

4.13 WATER RESOURCES

INTRODUCTION

This section provides an overview of hydrology and water quality within the project site and its vicinity, as well as an analysis of impacts to hydrology and water quality associated with the proposed project. Hydrology and water quality includes surface water hydrology (flood hazards), surface water quality, and groundwater quality. Water supply issues are addressed in Section 4.12 *Utilities and Service Systems*.

EXISTING SETTING

Water Quality

A number of factors affect surface water quality, including (but not limited to): the types of land uses in a given area, hydrological conditions, meteorological conditions, geological conditions, and soil types. Activities associated with different types of land uses affect surface water quality, for example, when an office building generates exterior pollutants (including cleaning and other materials) that can be washed away by surface water runoff, or when a surface parking lot that has deposits of oil, heavy metals gasoline, and other pollutants that can affect the quality of surface water runoff. Similarly, meteorological conditions can influence the quantity and concentration of pollutants that are washed away through the frequency and intensity of storm events. In addition, geological conditions such as types of soils, and the presence of geological features can affect infiltration and runoff velocity. Surface water runoff has less potential to carry sediments and pollutants when runoff is slow (i.e., sheet flow over a relatively flat surface versus sheet flow down a slope) and infiltrates the soil. In receiving waters, excess sediments can cause high turbidity, which can affect biological organisms (i.e., plant and animal life in lakes, ponds, rivers, etc.). In urban areas, non-sediment pollutants, (such as zinc, copper, and lead), can cause toxic effects in high concentrations, and are most commonly associated with surface water runoff.

The project site is located in the Santa Ana River Watershed. The most significant contributors to water quality degradation in the Santa Ana River Watershed are high concentrations of nitrogen and total dissolved substances (TDS).^{1,2} Historically, the Santa Ana River and its major tributaries likely flowed during most of the year, recharging deep alluvial groundwater basins in the inland valleys and the coastal plain. However, irrigation eventually led to the diversion of most of the streams tributary to the river, and the quantity of groundwater recharge diminished greatly. Diverted stream flows were used to support extensive irrigated agriculture operations, principally citrus orchards that were also reliant on the use of nitrogen fertilizers to sustain crop yields. As a consequence of these historic practices, water quality issues in the Santa Ana River Watershed have often revolved around elevated concentrations of TDS and total inorganic nitrogen (TIN).

At the local level, concentrations of chemicals and other contaminants in the drinking water delivered by the City are all below the maximum contaminant levels (MCLs), regulatory action levels (ALs), and maximum residual disinfectant levels (MRDLs) set by the United States Environmental Protection Agency (USEPA).³ They are also below the maximum contaminant level goals (MCLGs) and maximum residual disinfectant level goals (MRDLGs) set by the USEPA and the public health goals (PHGs) set by the California Environmental Protection Agency (Cal-EPA). In general, the maximum levels (such as the MCL) are the highest concentrations allowable, while the goals (such as the PHG) are the levels below

¹TDS is a measure of salinity.

²Santa Ana Regional Water Quality Control Board, *Watershed Management Initiative Chapter, Revised 2001*, Available at: http://www.waterboards.ca.gov/santaana/water_issues/programs/wmi/index.shtml, Accessed June 9, 2010.

³City of Redland Municipal Utilities and Engineering Department, *Consumer Confidence Report 2009*, Available at: http://www.ci.redlands.ca.us/utilities/PDFs/2008_09CCR.pdf, accessed June 9, 2010.

which there is no known or expected risk to health. In addition, the City's drinking water met all relevant secondary MCLs, which are set to preclude odor, taste, and color problems, as well as ALs for contaminants with no MCLs.

In 1996, perchlorate, a chemical known to interfere with the uptake of iodine in the thyroid gland, was discovered in some of the City's water wells. Since then, a program of shutting down highly contaminated wells, treating contaminated water, blending of water from uncontaminated sources, development of new, perchlorate-free wells, and increased production capacity of the City's surface water treatment facility has reduced the concentration of perchlorate in City water to below the California Department of Health Services (DHS) notification level of 6 parts per billion. Notification levels are non-regulatory health-based levels established by the DHS for contaminants in drinking water for which no MCLs have been set.⁴

Groundwater

Groundwater is the part of the hydrologic cycle representing underground water sources. Groundwater is present in many forms: in reservoirs, both natural and constructed, in underground streams, and in the vast movement of water in and through sand, clay and rock beneath the earth's surface. The place where groundwater is located beneath or at the surface is called the water table; in some areas it may be very deep and in others may be right at the surface. Therefore, groundwater hydrology is connected to surface hydrology and cannot truly be treated as a separate system. One example of this hydrological relationship is surface streams that are partly filled by groundwater. When that groundwater is pumped out and removed from the system, the stream levels will fall, or even dry up entirely, even though no water was removed from the stream itself.

A groundwater basin is a groundwater reservoir comprised of an overlying land surface and the underlying aquifers that contain water stored in the reservoir. Groundwater basins are separated from adjacent basins by geologic features such as non-water-bearing rock, faults, or other geological structures or topographical features which impede groundwater movement. Aquifers are an underground layer of water-bearing rock, permeable rock or unconsolidated materials (e.g., gravel, sand, silt, clay, etc) from which groundwater can be extracted. The name "aquitard" is given to the less permeable silt and clay layers that separate the aquifers. Spreading grounds are used to enhance groundwater recharge by retaining as much surface water as possible. Areas are flooded with water that percolates into aquifers and supplements the natural supply. The process is limited by available storage capacity, and ability of the basin to accept the water. Spreading grounds are not always enough to compensate for declining groundwater levels.

The project site is located on the Bunker Hill Sub-basin, which is part of the Upper Santa Ana Valley Groundwater Basin. This basin consists of Holocene and Pleistocene age alluvial deposits of sand, gravel, and boulders interspread with deposits of silt and clay and is divided into upper and lower aquifers. Maximum thickness of the upper aquifer is approximately 350 feet and 650 feet in the lower aquifer.⁵ Groundwater generally converges toward the Santa Ana River and is restricted by the numerous faults in the area, including the San Andreas and San Jacinto fault zones. Recharge to the Bunker Hill Sub-basin has historically resulted from infiltration of runoff from the San Gabriel and San Bernardino Mountains.

⁴City of Redlands Municipal Utilities and Engineering Department, *Perchlorate Information*, Available at http://www.ci.redlands.ca.us/utilities/water_perchlorate.htm, accessed June 9, 2010.

⁵California Department of Water Resources, *California Groundwater Bulletin 118: Upper Santa Ana Valley Groundwater Basin, Bunker Hill Sub-basin 2004*, Available at: http://www.water.ca.gov/pubs/groundwater/bulletin_118/basindescriptions/8-2.06.pdf, accessed June 7, 2010.

The Santa Ana River, Mill Creek, and Lytle Creek contribute more than 60 percent of the total recharge to the groundwater system. Other contributors include Cajon Creek, San Timoteo Creek, and most of the south flowing creeks out of the San Bernardino Mountains. Recharge of the Bunker Hill Sub-basin also occurs through both surface and subsurface flow, direct percolation of precipitation, stream flow, and applied water. In general, the far eastern and northwestern portions of the Bunker Hill Sub-basin show the decreases in water levels while the rest of the Sub-basin shows mostly stable or increasing groundwater elevations. The most recent available data indicates that average changes in ground water level elevations between Fall 1998 and Fall 1999 ranged up to an increase of about three feet.⁶ In 2008, two groundwater monitoring wells near the project area measured water depths greater than 100 feet below ground surface.⁷

The general quality of groundwater in Southern California is degraded as a result of land uses and water management practices. Fertilizers and pesticides typically used on agricultural lands as well as gasoline and industrial contaminants such as perchlorate infiltrate and degrade groundwater. Septic systems and leaking underground storage tanks also impact groundwater quality. Urban runoff is also a significant source of pollutants. Pollutants in urban runoff include urban debris, suspended solids, bacteria, viruses, heavy metals, pesticides, petroleum hydrocarbons and other organic compounds. In addition to these impairments, excessive groundwater pumping allows saltwater intrusion from the ocean to further degrade groundwater quality.

