5.9 HYDROLOGY AND WATER QUALITY

This section of the updated Draft Program Environmental Impact Report (PEIR) evaluates the potential of the Santa Ana General Plan Update (GPU) to impact hydrology and water quality conditions in the City of Santa Ana and its sphere of influence (plan area). Hydrology deals with the distribution and circulation of water, both on land and underground. Water quality deals with the quality of surface- and groundwater. Surface water includes lakes, rivers, streams, and creeks; groundwater is under the earth's surface.

The analysis in this section is based in part on the following technical reports:

- *City of Santa Ana General Plan Update Infrastructure Technical Report for Hydrology, Sewer, Water, and Water Quality*, Fuscoe, June 3, 2020.
- *City of Santa Ana General Plan Update Water Supply and Demand Technical Report*, Fuscoe, May 29, 2020.

Complete copies of these studies are included in the technical appendices (Volume III, Appendices H-a and H-b).

5.9.1 Environmental Setting

5.9.1.1 REGULATORY BACKGROUND

Federal, state, and regional laws, regulations, plans, or guidelines that are potentially applicable to the plan area are summarized in this section. They are designed to achieve regional water quality objectives and thereby protect the beneficial uses of the region's surface and groundwater.

Federal

Clean Water Act and National Pollution Elimination Discharge System

The Clean Water Act establishes regulations to control the discharge of pollutants into the waters of the United States and regulates water quality standards for surface waters (US Code, Title 33, §§ 1251 et seq.). Under the act, the US Environment Protection Agency (EPA) is authorized to set wastewater standards and runs the National Pollutant Discharge Elimination System (NPDES) permit program. Under the NPDES program, permits are required for all new developments that discharge directly into Waters of the United States. The federal Clean Water Act requires wastewater treatment of all effluent before it is discharged into surface waters. NPDES permits for such discharges in the project region are issued by the Santa Ana Regional Water Quality Control Board (RWQCB).

Federal Emergency Management Agency

The Federal Emergency Management Agency (FEMA) administers the National Flood Insurance Program to provide subsidized flood insurance to communities that comply with FEMA regulations limiting development in floodplains. FEMA also issues Flood Insurance Rate Maps that identify which land areas are subject to flooding. These maps provide flood information and identify flood hazard zones in the community. The design

standard for flood protection is established by FEMA. FEMA's minimum level of flood protection for new development is the 100-year flood event, also described as a flood that has a 1-in-100 chance of occurring in any given year. The project site is not in a 100-year floodplain.

State

Porter-Cologne Water Quality Control Act

Under the Porter-Cologne Water Quality Control Act (Water Code Sections 13000 et seq.), which was passed in California in 1969 and amended in 2013, the State Water Resources Control Board (SWRCB) has authority over state water rights and water quality policy. This act divided the state into nine regional basins, each under the jurisdiction of an RWQCB to oversee water quality on a day-to-day basis at the local and regional level. RWQCBs engage in a number of water quality functions in their respective regions. They regulate all pollutant or nuisance discharges that may affect either surface water or groundwater. The plan area is within the jurisdiction of the Santa Ana RWQCB.

State Water Resources Control Board Construction General Permit

The SWRCB has adopted a statewide Construction General Permit (Order No. 2012-0006-DWQ) for stormwater discharges associated with construction activity. These regulations prohibit the discharge of stormwater from construction projects that include one acre or more of soil disturbance. Construction activities subject to this permit include clearing, grading, and other disturbance to the ground, such as stockpiling or excavation, that results in soil disturbance of at least one acre of total land area. Individual developers are required to submit Permit Registration Documents (PRD) to the SWRCB for coverage under the NPDES permit prior to the start of construction. The PRDs include a Notice of Intent, risk assessment, site map, Stormwater Pollution Prevention Plan (SWPPP), annual fee, and a signed certification statement. The PRDs are submitted electronically to the SWRCB via the Stormwater Multiple Application and Report Tracking System (SMARTS) website.

The NPDES Construction General Permit requires all dischargers to (1) develop and implement a SWPPP that specifies best management practices (BMPs) to be used during construction of the project; (2) eliminate or reduce nonstorm water discharge to stormwater conveyance systems; and (3) develop and implement a monitoring program of all specified BMPs. The two major objectives of the SWPPP are to (1) help identify the sources of sediment and other pollutants that affect the water 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 nonstorm water discharges.

State Water Resources Control Board General Industrial Permit

The General Industrial Permit is an NPDES General Permit (Order No. CAS000001) issued in compliance with section 402 of the Clean Water Act. The permit took effect on July 1, 2015. The General Industrial Permit regulates operators of facilities subject to stormwater permitting that discharge stormwater associated with industrial activity.

State Water Resources Control Board Trash Amendments

On April 7, 2015, the State Water Board adopted an Amendment to the Water Quality Control Plan for Ocean Waters of California (Ocean Plan) to Control Trash, and Part 1, Trash Provisions of the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California. Together, they are collectively referred to as "the Trash Amendments." The purpose of the trash amendments is to reduce trash entering waterways statewide, provide consistency in the SWRCB's regulatory approach to protect aquatic life and public health beneficial uses, and reduce environmental issues associated with trash in state waters. There are two compliance tracks:

- **Track 1.** Permittees install, operate, and maintain a network of certified full capture systems to capture trash in storm drains, located in priority land use areas for municipal systems, and the entire facility for industrial and commercial permit holders.
- **Track 2.** Permittees install, operate, and maintain any combination of controls (structural and/or institutional) anywhere in their jurisdiction as long as they demonstrate that their system performs as well as Track 1.

The trash amendments provide a framework for permittees to implement the amendment's provisions. Full compliance must occur within 10 years of the permit, and permittees must also meet interim milestones such as average load reductions of 10 percent per year. The City is currently undergoing the process to comply with these new trash provisions.

Senate Bill 92

On June 27, 2017, Governor Brown signed Senate Bill (SB) 92 into law, which set forth new requirements focused on dam safety. As part of this legislation, dam owners must now submit inundation maps to the Department of Water Resources (DWR). After the maps are approved, the dam owner must submit an emergency action plan to the California Office of Emergency Services (Cal OES). The dam owner must submit updated plans and inundation maps every 10 years, or sooner under certain conditions. Cal OES will review and approve the emergency action plans. This legislation set forth additional provisions for the emergency action plans, including compliance requirements, exercises of the plan, and coordination with local public safety agencies (Cal OES 2019).

California Water Code Section 13751

In 1949, the California Legislature concluded that collecting information on newly constructed, modified or destroyed wells would be valuable in the event of underground pollution, and would also provide geologic information to better manage California's groundwater resources. Section 13751 of the Water Code requires Well Completion Report forms to be filed with DWR within 60 days from the date that construction, alteration, abandonment, or destruction of a well is completed. Completed forms are sent to the DWR Region Office whose boundaries include the area where the well is located (DWR 1999).

Sustainable Groundwater Management Act

The California Sustainable Groundwater Management Act (SGMA), a three-bill package signed into law in 2014, creates a framework for the management of groundwater sources throughout the state. Under SGMA, local agencies form groundwater sustainability agencies and create groundwater sustainability plans (GSP). If an agency is not formed, special act districts, such as Orange County Water District (OCWD), can submit "alternative plans" instead of GSPs. Timelines and requirements are based upon basin priority. Under SGMA, the Orange County Groundwater Basin is considered a medium-priority basin.

In January 2017 OCWD, the city of La Habra, and Irvine Ranch Water District submitted the Basin 8-1 Alternative Plan, which incorporates the requirements of GSPs and is considered to be "functionally equivalent" to a GSP. The Alternative Plan analyzes existing basin conditions and demonstrates that the Basin has been operated within its sustainable yield for more than 10 years without degrading water quality, reducing storage, or lowering groundwater levels. The Alternative Plan will be updated and resubmitted every 5 years as part of SGMA requirements.

Under the Alternative Plan, four management areas have been created for the Orange County Groundwater Basin. Each of these management areas has slightly different management goals and strategies based on the government bodies that serve them. The management areas are:

- **La Habra-Brea Management Area.** Includes the northern portion of the Basin outside of the OCWD service area.
- **OCWD Management Area.** Includes OCWD's service area, covering approximately 89 percent of the Basin.
- **South East Management Area.** Includes the southern and southeastern portions of the Basin that are outside of OCWD's service area.
- **Santa Ana Canyon Management Area.** Includes the eastern portion of the Basin outside of OCWD's service area.

Regional

Santa Ana River Basin Water Quality Control Plan

The "Basin Plan" establishes water quality standards for the ground and surface waters of the region and includes an implementation plan describing the actions by the RWQCB and others that are necessary to achieve and maintain the water quality standards. The RWQCB regulates waste discharges to minimize and control their effects on the quality of the region's ground and surface water. Permits are issued under various programs and authorities. The terms and conditions of these discharge permits are enforced through a variety of technical, administrative, and legal means. Water quality problems in the region are listed in the Basin Plan, along with the causes of those problems, if known. For water bodies with quality below the levels necessary to allow for all the beneficial uses of the water, plans for improving water quality are included. The latest update for the 1995 Water Quality Control Plan for the Santa Ana River Basin was issued in February 2016.

Orange County Regional Municipal Separate Stormwater Sewer System (MS4) Permit

The Santa Ana RWQCB MS4 Storm Water Permit, NPDES Permit No. CAS618030 (Order R8-2009-0030 as amended by Order No. R8-2010-0062), specifies waste discharge requirements for the County of Orange, the incorporated cities of Orange County, and the Orange County Flood Control District within the Santa Ana Region. Pursuant to this "Fourth-Term" MS4 Permit, the co-permittees were required to update and implement a drainage area management plan for their jurisdictions as well as local implementation plans (LIPs) that describe the co-permittees' urban runoff management programs for their local jurisdictions.

Under the City's LIP, land development policies pertaining to hydromodification and low impact development (LID) are regulated for new developments and significant redevelopment projects. The term "hydromodification" refers to the changes in runoff characteristics from a watershed caused by changes in land use condition. More specifically, hydromodification refers to the change in the natural watershed hydrologic processes and runoff characteristics (i.e., interception, infiltration, overland flow, interflow and groundwater flow) caused by urbanization or other land use changes that result in increased stream flows and sediment transport. The use of LID BMPs in project planning and design is to preserve a site's predevelopment hydrology by minimizing the loss of natural hydrologic processes such as infiltration, evapotranspiration, and runoff detention. LID BMPs try to offset these losses by introducing structural and nonstructural design components that restore these water quality functions into the project's land plan. These land development requirements are detailed in the County-Wide Model Water Quality Management Plan and Technical Guidance Document, approved in May 2011, which cities have incorporated into their discretionary approval processes for new development and redevelopment projects.

