4.7 Hydrology and Water Quality

This section evaluates the potential for impacts relating to hydrology and water quality resulting from implementation of the OC River Walk Project (project).

The analysis in this section is based on the OC River Walk Hydrology and Hydraulics prepared by PACE (2025). A complete copy of the report is included in Appendix G, Hydrology Report.

4.7.1 Environmental Setting

4.7.1.1 Regulatory Setting

This section describes the federal, state, and local regulatory framework adopted to address hydrology and water quality.

Federal

The Clean Water Act (CWA) establishes the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters. The basis of the CWA was enacted in 1948 and was called the Federal Water Pollution Control Act, but the Act was substantially reorganized and expanded in 1972. "Clean Water Act" became the Act's common name with amendments in 1972. Under the CWA, the U.S. Environmental Protection Agency has implemented pollution control programs such as setting wastewater standards for industry and set water quality standards for all contaminants in surface waters. The CWA made it unlawful to discharge any pollutant from a point source into navigable waters, unless a permit was obtained. The U.S. Environmental Protection Agency's National Pollutant Discharge Elimination System (NPDES) permit program controls discharges. Point sources are discrete conveyances such as pipes or human-made ditches.

The CWA provides guidance for restoring and maintaining the chemical, physical, and biological integrity of the nation's waters. Section 401 requires project proponents to obtain state certification when seeking a federal license or permit for activities that result in a discharge to waters of the United States, ensuring compliance with CWA provisions. In California, the State Water Resources Control Board (SWRCB) administers this certification program.

Section 402 establishes a permitting system for discharging pollutants (excluding dredged or fill material) into waters of the United States. The SWRCB also administers this program in California.

Section 404, administered by the U.S. Army Corps of Engineers (USACE), regulates permits for discharging dredged or fill material into waters of the United States, including wetlands.

State

The Porter-Cologne Act is the principal law governing water quality regulation in California. It establishes a comprehensive program to protect water quality and the beneficial uses of water. The Porter-Cologne Act applies to surface waters, wetlands, and groundwater and to both point and nonpoint sources of pollution. Pursuant to the Porter-Cologne Act (California Water Code, Section 13000 et seq.), the policy of the state is as follows: (SWRCB 2014)

- That the quality of all the waters of the State shall be protected;
- That all activities and factors affecting the quality of water shall be regulated to attain the highest water quality within reason; and
- That the State must be prepared to exercise its full power and jurisdiction to protect the quality of water in the State from degradation.

The Porter-Cologne Act established nine Regional Water Boards (based on hydrogeologic barriers) and the State Water Board, which are charged with implementing its provisions and which have primary responsibility for protecting water quality in California. The State Water Board provides program guidance and oversight, allocates funds, and reviews Regional Water Boards decisions. In addition, the State Water Board allocates rights to the use of surface water. The Regional Water Boards have primary responsibility for individual permitting, inspection, and enforcement actions within each of nine hydrologic regions. The State Water Board and Regional Water Boards have numerous nonpoint source-related responsibilities, including monitoring and assessment, planning, financial assistance, and management. (SWRCB 2014)

The Regional Water Boards regulate discharges under the Porter-Cologne Act primarily through issuance of NPDES permits for point source discharges and waste discharge requirements for numerous nonpoint source discharges. Anyone discharging or proposing to discharge materials that could affect water quality (other than to a community sanitary sewer system regulated by an NPDES permit) must file a report of waste discharge. The SWRCB and the Regional Water Quality Control Boards (RWQCBs) can make their own investigations or may require dischargers to carry out water quality investigations and report on water quality issues. The Porter-Cologne Act provides several options for enforcing waste discharge requirements and other orders, including cease and desist orders, cleanup and abatement orders, administrative civil liability orders, civil court actions, and criminal prosecutions. (SWRCB 2014)

The Porter-Cologne Act also implements many provisions of the CWA, such as the NPDES permitting program. The Porter-Cologne Act also requires adoption of water quality control plans that contain the guiding policies of water pollution management in California. In addition, regional water quality control plans (basin plans) have been adopted by each of the Regional Water Boards and get updated as necessary and practical. These plans identify the existing and potential beneficial uses of waters of the state and establish water quality objectives to protect these uses.

The basin plans also contain implementation, surveillance, and monitoring plans. (SWRCB 2014) The Project site is in the Santa Ana River Watershed which is within the purview of Santa Ana RWQCB. The Santa Ana RWQCB's Santa Ana River Basin Water Quality Control Plan is the governing water quality plan for the region.

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 June 2019.

The Santa Ana RWQCB has issued three Municipal Separate Stormwater Sewer System (MS4) permits to the three counties—Orange, Riverside, and San Bernardino—and all the incorporated cities within the jurisdiction of this RWQCB. In March 2024, the Santa Ana RWQCB has released a draft Santa Ana Regional I MS4 Permit for public review and comment. The draft Santa Ana Regional MS4 Permit is the first of its kind in the Santa Ana region, where each county previously maintained individual, county-wide permits. The permit combines three existing Phase I MS4 permits for north Orange, western Riverside, and western San Bernardino counties into a single regional permit encompassing the Santa Ana River Watershed area. The three existing MS4 permits were last renewed and adopted between 2009 and 2012. With the transition to a unified Santa Ana Regional MS4 Permit, it is likely that a new, consolidated Model Water Quality Management Plan (WQMP) and Technical Guidance Document (TGD) will be introduced to standardize stormwater management practices across the entire region. Santa Ana RWQCB is currently reviewing the comments received during the public review period of the draft Santa Ana Regional MS4 Permit, and the final adoption date has not been announced.

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

The Santa Ana RWQCB MS4 Storm Water Permit, Order No. R8-2009-0030, NPDES Permit No. CAS618030 (MS4 Permit), as amended by Order No. R8-2010-0062, is currently in effect, and specifies waste discharge requirements for the County of Orange, the incorporated cities of Orange County, and the Orange County Flood Control District (OCFCD) 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 that describe the co-permittees' urban runoff management programs for their local jurisdictions.

The Orange County Stormwater Program's Drainage Area Management Plan (DAMP) is Orange County's principal policy and program guidance document for stormwater management and includes a 2017 Technical Guidance Document to be followed in preparing the project's WQMP.

The Model WQMP and North Orange County TGD were developed by the Permittees according to section XII.C. of the current Order. These documents govern the development and implementation of post-construction pollution controls for certain new development and significant redevelopment as defined in the Order. The Order, Model WQMP, and TGD emphasize the use of controls that support low impact development (LID). Both documents are subject to periodic updates and amendments, subject to the approval of the Executive Officer and after public review.

The use of LID best management practices (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 this water quality functions into the project's land plan. These land development requirements are detailed in the Model WQMP and TGD, approved in May 2011, which cities have incorporated into their discretionary approval processes for new development and redevelopment projects. New developments and redevelopments must implement BMPs under the LID hierarchy, as described in the TGD. The LID hierarchy encourages, where feasible, new projects to first infiltrate, then harvest and reuse, then biofilter stormwater runoff, depending on site constraints.

Orange County Water District Groundwater Management Plan 2015 Update

Orange County Water District (OCWD) adopted its first Groundwater Management Plan in 1989. The latest update was completed in 2015. This plan sets forth basin management goals and objectives and describes how the basin is managed. This includes description of basin hydrogeology, water supply monitoring programs, management and operation of recharge facilities, water quality protection and management, and natural resource and collaborative watershed programs. Basin management goals are (1) to protect and enhance groundwater quality, (2) to protect and increase the sustainable yield of the basin in a cost-effective manner, and (3) to increase the efficiency of OCWD operations.

