3.6 Hydrology, Flooding, and Water Quality

This section presents the environmental setting and impact analysis of hydrology, flooding, and water quality in the Visalia Planning Area, including consistency with applicable local, State, and federal plans, policies, and regulations. Visalia's groundwater, surface water drainage system, and potential for flooding are described.

Environmental Setting

PHYSICAL SETTING

Climate

The north Pacific high-pressure system dominates the region's large-scale meteorology and produces northerly winds along the entire west coast of the United States during most of the year. The California Irrigation Management Information System (CIMIS) measures meteorological data including temperature and precipitation and has multiple monitoring stations throughout California. CIMIS historically monitored in Visalia, but for the sake of a more recent record, the Fresno State (CIMIS No. 80) location contains more recent data from 1988 to 2010. **Table 3.6-1** shows the average and maximum monthly precipitation and the minimum, average and maximum air temperature at CIMIS No. 80. The daily data count was included for both precipitation data and air temperature data. The reason there are so few data counts in summer months for precipitation is due to precipitation rarely occurring during summer months over the 22 year time period. In addition, the reason there are many counts higher than the amount of days in a month is because the table is presenting all the Januarys and Februarys from 1988 to 2010.

Table 3.6-1: Monthly Precipitation and Air Temperature at Fresno State (CIMIS No. 80), October 1988 to March 2010

	Precipitation (inches)			*Air Temperature (°F)*			
Month	*Count*	*Average*	*Maximum*	*Count*	*Minimum*	*Average*	*Maximum*
January	263	0.21	1.79	682	21	46	74
February	224	0.20	1.55	612	23	50	80
March	161	0.26	2.52	672	28	55	88
April	95	0.19	0.99	622	32	60	99
May	60	0.20	1.06	651	32	68	103
June	16	0.25	1.24	623	32	75	106

Table 3.6-1: Monthly Precipitation and Air Temperature at Fresno State (CIMIS No. 80), October 1988 to March 2010

	Precipitation (inches)			*Air Temperature (°F)*			
Month	*Count*	*Average*	*Maximum*	*Count*	*Minimum*	*Average*	*Maximum*
July	7	0.07	0.16	644	32	80	110
August	5	0.08	0.16	639	51	78	110
September	23	0.09	0.31	617	32	73	105
October	63	0.20	1.54	655	32	63	100
November	153	0.13	1.14	650	26	52	86
December	239	0.16	1.56	678	18	45	79

Source: CIMIS 2010.

Surface Water Hydrology

The Planning Area is located on relatively level terrain typical of the Tulare Lake Basin. However, Visalia does rest in the heart of the Kaweah River's Delta system, which results in many rivers and creeks that flow through the city. The Kaweah River travels to the south of the Planning Area, and the St. John's River splits off from the Kaweah River and travels on the northern border of Visalia. Surface runoff in the Planning Area generally flows from east to west and terminates in the Tulare Lake Basin. Major surface water resources in the area include the St. John's River, Modoc Ditch, Mill Creek Ditch, Mill Creek, Tulare Irrigation District (TID) Canal, Packwood Creek, Cameron Creek, Deep Creek, Evans Creek, Persian Ditch, and several other local ditches (See **Figure 3.6-1**). Except for the TID Canal, most watercourses are intermittent drainages that receive a significant portion of flow from storm water runoff during the rainy season. This intermittent flow is typically supplemented from water released from Terminus Dam, which was constructed in 1962 and is operated by the U.S. Army Corps of Engineers. When drier conditions return in the spring, groundwater generally provides base flow for a portion of the summer.

The City operates and maintains a vast municipal storm drainage system that consists of drainage channels, 23 detention and retention basins, 33 pump stations and 250 miles of pipe. Historically, runoff was disposed of by directing it to the natural creeks, rivers and irrigation ditches that flow through the city including the St. John's River, Mill Creek, Packwood Creek, Modoc Ditch, Evans Ditch and Persian Ditch. To mitigate the increased runoff due to urbanization, the City has invested heavily in the purchase of land and the construction of permanent retention basins.

Monthly minimum, mean and maximum inflow into Lake Kaweah is presented in **Table 3.6-2**. Count refers to the number of data points from 1994 to 2010. Note that the January maximum flow of 17,948 cubic feet per second (cfs) is from 1997, which is the highest storm flows on the period of record. **Table 3.6-3** contains the monthly minimum, mean and maximum outflow from Lake Kaweah. This flow drains down into the Kaweah River Delta system and through the many drainages and creeks that meander through the City of Visalia. Note that the January maximum outflow from Lake Kaweah is much less than the inflow due to the lake retention.

Figure 3.6-1:

