3.8

HYDROLOGY AND WATER QUALITY

3.8 Hydrology and Water Quality

This section of the Draft EIR addresses the potential for the Merced General Plan to affect or modify the existing hydrology and water quality of the Planning Area. Two comment letters were received on the NOP from the Merced Irrigation District (MID) in which they said that they would "Upon development of new and existing land covered within the scope of the 2030 General Plan, MID will provide a detailed response in regards to the proposed projects and their impacts upon MID facilities." The second letter received was in response to the NOP regarding hydrology and water quality. The commenter wants the City to prepare a Water Element and "perform an environmental review of the potentially positive environmental effects that could be based upon such additional elements."

3.8.1 SETTING

Environmental Setting

CLIMATE

The climate of the City of Merced is hot and dry in the summer and cool and humid in the winter. The average daily temperature ranges from 47 to 76 degrees Fahrenheit. Extreme low and high temperatures of 15°F and 111°F are also known to occur. Historical average precipitation is approximately 12" per year, with the rainy season commencing in October and running through April. On average, approximately 80% of the annual precipitation occurs between November and March. The hot and dry weather of the summer months usually results in high water demands for landscape irrigation during those months.

REGIONAL TOPOGRAPHY

The project area is located in and immediately adjacent to the City of Merced. The City of Merced is situated in the San Joaquin Valley at the base of the Sierra Nevada foothills. This area contains little topographic relief (less than 1% slopes) across the entire City. Elevation in the City ranges from approximately 200 feet above mean sea level (MSL) along the southeastern portions to approximately 150 feet above MSL in the southwestern extent of the City boundary.

DRAINAGE BASIN

The City of Merced and adjacent areas slated for expansion through the Specific Urban Development Plan/Sphere of Influence (SUDP/SOI) process are located within the San Joaquin/Merced River drainage basin or "watershed." A watershed is commonly defined as the area of land that drains water, sediment, and dissolved materials to a common outlet at some point along the stream channel.

The San Joaquin Valley drainage basin extends from near the City of Stockton to the north to near the City of Fresno to the south, and from the Sierra Nevada on the east to the Coastal Ranges on the west. The basin encompasses approximately 11,000 square miles and is approximately 110 miles long and 95 miles wide. The San Joaquin River originates in the Sierra Nevada mountains and flows southwesterly to the vicinity of Mendota. It then flows

northwesterly to its mouth in the Suisun Bay. It represents the principal stream in the regional drainage basin.

Principal tributaries to the San Joaquin River include the Stanislaus, Tuolumne, and Merced rivers. There are a number of minor tributaries, most of which are ephemeral (dry during the summers), which join the San Joaquin River in an east to west orientation. The following discussion briefly describes the key surface water resources relative to the SUDP/SOI or plan area.

- **The Merced River** is located approximately eight miles north of the study area, flowing through the northeastern part of Merced County. Originating in Yosemite National Park, it drains an area of approximately 1,040 square miles along the western flank of the Sierra Nevada range. With an average flow of 969,400 acre feet, the Merced River provides a source of water for a number of water systems including the Merced Irrigation District.

- **Black Rascal Creek** located north of Santa Fe Drive and Olive Avenue, flows southwesterly through the plan area. Black Rascal Creek originates in the foothills northeast of the plan area near the boundary of Merced and Mariposa Counties.

- **Bear Creek** flows located south of Santa Fe Drive/Olive Avenue, flows in an east-west direction. Its headwaters are impounded by a reservoir approximately four miles east of the plan area. Bear Creek ultimately flows directly into the San Joaquin River.

- **Fahrens Creek** originates at approximately the 700-foot elevation northeast of the plan area and flows southwesterly to its confluence with Black Rascal Creek at a location east of Highway 59 and north of Olive Avenue.

In addition to the natural drainage features, the study area is transected by numerous man-made channels which are part of MID's extensive system of irrigation canals, levees, and ditches. The most significant is the main canal which was constructed in 1886 and interrupts flows from the upper reaches of Ellendale Creek, Parkinson Creek, and Fahrens Creek water systems. The main canal ultimately conveys a portion of these flows to Lake Yosemite, located east of the plan area.

In terms of flooding, more than half of the Merced SUDP/SOI, is located within a 100-year flood plain, as shown on the Flood Insurance Rate Map (FIRM) prepared by the Federal Emergency Management Agency (FEMA) (Figure 3.8-1). A 100-year flood plain is defined as an area subject to inundation from a flood event that has a statistical probability of occurring once every 100 years.

GROUNDWATER

The City of Merced is located in the 2,665 square mile Middle San Joaquin-Lower Chowchilla watershed (USGS Hydrologic Unit 18040001), which in turn 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, is the major river system in the basin. The San Joaquin River drains into the Delta, which eventually empties into San Francisco Bay.

Legend

Merced City Limit

Proposed Sphere of Influence (SOI)

FEMA Q3 Flood Zones 1996

100 Year Flood Zone

500 Year Flood Zone

FEMA DFIRM Flood Zones 2006

100 Year Flood Zone

100 Year Flood Zone - BFE's Determined

100 Year Flood Zone - BFE's Determined - Flood Depth 1 to 3 Feet

100 Year Flood Zone - Average Flood Depths Determined - Flood Depth 1 to 3 Feet

200 Year Flood Zone

N

W E

S

0 0.5 1 1.5 2

Miles

Source: NAIP, 2005 / FEMA, 2009 / Quad Knopf, 2009

Quad Knopf

MERCED VISION 2030 GENERAL PLAN EIR
FEMA FLOOD ZONES

Figure 3.8-1

Job No.: 060429

Groundwater, which is generally supplied by runoff from the foothills and mountains, is a very significant source of domestic water for the City of Merced. The San Joaquin Valley Groundwater Basin and Merced Subbasin are described in California's Groundwater, California Department of Water Resources (DWR) Bulletin 118 (DWR Bulletin 118) originally published in 1975, and most recently updated in 2003, as follows:

- **Basin Boundaries and Hydrology -** The San Joaquin Valley is surrounded on the west by the Coast Ranges, on the south by the San Emigdio and Tehachapi Mountains, on the east by the Sierra Nevada and on the north by the Sacramento-San Joaquin Delta and Sacramento Valley. The northern portion of the San Joaquin Valley drains toward the Delta by the San Joaquin River and its tributaries, the Fresno, Merced, Tuolumne, and Stanislaus Rivers. The southern portion of the valley is internally drained by the Kings, Kaweah, Tule, and Kern Rivers that flow into the Tulare drainage basin including the beds of the former Tulare, Buena Vista, and Kern Lakes.