OCWD also requires an NPDES permit from the Santa Ana RWQCB to allow discharge of groundwater replenishment system GWRS water into the Santa Ana River (SAR). In addition to this, OCWD's existing Title 22 Reuse permit from the State Water Board, Division of Drinking Water would be amended to allow impoundment and groundwater recharge of GWRS water within the SAR.

Sustainable Groundwater Management Act Alternative Plan

In 2014, the California Sustainable Groundwater Management Act was passed. The law provides authority for agencies to develop and implement groundwater sustainability plans or alternative plans that demonstrate the basin is being managed sustainably. On January 1, 2017, the OCWD, City of La Habra, and Irvine Ranch Water District submitted the Basin 8-1 Alternative to the California Department of Water Resources. Elements to be included in groundwater sustainability plans as described in the California Water Code (Sections10727.2, 10727.4, and 10727.6) have been incorporated into the Basin 8-1 Alternative.

Local

City of Anaheim General Plan

The City of Anaheim General Plan includes the following goals and policies pertaining to hydrology and water quality.

Public Services and Facilities Element

- **Goal 6.1:** Maintain a storm drain system that will adequately protect and enhance the health, safety and general welfare of residents, visitors, employees, and their property.
  - **Policy 6.1-1.** Improve the City's storm drain system to address current deficiencies as well as long-term needs associated with future development to minimize flood damage and adequately convey rainfall and subsequent runoff from a 25-year frequency storm.
  - **Policy 6.1-2.** Develop Anaheim's flood control system for multi-purpose uses whenever practical and financially feasible (i.e., recreational, water quality/treatment, infiltration, etc.).
  - **Policy 6.1-3.** Minimize the amount of impervious surfaces in conjunction with new development.
  - **Policy 6.1-4.** Minimize the disturbance of natural water bodies and natural drainage systems, where feasible, resulting from development including roads, highways, and bridges.

Green Element

- **Goal 6.1:** Develop a Groundwater Protection Management Program to ensure the quality of groundwater drinking supplies.
  - **Policy 6.1-1.** Develop and disseminate educational materials that describe the importance of protecting groundwater and management techniques for the proper storage and disposal of materials and waste.
  - **Policy 6.1-2.** Include groundwater protection educational outreach efforts with Anaheim Fire Department hazardous materials and waste inspections.

  - **Policy 6.1-3.** Continue to coordinate groundwater protection efforts with the Orange County Water District, neighboring cities and other relevant agencies.

- **Goal 7.1:** Reduce urban run-off from new and existing development.
  - **Policy 7.1-1.** Ensure compliance with the Federal Clean Water Act requirements for National Pollutant Discharge Elimination System (NPDES) permits, including developing and requiring the development of Water Quality Management Plans for all new development and significant redevelopment in the City.
  - **Policy 7.1-2.** Continue to implement an urban runoff reduction program consistent with regional and federal requirements, which includes requiring and encouraging the following:
    - Increase permeable areas and install filtration controls (including grass lined swales and gravel beds) and divert flow to these permeable areas to allow more percolation of runoff into the ground;
    - Use natural drainage, detention ponds or infiltration pits to collect runoff; and,
    - Prevent rainfall from entering material and waste storage areas and pollution-laden surfaces.
  - **Policy 7.1-3.** Cooperate with surrounding jurisdictions and the County of Orange to provide adequate storm drainage facilities.
  - **Policy 7.1-4.** Require new development and significant redevelopment to utilize site preparation, grading and best management practices that provide erosion and sediment control to prevent construction-related contaminants from leaving the site and polluting waterways.
  - **Policy 7.1-5.** Coordinate with appropriate Federal, State, and local resource agencies on development projects and construction activities affecting waterways and drainages.
  - **Policy 7.1-6.** Provide public education information and outreach materials regarding proper materials handling practices to assist residents and businesses in complying with surface water quality regulations and to increase awareness of potential impacts to the environment resulting from improper containment or disposal practices.

Safety Element

- **Goal 3.1:** A community resilient to the effects of flooding and dam inundation hazards.
  - **Policy 3.1-1.** Evaluate all development proposals located in areas that are subject to flooding to minimize the exposure of life and property to potential flood risks.
  - **Policy 3.1-2.** Continue to participate in the National Flood Insurance Program. (Revised Policy)

- **Policy 3.1-3.** Continue compliance with the Cobey-Alquist Floodplain Management Act requirements and State of California Model Ordinance.
- **Policy 3.1-4.** Encourage properties prone to flooding or creating new flooding conditions to incorporate flood safe design elements and appropriate setbacks to reduce flood damage potential.
- **Policy 3.1-5.** Encourage new development to maintain and enhance existing natural streams, as feasible.
- **Policy 3.1-6.** Support policies and programs to promote water conservation measures, low-impact development, and green infrastructure that can help convey stormwater and reduce impacts from both drought and flooding.
- **Policy 3.1-7.** Coordinate with local, state, and federal agencies on flood control and stormwater management improvements in and around the city.
- **Policy 3.1-8.** Coordinate with OC Flood Control and US Army Corps of Engineers on operations, maintenance, and improvements to Prado Dam and the Santa Ana River.
- **Policy 3.1-9.** Utilize flood control methods that are consistent with Regional Water Quality Control Board Policies and Best Management Practices.

City of Anaheim Municipal Code

Chapter 10.09, National Pollution Discharge Elimination System (NPDES). This chapter states that new development and significant redevelopment within the City of Anaheim may have to comply with a WQMP as determined by the Director. If such a determination is made, the applicant must comply with the State General Permit, State Project Specific Permit, or Local Discharge Permit and undertake inspections to determine compliance with the permit.

Chapter 10.14, Storm Drain Impact and Improvement Fee. This chapter enforces a storm drain impact fee to finance storm drain improvements and to pay for new developments and expansions and additions to existing developments. The City Council has found the fee to be consistent with its General Plan, and pursuant to Government Code 65913.2, has considered the effects of the fee with respect to the City of Anaheim's storm drain needs in the South Central City Area as established in the Master Plan of Drainage for the South Central City Area and within "The Anaheim Resort Specific Plan No. 92-2."

Chapter 17.04, Grading, Excavations, Fills, Watercourses. The purpose of this chapter is to require that excavations and fills which may affect drainage and watercourses be performed in accordance with good engineering practice. The regulations and standards established in this chapter are the minimum regulations necessary for the protection of public and private and property and that, where circumstances warrant, the City Engineer shall recommend to the City Council such additional standards, procedures and other regulations as may improve the quality of such protection.

Chapter 17.28, Flood Hazard Reduction. This chapter provides methods for reducing flood losses through restricting or prohibiting uses that could endanger the health, safety, and property in the City of Anaheim; requires that uses vulnerable to flooding be protected against flood damage; provides for the control of the alteration of natural floodplains, stream channels, and natural protective barriers; provides for flood control infrastructure and prevent grading or dredging that may increase flood damage; and regulates the construction of flood barriers that divert floodwaters or increase flood hazards.

Storm Drainage Master Plans

The City of Anaheim Department of Public Works has an ongoing storm drainage master planning program for eight primary storm drainage tributary areas in the City of Anaheim. These tributary areas flow storm water into the East Garden Grove Wintersburg Channel, Anaheim-Barber City Channel, Stanton Channel, Carbon Creek Channels, Moody Channel, Fullerton Channel, North and West Santa Ana River and South and East Santa Ana River.