The Bunker Hill Sub-basin contains several contamination plumes. These plumes are primarily comprised of volatile organic compounds such as Trichloroethylene (TCE) and Tetrachloroethylene (PCE) associated with releases from plating, dry cleaning, automobile repair, and other facilities. Trace amounts of Dibromochloropropane (DBCP), an agricultural pesticide, have been found in all major City pumping areas. The Redlands plume, located between Judson Street and Mountain Avenue, northeast of the project site, is primarily composed of TCE, with lower levels of PCE and DBCP, and contaminates approximately 150,000 acre-ft of groundwater. The Norton Air Force Base plume consists of TCE and PCE. This plume stretches 2.5 miles long, and contaminates 100,000 acre-ft of groundwater. The Newark and Muscoy plumes are spread around the east and west sides of the Shandon Hills in northern San Bernardino. These plumes consist of TCE and PCE, and are designated Superfund sites. The Santa Fe plume is primarily of petroleum based contaminates.⁸ High levels of agricultural nitrates have been found in the groundwater within the Redlands area. It is estimated that 28 percent of the City's wells are contaminated by agricultural nitrates and must be considered non-potable without costly treatment.⁹

Groundwater management in the Bunker Hill Sub-basin is performed by the San Bernardino Valley Water Conservation District (SBVWCD), and is based primarily on the maintenance of groundwater levels in the pressure zone, which is located in downtown San Bernardino City. Inflows and outflows are monitored and adjusted so as not to allow water levels to rise to the ground surface within the City of San Bernardino's downtown located approximately ten miles to the northeast of the project site.¹⁰

⁶*Ibid.*

⁷California Department of Water Resources, *Ground Water Level Data 2008*, Available at: http://wdl.water.ca.gov/gw/hyd/rpt_hydrograph_data_CF.cfm?wellNumber=01S03W23A003S, accessed June 7, 2010.

⁸California Department of Water Resources, *California Groundwater Bulletin 118: Upper Santa Ana Valley Groundwater Basin, Bunker Hill Sub-basin 2004*, Available at: http://www.water.ca.gov/pubs/groundwater/bulletin_118/basindescriptions/8-2.06.pdf, accessed June 7, 2010.

⁹City of Redlands General Plan, 8.0 Health and Safety Element, 1995.

¹⁰California Department of Water Resources, *California Groundwater Bulletin 118: Upper Santa Ana Valley Groundwater Basin, Bunker Hill Sub-basin 2004*, Available at: http://www.water.ca.gov/pubs/groundwater/bulletin_118/basindescriptions/8-2.06.pdf, accessed June 7, 2010.

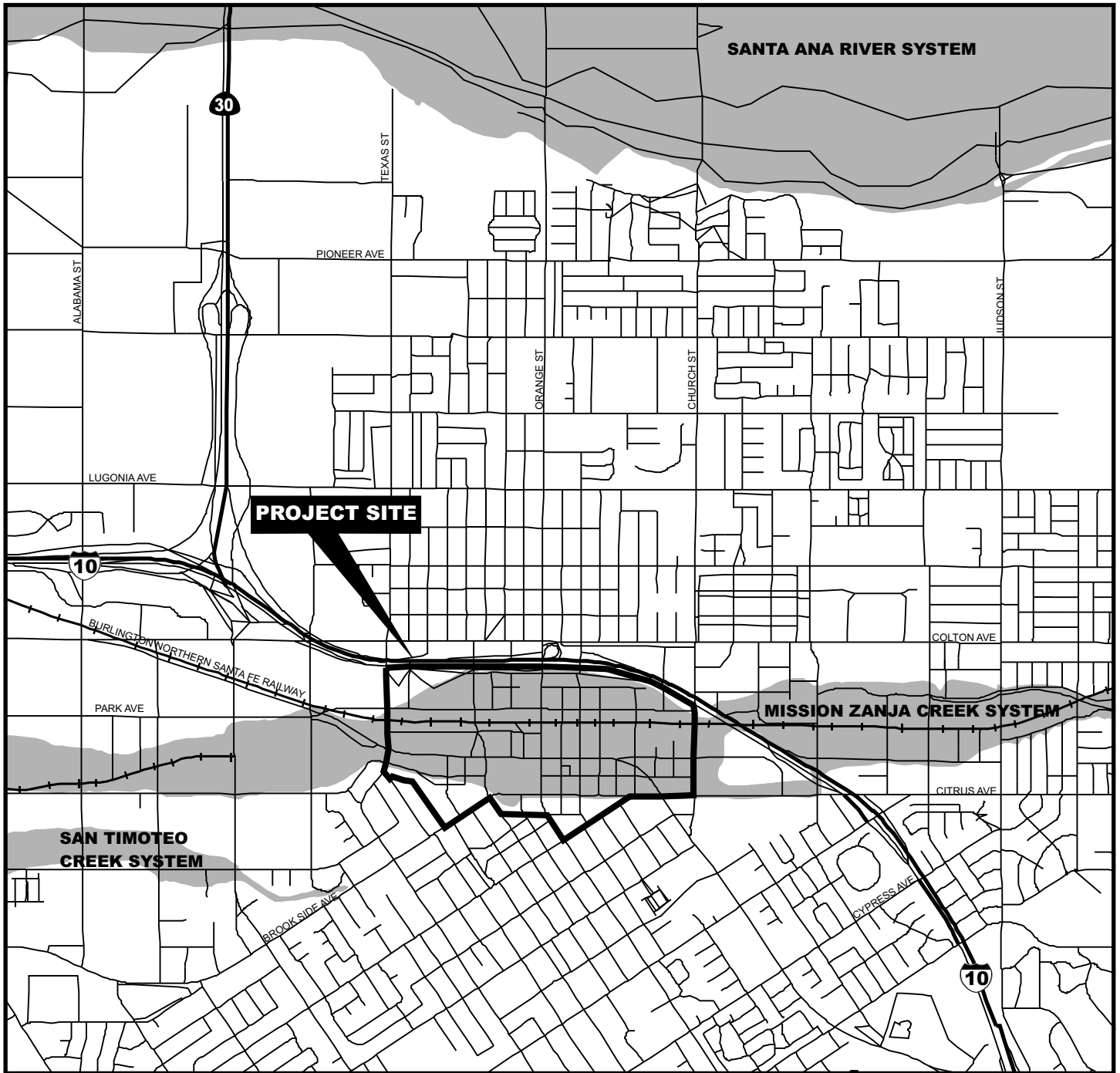
Hydrology and Drainage

Watersheds refer to areas of land, or basins in which all waterways drain to one specific outlet, or body of water, such as a river, lake, ocean or wetland. Watersheds have topographical divisions such as ridges, hills or mountains. All precipitation that falls within a given watershed eventually drains to the same body of water. The Redlands area is located in the Santa Ana River Watershed. The Santa Ana River Watershed includes much of Orange County, the northwestern corner of Riverside County, the southwestern corner of San Bernardino County and a small portion of Los Angeles County, draining a total of 2,065 square miles. The watershed is located within the South Coast Hydrologic Region. The Watershed is bounded on the south by the San Jacinto Watershed, on the east by the Salton Sea and Southern Mojave Watersheds and on the north/west by the Mojave and San Gabriel watersheds. The highest elevation in the watershed occurs in the San Bernardino Mountains at San Gorgonio Peak at 11,485 feet and the eastern San Gabriel Mountains at Mount Baldy at 10,080 feet. Surface waters start in the mountains zone and flow northeast to southwest. Further downstream, the Santa Ana Mountains and the Chino Hills form a topographic high before the river flows onto the coastal plain in Orange County and outlets into the Pacific Ocean in Huntington Beach. Major tributaries to the Santa Ana River include San Timoteo Creek and Santiago Creek.