Flood Zones

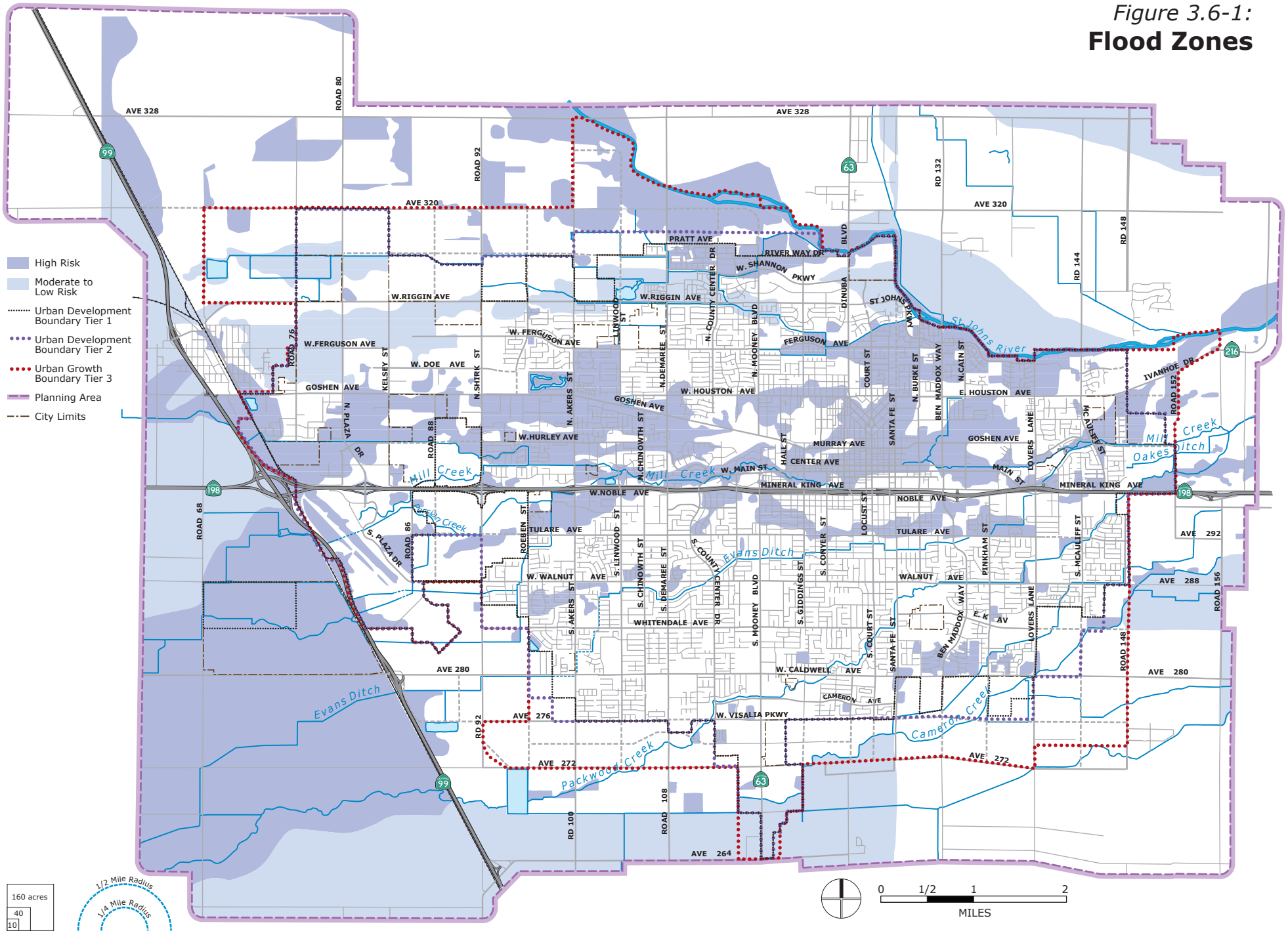


Table 3.6-2: Monthly Inflow (cfs) into Lake Kaweah,1994 to 2010

Month	*Count*	*Minimum*	*Mean*	*Maximum*
January	496	54	577	17,948[1]
February	430	101	597	5,077
March	481	221	820	8,369
April	411	222	1,186	6,737
May	437	487	1,870	4,882
June	414	53	1,438	5,332
July	422	2	623	4,772
August	396	8	163	1,151
September	396	7	74	638
October	435	3	92	7,360
November	457	7	162	9,436
December	455	25	239	6,354

1. Data point 17,948 is from January 1997 storm.

Source: California Data Exchange Center (CDEC) Available: http://cdec.water.ca.gov/.

Table 3.6-3: Monthly Outflow (cfs) from Lake Kaweah from 1994 to 2010

Month	*Count*	*Minimum*	*Mean*	*Maximum*
January	489	1	470	4,543
February	429	1	489	3,738
March	481	2	444	1,947
April	404	6	480	2,622
May	431	16	1,074	3,680
June	413	62	1,747	4,505
July	418	100	1,649	4,532
August	398	32	744	2,386
September	397	6	199	1,483
October	437	4	81	914
November	458	0	134	2,062
December	450	2	207	1,449

Source: California Data Exchange Center (CDEC) Available: http://cdec.water.ca.gov/.

Groundwater Hydrology

The project area overlies the southern portion of the San Joaquin unit of the Central Valley groundwater aquifer.[1] Groundwater in Tulare County is present in valley deposits of alluvium that are several thousand feet thick and occurs in both confined and unconfined conditions.[2] Packwood Creek, like other surface water bodies in the area, is intimately tied to the regional groundwater system. It functions as an influent or "losing" stream during the winter when stream flow feeds the groundwater and an effluent or "gaining" stream during the summer when the groundwater feeds the stream.

The depth to groundwater varies significantly throughout the valley floor area of Tulare County. In the area around Visalia, depth to groundwater varies from about 120 feet below ground surface along the western portion of the city to approximately 100 feet below ground surface to the east, as measured in spring 2010.[3] Groundwater levels measured in the city have declined since the 1940s, from approximately 30 feet below ground surface in 1940 to 120 feet below ground surface in 2010.[4]

Flooding

Visalia experienced major floods in 1950, 1955, 1966 and 1969. The waterways described in the hydrology section above have historically been used for flood control, storm water conveyance, riparian and recreational uses. In addition, the city maintains parks and detention ponds that serve to detain storm water runoff when significant storm events occur. **Table 3.6-4** describes the FEMA floodplain designation (zones) definitions.

Table 3.6-4: FEMA Floodplain Designations (Zones)

Zone	*Description*
Moderate to Low Risk Areas	
B and X (Shaded)	Area of moderate flood hazard, usually the area between the limits of the 100-year and 500-year floods. B Zones are also used to designate base floodplains of lesser hazards, such as areas protected by levees from 100-year flood, or shallow flooding areas with average depths of less than one foot or drainage areas less than 1 square mile.
C and X (Unshaded)	Area of minimal flood hazard, usually depicted on FIRMs as above the 500-year flood level. Zone C may have ponding and local drainage problems that don't warrant a detailed study or designation as base floodplain. Zone X is the area determined to be outside the 500-year flood and protected by levee from 100-year flood.

[1] Department of Water Resources (DWR). 2003. California's Groundwater Update, Bulletin 118.

[2] Ibid.

[3] DWR. 2010. Statewide Groundwater Level Data, 5-22.11 Kaweah, Depth to Water. .

[4] Kaweah Delta Water Conservation District. 2009. Groundwater Management Plan, 2009 Annual Report.

Table 3.6-4: FEMA Floodplain Designations (Zones)

High Risk Areas	
A	Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. Because detailed analyses are not performed for such areas; no depths or base flood elevations are shown within these zones.
AE	The base floodplain where base flood elevations are provided. AE Zones are now used on new format FIRMs instead of A1-A30 Zones.
A1-30	These are known as numbered A Zones (e.g., A7 or A14). This is the base floodplain where the FIRM shows a BFE (old format).
AH	Areas with a 1% annual chance of shallow flooding, usually in the form of a pond, with an average depth ranging from 1 to 3 feet. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Base flood elevations derived from detailed analyses are shown at selected intervals within these zones.
AO	River or stream flood hazard areas and areas with a 1% or greater chance of shallow flooding each year, usually in the form of sheet flow, with an average depth ranging from 1 to 3 feet. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Average flood depths derived from detailed analyses are shown within these zones.