The LID hierarchy requires new developments and redevelopments to implement BMPs under the LID hierarchy, as described in the Technical Guidance Document. The LID hierarchy requires new projects to first infiltrate, then harvest and reuse, then biofilter stormwater runoff from their project site depending on site constraints. New projects and redevelopments within the plan area will follow the set hierarchy of BMP selection.

Local

City of Santa Ana Municipal Code

Chapter 7: The purpose of Chapter 7 (Floodplain Management Regulations) is to promote the public health, safety, and general welfare, and to minimize public and private losses due to flood conditions. Standards specified for new subdivisions and other proposed development include:

- Identifying the special flood hazard areas[1] and base flood elevations.
- Identifying the elevations of lowest floors of all proposed structures and pads on the final plans.
- Providing an application for map revision for sites filled above the base flood elevation with the following as-built information for each structure:

[1] Special flood hazard areas are areas within the 100-year flood zone area.

- Lowest floor elevation.
- Pad elevation.
- Lowest adjacent grade.

- Minimizing flood damage.
- Providing public utilities and facilities such as sewer, gas, electrical, and water systems located and constructed to minimize flood damage.
- Providing adequate drainage to reduce exposure to flood hazards.

Chapter 18 Article IV: The purpose of Chapter 18 Article IV (Water Pollution) of the municipal code is to participate in the improvement of water quality and comply with federal requirements for the control of urban pollutants in stormwater runoff that enters the network of storm drains throughout Orange County. The article includes prohibitions on illicit connections and discharges, urban runoff control measures, and permit requirements.

City of Santa Ana Storm Drain Master Plan

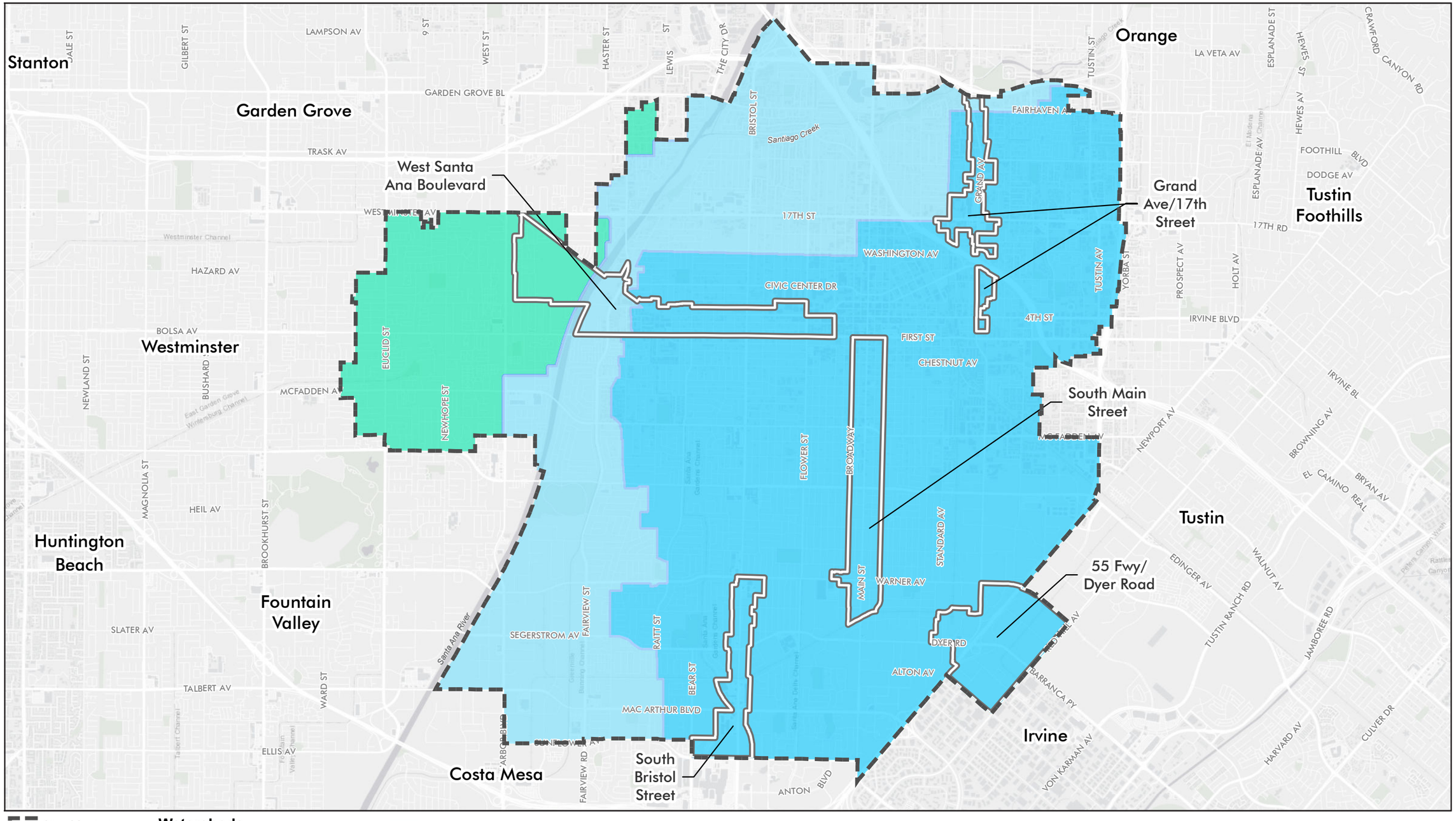
The purpose of the Master Plan of Storm Drainage (MPD) is to provide comprehensive long-range planning for the implementation and development of drainage facility improvements, determine the cost of implementing such facilities, and discuss funding priorities of the improvements in Santa Ana. Main collector elements (storm drain facilities 36 inches or larger) in the city were modeled with the goal of identifying issues related to existing storm drain facilities. Flooding results for the 10-, 25-, and 100-year storm conditions were compared to County of Orange design protection levels for streets in order to determine deficient segments and locations (Michael Baker 2015).

5.9.1.2 EXISTING CONDITIONS

Watersheds

The plan area spans three separate watersheds, each of these serving the plan area as well as surrounding areas. The northwestern portion of the plan area drains to the Anaheim Bay–Huntington Harbor Watershed, the northern and southwestern portions drain to the Santa Ana River Watershed, and the southeastern and eastern portions of the plan area drain to the Newport Bay Watershed (see Figure 5.9-1, *City of Santa Ana Watersheds*).

Figure 5.9-1 - City of Santa Ana Watersheds



Source: FUSCOE Engineering, 2020

5. Environmental Analysis
HYDROLOGY AND WATER QUALITY

This page intentionally left blank.

Surface Water Quality

Under Section 303(d) of the Clean Water Act, states are required to identify water bodies that do not meet their water quality standards. Once a water body has been listed as impaired on the 303(d) list, a total maximum daily load (TMDL) for the constituent of concern (pollutant) must be developed for that water body. A TMDL is an estimate of the daily load of pollutants that a water body may receive from point sources, nonpoint sources, and natural background conditions (including an appropriate margin of safety) without exceeding its water quality standard. Facilities and activities that are discharging into the water body, collectively, must not exceed the TMDL. In general terms, Municipal Separate Storm Sewer Systems (MS4) and other dischargers in each watershed are collectively responsible for meeting the required reductions and other TMDL requirements by the assigned deadline.

TMDLs have been established for pesticides, pathogens, sediment, and nutrients for the Upper and Lower Newport Bay. The remaining 303(d) listed impairments shown in Table 5.9-1 have not yet been established and are pending approval for TMDL establishments for 2019 to 2029.

Table 5.9-1 List of 303(d) Impairments and TMDLs

Water body/Channel	List of 303(d) Impairments	TMDL
East Garden Grove Wintersburg Channel	Ammonia (Unionized)	Pending 2021 TMDL Establishment for Ammonia
Bolsa Chica Ecological Reserve	Toxicity	Pending 2027 TMDL Establishment for Toxicity
Bolsa Chica State Beach	Copper, Nickel	Pending 2019 TMDL Establishment for Copper and Nickel
Huntington City Beach	No Impairments	N/A
Huntington Beach State Park	Polychlorinated Biphenyls (PCBs)	Pending 2019 TMDL Establishment for PCBs
Talbert Channel	Toxicity	Pending 2029 TMDL Establishment for Toxicity
Santa Ana River, Reach 1	No Impairments	N/A
Newport Slough	Indicator Bacteria	Pending 2021 TMDL Establishment for Indicator Bacteria
Newport Beach	No Impairments	N/A
Balboa Beach	DDT, Dieldrin, PCBs	Pending 2019 TMDL Establishment for DDT, Dieldrin, and PCBs
Santa Ana River Delhi Channel	No Impairments	N/A
Costa Mesa Channel	No Impairments	N/A
Newport Bay, Upper	Chlordane, Copper, DDT, Indicator Bacteria, Malathion, Nutrients, PCBs, Sedimentation, Toxicity	TMDLs for Chlordane, DDT, and PCBs Established 2013 TMDL for Chlorpyrifos/Diazinon Established 2004 TMDL for Lead Established 2000 TMDLs for Nutrients and Sedimentation Established 1999 Pending 2019 TMDL Establishment for Copper Pending 2027 TMDL Establishment for Malathion and Toxicity
Lower Newport Bay	Chlordane, Copper, DDT, Indicator Bacteria, Nutrients, PCBs, Sedimentation, Toxicity	TMDLs for Chlordane, DDT, and PCBs Established 2013 TMDL for Chlorpyrifos/Diazinon Established 2004 TMDL for Lead Established 2000 TMDLs for Nutrients and Sedimentation Established 1999 Pending 2019 TMDL Establishment for Copper Pending 2027 TMDL Establishment for Toxicity
Newport Beach West Jetty	No Impairments	N/A
Corona Del Mar State Beach	No Impairments	N/A

Source: Fuscoe 2020.

Existing Surface Water Conditions

According to the Santa Ana Region Water Action Plan, the channels with existing beneficial uses that serve the plan area include San Diego Creek; the Santa Ana River; and coastal wetlands, bays, and tidal prisms. Table 5.9-2 lists receiving waters in the plan area along with their beneficial uses.

