4.8 HYDROLOGY AND WATER QUALITY

4.8.1 METHODOLOGY

This section analyzes potential impacts on hydrology and water quality based on a review of existing publications and regulations, including the Seismic and Geologic Technical Background Report for the Arcadia General Plan Update.

4.8.2 RELEVANT PROGRAMS AND REGULATIONS

Federal

Clean Water Act and National Pollutant Discharge Elimination System

In 1972, the Federal Water Pollution Control Act (Clean Water Act [CWA]) was amended to require National Pollutant Discharge Elimination System (NPDES) permits for the discharge of pollutants into "Waters of the U.S." from any point source. In 1987, the CWA was again amended to require that the U.S. Environmental Protection Agency (USEPA) establish regulations for permitting under the NPDES permit program for municipal and industrial storm water discharges. The USEPA published final regulations regarding storm water discharges on November 16, 1990. The regulations require that municipal separate storm sewer system (MS4) discharges to surface waters be regulated by an NPDES permit. MS4s are a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels, or storm drains), and are owned or operated by a public body that has jurisdiction over the disposal of sewage, industrial wastes, storm water, or other wastes. The MS4s are only designated or used for collecting or conveying storm water (i.e., not wastewater or combined sewage).

In addition, the CWA requires States to adopt water quality standards for water bodies for USEPA approval. Water quality standards consist of designated beneficial uses for a particular water body (e.g., wildlife habitat, agricultural supply, fishing), along with water quality criteria necessary to support those uses. Water quality criteria are prescribed concentrations or levels of constituents, such as lead, suspended sediment, and fecal coliform bacteria, or narrative statements which represent the quality of water that supports a particular use. Because California has not established a complete list of acceptable water quality criteria, the USEPA established numeric water quality criteria for certain toxic constituents in the form of the California Toxics Rule (see 40 *Code of Federal Regulations* §131.38).

National Flood Insurance Program

The Federal Emergency Management Agency (FEMA) administers the National Flood Insurance Program (NFIP), which provides flood insurance, floodplain management, and flood hazard mapping. Communities subject to flood hazards voluntarily participate in the NFIP by adopting and enforcing floodplain management ordinances to reduce the potential for flood damage. In turn, the NFIP offers federally funded flood insurance to homeowners, renters, and business owners in participating communities. Under this program, FEMA produces Flood Insurance Rate Maps (FIRMs) that identify properties and buildings in flood insurance risk areas. Flood hazards related to storm events are generally described in terms of 100- or 500-year floods. These are floods that, respectively, have a 1 percent and 0.2 percent chance of occurring every year.

Emergency Action Plans for Dams

Because dam failure can have severe consequences, FEMA requires that all dam owners develop Emergency Action Plans (EAP) that specify warning, evacuation, and post-flood actions that would be implemented in the event of dam failure. Although there may be coordination with County officials in the development of the EAP, the responsibility for developing potential flood inundation maps and facilitation of emergency response is the responsibility of the dam owner.

State

California Porter-Cologne Act

Although it does establish certain guidelines for program development, the CWA places the primary responsibility for the control of water pollution and for planning the development and use of water resources with the States. California's primary statute governing water quality and water pollution issues is the Porter-Cologne Water Quality Control Act of 1970 (Porter-Cologne Act). The Porter-Cologne Act grants the State Water Resource Control Board (SWRCB) and the Regional Water Quality Control Boards (RWQCBs) broad powers to protect water quality and is the primary vehicle for implementing California's responsibilities under the Federal CWA. The Porter-Cologne Act grants the SWRCB and the RWQCBs authority and responsibility to: (1) adopt plans and policies; (2) regulate discharges to surface water and groundwater; (3) regulate waste disposal sites; and (4) require cleanup of discharges of hazardous materials and other pollutants. The Porter-Cologne Act also establishes reporting requirements for unintended discharges of any hazardous substance, sewage, and oil or petroleum products.

Each RWQCB must formulate and adopt a water quality plan (or Basin Plan) for its region. The regional plans conform to the policies set forth in the Porter-Cologne Act and those established by the SWRCB in its State Water Policy. The Porter-Cologne Act also enables the RWQCBs to include water discharge prohibitions applicable to particular conditions, areas, or types of waste within its regional plan. The RWQCBs are also authorized to (1) enforce discharge limitations; (2) take actions to prevent violations of these limitations from occurring; and (3) conduct investigations to determine the status of the quality of any "Waters of the State". Civil and criminal penalties are imposed on persons who violate the requirements of the Porter-Cologne Act or any SWRCB/RWQCB orders.

NPDES Construction General Permit

The NPDES permit program was first established under CWA authority to control water pollution by regulating point sources that discharge pollutants into "Waters of the U.S.". Pursuant to CWA Section 402(p), which requires regulations for permitting for certain storm water discharges, the SWRCB has issued the statewide NPDES General Permit for Storm Water Discharges Associated with the Construction and Land Disturbance Activities (Order No 2009-009-DWQ, NPDES No. CAS000002, adopted by the SWRCB on September 2, 2009), which will be effective for all project sites on July 1, 2010. Under this Construction General Permit, individual NPDES permits or Construction General Permit coverage must be obtained for discharges of storm water from construction sites with a disturbed area of one or more acres and are required to either obtain individual NPDES permits for storm water discharges or be covered by the Construction General Permit.

Coverage under the Construction General Permit is accomplished by completing and filing a Permit Registration Document (PRD) with the SWRCB prior to commencement of construction activities. The PRD consists of a Notice of Intent (NOI), Risk Assessment, Site Map,

Storm Water Pollution Prevention Plan (SWPPP), annual fee, and a signed certification statement. The primary objective of the SWPPP is to identify, construct, implement, and maintain BMPs to reduce or eliminate pollutants in storm water discharges and authorized non-storm water discharges from the construction site during construction. The Construction General Permit requires dischargers to assess the risk level of a project based on both sediment transport and receiving water risk, and each project will then be categorized into Risk Level 1, 2, or 3. For all Risk Level 3 and for some Risk Level 2 sites, the Construction General Permit requires effluent and receiving water monitoring for percent hydrogen (pH) and turbidity.

Numeric Action Levels (NALs) are established for pH (6.5 to 8.5) and for turbidity (250 Nephelometric Turbidity Units [NTU]). NALs have monitoring requirements intended to provide operational information regarding the performance of the Best Management Practices (BMPs) used at the project site to minimize the discharge of pollutants. NALs are not directly enforceable and do not constitute Numeric Effluent Limitations (NELs). If NALs are exceeded, additional BMPs must be immediately implemented and the SWPPP must be revised accordingly. NAL exceedances are reported on the SWRCB's online Storm Water Multi-Application and Report Tracking System (SMARTS).

NELs are only applicable to projects categorized as Risk Level 3. NEL exceedances (turbidity of 500 NTU or higher) are a violation of the Construction General Permit. NEL exceedances would result in the requirement to implement additional monitoring, incorporate BMPs, revise SWPPPs accordingly, and/or provide an NEL Violation Report to the SWRCB. Visual monitoring of storm water and non-storm water discharges and a record of monitoring inspections is required for all sites. Additionally, the Construction General Permit requires sampling, analysis, and monitoring for non-visible pollutants at all sites subject to the permit.

A future component of the new Construction General Permit includes post-construction standards, which will become effective three years from the adoption date of the permit (i.e., September 2, 2012). Coverage under the permit will require projects to replicate the pre-project water balance for volume through the use of non-structural or structural measures. For sites larger than two acres, a project shall also maintain the site's pre-project runoff rate. Compliance with the requirements of the Construction General Permit is the primary method used to evaluate a project's construction- and post-construction related impacts on surface water quality.

Discharges of Groundwater to Surface Waters

Los Angeles RWQCB (LARWQCB) Order No. R4-2003-0111 contains the waste discharge requirements for discharges of groundwater from construction and project dewatering to surface waters in the coastal watersheds of Los Angeles and Ventura Counties (General NPDES Permit No. CAG994004). This order regulates the discharge of groundwater that may or may not be impacted by toxic compounds and/or conventional pollutants. It requires that dewatering activities prevent water quality degradation and protect beneficial uses of receiving surface water bodies. The order also includes discharge limitations and discharge prohibitions, as well as Total Maximum Daily Loads (TMDLs) for receiving water bodies.

Dam Safety and Inundation Maps

Dams with heights greater than 25 feet or storage capacities of more than 50 acre-feet (af) are regulated and monitored for structural safety by the California Department of Water Resources, Division of Safety of Dams in accordance with Division 3 of the *California Water Code.* Dam

regulations substantially reduce the chance of catastrophic failure in the event of an earthquake or dam failure. In addition, Section 8589.5 of the *California Government Code* requires dam owners to provide the Governor's Office of Emergency Services with an inundation map showing the extent of damage to life and property that would occur given a complete and sudden dam failure at full capacity. These maps facilitate emergency planning and response by dam operators, Cities, and Counties affected by inundation hazards.

Title 24 Green Building Standards

The California Green Building Standards Code (24 *California Code of Regulations*, Part 11) was adopted in June 2008 as a primarily voluntary code, unless specifically adopted by a city or county. However, starting in January 1, 2011, the Code becomes mandatory and would apply to all new construction and reconstruction. It requires the use of green building principles and practices on planning and design, energy efficiency, water efficiency and conservation, material conservation and resource efficiency, and environmental quality. Under this Code, a SWPPP is required for construction sites less than one acre.

Regional

Water Quality Control Plan for the Los Angeles Region

The *Water Quality Control Plan: Los Angeles Region Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties* (Basin Plan) seeks to preserve and enhance water quality and protect the beneficial uses of water bodies in the region (Los Angeles RWQCB 1995). The Basin Plan provides quantitative and narrative criteria for a range of water quality constituents applicable to certain receiving water bodies and groundwater basins within the Los Angeles Region. The Basin Plan: (1) designates beneficial uses for surface and ground waters; (2) sets narrative and numerical objectives that must be attained or maintained to protect the designated beneficial uses and to conform to the State's anti-degradation policy; and (3) describes implementation programs to protect all waters in the region. All applicable SWRCB and RWQCB plans and policies and other pertinent water quality policies and regulations are incorporated by reference into the Basin Plan.

