270 feet and a number of new deeper MID wells were constructed. Two of these (No. 149A and 214) were completed to depths ranging from 560 to 650 feet and tap the Mehrten Formation. A number of other MID wells were also completed to tap strata above a depth of 400 feet.

WATER LEVELS

Water-Level Elevations and Direction of Groundwater Flow

Static water-level measurements for City wells are available for January of each year from 2000 to 2015. Measurements for January 2015 were used to determine water-level elevations (Table 3). Depth to water ranged from 47 to 105 feet in January 2015. Water-level elevations for the deep groundwater ranged from 79 to 99 feet above mean sea level. Figure 6 shows water-level elevations and the di-

TABLE 2-CONSTRUCTION DATA FOR MERCED IRRIGATION DISTRICT WELLS

Well No.	Date Drilled	Total Depth (feet)	Cased Depth (feet)	Diameter (inches)	Perforated Interval (feet)
30	1927	258	63	20	0-63
	Deepened 02/67		224	16	120-126
56	01/27	170	40	18	-
			102	16	0-102
80	02/29	163	46	16	0-46
87 A	10/40	106	62	18	0-62
	Deepened 04/78	382	244	16	120-140
90	02/67	215	196	16	O.B.
101	06/41	536	102	18	0-102
	Deepened 12/69		272	16	155-268
105	07/43	148	66	-	0-66
106	11/44	127	49	18	0-49
	Deepened 03/67	297	204	16	72-178
129	05/50	300	76	16	0-45
	Deepened 05/94	310	222	16	180-220
138	-	190	116	18	90 108
149 A	01/68	587	232	16	-
			560	14	220-436 & 456-556
202	03/66	390	304	16	271-302
			346	14	-
205	08/65	349	224	16	O.B.
206	08/65	394	280	16	O.B.
209	10/65	175	156	16	O.B.

Continued:

TABLE 2-CONSTRUCTION DATA FOR MERCED IRRIGATION DISTRICT WELLS
(Continued:)

<u>Well No.</u>	<u>Date Drilled</u>	<u>Total Depth (feet)</u>	<u>Cased Depth (feet)</u>	<u>Diameter (inches)</u>	<u>Perforated Interval (feet)</u>
211	07/65	292	172	16	O.B.
212	07/65	225	148	16	O.B.
213	07/65	315	172	16	O.B.
214	03/66	687	446	16	398-418 &
			650	14	418-650
215	03/66	286	244	16	O.B.
220	05/66	309	184	16	O.B.
222	05/65	372	192	16	O.B.
223	06/65	195	128	16	O.B.

Data from well drillers logs and completion reports.

TABLE 3-WATER-LEVEL DATA FOR CITY WELLS (JANUARY 2015)

<u>Well No.</u>	<u>Measuring Point Elevation (feet)</u>	<u>Depth to Water (feet)</u>	<u>Water-Level Elevation (feet)</u>
1A	177	76	101
1B	177	75	102
1C	177	76	101
2A	171	86	85
2B	177	86	91
2C	177	87	90
3C	173	77	96
5B	167	77	90
7A	182	87	95
7B	182	87	95
7C	182	87	95
8	170	72	98
9	171	77	94
10R-2	184	85	99
13	183	89	94
14	153	47	106
15	173	94	79
16	176	105	71
17	212	113	99
18	178	83.5	94.5
19	181	92	89

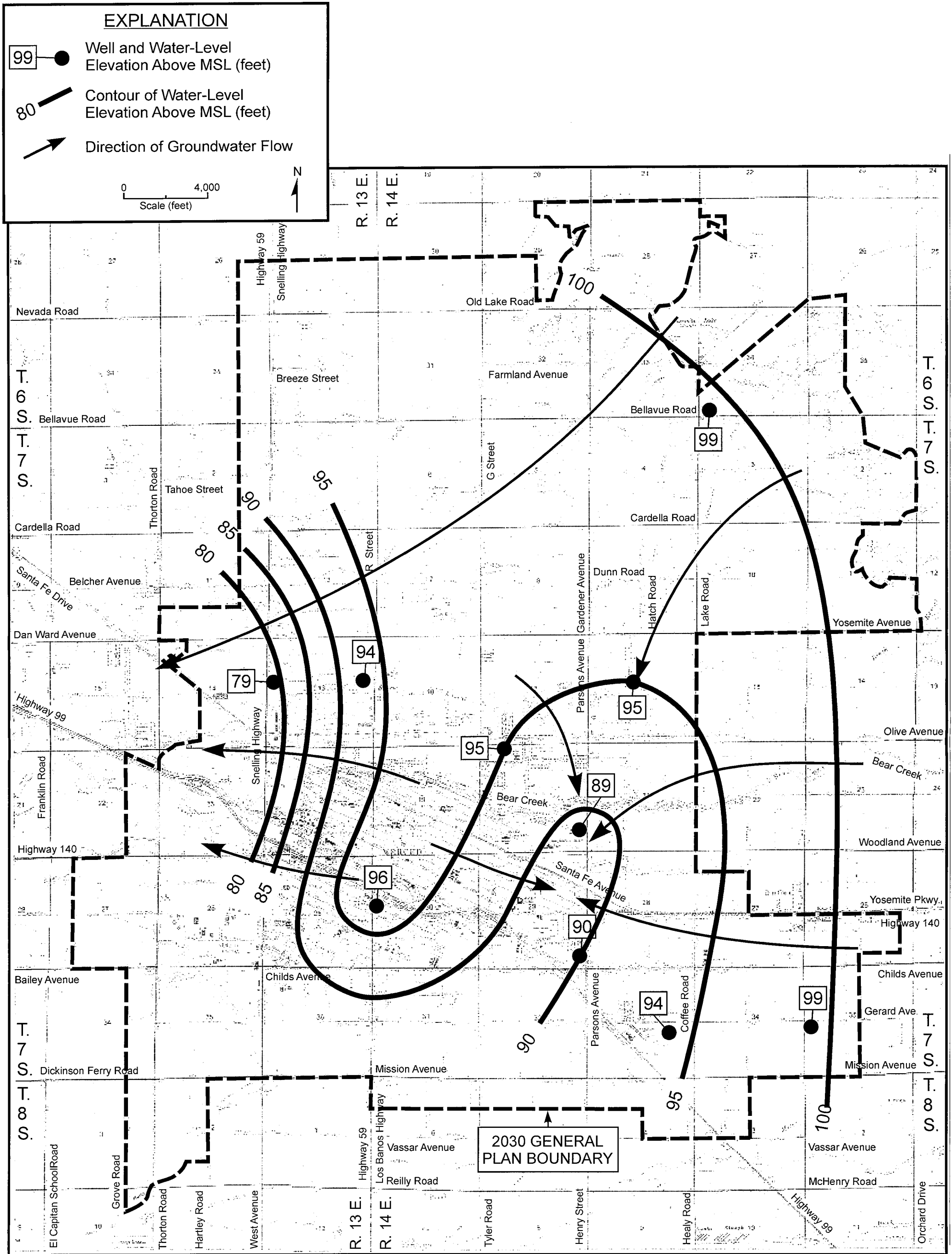


FIGURE 6 - WATER-LEVEL ELEVATIONS AND DIRECTION OF GROUNDWATER FLOW FOR DEEP GROUNDWATER

rection of flow for the deep groundwater for January 2015. Water-level elevations for the shallower groundwater weren't used in preparing this map. They are usually from 20 to 30 feet shallower than for the deep groundwater. An overall west-southwesterly groundwater flow direction was indicated for the deep groundwater. There was an area of higher water-level elevations beneath the central part of the older part of the City and a small depression east of this area.