Three major creek systems surround the project site, the Santa Ana River System to the north of the project site, the San Timoteo Creek System generally located in San Timoteo Canyon to the southwest of the project site, and the Mission Zanja Creek System (Zanja) traverses in an east-west direction through the City and project site. These systems are prone to flooding and have been identified as 100-year flood zones by the Federal Emergency Management System (FEMA). **Figure 4.13-1** illustrates the location of these creek systems. The Santa Ana River traverses the northern section of the City, the river hits a natural floodplain from the Upper Santa Ana Canyon and becomes a broadened wash, up to two miles wide, punctuated by numerous stream channels and several percolation basins. The San Timoteo Creek and Live Oak Creek traverse the south and southwesterly portions of the City. These streams flow generally through rural areas, after leaving the confines of the San Timoteo Canyon, the channel broadens to a wash, joining the Santa Ana River west of the City. The Zanja traverses the City, and project site, in an east-west direction and serves as the principle storm drain for the eastern and southeastern portions of the City. The Zanja travels through both natural- and concrete-bottom channels before it finally joins the Santa Ana River west of the project area.

The majority of the project area consists of impervious surfaces, including buildings, streets, parking areas and sidewalks. This limits the infiltration of precipitation and increases the rate of stormwater runoff. Consequently, natural drainage has been highly modified and is now controlled by engineering drainage works and flood control infrastructure. Surface flows within the project area consist of channelized storm flows, wastewater discharges, and all other flows that do not originate at an identifiable location (non-point). Existing stormwater drainage and conveyance infrastructure within the City is provided to the project site by the United States Army Corps of Engineers (USACE), San Bernardino Flood Control District (SBCFCD), and the City of Redlands Municipal Utilities and Engineering Department (RMUED).

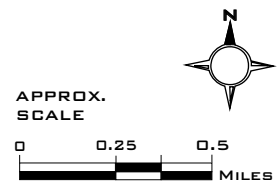
The project site is drained by the Zanja and its four major storm drains; the Oriental, Carrot, Texas, and Post Office Storm Drains, and a number of smaller drains throughout the project site. The Zanja is a flood protection facility that is owned and operated by the USACE and SBCFCD. The segment of the Zanja that traverses the project site begins near the intersection of Church Street and the Burlington Northern Santa Fe (BNSF) Railroad right-of-way and flows in a southwest direction until it meets 9th Street. From 9th Street to Texas Street, the Zanja flows parallel to Redlands Boulevard. The Zanja is an open channel from its origin to the Santa Ana River, except for the segment on the project site from 9th Street to Eureka Street, where it is an underground culvert that is beneath Redlands Boulevard.



LEGEND:

-  Proposed Specific Plan Area
-  100-Year Flood Zone

SOURCE: Federal Emergency Management Agency, 2008 and TAHA, 2011.



The Zanja is generally limited in its ability to contain water during storms and is prone to overflow. Historically, when flooding occurs on the project site it is attributed to the limited capacity of the 300 cubic feet per second (cfs) underground box inlet located beneath Redlands Boulevard. Increased development in unincorporated areas east of the project site has led to a reduction in the amount of permeable surfaces, and thus, increased the amount of storm runoff flowing into the City's storm drains. The increased development has put additional strain not only on the City's storm drain system, but the Zanja as well.¹¹

The RMUED maintains the local storm drains that serve the project site. The Oriental, Carrot, Texas, and Post Office storm drains collect and convey stormwater from the project site to the Zanja which eventually connects with the Santa Ana River west of the project site. The Oriental, Carrot, Texas, and Post Office storm drains collect and convey water are 24 to 30, 48, 66, and 60 inches in diameter, respectively.

Flooding and Inundation

The San Bernardino County Flood Control District (SBCFCD) was created in 1939 as a direct aftermath of the floods of 1938. The SBCFCD, which overlays the entire County covering both incorporated and unincorporated areas, is empowered with broad functions, including flood control and prevention. The authorizing Act that established the SBCFCD designates the Board of Supervisors of the County of San Bernardino to serve also as the Board of Supervisors of the SBCFCD, and provides that all county offices shall have corresponding duties and responsibilities for the SBCFCD. The project site is within Flood Control Zone 3.

The County of San Bernardino is a participant in the National Flood Insurance Program (NFIP). Communities participating in the NFIP must adopt and enforce minimum floodplain management standards, including identification of flood hazards and flooding risks. Participation in the NFIP allows communities to purchase low cost insurance protection against losses from flooding.

As discussed above, the Santa Ana River, San Timoteo, and Mission Zanga Creek systems collect and convey storm water from the City. These three creek systems have been identified as 100-year flood zones by FEMA. As illustrated in **Figure 4.13-1**, the Santa Ana River System and the San Timoteo System are located north and southwest of the project site, respectively, and do not represent a flood risk to the project site. The Zanja traverses the project site and represents the greatest risk for flooding to the project site.¹² The area around the Zanja includes FEMA zones A and AO.¹³ The FEMA zone AO flood zone depth within the project site is one foot. Areas in Zone A have a one percent annual chance of flooding and a 26 percent chance of flooding over a 30-year period. Zone AO includes river or stream flood hazard areas, and areas with a one percent or greater chance of shallow flooding each year, usually in the form of sheet flow. These areas have a 26 percent chance of flooding over a 30-year period. Flood control projects implemented by the USACE, SBCFCD, and the City have greatly reduced potential flood hazards. However, the potential for flooding during moderate (i.e., not unusually heavy) storm events still exists and is of primary concern for the project site.

Water Supply and Conservation

The region has a diverse mix of both local and imported water supply sources. Local water sources include water recycling, groundwater storage and conjunctive use, conservation, brackish water desalination, water transfer and storage and infrastructure enhancements. City water sources include local

¹¹City of Redlands Quality of Life Department, *City of Redlands Flood Plan*, July 15, 2008.

¹²City of Redlands, *City of Redlands Local Hazards Mitigation Plan*, March 4, 2005.

¹³Federal Emergency Management Agency, *Map Service Center: Map ID 06071C8716H and 06071C8712H*, Available at: <http://www.fema.gov/>, accessed June 7, 2010.

groundwater, local surface water, imported water from the State Water Project (SWP), and recycled water. These resources allow flexibility in managing supplies and resources in wet and dry years.

Water demand in California can generally be divided between urban, agricultural, and environmental uses. Within the project area, domestic water supply is comprised of both surface and groundwater. Annual water demand fluctuates in relation to available supplies. During prolonged periods of drought, water demand can be reduced significantly through conservation measures, while in years of above average rainfall demand for imported water usually declines. Increases in water demand are primarily due to population increases. According to the California Water Plan Update 2005, under a baseline scenario following current trends in use and growth, water demand in California will increase by approximately 3.5 million acre feet (maf) by 2030.

Water demand is influenced not only by population size, but also by socio-economic characteristics, meteorological conditions, geographical distribution of population and water conservation practices. For example the average residential per capita use ranges from 97 gallons per person per day in coastal areas, to 162 gallons per day in desert areas.¹⁴ Consumption within the City of Redlands is estimated to be 275 gallons per capita per day.¹⁵ **Table 4.13-1** provides factors that influence water demand.

TABLE 4.13-1 FACTORS INFLUENCING PER CAPITA WATER USE	
Factors that increase per capita water use	Factors that decrease per capita water use
Increased household income	Increased household size
Increased labor force	Increased proportion of multi-family housing
Increased commercial development	Changes in the industrial mix
Growth in the inland region	Urban water consumption
SOURCE: SCAG Draft Program Environmental Impact Report for the Regional Transportation Plan, 2008.	

Although the City’s potable wells comprise about 40 percent of the water supply, it is estimated that over half of the City’s wells are contaminated by agricultural nitrates, and must be considered non-potable, without treatment. Most contaminated wells are located south of the Santa Ana River, where the soil is rocky and porous and has a rapid infiltration rate.