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

- **Hydrogeologic Information -** The San Joaquin Valley represents the southern portion of the Great Central Valley of California. The San Joaquin Valley is a structural trough up to 200 miles long and 70 miles wide. It is filled with up to 32,000 feet of marine and continental sediments deposited during periodic inundation by the Pacific Ocean and by erosion of the surrounding mountains, respectively. Continental deposits shed from the surrounding mountains form an alluvial wedge that thickens from the valley margins toward the axis of the structural trough. This depositional axis is below to slightly west of the series of rivers, lakes, sloughs, and marshes, which mark the current and historic axis of surface drainage in the San Joaquin Valley.

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

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

little water to wells, and the younger alluvium in most places probably yields only moderate quantities of water to wells.

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

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

- **Groundwater Level Trends -** Groundwater supplies throughout the San Joaquin Valley are being depleted with a resulting decrease in groundwater levels and availability. Changes in groundwater levels are based on annual water level measurements by DWR, MID and other entities. Water level changes are monitored by the City of Merced on a quarterly basis, through more than 120 monitoring wells.

  Within the MGWB, 34 monitoring wells with at least 30 years of history (from 1970 to present) have been selected for evaluation of available groundwater. Data shows that since 1980, average groundwater levels beneath the MGWB have declined approximately 14 feet.

- **Groundwater Storage -** The 2003 DWR Bulletin 118 indicates that the MGWB has a surface area of about 491,000 acres. Estimations of the total storage capacity of the subbasin and the amount of water in storage as of 1995 were calculated using an estimated specific yield of 9.0 percent and water levels collected by DWR and cooperators. According to these calculations, the total storage capacity of this subbasin is estimated to be 15.7 million acre-feet to a depth of 300 feet and 42.2 million af to the base of fresh water. As of 2007, the MGWB is in a state of mild declione with a cumulative decrease in storage of approximately 720,000 af from 1980 to 2007.

- **Groundwater Budget (Type B) -** Although a detailed budget was not available for this subbasin, an estimate of groundwater demand was calculated based on the 1990 normalized year and data on land and water use. A subsequent analysis was done by a DWR water budget spreadsheet to estimate overall applied water demands, agricultural groundwater pumpage, urban pumping demand and other extraction data.

  Natural recharge into the subbasin is estimated to be 47,000 af. Values for artificial recharge and subsurface inflow are not determined. There is approximately 243,000 af of applied water recharge into the subbasin. Annual urban and agricultural extractions are 54,000 af and 492,000 af, respectively. Other extractions equal approximately 9,000 af. Subsurface inflow values are not determined.

From a more focused perspective, there are four recognized aquifers beneath the City of Merced and the larger SUDP/SOI area as described below.

- **The Mehrten Formation** is the oldest and thickest of the deposits and represents a significant aquifer to the SUDP/SOI area in terms of water supply. It is characterized as a consolidated clay stone, silt stone, conglomerate. Beneath the City of Merced, the Mehrten is found at a depth of approximately 300 feet. The Mehrten formation possesses a continuous layer of clay often referred to as a "300-foot clay" which is a significant geologic feature relative to water quality.

- **The confined aquifer** between the 300-foot clay in the Mehrten formation and the base of the Corcoran formation or E-clay. This formation consists of continental alluvial deposits of poorly-sorted gravel, sands, silt, and clay. Beneath the City of Merced, the continental deposits are found approximately 150 feet below the surface.

- **The intermediate aquifer** above the E-clay and below the shallow clay. Above the continental deposits lies the older alluvium which represents the most extensively developed aquifer in the study area. This deposit consists of gravel, sand, silt, and clay and is characterized as an older alluvium. The Corcoran or the E-clay component of this formation is a major confining layer that separates the older alluvium into distinct hydrostratographic units and confines the deeper alluvium and the continental deposits.

- **The shallow unconfined aquifer** consisting of alluvium flood basin deposits composed of fine sand, silt, and clay overlaying the older flood basin deposits. Groundwater in this formation can be accessed at 1 to 15 feet in depth at some locations within the SUDP/SOI area.

In terms of groundwater movement in the Merced area, groundwater generally tends to flow northeast to southwest, although groundwater pumpage creates cones of depression, and irrigation may cause a mounting effect complicating flow patterns and causing them to change over time.

Groundwater Quality

The geographic units beneath the City of Merced and the larger SUDP/SOI area are saturated with fresh water at a depth of approximately 1,200 feet. Existing water quality in the study area can generally be characterized as moderate to good. It should be noted, however, that most of the water quality samples collected in the area are from the City's deep municipal wells. The results of these water quality samples is only indicative of the water quality within the intermediate or deep aquifers in which the City of Merced draws the majority of its water for domestic applications. Groundwater in shallower aquifers in the Merced region is impacted by nitrates from wastewater disposal and agriculture, and water quality is declining.

The most significant groundwater quality issue for Merced appears to be the presence of Tetrachlorethylen (PCE), an industrial solvent associated with the dry cleaning industry. This compound has been detected in three shallow wells in the downtown area. These three well sites

have subsequently been closed and replaced with deeper wells. In addition, a well site located in an area known as the Kendall site was found to be contaminated with Tetrachlaroethleane (TCE), an industrial solvent and to a lesser extent Dibromochloropropane (DBCP), an agricultural chemical used in the control of root nematodes.

Clean-up of the Kendall site has been on-going for approximately 10 years and the process of air-stripping has been employed to reduce the level of TCE in the water to a maximum allowable level (MAL) of five parts per billion (PPB). As indicated, existing water quality in the study area can be characterized as moderate to good. However, the groundwater quality problems associated with the shallow aquifer could ultimately migrate through the restrictive clay layers, if continued pumpage from beneath these protective layers induces downward contamination migration.