Water-Level Hydrographs

The California Department of Water Resources (DWR) water-level website was accessed for long-term water-level records for wells in or near the City. Records were available for about two dozen wells that extend back to about 1980. Water-level declines in these wells ranged from about 0.4 to 1.9 feet per year, and averaged 1.0 foot per year, between 1980 and 2014.

The City of Merced provided annual water-level measurements for City wells for January 2000-15. Figure 7 shows water-level hydrographs for shallow City wells that primarily tap the upper aquifer. Water levels in these wells fell an average of about 1.3 feet per year between January 2000 and January 2015. Figure 8 shows water-level hydrographs for a number of deep City wells

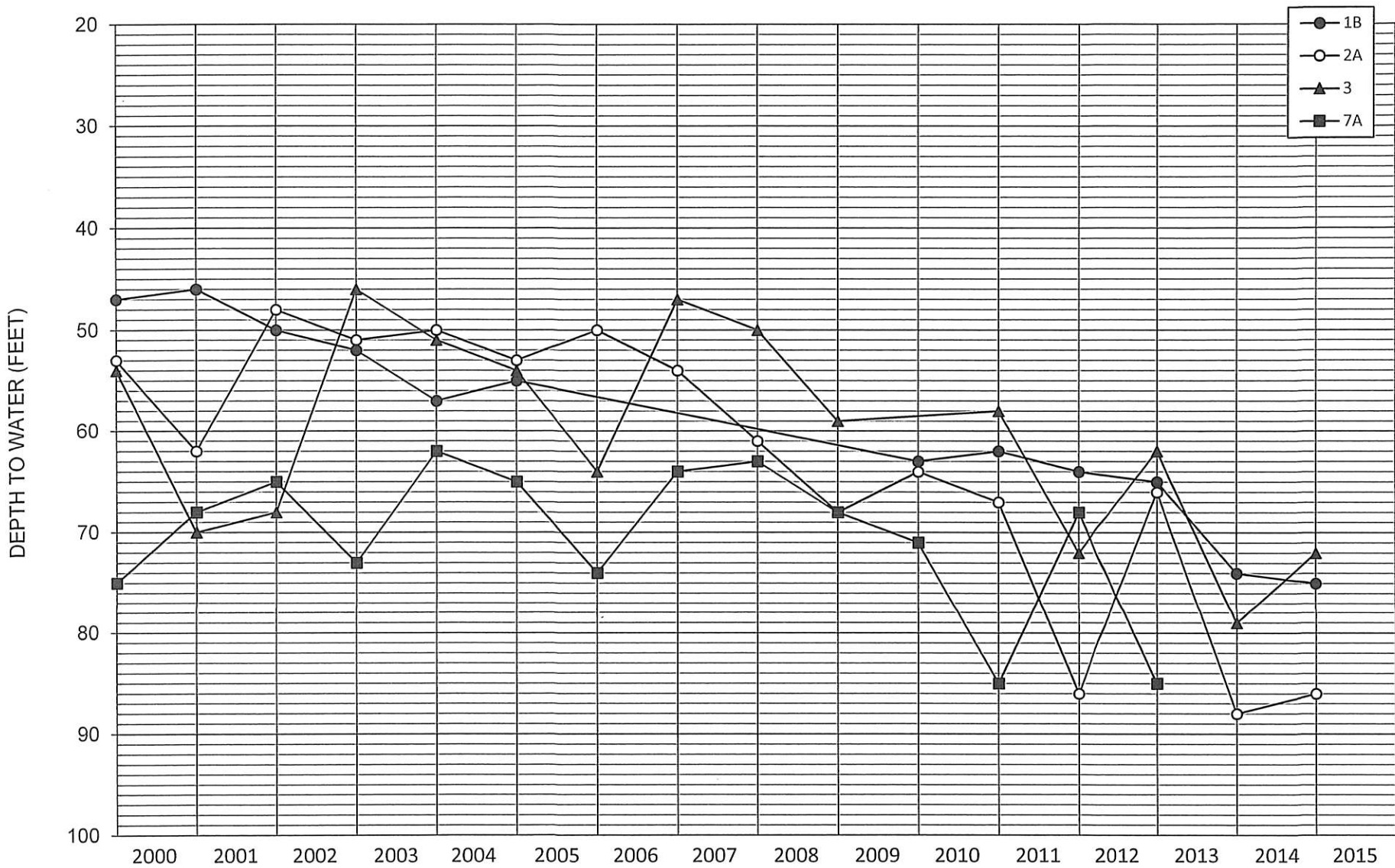


FIGURE 7-WATER-LEVEL HYDROGRAPHS FOR SHALLOW CITY WELLS

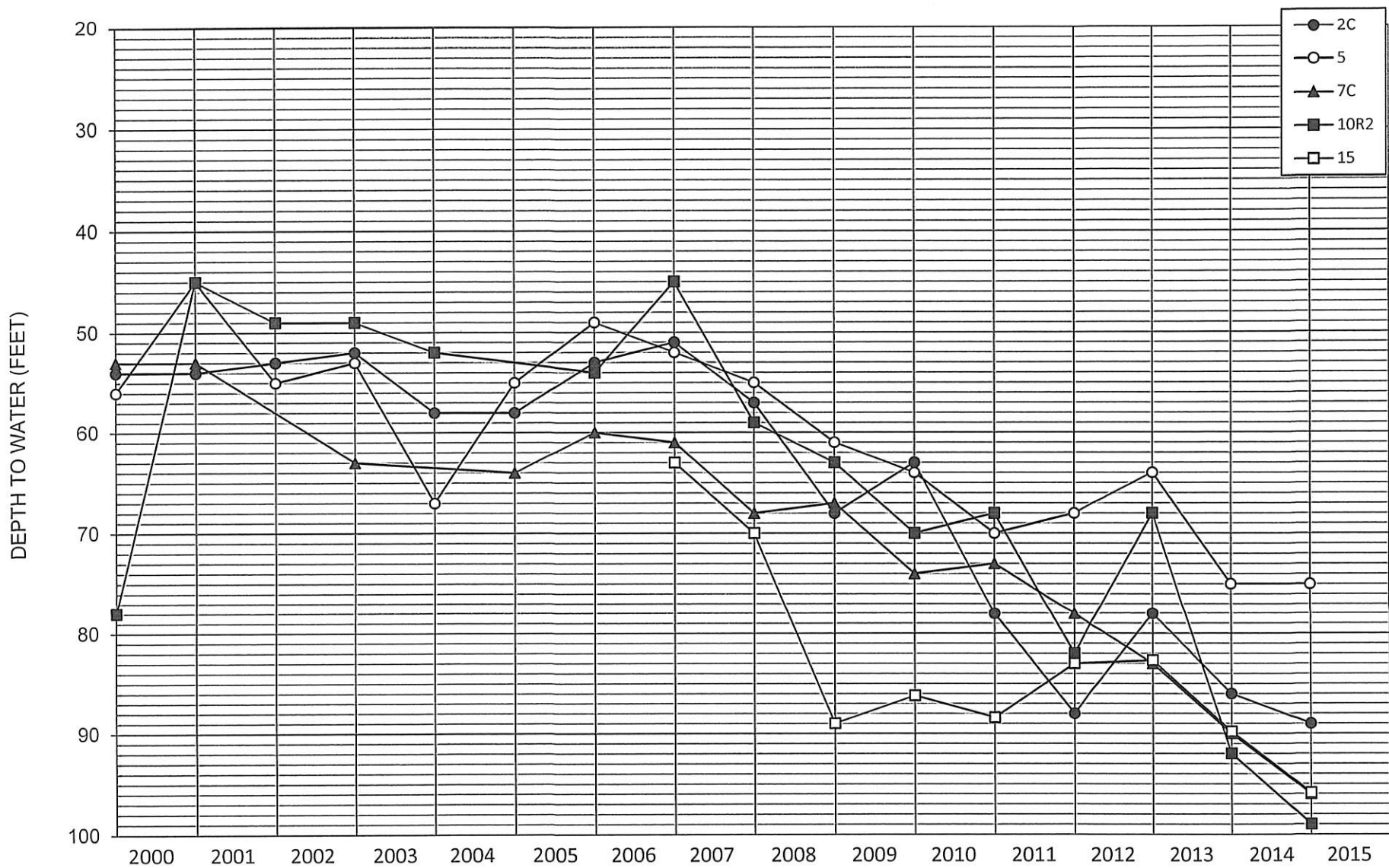


FIGURE 8-WATER-LEVEL HYDROGRAPHS FOR DEEP CITY WELLS

that tap the Mehrten Formation. Water levels in these wells fell an average of about 2.3 feet per year between January 2000 and January 2015.

PUMPAGE

Table 4 shows annual well pumpage for the City of Merced from 1978-2014. The annual pumpage increased from 11,500 acre-feet in 1998 to 27,500 acre-feet in 2013, then decreased due to additional water conservation measures to 25,200 acre-feet in 2014.

AQUIFER CHARACTERISTICS

Pumping rates of large capacity wells tapping the Mehrten Formation in the Merced area commonly range from about 1,000 to 3,000 gpm. Specific capacities range from about 25 to 80 gpm per foot and average about 50 gpm per foot.

On August 21-22, 2002, KDSA conducted a 28-hour constant discharge test on Well T7S/R14E-3K. This well was located about a third of a mile east of where City of Merced Well No. 17 is now located. The completion report for this well indicated that the casing was perforated from 318 to 818 feet in depth. The well tapped about 350 feet of coarse-grained deposits, including the

TABLE 4- ANNUAL PUMPAGE FOR CITY WELLS (1978-2014)

<u>Year</u>	<u>Annual Production (Acre-feet)</u>	<u>Annual Production (MG)</u>	<u>Average Daily Production (mgd)</u>
1978	11,500	3,748	10.3
1979	13,500	4,400	12.1
1980	14,000	4,563	12.5
1981	15,500	5,051	13.8
1982	17,000	5,540	15.2
1983	17,000	5,540	15.2
1984	19,500	6,355	17.4
1985	17,500	5,703	15.6
1986	17,000	5,540	15.2
1987	15,000	4,889	13.4
1988	16,000	5,214	14.3
1989	16,500	5,377	14.7
1990	16,500	5,377	14.7
1991	14,500	4,726	12.9
1992	16,000	5,214	14.3
1993	16,500	5,377	14.7
1994	18,000	5,866	16.1
1995	18,494	6,027	16.5
1996	20,649	6,730	18.4
1997	22,689	7,394	20.3
1998	20,990	6,841	18.7
1999	23,903	7,790	21.3
2000	22,209	7,238	19.8
2001	23,633	7,702	21.1
2002	23,658	7,710	21.1
2003	22,427	7,309	20
2004	23,977	7,814	21.4
2005	22,538	7,345	20.1
2006	22,166	7,224	19.8
2007	24,379	7,945	21.8
2008	24,164	7,874	21.5
2009	23,304	7,594	20.8
2010	23,659	7,709	21.1
2011	23,117	7,533	20.6
2012	25,899	8,439	23.1
2013	27,465	8,951	24.5
2014	25,231	8,222	22.5
Average	19,893	6,483	17.8