In 1973, a Master Plan of Drainage was developed for the entire City of Anaheim. In this Master Plan, the City of Anaheim was divided into 44 distinct watershed areas, designated as Districts. Storm drain deficiencies and the needed drainage facilities were also identified. The Master Plan of Drainage have since been updated. The City's Department of Public Works oversees a storm drainage master planning program for eight primary storm drainage tributary areas in the City of Anaheim. Each storm drainage master plan identifies existing deficient drainage areas for the corresponding tributary area, recommends drainage improvements to reduce or eliminate deficiencies, and presents the probable cost for construction of such improvements. All master plans are based on the criteria outlined in the City's 2005 Drainage Manual for Public and Private Drainage Facilities. The City of Anaheim has eight storm drainage master plans and the project site in the Anaheim Master Plan of Drainages North and West Santa Ana Tributaries (adopted July 2014).

City of Anaheim Best Management Design Guidelines

The City of Anaheim has established best management guidelines to be used by applicants during the BMP design process for all proposed projects within the City. All standards in the guidelines were developed to improve BMP functionality, stormwater treatment, and lifespan for all new projects within the City (City of Anaheim 2024). Compliance with the standards should be reflected within the grading plans and WQMP submitted to the City through design narrative and construction details.

County of Orange/Orange County Flood Control District BMP Design Manual

The County of Orange/OCFCD (County/OCFCD) is subject to two MS4 permits issued by the Santa Ana and San Diego RWQCBs. Both permits require the County/OCFCD to implement land development programs to ensure new development and significant redevelopment projects comply

with post-construction BMP regulations. The County/OCFCD BMP Design Manual was created to fulfill these requirements and provide guidance to developers on drafting WQMPs.

City of Orange General Plan

The City of Orange General Plan includes the following goals and policies pertaining to hydrology and water quality in the Natural Resources Element.

- **Goal 2.0:** Protect air, water, and energy resources from pollution and overuse.
  - **Policy 2.3:** Reduce the amount of water used for landscaping through the use of native and drought-tolerant plants, proper soil preparation, and efficient irrigation systems as parks and other City facilities are built or renovated.
  - **Policy 2.4:** Encourage the production, distribution, and use of recycled and reclaimed water for landscaping projects, while maintaining urban runoff water quality objectives.
  - **Policy 2.11:** Protect the ecological integrity and overall health of Orange's watersheds.
  - **Policy 2.12:** Cooperate with water supply agencies to protect the quantity and quality of local groundwater supplies.
  - **Policy 2.13:** Control surface runoff water discharges into the stormwater conveyance system to comply with the City's National Pollutant Discharge Elimination System (NPDES) Municipal Permit and other regional permits issued by the Santa Ana Regional Water Quality Control Board.
  - **Policy 2.14:** Reduce pollutant runoff from new development by requiring the use of low impact development practices and the most effective Best Management Practices (BMPs) currently available.
  - **Policy 2.15:** Minimize the amount of impervious surfaces and associated urban runoff pollutants in new development and significant redevelopment throughout the community.
  - **Policy 2.16:** Protect in-stream habitat and natural stream and channel features.
  - **Policy 2.17:** Educate City residents and businesses on the effects of urban runoff, and water and energy conservation strategies.

City of Orange Municipal Code

Chapter 7.01 (Water Quality and Stormwater Discharges) of the City of Orange Municipal Code requires the City to participate as a "Copermittee" under the NPDES permit program to accomplish the requirements of the CWA. Pursuant to this chapter, the City of Orange has established uniform standards for the improvement of water quality, to comply with the federal requirements for the control of urban pollutants to stormwater runoff and to regulate discharges of stormwater to the storm drain system in the City of Orange.

4.7.1.2 Existing Conditions

Regional Setting

The project site is in the lower Santa Ana River watershed that runs from Prado Dam to the Pacific Ocean, running about 31 miles through the cities of Yorba Linda, Anaheim, Orange, Santa Ana, Fountain Valley, Costa Mesa, and Huntington Beach before emptying into the Pacific Ocean.

The Santa Ana River Mainstem project was originally proposed by the USACE and authorized in the Water Resources Development Act of 1986 to increase the flood stage capacity of Prado Dam and improve downstream channel conveyance and capacity after a series of floods caused catastrophic damage to the increasingly urbanized areas downstream of Pardo in the early 1980s. The project included channelization of the Santa Ana River from Weir Canyon Road to the Pacific Ocean, which involved constructing a levee embankment for flood protection.

The project site is in the USACE lower Santa Ana River Reaches 5 and 6. Reach 5 spans from the Riverview Golf Course to the Orange Freeway (SR 57) and Reach 6 spans from the Orange Freeway to Glassell Street. Cross sections of the channel are typically trapezoidal with a soft-bottom and stone revetted side slopes between 1(vertical [V]) to 1.5 (horizontal [H]) to 1(V) to 3(H). A series of reinforced concrete drop structures ranging in height from 4.5 to 9.7 feet and buried riprap stabilizer structures are constructed at approximately 2,000 ft intervals. These act to maintain a stable grade and control channel scour within the lower Santa Ana River channel reach.

Construction of the Santa Ana River levee system was completed in September 1995, and the operation and maintenance of the levee was passed to the OCFCD which is administered by Orange County Public Works. The primary purpose of the levee is for flood control, as it protects over 1 million people. However, the OCWD also uses the soft-bottom channel of the Santa Ana River to recharge the groundwater basin by impounding water in a series of sand levees ("T and L" levees) that slow water within the Santa Ana River for infiltration and groundwater recharge.

Hydrology – Santa Ana River Flowrates

Design flowrates in the lower Santa Ana River watershed were established as part of the USACE design plan described in the General Design Memorandum Phase II General Design Memorandum (GDM) on the Santa Ana River Mainstem, Volume 7. The lower Santa Ana River reach was designed for flowrates equated to a 190-year storm event. In the vicinity of the project site, the 190-year design discharge is 40,000 cubic feet per second (cfs) with an increase to 41,000 cfs downstream of Collins Channel.

Project Site

OC River Walk consists of an approximately 90-acre area that covers both banks of the Santa Ana River. The project site is bound between Orangewood Avenue and Ball Road within the City of Orange and City of Anaheim.

Existing Major Elements

The project site encompasses areas containing six bridges over the Santa Ana River, two drop structures, the Collins Channel tributary, and the levee embankment.

Levee Embankment. The levee embankment on the project site consists of riprap lined riverbank. The Santa Ana River trail runs along the top of the bank between Orangewood Avenue and Katella Avenue on the west bank and between Katella Avenue and Ball Road on the east bank. According to the USACE as-built records, the riverbank protection is comprised of loose and grouted riprap at a 2(H):1(V) slope. The river channel has a base width ranging from 300–320 feet and depths ranging from 12 to 18.5 feet. The top of bank freeboard provided is a minimum of 2.5 feet (USACOE GDM 1988). Loose riprap along the embankments would have d_{50}[1] values ranging from 15 inches to 33 inches, with thicknesses of 24 inches to 48 inches, respectively. Embankment areas around the drop structures have grouted riprap with a d_{50} of 10 inches and a thickness of 15 inches.

Drop Structures. Two reinforced-concrete drop structures are located on the project site. The downstream structure is located approximately 350 feet downstream of the Metrolink/Los Angeles-San Diego-San Luis Obispo Rail (LOSSAN) Corridor railroad bridge with a drop height of approximately 7 feet. The upstream structure is located approximately 400 feet downstream of the Ball Road bridge with a drop height of approximately 9 feet. The drop structures provide energy dissipation and minimize riverbed and bank scour. Each structure uses a parabolic curved chute downstream of the crest, two rows of baffle blocks, and a sloping end sill (USACOE GDM 1988).