Surface Water Quality

Increasing the amount of impervious surfaces within the existing Merced SUDP/SOI has resulted in higher rates of runoff during rainy periods. This runoff can be a source of surface water pollution. The construction of roadways and vehicle parking areas, in combination with the use of chemical pesticides and fertilizers, cleaning solvents, etc., may have resulted in inadvertent contamination of surface waters throughout the City of Merced urban area. Storm runoff can carry these polluting agents into natural drainage courses causing adverse effects on surface water quality.

Constituents found in urban runoff vary from storm event to storm event at a given site and from site to site within a given area. Variances can be the result of differences in rainfall intensity and occurrence, geographic features and the land use of the site, as well as vehicle traffic and percent of impervious surface. The EPA estimates that runoff from construction sites without adequate erosion control measures can contribute high loads of sediment to receiving waters.

In the Central Valley, there is a natural weather pattern of long dry periods from May to October. During this seasonal dry period, pollutants created by vehicle exhaust, vehicle and tire wear, crank case drippings, spills and atmospheric fallout accumulate on roadways and parking areas. Precipitation during the early portion of the wet season, typically beginning in November, displaces these pollutants into the storm water runoff, resulting in high pollution concentrations in the initial wet weather runoff. This early runoff with peak pollutant levels is commonly referred to as the “first flush” of a storm.

Under conditions where surface storm water discharge is not regulated, water coming from paved roadways and parking areas may contain substances such as oil, battery acid, and engine coolant. All of these can be hazardous to local flora and fauna. Pesticides and fertilizers applied to landscaping could be washed into the stream channel which could affect native plants and animals.

As a result of the scientific data documenting the polluting potential of urban runoff, a number of federal and state programs have been initiated. At present, there is a very complex regulatory

environment within which new urban development must operate. These regulatory programs are discussed below.

Regulatory Setting

FEDERAL

Regional Water Quality Control Board Permitting

The National Pollution Discharge Elimination System (NPDES) program, under Section 402(p) of the Federal Clean Water Act, is administered locally by the Central Valley Regional Water Quality Control Board on behalf of the US Environmental Protection Agency (EPA). The program is designed to reduce pollution from storm water discharge and may require a permit from parties discharging to lakes, streams and other water bodies. In the case of the proposed project, a construction activity permit would be required since construction activities associated with the project would result in the disturbance of more than five acres and movement of at least 2.9 million cubic yards of soil. The permit would require that the following measures be implemented during construction activities: eliminate or reduce non-storm water discharges to storm water systems and other waters of the nation, develop and implement a Storm Water Pollution Prevention Plan (SWPPP), and perform inspections of storm water control structures and pollution prevention measures.

Clean Water Act-Section 404

The federal Clean Water Act (CWA, 33 USC 1251-1376), as amended by the Water Quality Act of 1987, is the major federal legislation governing water quality. The objective of the CWA is "to restore and maintain the chemical, physical, and biological integrity of the Nation's water." Important applicable sections of the Act are as follows:

- Sections 303 and 304 provide for water quality standards, criteria, and guidelines.

- Section 401 requires an applicant for any federal permit that proposes an activity which may result in a discharge to "waters of the United States" to obtain certification from the state that the discharge will comply with other provisions of the Act. The Regional Water Quality Control Board (RWQCB) provides certification.

- Section 402 establishes the NPDES, a permitting system for the discharge of any pollutant (except for dredge or fill material) into waters of the United States. This permit program is administered by the RWQCB.

- Section 404 establishes a permit program for the discharge of dredge or fill material into waters of the United States. The U.S. Army Corps of Engineers (ACOE) administers this permit program.

Wetlands and other waters of the U.S. are subject to the jurisdiction of the ACOE and EPA under Section 404 of the Clean Water Act. Wet areas that are not regulated by this Act do not have a hydrologic link to other waters of the U.S., either through surface or subsurface flow. The

ACOE has the authority to issue a permit for any discharge, fill, or dredge of wetlands on a case-by-case basis, or by a general permit. General permits are handled through a Nationwide Permit (NWP) process. These permits allow specific activities that generally create minimal environmental effects. Projects that qualify under the NWP program must fulfill several general and specific conditions under each applicable NWP. If a proposed project cannot meet the conditions of the applicable NWP, an individual permit would likely be required from the ACOE (EPA 2004).

Safe Drinking Water Act

The Safe Drinking Water Act (SDWA), administered by the U.S. Environmental Protection Agency in coordination with the states, is the chief federal regulatory legislation regulating drinking water quality. The 104th Congress reauthorized and made significant changes to the SDWA, which had most recently been reauthorized in 1986. Major changes included establishing a drinking water state revolving loan fund to be made available to public water systems to help them comply with national primary drinking water regulations and to upgrade water treatment systems; and requirements for EPA to establish drinking water standards based on risk assessment and cost/benefit analysis.

Federal Emergency Management Agency (FEMA)

The National Flood Insurance Program is a Federal program administered by FEMA. Participants in the NFIP must satisfy certain mandated floodplain management criteria. The National Flood Insurance Act of 1968 has adopted, as a desired level of protection, an expectation that developments should be protected from floodwater damage of the Intermediate Regional Flood (IRF). The IRF is defined as a flood that has an average frequency of occurrence on the order of once in 100 years although such a flood may occur in any give year. The County is occasionally audited by the Department of Water Resources to insure the proper implementation of FEMA floodplain management regulations.

Merced County Streams Project

The Merced County Streams Group Project was approved by Congress in 1970. The project was re-evaluated by the U.S. Corps of Engineers in 1980 and some construction has been completed, but the entire project currently lacks local cost-sharing commitments. The project, as currently defined, entails construction of two new detention dams (Castle on Canal Creek and Haystack Mountain on Black Rascal Creek), the enlargement and modification of the Bear Creek detention dam, and construction and modification of 32 miles of levees and channels on the Bear Creek Stream Group (Fahrens, Black Rascal, Cottonwood, and Bear Creeks, Black Rascal Slough, and El Capitan Canal). Castle Dam and a diversion structure from MID's main canal has been completed to date. Approximately 24 square miles in the Planning Area would be removed from the 100-year or more floodplain by this project.