Mehrten Formation. The average pumping rate was 2,035 gpm. The specific capacity was 23 gpm per foot and the transmissivity was 45,000 gpd per foot. On April 28-29, 2009 KDSA conducted a 22-hour step drawdown and constant discharge test on new City well No. 19. This well is perforated from 415 to 651 feet in depth and primarily taps the Mehrten Formation. The pumping rate for the constant discharge part of the test was about 2,790 gpm. The specific capacity was 25 gpm per foot. The transmissivity was indicated to be about 79,000 gpd per foot. Considering the average specific capacity of wells tapping the Mehrten Formation in Merced, the transmissivity probably ranges from about 100,000 to 150,000 gpd per foot.

SOURCES OF RECHARGE

The predominant sources of recharge to groundwater in the Merced area are seepage from canals and creeks and excess applied irrigation water beyond the crop consumptive use. Additional recharge comes from percolation of sewage effluent. Nolte (2009) indicated that an average of about 300,000 acre-feet per year of surface water was distributed to about 110,000 acres of irrigated land in the MID, or an average of about 2.7 acre-feet per acre per year. The estimated crop consumptive use of applied water in the MID has been estimated to be 2.5 acre-feet per acre per

year (WRIME 2007). Given this near balance, no water-level decline would be expected in the MID during a normal hydrologic base period, if groundwater flows were not considered. However, because of significant groundwater outflows from the MID, primarily to undistricted areas or other areas with no surface water supplies, there has been some overdraft in the MID.

GROUNDWATER OVERDRAFT

Groundwater overdraft can be estimated from the water-level declines for the shallow unconfined groundwater (not for the Mehrten Formation, as groundwater in it is confined). There are 25,700 acres of land in the 2030 planning area boundaries. The average rate of water-level decline for the shallow groundwater has been about 1.2 feet per year. A specific yield of 12 percent was used, based on a review of the textures for the upper aquifer shown on the subsurface cross sections. The groundwater overdraft was thus 25,700 acres times 0.12 times 1.2 feet per year, or 3,700 acre-feet per year.

LAND SUBSIDENCE

Much of the historical evaluations of land subsidence in the San Joaquin Valley focused on the west side of the valley, where the Corcoran Clay is present and many deep irrigation wells pumped

water from the lower aquifer (below the clay). Historical land subsidence was attributed to water-level declines in the lower aquifer, which caused compaction of the Corcoran Clay and underlying clay layers. After the California Aqueduct was completed in the 1960's, studies of land subsidence in the valley were largely curtailed. However, with the significant subsidence problem recognized in the Red Top-El Nido area in recent years, interest in land subsidence has been re-kindled. As part of concerns for the San Joaquin River restoration project, detailed monitoring of land subsidence has been conducted by the U.S. Geological Survey for Reclamation in Merced and Madera Counties in recent years. This information indicates that land subsidence at Merced was about 0.1 foot per year during 2012-15.

GROUNDWATER QUALITY

Chemical analyses for January 2014 and for several other recent years was received for this discussion, in order to characterize recent groundwater quality.