Bridges. There are six existing bridges that span over the Santa Ana River on the project site. Orangewood Avenue, SR-57 Freeway, Metrolink/LOSSAN Corridor railroad, Katella Avenue, Union Pacific Railroad, and Ball Road bridges. The relevant hydraulic parameters for each bridge are summarized in Table 4.7-1, Existing Bridge Description.

[1] The D50 of a riprap rock gradation refers to the median diameter (D) of the rocks used in rock riprap. It represents the size at which half of the rocks weigh more and half weigh less.

Table 4.7-1. Existing Bridge Description

Name	Bridge Deck	Data Bridge Pier Data	Bridge Undercrossing Notes
Orangewood Avenue Bridge	Width = 72 ft	6 Piers	SART undercrossing on west bank
57 Freeway Bridge	Width = 344 ft	6 Piers	SART undercrossing on west bank and maintenance road undercrossing on the East bank
Metrolink/LOSSAN Corridor Railroad Bridge	Width = 48 ft	3 Piers	SART undercrossing on west bank and maintenance road undercrossing on the East bank
Katella Avenue Bridge	Width = 130 ft	3 Piers	SART undercrossing on west bank and maintenance road undercrossing on the East bank
Union Pacific Railroad Bridge	Width = 18 ft	5 Piers	SART undercrossing on East bank
Ball Road Bridge	Width = 80 ft	5 Piers	Maintenance road undercrossing on the West bank and SART undercrossing on East Bank

SRT = Santa Ana River Trail

4.7.2 Thresholds of Significance

According to Appendix G of the California Environmental Quality Act (CEQA) Guidelines, the project would have a significant impact on hydrology and water quality if it would:

- **Threshold HYD-1:** Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality.
- **Threshold HYD-2:** Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin.
- **Threshold 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:
    a. Result in substantial erosion or siltation on- or off-site.
    b. Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite.
    c. 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.
    d. Impede or redirect flood flows.
- **Threshold HYD-4:** In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation.
- **Threshold HYD-5:** Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan.

The Initial Study (Appendix A to the Draft Environmental Impact Report [EIR]) determined that the following thresholds would have a less than significant, and this environmental topic will not be addressed further in this section of the Draft EIR.

- Threshold HYD-2
- Threshold HYD-4 (tsunami impact only)

4.7.3 Plans, Programs, and Policies

This section addresses plans, programs, and policies relevant to the project.

PPP HYD-1 The project is required to be developed in compliance with the following state, regional, and local regulations concerning grading, stormwater, and water quality control, as determined by the applicable approval authority:

- National Pollutant Discharge Elimination System General Construction Permit: Notice of Intent and Storm Water Pollution Prevention Plan Requirements
- State Water Resources Control Board General Industrial Activities Storm Water Permit
- Santa Ana Regional Water Quality Control Board Waste Discharge Permits and Water Quality Certifications
- Orange County Grading Manual
- Orange County Grading and Excavation Code
- Orange County Municipal Separate Storm Sewer Systems Permit
- Orange County Model Water Quality Management Plan and Technical Guidance Document
- Orange County Drainage Area Management Plan: New Development/Significant Redevelopment Program
- Orange County Hydrology Manual and 1996 Addendum
- Orange County Water District Groundwater Replenishment Program
- Orange County Flood Control District Local Implementation Plan 2019
- City of Anaheim and City of Orange Municipal Codes
- City of Anaheim Grading Design Manual
- Anaheim Master Plan of Drainages North and West Santa Ana Tributaries
- American Association of State Highway and Transportation Officials Load and Resistance Factor Design Bridge Design Specifications with California Amendments
- California Department of Transportation Standard Plans
- California Department of Transportation Seismic Desing Criteria
- California Department of Transportation Geotechnical Manual

PPP HYD-2 The City of Anaheim is required to obtain a Section 401 Permit from the Regional Water Quality Control Board.

PPP HYD-3 The City of Anaheim is required to obtain Section 404 and 408 Permits from the U.S. Army Corps of Engineers.

4.7.4 Environmental Impacts

The following sections address various potential impacts relating to hydrology and water quality that could result from implementation of the project.

4.7.4.1 Thresholds HYD-1 and HYD-3c (Polluted Runoff): Water Quality Standards and Polluted Runoff

Impact Analysis

Under Section 402 of the CWA, the U.S. Environmental Protection Agency regulates stormwater discharges through the NPDES program. In California, the SWRCB administers the program, developing permit requirements in coordination with the RWQCB. The project site falls within the jurisdiction of the Santa Ana RWQCB.

Construction Impacts

Project construction activities, including excavation, vegetation removal, grading, bridge and retaining wall construction, trenching, drainage improvements, paving, revegetation, and installation of fencing and trail amenities, would disturb more than one acre of land. Therefore, the project will comply with the state construction storm water general permit and will provide a Notice of Intent and a Storm Water Pollution Prevention Plan (SWPPP). Project disturbance of one or more acres are required to obtain coverage under the General Permit for Discharges of Storm Water Associated with Construction Activity, Order 2009-0009-DWQ (and subsequent Order 2022-0057-DWQ) and implement a SWPPP and monitoring program consistent with permit requirements. The SWPPP would incorporate BMPs to minimize water quality impacts, such as erosion and sediment control measures, wind erosion prevention, prevention of soil and debris tracking onto adjacent properties, waste and hazardous material management, and equipment and material storage in designated staging areas. Regular inspections, reporting, and stormwater sampling would ensure compliance with permit requirements. The project would also be required to coordinate with OCWD to minimize river percolating impacts during construction. Percolation in close proximity to the embankments and structures within the Santa Ana River could prolong construction timeframe due to potential dewatering requirements. With these mandatory BMPs, construction-related stormwater impacts would be less than significant.

Furthermore, the project involves impoundments, storm drain diversions, and embankment modifications to the Santa Ana River, requiring Sections 401 and 404 permits from the RWQCB

and USACE, respectively, pursuant to the regulatory requirements of the CWA. Compliance with these existing regulatory requirements would ensure that construction impacts to the waters of the United States are less than significant.

Implementation of NPDES permit provisions and compliance with the grading requirements of the Cities of Anaheim and Orange would minimize construction impacts through BMPs that reduce construction-related pollutants. The project would also comply with local and regional requirements to avoid adverse impacts on existing drainage facilities. Therefore, construction-related impacts on downstream waters would be less than significant.

Operational Impacts

The existing condition of the project site primarily only allowed for access through the Santa Ana River trail bike path. This unsupervised travel path allowed for nuisance use of the dirt areas adjacent to the river, promoting poor trash management and allowing for the potential of bacterial and biological pollution (PACE 2024). In addition, there had been no trash receptacles or public restrooms in the vicinity of the river. The project would result in increased paved surfaces due to new trails and trail improvements. The project would also increase users and visitors to the new trail, trail improvements, and the Santa Ana River. However, the increased impervious surfaces and users would not create additional sources of polluted runoff because the project includes the construction of public sanitary facilities and trash receptacles to minimize pollutants from entering the Santa Ana River preliminarily. The presence of these facilities will divert trash and other pollutants away from the Santa Ana River and into proper disposal pathways using source control (PACE 2024).

During operation of the proposed impoundments, there are opportunities to divert trash from the Santa Ana River. During dry weather operation, trash from the storm drain diversions will be captured and no longer enter the Santa Ana River. In the event of large storms, the Santa Ana River will operate as it currently does, any trash and debris within the river will continue downstream.

Flows from unexpected events, such as emergency responses during a fire, would be managed in the same fashion as tributary dry weather or large event flows. The operational mechanism of the project elements is designed to maintain regional and local drainage capacities. It would be possible to provide controls to local officials that enable operational decisions on an event basis, such as draining and impoundment that receives large volume of contaminated emergency response runoff, to avoid infiltration of pollutants.