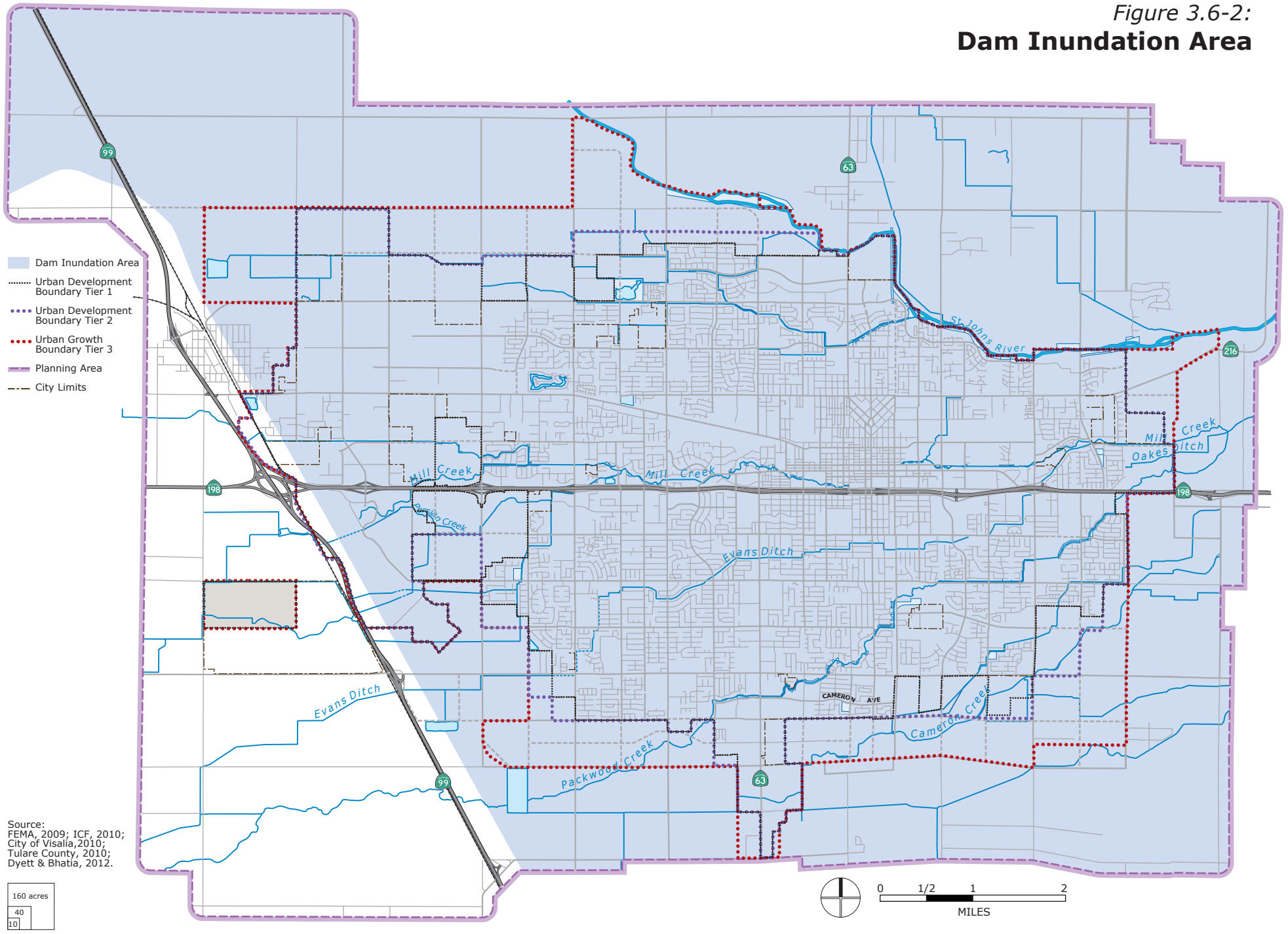
FEMA updated the Flood Insurance Rate Map (FIRM) panels of the City of Visalia in 2009 due to the construction of many infrastructure improvements to capture and convey storm water within the city. The previously dated FIRM panels (1994/1998) had identified much larger areas of the city as prone to the 100-year flood. The more recent data, as shown on the 2009 FIRMs, show significantly more areas in the city as protected from the 100-year event. **Figure 3.6-1** delineates the multiple flood zones for the Planning Area. Most of the City is located in Zone X and X02, defined as areas of moderate to low risk of flooding. However some areas along the creeks and drainages are within Zone A and Zone AE, which are high risk areas prone to the 100-year storm event.

The California Emergency Management Agency (Cal EMA) is responsible for the California Dam Safety Program, which was established by Government Code §8589.5 in 1972 following the near failure of the Lower San Fernando Dam during the Sylmar Earthquake. The Dam Safety Program provides assistance and guidance to local jurisdictions on emergency planning for dam failure events, collects and reviews dam failure inundation maps, and evaluates waivers from inundation mapping. Cal EMA provided data for Terminus Dam Inundation area and is presented in **Figure 3.6-2**. As shown in **Figure 3.6-2**, virtually the entire Planning Area would be inundated if Terminus Dam were to fail. Some of the Planning Area west of Highway 99 would not be affected by such an event.[5]

[5] California Emergency Management Agency (Cal EMA). 2012. Terminus Dam Inundation. Available: http://www.calema.ca.gov/hazardmitigation/pages/dam-inundation-program.aspx. Accessed: 11/12/2012.

Figure 3.6-2:

Dam Inundation Area



Source:
FEMA, 2009; ICF, 2010;
City of Visalia,2010;
Tulare County, 2010;
Dyett & Bhatia, 2012.

Water Quality

Surface Water Quality

The surface water quality of the Kaweah River Delta system is considered to be excellent and typical of Sierra Nevada snowmelt runoff. There are no known water quality impairments in the area according the CWA Section 303(d) List of impaired waters.[6] The City of Visalia complies with the terms of the General Permit for storm water discharges from small municipal separate storm sewer systems (MS4s). As a result, the City is proactively involved in protecting water quality. In November 2005, the City adopted a Storm Water Management Plan that includes a detailed analysis of its plans to handle storm water runoff from increased amounts of impervious surface. Plans include retention/detention facilities, street sweeping, establishment of a water quality hotline, and an Illicit Discharge Protection System which will allow the City to determine if there is a serious water quality problem from illegal discharges.

The quality of storm water in the urbanized area of Visalia varies greatly depending on climatic and land use conditions. Urban and industrial runoff is known to contribute significantly to the levels of toxic materials, such as metals and organic pesticides, transported to streams. Storm water discharges may contain unacceptable levels of petroleum fuels and oils; organic matter such as pet and domestic livestock wastes; pesticides, metals such as copper, lead, cadmium, and zinc; and fertilizers such as nitrogen and phosphorus may also be present.

Groundwater Quality

Water quality of the groundwater that underlies the Planning Area is excellent for domestic and agricultural uses. This is most likely due to the abundant snowmelt that originates in the Sierra Nevada. Groundwater is the primary source of drinking water for project area residents. The primary constituents of concern are high total dissolved solids (TDS), nitrate, arsenic, and organic compounds.[7] Water quality typically deteriorates west of Highway 99.

According to the California Water Service Company's (Cal Water) 2010 Urban Water Management Plan (UWMP) the drinking water from groundwater wells that is delivered to customers in the Visalia District meets or surpasses all federal and state regulations. The quality of groundwater produced in the Visalia District's active wells can vary depending on location. Several wells have been tested to produce water that exceeds the secondary standard (based on aesthetics for manganese); however, these wells have either been taken out of service or treated to reduce the contaminant level in the water delivered. Other issues of concern in the Visalia District are arsenic, nitrate and salt. The presence of these contaminants puts into question the potential availability of these facilities in the future if the concentrations were to increase above the existing treatment capacity. Also of concern is the potential loss of other wells due to contaminant migration.