Water quality objectives for ammonia, coliform bacteria, bioaccumulation, biochemical oxygen demand, biostimulatory substances, chemical constituents, total residual chlorine, color, exotic vegetation, floating material, methylene blue activated substances, mineral quality, nitrogen, oil and grease, dissolved oxygen, pesticides, pH, polychlorinated biphenyls, radioactive substances, suspended solids, taste and odor, temperature, toxicity, and turbidity are also included in the Basin Plan. Implementation of the Basin Plan occurs primarily through issuance of Waste Discharge Requirements (WDRs), including regulatory enforcement action, as necessary.

The existing, potential or intermittent beneficial uses for the Arcadia Wash, the Santa Anita Wash, and the Rio Hondo Channel where storm waters from the City are discharged and for the underlying groundwater basins in the City (Raymond and Main San Gabriel groundwater basins) include:

- ***Municipal and Domestic Supply (MUN):*** Uses of water for community, military, or individual water supply systems including, but not limited to, drinking water supply.
- ***Industrial Service Supply (IND):*** Uses of water for industrial activities that do not depend primarily on water quality including, but not limited to, mining, cooling water

supply, hydraulic conveyance, gravel washing, fire protection, or oil well repressurization.

- ***Industrial Process Supply (PROC):*** Uses of water for industrial activities that depend primarily on water quality.
- ***Agricultural Supply – (AGR):*** Uses of water for farming, horticulture, or ranching including, but not limited to, irrigating, stock watering, or supporting vegetation for range grazing.
- ***Groundwater Recharge (GWR):*** Uses of water for natural or artificial recharge of groundwater for future extraction, to maintain water quality, or to halt saltwater intrusion into freshwater aquifers.
- ***Water Contact Recreation (REC-1):*** Uses of water for recreational activities involving body contact with water where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, white water activities, fishing, or use of natural hot springs.
- ***Non-contact Water Recreation (REC-2):*** Uses of water for recreational activities involving proximity to water, but not normally involving body contact with water, where ingestion of water reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.
- ***Warm Freshwater Habitat (WARM):*** Uses of water that support warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish or wildlife (including invertebrates).
- ***Cold Freshwater Habitat (COLD):*** Uses of water that support cold water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.
- ***Wildlife Habitat (WILD):*** Uses of water that support terrestrial ecosystems including, but not limited to, preservation and enhancement of terrestrial habitats, vegetation, wildlife (e.g., mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources.
- ***Rare, Threatened, or Endangered Species (RARE):*** Uses of water that support habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species established under State or federal law as rare, threatened, or endangered.
- ***Wetland Habitat (WET):*** Uses of water that support wetland ecosystems, including, but not limited to, preserving or enhancing wetland habitats, vegetation, fish, shellfish, or wildlife, and other unique wetland functions that enhance water quality, such as providing flood and erosion control, stream bank stabilization, and filtration and purification of naturally occurring contaminants.

These beneficial uses by water body are listed in Table 4.8-1.

TABLE 4.8-1
BENEFICIAL USES OF RECEIVING WATERS

Water Body	Beneficial Uses											
	MUN	IND	PROC	AGR	GWR	REC 1	REC 2	WARM	COLD	WILD	RARE	WET
Arcadia Wash	P	–	–	–	I	P*	I	P	–	P	–	–
Santa Anita Wash	P	–	–	–	I	P*	E	P	–	P	E	–
Rio Hondo Channel	P	–	–	–	I	I*	E	P	–	I	E	E
Raymond Basin	E	E	E	E								
Main San Gabriel Basin	E	E	E	E								

E – Existing Beneficial Use; P – Potential Beneficial Use; I – Intermittent Beneficial Use
* - Access prohibited by LA County Department of Public Works in concrete-channelized areas
Source: Basin Plan for Los Angeles Region, June 1994.

Storm Water Permitting (MS4 Permit)

The State's Municipal Storm Water Permitting Program regulates storm water discharges from MS4s (municipal separate storm water sewer system). MS4 Permits were issued in two phases. Under Phase I, which started in 1990, the RWQCBs adopted NPDES storm water permits for medium (serving between 100,000 and 250,000 people) and large (serving more than 250,000 people) municipalities. Most of these permits were issued to a group of co-permittees[1] encompassing an entire metropolitan area. As part of Phase II, the SWRCB adopted a General Permit for the Discharge of Storm Water from Small MS4s (WQ Order No. 2003-0005-DWQ) in order to provide permit coverage for smaller municipalities (including non-traditional Small MS4s), which are governmental facilities such as military bases, public campuses, and prison and hospital complexes.

In 2001, the LARWQCB issued an NPDES Permit and Waste Discharge Requirements (Order No. 01-182; NPDES No. CAS0041) (Los Angeles County MS4 Permit) under the CWA and the Porter-Cologne Act for discharges of urban runoff in Los Angeles County public storm drains. The Los Angeles County MS4 Permit has been amended several times, most recently December 10, 2009, by Order No. R4-2009-0130. The Los Angeles County MS4 Permit regulates storm water discharges from areas within the City of Arcadia, which is within the jurisdiction of the LARWQCB. The Los Angeles County MS4 Permit details requirements for new development and significant redevelopment, including specific sizing criteria for treatment BMPs and flow-control requirements. This program regulates municipal storm water and urban runoff discharges for development projects within the County of Los Angeles and requires that all co-permittees prohibit non-storm water discharges into the MS4 and watercourses.

To implement the requirements of the NPDES permit, the Los Angeles County co-permittees have created development planning guidance and control measures that control and mitigate storm water quality and quantity impacts to receiving waters as a result of new development activity. The Los Angeles County co-permittees are also required to implement other municipal source detection and elimination programs and maintenance measures. The MS4 Permit requires the co-permittees to implement a Storm Water Quality Management Program (SQMP) that includes the components that will be implemented to comply with the MS4 Permit and to reduce discharges of pollutants in storm water to the maximum extent practicable (MEP).

[1] The Permittees are the Los Angeles County Cities and the County (collectively "the co-permittees").

For new development, the co-permittees implement their obligations under the MS4 Permit through adoption of ordinances to protect water quality and through implementation of plans to impose water quality requirements on new development projects. In Los Angeles County, applicable water quality ordinances mandating compliance with established programs are found in Chapter 12.80 of the Los Angeles County Code. These ordinances allow programs such as the Standard Urban Stormwater Mitigation Plan (SUSMP) to be developed and require that storm water and urban runoff to storm drain systems and waterways in the County comply with these MS4 Permit-related programs (see Los Angeles County Code Sections 12.80.400 and 12.80.410).

Standard Urban Stormwater Mitigation Plan (SUSMP)

Pursuant to LARWQCB NPDES Permit and Waste Discharge Requirements (Order No. 01-182; NPDES No. CAS0041), the co-permittees implement their obligations under the MS4 Permit through ordinance adoption to protect water quality and through implementation of plans to impose water quality requirements on new development projects. SUSMP documentation provides guidance that co-permittees can use to implement their own programs in compliance with the Permit. The SUSMP was approved by the LARWQCB as part of the MS4 program to address storm water pollution from new construction throughout Los Angeles County. The SUSMP contains a list of minimum BMPs that must be employed to infiltrate or treat storm water runoff, control peak flow discharge, and reduce the post-development discharge of pollutants from storm water conveyance systems. The SUSMP defines, based upon land use type, the types of BMPs that must be included and issues appropriate to the development type and size that must be addressed. Compliance with SUSMP requirements is used as one method to evaluate the significance of project development impacts on surface water runoff.

Groundwater Rights

Groundwater pumping in the groundwater basins underlying the City is regulated by the Main San Gabriel Basin Watermaster and the Raymond Basin Management Board. The Raymond Basin is the first adjudicated Basin in the State of California. The 1944 adjudication determined which entities have the right to extract water from the basin and the maximum annual amount of water allowed to be extracted by each entity, as administered by the Raymond Basin Management Board. The Raymond Basin has an identified Safe Yield of 30,622 af, as re-determined in 1955. Of this amount, the City of Arcadia is allowed to pump 3,526 af from the Santa Anita Subarea (East Raymond Basin) and 2,118 af from the Pasadena Subarea (West Raymond Basin). However, the Raymond Basin Management Board will be reducing pumping rights by 70 percent, which will reduce the City's water withdrawal rights to 1,482.6 acre-feet by 2013-2014 (Stetson 2010). In addition to its groundwater extraction rights, the City of Arcadia has a long-term storage account within the Pasadena Subarea of 1,591.2 af, which allows producers to exchange and/or lease water rights (Arcadia 2005).

A Stipulation Judgment in 1965 (Long Beach Judgment) required the water supply of the San Gabriel River system to be divided at Whittier Narrows, between San Gabriel Valley (upstream) and the coastal plain of Los Angeles County (downstream) (Arcadia 2005). Under the terms of the Judgment, the area downstream of Whittier Narrows is to receive an annual entitlement of usable water from the San Gabriel River system, which varies depending on the average annual rainfall in San Gabriel Valley for the ten years preceding the year for which the entitlement is calculated. This Judgment left the Main Basin free to manage its water resources as long as it meets its downstream obligation under the terms of the Long Beach Judgment (Arcadia 2005).

Subsequently, adjudication of the water rights of the Main Basin was entered in 1973. The Main Basin Judgment does not restrict the quantity of water that parties may extract from the Main Basin. Rather, it provides a means for replacing all annual extractions in excess of a party's annual right to extract water with supplemental water. The Basin Watermaster annually establishes an Operating Safe Yield for the Main Basin, which is then used to allocate its portion of the Operating Safe Yield to each party (City of Arcadia 2005).

The City of Arcadia has a prescriptive pumping right of 4.23099 percent of the Main Basin's Operating Safe Yield. For 2004–2005, the Operating Safe Yield was determined at 170,000 af. Therefore, the City was allowed to pump 7,193 af. The Operating Safe Yield for 2005–2006 and 2006–2007 increased to 240,000 af, and the City of Arcadia was allowed to pump 10,154 af. In 2007–2008, the safe yield was set at 210,000 af and the City's water rights were at 8,885 af (Arcadia 2005). The Operating Safe Yield for fiscal year 2009–2010 was set at 170,000 af (Main San Gabriel Basin Watermaster 2010).

