5.0 ENVIRONMENTAL IMPACT ANALYSIS

5.5 HYDROLOGY AND WATER QUALITY—HYDROLOGY

1. INTRODUCTION

This section of the Draft Supplemental Environmental Impact Report (SEIR) analyzes the impacts of the Entrada South and Valencia Commerce Center Project (Modified Project) related to hydrology, flood control, hydromodification, and drainage, as compared to the 2017 Project's impacts analyzed in the State-certified EIR. This section identifies the regulatory compliance and mitigation measures that are quantitatively factored into the analysis. In addition, the Project design features (PDFs) presented in **Section 5.6**, Hydrology and Water Quality—Water Quality, of this SEIR, as applicable to hydrology and hydromodification, are incorporated by reference in the following analysis. Please refer to **Section 5.6**, Hydrology and Water Quality—Water Quality, for evaluation of water quality impacts.

The hydrology analysis is based, in part, on the following documents, all of which are provided as part of **Appendix 5.5** of this SEIR:

- **Appendix 5.5a**—*Hydrology and Drainage Concept Report for Entrada South (Tract 53295)* (Entrada South *Hydrology and* Drainage Concept) prepared by Hunsaker and Associates in November 2024 (4 Volumes).
  - *Entrada South—Evaluation of Conformance with Project LID Performance Standards* (Entrada LID Conformance Memo), prepared by Geosyntec in November 2024, provided as Volume III[1] of the Hydrology and Drainage Concept Report for Entrada South.
- **Appendix 5.5b**—*Hydrology and Drainage Concept Report for Valencia Commerce Center (VTPM 18108)* (VCC Hydrology and Drainage Concept), prepared by Hunsaker and Associates in November 2024 (2 Volumes).
  - *Valencia Commerce Center VTPM 18108—Evaluation of Conformance with LID and Hydromodification Performance Standards* (VCC LID Conformance

[1] *Volume II is combined with the Drainage Concept Report for Entrada South (Tract 53295).*

Memo), prepared by Geosyntec in November 2024, provided as Volume II[2] of the Hydrology and Drainage Concept Report for Valencia Commerce Center.

- **Appendix 5.5c**—*Drainage Concept Report, Castaic Creek Bank Protection* (Castaic Creek Drainage Concept), prepared by Pacific Advanced Civil Engineering, Inc. (PACE) in September 2019 and approved September 2019.

- **Appendix 5.5d**—*Drainage Concept Report, Hasley Canyon Creek Bank Protection* (Hasley Creek Drainage Concept), prepared by PACE in October 2021 and approved March 2022.

- **Appendix 5.5e**—Valencia Commerce Center—Castaic Creek & Hasley Creek Flood Technical Report (VCC Flood Tech Report), prepared by PACE in November 2024.

- **Appendix 5.5f**—Los Angeles County Floodplain and Floodway Map Revision for Hasley Canyon Creek (Hasley Canyon Creek County Floodplain Report) prepared by PACE in May 2024 and approved in August 2024.

- **Appendix 5.5g**—Los Angeles County Floodway Revision ML Map No.'s 335-ML-1 and 2 for Castaic Creek (Castaic Creek Floodplain Report) prepared by PACE in November 2024.

- **Appendix 5.5h**—Hasley Canyon Creek Soil Cement Bank Protection Valencia Commerce Center (Hasley Canyon Creek CLOMR) prepared by PACE in August 2024.

- **Appendix 5.5i**—Castaic Creek Bank Protection for Valencia Commerce Center (From I-5 Freeway to Commerce Center Drive) (Castaic Creek CLOMR) prepared by PACE in June 2024.

2. ENVIRONMENTAL SETTING

a. Regulatory Setting

An overview of the regulatory setting is provided in **Table 5.5-1**, Hydrology and Water Quality—Hydrology Regulatory Overview, beginning on page 5.5-3 and a detailed discussion is provided below.

[2] *Volume II is combined with the Drainage Concept Report for Valencia Commerce Center (VTPM 18108).*