Table 5.9-2 List of Receiving Water and Beneficial Uses

Receiving Water	Beneficial Use
Lower Santa Ana River Basin – Santa Ana River Reach 1	MUN – Municipal and Domestic Supply GWR – Groundwater Recharge REC 1 – Water Contact Recreation REC 2 – Non-Contact Water Recreation WARM – Warm Freshwater Habitat WILD – Wildlife Habitat RARE – Rare, Threatened, or Endangered Species
Lower Santa Ana River Basin – Santa Ana-Delhi Channel	REC 2 – Non-Contact Water Recreation WARM – Warm Freshwater Habitat WILD – Wildlife Habitat RARE – Rare, Threatened, or Endangered Species
Lower Santa Ana River Basin – San Diego Creek Reach 1	REC 1 – Water Contact Recreation REC 2 – Non-Contact Water Recreation WARM – Warm Freshwater Habitat WILD – Wildlife Habitat
Lower Newport Bay	NAV – Navigation REC 1 – Water Contact Recreation REC 2 – Non-Contact Water Recreation COMM – Commercial and Sportfishing RARE – Rare, Threatened, or Endangered Species WILD – Wildlife Habitat SPWN – Spawning, Reproduction, and Development MAR – Marine Habitat SHEL – Shellfish Harvesting
Upper Newport Bay	REC 1 – Water Contact Recreation REC 2 – Non-Contact Water Recreation COMM – Commercial and Sportfishing BIOL – Biological Habitat of Significance EST – Estuarine Habitat COMM – Commercial and Sportfishing RARE – Rare, Threatened, or Endangered Species WILD – Wildlife Habitat SPWN – Spawning, Reproduction, and Development MAR – Marine Habitat SHEL – Shellfish Harvesting MAR – Marine Habitat SHEL – Shellfish Harvesting
Bolsa Chica Ecological Reserve	REC 1 – Water Contact Recreation REC 2 – Non-Contact Water Recreation BIOL – Biological Habitat of Significance EST – Estuarine Habitat RARE – Rare, Threatened, or Endangered Species

Table 5.9-2 List of Receiving Water and Beneficial Uses

Receiving Water	Beneficial Use
	WILD – Wildlife Habitat SPWN – Spawning, Reproduction, and Development MAR – Marine Habitat
Huntington Beach Wetlands	REC 1 – Water Contact Recreation REC 2 – Non-Contact Water Recreation BIOL – Biological Habitat of Significance RARE – Rare, Threatened, or Endangered Species WILD – Wildlife Habitat SPWN – Spawning, Reproduction, and Development MAR – Marine Habitat
Santa Ana River Salt Marsh	REC 1 – Water Contact Recreation REC 2 – Non-Contact Water Recreation BIOL – Biological Habitat of Significance RARE – Rare, Threatened, or Endangered Species WILD – Wildlife Habitat MAR – Marine Habitat EST – Estuarine Habitat
Tidal Prisms of Flood Control Channels Discharging to Coastal or Bay Waters	REC 1 – Water Contact Recreation REC 2 – Non-Contact Water Recreation COMM – Commercial or Sport Fishing WILD – Wildlife Habitat MAR – Marine Habitat
Tidal Prism of Santa Ana River and Newport Slough	REC 1 – Water Contact Recreation REC 2 – Non-Contact Water Recreation COMM – Commercial or Sport Fishing WILD – Wildlife Habitat RARE – Rare, Threatened, or Endangered Species MAR – Marine Habitat
Tidal Prism of Santa Ana-Delhi Channel	REC 2 – Non-Contact Water Recreation WILD – Wildlife Habitat RARE – Rare, Threatened, or Endangered Species MAR – Marine Habitat
Source: Fuscoe 2020.	

General water quality objectives have been prescribed in the Basin Plan for all surface waters within the Santa Ana River Region. In order to maintain the beneficial uses listed in Table 5.9-2, inland surface waters must achieve these water quality objectives. The following numeric objectives have been established by the Basin Plan for the Santa Diego Creek, Reach 1 that receives flows from the plan area:

- Total Dissolved Solids: 1,500 mg/L
- Total Inorganic Nitrogen: 13 mg/L
- Chemical Oxygen Demand: 90 mg/L

General water quality objectives have been prescribed for the upstream portions of the Santa Ana River Watershed and its inland surface streams. However, site-specific objectives have not been determined for the

reaches surrounding and fed by the plan area. These areas are often impaired (by high levels of minerals), and there is not sufficient historic data to designate objectives based on natural background conditions.

Groundwater Supply

The Orange County (OC) Basin underlies the northerly half of Orange County beneath broad lowlands. The OC Basin managed by OCWD covers an area of approximately 350 square miles, bordered by the Coyote and Chino Hills to the north, the Santa Ana Mountains to the northeast, and the Pacific Ocean to the southwest. The OC Basin boundary extends to the Orange County–Los Angeles County line to the northwest, where groundwater flows across the county line into the Central Groundwater Basin of Los Angeles County. The total thickness of sedimentary rocks in the OC Basin is over 20,000 feet, with only the upper 2,000 to 4,000 feet containing fresh water. The Pleistocene or younger aquifers comprising this OC Basin are over 2,000 feet deep and form a complex series of interconnected sand and gravel deposits. The OC Basin's full volume is approximately 66 million acre-feet.

The OCWD was formed in 1933 by a special legislative act of the California State Legislature to protect and manage the county's vast, natural groundwater supply using the best available technology and defend its water rights to the OC Basin. Groundwater levels are managed within a safe basin operating range to protect the long-term sustainability of the OC Basin and to protect against land subsidence. OCWD regulates groundwater levels in the OC Basin by regulating the annual amount of pumping. As mentioned in Section 5.9.1.1, the Basin has been operated within its sustainable yield for more than 10 years without degrading water quality, reducing storage, or lowering groundwater levels.

In 1928, Anaheim, Fullerton, and Santa Ana joined 10 other Southern California cities in the formation of the Metropolitan Water District of Southern California (MWD). The aim was to import water from the Colorado River. The supplemental water supplies of MWD encouraged other Orange County water providers to collaborate, creating the Coastal Municipal Water District in 1941 and Orange County Municipal Water District in 1951. The district would later change its name to Municipal Water District of Orange County (MWDOC).

The OC Basin is not adjudicated, and therefore pumping from the OC Basin is managed through a process that uses financial incentives to encourage groundwater producers to pump a sustainable amount of water. The framework for the financial incentives is based on establishing the basin production percentage (BPP), the percentage of each producer's total water supply that comes from groundwater pumped from the OC Basin. Groundwater production at or below the BPP is assessed a replenishment assessment. While there is no legal limit as to how much an agency pumps from the OC Basin, there is a financial disincentive to pump above the BPP. Agencies that pump above the BPP are charged the replenishment assessment plus the Basin Equity Assessment, which is calculated so that the cost of groundwater production is greater than MWDOC's full-service rate. The basin equity assessment can be increased to discourage production above the BPP. The BPP is set uniformly for all producers by OCWD on an annual basis (Arcadis 2016).

Groundwater production accounts for roughly 77 percent of the water supply in the plan area. The City's water system has a total of 21 groundwater wells.

Groundwater Recharge Facilities

Recharging water into the OC Basin through natural and artificial means is essential to support pumping from the basin. Active recharge of groundwater began in 1949, in response to increasing drawdown of the OC Basin and the consequent threat of seawater intrusion. The OC Basin's primary source of recharge is flow from the Santa Ana River, which is diverted into recharge basins, and its main Orange County tributary, Santiago Creek. Other sources of recharge water include natural infiltration, recycled water, and imported water. Natural recharge consists of subsurface inflow from local hills and mountains, infiltration of precipitation and irrigation water, recharge in small flood control channels, and groundwater underflow to and from Los Angeles County and the ocean.

Untreated imported water is used to recharge the OC Basin through the surface water recharge system in multiple locations, such as Anaheim Lake, Santa Ana River, Irvine Lake, and San Antonio Creek. Treated imported water can be used for in-lieu recharge, as was performed extensively from 1977 to 2007 (Arcadis 2016).

OCWD, MWDOC, and MWD have developed a successful and efficient groundwater replenishment program to increase storage in the OC Basin. The groundwater replenishment program allows MWD to sell groundwater replenishment water to OCWD and make direct deliveries to agency distribution systems in lieu of producing water from the groundwater basin when surplus surface water is available. This program indirectly replenishes the OC Basin by avoiding pumping. In the in-lieu program, OCWD requests an agency to halt pumping from specified wells. The agency then takes replacement water through its import connections, which is purchased by OCWD from MWD. OCWD purchases the water at a reduced rate, then bills the agency for the amount it would have had to pay for energy and the replenishment assessment if it had produced the water from its wells. The deferred local production results in water being left in local storage for future use.

Groundwater Quality

OCWD is responsible for managing the OC Basin. To maintain groundwater quality, OCWD conducts an extensive monitoring program that serves to manage the OC Basin's groundwater production, control groundwater contamination, and comply with all required laws and regulations. A network of nearly 700 wells provides OCWD with samples that are tested for a variety of purposes. OCWD collects 600 to 1,700 samples each month to monitor basin water quality. These samples are collected and tested according to approved federal and state procedures as well as industry-recognized quality assurance and control protocols.

The OC Basin also has prescribed beneficial uses and water quality objectives. According to the Santa Ana RWQCB Basin Plan, beneficial uses for the Orange Groundwater Management Zone include:

- MUN – Municipal and Domestic Supply
- AGR – Agricultural Supply
- IND – Industrial Service Supply
- PROC – Industrial Process Supply

Numeric water quality objectives in the Basin Plan have been established for the OC Basin:

- Total Dissolved Solids: 580 mg/L
- Nitrate as Nitrogen: 3.4 mg/L

Salinity is a significant water quality problem in many parts of southern California, including Orange County. Salinity is a measure of the dissolved minerals in water, including both total dissolved solids (TDS) and nitrates. The portions of the OC Basin with the highest levels are generally in the cities of Irvine, Tustin, Yorba Linda, Anaheim, Placentia, and Fullerton. OCWD continually monitors the levels of TDS in wells throughout the OC Basin. The TDS concentration in the OC Basin is expected to decrease over time because the TDS concentration of the water used to recharge the OC Basin is approximately 50 mg/L.

Nitrates are one of the most common and widespread contaminants in groundwater supplies, originating from fertilizer use, animal feedlots, wastewater disposal systems, and other sources. The maximum contaminant level for nitrate in drinking water is 10 mg/L. OCWD regularly monitors nitrate levels in groundwater and works with producers to treat wells that have exceeded safe levels of nitrate concentrations. OCWD manages the nitrate concentration of water recharged by its facilities to reduce nitrate concentrations in groundwater.

Furthermore, the south basin area includes a plume originating from more than 20 industrial locations located in Santa Ana, Irvine, and Tustin. The plume is bounded by Edinger Avenue, Main Street, the I-405 Freeway, Red Hill, and Von Karman. The contaminants of concern include volatile organic compounds (VOCs) and perchlorate. The uncontrolled plume occurs predominately in the shallow aquifer at 100-foot depth which flows into a deeper principal aquifer, bringing VOC contaminants with it. So far, contaminants have arrived in two municipal drinking water wells (OCWD 2018). OCWD is embarking on a comprehensive plan to control the spread and eventually remove these chemicals that have migrated beyond their original pollution sources. Regulatory oversight is provided by the Department of Toxic Substance Control (DTSC) and the Regional Water Quality Control Board (RWQCB). These two state agencies are working closely with OCWD and some cooperative potentially responsible parties to map the occurrence of the contaminants, identify appropriate remedies and implement groundwater cleanup (OCWD 2020a). As a component of the remedial plan, OCWD's consultant performed an assessment of the risk to human health and the environment associated with contaminated groundwater in the south basin area (OCWD 2020b).