The proposed impoundments would be supplied by treated water from the OCWD's GWRS that would discharge into the SAR. The project would be subjected to the NPDES permitting from the Santa Ana RWQCB such as through an individual NPDES permit or other de minimis discharge permit. The discharge operations for the project and associated NPDES permit would be

coordinated with OCFCD through the encroachment permit, in addition to other impacted regulatory agencies.

Additionally, a WQMP would be developed to address the required water quality components of the project elements. The project would be designed to comply with the North Orange County TGD and Model WQMP to achieve MS4 permit compliance.

The semi-permanent water bodies created by the proposed impoundments are for groundwater recharge, and the recharge water would be of sufficiently high quality that it satisfies the water quality objectives in the Basin Plan for the Orange County Management Zone and the surface water bodies. The project also includes a series of storm drain diversion pipe to sewer operated by the City of Anaheim and the City of Orange, depending on jurisdiction, further reducing pollutant entry into the river during dry-weather, contributing to improved water quality. For further discussion of impoundment operational conditions during dry weather, low river flow, and high river flow, see Section 4.7.4.2, Threshold HYD-3a: Site Drainage and Hydrology (Erosion and Siltation).

The project is required to comply with the requirements of the County of Orange, OCFCD local implementation plan, the OC Drainage Area Management Plan, and the MS4 permit to prevent long-term impacts of the project and, when feasible, incorporate LID/site design and source control BMPs to address post-construction stormwater runoff management. Additionally, the Santa Ana RWQCB does not list any impaired water bodies within the project reach. RWQCB Reach 2, of the Santa Ana River, which extends from Prado Dam to 17th Street in Santa Ana. However, the project would require long-term maintenance agreements with the City of Orange, County of Orange, and OCWD to identify the responsible parties and the specific tasks required for the proper maintenance and operation of the proposed water, trail, and recreational improvements, as intended and described herein, without adversely impacting water quality or creating polluted runoff. Therefore, to ensure that the project does not violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality, maintenance and operations agreements with multiple parties would be required as mitigation to reduce impacts to a less than significant level.

Level of Significance Before Mitigation: Potentially significant.

Mitigation Measures: Mitigation Measure HYD-1 is required.

4.7.4.2 Threshold HYD-3a: Site Drainage and Hydrology (Erosion and Siltation)

Impact Analysis

Construction

Construction of the project could result in soil erosion due to earthmoving activities such as excavation, grading, soil compaction and moving, soil stockpiling, and slope modification. The

Construction General Permit, as discussed in Section 4.7.4.1, Thresholds HYD-1 and HYD-3c (polluted runoff): Water Quality Standards and Polluted Runoff, requires preparation and implementation of a SWPPP for projects that involves construction or demolition activity, including but not limited to, clearing, grading, grubbing, or excavation, or any other activity that results in a land disturbance of equal to or greater than one acre. The project involves more than one acre of ground disturbance for the trail improvements and additional riverbed and embankment areas. The project SWPPP will provide construction BMPs to reduce erosion, siltation, and other runoff-related impacts resulting from construction. Additionally, the project would comply with the City of Anaheim General Plan Green Element Policies 7.1-1 and 7.1-2, and the City of Orange Natural Resources Element Policies 2.13 through 2.15 to reduce erosion, siltation, and other run-off impacts. With these mandatory BMPs, construction-related stormwater impacts would be less than significant.

Operation

Operational procedures of the impoundments are built on extensive analysis of the Santa Ana River hydrology and Prado Dam release procedures. The goals are effective utilization of groundwater replenishment system (GWRS) supply through increased groundwater recharge, channel flood conveyance capacity, and water quality of the impoundments. Three operational conditions are defined: dry weather operation, low river flow operation, and high river flow operation.

During dry weather operation, the impoundment water levels would be maintained using GWRS water supplied by OCWD. To address impoundment water quality concerns, dry weather nuisance flows in all adjacent tributary storm drain lines would be captured/diverted by gravity. These nuisance flows would be pumped to Orange County Sanitation District sewer lines and treatment facilities, with a few storm drain lines on the east side of the project discharged to the river channel downstream of the lower impoundment. This would minimize the possibility of any dry weather flows reaching the impoundments and mixing with GWRS water. In this operational condition, the impoundments would be filled to within 6 to 12 inches of the impoundment overflow elevation and maintained, with the ability to bypass a portion of the water through a bypass structure containing a modulating weir so water levels and discharge flow can be controlled.

A low flow event is defined as a precipitation event that produces expected flow volumes at the project site of less than 200 acre-feet (the volume of water retained by the two impoundments). Forecast monitoring of rainfall is already utilized for the operation of the Imperial and Five Coves rubber dams, as well as releases from Prado Dam, which constitute the majority of the flow in the Lower Santa Ana River Watershed. During a rain event, the dry weather nuisance diversion systems are turned off, allowing flow from the tributaries to enter the river. Flows to the project site would consist of a combination of flows from the surrounding tributaries and from Prado Dam releases. Generally, in low flow conditions the GWRS water supply to the impoundments would be halted, and the GWRS water would be allowed to infiltrate or may be pumped to Burris Basin,

an off-river basin operated by OCWD. Santa Ana River flows, either tributary or from Prado Dam, would fill the impoundments up to the 200-acre-foot capacity. In any event where flows over the rubber dam reach a 6-inch nappe (approximately 320 cfs), the inflatable dams would be deflated. It is anticipated that clogging materials from the river impoundments would be scoured during a high-flow storm event when the dams are deflated, or would be removed manually using bulldozers after the wet season, so that GWRS water can be placed into the impoundments after the captured stormwater has percolated or passed through.

High flow events are defined as events where the flows reaching the project site, which include tributary runoff and flows from Prado Dam, are 200 acre-feet or greater. In these conditions, both impoundments would be evacuated, and the rubber dams would be deflated to allow complete storm conveyance in the Santa Ana River channel. For this operation, GWRS inflows to the impoundments would be halted and allowed to fully infiltrate, which takes approximately 10 days, or the GWRS water would be drained and pumped to Burris Basin, which is anticipated to take approximately 3 days. The impoundments would then be fully deflated to maintain peak flood capacity of the Santa Ana River channel. In the later parts of the storm, the rubber dams would be reinflated with the intent of capturing the full operation volume, or 200 acre-feet, in both impoundments. During any event, regardless of expected volume, when the flow exceeds 320 cfs (6-inch nappe) over the dams, they would automatically deflate as a safety mechanism to prevent damage. There would be no changes to other segments of the Santa Ana River. Therefore, the impoundments would not result in additional erosion or siltation impact compared to the existing conditions.

There is an inflatable dam located in Collins Channel where it meets the SAR. This inflatable dam prevents GWRS water from backing up into Collins Channel and prevents dry weather runoff from Collins Channel from entering the impoundments. The crest of the Collins Channel inflatable dam will be at the same elevation as the north SAR dam.

The Collins Channel dam would be operated in conjunction with the proposed impoundments and would be raised and lowered to facilitate various operating conditions. During dry weather, with the Collins Channel dam inflated, a pump station would pump flow in Collins Channel to the SAR downstream of the proposed impoundments. During storm events, the Collins Channel dam would be lowered in conjunction with the proposed rubber dams. The operation of the Collins Channel dam would maintain the flow pattern of the Collins Channel, and would not impact existing Collins Channel drainage capacity.