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[6] State Water Resources Control Board (SWRCB). 2010. Clean Water Act Section 303(d) List of water quality limited segments. Central Valley Region. Available: http://www.swrcb.ca.gov/water_issues/programs/tmdl/integrated2010.shtml. Accessed 10/4/2012.

[7] Department of Water Resources (DWR). 2003. California's Groundwater Update, Bulletin 118.

Additionally, some wells have been found to contain concentrations of volatile organic compounds (VOCs), particularly trichloroethylene (TCE), tetrachloroethylene (PCE) and carbon tetrachloride (CTC), which have, on occasion, exceeded the maximum contaminant level (MCL) for these substances. A number of wells contain detectable concentrations of the inorganic compound nitrate. Cal Water is increasing its monitoring of pesticides (DBCP), nitrate, arsenic, and pentachlorophenol. In all cases if the concentration of these compounds exceeds the MCL, the wells are taken out of service or appropriate treatment technologies are applied to remove the contaminant.[8]

REGULATORY SETTING

Federal Regulations

Federal Clean Water Act (CWA)

The federal Clean Water Act (CWA) of 1972 requires the U.S. Environmental Protection Agency (EPA) to develop, publish, and periodically update ambient water quality criteria for the protection of human health. In 1980, the EPA published water quality criteria for 64 pollutants and pollutant classes and considered non-cancer, cancer, and taste and odor effects. Over the years, these criteria have evolved and have included additional pollutants and pollutant classes. During the last decade, policy has shifted from a program-by-program, source-by-source, pollutant-by-pollutant approach to more watershed-based strategies. Ultimately, these criteria are used by states for establishing water quality standards under Section 303 (c) of the CWA and provide a basis for controlling discharges or releases of pollutants.

Section 401—Water Quality Certification

CWA 401 requires that an applicant pursuing a federal permit to conduct any activity that may result in a discharge of a pollutant obtain a water quality certification (or waiver). Water quality certifications are issued by RWQCBs in California. Under CWA, the state (as implemented by the relevant board) must issue or waive CWA 401 water quality certification for the Project to be permitted under CWA 404. Water quality certification requires the evaluation of water quality considerations associated with dredging or the placement of fill materials into waters of the United States. Construction of individual projects within the City of Visalia would require CWA 401 certification for the Project if CWA 404 were triggered.

National Pollutant Discharge Elimination System Waste Discharge Regulations

The 1972 amendments to the Federal Water Pollution Control Act established the NPDES permit program to control discharges of pollutants from point sources (CWA 402). The 1987 amendments to CWA created a new section of CWA devoted to stormwater permitting (CWA 402[p]). The EPA has granted the State of California primacy in administering and enforcing the provisions of CWA and the NPDES permit program. The NPDES permit program is the primary federal program that regulates point-source and nonpoint-source discharges to waters of the United States.

[8] California Water Service Company. 2010. Visalia District Urban Water Management Plan.

SWRCB issues both general and individual permits for certain activities. Relevant general and individual NPDES permits are discussed below.

Construction Stormwater NPDES Permit

A Construction General Permit for Discharges of Storm Water Associated with Construction Activity (Construction General Permit, Order 2009-0009-DWQ) is required for dischargers or projects who disturb one acre or more of soil or whose project disturbs less than one acre, but which is part of a larger common plan of development that in total disturbs one acre or more. This permit was most recently updated in September 2009 and went into effect July 2010.

The Construction General Permit requires the development and implementation of a Storm Water Pollution Prevention Plan (SWPPP). The SWPPP should contain a site map(s) which shows the construction site perimeter, existing and proposed buildings, lots, roadways, stormwater collection and discharge points, general topography both before and after construction, and drainage patterns across the project. The SWPPP must list Best Management Practices (BMPs) the discharger will use to protect stormwater runoff and show the placement of those BMPs. Additionally, the SWPPP must contain a visual monitoring program, a chemical monitoring program for "non-visible" pollutants to be implemented if there is a failure of BMPs, and a sediment monitoring plan if the site discharges directly to a water body listed on the 303(d) list for sediment. Section A of the Construction General Permit describes the elements that must be contained in a SWPPP.

General Dewatering Permit

Small amounts of construction-related dewatering are covered under the General Construction Permit. Large amounts of dewatering, particularly over lengthy periods of time would be required to comply with the General Dewatering Permit. Project-related dewatering is likely to be limited in nature and scope and would likely be covered under the General Construction Permit.

However, some projects may result in larger amount of dewatering than covered under the Construction General Permit and a Low Threat Discharge and Dewatering Permit would need to be obtained from the Central Valley RWQCB.

Section 404

CWA 404 regulates the discharge of dredged and fill materials into waters of the United States, which include oceans, bays, rivers, streams, lakes, ponds, and wetlands. Project proponents must obtain a permit from the USACE for all discharges of dredged or fill material into waters of the United States, including wetlands, before proceeding with a proposed activity. Before any actions that may impact surface waters are carried out, a delineation of jurisdictional waters of the United States must be completed following USACE protocols (Environmental Laboratory 1987) to determine whether a particular Project Area encompasses wetlands or other waters of the United States that qualify for CWA protection. These include any or all of the following:

- Areas within the ordinary high water mark of a stream, including nonperennial streams with a defined bed and bank, and any stream channel that conveys natural runoff, even if it has been realigned; or

- Seasonal and perennial wetlands, including coastal wetlands.

Wetlands are defined for regulatory purposes as areas "inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (33 CFR 328.3; 40 CFR 230.3).

Under the CWA 404 permit program, general permits (known as nationwide permits) have been adopted, and coverage under nationwide permits is possible when the amount of fill is relatively small (usually less than 0.5 acre). Individual projects within the City of Visalia that do not qualify for a nationwide permit must obtain an individual permit, which has a longer and more involved permitting process.

Regulations Covering Development in Floodplains

National Flood Insurance Program

Congress passed the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. The intent of these acts was to reduce the need for large, publicly funded flood control structures and disaster relief by restricting development on floodplains.

FEMA administers the National Flood Insurance Program (NFIP) to provide subsidized flood insurance to communities that comply with FEMA regulations limiting development in floodplains. FEMA issues FIRMs for communities participating in the NFIP.

Executive Order 11988

Executive Order 11988 (Floodplain Management) addresses floodplain issues related to public safety, conservation, and economics. It generally requires federal agencies constructing, permitting, or funding to:

- Avoid incompatible floodplain development;
- Be consistent with the standards and criteria of the NFIP, and
- Restore and preserve natural and beneficial floodplain values.

State Regulations

The following sections describe state water quality control programs, plans, and policies applicable to the City of Visalia.

Porter-Cologne Water Quality Control Act of 1969

The Porter-Cologne Water Quality Control Act established the State Water Resources Control Board (SWRCB) and divided the state into nine regional basins, each with a Regional Water Quality Control Board (RWQCB). The SWRCB is the primary state agency responsible for protecting the quality of the state's surface and groundwater supplies, while the regional boards are responsible for developing and enforcing water quality objectives and implementation plans. The Planning Area is within the jurisdiction of Central Valley RWQCB.