Imported SWP water is potentially available to the project area, although this source is more costly than local sources. Historically the City has used imported water only as a short-term supplemental source. The San Bernardino Valley Municipal Water District (SBVMWD) is the purveyor of SWP to the project area. SWP water is transported from the Feather River in Northern California along the California Aqueduct to the aqueduct’s east branch, where it is conveyed eastward to the project area via a 17-mile Foothill Pipeline. The maximum yearly allotment of SWP water from which the City of Redlands may draw from the SBVMWD is 102,600 acre-feet. The actual amount of SWP water received by the City varies from year to year depending upon the availability of local groundwater supplies and the status of statewide water supply conditions (i.e., drought conditions).

Conservation is an important part of ensuring adequate water supply for future generations. Urban conservation measures include reducing landscape water use and installing low flow toilets and showerheads in new development. Best Management Practices to conserve water in commercial, institutional, and industrial uses could further reduce demand by an estimated three to five percent. Encouragement of the use of native and drought-tolerant plants, increased water conservation credits,

¹⁴Southern California Association of Governments. *Draft Program Environmental Impact Report for the Regional Transportation Plan*, 2008 .

¹⁵City of Redlands Master Environmental Assessment, 6-4 Water Quality, 1995.

funding for innovative conservation ideas in industry, tiered water rate structures, “smart” irrigation controllers and rebates for conservation hardware are all methods being implemented for increased conservation.

REGULATORY FRAMEWORK

Federal

Federal Water Pollution Control Act (Clean Water Act, or CWA). In 1972, the Federal Water Pollution Control Act (also referred to as the Clean Water Act, or CWA) was amended to provide that the discharge of pollutants to waters of the United States from any point (such as discharge from an industrial facility) or non-point (surface and farmland water runoff) source is unlawful unless the discharge is in compliance with a National Pollutant Discharge Elimination System (NPDES) permit. In November 1990, the USEPA published final regulations that established stormwater permit application requirements for specified categories of industries. With subsequent amendments, current regulations provide that discharges of stormwater to waters of the United States from industrial activities and from construction activities that encompass one acre or more of soil disturbance are effectively prohibited unless the discharge is in compliance with a NPDES permit. Federal regulations allow two permitting options for stormwater discharges (individual permits and general permits). The State Water Resource Control Board (SWRCB) has elected to adopt one statewide general permit for construction activity at this time. The General Construction Activities Stormwater Permit (GCASP) applies to all stormwater discharges associated with construction activity, except for those on tribal lands, those in the Lake Tahoe Hydrologic Unit, and those performed by the California Department of Transportation (Caltrans). Currently, the GCASP requires all dischargers where construction activity disturbs one acre or more to conduct the following:

- Develop and implement a Stormwater Pollution Prevention Plan (SWPPP), which specifies Best Management Practices (BMPs) that will prevent all construction pollutants from contacting stormwater and with the intent of keeping all products of erosion from moving off-site into receiving waters;
- Eliminate or reduce non-stormwater discharges to storm sewer systems and other waters of the United States; or
- Perform inspections of all BMPs.

The federal CWA was enacted with the primary purpose of restoring and maintaining the chemical, physical, and biological integrity of the Nation’s waters. The CWA also directs states to establish water quality standards for all “waters of the United States” and to review and update such standards on a triennial basis. Section 319 mandates specific actions for the control of pollution from nonpoint sources. The USEPA has delegated responsibility for implementation of portions of the CWA, including water quality control planning and control programs, such as the NPDES Program, to the SWRCB and the Regional Water Quality Control Board (RWQCB). Section 303(c)(2)(b) of the CWA requires states to adopt water quality standards for all surface waters of the United States based on the water body’s designated beneficial use. Where multiple uses exist, water quality standards must protect the most sensitive use. Water quality standards are typically numeric, although narrative criteria based upon biomonitoring methods may be employed where numerical standards cannot be established or where they are needed to supplement numerical standards. Water quality standards applicable to the proposed project are listed in the California RWQCB’s Basin Plan.

Section 303(d) and Total Maximum Daily Loads (TMDLs). Section 303(d) of the CWA bridges the technology-based and water quality-based approaches for managing water quality. Section 303(d) requires that states make a list of waters that are not attaining standards after the technology-based limits are put in place. For waters on this list (and where the USEPA administrator deems they are appropriate),

the states are to develop TMDLs. TMDLs are established at the level necessary to implement applicable water quality standards. A TMDL must account for all sources of pollutants that cause the water to be listed. Federal regulations require that TMDLs, at a minimum, account for contributions from point sources and nonpoint sources.

National Pollutant Discharge Elimination System (NPDES). The goal of the NPDES diffuse source regulations is to improve the quality of stormwater discharged to receiving waters to the “maximum extent practicable” through the use of BMPs. The NPDES permit system was established in the CWA to regulate point source discharges (a municipal or industrial discharge at a specific location or pipe) and certain types of diffuse source dischargers. As defined in the federal regulations, nonpoint sources are generally exempt from federal NPDES permit program requirements. Nonpoint pollution sources are diffuse and originate over a wide area rather than from a definable point. Nonpoint pollution often enters receiving water in the form of surface runoff and is not conveyed by way of pipelines or discrete conveyances. Urban stormwater runoff and construction site runoff, however, are diffuse-sources regulated under the NPDES permit program because they discharge to receiving waters at discrete locations in a confined conveyance system. Sections 401 and 402 of the CWA contain general requirements regarding NPDES permits. Section 307 of the CWA describes the factors that the USEPA must consider in setting effluent limits for priority pollutants. For point source discharges, each NPDES permit contains limits on allowable concentrations and mass emissions of pollutants contained in the discharge. The Redlands Wastewater Treatment Plant (WWTP) would be a point source discharger subject to an individual NPDES permit if it discharged directly to a surface water. However, the WWTP does not discharge to surface water and, therefore, does not require an individual NPDES permit. For diffuse-source discharges (e.g., municipal stormwater and construction runoff), the NPDES program establishes a comprehensive stormwater quality program to manage urban stormwater and minimize pollution of the environment to the maximum extent practicable. The NPDES program consists of (1) characterizing receiving water quality, (2) identifying harmful constituents, (3) targeting potential sources of pollutants, and (4) implementing a Comprehensive Stormwater Management Program. State implementation of the NPDES program as it relates to the proposed project is discussed below under State and Regional regulations.

Flood Insurance Rate Maps. Flood Insurance Rate Maps (FIRM) are prepared by the Federal Insurance Administration of the Department of Housing and Urban Development (HUD) after a risk study for a community has been completed and the risk premium rates have been established. The maps indicate the risk premium zones applicable in the community and when those rates are effective. They are used in making flood plain determinations and to determine if a proposed action is located in the base or critical action flood plain, as appropriate. The base floodplain is defined as “the area subject to flooding by the flood or tide having a one percent chance of being exceeded in any given year.” An encroachment is defined as “an action within the limits of the base floodplain.”

State

Responsibility for the protection of water quality in California rests with the SWRCB and nine RWQCBs. The SWRCB establishes statewide policies and regulations for the implementation of water quality control programs mandated by federal and State water quality statutes and regulations. The RWQCBs develop and implement Water Quality Control Plans (Basin Plans) that consider regional beneficial uses, water quality characteristics, and water quality problems. In cases where the Basin Plan does not contain a standard for a particular pollutant, other criteria are used to establish a standard. Other criteria may be applied from SWRCB documents (e.g., the Inland Surface Waters Plan and the Pollutant Policy Document, California Toxics Rule) or from USEPA water quality criteria developed under Section 304(a) of the CWA. Numeric criteria are required by the CWA for many priority toxic pollutants. To fill in the gap between the water quality control plans and CWA requirements, on May 18, 2000, the USEPA promulgated the California Toxics Rule based on the Administrator’s determination that numeric criteria

are necessary in the State of California to protect human health and the environment. These federal criteria are numeric water quality criteria for priority toxic pollutants and other provisions for water quality standards legally applicable in the State of California for inland surface waters, enclosed bays, and estuaries for all purposes and programs under the CWA.

Section 401 of the CWA requires water quality certification from the SWRCB or from a RWQCB when a project requires a CWA Section 404 permit. Section 404 of the CWA requires a permit from the USACE to discharge dredged or fill material into waters of the United States.