STATE

Senate Bill 610 Water Supply Assessment

Senate Bill 610 (SB 610), passed in 2001, amended the California Water Code, to require a written water supply assessment for projects of 500 or more residential units, 500,000 square feet of retail commercial space, or 250,000 square feet of office commercial space.

Senate Bill 221 Water Supply Verification

Senate Bill 221 (SB 221), passed in 2001, amended the California Water Code, to require a written affirmative verification of sufficient water supply by a city or county for certain residential subdivisions.

California Water Code

The California Water Code establishes the foundation for acquisition and protection of water rights. These water doctrines, with some originating hundreds of years ago, remain relevant to current water law discussions to varying extents, and they have been used by the court system over the years to resolve conflicts and establish precedents.

Rights to groundwater are more complex and groundwater as a resource is generally considered in three separate classes: (1) as stream underflow, (2) as definite underground streams, and (3) as percolating waters. The first two are treated legally as surface water, and all underground water is considered percolating water unless proven otherwise.

California State Water Resources Control Board

Responsibility for administering California water rights procedures lies with the California State Water Resources Control Board (SWRCB), which also is responsible for managing and administering various federal and state water quality control programs. Procedures are provided by statute, but the board has the authority to establish rules and regulations to help it carry out its work. All board activities are governed by state water policy and are administered in accordance with policies and procedures in the California Water Code.

The SWRCB carries out its water quality protection authority through the adoption of specific Water Quality Control Plans (Basin Plans). These plans establish water quality standards for particular bodies of water. California water quality standards are composed of three parts: the designation of beneficial uses of water, water quality objectives to protect those uses, and implementation programs designed to achieve and maintain compliance with the water quality objectives.

The SWRCB adopted the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (SWRCB 2005). This policy provides implementation measures for numerical criteria contained in the California Toxics Rule, promulgated in May 2000 by the U.S. EPA. When combined with the beneficial use

designations in the Basin Plan, these documents establish statewide water quality standards for toxic constituents in surface waters.

Central Valley Regional Water Quality Control Board

The SWRCB administers water rights, water pollution control, and water quality functions throughout the state, while the Regional Water Quality Control Boards conduct planning, permitting, and enforcement activities. The project area lies within the jurisdiction of the Central Valley Regional Water Quality Control Board (CVRWQCB).

The CVRWQCB is responsible for the protection of beneficial uses of water resources within the Central Valley region. Designation of beneficial uses defines the resources, services, and qualities of the aquatic system that are the ultimate goals of protecting and achieving high water quality. The CVRWQCB uses planning, permitting, and enforcement authorities to meet this responsibility, and has adopted the Central Valley Region Water Quality Control Plan (Basin Plan) to implement plans, policies, and provisions for water quality management. Beneficial uses of surface waters are described in the Basin Plan and are designated for major surface waters and their tributaries. In addition to identification of beneficial uses, the Basin Plan also contains water quality objectives that are intended to protect the beneficial uses of the Basin. The CVRWQCB has region-wide and water body/beneficial use-specific water quality objectives.

Beneficial uses of the surface waters of the Delta include municipal, agricultural, industrial, and recreational uses, freshwater habitat, migration, spawning, wildlife habitat, and navigation. Beneficial uses for all groundwater resources in the Central Valley region include or potentially include municipal, agricultural, and industrial uses.

The CVRWQCB has set water quality objectives for all surface waters in the region concerning bacteria, bioaccumulation, biostimulatory substances, color, dissolved oxygen, floating material, oil and grease, population and community ecology, pH, salinity, sediment, settleable material, suspended material, sulfide, tastes and odors, temperature, toxicity, turbidity, and ammonia. Water quality objectives for groundwater include standards for bacteria, chemical constituents, radioactivity, tastes and odors, and toxicity.

Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act regulates the discharge of waste into waters of the state. The Regional Water Quality Control Board (RWQCB) administers this regulation. Water Code Section 13260 requires "any person discharging, or proposing to discharge waste, within any region that could affect the waters of the state to file a report of discharge." A report of waste discharge ("RWD") is an application for waste discharge requirements ("WDRs"). WDRs contain conditions imposed on a given discharge by the appropriate RWQCBs for the purpose of protecting the beneficial uses of the waters of the state. Upon receipt of a RWD, the RWQCB may issue WDRs imposing conditions on the proposed discharge, or it may waive the requirement for WDRs.

Urban Water Management Planning Act

The Urban Water Management Planning Act became part of the California water code with passage of AB 797 in 1984. The act requires every urban water supplier (providing water for municipal purposes to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually) to adopt and submit an urban water management plan at least once every five years to the Department of Water Resources. The most current Merced Urban Water Management Plan (UWMP) is dated December 2005, but the UWMP is in the process of being updated by the City in 2010.

AB 162 - Designation

In compliance with Assembly Bill 162 and Government Code §65302(g), jurisdictions are also required to utilize the FEMA flood insurance rate maps to determine flood hazards zones, and the NFIA maps when considering development in flood hazard areas.

LOCAL

Merced Municipal Code

The purpose of Chapter 17.48, Flood Damage Prevention, of the Merced Municipal Code, is to promote the public health, safety, and general welfare, and to minimize public and private losses due to flood conditions in specific areas. Methods of reducing flood losses include:

A. Restricting or prohibiting uses which are dangerous to health, safety, and property due to water or erosion hazards, or which result in damaging increases in erosion or flood heights or velocities;

B. Requiring that uses vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the time of initial construction;

C. Controlling the alteration of natural floodplains, stream channels, and natural protective biers, which help accommodate or channel flood waters;

D. Controlling fill, grading, dredging, and other development which may increase flood damage; and

E. Preventing or regulating the construction of flood barriers, which will unnaturally divert flood waters or which may increase flood hazards in other areas.

Chapter 17.60, Water Efficient Landscaping and Irrigation, of the Merced Municipal Code is intended to enhance the environmental performance of development by promoting the percolation of storm water, conservation of water and preservation of water quality by requiring drought tolerant plant material in landscaping and the retention of existing natural vegetation.