Other contaminants that OCWD monitors in the OC Basin include:

- Methyl tertiary butyl ether[2]
- Volatile organic compounds
- NDMA[3]
- 1-4-dioxane[4]
- Perchlorate[5]

[2] MTBE is almost exclusively used as a fuel additive in gasoline.
[3] NDMA can be unintentionally produced in and released from industrial sources. Potential industrial sources include byproducts from tanneries, pesticide manufacturing plants, rubber and tire manufacturers, alkylamine manufacture and use sites, fish processing facilities, foundries and dye manufacturers.
[4] 1,4-Dioxane is a trace contaminant of some chemicals used in cosmetics, detergents, and shampoos.
[5] Perchlorate is used in munitions, fireworks, explosives, airbag initiators for vehicles, matches, signal flares, fertilizers, chlorine cleaners, and pool chlorination chemicals.

- Selenium
- Constituents of emerging concern

Storm Drain System

Storm drain lines throughout the plan area include both City and Orange County Flood Control District (OCFCD) drainage facilities to convey stormwater runoff. All underground lines are under jurisdiction of the City, and all the open flood control channels are maintained by OCFCD. One open trapezoidal channel that runs west from Harbor Boulevard to south of 1st Street is owned and maintained by the City.

The City storm drain infrastructure feeds to a series of OCFCD regional drainage channels. These channels and their respective drainage areas divide the plan area into seven separate regional watersheds (Michael Baker 2015), named after the drainage channel that they flow to. The seven channels are:

- **Wintersburg/Garden Grove.** Located in the northwest corner of the city, drains to Anaheim Bay–Huntington Harbor Watershed. Services portions of the West Santa Ana Boulevard focus area.
- **Greenville-Banning.** Located in the southwest of the city, drains to the Santa Ana River Watershed. Services portions of the West Santa Ana Boulevard focus area.
- **Gardens.** Located in the southern portion of the city, drains to the Newport Bay Watershed. Serves portions of the West Santa Ana Boulevard focus area.
- **Santa Ana.** Located in the northern portion of the city, drains to the Santa Ana River Watershed. Services portions of the 17th Street and Grand and West Santa Ana Boulevard focus areas.
- **Delhi.** Located in the southern portion of the city, drains to the Newport Bay Watershed. Services the South Main focus area and portions of the 17th Street and Grand and West Santa Ana Boulevard focus areas.
- **Santa Fe.** Located in the northeastern corner of the city, drains to the Newport Bay Watershed. Services portions of the 17th Street and Grand focus area.
- **Lane-Barranca.** Located in the southeastern corner of the city, drains to the Newport Bay Watershed. Services the 55 Freeway and Dyer Road focus area.

Additional major drainage features within the city include trunk lines that outlet to the larger drainage channels. Storm drain facilities serving the focus areas are described in Table 5.9-3

Table 5.9-3 Existing Drainage Facilities in the Focus Areas

Focus Area	Acreage	Primary Drainage Facility
West Santa Ana Boulevard	604	12"–60" City storm drain lines OCFCD drainage channels Santa Ana River (OCFCD maintained)
17th Street and Grand	81	36"–81" City storm drain lines
South Main Street	451	12"–84" City storm drain lines
South Bristol Street	232	12"–72" City storm drain lines OCFCD drainage channel (Gardens)
55 Freeway and Dyer Road	449	12"–48" City storm drain lines OCFCD drainage channel (Lane-Barranca)

Source: Fuscoe 2020.

See Figure 5.9-2, *Existing Storm Drain System,* which shows the existing storm drain system throughout the city and the focus areas.

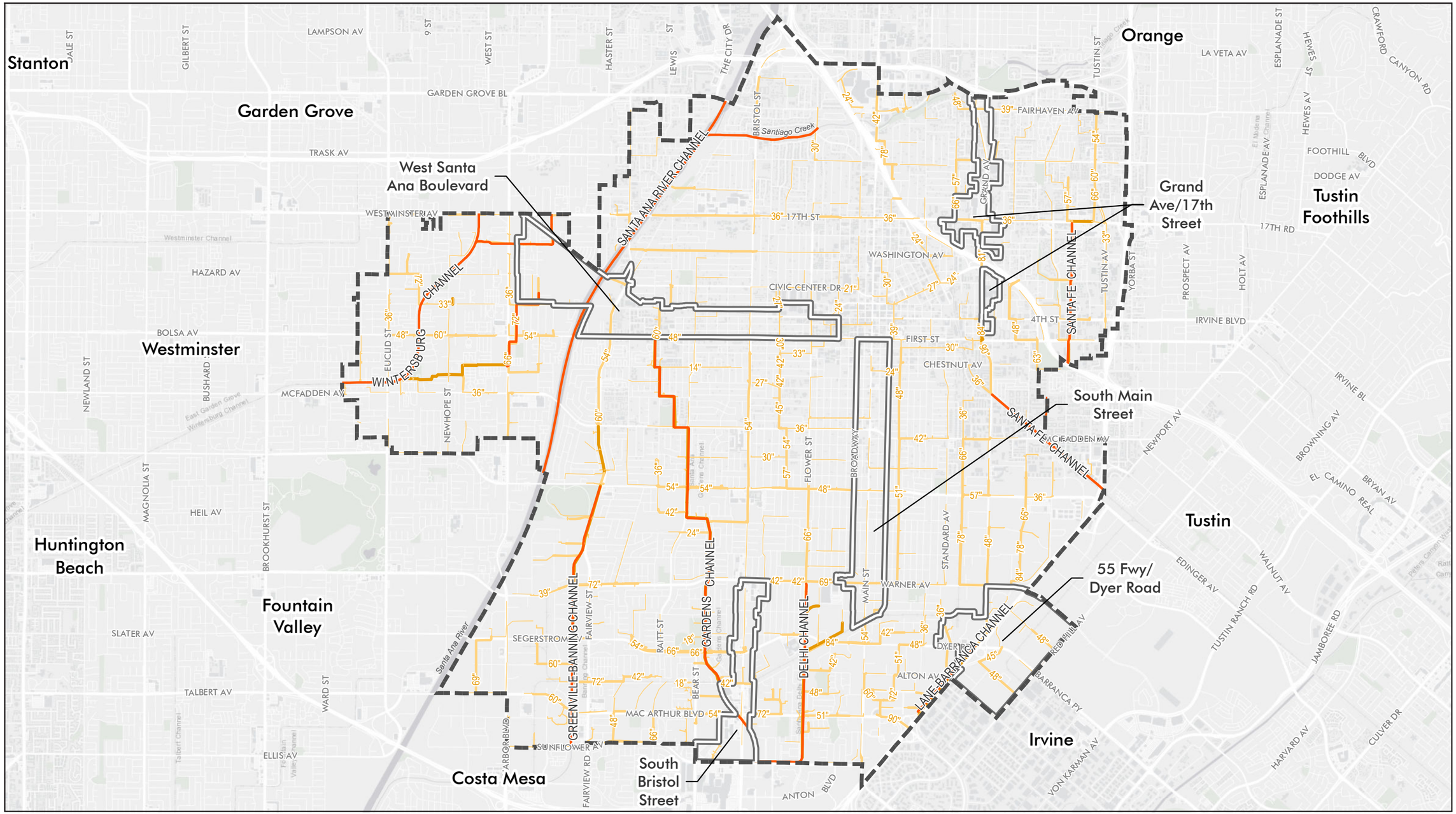
Santa Ana's MPD recommended improvements for each regional watershed in the plan area. Top recommended improvements are shown in Table 5.9-4. The MPD recommends that all improvements be implemented beginning at the most downstream portion of the target area. All recommendations made in the MPD are at a master planning level. For individual projects, specific modeling/analysis may be necessary. Of the 10 improvement projects identified in the MPD, one project (Improvement 7) was included in the 2018/2019 City of Santa Ana Capital Improvement Plan (CIP). Figure 5.9-3, *Existing Storm Drain Recommended Improvements*, illustrates recommended storm drain improvement areas in the city and their associated improvement numbers.

Table 5.9-4 Plan Area Recommended Storm Drain Improvements

Improvement Number	Regional Watershed	Improvement
1	Delhi	Improve County Delhi Channel between Alton and Sunflower
2	Gardens	Improve County Gardens Channel between Edinger and Sunflower
3	Santa Ana	Improve City system along 17th Street between Santa Ana River and west of Flower St
4	Santa Fe	Improve City system along Grand Avenue between Santa Clara and the Santa Fe Channel
5	Santa Fe	Improve City system along Tustin Avenue between 17th Street and the Santa Fe Channel
6	Santa Fe	Improve City system between Macarthur and Sunflower
7	Greenville Banning	Improve City system between Alton and Macarthur connecting to the Lane Channel
8	Santa Ana	Improve City system along Flower between Santa Clara and Santiago Creek
9	Santa Ana	Improve City system along Fairview between Trask and the Santa Ana River
10	Wintersburg	Improve City system along Rosita between Hazard Avenue and the Wintersburg Channel

Source: Fuscoe 2020.