Porter-Cologne Water Quality Control Act. The Porter-Cologne Water Quality Control Act establishes the SWRCB and each RWQCB as the principal State agencies for coordinating and controlling water quality in California. Specifically, the Porter-Cologne Water Quality Control Act authorizes the SWRCB to adopt, review, and revise policies for all waters of the state (including both surface and groundwaters) and directs the RWQCBs to develop regional Basin Plans. Section 13170 of the California Water Code also authorizes the SWRCB to adopt water quality control plans on its own initiative.

Regional

Basin Plan for the California Regional Water Quality Control Board, Santa Ana Region (Basin Plan). The project site is within the jurisdiction of the Santa Ana RWQCB. The Santa Ana RWQCB provides permits that affect surface waters and groundwater. Under Section 303(d) of the CWA, the Santa Ana RWQCB is also responsible of the CWA for protecting surface waters and groundwater from both point and non-point sources of pollution within the project site and for establishing water quality standards and objectives in its Basin Plan that protect the beneficial uses of various waters. The State has developed TMDLs, which is a calculation of the maximum amount of a pollutant that a waterbody can have and still meet Water Quality Objectives (WQOs) established in the Basin Plan, in order to protect the valuable uses of its waters.

NPDES General Construction Activity Stormwater Permit (GCASP). The SWRCB permits all regulated construction activities under NPDES GCASP for stormwater discharges associated with construction activity (Order No. 98-08-DWQ (1999)). This Order requires that, prior to beginning any construction activities, the permit applicant must obtain coverage under the GCASP by preparing and submitting a Notice of Intent (NOI) and appropriate fee to the SWRCB. Additionally, protection is provided through preparation of an adequate SWPPP. A separate NOI must be submitted to the SWRCB for each construction site.

Construction activities subject to the NPDES GCASP include clearing, grading, and disturbances to the ground, such as stockpiling or excavation, that result in soil disturbances of at least one acre of total land area. Because construction of the proposed project would cumulatively disturb more than one acre, all improvements and construction activities would be subject to these permit requirements.

The SWPPP, which specifies BMPs to prevent all construction pollutants from contacting stormwater and with the intent of keeping all products of erosion from moving off-site into receiving waters, has two major objectives: (1) to help identify the sources of sediment and other pollutants that affect the quality of stormwater discharges and (2) to describe and ensure the implementation of BMPs to reduce or eliminate sediment and other pollutants in stormwater as well as nonstormwater discharges. The SWPPP must include BMPs that address source control, and, if necessary, must also include BMPs that address specific pollutant control. The SWPPP includes a description of (1) the site, (2) erosion and sediment controls, (3) means of waste disposal, (4) implementation of approved local plans, (5) control of post-construction sediment and erosion control measures and maintenance responsibilities, and (6) nonstormwater management controls. Dischargers are also required to inspect their construction sites before and after

storms to identify stormwater discharge associated with construction activity and to identify and implement controls where necessary.

BMPs are intended to diminish impacts to the Maximum Extent Practicable (MEP), which is a standard developed by Congress to allow regulators the flexibility needed to shape programs to the site-specific nature of municipal stormwater discharges. Reducing impacts to the MEP generally relies on BMPs that emphasize pollution prevention and source control, with additional structural controls as needed.

Local

City of Redlands Municipal Code. The Redlands Municipal Code (RMC), Title 13, Chapter 13.52, was recently modified to include a comprehensive stormwater ordinance that prohibits illicit discharges to the storm drain system. It is prohibited to:

- Discharge directly or indirectly into the storm drain system any stormwater or other solid, liquid or gaseous matter in violation of any law, rule, regulation, permit, order or other requirement of any federal, state, county, municipal or other governmental entity or agency;
- Discharge nonstormwater directly or indirectly to the storm drain system or any street, or lined or unlined drainage ditch which leads to a public storm drain, unless such discharge is permitted by an NPDES permit or a city permit. If such discharge is permitted by an NPDES permit, but causes the city to violate any portion of its NPDES permit for stormwater discharges, such discharge is also prohibited;
- Throw, deposit, leave, maintain, keep or permit to be thrown, deposited, placed, left or maintained, any refuse, rubbish, garbage, or other discarded or abandoned objects, articles, and accumulations, in or upon any street, alley, sidewalk, storm drain, inlet, catch basin, conduit or other drainage structures, business place, or upon any public or private lot of land in the city, so that the same might be or become a pollutant; or
- Throw or deposit litter in any fountain, pond, lake, stream or any other body of water in any park, or elsewhere within the city. (Ord. 2274 § 1, 1995)

City of Redlands General Plan. The City of Redlands' General Plan contains several policies regarding water quality and the risks associated with flooding in the Health and Safety Element. Specifically, it provides assessment of natural and manmade hazards associated with flooding and dam inundation, as well as providing a framework and guiding policies to guide future development and strengthen existing regulations within the City. The guiding policies in regards to water quality and flooding are as follows:

- Policy 8.20a: Work with the local and regional water agencies to improve and enhance groundwater quality in the region. The RWQCB's Water Quality Control Plan: Santa Ana River Basin, 1984, with amendments through 1994, specifies regional water quality objectives and implementation measures.
- Policy 8.20b: Oppose approval of development projects within the Planning Area that would rely on package wastewater treatment plants. City of Redlands wastewater treatment capacity can be expanded to serve the Planning Area at buildout. Separate, smaller package plants typically are more difficult to maintain and operate at comparable standards and may pose a threat to groundwater quality. Expansion to the Redlands sewage treatment plant in 1994 provided capacity for 15 years of growth at 100 gallons per capita per day. Rapid development in the East Valley Corridor could require further expansion before then.

- Policy 8.20c: Where feasible given flood control requirements, maintain the natural condition of waterways and flood plains to ensure adequate groundwater recharge and water quality. This policy is a restatement of a part of Policy 8.40d in Section 8.40, Drainage and Flooding. An increase in impervious surfaces works to diminish percolation of water into the aquifer. The flushing action of adequate flows is necessary to preserve water quality. Preservation of soft or natural-bottom channels aids in percolation and recharge, maintaining water quality. See also Policy 7.211, Open Space and Conservation Element
- Policy 8.20h: State Water Project water shall be considered, to the extent possible, as supplemental water, and shall be utilized only as necessary to meet demand.
- Policy 8.20i: The City will actively protect all water supply sources, to the extent legally possible, from contamination and from a diminution of supply, will undertake all necessary steps to provide a secure supply of high quality water to meet the present and future needs of its citizens.
- Policy 8.40a: Protect lives and property and ensure that structures proposed for sites located on floodplains subject to the 100-year flood are provided adequate protection from floods.
- Policy 8.40b: Preserve as open space those areas which cannot be mitigated for flood hazard.
- Policy 8.40d: Where feasible given flood control requirements, maintain the natural condition of waterways and flood plains to ensure adequate groundwater recharge and water quality, preservation of habitat, and access to mineral resources/
- Policy 8.40e: Coordinate with the U.S. Army Corps of Engineers and San Bernardino throughout construction, mitigation, and operation of the various components/projects that make up the “Santa Ana River Mainstem Project” that will directly affect the Planning area. These projects include the following: the Seven Oaks Dam, the improvement to the Mill Creek levees (completed), and the planned improvements along the three reaches of the San Timoteo Creek Project. In addition to the coordinated effort on the projects mentioned above between the U.S. Army Corps of Engineers and the San Bernardino County Flood Control District, the City of Redlands Public Works Department must be actively included in the development of any/all proposed flood control facilities along the reaches of the Mission Zanja Creek system.
- Policy 8.40f: Support the intent of the County of San Bernardino’s flood control policies as specified in the County General Plan.

THRESHOLDS OF SIGNIFICANCE

The proposed project would have a significant impact on water resources if it would:

- Violate any water quality standards or waste discharge requirements;
- Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table;
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner, which would result in substantial erosion or siltation on- or off-site;

- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site;
- Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff;
- Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map;
- Place within a 100-year flood hazard area structures which would impede or redirect flood flows;
- Expose people or 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; and/or
- Expose people or structures to a significant risk of loss, injury or death involving inundation by seiche, tsunami, or mudflow.