Merced Water Supply Plan

The Merced Water Supply Plan was completed in 1995 and evaluated future water needs in the Merced area. It was projected that the City of Merced's needs could increase from 15,000 AF in 1995 to 60,000 AF by 2030. After extensive public involvement in all phases of the plan, the "groundwater recharge" alternative was selected because the Project Advisory Committee felt it was the most cost effective and environmentally sound approach. Under this Preferred Alternative, the cities will remain on groundwater (constructing new wells as needed); groundwater recharge facilities will be constructed on an annual basis with the goal of stabilizing groundwater at 1992 levels, and MID will increase the delivery of surface water to agricultural users along with installing new wells to protect against droughts.

During 1997, several agencies within the groundwater basin adopted Resolutions of Intention to adopt a Groundwater Management Plan pursuant to Water Code Section 10753 et seq. In addition, these agencies formed the Merced Area Groundwater Pool Interests (MAGPI) for the purpose of developing a basin-wide groundwater management plan to guide the management of groundwater resources in the MGWB.

The 1997 GWMP was the result of the planning effort of the City of Merced and MID on behalf of MAGPI. In June 2001, the DWR entered into an MOU to work cooperatively to promote conjunctive use of surface and groundwater projects within the MGWB.

Merced Storm Drain Master Plan

The City prepared a Storm Drain Master Plan (2002), which identified the infrastructure improvements necessary to accommodate storm water runoff at build-out of the 2015 General Plan SUDP/SOI. The City requires the construction of storm water percolation/detention basins with new development. Percolation basins are designed to collect storm water and filter it before it is absorbed into the soil and reaches groundwater tables. Detention basins are designed to temporarily collect runoff so it can be metered at acceptable rates into canals and streams which have limited capacity.

General Plan Consistency

The *Merced Vision 2030 General Plan* contains a number of policies that apply to Hydrology and Water Quality impacts in conjunction with ultimate build-out of the City in accordance with the General Plan. The specific policies listed below contained in the Public Services and Facilities, Land Use and Parks, Open Space, and Conservation, and Safety Elements of the General Plan are designed to ensure that hydrology and water quality impacts are minimized as development occurs in accordance with the *Merced Vision 2030 General Plan.*

Public Services and Facilities 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.

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.

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.

Open Space, Conservation, and Recreation Policies:

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

OS-1.5 Preserve and enhance water quality.

OS-5.1 Promote water conservation throughout the planning area.

Safety Policies:

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

S-3.1 Endeavor to remove most of the existing City, and the vast majority of the SUDP/SOI, from the 100-year and 200-year floodplain.

S-3.2 Maintain essential City services in the event of flooding or dam failure.

3.8.2 THRESHOLDS OF SIGNIFICANCE

According to Appendix G of the CEQA Guidelines, a project is considered to have a significant impact on the environment if it will:

- Violate any water quality standards or waste discharge requirements

- 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)

- 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

- 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

- 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

- Otherwise substantially degrade water quality

- 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

- Place within a 100-year flood hazard area structures which would impede or redirect flood flows

- Expose people or structure to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam

- Inundation by seiche, tsunami, or mudflow

3.8.3 IMPACTS AND MITIGATION MEASURES

Impact #3.8-1: Violation of water quality standards or waste discharge requirements or otherwise substantially degrade water quality

Discussion/Conclusion: Water quality can be impacted by the discharge of soils and other pollutants often associated with urban runoff such as oil, grease, pesticides and fertilizers. Grading and construction activity can cause erosion, which can increase the sediment load of runoff. These non-point source pollutants may flow into local surface waters or seep into the groundwater table and incrementally degrade water quality. Areas designated for future development proposed under the Merced 2030 General Plan would potentially impact the quality of runoff and other pollutant loadings to receiving waters. Water quality impacts may be significantly greater during the region's rainy season.

Policies included as part of the General Plan Update that would minimize this impact include Policies P-5.1 and P-5.2 which will provide effective storm drainage facilities for future development and integrate drainage facilities with bike paths, sidewalks, recreation facilities, agricultural activities, groundwater recharge, and landscaping. Implementing Action 5.1a states that the City will continue to implement, along with MID and the County, the Merced Storm Water Master Plan and the Storm Water Management Plan within the Merced SUDP/SOI. Implementing Action 5.1.b states that the City will work with MID and the County to update the Merced Storm Water Master Plan to account for changes in expected storm drainage runoff due to expanded land uses within the Merced area. Implementing Action 5.1.c requires all development to comply with the Merced Storm Water Master Plan and any subsequent updates.

In the Open Space Element, Policy OS-1.5 states, "preserve and enhance water quality." Implementing Action 1.5a calls for the utilization of storm water retention basins and other "Best Management Practices" to improve the quality of storm water discharged into the region's natural surface water system. Implementing Actions 1.5.b and 1.5.c call for the monitoring of known sources of groundwater contamination within the City and its future expansion area and ground water in areas in and around the City using septic system wastewater disposal systems. Policy OS-5.1 and Implementing Action 5.1.b promote water conservation and the preservation of water quality by requiring drought tolerant plant material in landscaping and the retention of existing natural vegetation on new development projects.

While the *Merced Vision 2030 General Plan* would allow new development that could potentially create additional urban pollutants that may end up in the surface or groundwater systems, implementation of the above policies and implementing actions will be self-mitigating and result in a ***less than significant*** impact.

Mitigation Measures

No mitigation measures are required.

Impact #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.

Discussion/Conclusion: With respect to water supply, as previously indicated, Merced is primarily dependent on groundwater sources that draw from the San Joaquin aquifer. The City has storage capacity of approximately 1.4 million gallons in four elevated storage tanks, 21 active well sites, and 14 pumping stations, which provide service to meet peak hour urban level conditions and the average daily demand plus fire flows.

The City of Merced has instituted significant water conservation measures in recent years in response to a prolonged drought period in California and the Central Valley. As a result, peak water production declined from its high of 38.3 million gallons per day (MPD) in 1984 to around 31.6 MPD in 1994. In 2007, the amount of water consumed per day had dropped to just over 21.0 MPD. This decline in peak day production has occurred despite the fact that population growth in the City has been occurring at a rapid rate.