If the City pumps more water than the allowed amount, replacement water must be purchased from the Metropolitan Water District for spreading and recharging the Main San Gabriel Groundwater Basin. Alternatively, the City may pre-purchase water for cyclic storage for later use (Arcadia 2005).

East Raymond Basin Water Resources Program

The East Raymond Basin has historically accounted for 15 percent to 28 percent of the total groundwater pumped by the City. The East Raymond Basin Water Resources Program (ERBWRP) was developed as a part of the Water System Reliability Program (WSRP) study conducted through the U.S. Army Corps of Engineers (USACE) and to increase water storage and production in the East Raymond Basin. The total cost of the ERBWRP is $26.7 million, of which the federal government has approved funding of $20 million through the Water Resources Development Act (WRDA). The Cities of Arcadia and Sierra Madre and the County of Los Angeles Flood Control District will fund the remaining $6.7 million through a Cooperative Agreement that was approved by the City Council on April 7, 2009. Five projects have been identified to increase water storage in the East Raymond Basin through: (1) retention of storm water runoff from the Santa Anita Watershed; (2) extraction of groundwater from one new well; and (3) the implementation of water and recycled water system reliability projects (Arcadia 2009a).

Local

Arcadia Floodplain Management Regulations

The City's Floodplain Management Regulations are contained in the Arcadia Municipal Code (Article III, Chapter 10 – Floodplain Management). The regulations require all new construction and major improvements (1) to be built and adequately anchored to prevent flotation, collapse, or lateral movement from hydrodynamic and hydrostatic loads during flood; (2) to be constructed with materials and utility equipment that is resistant to flood damage and by using methods and practices that minimize flood damage; and (3) with electrical, heating, ventilation, plumbing, and air conditioning equipment and other utility systems that prevent water from entering or accumulating within the components during floods.

Storm Water Discharge Regulations

The Arcadia Municipal Code (Article VII, Chapter 8) addresses storm water management and discharge control as a supplement to the City's NPDES permit. The regulations prohibit the discharge of pollutants into storm water, including the following:

- Wash water from gas stations, auto repair garages, and other automotive related service facilities;
- Untreated wastewater from mobile auto washing, steam cleaning, mobile steam cleaning and other mobile commercial and industrial operations;
- Discharges from the repair of machinery and equipment, such as leaking oil, fluid, or antifreeze;
- Untreated runoff from storage areas containing grease, oil, or other hazardous substances;
- Filter backwash or chlorinated/brominated water from swimming pools;
- Untreated runoff from the washing of toxic materials from paved or unpaved areas;
- Concrete- or cement-laden wash water from concrete trucks, pumps, tools, and equipment;
- Pesticides, fungicides, or herbicides banned by the USEPA or the California Department of Pesticide Regulation;
- Disposal of food and food processing wastes; and
- Disposal of litter, landscape debris, and construction debris.

The regulations also provide best management practices to reduce pollutants in storm water.

4.8.3 EXISTING CONDITIONS

Hydrology

Surface Water

The Los Angeles River drains an area of about 824 square miles along its 55-mile length. The main tributaries to the lower stretch of this river include the Arroyo Seco, the Rio Hondo, and Compton Creek. The river is hydraulically connected to the San Gabriel River Watershed by the Rio Hondo through the Whittier Narrows Reservoir, where flows from the San Gabriel River and Rio Hondo merge during large flood events. Whittier Narrows is a low gap between the Montebello and Puente Hills, just northwest of the City of Whittier, through which the San Gabriel River and the Rio Hondo flow toward the coastal plain of Los Angeles County. Whittier Narrows is also a natural topographic divide and a subsurface restriction to the movement of groundwater between the Main San Gabriel Basin and the Coastal Plain (Los Angeles RWQCB 2007).

The City of Arcadia is located within the watershed of the Los Angeles River, and drains through the Rio Hondo. Surface topography is defined by various local drainage courses. Runoff from the San Gabriel Mountains flows through the City along five major washes: Eaton Wash, Arcadia Wash, Santa Anita Wash, Sierra Madre Wash, and Sawpit Wash. Excess flows in these washes are diverted to spreading basins located below the Eaton Wash and Santa Anita Wash

Dams and within Sierra Vista Park. Water in the Santa Anita Wash is also spread at the Peck Road Spreading Basin/Water Conservation Park, located west of Peck Road at the southern portion of the City. These facilities are maintained by the Los Angeles County Department of Public Works (LADPW 2009).

Surface features along the City's eastern boundary flow to the San Gabriel River, which includes sand and gravel mining operations and surface water spreading grounds adjacent to the I-605 Freeway. Smaller spreading basins are also present along various washes.

Storm Drainage

Storm drainage in the City is provided by curbs and gutters along streets, which direct storm water into the catch basins, pipes, and washes that run southerly in or near the City. Over 4 miles of City-maintained storm water management facilities are present in Arcadia, which connect to regional flood-control and runoff conveyance facilities (Hogle-Ireland 2010a). Storm water flows in a southerly direction through the Eaton Wash, Arcadia Wash, Santa Anita Wash, Sierra Madre Wash, and Sawpit Wash toward the Rio Hondo, which runs southwest into the Whittier Narrows and continues southwest to join the Los Angeles River in Downey (LADPW 2009).

Groundwater

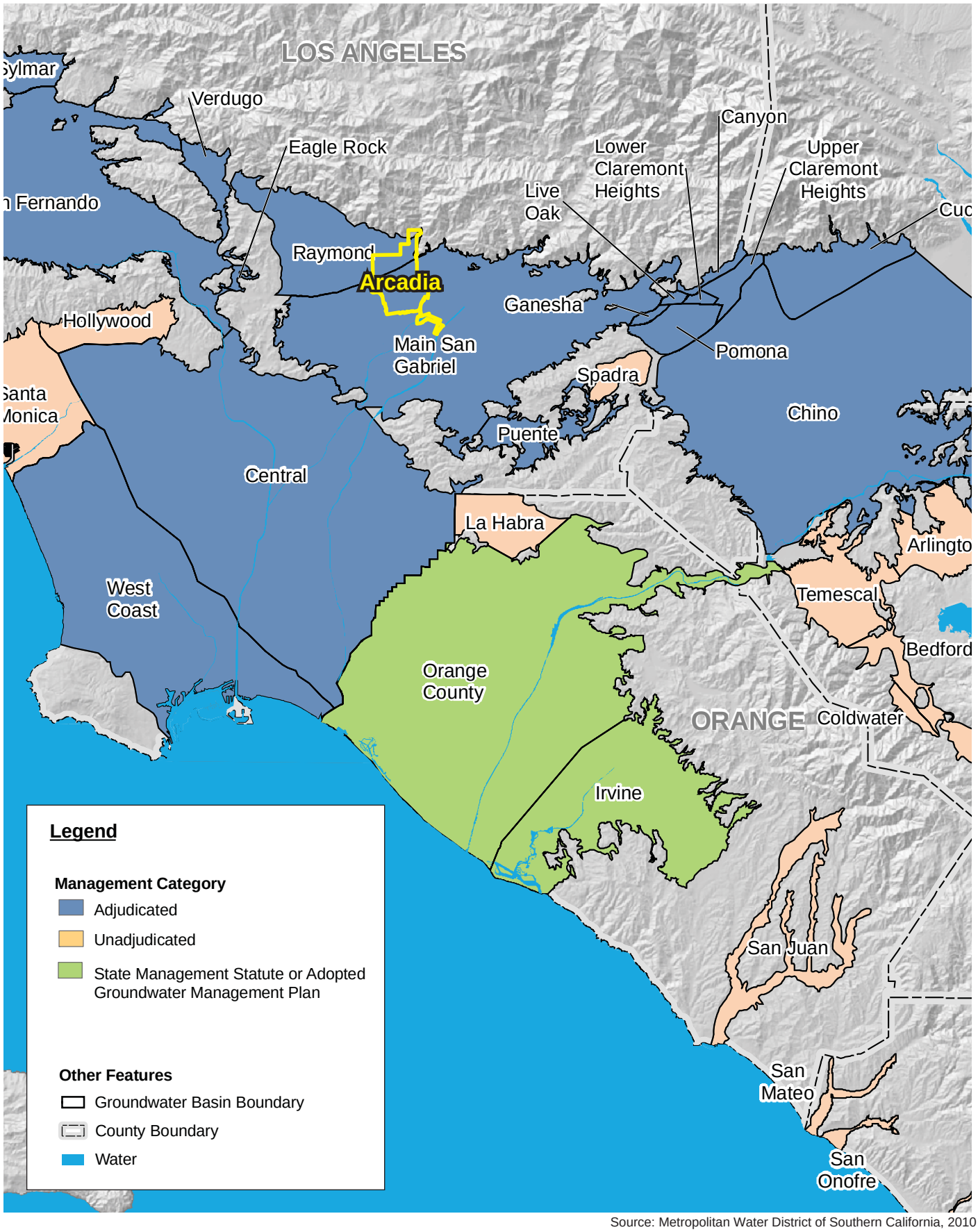
The City of Arcadia is underlain by the Main San Gabriel and the Raymond groundwater basins, with the Raymond basin underlying the area located generally north of the Raymond Hill Fault and the Main San Gabriel Basin located south of the fault. Raymond Fault acts as a hydrological barrier between the two basins (Wilson Geosciences 2008). Exhibit 4.8-1 shows the boundaries of the underlying groundwater basins.

The Raymond Basin underlies an alluvial valley covering approximately 40 square miles and is bordered by the San Gabriel Mountains on the north, the San Rafael Hills on the west, and the Raymond Fault on the south and east. The general east-west trend of the San Gabriel Mountains, the north-south trend of the San Rafael Hills, and northeast trend of the Raymond Fault result in the basin having a triangular form. The basin consists of the East Unit (Santa Anita subbasin) and the West Unit (Pasadena subbasin), which are not based on geology (DWR 2004a).