The existing levee embankment within the project site consists of riprap-lined riverbank. The riverbank protection is comprised of loose and grouted riprap at a 2(H):1(V) slope. The project would modify the existing riprap with soil cement bank protection, reinforced concrete terraces and steps and new riprap, therefore, no erosion and siltation would occur during operation. Also, once constructed, surface drainage in the project site would primarily remain the same, with the river trails

and surrounding areas draining to the Santa Ana River. The trail and trail improvement design would include various impervious surface materials and landscaping, and there would be no exposed soils with risk of substantial soil erosion or siltation. Impacts would be less than significant.

Level of Significance Before Mitigation: Less than significant.

Mitigation Measures: No mitigation measures are required.

4.7.4.3 Thresholds HYD-3b and 3d: Site Drainage and Hydrology (Flooding and Flood Flows)

There are four main improvements related to the project that are within or would interact with the Santa Ana River hydraulics, including:

- Two river impoundments in the Santa Ana River for increased groundwater recharge capabilities and recreational use
- Two non-motorized (pedestrian and bicycle) bridges across the Santa Ana River
  - Approximately 400 feet upstream of Orangewood Avenue
  - Approximately 800 feet upstream of Katella Avenue
- Riverbank modifications replacing existing riprap with soil cement bank protection, reinforced concrete terraces and steps and new riprap
- Two new Santa Ana River Trail bike undercrossings
  - At the west bank at the ARTIC station, under the Metrolink/LOSSAN Corridor railroad bridge
  - At the Union Pacific railroad bridge

River Impoundments: The water impoundment within the Santa Ana River would be similar to OCWD's existing rubber dam impoundments currently in place for river flow diversion to groundwater recharge. However, instead of being used to divert water to offline basins, the OC River Walk impoundment structures would be installed to create semi-permanent water bodies in the Santa Ana River for groundwater recharge. Identical to the existing OCWD structures, the impoundment structures will lower automatically during large storm events or to drain impounded water when otherwise desired to ensure the flood capacity of the Santa Ana River is maintained. For further discussion of impoundment operational conditions during dry weather, low river flow, and high river flow, see Section 4.7.4.2.

The first impoundment would be located upstream of the ARTIC railroad bridge crossing and create about 23 acres of water surface, with a depth up to 8 feet at the location of the impoundment structure. The second impoundment location would be upstream of the Orangewood Avenue bridge crossing and create about 14.4 acres of water surface, with an impoundment depth up to 10 feet at the location of the dam structure. Inflatable rubber dams have been selected to create the impoundments because they can be deflated during major river flow storm events to maintain full flood flow capacity in the

Santa Ana River channel. The design and operation would be similar to the inflatable dams OCWD has operated for 30 years, upstream of the project site in the Santa Ana River at the Imperial and Five Coves diversion locations. Each dam would be equipped with an automated inflation and deflation system, including an inlet/outlet compressed air piping system, compressor, pressure relief valve, and a control and monitoring system that would be housed within a sound attenuating enclosure (precast vault or aboveground building as the preferred option).

Pedestrian Bridges: Two new pedestrian bridges are proposed over the Santa Ana River to facilitate pedestrian and bicycle access and to connect the west and east paths of the SART. The first bridge crossing would be located near the Honda Center, approximately 800 feet upstream of Katella Avenue. The bridge is proposed to have three piers and a width of 35 feet. The second bridge would be approximately 400 feet upstream of Orangewood Avenue, near Angel Stadium. The second pedestrian bridge is proposed to have one pier and a width of 16 feet.

River Embankment Modifications: The embankments on both sides of the Santa Ana River would be transformed by removing the existing riprap and adding reinforced concrete stepped terraces and new soil cement banks. The proposed improvements include changing the existing riprap bank slope of 2(H):1(V) to a soil cement slope of 1.5(H):1(V). The proposed riverbank modifications would maintain river flood control hydraulic capacity and bank stability.

Hydraulic Impacts

A detailed hydraulic model of the project site and its vicinity reach using HEC-RAS version 6.4.1. Steady and unsteady state models were created to simulate various flows within the river channel. Hydraulic models were used to evaluate changes in water surface elevations and velocity, freeboard within the river, sediment transport potential, potential bridge scour, and an impoundment deflation scenario to evaluate hydrology with implementation of the project.

The USACE Santa Ana River model was obtained and used as the baseline for the existing condition model. The existing and proposed condition models were compared to quantify any changes to hydraulics as a result of the proposed improvements. The purpose of the existing condition model is to serve as a baseline that represents the as-is, as-built condition of the Santa Ana River. The proposed condition model includes all channel improvements and modifications.

Depth and Velocity

The project is designed using the USACE 190-year event flowrate, 40,000 cfs to 41,000 cfs. Under the existing condition HEC-RAS model, flow depths for the design discharge (Q190 = 40,000 to 41,000 cfs) ranged from 11.2 to 17.6 feet, and channel velocity ranged from 7.6 to 11.5 feet per second. Under the proposed condition HEC-RAS model, flow depths for the design discharge ranged from 11.2 to 17.7 feet, and channel velocity for the design event ranged from 7.6 to 11.7 feet per second. The change in depth as a result of the project shows a maximum increase of 0.5

ft, and in some areas a decrease in depth up to 0.2 ft. The changes to depth are generally upstream of the two proposed pedestrian bridges. The changes to velocity as a result of the proposed project include increases up to 0.6 feet per second (fps) and decreases up to 0.9 fps. The decreases are generally located around the proposed pedestrian bridges, where the addition of piers within the main channel slow down the flow, decreasing velocity. The maximum increase in velocity is localized to the proposed Meadow Park, which includes a small change in the bank alignment that slightly decreases flow area, therefore increasing velocity. As such, only negligible increases in channel depth and velocity would occur with implementation of the project, and impacts would be less than significant. The Hydrology Study included as Appendix G to the Draft EIR compares the flow depth and velocities from the two conditions.

Freeboard

The Santa Ana River is designated as a levee which has minimum freeboard requirements. Freeboard is the vertical distance between the design water level and the top of bank. The USACE GDM Volume 3 specifies the minimum freeboard in the project reach as 2.5 feet. Freeboard was determined for the existing and proposed condition HEC-RAS models by subtracting the design water surface elevation from the top of bank. A comparison of the freeboard provided in the existing and proposed conditions is detailed in Appendix E of the Hydrology Report included as Appendix G to the Draft EIR.

The freeboard analysis shows there is generally sufficient freeboard (a minimum of 2.5 feet) in the existing condition, with some deficiencies located just upstream of the SR-57 Freeway bridge, Metrolink/LOSSAN Corridor Bridge, and Katella Avenue Bridge, and around the crest of the downstream drop structure. In the proposed condition, the amount of freeboard gained or lost is directly related to the change in water surface elevation. The project is intended to fix any deficiencies in freeboard in the existing condition by raising the top of bank to meet the freeboard requirement specified in the USACE GDM. The project design would be reviewed and permitted by USACE and the OCFCD through the 408 permitting process. Freeboard would improve as a result of the project and impacts would be less than significant.

Scour

As discussed in the above depth and velocity discussion, changes in velocity are minimal, which mean changes in scour depth are also minimal. There are no anticipated changes to channel scour depth as a result of the proposed embankment improvements. Therefore, hydraulic impacts pertaining to scouring would be less than significant.

Hydrologic Impacts

Hydrologic changes are related to the ground cover on the project site. The project would change 26,400 linear feet of grouted/un-grouted riprap to soil cement and riprap. This may result in a small increase to

impervious area on the project site. However, in the perspective of the lower Santa Ana River watershed, this is a negligible increase. The lower Santa Ana River watershed covers an approximately 200 square mile area, while the change in pervious area is less than 0.01 square mile. There would be no significant impacts to the Santa Ana River hydrology as a result of the proposed bank modifications.