Inorganic Chemical Constituents

Table 5 shows results of January 2014 analyses of water from City wells. Concentrations of total dissolved solids (TDS) ranged from 170 to 380 mg/l. The highest TDS concentrations (exceeding

TABLE 5-CONCENTRATIONS OF CHEMICAL CONSTITUENTS IN WATER FROM CITY WELLS

<u>Constituent (mg/l)</u>	<u>1A</u>	<u>1B</u>	<u>1C</u>	<u>2A</u>
Calcium	50	50	48	53
Magnesium	24	24	23	20
Sodium	28	28	29	34
Carbonate	<2	<2	<2	<2
Bicarbonate	366	360	154	317
Sulfate	13	13	10	12
Chloride	12	11	10	12
Nitrate	16	17	14	18
Fluoride	0.1	0.1	0.1	<0.1
pH	8.0	8.0	8.0	8.1
Electrical Conductivity (micromhos/cm @ 25°C)	510	530	490	470
Total Dissolved Solids (@ 180°C)	340	350	330	320
Iron	<0.03	0.14	<0.03	<0.03
Manganese	<0.01	<0.01	<0.01	<0.01
Arsenic (ppb)	ND	ND	ND	3
Alpha Activity (pc/l)	6.1	4.4	6.1	8.3
DBCP (ppb)	ND	ND	ND	ND
EDB (ppb)	ND	ND	ND	ND
1,2,3-TCP (ppt)	ND	ND	ND	ND
PCE (ppb)	ND	ND	ND	ND
TCE (ppb)	ND	ND	ND	ND
Perforated Interval (ft)	144-170	98-126	123-156	132-184

Continued:

TABLE 5-CONCENTRATIONS OF CHEMICAL CONSTITUENTS IN WATER FROM CITY WELLS
(Continued)

<u>Constituent (mg/l)</u>	<u>2B</u>	<u>2C</u>	<u>3</u>	<u>5</u>
Calcium	57	29	22	17
Magnesium	22	9	8	6
Sodium	35	26	22	27
Carbonate	<2	<2	<2	<2
Bicarbonate	415	220	171	159
Sulfate	13	13	11	9
Chloride	13	10	9	9
Nitrate	24	14	11	9
Fluoride	<0.1	<0.1	<0.1	0.1
pH	8.1	8.1	8.0	8.1
Electrical Conductivity (micromhos/cm @ 25°C)	570	340	270	260
Total Dissolved Solids (@ 180°C)	380	260	230	200
Iron	<0.03	<0.03	<0.03	<0.03
Manganese	<0.01	<0.01	<0.01	<0.01
Arsenic (ppb)	2	6	3	7
Alpha Activity (pc/l)	5.5	ND	ND	ND
DBCP (ppb)	ND	ND	ND	ND
EDB (ppb)	ND	ND	ND	ND
1,2,3-TCP (ppt)	ND	ND	ND	ND
PCE (ppb)	ND	ND	ND	ND
TCE (ppb)	ND	ND	ND	ND
Perforated Interval (ft)	144 O.B.	370-675	502-554	481-526

Continued:

TABLE 5-CONCENTRATIONS OF CHEMICAL CONSTITUENTS IN WATER FROM CITY WELLS
(Continued)

<u>Constituent (mg/l)</u>	<u>7A</u>	<u>7B</u>	<u>7C</u>	<u>8</u>
Calcium	44	42	27	39
Magnesium	22	21	9	17
Sodium	26	26	17	22
Carbonate	<2	<2	<2	<2
Bicarbonate	244	220	183	329
Sulfate	15	16	10	13
Chloride	12	9	7	9
Nitrate	42	67	18	12
Fluoride	<0.1	<0.1	<0.1	<0.1
pH	7.9	7.9	8.0	8.0
Electrical Conductivity (micromhos/cm @ 25°C)	-	-	300	400
Total Dissolved Solids (@ 180°C)	200	340	240	280
Iron	<0.03	0.04	<0.03	<0.03
Manganese	<0.01	<0.01	<0.01	<0.01
Arsenic (ppb)	ND	ND	3	2
Alpha Activity (pc/l)	ND	ND	ND	ND
DBCP (ppb)	ND	ND	ND	ND
EDB (ppb)	ND	ND	ND	ND
1,2,3-TCP (ppt)	ND	ND	ND	ND
PCE (ppb)	ND	ND	ND	ND
TCE (ppb)	ND	ND	ND	ND
Perforated Interval (ft)	174-249	174-266	335-600	102-294

Continued:

TABLE 5-CONCENTRATIONS OF CHEMICAL CONSTITUENTS IN WATER FROM CITY WELLS
(Continued)

<u>Constituent (mg/l)</u>	<u>9</u>	<u>10R2</u>	<u>11</u>	<u>13</u>	<u>14</u>
Calcium	28	21	22	26	31
Magnesium	11	5	10	6	12
Sodium	22	28	19	31	22
Carbonate	<2	<2	<2	<2	<2
Bicarbonate	207	171	159	195	220
Sulfate	7	12	8	12	11
Chloride	7	9	9	11	9
Nitrate	12	11	11	11	12
Fluoride	0.3	<0.1	0.3	0.6	0.7
pH	8.0	8.1	8.0	8.2	8.0
Electrical Conductivity (micromhos/cm @ 25°C)	250	270	260	280	350
Total Dissolved Solids (@ 180°C)	240	230	210	240	250
Iron	<0.03	<0.03	<0.03	<0.03	<0.03
Manganese	<0.01	<0.01	<0.01	0.03	<0.01
Arsenic (ppb)	ND	6	3	5	3
Alpha Activity (pc/l)	ND	ND	ND	ND	ND
DBCP (ppb)	ND	ND	ND	ND	ND
EDB (ppb)	ND	ND	ND	ND	ND
1,2,3-TCP (ppt)	ND	ND	ND	ND	ND
PCE (ppb)	ND	ND	ND	ND	ND
TCE (ppb)	ND	ND	ND	ND	ND
Perforated Interval (ft)	230-470	440-760	266-398	457-672	

Continued:

TABLE 5-CONCENTRATIONS OF CHEMICAL CONSTITUENTS IN WATER FROM CITY WELLS

(Continued)

<u>Constituent (mg/l)</u>	<u>15</u>	<u>16</u>	<u>17</u>	<u>18</u>	<u>19</u>
Calcium	26	16	17	23	23
Magnesium	10	6	5	10	8
Sodium	20	14	22	15	16
Carbonate	<2	<2	<2	<2	<2
Bicarbonate	195	122	134	171	171
Sulfate	7	7	11	8	10
Chloride	7	5	8	8	8
Nitrate	12	7	11	12	18
Fluoride	<0.1	0.1	0.1	<0.1	<0.1
pH	7.9	8.0	8.0	8.0	8.0
Electrical Conductivity (micromhos/cm @ 25°C)	280	190	230	260	290
Total Dissolved Solids (@ 180°C)	210	170	210	210	220
Iron	<0.03	<0.03	<0.03	<0.03	0.56
Manganese	<0.01	<0.01	<0.01	<0.01	<0.01
Arsenic (ppb)	3	5	6	3	3
Alpha Activity (pc/l)	ND	ND	ND	ND	ND
DBCP (ppb)	ND	ND	ND	ND	ND
EDB (ppb)	ND	ND	ND	ND	ND
1,2,3-TCP (ppt)	ND	ND	ND	ND	ND
PCE (ppb)	ND	ND	ND	ND	ND
TCE (ppb)	ND	ND	ND	ND	ND
Perforated Interval (ft)	255-560	265-574	314-622	314-122	415-650

300 mg/l) were usually in water for wells with perforations extending above a depth of about 150 feet. The lowest TDS concentrations (less than 250 mg/l) were in water from deeper wells. The waters were of the mixed cation bicarbonate type. Chloride concentrations ranged from 5 to 13 mg/l and sulfate concentrations ranged from 7 to 16 mg/l, and these are considered low. Except for two presently inactive wells (No. 7A and 7B), nitrate concentrations in water from the wells ranged from 7 to 24 mg/l, well below the MCL of 45 mg/l. Nitrate analyses for recent years indicated concentrations ranging from 20 to 24 mg/l in water from Well No. 2B and from 12 to 40 mg/l in water from Well No. 7C. The highest nitrate concentrations (greater than 15 mg/l) were usually in water from wells with perforations extending up to depths of less than 150 feet. In 2014, iron and manganese concentrations were below the recommended MCLs of 0.3 mg/l and 0.05 mg/l, respectively, except for an iron concentration of 0.56 mg/l in water from Well No. 19. In 2014, arsenic concentrations ranged from less than 2 to 8 ppb, below the MCL of 10 ppb. Arsenic concentrations in water from Well No. 1B ranged from less than 2 to 10 ppb during 2011-15, and were less than the MCL, except for one sample. In 2014, alpha activities ranged from 4 to 8 picocuries per liter, compared to the MCL of 15 picocuries per liter.