The California Department of Water Resources estimates the Raymond Basin storage at about 1,450,000 af, with about 1,000,000 af of water remained in storage. The Raymond Basin is recharged by the Arroyo Seco, a tributary to the Los Angeles River, and by Eaton Wash, Santa Anita Wash, and other streams in the watershed. Pumping rights to the Raymond Basin are adjudicated and are managed by the Raymond Basin Management Board (DWR 2004a).

During the drought in the early 2000s, water levels in the Santa Anita unit of the Raymond Basin were lower than historical levels and the City had to lower its pump to extract water at the Orange Grove well. Studies on the watershed indicated that underutilized water in the Sierra Madre and Santa Anita Creek Watersheds could improve the reliability of water supply in the Raymond Basin (AKM 2008).

The Main San Gabriel Groundwater Basin (Main Basin) includes the entire valley floor of San Gabriel Valley, with the exception of the Raymond Basin and Puente Basin. The boundaries of the Main Basin are the Raymond Basin on the northwest, the base of the San Gabriel Mountains on the north, the groundwater divide between the cities of San Dimas



Source: Metropolitan Water District of Southern California, 2010

Groundwater Basins

Exhibit 4.8-1

Arcadia General Plan Update

BonTerra CONSULTING

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and La Verne and the lower boundary of the Puente Basin on the east, and Whittier Narrows on the southwest. Subbasins within the Main Basin include the Upper San Gabriel Canyon Basin, Lower San Gabriel Canyon Basin, Glendora Basin, Foothill Basin, Way Hill Basin, and San Dimas Basin. In addition, the Puente Basin is tributary to the Main Basin from the southeast, between the San Jose and Puente Hills (DWR 2004b).

The water-bearing materials in the Main Basin range from 200 to 300 feet thick in the northeastern portion of the Basin near the mountains to nearly 4,000 feet thick in the South El Monte area. The total fresh water capacity of the Main Basin is estimated to be approximately 9.5 million af (Stetson 2010).

With the groundwater level at an elevation of 200 feet above mean sea level (msl) at the Key Well (as the minimum level to be maintained under the Main Basin adjudication), the Main Basin has about 7,600,000 af of available storage. This basin is replenished by stream runoff from the adjacent mountains and hills; by rainfall directly on the surface of the valley floor; by subsurface inflow from the Raymond Basin and Puente Basin; and by return flow from water applied for overlying uses. Additionally, the Main Basin is replenished with imported water through the Upper San Gabriel Valley Municipal Water District. Pumping and recharge of the basin is administered by the Main San Gabriel Basin Watermaster (Arcadia 2005).

Shallow or perched groundwater may be encountered in some areas of the City, where groundwater may exist at depths ranging from 10 to 40 feet below the ground surface. These conditions exist in areas north of the Raymond Fault, along the northern segment of Santa Anita Wash, and at the southern section of the City. In times of high precipitation or excessive surface water spreading, the groundwater may reach the ground surface (Wilson Geosciences 2008).

Water Quality

Surface Water Quality

Water bodies that do not meet water quality standards are deemed “impaired” and, under Section 303(d) of the federal Clean Water Act, are placed on a list of impaired waters for which a TMDL must be developed for the impairing pollutant(s). A TMDL is an estimate of the total load of pollutants from point, non-point, and natural sources that a water body may receive without exceeding applicable water quality standards (with a “factor of safety”). Once established, the TMDL is allocated among current and future pollutant sources to the water body.

As indicated earlier, runoff from the City of Arcadia flows into the Eaton Wash, Arcadia Wash, Santa Anita Wash, Sierra Madre Wash, Sawpit Wash, Rio Hondo, and Los Angeles River. The local washes are not listed as impaired water bodies. The segment of the Rio Hondo from its confluence with the Los Angeles River to the I-5 Freeway is listed as “impaired” for cyanide, copper, toxicity, lead, pH, zinc, coliform bacteria, and trash and the Rio Hondo spreading grounds is listed as “impaired” for coliform bacteria. The segment upstream of the spreading grounds is not impaired. TMDLs for the Rio Hondo have been established for copper, lead, pH, zinc, coliform bacteria, and trash, while TMDLs for cyanide and toxicity are still in development. The Los Angeles River, downstream of the Rio Hondo, is listed as “impaired” for a host of metals and other pollutants, for which TMDLs for copper, lead pH, zinc, nutrients, cadmium, ammonia, and trash have been established (Los Angeles RWQCB 2009).

While the impairment listing of the Rio Hondo and Los Angeles River is not directly attributable to pollutants and land uses in Arcadia, discharges from the City are subject to the discharge limitations of the established TMDLs.

Groundwater Quality

Groundwater water quality from City wells generally meets the California Department of Health Services (CDHS) drinking water standards, except at five wells. Groundwater from the Longden 1, Longden 2, Grove 1A, and Orange Grove 5 wells contains concentrations of volatile organic compounds (VOCs) at levels exceeding California Department of Public Health's (CDPH) standards. The City has installed air stripping treatment equipment to remove VOCs from the groundwater at the Longden wells. Groundwater from the Longden 2, Orange Grove 5, and St Joseph 2 wells contains concentrations of nitrate at levels that exceed CDPH standards. The City has instituted CDPH-approved blending plans to reduce nitrate and VOC concentrations to below 80 percent of CDPH standards (Stetson 2010).

Flood Hazards

The Los Angeles County Department of Public Works has constructed regional flood and debris control facilities throughout the region; these facilities include the flood-control channels in Arcadia that direct runoff water through the City into regional facilities to the south. A system of spreading basins along major washes and rivers has been constructed to manage storm water runoff and to help recharge local groundwater basins (LADPW 2009). Locally, the City of Arcadia maintains approximately four miles of subsurface storm drains that flow into the regional channels. Due to the combination of underground storm drain lines, concrete-lined channels, and spreading basins, no areas in Arcadia lie within a 100-year floodplain (Hogle-Ireland 2010a).

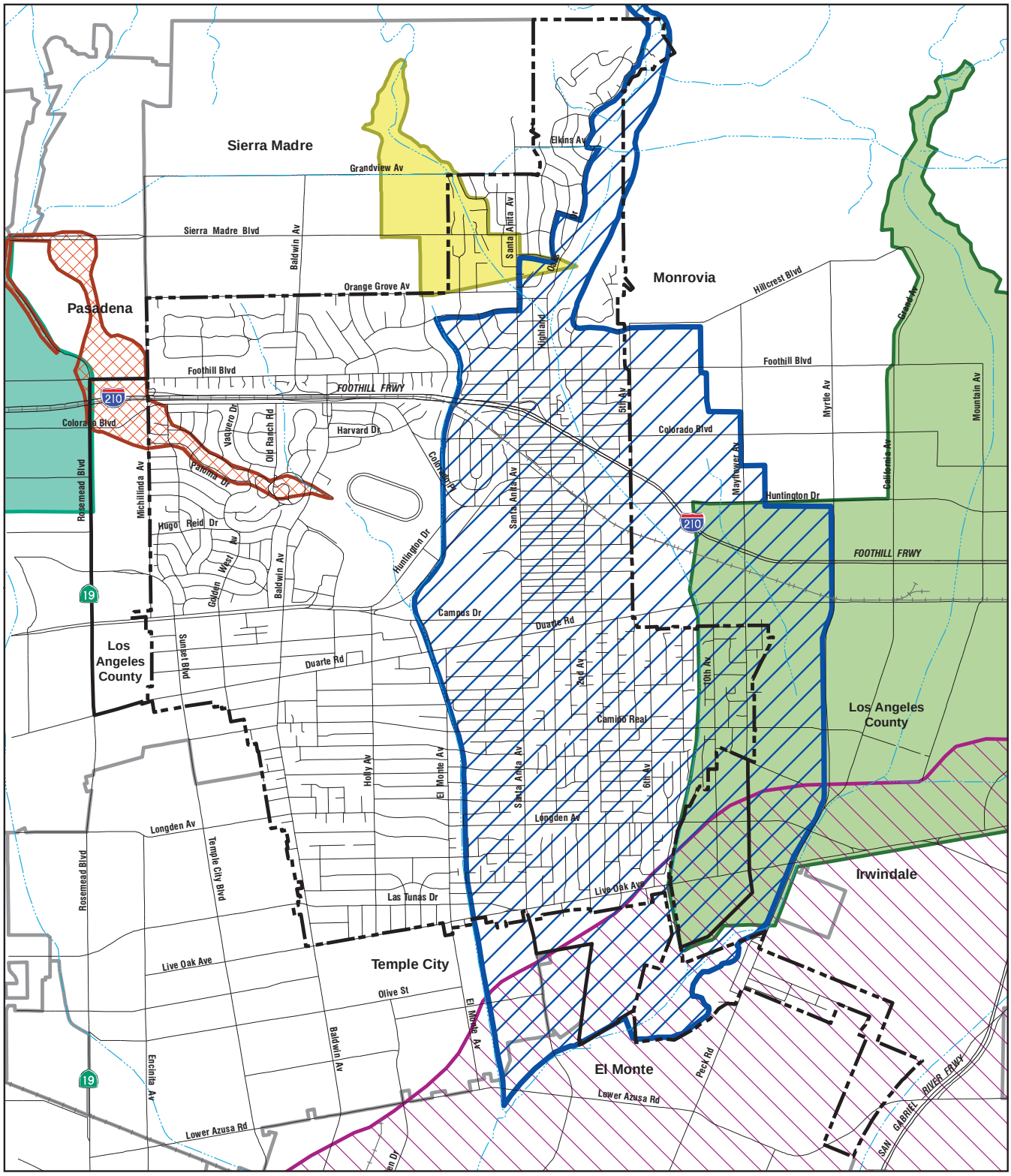
FEMA has indicated that the City of Arcadia is located within Zone D–where no Special Flood Hazard Areas exist within the corporate limits of the City. This finding is in compliance with Part 67, Chapter I, Title 44 of the Code of Federal Regulations (Hogle-Ireland 2010b).