Figure 5.9-2 - Existing Storm Drain System

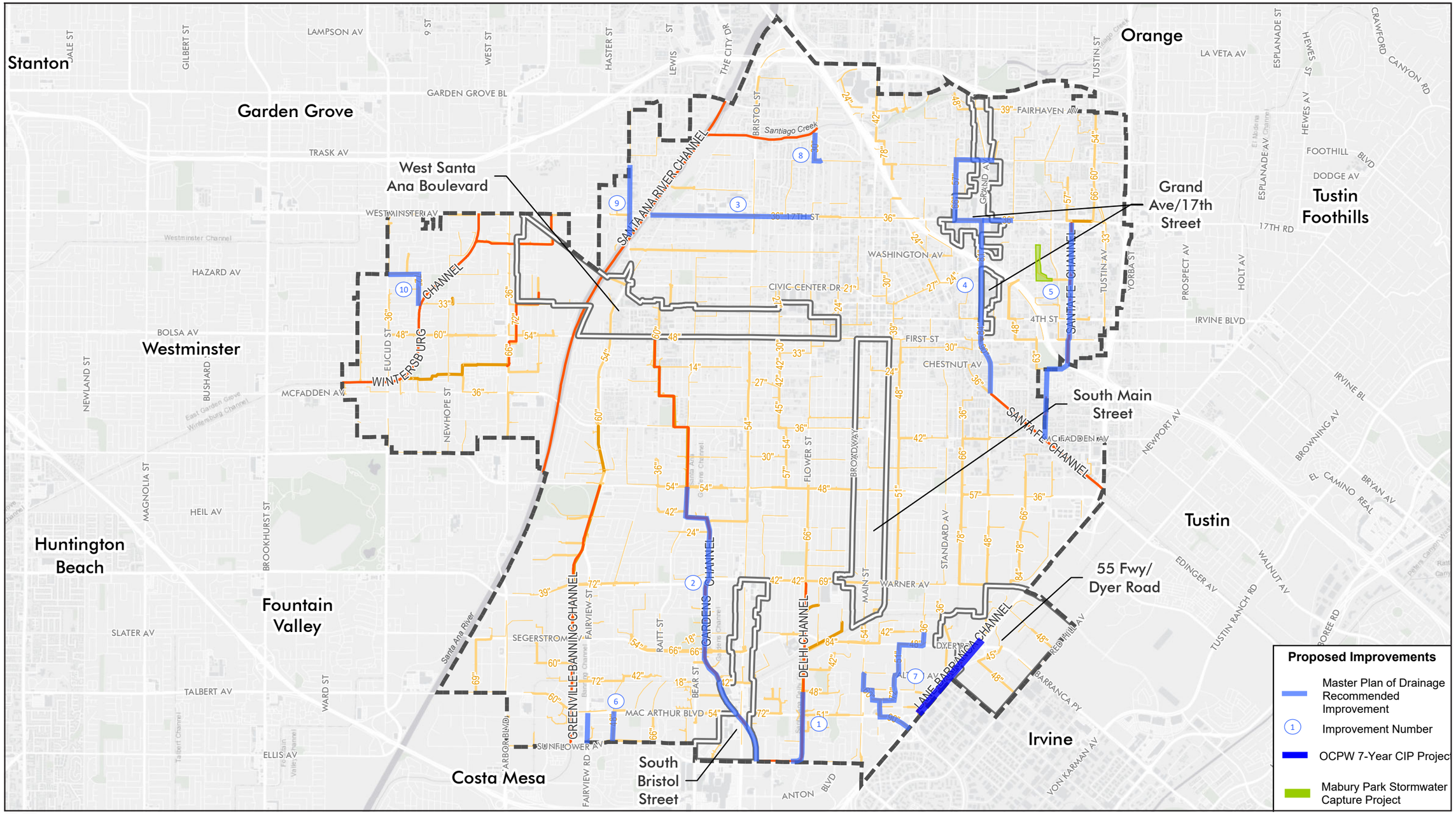


Source: FUSCOE Engineering, 2020

5. Environmental Analysis
HYDROLOGY AND WATER QUALITY

This page intentionally left blank.

Figure 5.9-3 - Existing Storm Drain Recommended Improvements



Source: FUSCOE Engineering, 2020

5. Environmental Analysis
HYDROLOGY AND WATER QUALITY

This page intentionally left blank.

The 2018/2019 CIP includes a stormwater capture project at Mabury Park. This project includes the construction of a large bioretention basin to slow and treat flows draining into Newport Bay.

In addition, the City provides frequent updates to the status of their CIP projects for sewer, water, and storm drain systems. The following projects are listed on the October–March 2020 CIP quarterly executive summary schedule:

- D-03 Channel Improvements at Alton Ave
- Civic Center Storm Drain Lift Station
- C-5-F channel Repair between Newhope and Harbor
- First Street Undercrossing Stormwater Lift Station
- Warner Avenue Storm Drain Improvements (Ph 1) (Main Street to Oak Street)

The majority of the projects listed above are either going through the design phase or construction phase as of March 2020.

Furthermore, Orange County Public Works' (OCPW) 7-Year Capital Improvement Plan covers OCFCD drainage facilities, road, bridge, flood, and bikeway projects for fiscal years 2019/20 to 2025/26. There was one project in the plan area downstream of the 55 Freeway/Dyer Road focus area in the 2018/19 CIP that is estimated to be concluded in June 2023:

- **Lane Channel (FY 18/19).** Demolish existing damaged concrete-lined channel and replace with channel lining constructed with current design standard criteria.

Flood Hazards

Designated 100-Year Flood Zones

According to the Flood Insurance Rate Map covering the plan area, the majority of the city lies within Zone X. Zone X is designated as areas determined to have minimal flood hazards, areas protected by levee from a 100-year flood, or areas with a 0.2 percent chance of flooding. The western portion of the plan area is protected by levee from flood events or features a 0.2 percent chance of flooding, and the eastern portion features a minimal risk of flooding. There are small areas surrounding the various drainage channels throughout the plan area, including the Delhi Channel, that are listed as Zone A, which represents areas with a 1 percent annual chance of flooding and a 26 percent chance of flooding over the life of a 30-year mortgage. These areas are immediately adjacent to the drainage channels in question, with surrounding developments and neighborhoods protected by levee. The drainage area within and surrounding Santiago Creek, located in the northern portion of the plan area, is listed as both Zone AE and as a Regulatory Floodway. Zone AE represents a 1 percent annual chance of flooding with a base flood elevation. In addition, a small segment of the plan area between the Santa Ana River and the Greenville-Banning Channel is designated as Flood Zone D, representing areas where no flood analysis has been conducted, or where recent incorporation into a larger community has resulted in no map being prepared. See Figure 5.9-4, *City of Santa Ana Flood Zones*, for a map of the FEMA flood zones within the plan area.

Seismically Induced Dam Inundation

Much of the central and western parts of the plan area are in the dam inundation area for Prado and Santiago Creek dams. Small parts of the northern portion of the plan area, north of Fairhaven Memorial Park, are in the dam inundation area for the Santiago Creek dam (see Figure 5.9-5, *Dam Inundation Areas*).

Santiago Creek dam was built in 1933 and is owned and operated by the Serrano Water District and Irvine Ranch Water District. The dam has a capacity of 25,000 acre-feet and is an earthen dam. The dam's downstream hazard is extremely high (DSOD 2019).

The Prado dam and reservoir are owned and operated by the Army Corp of Engineers (Corps) and were constructed in 1941. The dam is in San Bernardino County, approximately two miles west of Corona and on the lower Santa Ana River, approximately 30.5 miles upstream from the confluence with the Pacific Ocean. Prado Dam and Reservoir serves as the principal regulating structure on the Santa Ana River and comprises more than 11,500 acres, out of which 4,100 acres are riparian habitat, 4,823 acres are recreation areas, and 2,400 acres are owned by the Orange County Water District. The Corps owns 9,100 acres in the Basin. The reservoir has a capacity of 217,000 acre-feet (Army Corps of Engineers 2019). The Army Corps of Engineers has characterized Prado Dam as a high urgency risk (Insurance Journal 2019).

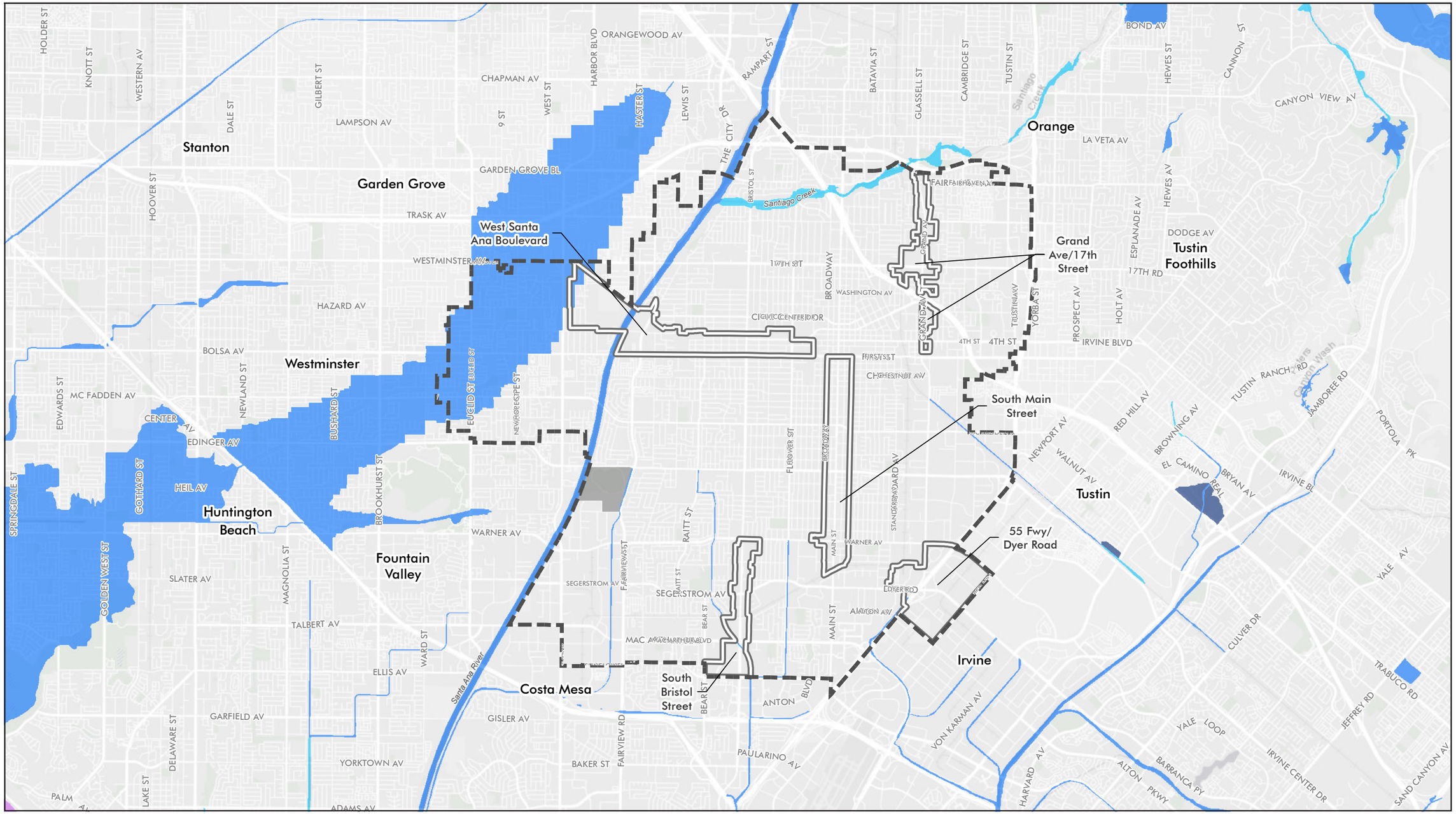
Seiches

A seiche is a surface wave created when an inland water body is shaken, usually by an earthquake or due to a change in atmospheric pressure. Inland water bodies in the plan area that could generate seiches are retention basins and reservoirs and include the Prado Reservoir, Irvine Lake, and the Santiago Creek Recharge Basins.

Tsunami

A tsunami is a series of ocean waves caused by a sudden displacement of the ocean floor, most often due to earthquakes. The plan area ranges in elevation from approximately 210 feet above mean sea level at the northeast corner to 35 feet above mean sea level at the city's southern border. The city is about five miles inland from the Pacific Ocean; therefore, the chances of a tsunami impacting the plan area are negligible.