Table 5.5-1
Hydrology and Water Quality—Hydrology Regulatory Overview

Issue Area and Relevant Legislation	Applicable Agency
Federal Regulations	
Clean Water Act (33 United States Code Sections 1251, et seq.) **Section 401 of the Clean Water Act.** Under Section 401 of the CWA every applicant for a federal permit for any activity that may result in a discharge of dredge or fill material into waters of the United States (WOTUS) must obtain a state water quality certification verifying that the proposed activity will comply with state water quality standards (i.e., beneficial uses, water quality objectives, and anti-degradation policy). The Los Angeles Regional Water Quality Control Board (LARWQCB) issues Section 401 water quality certifications for the Los Angeles region. **Section 402 of the Clean Water Act.** The CWA prohibits the discharge of pollutants to WOTUS from any point source unless the discharge is in compliance with a National Pollutant Discharge Elimination System (NPDES) permit. CWA Section 402 requires a NPDES permit for: the discharge of stormwater from municipal separate storm sewer systems (MS4) serving urban areas with a population greater than 100,000; construction sites that disturb one acre or more; and industrial facilities. Containment and spill cleanup are encompassed in the Storm Water Pollution Prevention Plan (SWPPP) which is required to be developed as a condition of permit issuance. **Section 404 of the Clean Water Act.** Under Section 404 of the CWA, the U.S. Army Corps of Engineers (Corps) is authorized to permit the discharge of dredged and/or fill materials to WOTUS, which includes both wetland and non- wetland aquatic habitats within the jurisdictional extent of rivers and streams defined by the ordinary high-water mark and wetlands adjacent to WOTUS. Section 404 permits can be issued as individual or general (nationwide or regional) permits. A CWA Section 404(b)(1) alternatives analysis is required for all individual permits.	Corps, LARWQCB
Federal Emergency Management Agency and the National Flood Insurance Act In accordance with the National Flood Insurance Act, the National Flood Insurance Program (NFIP) is administered by the Federal Emergency Management Agency (FEMA). The intent of the NFIP is to reduce future flood damage through community floodplain management ordinances and to provide protection for property owners against potential losses through an insurance mechanism that requires a premium to be paid for protection. Through this program, hydrologic analyses are conducted to determine the magnitude of flood risk that exists in various communities throughout the country. FEMA identifies flood zones or areas subject to flooding through its Flood Insurance Rate Maps.	FEMA
State Regulations	
Cobey-Alquist Flood Plain Management Act The Cobey-Alquist Flood Plain Management Act (FPMA) (California Water Code [CWC] Sections 8400, et seq.) acknowledges that a portion of the State is subject to recurrent flooding by the overflow of streams and watercourses. The FPMA indicates that the public interest necessitates sound development of land and that state floodplains represent a land resource to be developed	Department of Public Works

Table 5.5-1 (Continued)
Hydrology and Water Quality—Hydrology Regulatory Overview

Issue Area and Relevant Legislation	Applicable Agency
in a manner which, in conjunction with economically justified structural flood control measures, will prevent human and economic losses caused by excessive flooding. The FPMA encourages local governments to adopt and enforce land use regulations to accomplish floodplain management.	
California Fish and Game Code Per California Fish and Game Code Sections 1600–1603, the CDFW regulates activities that alter the flows, beds, channels, or banks of streams and lakes.	CDFW
Porter-Cologne Water Quality Control Act The Porter-Cologne Water Quality Control Act of 1970 (embodied in CWC Sections 13000 et seq.; Porter-Cologne Act) authorizes the SWRCB, through each Regional Water Quality Control Board (RWQCB), to regulate and control discharges into WOTUS. Each RWQCB must formulate and adopt a water quality control plan for its region, which must conform to the policies set forth in the Porter-Cologne Act and established by the SWRCB in its state water policy.	SWRCB, LARWQCB
Sustainable Groundwater Management Act The Sustainable Groundwater Management Act of 2014 (SGMA) requires the designation of groundwater sustainability agencies (GSAs) by one or more local agencies and the adoption of groundwater sustainability plans (GSPs) for basins designated as medium- or high-priority by DWR. SGMA grants new powers to GSAs, including the power to adopt rules, regulations, ordinances, and resolutions; regulate groundwater extractions; and to impose fees and assessments. SGMA also allows the SWRCB to intervene if local agencies will not or do not meet the SGMA requirements, in addition to mandating that critically overdrafted basins be sustainable by 2040, and medium- or high-priority by 2042.	SWRCB
Regional Regulations	
Stormwater Permit/Waste Discharge Requirements In 2021, the LARWQCB issued an NPDES Permit and Waste Discharge Requirements (WDRs) (Order No. R4-2021-0105) under the CWA and the Porter-Cologne Act for discharges of urban runoff in public storm drains within the coastal watersheds of Los Angeles and Ventura Counties. The Permittees are Los Angeles Los Flood Control District, Los Angeles County, 85 incorporated cities within the coastal watersheds of Los Angeles County, Ventura County, and 10 incorporated cities within Ventura County.	LARWQCB
County Regulations	
Flood Control District Any proposed drainage improvements of County-owned storm drain facilities, such as catch basins and storm drains lines, require review and approval from the County Flood Control District. This division of Public Works is responsible for collecting and analyzing hydrologic data to support the design, operation, and maintenance of flood control facilities within the County. Among other duties, the Flood Control District performs hydrology and sedimentation studies; collects stream flow, precipitation, and evaporation data; forecasts rainfall runoff; and analyzes flood flows.	Department of Public Works

Table 5.5-1 (Continued)
Hydrology and Water Quality—Hydrology Regulatory Overview