Dam Inundation

The City lies downstream of several dams, reservoirs, and debris basins whose drainages ultimately flow across portions of the City. Dam failure could lead to the sudden release of waters and the creation of inundation hazards to downstream areas. Inundation hazards in the City are posed by:

1. Santa Anita Dam (858 af capacity)
2. Morris S. Jones Reservoir (154 af capacity)
3. Sierra Madre Dam (51 af capacity)
4. Sawpit Dam (406 af capacity)
5. Santa Fe Dam (32,109 af capacity on the San Gabriel River)

Exhibit 4.8-2, Dam Inundation Flood Hazards Map, shows the dam inundation areas within and adjacent to the City. Inundation hazards range from high to low with increasing distance away from the water containment structures (Wilson Geosciences 2008).



Inundation Areas

- Santa Anita Dam
- Morris S. Jones Reservoir
- Santa Fe Dam
- Sierra Madre Dam
- Sawpit Dam
- Eaton Wash Dam
- City Boundary
- Sphere of Influence

0 1,200 2,400 3,600 4,800 Feet

Source: Hogle-Ireland, Inc. 2010

Dam Inundation Flood Hazards Map

Exhibit 4.8-2

Arcadia General Plan Update

N W E S

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As shown, approximately half of the City is within the Santa Anita Dam Inundation Zone. Failure of the Santa Anita Dam would lead to inundation of a large eastern section of the City. At capacity, floodwaters from the dam would travel down Santa Anita Canyon to about Orange Grove Avenue and then spread across the eastern half of the City from Arcadia Wash. To comply with State dam safety regulations, the water level behind Santa Anita Dam is restricted to be no higher than an elevation of 1,230 feet above msl to meet the California Division of Safety of Dams (DSOD) seismic safety requirements and to reduce the potential magnitude of downstream flooding (Wilson Geosciences 2008).

In 2009, the Los Angeles County Department of Public Works initiated a sediment removal project at the Santa Anita Dam to increase reservoir capacity and to comply with California Department of Water Resources, Division of Safety of Dams' seismic stability requirements for the dam. Over one-half million tons of sediment is to be transferred to the Santa Anita Sediment Placement Site in Arcadia. Seismic safety retrofits to the dam include modifications to the dam's inlet/outlet works and the construction of a new dam riser (Hogle-Ireland 2010b).

Floodwaters from the Sierra Madre Dam would cover a smaller area of the City, north of the I-210 Freeway to Grandview Avenue between Arcadia Wash and First Avenue. Waters from Santa Fe Dam would impact the lower southeast corner (one-quarter) of the City, generally south of Duarte Road and east of Santa Anita Avenue. Waters from the Morris S. Jones Reservoir and Sawpit Dam would have smaller inundation areas (Wilson Geosciences 2008).

In addition to the dams, the City has 16 reservoirs holding a total of 40 million gallons (MG) of water, including the Santa Anita Reservoirs #3 (3.9 MG) and #4 (3.5 MG); Orange Grove Reservoirs #2 (2.50 MG), #3 (3.50 MG), #4 (3.5 MG), and #5 (5.25 MG); St Joseph Reservoirs #2 (6.3 MG) and #3 (4.85 MG); and Baldwin Reservoir (9.3 MG). Failure of these reservoirs also poses localized inundation hazards around each reservoir (Wilson Geosciences 2008).

4.8.4 THRESHOLDS OF SIGNIFICANCE

The following significance criteria are derived from Appendix G of the State CEQA Guidelines. A project would result in a significant adverse impact related to hydrology and water quality if it would:

Threshold 4.8a: Violate any water quality standards or waste discharge requirements;

Threshold 4.8b: 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);

Threshold 4.8c: 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;

Threshold 4.8d: Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river;

Threshold 4.8e: 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 storm water drainage systems, or provide substantial additional sources of polluted runoff;

Threshold 4.8f: Otherwise substantially degrade water quality;

Threshold 4.8g: 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;

Threshold 4.8h: Place within a 100-year flood hazard area structures which would impede or redirect flood flows;

Threshold 4.8i: 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;

Threshold 4.8j: Result in inundation by seiche, tsunami, or mudflow.

From Section 4.16, Utilities and Service Systems

Threshold 4.16c: Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects.

4.8.5 GENERAL PLAN GOALS, POLICIES, AND IMPLEMENTATION ACTIONS

A number of goals and policies in the Arcadia General Plan Update address hydrology, water quality and flooding in the City. Implementation of these goals and policies would reduce impacts on hydrology and water quality from future development pursuant to the General Plan Update and public and infrastructure projects in the City. These include:

Goal S-2: *Superior storm drainage and flood control facilities that minimize risk of flooding.*

> ***Policy S-2.1:*** *Prioritize improvements to Arcadia's storm drain system in areas that are prone to localized ponding and flooding.*
>
> ***Policy S-2.2:*** *Continue rigorous maintenance of storm drainage and flood control facilities within the City's jurisdiction.*
>
> ***Policy S-2.3:*** *Require that new development projects retain as much runoff as possible on the development site to reduce flow volumes into the storm drain system, allow for recharge of the groundwater basins, and comply with the City's storm water permitting requirements (consistent with the National Pollutant Discharge Elimination Systems program (or NPDES) and employ Best Management Practices (BMPs).*
>
> ***Policy S-2.4:*** *Support efforts of the Los Angeles County Department of Public Works and other agencies responsible for the maintenance of dams and reservoirs above Arcadia to improve conditions of the facilities and reduce the risk of inundation resulting from dam or reservoir failure.*

Goal CI-11: *Storm drain infrastructure that minimizes regional and localized flood hazards.*

> ***Policy CI-11.1:*** *Use the annual capital planning and funding process to identify immediate, near-term, and longer-term funding priorities for storm drain system improvements.*
>
> ***Policy CI-11.2:*** *Continue to consult and coordinate local storm drain system improvement projects with the Los Angeles County Department of Public Works.*
>
> ***Policy CI-11.3:*** *Improve storm drainage infiltration, including collection and infiltration of water down Santa Anita Canyon and collection and infiltration of water down surface streets.*
>
> ***Policy CI-11.4:*** *Provide detention basins under streets for infiltration, and use permeable asphalt or similar paving for City parking lots for infiltration into the ground.*
>
> ***Policy CI-11.5:*** *Require developers to pay the full costs associated with storm drain system improvements needed specifically to service their development, as well as fair-share costs for enhancements identified in the Capital Improvement and Equipment Plan.*

A number of implementation actions in the General Plan Update would reduce impacts related to hydrology and water quality. These include:

Implementation Action 4-10: *Management of Storm Water and Irrigation Runoff*

Implementation Action 4-15: *Storm Drain System Improvements*

4.8.6 STANDARD CONDITIONS

There are existing federal, State, and regional regulations that relate to hydrology and water quality issues. Compliance with these regulations would be required for all new development in the City. These include:

SC 4.8-1: The project applicant/developer for all applicable development projects shall file a Permit Registration Document (PRD) with the State Water Resources Control Board in order to obtain coverage under National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with the Construction and Land Disturbance Activities (Order No 2009-009-DWQ, NPDES No. CAS000002) or the latest approved general permit. The project applicant/developer shall provide documentation of coverage under the Construction General Permit to the City of Arcadia. The PRD consists of a Notice of Intent (NOI); Risk Assessment; Site Map; Storm Water Pollution Prevention Program (SWPPP); annual fee; and a signed certification statement. Pursuant to permit requirements, the project applicant/developer shall develop and incorporate Best Management Practices (BMPs) for reducing or eliminating construction-related pollutants in the site runoff. Starting in 2011, SWPPPs shall also be prepared and implemented for construction sites less than one acre, per Title 24 Green Building Standards.

SC 4.8-2: As required under the Municipal Separate Storm Sewer System (MS4) Permit and Waste Discharge Requirements (Order No. 01-182; NPDES No. CAS0041) for the County, the City of Arcadia requires new development and major

redevelopment to prepare a Standard Urban Stormwater Management Plan (SUSMP) as part of the development permit process. The SUSMP shall identify post-construction treatment-control BMPs that would be implemented on site for long-term storm water pollutant mitigation. The SUSMP shall be prepared pursuant to the guidelines prepared by the Los Angeles County Department of Public Works' SUSMP Manual.

SC 4.8-3: All development in the City shall comply with Article VII, Chapter 8, Stormwater Management and Discharge Control, of the Arcadia Municipal Code supplements the City's NPDES permit, which prohibits the discharge of specific pollutants into the storm water and requires development projects to provide best management practices to reduce pollutants in the storm water.

SC 4.8-4: Discharges of groundwater from construction and project dewatering shall comply with the Los Angeles Regional Water Quality Control Board's (LARWQCB's) Order No. R4-2003-0111, which outlines the waste discharge requirements to surface waters in the coastal watersheds of Los Angeles and Ventura Counties (General NPDES Permit No. CAG994004). Projects that involve dewatering activities and that could result in discharges into "Waters of the State" must file a Report of Waste Discharge (RWD) with the LARWQCB. The LARWQCB reviews the RWD and the proposed discharge and prepares Waste Discharge Requirements (WDRs), which include operational requirements, contaminant limitations, and monitoring requirements. Compliance with the WDR would: (1) prevent groundwater discharges from resulting in water quality degradation of receiving surface water bodies and (2) protect beneficial uses of water.

SC 4.8-5: All new construction and major improvements shall be built in accordance with the City's Floodplain Management Regulations (Article III, Chapter 10 – Floodplain Management of the Arcadia Municipal Code), which require that structures (1) be adequately anchored to prevent flotation, collapse, or lateral movement from hydrodynamic and hydrostatic loads during flood; (2) be constructed with materials and utility equipment resistant to flood damage and using methods and practices that minimize flood damage; and have electrical, heating, ventilation, plumbing and air conditioning equipment and other utility systems that prevent water from entering or accumulating within structures during floods.