Dam Deflation

The inflatable dams would be managed to accommodate projected storm events that would cause large flows through the project site. Any necessary evacuation of the impoundments is expected to occur through infiltration within 10 days, however, the hydraulics of a sudden deflation and resultant release of impounded water were investigated. Approximately 9,500 feet downstream of the south impoundment is the Riverview Golf Course. This 18-hole golf course is located within the Santa Ana River floodplain, with the Santa Ana River running directly through the fairway. Potential impacts to the Riverview Golf Course and downstream areas were analyzed considering an emergency deflation of the dams holding full impoundment volumes. Three deflation scenarios were modeled using a HEC-RAS model:

- North Impoundment deflation: Scenario where only the filled north impoundment is deflated.
- South Impoundment deflation: Scenario where only the filled south impoundment is deflated.
- Simultaneous North and South Impoundment Deflation: Scenario where both the north and south impoundments are deflated concurrently.

The HEC-RAS modeling determined that the Riverview Golf Course would not be negatively impacted by dam deflation from the project implementation. The north impoundment deflation would result in a peak discharge of 2,833 cfs, the south impoundment deflation would result in a peak discharge of 2,071 cfs, and the combined north/south simultaneous deflation scenario would result in a peak discharge of 4,850 cfs. The maximum profile from the simultaneous discharge was compared to a steady-state 2-year storm event. The modeling results indicated that the maximum profile for all three deflation scenarios have lower water surface elevations than the 2-year steady state event. This indicates that the dam deflation scenario has smaller impacts than a 2-year storm event. Therefore, the worst-case dam deflation scenario associated with the proposed impoundments would not result in adverse flooding impacts to the downstream Riverview Golf Course.

The project would not substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site, or impede or redirect flood flows to result in adverse hydrology or hydraulics impacts. Impacts would be less than significant.

Level of Significance Before Mitigation: Less than significant.

Mitigation Measures: No mitigation measures are required.

4.7.4.4 Threshold HYD-3c: Site Drainage and Hydrology (Drainage Capacity)

According to the Hydrology and Hydraulics prepared by PACE (PACE 2025), surface drainage on the project site would primarily remain the same, with the river trails and surrounding areas draining to the Santa Ana River. Therefore, new impoundments would not create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage system. As required by MS4, a WQMP will be developed to address the required water quality components of the project elements. It is anticipated that BMPs will be implemented as required following the Orange County Model WQMP and TGD, as appropriate. The stormwater runoff would be required to be managed following the LID BMPs contained in the WQMP to ensure that post-development runoff volume, time of concentration, and velocity do not adversely impact existing drainage facilities and downstream water bodies. Impacts would be less than significant.

Level of Significance Before Mitigation: Less than significant.

Mitigation Measures: No mitigation measures are required.

4.7.4.5 Threshold HYD-4: Flood Hazard or Seiche

Impact Analysis

Flood Hazard

The project site includes the Santa Ana River corridor and lies within the Santa Ana River floodplain. The project would create water impoundment structures that would create semi-permanent water bodies in the Santa Ana River for groundwater recharge. However, these structures would be lowered automatically during large storm events or to drain impounded water when otherwise desired. Although the project site is within a floodplain, because the impoundments are for groundwater recharge, the released water to downstream during storm events would not be at risk of pollutants release during inundation.

Impacts would be less than significant.

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 such as the Santa Ana River, including two water impoundments to be created by the project, and the Burris Basin could generate seiches. However, as discussed above under Section 4.7.4.3 Threshold HYD-3b and HYD-3d: Site Drainage and Hydrology (Flooding and Flood Flows), the impoundment structures would be lowered automatically during large storm events or other desired events, and flooding impact is not anticipated during the worst impoundment deflation scenario. Furthermore, a WQMP will be developed to address the required water quality components of the project elements and implementation of appropriate LID BMPs would ensure that the project would not result in

substantial risk related to the release of pollutants due to inundation from a seiche. Impacts would be less than significant.

Level of Significance Before Mitigation: Less than significant.

Mitigation Measures: No mitigation measures are required.

4.7.4.6 Threshold HYD-5: Water Quality Control Plan

Impact Analysis

The project would create semi-permanent water bodies in the Santa Ana River for groundwater recharge through installation of three inflatable rubber dams creating two water impoundments. The recharge water would be of sufficient high quality that it satisfies the water quality objectives in the RWQCB's Water Quality Control Plan for the Orange County Management Zone and the surface water bodies. GWRS water from OCWD would be dechlorinated prior to being discharged into the Santa Ana River. Further chemical addition prior to discharge is anticipated for concrete corrosion control (e.g. calcium chloride addition) and algae control (e.g. alum addition). It is assumed that the water quality of Collins Channel would be on par with other dry-weather flows, and percolation from Collins Channel was not taken into account due to its narrow width. The construction of the project would be conducted in accordance with all applicable local, state, and federal regulations that relate to water quality, ensuring that construction impacts to water quality and the Groundwater Management Plan would be less than significant. As discussed under Section 4.7.4.1, construction activities impacting jurisdictional waters or wetlands are subject to a permit Sections 401 and 404 of the CWA. Adherence to these regulatory requirements would ensure that surface and groundwater quality are not adversely impacted during construction and operation of development pursuant to the project. Other project components such as pump station, pedestrian and bike bridges, trails and trail improvements, and enhanced community amenities would be required to implement the requirements of the Construction General Plan, the Orange County MS4 Permit, and compliance with Section 10.09 of the City of Anaheim Municipal Code and Chapter 7.01 (Water Quality and Stormwater Discharges) of the City of Orange Municipal Code during construction to ensure that they do not conflict with a water quality control plan or sustainable groundwater management plan. After project completion, these uses would not involve activities that would adversely impact water quality. The Santa Ana RWQCB also does not list any impaired water bodies within the Reach 2 of the Santa Ana River. Therefore, the project would not obstruct or conflict with the implementation of the Santa Ana River Basin Water Quality Control Plan, the Groundwater Management Plan, nor the Basin 8-1 Alternative Plan. Impacts would be less than significant.

Level of Significance Before Mitigation: Less than significant.

Mitigation Measures: No mitigation measures are required.

4.7.5 Cumulative Impacts

This section addresses various potential cumulative impacts relating to hydrology and water quality that could result from implementation of the project and other development projects in the Santa Ana River Watershed.

4.7.5.1 Cumulative Thresholds HYD-1 and HYD-3c (Polluted Runoff): Water Quality Standards and Polluted Runoff

Cumulative impacts on water quality from multiple projects within the region are primarily influenced by construction-related activities, increased impervious surfaces, and changes in stormwater management. Other regional development projects involving excavation, grading, vegetation removal, and infrastructure improvements contribute to potential cumulative stormwater pollution.

Construction activities from cumulative projects would be required to comply with Section 402 of the CWA through the NPDES permitting program. Each project would need to implement BMPs through SWPPPs to mitigate construction-related stormwater impacts. As a result, while multiple projects may generate temporary increases in sediment, pollutants, and runoff, adherence to NPDES regulations and BMP implementation would reduce cumulative construction-related water quality impacts to less than significant.

Operationally, cumulative projects could increase impervious surfaces, leading to higher stormwater runoff volumes. However, compliance with WQMPs and incorporation of LID BMPs across projects would ensure that runoff quality is maintained, preventing significant cumulative degradation of surface and groundwater quality. The project, in conjunction with others, would not violate water quality standards or substantially contribute to polluted runoff.