Trace Organic Constituents

Concentrations of DBCP, EDB, 1,2,3-TCP, trichloroethylene (TCE) and tetrachloroethylene (PCE) were non detectable in samples collected in January 2014 from all of the wells. TCE concentration ranging from less than 0.5 to 1.1 ppb (less than the MCL of 5 ppb), were found in water from Well No. 13 during 2011-15. Extensive PCE contamination was found in shallow groundwater (above a depth of about 60 feet) beneath parts of the City of Merced several decades ago. This contamination was associated with dry cleaners and other facilities, such as auto repair shops, that used this solvent. As of the late 1990's, virtually no monitor wells at dry cleaner sites were present to determine the vertical extent of PCE contamination in the groundwater. In April 1999, two deeper monitor wells were installed at two one-hour Martinizing sites (G-Street and R-Street). These wells were perforated from 115 to 125 and 140 to 150 feet in depth and from 160 to 180 feet in depth, respectively. Sampling of water from both of these deeper monitor wells indicated that the high PCE concentrations were only in groundwater above a depth of about 100 feet at these two sites. This was due to the presence of several silty clay or clay layers, that did not allow deeper movement of the contaminated groundwater. The City has multiple completion monitor wells at a number of well sites, and the results of sampling these in recent years has shown PCE concentrations as high as 22 ppb in the shallow groundwater. PCE concen-

trations in water from City Well No. 3C started being detectable in late 2003 and gradually increased to 2.2 ppb (less than the MCL of 5 ppb) in January 2014. Water from City Well No. 3C is to be treated for PCE removal, because of the high PCE concentrations in shallow groundwater near the well, and the increasing PCE concentrations in the supply well.

WATER BUDGETS

Existing Conditions

Important components of the water budget for the lands within the 2030 planning area boundaries include 1) Amounts of surface water used, 2) consumptive use, and 3) wastewater export. In this evaluation, groundwater inflow and outflow are not considered, because of the desire to have a groundwater balance in the City irrespective of these flows. A balance can be obtained if the amount of surface water used balances the sum of the consumptive use and wastewater export.

For urban lands, the wastewater flows are deducted from the total water demand to estimate the outside water use. Outside water use means water used outside of the residences or other buildings. The 2014 water demand for the urban area was 25,200 acre-feet per year and the wastewater flows were 12,400 acre-feet per year. The outside water use was thus 12,800 acre-feet per

year. An irrigation efficiency of 70 percent was used for the outside water use in the urban area. The consumptive use in the urban area was thus 70 percent of 12,800, or 9,000 acre-feet per year. For the rural part of this area, a crop map for 2012 was provided by the MID. The acreage of each crop within the planning area was determined by KDSA, and consumptive use values for these crops were taken from Table 15 of California Department of Water Resources (1975) Bulletin 113-3. Calculations indicate that the consumptive use of applied water was 23,400 acre-feet per year for 8,770 acres of irrigated crops, or about 2.7 acre-feet per acre per year. The total consumptive use (urban and rural) in the 2030 planning area boundary was thus 32,400 acre-feet per year.

Records from MID reports indicated that an average of 2.5 acre-feet per acre per year of canal water has been delivered to irrigated lands in the District. For the 8,770 acres of irrigated lands in the 2030 plan area, the average canal water deliveries would have been about 21,900 acre-feet per year in 2012. There was thus an average exceedance of 10,500 acre-feet per year of the consumptive use over the canal water delivered in the 2030 planning area.

The existing wastewater export was not precisely known at the time of this report, but was estimated to be about 11,000 acre-feet

per year. This was primarily due to the use of some recycled water in the City. Table 6 provides values for water budget items for the existing conditions.

Development of 2030 General Plan Area

Table 7 shows water budget data for full development of the 2030 planning area. The projected urban water demand for full development of the 2030 planning area is 44,500 acre-feet per year, of which about 11,200 acre-feet per year would be from a surface water treatment plant. The projected wastewater flows for full development would be 22,400 acre-feet per year. The outside water demand would thus be 44,500 minus 22,400, or 22,100 acre-feet per year. The consumptive use of water in the urban area would be about 70 percent of this, or 15,500 acre-feet per year. The reduction in consumptive use compared to the existing consumptive use would be 32,400 acre-feet per year minus 15,500 acre-feet per year, or 16,700 acre-feet per year.

If 11,200 acre-feet per year of surface water is used in the urban area, the reduction in surface water use from the existing conditions would be 21,900 acre-feet per year minus 11,200 acre-feet per year, or 10,700 acre-feet per year. Considering the decreased consumptive use, there would be a net gain of 6,000

TABLE 6- WATER BUDGET DATA FOR EXISTING CONDITIONS

	<u>Item</u>	<u>Amount</u> <u>(acre-feet per year)</u>
Pumpage		25,200
Canal Water		
	Rural Irrigation	21,900
	Urban Use	0
	Subtotal	21,900
Consumptive Use		
	Irrigated Crops	23,400
	Urban Outside Use	9,000
	Subtotal	32,400
Difference Between Canal Water and Consumptive Use		-10,500
Wastewater Export (estimated)		11,000

Note: Groundwater flows, canal seepage, and overdraft are not considered above. However, the existing groundwater overdraft is estimated to be 3,700 acre-feet per year within the 2030 General Plan Area boundary.

TABLE 7- WATER BUDGET DATA FOR FULL DEVELOPMENT OF 2030
GENERAL PLAN AREA

	<u>Item</u>	<u>Amount</u> <u>(acre-feet per year)</u>
Pumpage		33,500
Canal Water		
	Rural Irrigation	0
	Urban Use	11,200
	Subtotal	11,200
Consumptive Use		
	Irrigated Crops	0
	Urban Outside Use	15,500
	Subtotal	15,500
Difference Between Canal Water and Consumptive Use		-4,300
Wastewater Export (estimated)		14,000

Note: Groundwater flows, canal seepage, and overdraft are not considered above. However, due to state groundwater management legislation, the groundwater overdraft within the 2030 General Plan Area boundary is projected to be zero or minimal. This would require more canal water or less wastewater export than shown above.

acre-feet per year in the water budget in the 2030 planning area (not considering wastewater flows). The amount of recycled water use in the City under full development of the 2030 General Plan Area is presently unknown. However, for full development of the 2030 plan area, the wastewater export is estimated to be about 14,000 acre-feet per year. This would reduce the net gain in the water budget to about 3,000 acre-feet per year.

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Appendix E

Review of Merced Municipal Well Water Quality Data

Memorandum

To: David Young

From: Stephen Spencer

Subject: Review of Merced Municipal Well Water Quality Data

Date: February 18, 2016

I have reviewed the last 5 years of available analytical data for the City's municipal wells looking for water quality trends/issues. The attached table summarizes the most common organic and inorganic constituents that may affect water quality in the Merced area. Based on my review, I have the following observations.