Repeated from Section 4.6, Geology and Soils

SC 4.6-6: In accordance with the City's Zoning Regulations and Building Regulations, every application for a development permit within the Residential Mountainous Single-Family Zone shall include plans for erosion control planting or other protective devices. Irrigation systems or watering devices that cause soil erosion or saturate the soil to cause slope failure are prohibited. Site topography or configuration that causes or will cause erosion, subsidence, surface water runoff problems, or other conditions that may affect adjacent properties or the public health, safety, and welfare are prohibited.

Repeated from Section 4.16, Utilities and Service Systems

SC 4.16-1: All water, sewer, storm drain, and other utility infrastructure improvements within the City shall be conducted in compliance with the applicable regulations set forth in the Arcadia Municipal Code, which incorporates by reference applicable State regulations, including those that adopt California Building Code, California Plumbing Code, California Electrical Code, and California Mechanical Code. Article IX, Chapter 1, Subdivision Code, sets forth standards for the review and approval of all development plans by the City Engineer and requires that the project applicant/developer provide utility facilities in accordance with the standards and specifications approved by the City Engineer.

4.8.7 ENVIRONMENTAL IMPACTS

Future development pursuant to the General Plan Update and public and infrastructure projects could lead to changes in hydrology and water quality in the City and downstream areas. Specific topics are discussed below.

Water Quality and Waste Discharge Standards

Threshold 4.8a: Would the proposed 2010 General Plan Update violate any water quality standards or waste discharge requirements?

Threshold 4.8f: Would the proposed 2010 General Plan Update otherwise substantially degrade water quality?

Construction Impacts

Storm water runoff from individual construction sites could contain pollutants such as soils and sediments that are released during grading and excavation activities and petroleum-related pollutants due to spills or leaks from heavy equipment and machinery. Other common pollutants that may result from construction activities include solid or liquid chemical spills; concrete and related cutting or curing residues; wastes from paints, stains, sealants, solvents, detergents, glues, acids, lime, plaster, and cleaning agents; and heavy metals from equipment.

Construction runoff would flow into the storm drain inlets in the City or in the surrounding area and would enter into Eaton Wash, Arcadia Wash, Santa Anita Wash, Sierra Madre Wash, or Sawpit Wash, which are connected to the Rio Hondo and the Los Angeles River. With segments of the Rio Hondo and Los Angeles River considered as impaired water bodies, pollutants in the storm water could add to further degradation of water quality and violation of TMDLs for the Rio Hondo and Los Angeles River.

However, the CWA establishes a framework for regulating potential water quality impacts from construction activities through the NPDES program. Construction activities that disturb one acre or more of land are required to obtain an NPDES permit from the SWRCB, Division of Water Quality. Coverage under the NPDES Construction General Permit is accomplished by completing and filing a PRD with the SWRCB prior to commencement of construction activities. The determination of Risk Level 1, 2, or 3 for a development project would be made at the time of PRD submittal. The BMPs set forth in the SWPPP and implemented during construction activities that are most often used include (1) erosion-control BMPs such as hydraulic mulch, soil binders, and geotextiles and mats to stabilize soils; (2) temporary drainage swales to divert runoff from exposed soils; (3) sediment controls such as fiber rolls along disturbed areas,

temporary desilting basins, and gravel bags around storm drain inlets; (4) watering of exposed soils and covering stockpiles of soil; (5) stabilization of construction entrance/exit points to reduce tracking sediments; and (5) timing of grading to avoid the rainy season (November through April).

Provisions of the 2007 *California Building Code*, grading permit requirements and conditions, and Arcadia Municipal Code provisions include elements that require reduction of erosion and sedimentation impacts. As required by SC 4.8-1, the project applicant/developer's full compliance with the NPDES General Permit No CAR000002 for Storm Water Discharges Associated with Construction Activity (or the latest approved general permit) is required. Pursuant to permit requirements, the project applicant/developer shall develop a PRD (including an SWPPP) that incorporates BMPs for reducing or eliminating construction-related pollutants in the site runoff and for ongoing monitoring of site runoff water quality. As a result, compliance with the requirements of the NPDES Construction General Permit and Title 24 Green Building Standards, per SC 4.8-1, would reduce short-term, general construction-related water quality impacts to surface water and to groundwater to levels considered less than significant; no mitigation is required.

Operational Impacts

Potential pollutants that could be generated by the operation of future development pursuant to the General Plan Update and public and infrastructure projects in the City could include but are not limited to: bacteria/virus, heavy metals, nutrients, pesticides, organic compounds, sediments, trash and debris, oxygen-demanding substances, and oil and grease. Specific pollutants would depend on the type of land use and the site improvements proposed by individual projects such that residential developments, industrial or commercial developments, automotive repair shops, restaurants, hillside developments, parking lots and streets would have different storm water pollutant generation potential.

Existing developments in the City drain into the Eaton Wash, Arcadia Wash, Santa Anita Wash, Sierra Madre Wash, and Sawpit Wash, which are connected to the Rio Hondo, the Los Angeles River, and the Pacific Ocean. The local washes are not listed as impaired water bodies but segments of the Los Angeles River and the Rio Hondo are listed as "impaired" water bodies. While the impairment of the Rio Hondo and Los Angeles River is not directly attributable to pollutants and land uses in Arcadia, discharges from future development and public and infrastructure projects in the City would contribute to the continued impairment of the Los Angeles River and the Rio Hondo.

As required under SC 4.8-2, the Los Angeles County NPDES MS4 Permit calls for new development and major redevelopment projects to prepare individual SUSMPs that identify the potential pollutants that would be generated by the project and the site. SUSMPs are also required for the following activities: vehicle or equipment fueling areas; vehicle or equipment maintenance areas, including washing and repair; commercial or industrial waste handling or storage; outdoor handling or storage of hazardous materials; outdoor manufacturing areas; outdoor food handling or processing; outdoor animal care, confinement, or slaughter; or outdoor horticulture activities.

The SUSMP must include a drainage concept and storm water quality plan that reduces peak storm water runoff discharge rates; conserves natural areas; minimizes storm water pollutants of concern; protects slopes and channels; provides storm drain system stenciling and signage; properly designs outdoor material storage areas and trash storage areas; and provides proof of ongoing BMP maintenance through structural or treatment-control BMPs.

Satisfaction of MS4 Permit requirements for new development (SC 4.8-2), with preparation of a SUSMP by individual projects, would comply with the water quality standards for storm water runoff. As stated in SC 4.8-3, the City also prohibits the discharge of specific pollutants into the storm water and requires development projects to provide best management practices to reduce pollutants in the storm water, under Article VII, Chapter 8 of the Arcadia Municipal Code. Compliance with these regulations would reduce storm water pollution in the long term. Compliance with SC 4.8-2 and SC 4.8-3 would prevent long-term water quality impacts from future development. Impacts would be less than significant, and no mitigation is required.

Additionally, Policy S-2.3 of the General Plan Update requires that new development projects (1) retain as much runoff as possible on the development site to reduce flow volumes into the storm drain system; (2) allow for recharge of the groundwater basins; and (3) comply with the City's storm water permitting requirements (consistent with the NPDES) and employ BMPs. Implementation Action 4-10 would lead to the development of storm water runoff and irrigation capture basins on public property to collect gutter flows into retention facilities that allow the water to infiltrate into groundwater basins. Goals and supporting policies from the Safety Element of the General Plan Update, as well as supporting Implementation Actions, would further reduce water quality impacts.

Groundwater

Threshold 4.8b: Would the proposed 2010 General Plan Update 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)?

Groundwater Recharge

As previously discussed, the City of Arcadia is largely developed with urban and suburban land uses, with approximately one percent of its land area being vacant and available for development. Groundwater recharge is accomplished through the infiltration of rainwater and storm water runoff into pervious soils, whether through an engineered spreading ground facility, through creeks and drainages, and/or through vacant and vegetated (including landscaped) areas. The construction of new impervious surfaces, including roadways, building foundations, parking lots, and other concrete or asphalt surfaces, would prevent rainwater from infiltrating the soils, potentially reducing groundwater recharge.

Future development pursuant to the General Plan Update would not significantly interfere with or prevent groundwater recharge, since the Peck Road Recharge Basin will be retained as open space under the proposed Land Use Policy Map. Therefore, the main groundwater recharge facility within the City would remain unchanged. Additionally, development of vacant lots, which would account for approximately one percent of the City's total acreage, is predominantly located in the northern portion of the City, which would be developed with Residential Estates (up to 2 dwelling units per acre). This type of development allows for the retention of natural and/or landscaped pervious surfaces. The development of other vacant parcels scattered throughout the City would not result in the creation of substantial interference to groundwater recharge, and impacts would be less than significant; no mitigation is required.

Groundwater Supplies

Construction-Related Dewatering

Groundwater elevations in the City become shallower toward the south and southeast and are approximately 150 to 250 feet deep across most of the City, 200 feet deep or less north of the Raymond Fault, and 100 feet deep near the San Gabriel River. Shallow groundwater areas, as discussed in Section 4.6, Geology and Soils, have been identified north of the Raymond Fault and in the southern section of the City, south of Live Oak Avenue. Excavation and grading activities for future development would not be deep enough (up to 100 feet) to affect the underlying groundwater resources in most areas of the City.

However, development projects in areas with shallow groundwater could encounter underlying groundwater and potentially could require "dewatering" activities. Dewatering involves the removal of groundwater from a construction site to enable the development of the site. As stated under SC 4.8-4, the LARWQCB's Order No. R4-2003-0111 regulates the discharges of groundwater from construction and project dewatering to surface waters in the coastal watersheds of Los Angeles and Ventura Counties. The order includes discharge limitations and discharge prohibitions, as well as TMDLs for receiving water bodies. Under this order, an individual waste discharge permit would be required for projects that involve dewatering activities.

Depending on the water quality of groundwater and the water quality objectives for the receiving water, applicants need to specify that various biological, chemical, physical, thermal treatment systems could be employed to remove these toxic or conventional pollutants in groundwater to applicable permit limits. This would include identifying potential contaminants in the groundwater and from the project construction and the steps needed to prevent contamination of the groundwater and discharges into surface waters. Treatment options include (1) air stripping, carbon absorption, chemical oxidation treatment systems to remove volatile organic compounds in groundwater; (2) reverse osmosis, ion exchange, or pH adjustment to remove conventional pollutants and metals; and (3) biological systems to degrade or remove semi-volatile organic compounds. Compliance with SC 4.8-4 would prevent water quality impacts to exposed groundwater that could result from dewatering water activities. Water quality impacts due to discharges of groundwater would be less than significant; and no mitigation is required.