IMPACTS

Water Quality

Construction. Development under the proposed project would include grading and other earth moving activities, which would expose on-site soils to erosion processes. This in turn could lead to an increase in suspended solids from site runoff, as unprotected disturbed soil is susceptible to high rates of erosion from wind and rain, as well as from such activities as hosing down of construction sites. Additionally, construction activities could lead to exposure of contaminated materials/soils which if present on-site could impact surface water quality during storm events.

However, all projects proposed in the project site would be required to comply with City and State regulations regarding site runoff and water quality protection, including NPDES requirements and implementation of BMPs. These permits require development and implementation of a SWPPP during construction and use of permanent BMPs to address post-construction runoff. Therefore, the proposed project would result in less-than-significant construction impacts related to water quality.

Operation. The project site is an urbanized area with development that likely already contributes non-point source pollution such as motor oil, heavy metals, fertilizers and pesticides, human littering, animal waste and other pollutants typical of developed commercialized areas. These pollutants are washed from streets, parking lots and garages during rainfall events that create sufficient runoff to carry the waste materials. These pollutants may also be washed from the streets during non-storm events such as hosing down a walkway or parking garage surface. These pollutants have the potential to degrade water quality and may result in significant impacts.

All projects proposed under the Downtown General Plan and Specific Plan No. 45 Amendments would be required to comply with NPDES standards to ensure pollutant loads from proposed projects do not exceed TMDLs for downstream receiving waters. New development projects would be required by the County of San Bernardino and the Santa Ana RWQCB Order Number R8-2010-0036 to prepare a Water Quality Management Plan (WQMP) that includes BMPs for source control, pollution prevention, and/or structural treatment BMPs.¹⁶ Therefore, the proposed project would result in less-than-significant operational impacts related to water quality.

¹⁶Santa Ana Regional Water Quality Control Board, *Adopted Order No 2010-0036*, Available at: http://www.swrcb.ca.gov/rwqcb8/board_decisions/adopted_orders/orders/2010/10_036_SBC_MS4_Permit_01_29_10.pdf, accessed June 9, 2010.

Groundwater

The proposed project would be served by the RMUED that utilizes water from the Bunker Hill and Yucaipa Groundwater Sub-basins. Both the Bunker Hill and Yucaipa Sub-basins are adjudicated basins, managed according to a court decree by the Watermaster Program that ensures water is allocated by established rights. Groundwater use as a result of implementation of the proposed project would be in accordance with existing plans and projections of the RMUED and would not substantially deplete groundwater supplies (refer to Section 4.12 *Utilities and Service Systems* of this Program EIR for detailed analysis of water supplies).

The majority of the project site is developed primarily with impervious surfaces and is currently not used for groundwater recharge activities. As discussed above, recharge into the Bunker Hill Sub-basin has historically resulted from infiltration of runoff from the San Gabriel and San Bernardino Mountains. The Santa Ana River, Mill Creek, and Lytle Creek contribute more than 60 percent of the total recharge to the groundwater system. Lesser contributors include Cajon Creek, San Timoteo Creek, and most of the creeks flowing southward out of the San Bernardino Mountains. The project site is not located within the main groundwater recharge areas or within include any spreading basins used for recharge of the Bunker Hill Sub-Basin. Development associated with the proposed project is not anticipated not result in the interference with the Bunker Hill Sub-Basin groundwater recharge. Therefore, the proposed project would result in a less-than-significant impact related to groundwater supply or recharge.

Under existing conditions, there would be little, if any, potential for natural groundwater recharge to occur, and there would be no facilitated groundwater recharge. Under the proposed project, impervious surface characteristics would not be greatly altered, and no facilitated groundwater recharge facilities are planned or necessary. However, the proposed project includes development incentives including FAR bonuses for projects that are eligible for LEED Silver designation and incorporate roofs for stormwater management. For projects that cannot meet their opens space requirements, permits can be obtained by building green features including creating a stormwater parkway (a dedicated area in the public right of way with permeable surfaces and plants intended to capture and filter stormwater runoff from streets). Improvement such as these would offset the loss of permeable surfaces and improve overall drainage on site. Therefore, the proposed project would result in a less-than-significant impact related to groundwater supplies or recharge.

Surface Water Drainage

Drainage Patterns. The majority of the project area is developed with primarily impervious surfaces. Drainage for the project site is provided by the RMUED through existing stormwater collection and conveyance systems. The Zanja and its four major storm drains provide the majority of the drainage in the project site. Construction activities associated with development under proposed project could result in localized changes to drainage patterns. In particular, vacant lots that drain via sheet flow would be developed with collection, treatment and conveyance systems. These changes could increase the amount and rate of discharge into the storm drain system. Individual projects developed within the project area would include project design features that would aid in the conveyance of stormwater to existing facilities. All runoff would continue to be conveyed via streets and gutters to storm drain locations within the project area.

Individual projects within the project area would be required to comply with the provisions of the RMC related to water quality, including RMC Chapter 13.54 Storm Drains, which regulates stormwater and non-stormwater discharges into the City storm drain systems by prohibiting non-permitted discharges to the storm sewers, controlling the discharge to storm sewers from spills, dumping or disposal of materials other than stormwater, and reducing pollutants in stormwater discharges, as well as RMC Section 13.54.100 Compliance with BMPs, which requires that all activities that could adversely affect the storm

drain system must comply with all adopted BMPs. The proposed project would also comply with all State and federal laws related to water quality, such as the requirements of the NPDES.

Compliance with existing regulations would ensure that the proposed project would not result in substantial erosion, siltation, or flooding due to changes in existing drainage patterns. Therefore, the proposed project would result in a less-than-significant impact related to drainage.

Storm Drain Systems. Individual projects would contain construction activities, such as excavation and trenching for foundations and utilities, grubbing and clearing, soil compaction and moving, cut and fill activities, and grading that would agitate soil but would not substantially alter overall permeability at the site. Sediment-laden runoff from construction and post-construction operations at the site could enter the City's storm drain system, and contribute to degradation of water quality. Urban contaminants in runoff from the proposed project area could lower the quality of stormwater runoff both during and after construction. Erosion and sedimentation are major visible water quality impacts attributable to construction activities. Other pollutants such as nutrients, trace metals, and hydrocarbons can attach to sediment and be transported with the particulate fraction.

In an effort to improve surface runoff quality and improve site drainage, the proposed project identifies a number of stormwater improvement guidelines including; the use permeable surfaces to absorb stormwater and recharge groundwater, installation of green roofs, stormwater parkways (areas in the public right of way with permeable surfaces and plants intended to capture and filter stormwater runoff), rain gardens, bioswales, and stormwater retention ponds. Additionally, individual projects would be required to comply with the provisions of the RMC related to water quality, including RMC Chapter 13.54 and 13.54.100, as discussed above, and preparation of WQMP in accordance with the County of San Bernardino and the Santa Ana RWQCB Order Number R8-2010-0036. Compliance with permit requirements and existing ordinances would ensure that the proposed project would not result in additional sources of polluted runoff.

The proposed project includes an expansion of the existing storm drain collection and conveyance infrastructure serving the project site. The proposed project includes two major storm drain projects to ensure that stormwater runoff is adequately conveyed off the project site. The first proposed storm drain project includes the installation of a storm drain beginning at 9th Street and ending to the east of Texas Street that would run parallel to Redlands Boulevard and between Oriental Avenue and Redlands Boulevard. The second proposed storm drain project includes the installation of a storm drain beneath 6th Street from the BNSF right-of-way to the previously mentioned proposed storm drain. However, funding for these storm drain improvements has not been identified, and improved stormwater conveyance based on these improvements is speculative. Nonetheless, developers of residential, retail, and commercial uses associated with the proposed project are expected to comply with Chapter 3.56 of the RMC. Compliance with Chapter 3.56 of the RMC would ensure that (a) any public facilities and improvements would be available to serve new developments associated with the proposed project and (b) that storm drain infrastructure on developed properties would be in compliance with the City's storm drain master plan and thus ensure stormwater is adequately conveyed off the project site. Therefore, the proposed project would result in a less-than-significant impact related to storm drain systems.