Policies and implementation actions included as part of the proposed project that would minimize this impact through the ongoing protection of groundwater resources are summarized as follows. Policy P-3.2 of the Public Services and Facilities Element states that the City will work with the County and MID to stabilize the region's aquifer. Implementing Action 3.2.a states that the City will work closely with the State and County agencies in exploring innovative technology and procedures for water conservation and recycling. The City will work cooperatively with MID to preserve and enhance its surface water delivery system (Implementing Action 3.2.b). Implementing Action 3.2.c states that the City will explore the use of MID water resources for applications that do not require treated water to reduce demand on

the regional groundwater supplies and reduce costs of water treatment. Implementing Action 3.2.d will ensure cooperation with MID and the County in the development of groundwater recharge facilities as called for in the Merced Water Supply Plan. Policy P-4.2 calls for the City to consider the use of reclaimed water to reduce non-potable water demands whenever practical.

Regarding groundwater depletion and recharge, Merced is within the Merced Sub-basin which is, according to the California Department of Water Resources, being subject to critical conditions of overdraft. Also, a Groundwater Impacts Analysis prepared by Brown and Caldwell for the City of Merced indicates that there is groundwater overdraft in the City's service area, and that the rate of overdraft will continue to increase with future urban development. Implementation of proposed policies and implementation actions in the proposed General Plan will help to reduce this impact within Merced's Planning Area; however, it will remain a ***significant impact***.

Mitigation Measures

No mitigation measures are available to reduce this impact to less than significant.

Impact #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.

Discussion/Conclusion: Drainage runoff from developing areas or parcels is dependent on the percent of impervious surface assigned to individual parcels or projects. New areas will see development potential under the 2030 General Plan. Urban density development will increase the amount of impervious surfaces, thereby increasing the amounts and speed of runoff. Increased runoff volumes and speeds may increase erosion or siltation and could result in localized nuisance flooding in areas without adequate drainage facilities.

Policies included as part of the proposed project that would minimize this impact are summarized as follows: The Open Space Element includes Policy OS-5.2 which calls for the City to protect soil resources from the erosive forces of wind and water. Implementing Action 5.2.a says that the City will reduce soil erosion potential of new development. Policy P-1.1 calls for the City to provide adequate public infrastructure and services to meet the needs of future development and Implementing Action 1.1.d states that the City will construct a storm water drainage system in accordance with master plans. As noted under Impact #3.8-1, Policies P-5.1 and P-5.2 will provide effective storm drainage facilities for future development and integrate drainage facilities with bike paths, sidewalks, recreation facilities, agricultural activities, groundwater recharge, and landscaping. Implementing Action 5.1a says that the City will continue to implement, along with MID and the County, the Merced Storm Water Master Plan within the Merced urban area. Implementing Action 5.1.b says that the City will work with MCFCD, MID and the County to update the Merced Storm Water Master Plan to account for changes in expected storm drainage runoff due to expanded land uses within the Merced area.

Implementing Action 5.1.c requires all development to comply with the Merced Storm Drain Master Plan and any subsequent updates.

Policies S-3.1 and S-3.2 call for the City to remove most of the existing City, and the vast majority of the SUDP/SOI, from the 100-year and 200-year floodplains and maintain essential City services in the event of flooding or dam failure. Implementing Action 3.2.a says that the City will continue to build all pump station (both sewer and water) entryways at one (1) foot above the 200-year flood elevation and consider additional standards to address flooding due to dam failure. Implementing Action 3.2.b says the City will continue the "flood-proofing" 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.

Implementation of the General Plan itself will not alter the drainage pattern of the area. It allows for the development of future projects that could result in the changes of drainage patterns that could result in erosion, siltation or flooding. All new development as a result of the General Plan Update will have to be consistent with the City's policies noted above and also with the City's Storm Drain Master Plan, the rules and regulations of MID, and any future studies/plans as a result of General Plan adoption. Further, any development must be consistent with all federal and state regulations as well. This impact is ***less than significant***.

Mitigation Measures

No mitigation measures are required.

Impact #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 additional sources of polluted runoff.

Discussion/Conclusion: Flood control detention is considered the most viable option for mitigating the increase in runoff from new development areas, with the specific types and locations of these drainage facilities to be determined at the time development applications are submitted consistent with City Design Standards. Pollution associated with increased stormwater and urban runoff would affect local and regional surface and groundwater quality conditions. Unlike sewage, which is transported to a treatment facility, urban runoff flows untreated through the storm drainage system. Anything thrown, swept, or poured into the street, gutter, or a catch basin (the curbside openings that lead into the storm drainage system) flows directly into local channels and creeks. Pollutant loads can be particularly acute at the beginning of the rainy season, but can be a problem at any time due to the improper disposal of products associated with home, garden, or automotive use.

Policies included as part of the Proposed Project that would minimize this impact are summarized below. Policy P-1.1 will provide adequate public infrastructure and services to meet the needs of future development. Implementing Action 1.1.d calls for the City to construct a stormwater drainage system, water system and sewer system in accordance with master plans. Policy P-3.2 calls for the City to cooperate with the County and MID to stabilize the region's

aquifer. Implementing Action 3.2.d states that the City will cooperate with MID and the County in the development of groundwater recharge facilities as called for in the Merced Water Supply Plan.

As noted under Impact #3.8-1, Policies P-5.1 and P-5.2 will provide effective storm drainage facilities for future development and integrate drainage facilities with bike paths, sidewalks, recreation facilities, agricultural activities, groundwater recharge, and landscaping. Implementing Action 5.1a says that the City will continue to implement, along with MID and the County, the Merced Storm Water Master Plan within the Merced urban area. Implementing Action 5.1.b says that the City will work with MID and the County to update the Merced Storm Water Master Plan to account for changes in expected storm drainage runoff due to expanded land uses within the Merced area. Implementing Action 5.1.c requires all development to comply with the Merced Storm Water Master Plan and any subsequent updates.

Implementation of the General Plan Update itself will not create or contribute runoff water which would exceed capacity of existing/planned systems or provide substantial additional sources of pollutants; however it allows for the development of future projects that could result in stormwater capacity being exceeded or additional sources of pollutants. Since all new development as a result of the General Plan Update will have to be consistent with numerous regulations, including the City's policies noted above, the City's Storm Drain Master Plan, City Design Standards, the rules and regulations of MID, and any future studies/plans after General Plan adoption. In addition, federal and state regulations (such as preparing a SWPPP) regarding runoff and erosion must be followed. This impact is ***less than significant***.