Construction-related dewatering activities are site-specific and temporary in nature and would not result in a substantial depletion of groundwater supplies that could result in a lowering of the groundwater table. Impacts to groundwater supplies from dewatering activities would be less than significant.

Groundwater Wells

The City of Arcadia operates its own municipal water services, with water supplies from the underlying Raymond and Main San Gabriel groundwater basins. The City obtains its groundwater supply through 14 active wells, with 8 wells within the Raymond Basin and 6 wells within the Main San Gabriel Basin. Assuming a well operating factor of 75 percent (groundwater wells are operated 75 percent of the time), the Arcadia water system's total current groundwater pumping capacity is approximately 17,300 acre-feet per year (afy) from wells in the Main Basin and is approximately 5,760 afy from wells in the Raymond Basin (Stetson 2010).

Future development pursuant to the General Plan Update would create a long-term demand for water to be used for domestic purposes, landscape irrigation and maintenance activities. This

water demand would lead to an increase in groundwater pumping from local wells. As discussed in Section 4.16, Utilities and Service Systems, the City's Water Master Plan recommends seven new wells in the Main Basin to allow the system to meet the maximum day demand when the largest capacity well is out of service and would provide an additional 10,500 additional gallons per minute of groundwater pumping capacity.

The Water Supply Assessment (WSA) for the proposed General Plan Update indicates that the City's groundwater supplies are adequate to meet the estimated demand in the City from 2010 through 2030 during normal, single-dry and multiply-dry years (Stetson 2010). The City of Arcadia's water demands are projected to increase from approximately 18,720 afy (current) to approximately 19,428 afy (buildout). Total water demand of 19,428 afy would require water supplies from groundwater resources, with replacement water supplied by imported water and recycled water.

Groundwater pumping is regulated by the Raymond Basin Management Board and the Main San Gabriel Basin Watermaster. As discussed in Section 4.16, Utilities and Service Systems, the City complies with its pumping rights and the need to replenish groundwater when the City exceeds its allocation. Thus, groundwater pumping that may lead to the depletion of local groundwater resources is not expected to occur. The City has also participated in the East Raymond Basin Water Resources Program to increase reliability of water supplies from the East Raymond Basin. Implementation of the projects under this program would allow continued use of groundwater resources from the Raymond Basin.

No new water supplies are needed to serve future development allowed by the General Plan Update. Continued management of the groundwater basins by the Raymond Basin Management Board and the Main San Gabriel Basin Watermaster would also prevent overdraft conditions or other adverse impacts to local groundwater. No significant adverse impact on groundwater supplies is expected with future development in the City, and no mitigation is required.

Additionally, implementation of the City's water conservation programs, as discussed in Section 4.16, Utilities and Service Systems, would provide that implementation of the General Plan Update would not significantly affect groundwater resources. Based on the City's Urban Water Management Plan (UWMP) and the WSA for the proposed General Plan Update, groundwater supplies are expected to be available to meet the water demands in the City to the year 2035.

Drainage and Erosion

Threshold 4.8c: Would the proposed 2010 General Plan Update 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?

The City of Arcadia is largely developed, with an improved storm drain system of underground pipelines and concrete-lined washes. Future development pursuant to the General Plan Update would occur on a few scattered sites throughout the City, including the undeveloped parcels at the northern portion of the City. Development of vacant properties could alter drainage patterns that could result in erosion or siltation.

Erosion-control measures required by the City's Zoning and Building Regulations (SC 4.6-6 in Section 4.6, Geology and Soils) would prevent erosion hazards on site and off site. SC 4.8-1

requires short-term construction activities to comply with the NPDES Construction General Permit requirements and Title 24 Green Building Standards through implementation of adequate BMPs, and SC 4.8-2 calls for the incorporation of permanent BMPs into the project design. Compliance with SC 4.8-1, SC 4.8-2, and SC 4.6-6 would prevent short-term construction and long-term operational activities from creating substantial erosion or siltation and impacts would be less than significant; no mitigation is required.

Drainage Patterns

Threshold 4.8d: Would the proposed 2010 General Plan Update substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river?

As discussed above, changes in drainage patterns would be confined to individual development sites and would not affect major underground storm drain lines and concrete-lined washes in the City. All development must be conducted in compliance with applicable State and local regulations (SC 4.8-1, SC 4.8-2, and SC 4.6-6), which prevent substantial alteration of site drainage patterns. Since drainages and washes in the City, the Rio Hondo, and the Los Angeles River are concrete-lined, no alteration in the course of these channels would occur from future development. Impacts would be less than significant, and no mitigation is required.

Surface Runoff and Storm Drain Facilities

Threshold 4.8e: Would the proposed 2010 General Plan Update 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?

Threshold 4.16c: Would the proposed 2010 General Plan Update require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?

As previously discussed, the City of Arcadia is largely developed with urban and suburban land uses, with approximately one percent of land as vacant and available for development. The construction of new impervious surfaces would reduce the amount of rainwater that could infiltrate the soils, potentially increasing storm water runoff due to reductions in infiltration.

Because only one percent of the land available for development within the City is vacant, development pursuant to the General Plan Update would only slightly increase the amount of impervious surface areas in the City. This would occur through the introduction of new structures, driveways, parking lots, walkways and other site improvements on these vacant properties, as well as potentially increased impervious surfaces from redevelopment of existing properties. Therefore, storm water runoff volumes are likely to increase over existing conditions, which could impact the capacity of existing storm drain facilities.

To guard against significant impacts related to storm drain infrastructure, MM 4.16-1 from Section 4.16, Utilities and Service Systems requires the City to mandate that all future development applications provide an adequate engineering analysis of project-specific impacts to utility infrastructure and identify specific improvements that would eliminate the impacts.

Compliance with SC 4.8-2, which requires project compliance with the requirements of SUSMP, would reduce storm water runoff volume and pollutants and, would prevent negative impacts to downstream storm drain facilities or drainages. Additionally, SC 4.16-1 (from Section 4.16, Utilities and Service Systems) requires compliance with the Arcadia Municipal Code as it relates to the review and approval of all grading and drainage plans by the City Engineer, and requires the project applicant/developer to provide drainage facilities in accordance with the standards and specifications approved by the City Engineer. Compliance with SC 4.8-2 and SC 4.16-1, and implementation of MM 4.16-1, would provide that potential impacts related to increased surface runoff and associated impacts to the capacity of storm drain systems would be less than significant.

The location or extent of the facilities required to support future development is unknown at this time and is dependent upon specific development project applications. Construction-related impacts associated with the storm drain infrastructure would be subject to project-specific environmental review pursuant to CEQA prior to implementation. Construction-related impacts from new development are discussed in Sections 4.1 through 4.17 of this EIR, and specifically Section 4.3 (Air Quality), Section 4.11 (Noise), and Section 4.15 (Traffic and Transportation).

As stated in the Safety Element, Goal S-2 calls for superior storm drainage and flood-control facilities in the City, with supporting policies for prioritizing improvements, maintenance, and runoff retention. Goals CI-10 and CI-11 from the Circulation and Infrastructure Element and their supporting policies call for storm drain infrastructure that minimizes regional and localized flood hazards. Additionally, Implementation Action 4-15 calls for storm drain system improvements to prevent street flooding and to eliminate ponding at high-maintenance nuisance areas.

Flood Hazards

Threshold 4.8g: Would the proposed 2010 General Plan Update 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?

Threshold 4.8h: Would the proposed 2010 General Plan Update place within a 100-year flood hazard area structures which would impede or redirect flood flows?

The City of Arcadia is not located within the 100-year flood hazard area, as mapped by FEMA. Future development pursuant to the General Plan Update, including housing or other structures, would not be exposed to flood hazards. Structures that would be built as part of future development would not impede or redirect flood flows. Impacts would be less than significant, and no mitigation is required.

As stated in the Safety Element, Goal S-2 calls for superior storm drainage and flood-control facilities in the City, with supporting policies for prioritizing improvements, maintenance, and runoff retention. Goals CI-10 and CI-11 from the Circulation and Infrastructure Element and their supporting policies call for storm drain infrastructure that minimizes regional and localized flood hazards. Additionally, Implementation Action 4-15 calls for storm drain system improvements to prevent street flooding and to eliminate ponding at high-maintenance nuisance areas.

Dam Inundation and Mudflows

Threshold 4.8i: Would the proposed General Plan Update 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?

Threshold 4.8j: Would the proposed General Plan Update result in inundation by seiche, tsunami, or mudflow?

Dam Inundation

The City is located within the inundation area of several dams, as shown in Exhibit 4.8-2. Hazards from dam inundation would affect future development that would be located in the eastern half of the City and along Eaton Wash.

The California Department of Water Resources Division of Safety of Dams (DSOD) regulates and monitors dams for structural safety in accordance with Division 3 of the *California Water Code.* To comply with State dam safety regulations, the water level behind Santa Anita Dam is restricted to be no higher than an elevation of 1,230 feet above msl to meet the DSOD seismic safety requirements and to reduce the potential magnitude of downstream flooding. The County's ongoing sediment removal project at the Santa Anita Reservoir is also expected to increase reservoir capacity and maintain seismic stability of the dam. Seismic safety retrofits to the dam include modifications to the dam's inlet/outlet works and the construction of a new dam riser. Compliance with the DSOD requirements and ongoing implementation of County maintenance and retrofit projects would reduce the potential for dam failure.

However, inundation hazards may result if (1) failure were to occur while the dam is at or near full capacity; (2) a complete and sudden breach of the dam occurs (rather than partial failure which would allow water to be released slowly into containment channels); or (3) sabotage, earthquake, or erosion during periods of extremely heavy rain occur. At capacity, floodwaters from the Santa Anita Dam would reach the northern end of the City within minutes of dam failure and the southern end of the City in about one hour. Water depths could range from several tens of feet near the Santa Anita Dam, to several feet at Foothill Boulevard, and a few feet at Live Oak Avenue.