Flooding and Inundation

100-Year Flood Hazards. The project area is located within the FEMA-defined 100-year flood hazard area, as discussed above. The Zanja traverses the project site and represents the greatest risk for flooding to the project site. Flood control projects implemented by the USACE, SBCFCD, and the City have greatly reduced potential flood hazard. The majority of the project area is developed with urban uses. Implementation of the proposed project would include redevelopment of existing sites and new development of underdeveloped sites, resulting in placement of housing within the Zanja 100-year flood

plain. The proposed project includes Flood Control Standards that will raise the ground floors on all new retail, commercial, and multi-family development above ground level to a safe height. Ground levels will be required to comply with safe levels as established by FEMA Flood Zone maps. Additionally, Chapter 15.32 of the RMC includes standards for residential construction that include elevations above flood depths for each flood zone. Therefore, the proposed project would result in a less-than-significant impact related to placement of housing in a 100-year flood plain.

The primary cause of flooding would be an overflow of the Zanja in a major storm event. In the event of a major flood, flooding would be sufficiently widespread that water would likely be standing within the downtown area, and existing drainage facilities would be overwhelmed with water flowing into the area. The downtown streets function to some extent as drainage facilities during routine rain events. When floodwaters start to recede, the area's streets would provide the primary conduit to convey standing floodwaters, until such time as water levels drop to allow infrastructure built for this purpose to resume its function. Future development under the proposed project would generally not impede or redirect floodwater flows within the City's overall drainage system. There are no proposed major street improvements within the proposed project that would significantly alter existing drainage patterns that would impede or redirect floodwater flows. The two drainage projects proposed under the Downtown General Plan and Specific Plan No. 45 Amendments would connect to existing infrastructure for conveyance of floodwaters downstream. Therefore, the proposed project would result in a less-than-significant impact related to the placement of structures that would impede or redirect floodwaters.

Levee or Dam Failure. The project site is not located within a levee failure or dam inundation area.¹⁷ Consequently, implementation of the proposed project would not 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 of dam. Therefore, no impact related to levee or dam failure would occur.

Seiches, Tsunamis and Mudflows

Seiches. Seiches are waves that rock back and forth in enclosed bodies of water, such as lakes, reservoirs, bays, or harbors. The project area is not located near such bodies of water. The closest enclosed bodies of water that could result in earthquake-induced seiches are Big Bear Lake, Lake Arrowhead, and Lake Perris. The closest of these lakes, which is Lake Perris, is almost 18 miles away from the project site, and is located hydrologically downstream (and across two major interstate highways), which makes risks from a seiche very unlikely. Lake Arrowhead and Big Bear Lake are each approximately 30 miles from the project site, and there have never been any documented impacts from seiches in Redlands, despite many large earthquakes in the Southern California area. Therefore, no impact related to seiches would occur.

Tsunami. A tsunami is a spontaneous water wave that occurs when hundreds to more than a thousand square miles of submerged continental shelf or slope is rapidly displaced vertically during a large earthquake or submarine slide. Because the project site is located almost 80 miles inland of the Pacific Ocean, the project site would not be subject to tsunami inundation. Therefore, no impact related to tsunamis would occur.

Mudflow. Mudflow hazards typically occur where unstable hill slopes are located above gradient or where site soils are unstable and subject to liquefaction, and when substantial rainfall saturates soils causing failure. The project site is not located near steep unstable hill slopes susceptible to mudslides. The closest hillsides up-gradient from the project site are approximately ten miles to the north, and are separated from the project site by urban development, including residential uses, streets, and storm drain

¹⁷County of San Bernardino, *General Plan Update: Hazards Overlay Map 2007*, Available at: <http://www1.sbcounty.gov/landuseservices/General%20Plan%20Update/Mapping/2-Hazard%20Overlays%20Maps/FH31B.pdf>, accessed June 9, 2010.

systems, which makes it unlikely that the project site would experience any affects caused by mudslides. Therefore, no impact related to mudflow would occur.

MITIGATION MEASURES

Water Quality

Impacts related to water quality would be less than significant. No mitigation measures are required.

Groundwater

Impacts related to groundwater would be less than significant. No mitigation measures are required.

Drainage Patterns

Impacts related to drainage patterns would be less than significant. No mitigation measures are required.

Storm Drain Systems

Impacts related to storm drain systems would be less than significant. No mitigation measures are required.

Flooding and Inundation

Impacts related to flooding and inundation would be less than significant. No mitigation measures are required.

Levee or Dam Failure

No impacts related to levee or dam failure would occur. No mitigation measures are required.

Seiches, Tsunamis and Mudflows

No impacts related to seiches, tsunamis, or mudflows would occur. No mitigation measures are required.

CUMULATIVE IMPACTS

Water Quality

The geographic context for analysis of cumulative water quality impacts is the Santa Ana River Watershed. Proposed projects under the Downtown General Plan and Specific Plan No. 45 Amendments will ultimately result in stormwater discharge to the Santa Ana River and its associated tributaries. The most significant contributors to water quality degradation in the Santa Ana River Watershed are high concentrations of nitrogen and TDS. Construction and operational activities and cumulative projects could have the potential to contribute to an overall cumulative impact on water quality. However, cumulative projects and proposed projects under the Downtown General Plan and Specific Plan No. 45 Amendments would be required to comply with existing NPDES permitting processes, the Santa Ana RWQCD Basin Plan, and City and County Ordinances for stormwater quality controls, and will not contribute significantly to watershed-wide water quality impairment. Therefore, no significant overall cumulative impact would occur, and the proposed project would not result in a cumulatively considerable contribution. Therefore, impacts related to water quality would not be cumulatively considerable.

Groundwater

Bunker Hill Sub-basin. The geographic context for analysis of cumulative groundwater impacts are the limits of the Bunker Hill and Yucaipa Sub-basins. The Bunker Hill Sub-basin is an adjudicated basin with extraction and recharge agreements that are managed by the Watermaster Program. The City uses both groundwater and surface water resources to meet their water supply demands. The 2005 Urban Water Management Plan (2005 UWMP) predicts a surplus of over 8,000 acre feet per year (AFY) at full build out of its General Plan in 2030. The City recycles water from its residents for non-potable uses and the General Plan policy and RMC include requirements for water conservation. Water desalination and clean up efforts currently underway would only increase the available water supply. Consequently, the City has more than adequate water supplies to meet demands without causing or contributing to depletion of groundwater resources.

The primary source of recharge of the Bunker Hill Sub-basin occurs from stream and tributary recharge, spreading basin recharge, and upland runoff recharge. Direct precipitation recharge is not a significant component of groundwater recharge.¹⁸ Consequently increases in impervious surfaces from development in the sub-basin would not be expected to substantially affect groundwater recharge. Surplus water supplies for the City is predicted to be over 8,000 AFY, while groundwater recharge through precipitation is only predicted to be about 1,000 AFY.¹⁹ Furthermore, local runoff contributes to more groundwater recharge than direct precipitation percolation.²⁰ Local runoff recharge would offset the reduction in direct percolation recharge. Consequently, development within the Bunker Hill Sub-basin is not expected to substantially affect groundwater recharge.

Development under the proposed project and cumulative projects using sub-basin groundwater would be subject to the adjudication. As detailed in the impacts analysis, the proposed project would not have a substantial effect on recharge of the Bunker Hill Sub-basin. Additionally, proposed projects would comply with all relevant regulatory requirements to protect groundwater resources such as RMC Chapter 13.54 Storm Drains, which regulate stormwater and non-stormwater discharges into the City storm system, as well as BMPs outlined in the RMC. Therefore, impacts related to the Bunker Hill Sub-basin groundwater would not be cumulatively considerable.