The act authorizes the SWRCB to enact state policies regarding water quality in accordance with CWA 303. In addition, the act authorizes the SWRCB to issue WDRs for projects that would discharge to state waters. The Porter-Cologne Water Quality Control Act requires that the SWRCB or the Central Valley RWQCB adopt water quality control plans (basin plans) for the protection of water quality. A basin plan must:

- Identify beneficial uses of water to be protected,
- Establish water quality objectives for the reasonable protection of the beneficial uses, and
- Establish a program of implementation for achieving the water quality objectives.

Basin plans also provide the technical basis for determining waste discharge requirements, taking enforcement actions, and evaluating clean water grant proposals. Basin plans are updated and reviewed every 3 years in accordance with Article 3 of Porter-Cologne Water Quality Control Act and CWA 303(c) (Central Valley RWQCB 2004 with approved amendments).

California Regional Water Quality Control Board, Central Valley Region—Basin Plan

Water quality in streams and aquifers of the region is guided and regulated by the Central Valley RWQCB Tulare Lake Basin Plan.[9] State policy for water quality control is directed at achieving the highest water quality consistent with the maximum benefit to the people of the state. To develop water quality standards consistent with the uses of a water body, the Central Valley RWQCB classifies historical, present, and potential future beneficial uses as part of its basin plan.

The Central Valley RWQCB's Basin Plan identifies the beneficial uses of the Tulare Lake basin. Although the St. John's River is not specifically listed on the Tulare Lake Basin Plan, the Valley Floor Creeks are listed for agriculture, industrial, process water, recreation, warm water habitat, wild habitat, rare species habitat, and groundwater recharge. A detailed discussion of beneficial uses and water quality objectives can be found in the Basin Plan.

The Central Valley RWQCB's Basin Plan has also established the water quality objectives for dissolved oxygen in various habitats. The objective for warm water beneficial use habitats is 5mg/L minimum; and for cold water habitats is 7mg/L minimum. [10]

The Central Valley RWQCB's Basin Plan also states that turbidity shall not be increased by more than 1 NTU when ambient turbidity is between 0 and 5 NTU. Turbidity shall not be increased by more than 20 percent when ambient turbidity is between 5 and 50 NTU. Finally, when ambient turbidity is greater than 100 NTU, turbidity shall not be increased by more than 10 percent (Central Valley RWQCB 2004).

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[9] Central Valley Regional Water Quality Control Board (Central Valley RWQCB). 2004. Water Quality Control Plan for the Tulare Lake Basin, Second Edition. Basin Plan. Available: http://www.waterboards.ca.gov/centralvalley/water_issues/basin_plans/tlbp.pdf. Accessed 10/4/2012.

[10] Ibid.

Streambed Alteration Agreement

The California Department of Fish and Wildlife (DFW) regulates streambed alterations in accordance with the California Fish and Game Code 1601–1616: Streambed Alterations. Whenever a project proposes to alter a streambed, channel, or bank, an agreement with DFW is required. The agreement is a legally binding document that describes measures agreed to by both parties to reduce risks to fish and wildlife in the stream system during the project. This is a separate process from CEQA approval but is usually coordinated with CEQA compliance. Agreements typically have fewer procedural and legal requirements than CEQA in order to work with small-scale projects that are important to fish. Timeframes for agreements are 30 days for DFW to determine the completeness of an application and an additional 60 days to provide a draft agreement to the applicant.

Regional Regulations

Municipal Storm Water NPDES Permit

The Municipal Storm Water Permitting Program established under NPDES regulates storm water discharges from municipal separate storm sewer systems (MS4s). In the first phase, the SWRCB issued permits to medium and large municipalities, typically grouped as co-permittees in a metropolitan region. In the second phase, the SWRCB adopted a General Permit for the Discharge of Storm Water from Small MS4s. The permits require a municipality or other storm water discharger to develop and implement a storm water management plan or program. The storm water programs incorporate BMPs that include construction controls (such as a model grading ordinance), legal and regulatory approaches (such as storm water ordinances), public education and industrial outreach (to encourage the reduction of pollutants at various sources), inspection activities, wet-weather monitoring, and special studies.

The City of Visalia's NPDES Phase II Storm Water Management Plan, covering the City itself, and the Storm Water Management Program for Tulare County, which covers all unincorporated parts of the County, including within the Study Area, were adopted in 2003 and 2008, respectively.

Visalia Urban Water Management Plan

California Water Service Company's Visalia District 2010 Urban Water Management Plan (UWMP) evaluates water demand and potential supply based on projected population and urban area growth. California Water Code Section 10644(a) requires urban water suppliers to file UWMPs with the Department of Water Resources, the California State Library, and any city or county within which the supplier provides water supplies. The UWMP describes the water system, system demands, system supplies, water supply reliability and water shortage contingency planning, and demand management measures.

IMPACT ANALYSIS

Significance Criteria

Implementation of the proposed Visalia General Plan would have a potentially significant adverse impact on water resources if it would:

Criterion 1: Violate any water quality standard or waste discharge requirement.

Criterion 2: 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).

Criterion 3: 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.

Criterion 4: 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.

Criterion 5: 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.

Criterion 6: Otherwise substantially degrade water quality.

Criterion 7: 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.

Criterion 8: Place within a 100-year flood hazard area structures which would impede or redirect flood flows.

Criterion 9: 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, sea level rise, or inundation by seiche, tsunami, or mudflow.

Methodology and Assumptions

This analysis of hydrologic and water quality impacts is based on a determination of the potential for water quality degradation and an individual project's or cumulative projects' potential to cause increased erosion, sedimentation, and adverse conditions associated with changes to stormwater runoff attributable to implementation of the proposed General Plan, with consideration of legally-mandated requirements for protecting water quality. The nature, magnitude, duration/frequency, and overall severity of the resultant effects can only be generalized relative to the significance criteria to determine if the project would result in significant impacts and if mitigation measures would be warranted.

Impact Summary

Proposed Project Impact	*Mitigation Measure*	*Significance after Mitigation*
Implementation of the proposed Visalia General Plan could adversely affect water quality and drainage patterns in the short term due to erosion and sedimentation during construction activities.	None required	Less than significant
Implementation of the proposed Visalia General Plan could result in degradation of water quality and depletion of groundwater supplies by increasing nonpoint source pollutants including sedimentation in stormwater runoff through creation of new impervious surfaces in new development and increased water demand.	None required	Less than significant
Implementation of the proposed Visalia General Plan could result in additional runoff exceeding the capacity of existing stormwater facilities and increasing potential flooding of receiving waters and downstream areas.	None required	Less than significant
Implementation of the proposed Visalia General Plan could result in the placement of housing in the 100 year floodplain or structures that would impede flood flows exposing people to injury or death.	None required	Less than significant
Implementation of the proposed Visalia General Plan would expose people or structures to risk of flooding due to the failure of a dam.	None required	Significant and Unavoidable
Implementation of the proposed Visalia General Plan in combination with past, present, and foreseeable future development in the surrounding communities and with other agencies in the County, could adversely affect water quality of regional water bodies.	None required	Less than significant

IMPACTS AND MITIGATION MEASURES

Impact

- **3.6-1 Implementation of the proposed Visalia General Plan could adversely affect water quality and drainage patterns in the short term due to erosion and sedimentation during construction activities. (*Less than Significant*)**

Construction activities undertaken to implement subsequent development projects associated with build-out of the General Plan could include excavation, soil stockpiling, boring, and/or grading activities that strip existing vegetation prior to the installation of impervious surfaces. Soil erosion is probable during construction which may result in water quality impairments in receiving waters. Water quality impairments may include turbidity, increased algal growth, oxygen depletion, or sediment buildup, thereby degrading aquatic habitats. Sediment from project-induced erosion could also ultimately accumulate in downstream drainage facilities and interfere with stream flow, thereby aggravating downstream flooding conditions.