4.7.5.2 Cumulative Threshold HYD-3a: Site Drainage and Hydrology (Erosion and Siltation)

The combined effects of multiple projects involving grading, soil disturbance, and drainage modifications can contribute to increased erosion and siltation within the watershed. However, all projects exceeding one acre of ground disturbance must comply with the Construction General Permit, requiring SWPPP implementation. BMPs such as sediment barriers, erosion control blankets, and vegetation stabilization would minimize erosion and siltation impacts.

During operation, projects within the watershed may alter drainage patterns, potentially increasing erosion and siltation risks. However, as discussed in Section 4.7.4.2, Threshold HYD-3a: Site Drainage and Hydrology (Erosion and Siltation), the project would not individually cause operational erosion or siltation impacts. Other cumulative projects in the watershed would be required to minimize long-term operational impacts by implementing erosion control and hydrology management measures in compliance with MS4 permit requirements and project-specific WQMPs. Post-development, cumulative projects are not expected to leave exposed soils

susceptible to erosion or siltation. Therefore, cumulative impacts related to erosion and siltation would be less than significant.

4.7.5.3 Cumulative Thresholds HYD-3b and HYD-3d: Site Drainage and Hydrology (Flooding and Flood Flows)

The project, along with other developments in the watershed, could incrementally affect surface runoff, potentially resulting in on- or off-site flooding. However, as discussed in Section 4.7.4.3, the project would not individually cause a substantial increase in runoff rate or volume that would result in adverse flooding impacts. Other cumulative projects in the watershed must comply with applicable floodplain and flood control ordinances and stormwater management programs to minimize impacts. As each development must adhere to hydraulic modeling and floodplain management requirements, no significant cumulative increase in flood risk is anticipated. Therefore, cumulative impacts related to flooding and flood flows would be less than significant.

4.7.5.4 Cumulative Threshold HYD-3c: Site Drainage and Hydrology (Drainage Capacity)

Cumulatively, regional development could lead to increased stormwater runoff, which may impact the capacity of existing drainage infrastructure. However, as with the project, other cumulative projects are also required to develop and implement WQMPs and LID strategies to ensure that stormwater discharges do not exceed drainage system capacities.

The project's incorporation of drainage improvements, stormwater management facilities, and compliance with MS4 permit requirements would minimize significant cumulative drainage capacity issues. Therefore, cumulative impacts related to site drainage and hydrology would be less than significant.

4.7.5.5 Cumulative Threshold HYD-4: Flood Hazard or Seiche

The project’s location within a floodplain. However, the proposed improvements in the Santa Ana River channel would provide increased flood protection as the project includes raising the top of bank in sections of the OC River Walk Project to provide additional freeboard during a storm event. In addition, the proposed project does not alter the flood conveyance capacity of the Santa Ana River, as the rubber dams deflate when necessary and do not create a restriction to flow capacity. The Santa Ana River flood conveyance would improve or remain the same. Therefore, while there could be other cumulative development in flood-prone areas, the project would not contribute to increased flood risks. Furthermore, cumulative projects are required to be developed in compliance with floodplain development requirements and stormwater control measures to minimize cumulative flood risks and release of pollutants. Therefore, development of the project, combined with cumulative projects, would not result in cumulative impacts related flood hazard and risk of pollutant release.

Regarding seiche hazards, while additional water bodies introduced by multiple projects could theoretically increase seiche potential, structural design measures and emergency response protocols ensure that the risk remains minimal. The project's ability to automatically lower impoundment structures during storm events further reduces potential cumulative hazards.

4.7.5.6 Cumulative Threshold HYD-5: Water Quality Control Plan

As with the project, cumulative projects within the watershed must comply with the water quality standards established by the Basin Plan, which sets water quality objectives for participating jurisdictions, including Anaheim and Orange. The Basin Plan's thresholds are designed to reduce pollutant discharge and ensure water bodies remain suitable for their designated beneficial uses. As discussed in Section 4.7.4.6, Threshold HYD-5: Water Quality Control Plan, the project would not conflict with the Basin Plan, and other cumulative projects must adhere to all applicable regulatory requirements, such as the NPDES permitting mandates, to prevent significant pollutant discharges into downstream water bodies. Furthermore, the project would individually result in beneficial impact through the GWRS, and other cumulative projects would be required to adhere to the management goals of the Groundwater Management Plan 2015 Update and the Basin 8-1 Alternative, by adhering to all applicable regulatory requirements (e.g., the CGP, the Orange County MS4 Permit, and compliance with Section 10.09 of the City of Anaheim Municipal Code and Chapter 7.01, Water Quality and Stormwater Discharges, of the City of Orange Municipal Code) to protect groundwater and surface water resources. Therefore, cumulative adverse impacts to implementation of a water quality control plan or sustainable groundwater management plan are not anticipated.

4.7.6 Level of Significance Before Mitigation

Without mitigation, the following thresholds would be potentially significant:

- **Thresholds HYD-1 and HYD-3c (partially):** Implementation of the project would not violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality; or provide substantial additional sources of polluted runoff.

Upon implementation of the plans, programs, and policies, the following threshold would be less than significant:

- **Thresholds HYD-1 and HYD-3c (partially):** Implementation of the project would not violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality; or provide substantial additional sources of polluted runoff.
- **Threshold HYD-3a:** Implementation of the project would not 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 result in substantial erosion or siltation on- or off-site.

- **Thresholds HYD-3b and HYD-3d:** Implementation of the project would not 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 substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site; or impede or redirect flood flows.
- **Threshold HYD-3c:** Implementation of the project would not 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 create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems.
- **Threshold HYD-4:** Implementation of the project would not risk release of pollutants due to project inundation from being in flood hazard or seiche zones.
- **Threshold HYD-5:** Implementation of the project would not conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan.

4.7.7 Mitigation Measures

4.7.7.1 Thresholds HYD-1 and HYD-3c

HYD-1 Prior to the issuance of a discretionary and/or regulatory permit by the City of Orange, County of Orange, or Orange County Water District ("Participating Stakeholders"), the City of Anaheim shall enter into a Maintenance and Operations Agreement (MOA) with the Participating Stakeholder issuing said permit, as applicable. The MOA shall specify roles, responsibilities, performance standards, and communication protocols for the ongoing maintenance and operation of the project elements.

The MOA shall include, at a minimum, the following responsibilities and tasks, or similar, as appropriate for each agreement with the applicable agency:

- Maintenance responsibilities related to trails, river impoundments and water features, and stormwater and sewer facilities;
- Operations responsibilities related to access control, hours of operation, public use rules (including, but not limited to, posting signage for hours, allowed uses, and prohibited activities), security and public safety (including, but not limited to, law enforcement coordination, patrolling duties, transient management, and emergency response protocols), debris removal, preparation and implementation of a flood contingency plan, and post storm event procedures;
- Inspection, monitoring, and reporting responsibilities, including the frequency of routine inspections and water quality monitoring as required by applicable

regulatory permits and to address any public health concerns regarding recreational use of the water in the Santa Ana River channel; and

- Communication and notification protocols, including construction timing and phasing information for each project element.

The MOA shall also address any other items deemed necessary by the Participating Stakeholders to ensure the proper long-term maintenance and operation of the project.

4.7.8 Level of Significance After Mitigation

4.7.8.1 Thresholds HYD-1 and HYD-3c

Implementation of Mitigation Measure HYD-1 would reduce potential water quality and polluted runoff impacts from the project to a less-than-significant level by ensuring that the trail, impoundments, and other water features are properly maintained and operated by the participating stakeholders. Therefore, no significant and unavoidable impacts would remain.

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