- Low levels of naturally occurring arsenic are present throughout the Merced well basin. Two wells (Wells 02C and 13) have had water samples containing arsenic at or near the MCL of 10 micrograms per liter. Both wells are located in the southeast part of the City and are screened between 370 and 675 feet below ground surface (bgs). Other wells in that area (Wells 10, 02A, and 02B) also have had arsenic concentrations slightly higher when compared to the rest of the City's wells. Well 10 is screened across the same approximate interval as Wells 02C and 13, whereas Wells 02A and 02B are screened above 184-foot bgs.
- Multiple samples from Well 3C have contained low-level but detectable PCE (below the MCL) over the last 5 years. The shallow aquifer in the Well 3C area has been impacted by PCE for some time, forcing the City to destroy previous, shallower municipal wells at that site (Wells 03A and 03B). As noted by Ken Schmidt in his report, the City has monitoring wells at the Well 03C site screened across several intervals. The shallow aquifer contains PCE above the MCL. Wellhead treatment is currently being installed to remove PCE from the well water.
- Multiple samples from Well 13 have contained low-level but detectable TCE (below the MCL) over the last 5 years. None of the samples with detectable TCE contained TCE breakdown products (1,1-DCE, 1,2-DCA, 1,1,1-TCA, etc.), however. As noted above, Well 13 is located in the southeast corner of the City. Additional investigation would be required to attempt to identify a source for the TCE.
- A single sample from Well 13 contained detectable levels of 1,2,3-TCP. The sample, collected in 2012, contained TCP at 0.014 micrograms per liter. The next sample from Well 13, collected in 2015, did not contain detectable TCP. No other City wells have had samples with detectable TCP over the past 5 years.
- The sample collected from Well 19 in 2014 contained iron at a concentration of 0.56 mg/L (above the MCL of 0.3 mg/L). The previous sample from Well 19, collected in 2011, did not contain detectable iron. Whether the iron is actually present in the aquifer or is a product of the method of sampling would require additional analysis.

- Nitrate concentrations in samples collected from Well 07C have varied significantly over the last 5 years, with some samples approaching the MCL. The well is screened from 335 to 600 feet bgs. The variability of the nitrate results could be due to the timing of the sample collection and how long the well had been running when the sample was collected. However, determining the actual cause will require additional investigation.