Figure 5.9-4 - City of Santa Ana Flood Zones

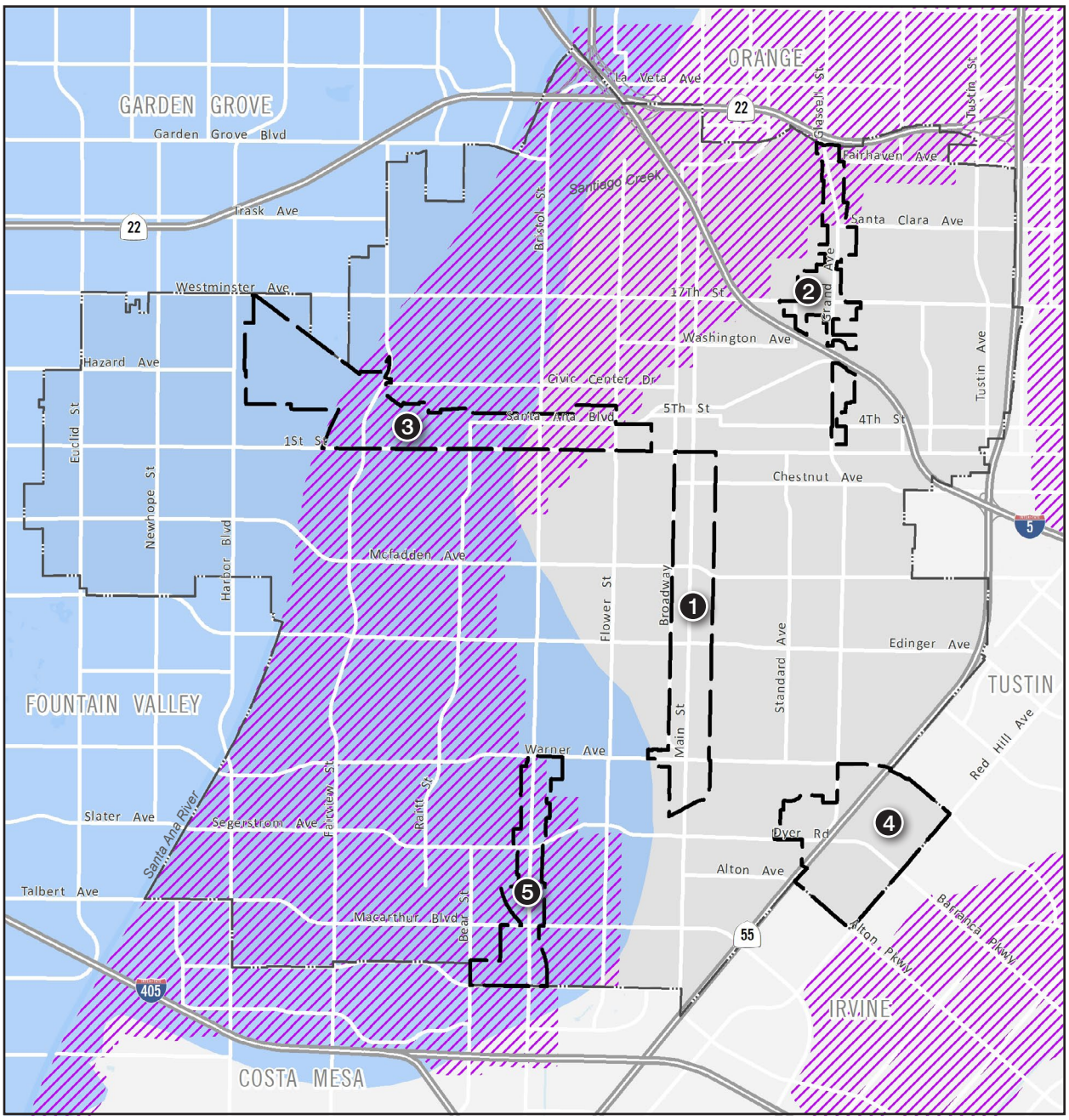


Source: FUSCOE Engineering, 2020

5. Environmental Analysis
HYDROLOGY AND WATER QUALITY

This page intentionally left blank.

Figure 5.9-5 - Dam Inundation Areas
5. Environmental Analysis



City of Santa Ana

Focus Area

Potential Dam Inundation Area

Santiago Creek Dam

Prado Dam

Focus Areas

1. South Main Street
2. Grand Ave/17th Street
3. West Santa Ana Boulevard
4. 55 Fry/Dyer Road
5. South Bristol Street

0 1
Scale (Miles)

Source: Cal OES, 2017

5. Environmental Analysis
HYDROLOGY AND WATER QUALITY

This page intentionally left blank.

5.9.2 Thresholds of Significance

According to Appendix G of the CEQA Guidelines, a project would normally have a significant effect on the environment if the project would:

HYD-1 Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality.

HYD-2 Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin.

HYD-3 Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:

i) Result in a substantial erosion or siltation on- or off-site.

ii) Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite.

iii) 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.

iv) Impede or redirect flood flows.

HYD-4 In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation.

HYD-5 Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan.

5.9.3 Regulatory Requirements and General Plan Update Policies

5.9.3.1 REGULATORY REQUIREMENTS

RR-HYD-1 All development pursuant to the General Plan Update shall comply with the requirements of the Construction General Permit (Order No. 2012-0006-DWQ) for stormwater discharges associated with construction activity. Compliance requires filing a Notice of Intent, a Risk Assessment, a Site Map, a Storm Water Pollution Prevention Plan and associated best management practices, an annual fee, and a signed certification statement.

RR-HYD-2 All industrial development pursuant to the General Plan Update shall comply with the requirements of the General Industrial Permit (Order No. CAS000001). The General Industrial Permit regulates operators of facilities subject to stormwater permitting, that discharge stormwater associated with industrial activity.

RR-HYD-3 All development pursuant to the General Plan Update that involve the installation or decommissioning of water wells shall do so in accordance with Section 13751 of the Water Code.

RR HYD-4 All development pursuant to the General Plan Update shall comply with the requirements of the Orange County MS4 Permit (Order R8-2009-0030, NPDES No. CAS618030, as amended by Order No. R8-2010-0062). The MS4 Permit requires new development and redevelopment projects to:

- Control contaminants into storm drain systems
- Educate the public about stormwater impacts
- Detect and eliminate illicit discharges
- Control runoff from construction sites
- Implement best management practices and site-specific runoff controls and treatments for new development and redevelopment

RR HYD-5 All development pursuant to the General Plan Update shall comply with the requirements detailed in Chapter 18 Article IV of the Santa Ana Municipal Code.

RR HYD-6 All development pursuant to the General Plan Update that is located within a floodplain shall comply with the requirements of Chapter 7 of the Santa Ana Municipal Code.

5.9.3.2 GENERAL PLAN UPDATE POLICIES

The following are relevant policies of the Santa Ana General Plan Update, which may contribute to reduce potential impacts to hydrology and water quality.

Public Services Element

- **Policy 3.4 Drainage Facilities.** Expand and maintain storm drain facilities to accommodate the needs of existing and planned development.
- **Policy 3.5 Green Infrastructure.** Incorporate sustainable design and Low Impact Development (LID) techniques for storm water facilities and new development to achieve multiple benefits, including enhancing preserving and creating open space and habitat, reducing flooding, and improving runoff water quality.

Conservation Element

- **Policy 4.6 Water Quality.** Work with public and private property owners to reduce storm water runoff and to protect the water quality percolating into the aquifer and into any established waterway.

Safety Element

- **Policy 1.1 Regional Collaboration.** Continue to consult with agencies to maintain the most current flood hazard and floodplain information; use the information as a basis for project review and to guide development in accordance with regional, state, and federal standards.

- **Policy 2.1 Regional Collaboration.** Consult and collaborate with federal, state, and regional agencies to identify and regulate the disposal and storage of hazardous materials, ~~and~~ prevent the illegal transportation and disposal of hazardous waste., ~~facilitate the cleanup of contaminated sites,~~ and facilitate the cleanup of contaminated sites.

- **Policy 1.3 Storm Drain Infrastructure.** Update the Drainage Master Plan to prioritize improvements to existing system deficiencies, and plan for infrastructure needs that support the General Plan land use vision.

- **Policy 1.4 Critical Infrastructure.** Design, construct, and retrofit critical public facilities and utilities located in flood-prone areas to maintain their structural and operational integrity during floods.

- **Policy 1.5 Flood Awareness.** Promote education of flooding hazards and bring awareness to resources and programs that assist property owners, residents, and businesses to protect their homes and property from flood damage.

- **Policy 1.6 Alternative Flood Control Methods.** Explore and encourage natural flood control infrastructure and techniques that create new open areas to capture storm water, recharge aquifers, prevent flooding, and that expand recreation opportunities.

- **Policy 1.7 Surface Water Infiltration.** Encourage site drainage features that reduce impermeable surface area, increase surface water infiltration, and minimize surface water runoff during storm events on private and public developments.

- **Policy 1.8 Development in Flood Zone.** Continue to implement federal, state, and regional requirements related to new construction in flood plain areas to ensure that future flood risks to life and property are minimized.

5.9.4 Environmental Impacts

The following impact analysis addresses thresholds of significance for which the Notice of Preparation disclosed potentially significant impacts. The applicable thresholds are identified in brackets after the impact statement.

Impact 5.9-1: Projects pursuant to the General Plan Update would not violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality. [Thresholds HYD 1 and HYD-3 (i)]

Discharges from Construction Sites to Stormwater

Buildout under the General Plan Update will involve soil disturbance, construction, and operation of developed land uses that could generate pollutants affecting stormwater. Buildout will involve construction of about 36,261 housing units and about 5.8 million square feet of nonresidential land uses, compared to existing conditions.

Clearing, grading, excavation, and construction activities associated with the General Plan Update have the potential to impact water quality through soil erosion and increasing the amount of silt and debris carried in runoff. Additionally, the use of construction materials, such as fuels, solvents, and paints, may present a risk to surface water quality. Finally, the refueling and parking of construction vehicles and other equipment on-site during construction may result in oil, grease, or related pollutant leaks and spills that may discharge into the storm drain system.

To minimize these potential impacts, development pursuant to the General Plan Update must comply with the Construction General Permit (CGP) Water Quality Order 2009-0009-DWQ (as amended by Order No. 2010-0014-DWQ and 2012-006-DWQ), which requires the preparation and implementation of a SWPPP. A SWPPP requires the incorporation of BMPs to control sediment, erosion, and hazardous materials contamination of runoff during construction and prevent contaminants from reaching receiving water bodies. The SWRCB mandates that projects that disturb one or more acres of land obtain coverage under the Statewide CGP. The CGP also requires that prior to the start of construction activities, the project applicant must file PRDs with the SWRCB, which includes a Notice of Intent, risk assessment, site map, annual fee, signed certification statement, SWPPP, and post-construction water balance calculations. The construction contractor is always required to maintain a copy of the SWPPP at the site and implement all construction BMPs identified in the SWPPP. Prior to the issuance of a grading permit, the project applicant is required to provide proof of filing of the PRDs with the SWRCB, which includes preparation of a SWPPP. Categories of potential BMPs that would be implemented for this project are described in Table 5.9-5, *Construction BMPs*.