Depending on the project location, impaired stormwater runoff could be intercepted by local storm drain catch basins, culverts, flood control channels, and ultimately discharged into receiving waters. Most runoff in urban areas is eventually directed to either a storm drain or water

body, unless allowed to stand in a detention area and filter into the ground. For this reason, even projects not directly adjacent to or crossing a sensitive area could have an impact. However, all projects that would disturb one acre or more are required to prepare and implement a SWPPP, in accordance with the SWRCB's General Construction Permit. The SWPPP would include erosion control measures such as those listed below:

- Limiting excavation and grading activities during the dry season only (April 15 to October 15), to the extent possible. This would reduce the chance of severe erosion from intense rainfall and surface runoff, as well as the potential for soil saturation in swale areas.
- If excavation does occur during the rainy season, stormwater runoff from the construction area can be regulated through a stormwater management/erosion control plan that may include temporary on-site silt traps and/or basins with multiple discharge points to natural drainages and energy dissipaters. Stockpiles of loose material are generally covered and runoff diverted away from exposed soil material. Sediment basin/traps would be located and operated to minimize the amount of offsite sediment transport. Any trapped sediment would be removed from the basin or trap and placed at a suitable location on-site, away from concentrated flows, or removed to an approved disposal site.
- Temporary erosion control measures would be provided until perennial revegetation or landscaping is established that can minimize discharge of sediment into receiving waterways.
- After completion of grading, erosion protection would be provided on all exposed soils either by revegetation or placement of impervious surfaces. Revegetation would be facilitated by mulching, hydroseeding, or other methods and initiated as soon as possible after completion of grading and prior to the onset of the rainy season (by October 15).
- Permanent revegetation/landscaping shall emphasize drought-tolerant perennial ground coverings, shrubs, and trees.
- BMPs selected and implemented for the project shall be in place and operational prior to the onset of major earthwork on the site. The construction phase facilities shall be maintained regularly and cleared of accumulated sediment as necessary.
- Hazardous materials such as fuels and solvents used on the construction sites shall be stored in covered containers and protected from rainfall, runoff, and vandalism. A stockpile of spill cleanup materials shall be readily available at all construction sites. Employees shall be trained in spill prevention and cleanup, and individuals should be designated as responsible for prevention and cleanup activities.

Incorporation of these or equivalent practices in accordance with the requirements of the SWRCB's General Construction Permit process would reduce this potentially significant impact on water resources during construction to a less-than-significant level.

Proposed General Plan Policies that Reduce the Impact

None necessary.

Mitigation Measures

None required.

Impact

3.6-2 Implementation of the proposed Visalia General Plan could result in degradation of water quality and depletion of groundwater supplies by increasing nonpoint source pollutants including sedimentation in stormwater runoff through creation of new impervious surfaces in new development and increased water demand. (*Less than Significant*)

Construction in the General Plan area could result in the expansion or reconfiguration of existing development that might increase the overall amount of impervious surface areas. Increasing the total area of impervious surfaces could result in a number of potential impacts associated with a greater potential to introduce pollutants to receiving waters and would also reduce the amount of groundwater recharge to the local aquifer. In addition, build-out would also increase the demand for potable water. Urban runoff can carry a variety of pollutants, such as oil and grease, metals, sediment, and pesticide residues from roadways, parking lots, rooftops, landscaped areas, and other surfaces, and deposit them in adjacent waterways. Pollutant concentrations in urban runoff are extremely variable and are dependent on storm intensity, land use, elapsed time between storms, and the volume of runoff generated in a given area that reaches receiving waters. The most critical time for urban runoff effects is in the fall months under low flow conditions as there is less dilution available to mix with urbanized runoff. Pollutant concentrations are typically highest during the first major rainfall event after the dry season, known as the "first flush."

Water quality in stormwater runoff is regulated locally by the Central Valley RWQCB and the municipal stormwater requirements (referred to as a Municipal Separate Storm Sewer System MS4 Permit) set by the SWRCB. Adherence to these requirements results in new development and redevelopment projects incorporating treatment measures and other appropriate source control and site design features that reduce pollutants in runoff to the maximum extent practical. Many of these requirements result in the construction of Low Impact Development (LID) techniques such as use of on-site infiltration through landscaping or vegetated swales that reduce pollutant loading in off-site discharges. Incorporation of these types of source control design measures can even potentially improve upon existing conditions.

Additionally, build-out of the General Plan would result in additional wastewater being produced which would require additional Wastewater Treatment Capacity. Wastewater would continue to be treated to Title 22 standards and adhere to the Central Valley RWQCB Permits for wastewater treatment and effluent and receiving water requirements.

The Planning Area is already largely developed and widely covered by impervious surfaces, and therefore any increase in impervious surfaces due to redevelopment is anticipated to be small. A net increase in impervious surfaces might affect the amount of precipitation that is recharged to the shallow aquifer. Under SB 610, a Water Supply Analysis will be required for large developments over 500 single dwelling units, which will help ensure that there is adequate water

supply for approved projects.[11] In addition, the City of Visalia will continue to promote water conservation measures and explore surface water use over groundwater extraction.

These impacts are considered potentially significant. However, implementation of the following General Plan Policies would reduce these impacts to a less than significant level.

Proposed General Plan Policies that Reduce the Impact

PSCU-P-59 Require new developments to incorporate floodwater detention basins into project designs where consistent with the Stormwater Master Plan and the Groundwater Recharge Plan.

Stormwater drainage basins can provide groundwater recharge, and may be combined with recreational uses. Additional policies for drainage basins designed for recreational use are provided in the Parks and Open Space section, which follows.

PSCU-P-60 Control urban and stormwater runoff, and point and non-point discharge of pollutants. As part of the City's Stormwater Management Program, adopt and implement a Stormwater Management Ordinance to minimize stormwater runoff rates and volumes, control water pollution, and maximize groundwater recharge. New development will be required to include Low Impact Development features that reduce impermeable surface areas and increase infiltration.

Such features may include, but are not limited to:

- Canopy trees or shrubs to absorb rainwater;
- Grading that lengthens flow paths over permeable surfaces and increases runoff travel time to reduce the peak hour flow rate;
- Partially removing curbs and gutters from parking areas where appropriate to allow stormwater sheet flow into vegetated areas;
- Use of permeable paving in parking lots and other areas characterized by significant impervious surfaces;
- On-site stormwater detention, use of bioswales and bioretention basins to facilitate infiltration; and
- Integrated or subsurface water retention facilities to capture rainwater for use in landscape irrigation and other non-potable uses.