Yucaipa Sub-basin. Unlike the Bunker Hill Sub-basin, the Yucaipa Sub-basin is not an adjudicated basin and a groundwater management plan has not yet been implemented. Continued development within the region could contribute to depletion of this groundwater resource. However, when the groundwater management plan is implemented it would require restrictions on groundwater pumpage depending upon prevailing water rights. If the City does not have a prior right to this water compared to other water users, it would have to reduce or eliminate use of this water resource if the groundwater basin proceeds into overdraft conditions.

The City relies on the Yucaipa Sub-basin for a relatively small (1,000 AFY) amount of water and the 2005 UWMP does not project an increased reliance on this water supply for their 2030 demand. The 2005 UWMP predicts a surplus of over 8,000 AFY. Elimination of the 1,000 AFY from the Yucaipa Sub-basin would not substantially affect the City's water supply. Unless there is an operating groundwater management plan for the sub-basin, development and demand increase in the area could potentially lead to significant cumulative impacts. However, the City's cumulative contribution to these

¹⁸United States Geological Society, *Hydrology, Description of Computer Models, and Evaluation of Selected Water-Management Alternatives in the San Bernardino Area, California*, 2005, Available at: <http://pubs.usgs.gov/of/2005/1278/pdf/ofr2005-1278.pdf>, accessed June 11, 2010.

¹⁹City of Redlands, *Urban Water Management Plan*, 2005.

²⁰United States Geological Society, *Hydrology, Description of Computer Models, and Evaluation of Selected Water-Management Alternatives in the San Bernardino Area, California*, 2005, Available at: <http://pubs.usgs.gov/of/2005/1278/pdf/ofr2005-1278.pdf>, accessed June 11, 2010.

impacts would not be cumulatively considerable as their reliance on the Yucaipa Sub-basin is minimal and not anticipated to increase. Furthermore, the projected surplus in the 2005 UWMP can accommodate full development under the existing General Plan, including any additional demand that may be created by implementation of the proposed project.

Consequently, although cumulative impacts on this basin could be significant, the proposed project would not contribute considerably to cumulative impacts in this groundwater basin because it would not increase current extractions beyond existing conditions and would reduce extractions if required by any groundwater management plan. The proposed project is not located within the Yucaipa Sub-basin and would, therefore, have no effect on the Yucaipa sub-basin groundwater recharge. Additionally, projects would comply with all relevant regulatory requirements to protect groundwater resources such as RMC Chapter 13.54 Storm Drains, which regulate stormwater and non-stormwater discharges into the City storm system, as well as BMPs outlined in the RMC. Therefore, impacts related to the Yucaipa Sub-basin groundwater would not be cumulatively considerable.

Surface Water Drainage

Drainage Patterns. Construction of cumulative projects could lead to conversion of vacant land or agricultural land or redevelopment of underutilized land that would result in grading that could alter surface drainage characteristics that could in turn increase erosion and sediment transport. All cumulative projects would be required to comply with the NPDES permit process that requires preparation of a SWPPP with construction BMPs to reduce erosion and sediment transport for projects that disturb more than one acre. Additionally, all development projects would have to comply with the Stormwater Quality Management Program including preparation of a site specific WQMP, which incorporates stormwater quality BMPs for sediment and erosion control and compliance with local Municipal Codes, the Basin Plan, and any TMDLs. Implementation of existing regulations would ensure that potential cumulative construction impacts from erosion or siltation on drainage patterns are less than significant. As discussed above, proposed projects would be required to comply with existing regulatory requirements for stormwater discharge and impacts are not cumulatively considerable. Therefore, impacts related to erosion and siltation on drainage patterns would not be cumulatively considerable.

Local Municipal Codes incorporate design review requirements that would likely prevent substantial on-site flood effects. However, increased impervious surfaces due to cumulative development within the watershed could increase the amount and rate of stormwater runoff that may cause or contribute to downstream flooding. Planned drainage capacities have been determined assuming a full build-out scenario. All development within the Santa Ana River Watershed Management Area must comply with the requirements of the NPDES permit, and other pertinent local drainage and conveyance ordinances. Related projects are also required to adhere to WQMP BMPs that are aimed at increasing the retention of water on-site and minimizing runoff. The WQMP for all projects and development would include BMPs, landscaping, and drainage systems similar to proposed development. The SBFCDC is responsible for operating and maintaining the area's major flood control channels and drainage system, including required improvements. Individual municipalities are often charged with maintaining local and tributary flood control systems. The principal functions of the SBFCDC are: flood protection on major streams, water conservation, and storm drain construction. The Flood Control Permit Section provides relevant permit information and processes encroachment permit applications for work within the SBFCDC's right-of-way. The Section coordinates Departmental reviews and issues permits for activities such as construction projects, land use permits, and general encroachment within SBFCDC right-of-way. This process allows the SBFCDC oversight over drainage and flood control issues within San Bernardino County. Therefore, impacts related to flooding resulting from changes in drainage patterns would not be cumulatively considerable.

Storm Drain Systems. Cumulative growth within the Santa Ana River Watershed Management Area could cumulatively increase flood flows as more impervious surfaces are created within the watershed. Alterations in area drainage patterns could also alter flood conveyance capacity of existing drainages. This could create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of contaminated runoff. All major development within the area would be subject to environmental review, the SBFCF permits, the NPDES permits, as well as local Municipal Codes and plans. Additionally, the Master Drainage Plan for the Santa Ana River Watershed Management Area was prepared to define full build-out capacities within the Master Drainage Plan area as required by the NPDES. Therefore, impacts related to construction impacts related to increased runoff on existing stormwater capacity would not be cumulatively considerable.

All cumulative projects would be required to adhere to comply with NPDES permit process that requires preparation of a SWPPP with construction BMPs to reduce erosion and sediment transport for projects that disturb more than 1 acre. Additionally, all development projects would have to comply with the Stormwater Quality Management Program including preparation of a site specific WQMP, which incorporates stormwater quality BMPs for sediment and erosion control and compliance with local Municipal Codes, the Basin Plan, and any TMDLs. Therefore, impacts related to construction impacts related to polluted runoff would not be cumulatively considerable.

Flooding and Inundation

The geographic context for analysis of cumulative flooding and inundation impacts is the SBFCF. Cumulative growth within the SBFCF management area could cumulatively increase flood flows as more impervious surfaces are created within the area. Alterations in area drainage patterns could also alter flood conveyance capacity of existing drainages. The SBFCF is responsible for operating and maintaining the area's major flood control channels and drainage system, including required improvements. Individual municipalities are often charged with maintaining local and tributary flood control systems. The principal functions of the SBFCF are: flood protection on major streams, water conservation, and storm drain construction. The Flood Control Permit Section provides relevant permit information and processes encroachment permit applications for work within the San Bernardino County Flood Control District's right-of-way. The Section coordinates Departmental reviews and issues permits for activities such as construction projects, land use permits, and general encroachment within SBFCF right-of-way. This process allows the SBFCF oversight over drainage and flood control issues within San Bernardino County. However, despite SBFCF's efforts to reduce flood risks within its management area, flood risks continue to be a concern for the region. As development continues throughout the region, increased amounts of impervious surfaces will ultimately lead to flood risks downstream. Therefore, overall cumulative impacts would occur.

The proposed project would allow intensification of existing development within the Downtown area, which could place a substantial number of new structures and residents at risk of flooding. This is a potentially significant impact, which would be mitigated through the Flood Control Standards outlined in the proposed project that would raise the ground floors on all new retail, commercial, and multi-family development to safe levels. The standards included in the proposed project would be sufficient to reduce the project's contribution to cumulative impacts. Additionally, in an effort to improve surface runoff quality and improve site drainage, the proposed project calls for a number of stormwater improvement guidelines including; the use permeable surfaces to absorb stormwater and recharge groundwater, installation of green roofs, stormwater parkways (area in the public right of way with permeable surfaces and plants intended to capture and filter stormwater runoff), rain gardens, bioswales, and stormwater retention ponds. The proposed project also includes an expansion of the existing storm drain collection and conveyance infrastructure serving the project site. These proposed storm drains would connect to existing infrastructure for conveyance to the Santa Ana River. Therefore, impacts related to flooding and inundation would not be cumulatively considerable.