Table 5.9-5 Construction BMPs

Category	Purpose	Examples
Erosion Controls and Wind Erosion Controls	• Use project scheduling and planning to reduce soil or vegetation disturbance (particularly during the rainy season) • Prevent or reduce erosion potential by diverting or controlling drainage • Prepare and stabilize disturbed soil areas	Scheduling, preservation of existing vegetation, hydraulic mulch, hydroseeding, soil binders, straw mulch, geotextile and mats, wood mulching, earth dikes and drainage swales, velocity dissipation devices, slope drains, streambank stabilization, compost blankets, soil preparation/roughening, and non-vegetative stabilization
Sediment Controls	• Filter out soil particles that have been detached and transported in water	Silt fence, sediment basin, sediment trap, check dam, fiber rolls, gravel bag berm, street sweeping and vacuuming, sandbag barrier, straw bale barrier, storm drain inlet protection, manufactured linear sediment controls, compost socks and berms, and biofilter bags
Wind Erosion Controls	• Apply water or other dust palliatives to prevent or minimize dust nuisance	Dust control soil binders, chemical dust suppressants, covering stockpiles, permanent vegetation, mulching, watering, temporary gravel construction, synthetic covers, and minimization of disturbed area
Tracking Controls	• Minimize the tracking of soil offsite by vehicles	Stabilized construction roadways and construction entrances/exits, and entrance/outlet tire wash.
Non-Storm Water Management Controls	• Prohibit discharge of materials other than stormwater, such as discharges from the cleaning, maintenance, and fueling of vehicles and equipment. • Conduct various construction operations, including paving, grinding, and concrete curing and finishing, in ways that minimize non-stormwater discharges and contamination of any such discharges.	Water conservation practices, temporary stream crossings, clear water diversions, illicit connection/discharge, potable and irrigation water management, and the proper management of the following operations: paving and grinding, dewatering, vehicle and equipment cleaning, fueling and maintenance, pile driving, concrete curing, concrete finishing, demolition adjacent to water, material over water, and temporary batch plants.
Waste Management and Controls (i.e., good housekeeping practices)	• Manage materials and wastes to avoid contamination of stormwater.	Stockpile management, spill prevention and control, solid waste management, hazardous waste management, contaminated soil management, concrete waste management, sanitary/septic waste management, liquid waste management, and management of material delivery storage and use.

Source: CASQA 2012.

Submittal of the PRDs and implementation of the SWPPP throughout the construction phase of projects pursuant to the General Plan Update will address anticipated and expected pollutants of concern as a result of construction activities. As a result, water quality impacts associated with construction activities would be less than significant.

Discharges from Developed Land Uses (Postconstruction) to Stormwater

With the proposed land use changes, development resulting from the General Plan Update may have long-term impacts on the quality of stormwater and urban runoff, subsequently impacting downstream water quality. Developments can potentially create new sources for runoff contamination through changing land uses. As a consequence, developments in individual focus areas and the city as a whole may have the potential to increase the postconstruction pollutant loadings of certain constituent pollutants associated with the proposed land uses and their associated features, such as landscaping and plaza areas.

To help prevent long-term impacts associated with land use changes and in accordance with the requirements of the City of Santa Ana LIP and consistency with OC Drainage Area Management Plan and Fourth-Term MS4 permit, designated new development and significant redevelopment projects must incorporate LID/site design and source control BMPs to address post-construction stormwater runoff management.

In addition, projects that are identified as priority projects are required to implement site design/LID and source control BMPs applicable to their specific priority project categories, as well as implement treatment control BMPs where necessary. Selection of LID and additional treatment control BMPs is based on the pollutants of concern for the specific project site and the BMP's ability to effectively treat those pollutants, in consideration of site conditions and constraints. Further, both priority and nonpriority projects must develop a project-specific water quality management plan (WQMP) that describes the menu of BMPs chosen for the project and includes operation and maintenance requirements for all structural and any treatment control BMPs.

Since the GPU does not include a specific or detailed development plan, project-specific WQMP(s) will not be required at this time. Future project-specific WQMPs, preliminary and/or final, will be prepared consistent with the prevailing terms and conditions of the City's LIP, OC Drainage Area Management Plan, and Model WQMP at the time of project application. Moreover, LID and water quality treatment solutions prescribed in project-specific WQMPs shall be designed to support or enhance the regional BMPs and efforts implemented by the City to improve water quality.

Furthermore, as part of the statewide mandate to reduce trash in receiving waters, the City of Santa Ana has been required to adhere to the amended CA Trash TMDL since July 2016. The requirements include the installation and maintenance of trash screening devices at all public curb inlets, grate inlets, and catch basin inlets. The trash screening devices must be approved by the local agency and consistent with the minimum standards of the Trash TMDL. The City of Santa Ana has selected Track 1 as its compliance option. By selecting Track 1, the City has agreed to install, operate, and maintain full capture systems in storm drains that capture runoff from one or more priority land use area.

Additionally, all development pursuant to the General Plan Update shall comply with the requirements of the Santa Ana Municipal Code, which prohibits illicit connections to the storm drainage system and forbids prohibited discharges. All development that discharges stormwater associated with industrial activity shall also comply with the requirements of the General Industrial Permit (Order No. CAS000001). Development pursuant to the General Plan Update that involves the installation or decommissioning of water wells shall do so in accordance with Section 13751 of the Water Code. Therefore, with the implementation of state, regional, and local regulatory requirements, development pursuant to the General Plan Update would not violate any

water quality standards or waste discharge requirements or result in a substantial erosion or siltation on- or off-site.

Furthermore, drainage patterns would largely be maintained and would utilize the existing drainage facilities within the public right-of-way. Current runoff is captured and conveyed by existing storm drain infrastructure throughout the city before discharging to County drainage channels and to the Pacific Ocean. The city is built out except for a small number of vacant parcels that are stabilized and will likely be developed under buildout conditions. The majority of streams and channels that drain the city are concrete lined and not susceptible to scour or erosion. For areas that are tributary to streams that may be susceptible to scour, hydromodification requirements as part of the regional MS4 permit will ensure that impacts are minimized. Therefore, overall impacts are less than significant.

Level of Significance Before Mitigation: With the implementation of RR HYD-1 through HYD-5 and Policy 1.7 of the Safety Element, Policy 3.5 of the Public Services Element, and Policy 4.6 of the Conservation Element (as shown under Section 5.9.3.2), Impact 5.9-1 will be less than significant.

Impact 5.9-2: Development pursuant to the General Plan Update would increase the demand on groundwater use but would not impede sustainable groundwater management of the basin. [Threshold HYD-2]

The City of Santa Ana relies on local groundwater resources for approximately 77 percent of its water supply, and the implementation of the Santa Ana GPU has the potential to increase water demand by 6,950 acre-feet per year (AFY). However, the Water Supply and Demand Technical Report showed that the projected water demand from the proposed GPU at buildout is well within the projected total water demand for 2040 in the 2015 urban water management plan for normal, dry year, and multiple dry year scenarios. Therefore, it is not anticipated that implementation of the GPU will exceed projected long-term water supplies. This is further supported by OCWD projections and purchase agreements.

The 2018-19 OCWD Engineer's report provides data on groundwater usage across its service area, including Santa Ana. The total groundwater production for the 2018-19 year was 302,756 acre-feet (AF), which falls within OCWD's sustainable groundwater management goals. Population within OCWD's service area is expected to increase from the current 2.28 million people (based on Census 2010 demographic data) to approximately 2.59 million people by the year 2035. This population growth is expected to increase water demands from the current 393,222 AFY to 447,000 AFY in 2035 (a water demand projection that takes into consideration future water conservation savings). This yields an anticipated increase in water demand of 53,779 AFY. The proposed increase of 6,950 AFY under implementation of the Santa Ana GPU is well within the planned increase in water demands from OCWD projections.

Furthermore, OCWD oversees groundwater recharge and groundwater levels and has multiple mechanisms to prevent groundwater overdraft. The basin is covered by Alternative Plan 8-1, and the groundwater management strategies laid out in the Alternative Plan have been approved by DWR. The Alternative Plan will be updated and resubmitted every five years as part of SGMA requirements. Additionally, because Santa Ana is a built-out city, any proposed land use changes and development will occur within areas that are already built out and will not interfere with groundwater recharge.

Level of Significance Before Mitigation: Impact 5.9-2 will be less than significant.

Impact 5.9-3: Development pursuant to the General Plan Update would increase the amount of pervious surfaces in the plan area, but could substantially increase the rate or amount of surface runoff in some focus areas in a manner which would result in flooding off-site or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems. [Thresholds HYD-3 (ii) and (iii)]

As described in Section 5.9.1.2, the city is largely built out, and there are no major areas that are undeveloped. Therefore, peak flows would be decreased overall due to the implementation of landscaping requirements as well as LID features associated with water quality regulations. These features would increase pervious areas which would decrease stormwater flows. For areas where single-family homes and vacant lots would be redeveloped into higher intensity uses, however, an increase of stormwater runoff peak flow rates could result from the introduction of new impervious surfaces. These are summarized below for the focus areas:

- **West Santa Ana Boulevard Focus Area.** The West Santa Ana Boulevard focus area has some existing single-family residences that are proposed to include the Urban Neighborhood land designation. This could result in increased impervious surfaces in these areas and therefore increase stormwater runoff peak flows. There are some downstream improvements to the Gardens Channel between Edinger and Sunflower in the City's MPD to alleviate some local flooding issues near Thorton Park. These improvements are also listed on the current OCPW 7-year CIP as a qualified future project. Therefore, based on these findings, prioritizing the Gardens Channel improvements may be beneficial to ensure no hydrology impacts result from the future developments proposed under the GPU.

- **Grand Avenue / 17th Street Focus Area.** The Grand Avenue/17th Street focus area also has some existing single-family residences that may be converted to multifamily residences or commercial land uses. This could result in increased impervious surfaces in these areas and therefore increased stormwater runoff peak flows. There are several identified improvements along Grand Avenue between Santa Clara and the Santa Fe Channel within the regional Santa Fe Watershed. The majority of these improvements are to upsize various storm drainpipes to convey the 10-year storm event. Based on these findings, prioritizing the Santa Fe Grand storm drain improvements may be beneficial to ensure no hydrology impacts result from the future developments proposed under the GPU.