PSCU-P-61 Update the Stormwater Master Plan to provide site-appropriate solutions that protect surface water quality in Planning Area waterways and correspond to the approach directed by the Stormwater Management Program.

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[11] SB 610 applies to water suppliers and project proponents. The Urban Water Management Plan is considered a foundational document for compliance with SB 610. As the primary water supplier for Visalia, Cal Water has prepared an Urban Water Management Plan for the Visalia District. Section 3.9 Public Services, Facilities, and Utilities, includes a water supply assessment based on Cal Water's Urban Water Management Plan and an additional domestic water analysis to evaluate water supply under General Plan buildout.

PSCU-O-14 Provide for long-range community water needs by adopting best management practices for water use, conservation, groundwater recharge and wastewater and stormwater management.

PSCU-P-44 Continue to improve and expand the City's Water Conservation Program, consistent with the Urban Water Management Plan as appropriate, including an active public outreach component and an online presence. The program should provide information and links to additional resources on water-efficient plumbing fixtures and planting and irrigation methods, and the development of safe and effective gray water systems. It should also maintain an up-to-date list of incentive programs.

Gray water is generally defined as untreated household waste water from bath tubs, showers, sinks, and washing machines. Gray water may be used for toilet flushing and landscaping of non-edible plants, conserving potable water resources. The most current State Plumbing Code allows single-fixture gray water systems to be installed without permits.

PSCU-P-45 Continue the City's active role in regional and local water management planning, building on partnerships with Kaweah Delta Water Conservation District and participation in the Integrated Regional Water Management Planning (IRWM) in implementing the Urban Water Management Plan and the Groundwater Management Plan. Continue to develop and implement projects that address groundwater overdraft mitigation, and support additional groundwater recharge, using funds generated from the Water Resources Management and Groundwater Overdraft Mitigation Fee Ordinance and other sources. Projects may include but are not limited to:

- Acquisition of surface water rights and surface water supplies;
- Development of groundwater recharge programs and facilities;
- Reconfiguration of stormwater facilities designed to retain as much stormwater as possible within and near the City;
- Enhancement of cooperative programs with local water management agencies and companies; and
- Development of more extensive recycled water delivery systems in support of the Urban Water Management Plan.

Groundwater management, as defined by the California Department of Water Resources, is the planned and coordinated monitoring, operation, and administration of a groundwater basin or portion of a groundwater basin with the goal of long-term sustainability of the resource. Groundwater management is conducted at the local agency level. Additional actions may be taken by local governments, such as enactment of groundwater ordinances, which the City has already done. The State's role is to provide technical and financial assistance to local agencies for their groundwater management efforts. Additional guidance on this topic is in the Urban Water Management Plan.

PSCU-P-46 *Adopt and implement a Water Efficient Landscaping Ordinance for new and/or refurbished development that exceeds mandated sizes, and ensure that all new City parks, streetscapes, and landscaped areas conform to the Ordinance's requirements. The Ordinance should include provisions to optimize outdoor water use by:

- Promoting appropriate use of plants and landscaping;
- Establishing limitations on use of turf including size of turf areas and use of cool-season turf such as Fescue grasses, with exceptions for specified uses (e.g., recreation playing fields, golf courses, and parks);
- Establishing water budgets and penalties for exceeding them;
- Requiring automatic irrigation systems and schedules, including controllers that incorporate weather-based or other self-adjusting technology;
- Promoting the use of recycled water; and
- Minimizing overspray and runoff.

The Ordinance will be tailored to Visalia's needs, using the State's Model Ordinance, which the City has adopted, as a guide. It will apply to new construction and rehabilitation landscapes for public agency projects; private development projects with landscape areas of 2,500 square feet or greater that require permit, plan check or design review; and homeowner-installed projects with landscape areas of 5,000 square feet or greater that require permit, plan check or design review. The Ordinance also will include standard conditions of approval that would apply to new discretionary development approvals to improve water efficiency for existing landscapes of greater than one acre and to prevent runoff from existing landscapes due to overspray or similar conditions.

PSCU-P-47 *Implement a program of irrigation water use analyses, irrigation surveys, irrigation audits or similar techniques using available technology to evaluate water use in existing City parks and landscape areas, and undertake improvements to reduce water use to a level that does not exceed the Maximum Applied Water Allowance as calculated under the Water Efficient Landscaping Ordinance under Policy CO-P-3.

PSCU-P-48 *Establish a program to reduce water use in municipal buildings and allow use of recycled water (treated wastewater) in buildings and irrigation, as feasible and appropriate.

This program will include developing a schedule and budget for the retrofit of City buildings and irrigation systems with water conservation features and dual pumping where viable for use of recycled water.

PSCU-P-49 *Require that industrial development projects submit plans for water recycling and conservation and demonstrate how water use will meet requirements of the National Pollution Discharge Elimination System during the plan review process.

PSCU-P-50 *Ensure that City building plan inspectors are adequately prepared to implement the requirements of the California Green Building Code (CalGreen), including mandatory low-water-use plumbing and water meters.

PSCU-P-51 Continue development of a conveyance system to allow for the reuse of treated wastewater for groundwater recharge, irrigation for farmland, ornamental landscaping, and golf courses, and expand the use of recycled water with a "purple pipe" delivery system, to the greatest extent feasible.

PSCU-P-52 Continue to support the Tulare County Environmental Health Division in protecting groundwater by promoting responsible use, storage and disposal of household hazardous materials. Household hazardous materials, if improperly disposed of, may infiltrate the groundwater system and impair water quality.

PSCU-O-16 Ensure that adequate wastewater collection, treatment, recycling and disposal facilities are provided in a timely fashion to serve existing and future needs.

PSCU-P-53 *Continue to develop and expand the City's water recycling capacity to produce water suitable for landscape and crop irrigation and trade with agricultural water users in exchange for water for groundwater recharge. Promote the development of a purple-pipe recycled water distribution system.

This policy will help reduce potable water supply needs by allowing use of recycled water for appropriate uses (e.g., landscape, irrigation) now being supplied by potable water.

PSCU-P-54 *Periodically review and update development impact fees, wastewater connection charges, groundwater mitigation fees, and monthly service charges to ensure that adequate funds are collected to operate and maintain existing facilities and to construct new facilities.

PSCU-P-55 *In partnership with County, State and federal agencies, work to prevent illegal wastewater and chemical disposal.

PSCU-P-56 Update the Water Conservation Plant Master Plan, Sewer System Master Plan, and any other specific Master Plans related to infrastructure development to ensure that existing levels of service can be maintained for proposed land uses and development densities.

PSCU-P-57 Coordinate urban growth management planning with public and private utilities. Develop and carry out an infrastructure and public services assessment during annexation reviews to determine infrastructure needs, feasibility, timing, and financing.