Floodwaters from the Sierra Madre Dam would inundate a smaller area of the City, generally north of the I-210 Freeway to Grandview Avenue between Arcadia Wash and First Avenue. Water from Santa Fe Dam would impact the lower southeast corner (one-quarter) of the City, generally south of Duarte Road and east of Santa Anita Avenue. Waters from the Morris S. Jones Reservoir and Sawpit Dam would result in smaller inundation areas.

Areas immediately adjacent to drainage courses would be the most susceptible to damage from rapidly flowing water, severe erosion, and associated floating debris. Higher areas and those farthest from the existing flood channels could suffer some damage from rising water.

The Metropolitan Water District (MWD) Upper Feeder is a main water pipeline that runs east-west across the northern part of the city along Elkins Avenue. A break in this pipeline could also cause flooding down slope from Elkins Street.

As stated in SC 4.8-5, the City's Floodplain Management Regulations (Article III, Chapter 10 – Floodplain Management of the Arcadia Municipal Code) requires all new construction and major

improvements to be built and adequately anchored to prevent flotation, collapse, or lateral movement from hydrodynamic and hydrostatic loads during flood; to be constructed with materials and utility equipment resistant to flood damage and to employ methods and practices that minimize flood damage; and to have electrical, heating, ventilation, plumbing and air conditioning equipment and other utility systems that prevent water from entering or accumulating within structures during floods.

Compliance with SC 4.8-5 would provide that future development pursuant to the General Plan Update experience limited damage from potential inundation. Impacts would be less than significant, and no mitigation is required.

In addition, emergency action plans, as required by the FEMA, have been prepared by the County Department of Public Works to specify warning, evacuation, and post-flood actions that need to be taken by assigned agencies and individuals in the event of dam failure of County-owned facilities upstream of the City. Implementation of the emergency action plans would warn City residents, employees, and visitors and would allow for evacuation to areas outside the inundation zones. This would further reduce personal injury and property damage to existing and future developments under the General Plan Update. Further, Policy S-2.4 in the Safety Element calls for the support of efforts of the Los Angeles County Department of Public Works and other agencies responsible for the maintenance of dams and reservoirs above Arcadia to improve conditions of the facilities and to reduce the risk of inundation resulting from dam or reservoir failure.

Mudflows

The City is located at the foot of the San Gabriel Mountains, where mudflow hazards are present. The County Department of Public Works has constructed and maintains a number of dams and debris basins within or near the foothills of the San Gabriel Mountains to reduce the volume and velocity of runoff and to prevent mudflow. These facilities include the Santa Anita Dam; the Sierra Madre Dam; the Santa Fe and Sawpit Dams; and the Lannan, Auburn, Santa Anita, Career, and Sunnyside Debris Basins, which are located upstream of the City. These dams and debris basins control the volume and rate of runoff flows and capture mud and debris from upstream areas. They protect the City of Arcadia from mudflow hazards.

The hillside areas at the northern end of the City have a potential for mudflow hazards. As stated in SC 4.6-6 from Section 4.6, Geology and Soils, of this EIR, the City's Zoning Regulations and Building Regulations require every application for a development permit to include plans for erosion-control planting or other protective devices, especially for cut and fill slopes in the Residential Mountainous Single Family Zone. Compliance with erosion-control measures under SC 4.6-6 would reduce the potential for mudflow from development sites with steep slopes. Coupled with the continued operation and maintenance of upstream dams and debris basins, mudflow hazards in the City would be reduced to less than significant levels. No mitigation is required

Tsunami

Tsunami (sea waves) hazards are not present for the City of Arcadia due to the City's elevation and distance from the ocean. The City is located outside the tsunami inundation areas in the Los Angeles County Tsunami Inundation Maps prepared by the California Department of Conservation (CGS 2007). The City is located inland, and future development would not be subject to tsunami hazards. There would be no impact; no mitigation is required.

Seiche

A seiche is the formation of large waves in landlocked bodies of water due to seismic activity. In the event of an earthquake, a seiche can occur and potentially cause major flooding and water inundation damage. While no large open water bodies exist in Arcadia, waters stored behind Santa Anita Dam could experience seismic-induced wave action. Also, seiche-type actions could occur in aboveground water reservoirs, including the 16 reservoirs in Arcadia. Major reservoirs in the area include the Baldwin Reservoir (9.3 MG), St. Josephs Reservoir 2 (6.3 MG), and Santa Anita Reservoir 5 (5.25 MG). These reservoirs were constructed to guard against failure due to seismic activity, both from structural failure and internal wave action that could be generated by an earthquake and through compliance with applicable local and State seismic design requirements (Hogle-Ireland 2010b).

Should failure of the reservoirs occur, localized inundation hazards downstream of each reservoir can be expected. In compliance with local and State regulations, reservoirs are designed with setbacks from adjacent developments, and waters would flow from the reservoir sites into streets as part of the site drainage; it would then sheet-flow onto roadway pavements or enter the underground storm drain system. Impacts would be less than significant, and no mitigation is required.

4.8.8 CUMULATIVE IMPACTS

Water Quality

Cumulative hydrology and water impacts are considered in the Los Angeles River Watershed, where the City of Arcadia is located. Future development within the Los Angeles River Watershed, which includes the majority of Los Angeles County, would generate new sources for urban pollutants, which could impact water quality. However, construction activities throughout Los Angeles County are required to conduct all construction activities of one acre or more in compliance with the NPDES Construction General Permit, which would prevent short-term construction activities from resulting in significant water quality impacts.

Cities in the County have adopted programs for long-term storm water pollution mitigation through the requirement for SUSMPs for individual developments. WDRs also impose guidelines for individual developments that may lead to discharges into the storm drain system or surface water bodies. These regulations implement the Basin Plan for the Los Angeles region and help meet the established water quality objectives for both groundwater and surface water bodies.

Also, the Rio Hondo has a 142-square-mile watershed and the Los Angeles River has an 824-square-mile watershed. Runoff originating within the City and its Sphere of influence (12.36 square miles) represents a minor proportion (8.7 percent of the Rio Hondo and 1.5 percent of the Los Angeles River) of the total runoff volume when compared to the water volumes handled by the Rio Hondo and the Los Angeles River. Runoff from future development activity would generate a minor amount of the total runoff from the City. Therefore, no cumulative adverse impacts related to water quality would occur.

Groundwater

Increases in the resident population and intensity of development in the watershed would translate to a greater demand for water and increased pumping of the groundwater basins, as well as greater use of imported water sources. Individual developments would coordinate with

the water service providers to allow service providers to provide water service in a timely and adequate manner. The Water Service Providers' groundwater supplies are controlled by the Main San Gabriel Basin Watermaster and the Raymond Basin Management Board, who are responsible for monitoring groundwater levels and water quality, including the operating safe yields of the basins and extraction limits and amounts. Continued management of the groundwater basins would prevent overdraft conditions, water quality problems, and other impacts on groundwater resources in the watershed. Therefore, no cumulative adverse impacts related to groundwater recharge or supplies would occur.

Hydrology

Future growth and development within the watershed would increase impermeable surfaces and decrease water percolation areas. Increase in impervious surfaces would increase storm water volumes and flow rates in local and regional drainage channels. However, all development within Los Angeles County is subject to development in compliance with SUSMP and local municipal code standards for reducing storm drain capacity impacts. Storm drain infrastructure is incrementally improved with project-specific design plans that are subject to the review and approval of local jurisdiction. Project-specific design and utility improvements would prevent negative impacts to regional drainage channel capacity. Therefore, no cumulative adverse impacts related to flood hazards or inadequate storm drainage would occur.

Dam and Reservoir Facilities

Several dams at the foothills of the San Gabriel Mountains pose inundation hazards in the event of dam failure. Failure of any dam could affect existing and future developments within identified inundation areas within the watershed. The potential for property damage and personal injury is reduced by the construction of dams in accordance with State and federal dam safety regulations and the preparation of emergency action plans for individual dams, which include warning, evacuation, and post-disaster actions. Cumulative impacts from dam inundation would be less than significant.

The hazards associated with a tsunami are confined to the shoreline and coastal areas of Los Angeles County and the General Plan Update would not be exposed or would add to this hazard. Seiche hazards would affect local areas downstream of a water body or reservoir and would not create cumulative impacts. Future development on steep hillside areas within the watershed may be exposed to potential mudflow hazards. The debris basins that have been constructed by the Los Angeles County Department of Public Works at the foothills of the San Gabriel Mountains are expected to reduce storm water flows and debris volumes, preventing mudflow hazards. Therefore, no cumulative adverse impacts related to water retention facilities would occur.

4.8.9 MITIGATION MEASURES

Repeated from Section 4.16, Utilities and Service Systems

MM 4.16-1 Prior to approval of development applications that could have an impact on existing water, sewer, or storm drain infrastructure capacities, as determined by the City Engineer, the project applicant/developer shall be required to determine project impacts on each system. If water, sewer, and/or storm drain infrastructure improvements are required in order to serve the proposed project, then appropriate mitigation shall be provided in the analysis and shall be incorporated into site development plans, subject to review and approval by the City Engineer.

If infrastructure improvements outside the jurisdiction of the City of Arcadia are required, including improvements to trunk sewer lines owned by the Sanitation Districts of Los Angeles County, the needed improvements, or fair share payments in lieu of infrastructure improvements, shall be completed to the satisfaction of the appropriate jurisdictions.

4.8.10 LEVEL OF SIGNIFICANCE AFTER MITIGATION

Water Quality and Waste Discharge Standards

Less Than Significant Impact

Groundwater Recharge and Supplies

Less Than Significant Impact

Drainage Patterns and Erosion

Less Than Significant Impact

Surface Runoff and Storm Drain Facilities

Less Than Significant Impact With Mitigation

Flood Hazards

Less Than Significant Impact

Dam Inundation and Mudflows

Less Than Significant Impact

Cumulative Impacts

Less Than Significant Impact