Sample Location	Sample Year	# of Samples	Perforated Interval (ft btc)	Results															
				PCE (µg/L)	TCE (µg/L)	1,2,3-TCP (µg/L)	DBCP (µg/L)	EDB (µg/L)	MTBE (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethyl Benzene (µg/L)	Xylenes (µg/L)	Arsenic (µg/L)	Nitrate as NO3 (mg/L)	Gross Alpha (Pci/L)	Hex Chrome (µg/L)	Iron (mg/L)	Manganese (mg/L)
Well 01A	2015	10	144 - 170	< 0.5	< 0.5	NA	< 0.01 ¹	< 0.02 ¹	< 3	< 0.5	< 0.5	< 0.5	< 0.5	NA	16 ³	NA	NA	NA	NA
	2014	12		< 0.5	< 0.5	NA	NA	NA	< 3	< 0.5	< 0.5	< 0.5	< 0.5	< 2 ³	15 ³	NA	3.6 ³	< 0.1	< 0.020
	2013	11		< 0.5	< 0.5	NA	NA	NA	< 3	< 0.5	< 0.5	< 0.5	< 0.5	NA	12 ³	6.07 ³	NA	NA	NA
	2012	12		< 0.5	< 0.5	< 0.005 ²	< 0.01 ¹	< 0.02 ¹	< 3	< 0.5	< 0.5	< 0.5	< 0.5	NA	13 ³	NA	NA	NA	NA
	2011	10		< 0.5 - 0.51	< 0.5	NA	NA	NA	< 3	< 0.5	< 0.5	< 0.5	< 0.5	2.4 ³	15 ³	NA	NA	< 0.1	< 0.020
Well 01B	2015	10	98 - 126	< 0.5	< 0.5	NA	< 0.01 ¹	< 0.02 ¹	< 3	< 0.5	< 0.5	< 0.5	< 0.5	NA	17 ³	NA	NA	NA	NA
	2014	12		< 0.5	< 0.5	NA	NA	NA	< 3	< 0.5	< 0.5	< 0.5	< 0.5	< 2 ³	15 ³	NA	3.3 ³	0.14	< 0.020
	2013	11		< 0.5	< 0.5	NA	NA	NA	< 3	< 0.5	< 0.5	< 0.5	< 0.5	NA	12 ³	4.42 ³	NA	NA	NA
	2012	12		< 0.5	< 0.5	< 0.005 ²	< 0.01 ¹	< 0.02 ¹	< 3	< 0.5	< 0.5	< 0.5	< 0.5	NA	14 ³	NA	NA	NA	NA
	2011	10		< 0.5 - 0.67	< 0.5	NA	NA	NA	< 3	< 0.5	< 0.5	< 0.5	< 0.5	2.4 ³	14 ³	NA	NA	< 0.1	< 0.020
Well 01C	2015	10	123 - 156	< 0.5	< 0.5	NA	< 0.01 ¹	< 0.02 ¹	< 3	< 0.5	< 0.5	< 0.5	< 0.5	NA	14 ³	NA	NA	NA	NA
	2014	12		< 0.5	< 0.5	NA	NA	NA	< 3	< 0.5	< 0.5	< 0.5	< 0.5	2.5 ³	14 ³	NA	3.4 ³	< 0.1	< 0.020
	2013	11		< 0.5	< 0.5	NA	NA	NA	< 3	< 0.5	< 0.5	< 0.5	< 0.5	NA	12 ³	6.07 ³	NA	NA	NA
	2012	12		< 0.5	< 0.5	< 0.005 ²	< 0.01 ¹	< 0.02 ¹	< 3	< 0.5	< 0.5	< 0.5	< 0.5	NA	12 ³	NA	NA	NA	NA
	2011	10		< 0.5	< 0.5	NA	NA	NA	< 3	< 0.5	< 0.5	< 0.5	< 0.5	2.2 ³	13 ³	NA	NA	< 0.1	< 0.020
Well 02A	2015	10	132 - 184	< 0.5	< 0.5	NA	< 0.01 ¹	< 0.02 ¹	< 3	< 0.5	< 0.5	< 0.5	< 0.5	3.0 - 5.3	18 ³	NA	NA	NA	NA
	2014	12		< 0.5	< 0.5	NA	NA	NA	< 3	< 0.5	< 0.5	< 0.5	< 0.5	< 2 - 6.0	18 ³	NA	4.1 ³	< 0.1	< 0.020
	2013	12		< 0.5	< 0.5	NA	NA	NA	< 3	< 0.5	< 0.5	< 0.5	< 0.5	2.6 - 5.5	16 ³	8.28 ³	NA	NA	NA
	2012	12		< 0.5 - 0.58	< 0.5	< 0.005 ²	< 0.01 ¹	< 0.02 ¹	< 3	< 0.5	< 0.5	< 0.5	< 0.5	2.0 - 5.7	20 ³	NA	NA	NA	NA
	2011	10		< 0.5	< 0.5	NA	NA	NA	< 3	< 0.5	< 0.5	< 0.5	< 0.5	< 2 - 5.8	18 ³	NA	NA	< 0.1	< 0.020
Well 02B	2015	10	144 - 161 OB	< 0.5	< 0.5	NA	< 0.01 ¹	< 0.02 ¹	< 3	< 0.5	< 0.5	< 0.5	< 0.5	< 2 - 4.2	24 ³	NA	NA	NA	NA
	2014	12		< 0.5	< 0.5	NA	NA	NA	< 3	< 0.5	< 0.5	< 0.5	< 0.5	< 2 - 5.6	23 ³	NA	3.8 ³	< 0.1	< 0.020
	2013	12		< 0.5	< 0.5	NA	NA	NA	< 3	< 0.5	< 0.5	< 0.5	< 0.5	< 2 - 4.6	22 ³	5.52 ³	NA	NA	NA
	2012	12		< 0.5	< 0.5	< 0.005 ²	< 0.01 ¹	< 0.02 ¹	< 3	< 0.5	< 0.5	< 0.5	< 0.5	< 2 - 7.4	20 ³	NA	NA	NA	NA
	2011	10		< 0.5	< 0.5	NA	NA	NA	< 3	< 0.5	< 0.5	< 0.5	< 0.5	< 2 - 5.9	20 ³	NA	NA	< 0.1	< 0.020
Well 02C	2015	9	370 - 675	< 0.5	< 0.5	NA	< 0.01 ¹	< 0.02 ¹	< 3	< 0.5	< 0.5	< 0.5	< 0.5	5.9 ³	10 ³	NA	NA	NA	NA
	2014	12		< 0.5	< 0.5	NA	NA	NA	< 3	< 0.5	< 0.5	< 0.5	< 0.5	< 2 - 9.3	14 ³	NA	3.9 ³	< 0.1	< 0.020
	2013	12		< 0.5	< 0.5	NA	< 0.01 ¹	< 0.02 ¹	< 3	< 0.5	< 0.5	< 0.5	< 0.5	3.3 - 9.2	11 ³	< 3 ³	NA	NA	NA
	2012	12		< 0.5	< 0.5	< 0.005 ²	NA	NA	< 3	< 0.5	< 0.5	< 0.5	< 0.5	< 2 - 10	13 ³	NA	NA	NA	NA
	2011	10		< 0.5	< 0.5	NA	NA	NA	< 3	< 0.5	< 0.5	< 0.5	< 0.5	2.8 - 10	12 ³	NA	NA	< 0.1	< 0.020
Well 03C	2015	9	502 - 554	< 0.5 - 0.64	< 0.5	NA	< 0.01 ¹	< 0.02 ¹	< 3	< 0.5	< 0.5	< 0.5	< 0.5	NA	10 ³	NA	5.4 ³	NA	NA
	2014	8		< 0.5 - 2.2	< 0.5	NA	NA	NA	< 3	< 0.5	< 0.5	< 0.5	< 0.5	3.1 ³	11 ³	NA	NA	< 0.1	< 0.020
	2013	11		< 0.5 - 1.4	< 0.5	NA	NA	NA	< 3	< 0.5	< 0.5	< 0.5	< 0.5	NA	9.4 - 13	< 3 ³	NA	NA	NA
	2012	20		< 0.5 - 1.5	< 0.5	< 0.005 ²	< 0.01 ¹	< 0.02 ¹	< 3	< 0.5	< 0.5	< 0.5	< 0.5	NA	11 ³	NA	NA	NA	NA
	2011	25		< 0.5 - 1.7	< 0.5	NA	NA	NA	< 3	< 0.5	< 0.5	< 0.5	< 0.5	3.8 ³	12 ³	NA	NA	0.14	< 0.020
Well 05B	2015	5	481 - 526	< 0.5	< 0.5	NA	NA	NA	< 3	< 0.5	< 0.5	< 0.5	< 0.5	NA	NA	NA	NA	NA	NA
	2014	6		< 0.5	< 0.5	NA	< 0.01 ¹	< 0.02 ¹	< 3	< 0.5	< 0.5	< 0.5	< 0.5	6.7 ³	8.7 ³	NA	NA	< 0.1	< 0.020
	2013	12		< 0.5	< 0.5	NA	NA	NA	< 3	< 0.5	< 0.5	< 0.5	< 0.5	NA	10 ³	< 3 ³	NA	NA	NA
	2012	11		< 0.5	< 0.5	< 0.005 ²	NA	NA	< 3	< 0.5	< 0.5	< 0.5	< 0.5	NA	8.5 ³	NA	NA	NA	NA
	2011	10		< 0.5	< 0.5	NA	< 0.01 ¹	< 0.02 ¹	< 3	< 0.5	< 0.5	< 0.5	< 0.5	4.2 ³	9.8 ³	NA	NA	< 0.1	< 0.020
Well 07C	2015	10	335 - 600	< 0.5	< 0.5	NA	NA	NA	< 3	< 0.5	< 0.5	< 0.5	< 0.5	NA	18 ³	NA	NA	NA	NA
	2014	12		< 0.5	< 0.5	NA	NA	NA	< 3	< 0.5	< 0.5	< 0.5	< 0.5	2.7 ³	17 - 28	NA	2.6 ³	< 0.1	< 0.020
	2013	12		< 0.5	< 0.5	NA	< 0.01 ¹	< 0.02 ¹	< 3	< 0.5	< 0.5	< 0.5	< 0.5	NA	16 - 32	< 3 ³	NA	NA	NA
	2012	12		< 0.5	< 0.5	< 0.005 ²	NA	NA	< 3	< 0.5	< 0.5	< 0.5	< 0.5	NA	15 - 29	NA	NA	NA	NA
	2011	10		< 0.5	< 0.5	NA	NA	NA	< 3	< 0.5	< 0.5	< 0.5	< 0.5	3.0 ³	12 - 40	NA	NA	< 0.1	< 0.020