PSCU-P-58 Implement public facility master plans through various funding mechanisms including assessment districts, user fees, development impact fees, reimbursement

agreements and/or other mechanisms which provide for equitable distribution of development costs.

Mitigation Measures

None required.

Impact

3.6-3 Implementation of the proposed Visalia General Plan could result in additional runoff exceeding the capacity of existing stormwater facilities and increasing potential flooding of receiving waters and downstream areas. *(Less than Significant*)

Development under the proposed Visalia General Plan could result in construction of structures on land that is currently vacant, thus introducing additional impervious surfaces. Streets, traditional parking lots, and rooftops prevent the natural drainage and infiltration of stormwater through the soil. Surface water runoff volumes and rates generated from undeveloped, unpaved areas can increase significantly when sites are paved and the capability of surface water infiltration is reduced or eliminated. Depending on the capacities of existing stormwater drainage facilities, any increase in runoff could potentially cause flooding on or downstream of newly constructed sites and near local drainage facilities. In addition, runoff from built-out areas could be discharged more swiftly, decreasing the time it takes to reach downstream facilities and altering the existing peak flood timing.

Unless improvements to drainage conditions are undertaken, increased development could contribute to increased risk of storm flooding in these newly developed areas. If the City does not design storm drainage systems to handle adequate stormwater flows during sufficient peak storm events, then flooding would occur from build-out.

These impacts are considered potentially significant. However, the following General Plan Policies would reduce these impacts to a less than significant level.

Proposed General Plan Policies that Reduce the Impact

The stormwater drainage system improvements required under Impact 3.6-2 above would reduce these impacts to a less than significant level.

Mitigation Measures

None required.

Impact

3.6-4 Implementation of the proposed Visalia General Plan could result in the placement of housing in the 100-year floodplain or structures that would impede flood flows exposing people to injury or death. (*Less than Significant*)

The 2009 FEMA FIRM maps delineate most of the city as protected from the 100-year event, in areas of moderate to low risk of flooding. Although the majority of the Planning Area is located

outside of the 100-year floodplain, there are areas where new development could be located within the 100-year floodplain. In addition, areas within the existing Visalia city limits may also experience 100-year floods (See **Figure 3.6-1**, for flooding definitions see **Table 3.6-4**). However, the proposed policies of the plan would continue existing policies that minimize the potential for flooding to adversely impact land uses. Not only would there be design requirements for new development, but there also would be assurances of adequate storm drainage capacities, and the continued improvements of the flood control projects associated with the multiple creeks that flow through Visalia. With implementation of the policies below, the potential impact from flooding would be less than significant.

Proposed General Plan Policies that Reduce the Impact

The stormwater drainage system improvements required under Impact 3.6-2 above along with the following Flood Hazard Policies would make these impacts less than significant.

S-P-8 *Reinforce the City's transportation infrastructure for protection from flooding through activities such as elevating the road, installing culverts beneath the road, or constructing a higher bridge across an area that experiences regular flooding.

S-P-9 *Implement post-fire debris flow and channel treatments, such as seeding, mulching, and checking dams and debris racks, as needed.

S-P-10 Implement recommendations contained in the County Flood Control Master Plan that are within the City's jurisdiction.

S-P-11 *Create and implement a public outreach program that informs property owners located in flood hazard and levee inundation areas about voluntary flood insurance.

S-P-12 Increase participation in the National Flood Insurance Program by enhanced floodplain management activities that may allow property owners to receive a discount on their flood insurance.

S-P-13 Work with State and federal agencies to create a program to acquire, relocate, or elevate critical facilities and residential structures, in particular those that have been identified as Repetitive Loss properties that are located within the 100-year floodplain.

S-P-14 Work with FEMA Region IX to address any floodplain management issues that may have arisen/arise from the countywide Digital Flood Insurance Rate Map, Community Assessment Visits, and/or the California Department of Water Resources oversight.

Mitigation Measures

None required.

Impact

3.6-5 Implementation of the proposed Visalia General Plan 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, sea level rise, or inundation by seiche, tsunami, or mudflow. (*Significant and Unavoidable*)

The Planning Area is located sufficiently inland to be out of what would be considered a potential hazard area for seiches, tsunamis, and sea level rise. In addition, the relatively gentle topography and location of the Planning Area make the potential for mudflows also remote. Therefore, there would be no impact related to these hazards.

Lake Kaweah is located upstream of the Planning Area and was formed upon the construction of Terminus Dam in 1962. In 2004, the Army Corps of Engineers undertook a project to raise the lake 21 feet. The project included the construction of six 21-foot fuse-gates in the Terminus Spillway. Terminus Dam is capable of handling up to a 1,000 year flood, meaning there is a 1% chance in 1,000-years that the dam would be overtopped. The likelihood of failure of Terminus Dam is very slim. However, if a significant seismic event were to occur that was at a magnitude the dam could not sustain, the existing urbanized area of Visalia and most of the Study Area would be inundated (See **Figure 3.6-2**). The dam inundation area covers the entirety of the planning area east of Highway 99, excluding a small strip of land east of Highway 99. The area west of Highway 99 is largely outside the inundation area, with the exception of a portion of land north of Avenue 320. This would expose people and structures to flooding risk. Damages could be catastrophic, including substantial loss of property and life. This impact is considered significant and unavoidable.

Proposed General Plan Policies that Reduce the Impact

The following policies will help to reduce this impact, but not to a less than significant level. In addition to these Visalia General Plan policies, the County of Tulare maintains the Tulare County Hazard Mitigation Plan and a Mass Evacuation Plan for the entire county that also serve to reduce this impact.

S-O-6 Provide comprehensive emergency response and evacuation routes for Visalia area residents.

S-P-40 Continue to rely on the Tulare County Office of Emergency Services to maintain inventories of available resources to be used during disasters.

S-P-41 Continue to upgrade preparedness strategies and techniques in all departments so as to be prepared when disaster, either natural or man-made, occurs.

Mitigation Measures

None available.

Cumulative Impact

3.6-6 Implementation of the proposed Visalia General Plan in combination with past, present, and foreseeable future development in the surrounding communities and with other agencies in the County, could adversely affect water quality of regional water bodies. (*Less than Significant*)

Implementation of the proposed General Plan would include policy provisions as well as compliance with the city's Grading and Drainage Ordinance which would reduce the city's contribution to cumulative water quantity and quality impact to a less than cumulatively considerable level. This impact is also mitigated through the requirements of the Central Valley RWQCB which address the use of water quality and quantity control through design measures and use of BMPs. Effective BMPs relate to site preparation, runoff control, sediment retention, and other similar features. The effectiveness of BMPs has been recognized in the California Stormwater Quality Association, California Stormwater Best Management Practice Handbooks.

Therefore, with adherence to the existing regulatory requirements regarding stormwater control and the policies identified above, the cumulative contribution of the proposed General Plan would be less than significant.

Proposed General Plan Policies that Reduce the Impact

The policies listed above under Impacts 3.6-1 through 3.6-5 help to reduce this potential cumulative impact.

Mitigation Measures

None required.

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