- **South Main Street Focus Area.** The South Main Street focus area also has some existing single-family residences that may be converted to multifamily residences or commercial land uses. This could result in increased impervious surfaces in these areas and therefore increased stormwater runoff peak flows. However, City and County policies, as detailed below, would eliminate any potential increase in runoff and the conversion from lower density single family neighborhoods to higher density residential and mixed uses would not result in higher peak flow rates.

- **55 Freeway/Dyer Road Focus Area.** Within the 55 Freeway/Dyer Road focus area are some large vacant parcels that may also result in increases in stormwater runoff once they are developed. The OCPW 7-Year CIP includes the Lane Channel improvements, which entails demolishing and replacing a portion of

damaged concrete-lined channel. These improvements are anticipated to be finished in June 2020 and will serve to improve the hydrologic capacity of downstream areas.

- **South Bristol Street Focus Area.** The South Bristol focus area discharges to the Gardens Channel, which is listed for improvement in the Santa Ana MPD. Although this area is not anticipated to have an increase in peak runoff rates due to a likely increase in pervious areas, this improvement project should be considered for prioritization.

The City and County have policies in place for reviewing and permitting new developments. As part of the development process, detailed hydrology studies will be required and, if necessary, on-site detention systems within the development can be required to match existing peak flows, thereby eliminating any potential increase in runoff. Therefore, conversion from lower density single family neighborhoods to higher density residential and mixed uses, which would occur over an extended period, would not result in higher peak flow rates. In addition, the City will continue monitoring its storm drain system for any segments that need immediate improvements and will regularly update its MPD to adequately plan for future drainage needs. OCPW also updates its CIP each year to ensure regional drainage facilities are functioning. Redevelopment projects under implementation of the GPU will provide additional opportunities for capital improvements.

Furthermore, GPU policies require expanding and maintaining storm drain facilities to accommodate the needs of existing and planned development, updating the Drainage Master Plan to prioritize improvements to existing system deficiencies, and planning for infrastructure needs that support the General Plan land use vision. GPU policies also encourage site drainage features that reduce impermeable surface area, increase surface water infiltration, and minimize surface water runoff on private and public developments during storm events. Therefore, impacts due to development pursuant to the GPU would be less than significant.

Level of Significance Before Mitigation: With the implementation of RR HYD-4 and Policies 1.3, 1.7, 3.4, and 3.5 (as shown under Section 5.9.3.2), Impact 5.9-2 will be less than significant.

Impact 5.9-4: In flood hazard, tsunami, or seiche zones, development pursuant to the General Plan Update would not risk release of pollutants due to project inundation or impede or redirect flood flows. [Thresholds HYD-3 (iv) and HYD-4]

As shown in Figure 5.9-3, none of the focus areas are within the 100-year flood hazard area except the northeast corner of the West Santa Ana Boulevard focus area, which is proposed for low density residential.

It is the City's policy to avoid placing new housing within 100-year flood hazard areas based on FEMA's floodplain maps. Development in these areas is restricted per the City's Municipal Code Chapter 7, Floodplain Management. The floodplain administrator shall approve, conditionally approve, or disapprove all development within the 100-year flood zone based on the determination of whether the following standards are satisfied:

- The proposed development must be consistent with the need to minimize flood damage within the special flood hazard area.

- All public utilities and facilities, such as sewer, gas, electrical, and water systems must be located and constructed to minimize or eliminate flood damage.

- Adequate drainage must be provided to reduce exposure to flood hazards. Within the special flood hazard area, adequate drainage paths around structures on slopes must be provided to guide floodwaters around and away from proposed structures.

The central and eastern portion of the West Santa Ana Boulevard focus area, the southern portion of the Grand Avenue/17th Street focus area, and the entirety of the 55 Freeway/Dyer Road focus area are within the inundation area of the Santiago Creek Dam. Furthermore, the entirety of the 55 Freeway/Dyer Road focus area, and the central and western portions of the West Santa Ana Boulevard focus area are within the dam inundation area of Prado Dam (see Figure 5.9-5).

Dams in California are monitored and inspected annually by the California Division of Safety of Dams (DSOD). In addition, dam owners are required to maintain Emergency Action Plans (EAP) that include procedures for damage assessment and emergency warnings. An EAP identifies potential emergency conditions at a dam and specifies preplanned actions to help minimize property damage and loss of life should those conditions occur. EAPs contain procedures and information that instruct dam owners to issue early warning and notification messages to downstream emergency management authorities. Santiago Creek dam is certified by DSOD to safely impound water to the elevation associated with the dam's capacity. The dam has been assessed by DSOD to have no existing or potential dam safety deficiencies. Acceptable performance is expected under all loading conditions (static, hydrologic, seismic) in accordance with the applicable regulatory criteria or tolerable risk guidelines (DSOD 2019). Therefore, impacts due to inundation by Santiago Creek dam are less than significant.

Prado Dam operates an EAP in accordance with DSOD's requirements and is governed by the U.S. Army Corps of Engineers' Dam Safety Program to maintain public safety. An integral part of the program is the risk-informed screening process. Dams are classified based upon confirmed or unconfirmed dam safety issues, the combination of life or economic consequences should failure occur, and the probability of failure. This process enables the Corps to prioritize dam safety actions to correct deficiencies, which include interim risk reduction measures to be undertaken while further investigations are conducted, and remedial actions are implemented (Army Corps of Engineers 2012). The Corps has characterized Prado Dam as a high urgency risk. The Corps' assessment of the dam has identified performance concerns that require attention to meet the Corps' rigorous dam safety standards. The dam, which is typically dry, has historically operated without incident. The Corps is working with a national team to reduce the risks associated with the spillway. The agency is implementing interim risk-reduction measures. Modification of the existing spillway is expected to begin in 2021. The dam is also in the process of being modified as part of the larger Santa Ana River Mainstem project. Modification of the dam began in 2002 to provide additional capacity for storage of floodwaters and sediment by enlarging the existing Prado Dam and reservoir. This includes raising the main dam embankment, replacing the outlet works, constructing dikes, and improving the downstream channel. Therefore, impacts due to inundation by Prado Dam are less than significant.

The Prado Reservoir, Irvine Lake, and the Santiago Creek Recharge Basins could generate seiches. A seiche could theoretically occur in these reservoirs as the result of an earthquake or other disturbance, but the flooding impact would be less than for the dam inundation zones. Additionally, the city is about 5 miles inland from the Pacific Ocean; therefore, the chances of a tsunami impacting the plan area are negligible.

As noted in Impact 5.9-2, the City and County regularly maintain and improve storm drain and flood control infrastructure based on priority, and new developments will comply with all pertinent flood control regulation. Furthermore, GPU policies encourage consultation with regional agencies to maintain the most current flood hazard and floodplain information, to use the information as a basis for project review and to guide development in accordance with regional, state, and federal standards. The GPU policies also promote the design, construction, and retrofitting of critical public facilities and utilities located in flood-prone areas to maintain their structural and operational integrity during floods.

Level of Significance Before Mitigation: With the implementation of RR HYD-6 and Policies 1.1, 1.4, 1.5, 1.6, and 1.8 (as shown in Section 5.9.3.2), Impact 5.9-4 will be less than significant.

Impact 5.9-5: Development pursuant to the General Plan Update would not conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan. [Threshold HYD-5]

New development and redevelopment pursuant to the GPU implement the requirements of the CGP, the Orange County MS4 Permit, and Chapter 18 Article IV of the Santa Ana Municipal Code. Furthermore, industrial development and redevelopment would abide by the General Industrial Permit, and well installation or decommissioning will be conducted in accordance with Section 13751 of the Water Code.

Adherence to these regulatory requirements ensure that surface and groundwater quality are not adversely impacted during construction and operation of development pursuant to the GPU. As a result, site development will not obstruct or conflict with the implementation of the Santa Ana River Basin Water Quality Control Plan. Proposed development will be connected to the City's public water supply, and there will be no on-site wells for use of groundwater. The City manages potable and nonpotable supplies to ensure withdrawals from the Orange County Groundwater Basin do not exceed the safe yield for the Basin. As discussed in Impact 5.9-2, increased demand due to development pursuant to the GPU would not adversely impact the sustainable management of the basin. Therefore, the project would not obstruct or conflict with the Basin 8-1 Alternative Plan, and impacts would be less than significant.

Level of Significance Before Mitigation: With the implementation of RR HYD-1 through HYD-5 and Policies 1.7, 3.5, and 4.6 (as shown under Section 5.9.3.2), Impact 5.9-5 will be less than significant.

5.9.5 Level of Significance Before Mitigation

Upon implementation of regulatory requirements and GPU policies, the following impacts would be less than significant: 5.9-1, 5.9-2, 5.9-3, 5.9-4, and 5.9-5.

5.9.6 Mitigation Measures

No mitigation required.

5.9.7 Level of Significance After Mitigation

Impacts 5.9-1, 5.9-2, 5.9-3, 5.9-4, and 5.9-5 are less than significant.

5.9.8 References

Arcadis. 2016, June. City of Santa Ana 2015 Urban Water Management Plan. https://www.santa-ana.org/sites/default/files/Documents/urban_water_management_plan.pdf.

California Office of Emergency Services (Cal OES). 2019 (accessed) Dam Safety Planning Division web page. https://www.caloes.ca.gov/cal-oes-divisions/hazard-mitigation/dam-safety-planning-division.

Division of Safety of Dams (DSOD). 2019, September. Dams Within Jurisdiction of the State of California. California Department of Water Resources. https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/All-Programs/Division-of-Safety-of-Dams/Files/Publications/2019-Dams-Within-Jurisdiction-of-the-State-of-California-Alphabetically-by-County_a_y20.pdf.

Insurance Journal. 2019, May 20. "Army Corps of Engineers Raises Risk Assessment on Southern California Dam." Insurance Journal website. https://www.insurancejournal.com/news/west/2019/05/20/526841.htm.

Michael Baker International. 2015, December. City of Santa Ana Storm Drain Master Plan.

Orange County Water District (OCWD). 2020a, July 23 (accessed). South Basin Groundwater Remedial Investigation and Feasibility Study. https://www.ocwd.com/what-we-do/water-quality/groundwater-cleanup/south-basin/.

———. 2020b, July, 2020. North and South Basin Groundwater Cleanup Update. https://www.ocwd.com/media/8992/nb-sb-cleanup-update-july-2020.pdf.

———. 2018, June 25. Orange County Water District South Basin # D-1712505 Remedial Investigation Workplan. https://www.ocwd.com/media/6813/south-basin-project-d1712505-ri-work-plan.pdf

US Army Corps of Engineers. 2019, August 22 (accessed). Prado Dam. https://www.spl.usace.army.mil/Missions/Asset-Management/Prado-Dam/.

———. 2012, July 26. Dam Safety Program. https://www.spl.usace.army.mil/Media/Fact-Sheets/Article/477349/dam-safety-program/.

US Environmental Protection Agency (USEPA). 2012, September 26. Water Permitting 101. http://www.epa.gov/npdes/pubs/101pape.pdf.