Sample Location	Sample Year	# of Samples	Perforated Interval (ft btc)	Results															
				PCE (µg/L)	TCE (µg/L)	1,2,3-TCP (µg/L)	DBCP (µg/L)	EDB (µg/L)	MTBE (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethyl Benzene (µg/L)	Xylenes (µg/L)	Arsenic (µg/L)	Nitrate as NO3 (mg/L)	Gross Alpha (Pci/L)	Hex Chrome (µg/L)	Iron (mg/L)	Manganese (mg/L)
Well 08	2015	1	102 - 295	< 0.5	< 0.5	NA	< 0.01	< 0.02	< 3	< 0.5	< 0.5	< 0.5	< 0.5	2.1	12	NA	3.2 ³	< 0.1	< 0.020
	2012	1		< 0.5	< 0.5	< 0.005 ²	< 0.01	< 0.02	< 3	< 0.5	< 0.5	< 0.5	< 0.5	NA	13	< 3	NA	NA	NA
	2011	3		< 0.5	< 0.5	NA	NA	NA	< 3	< 0.5	< 0.5	< 0.5	< 0.5	< 2 ³	13 ³	NA	NA	< 0.1	< 0.020
Well 09	2015	1	230 - 470	< 0.5	< 0.5	NA	< 0.01	< 0.02	< 3	< 0.5	< 0.5	< 0.5	< 0.5	< 2	12	NA	4.0 ³	< 0.1	< 0.020
	2012	1		< 0.5	< 0.5	< 0.005 ²	< 0.01	< 0.02	< 3	< 0.5	< 0.5	< 0.5	< 0.5	NA	14	< 3	NA	NA	NA
	2011	1		< 0.5	< 0.5	NA	NA	NA	< 3	< 0.5	< 0.5	< 0.5	< 0.5	2.1	14	NA	NA	< 0.1	< 0.020
Well 10	2015	1	440 - 760	< 0.5	< 0.5	NA	NA	NA	< 3	< 0.5	< 0.5	< 0.5	< 0.5	NA	11	NA	NA	NA	NA
	2014	1		NA	NA	NA	< 0.01	< 0.02	NA	NA	NA	NA	NA	5.8	11	< 3	3.7 ³	< 0.1	< 0.020
	2012	1		< 0.5	< 0.5	< 0.005 ²	NA	NA	< 3	< 0.5	< 0.5	< 0.5	< 0.5	5.9	11	NA	NA	NA	NA
	2011	1		< 0.5	< 0.5	NA	< 0.01	< 0.02	< 3	< 0.5	< 0.5	< 0.5	< 0.5	6.9	11	NA	NA	< 0.1	< 0.020
Well 11	2015	1	266 - 398	< 0.5	< 0.5	NA	NA	NA	< 3	< 0.5	< 0.5	< 0.5	< 0.5	NA	11	NA	NA	NA	NA
	2014	1		NA	NA	NA	< 0.01	< 0.02	NA	NA	NA	NA	NA	2.7	13	< 3	3.1 ³	< 0.1	< 0.020
	2012	1		< 0.5	< 0.5	< 0.005 ²	NA	NA	< 3	< 0.5	< 0.5	< 0.5	< 0.5	NA	13	NA	NA	NA	NA
	2011	1		< 0.5	< 0.5	NA	< 0.01	< 0.02	< 3	< 0.5	< 0.5	< 0.5	< 0.5	4.2	12	NA	NA	< 0.1	< 0.020
Well 13	2015	10	457 - 672	< 0.5	< 0.5 - 0.56	NA	< 0.01 ¹	< 0.02 ¹	< 3	< 0.5	< 0.5	< 0.5	< 0.5	3.6 - 5.3	11 ³	NA	NA	NA	NA
	2014	11		< 0.5	< 0.5 - 0.76	NA	NA	NA	< 3	< 0.5	< 0.5	< 0.5	< 0.5	< 2 - 8.0	13 ³	NA	3.6 ³	< 0.1	0.03
	2013	12		< 0.5	< 0.5 - 0.79	< 0.005 ²	NA	NA	< 3	< 0.5	< 0.5	< 0.5	< 0.5	3.2 - 8.8	12 ³	< 3 ³	NA	NA	NA
	2012	16		< 0.5	< 0.5 - 1.1	< 0.005 ²	0.014 ¹	< 0.02 ¹	< 3	< 0.5	< 0.5	< 0.5	< 0.5	< 2 - 9.5	12 ³	NA	NA	NA	NA
	2011	17		< 0.5	< 0.5 - 0.98	NA	NA	NA	< 3	< 0.5	< 0.5	< 0.5	< 0.5	< 2 - 10	12 ³	NA	NA	< 0.1	< 0.020
Well 14	2015	1	275 - 365	< 0.5	< 0.5	NA	NA	NA	< 3	< 0.5	< 0.5	< 0.5	< 0.5	2.7	12	NA	3.4 ³	< 0.1	< 0.020
	2012	1		< 0.5	< 0.5	< 0.005 ²	< 0.01	< 0.02	< 3	< 0.5	< 0.5	< 0.5	< 0.5	NA	20	< 3	NA	NA	NA
	2011	1		< 0.5	< 0.5	NA	NA	NA	< 3	< 0.5	< 0.5	< 0.5	< 0.5	< 2	18	NA	NA	< 0.1	< 0.020
Well 15	2015	1	255 - 560	< 0.5	< 0.5	NA	NA	NA	< 3	< 0.5	< 0.5	< 0.5	< 0.5	2.7	12	NA	4.1 ³	< 0.1	< 0.020
	2013	1		NA	NA	NA	< 0.01	< 0.02	NA	NA	NA	NA	NA	NA	12	< 3	NA	NA	NA
	2012	1		< 0.5	< 0.5	< 0.005 ²	NA	NA	< 3	< 0.5	< 0.5	< 0.5	< 0.5	NA	12	NA	NA	NA	NA
	2011	1		< 0.5	< 0.5	NA	NA	NA	< 3	< 0.5	< 0.5	< 0.5	< 0.5	2.9	12	NA	NA	< 0.1	< 0.020
Well 16	2015	1	263 - 574	< 0.5	< 0.5	NA	NA	NA	< 3	< 0.5	< 0.5	< 0.5	< 0.5	4.6	6.5	NA	2.7 ³	< 0.1	< 0.020
	2013	1		NA	NA	NA	< 0.01	< 0.02	NA	NA	NA	NA	NA	NA	6.2	< 3	NA	NA	NA
	2012	1		< 0.5	< 0.5	< 0.005 ²	NA	NA	< 3	< 0.5	< 0.5	< 0.5	< 0.5	NA	6.4	NA	NA	NA	NA
	2011	1		< 0.5	< 0.5	NA	NA	NA	< 3	< 0.5	< 0.5	< 0.5	< 0.5	3.7	6.1	NA	NA	< 0.1	< 0.020
Well 17	2015	1	314 - 622	< 0.5	< 0.5	NA	< 0.01	< 0.02	< 3	< 0.5	< 0.5	< 0.5	< 0.5	5.5	11	NA	1.5 ³	< 0.1	< 0.020
	2012	1		NA	NA	< 0.005 ²	< 0.01	< 0.02	NA	NA	NA	NA	NA	NA	12	< 3	NA	NA	NA
	2011	1		< 0.5	< 0.5	NA	< 0.01	< 0.02	< 3	< 0.5	< 0.5	< 0.5	< 0.5	5.7	13	NA	NA	< 0.1	< 0.020
Well 18	2015	1	314 - 622	< 0.5	< 0.5	NA	NA	NA	< 3	< 0.5	< 0.5	< 0.5	< 0.5	3.1	12	NA	4.8 ³	< 0.1	< 0.020
	2013	1		NA	NA	NA	< 0.01	< 0.02	NA	NA	NA	NA	NA	NA	10	< 3	NA	NA	NA
	2012	3		< 0.5	< 0.5	< 0.005 ²	NA	NA	< 3	< 0.5	< 0.5	< 0.5	< 0.5	NA	NA	NA	NA	NA	NA
	2011	3		< 0.5	< 0.5	NA	NA	NA	< 3	< 0.5	< 0.5	< 0.5	< 0.5	3.1 ³	10 ³	NA	NA	< 0.1	< 0.020
Well 19	2015	1	415 - 650	< 0.5	< 0.5	NA	< 0.01	< 0.02	< 3	< 0.5	< 0.5	< 0.5	< 0.5	2.8	18	NA	4.6 ³	0.56	< 0.020
	2012	2		NA	NA	< 0.005 ²	< 0.01 ¹	< 0.02 ¹	NA	NA	NA	NA	NA	3.7 ³	12	< 3 ³	NA	NA	NA
	2011	1		< 0.5	< 0.5	NA	< 0.01	< 0.02	< 3	< 0.5	< 0.5	< 0.5	< 0.5	2.8	13	< 3	NA	< 0.1	< 0.020

Notes

NA Not analyzed

1 Only a single sample for EDB and DBCP was analyzed during the year identified

2 Only a single sample was analyzed for 1,2,3-TCP during the year identified

3 Only a single sample for arsenic, gross alpha, nitrate, and hexavalent chrome was analyzed during the year identified