Mitigation Measures

No mitigation measures are required.

Impact #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.

Discussion/Conclusion: A review of applicable FEMA flood maps indicates that approximately 1/2 of the City, the southern half, is located within the 100-year floodplain (see Figure 3.8-1). A good portion of the proposed SUDP/SOI is also within the 100-year floodplain and a smaller portion in the 500-year floodplain. Buildout of the proposed project could expose more people and structures to potential flooding if development occurs within or adjacent to these floodplain areas.

Policies of the General Plan Update Safety Element direct the City to limit development in hazardous areas and minimize flooding hazards. Policies S-3.1 and S-3.2 state that the City will endeavor to remove most of the existing City, and the vast majority of the SUDP/SOI, from the 100-year and 200-year floodplains and the City will maintain essential City services in the event of flooding or dam failure. Implementing Action 3.1.a states that the City will work on the

development and implementation of a funding plan to provide for the City's share of the Merced Streams Project. The City will also consider basing assessments on those areas which would benefit from removal from the 200-year flood and/or Lake Yosemite's inundation area. Implementing Action 3.2.a states that the City will continue to build all pump stations (both sewer and water) entryways at one (1) foot above the 100-year flood elevation and consider additional standards to address flooding due to dam failure. Implementing Action 3.2.b states that the City will continue the "flood-proofing" 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. There are currently two plans that should reduce the risk of flooding within the City's Planning Area.

The State of California has adopted legislation that requires jurisdictions to prepare floodplain regulations based on the 200-year flood event. New maps identifying the 200-year event boundaries were released by the State Dept. of Water Resources on October 15, 2008. The maps do not indicate that there are any areas within City limits, or within the SUDP/SOI, that are impacted by the 200-year floodplain. The DWR plans further studies over the next four years; any changes will need to be incorporated into affected development proposals.

New development as a result of the General Plan's adoption will have to adhere to the City's Flood Damage Prevention Ordinance, Municipal Code, General Plan policies, MID rules and regulations, and the Merced Storm Water Master Plan where applicable. With adherence to the City's ordinances, master plans and General Plan policies and implementation of the following mitigation measures to comply with Government Code §65302(g), potential flood hazards will be reduced from potentially significant impact to ***less than significant.***

Mitigation Measures

No mitigation measures are required.

Impact #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.

Discussion/Conclusion: In addition to flood hazards associated with 100-year flood zones, flood inundation resulting from levee or dam failure due to a variety of factors is a potential hazard for the City. Merced is presently in the inundation area of two dams, Bear Reservoir Dam and Lake Yosemite Dam (see Figure 3.8-2). Bear Reservoir Dam is located on Bear Reservoir from which Bear Creek flows into, and is approximately 20 miles east of Merced. Lake Yosemite Dam is located on Lake Yosemite which is on a tributary of the Merced River, and is in the northeast corner of the Planning Area. Both of these dams are earthen-fill which makes them more flexible and, therefore, more earthquake resistant. However, they are more likely to fail if over-topped. Dam failure can result from numerous natural or human activities, such as earthquakes, erosion, improper siting, rapidly rising flood waters, and structural and design flaws.

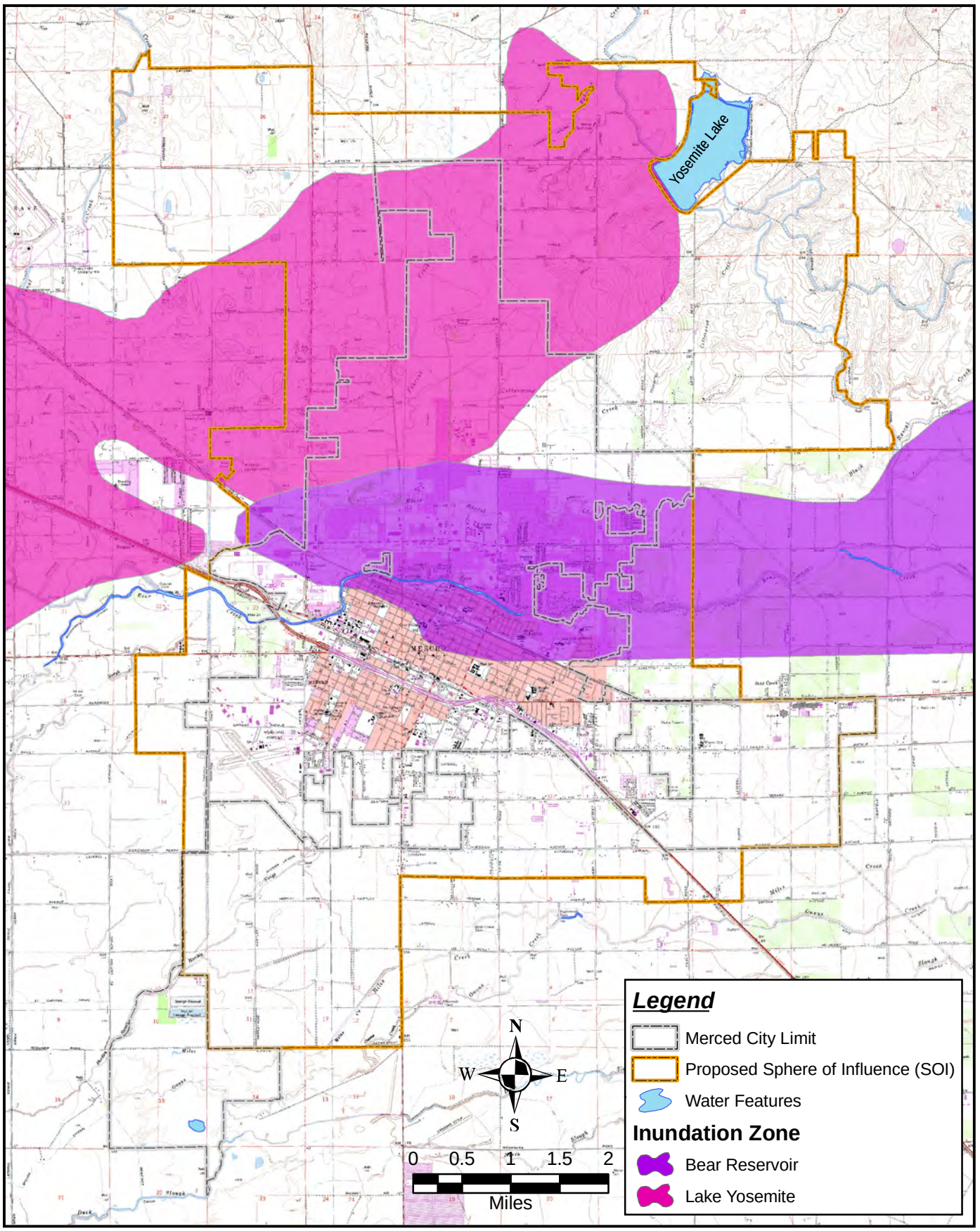
Recent flood events, including Hurricane Katrina, and more locally, levee failures in the Sacramento-San Joaquin Delta region, have brought to the forefront a heightened awareness of the dangers of levee failure. This realization has led to increased public scrutiny of new development projects that are located in floodplain areas protected by levees. Levees typically fail in one of two ways: (1) overtopping of the levee during peak flows or (2) structural failure. Structural failure can occur as a result of a variety of factors including seismic activity, erosion, damage from vegetation and rodents. Both types of levee failure can result in deep flooding within the adjacent floodplain.

In summary, there could be a minor, major, or catastrophic failure of the levee. Implementation of the proposed project would result in additional City-wide residential and non-residential land use developments that would face similar risks to those experienced by other residents in the region. Other areas of California face similar risks from natural disasters including earthquakes, mudslides, wildfires, and inundation as a result of dam failure; however, the regulatory framework developed to address these hazards and fund the necessary improvements is generally better established. Levees in Merced are owned by the Merced Irrigation District. While the City has no jurisdiction and is limited in terms of alternatives to mitigate for the identified risks, the City works closely with the district on a number of issues, including flood control, and impacts to MID facilities due to development. Levee maintenance and its associated funding mechanisms are complicated by various factors outside the City's control and beyond the scope of this project.

Policies of the General Plan Safety Element direct the City to limit development in hazardous areas and minimize flooding hazards. Policies S-3.1 and S-3.2 state that the City will endeavor to remove most of the existing City, and the vast majority of the SUDP/SOI, from the 100-year and 200-year floodplains and the City will maintain essential City services in the event of flooding or dam failure. Implementing Action 3.1.a states that the City will work on the development and implementation of a funding plan to provide for the City's share of the Merced Streams Project and consider basing assessments on those areas which would benefit from removal from the 100-year flood and/or Lake Yosemite's inundation area. Implementing Action 3.2.a states that the City will continue to build all pump stations (both sewer and water) entryways at one (1) foot above the 100-year flood elevation and consider additional standards to address flooding due to dam failure. Implementing Action 3.2.b states that the City will continue the "flood-proofing" 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.

New development as a result of the General Plan Update's adoption will have to adhere to the City's Flood Damage Prevention Ordinance, Municipal Code, General Plan policies, MID rules and regulations, and the Merced Storm Drain Master Plan where applicable. For these reasons, the implementation of the proposed General Plan would have a ***less than significant impact*** with respect to flooding.

The proposed General Plan would allow additional development to occur in areas of dam inundation risk as noted previously. In the case of dam failure, these particular areas are subject to flooding. However, the risk of dam inundation is low since the Department of Water Resources is responsible for completing annual inspections of each dam for the purpose of



Quad Knopf

MERCED VISION 2030 GENERAL PLAN EIR
INUNDATION ZONES

Figure 3.8-2

Job No.: 060429

safeguarding life and destruction of property. Since the risk of dam failure is low, the adoption of the proposed General Plan would ***not result in a significant impact***.

Seiches, or waves generated in bodies of water similar to the back-and-forth sloshing of water in a tub, could possibly occur in swimming pools and water tanks. Both Lake Yosemite and Bear Reservoir are subject to seiches in the event of an earthquake. If the seiche overtops either of the dams, failure could result. Failure of either dam would cause flooding within parts of the City. Given the distance between the lakes, and any major faults, the risk of seiche is extremely low. Neither lake has experienced a seiche since their construction, though a number of earthquakes have occurred since. This is a ***less than significant*** impact.

Merced is not at risk from tsunami due to its inland location. Finally, the Merced area is also not at risk of mudflows due to its relatively flat topography and distance from any hillsides. The proposed project will have ***no impact*** to the potential for inundation by seiche, tsunami or mudflow.

Mitigation Measures

No mitigation measures are required.

CUMULATIVE IMPACT ANALYSIS

As development proceeds within Merced and the SUDP/SOI, the amount of polluted runoff would increase, as well as the amount of stormwater, which presents a potential impact to surface and groundwater quality. A greater percentage of the population would also be exposed to the risk from flooding of the 200-year floodplain, or from dam inundation. However, project-level water quality and flooding impacts would be reduced to a less than significant level by proposed General Plan policies and existing regulations. New development within the County would also result in an increase in runoff and may locate additional population and structures within areas subject to flooding. Regional development would also be required to comply with regional, State and federal regulations addressing stormwater runoff, water quality and flooding. These regulations would reduce the potential for a cumulative hydrology and water quality impact to less than significant, so the proposed General Plan would ***not contribute to a significant cumulative impact***.

Regarding groundwater depletion and recharge, Merced is within the Merced Sub-basin which is, according to the California Department of Water Resources, being subject to critical conditions of overdraft. Also, a Groundwater Impacts Analysis prepared by Brown and Caldwell for the City of Merced indicates that there is groundwater overdraft in the City's service area, and that the rate of overdraft will continue to increase with future urban development. Implementation of mitigation measures in Section 3.8 (#3.8-5a through 3.8-5h), will help to reduce this impact within Merced's Planning Area; however, it will remain a ***significant cumulative impact***.