Issue Area and Relevant Legislation	Applicable Agency
Public Works Hydrology Manual The Public Works Hydrology Manual requires a storm drain conveyance system to be designed for a minimum 25-year storm event, and the combined capacity of a storm drain and street flow system must accommodate flows from a 50-year storm event. Areas with sump conditions are required to have a storm drain conveyance system capable of conveying flows from a 50-year storm event. The County also limits the allowable discharge into existing storm drain facilities. The Public Works Hydrology Manual also provides various analysis tools and calculation methodologies required for hydrologic evaluations.	Department of Public Works
Low Impact Development Title 31 of the County Code, known as the Green Building Standards Code, adopts by reference the 2022 California Green Building Standards Code (CALGreen Code), which is designed to improve public health, safety, and general welfare by utilizing design and construction methods that reduce the negative environmental impact of development and encourage sustainable construction practices. Title 31 references County Code Chapter 12.84, which sets forth low impact development (LID) requirements that focus on the control of stormwater at its source to mimic the drainage conditions of an undisturbed (undeveloped) site.	County of Los Angeles
Santa Clara River and Major Tributaries Drainage Policy Public Works has determined the Santa Clara River basin is a major source of sediment for coastal beaches, and groundwater basins that underlie the Santa Clara River are an important source of water for the Santa Clarita Valley and that it is important that the groundwater basins continue to be recharged by streambed percolation. Accordingly, Public Works has adopted a specified drainage policy and design criteria for flood protection facilities for the Santa Clara River and its major tributaries, as set forth in its Sedimentation Manual.	Department of Public Works

Source: Eyestone Environmental, 2024.

(1) Federal Regulations

(a) Clean Water Act (33 United States Code Sections 1251, et seq.)

(i) Section 401 of the Clean Water Act.

Under Section 401 of the CWA every applicant for a federal permit for any activity that may result in a discharge of dredge or fill material into waters of the United States (WOTUS) must obtain a state water quality certification verifying that the proposed activity will comply with state water quality standards (i.e., beneficial uses, water quality objectives, and anti-degradation policy). The Los Angeles Regional Water Quality Control Board (LARWQCB) issues Section 401 water quality certifications for the Los Angeles region.

(ii) Section 402 of the Clean Water Act.

The CWA prohibits the discharge of pollutants to WOTUS from any point source unless the discharge is in compliance with a National Pollutant Discharge Elimination System (NPDES) permit. CWA Section 402 requires a NPDES permit for: the discharge of stormwater from municipal separate storm sewer systems (MS4) serving urban areas with a population greater than 100,000; construction sites that disturb 1 acre or more; and industrial facilities. Containment and spill cleanup are encompassed in the Storm Water Pollution Prevention Plan (SWPPP) which is required to be developed as a condition of permit issuance. The SWPPP must include measures to ensure that: all pollutants and their sources are controlled; non-stormwater discharges are identified and eliminated, controlled, or treated; site best management practices (BMPs) are effective and result in the reduction or elimination of pollutants in stormwater discharges and authorized non-stormwater discharges; and BMPs installed to reduce or eliminate pollutants after construction are completed and maintained.

The LARWQCB administers these permits with oversight by the State Water Resources Control Board (SWRCB) and the United States Environmental Protection Agency (USEPA) Region IX. Compliance with CWA Section 402 is discussed in **Section 5.6**, Hydrology and Water Quality—Water Quality, of this SEIR.

(iii) Section 404 of the Clean Water Act.

Under Section 404 of the CWA, the U.S. Army Corps of Engineers (Corps) is authorized to permit the discharge of dredged and/or fill materials to WOTUS, which includes both wetland and non- wetland aquatic habitats within the jurisdictional extent of rivers and streams defined by the ordinary high-water mark and wetlands adjacent to WOTUS. Section 404 permits can be issued as individual or general (nationwide or regional) permits. A CWA Section 404(b)(1) alternatives analysis is required for all individual permits.

(b) Federal Emergency Management Agency and the National Flood Insurance Act

In accordance with the National Flood Insurance Act, the National Flood Insurance Program (NFIP) is administered by the Federal Emergency Management Agency (FEMA). The intent of the NFIP is to reduce future flood damage through community floodplain management ordinances and to provide protection for property owners against potential losses through an insurance mechanism that requires a premium to be paid for protection. Through this program, hydrologic analyses are conducted to determine the magnitude of flood risk that exists in various communities throughout the country. FEMA identifies flood zones or areas subject to flooding through its Flood Insurance Rate Maps. The standard

for flood protection established by FEMA and referenced in the State CEQA Guidelines (California Code of Regulations, Title 14, Sections 15000 et seq.) (CEQA Guidelines) is the 1-in-100 annual exceedance probability, commonly referred to as the 100-year flood event.

The County entered into FEMA's NFIP in 1980, and its participation makes flood insurance available to unincorporated County residents and allows them to obtain direct federal relief loans after federally-declared flood hazards. The NFIP set the 100-year flood as the standard for flood insurance protection. In flood hazard areas, the federal standard requires the finished floor elevation of proposed dwellings to be at least one foot above the water surface elevation of the 100-year flood.

For areas where the location of the FEMA-defined floodplain would be altered by a project, a Conditional Letter of Map Revision (CLOMR) must be submitted to the Los Angeles County Department of Public Works (Public Works) for review and subsequent submittal to FEMA. FEMA then reviews the CLOMR, and, if it concurs, validates the map revision. The CLOMR indicates whether FEMA would recognize the modification following project implementation. Once the project is complete, a Letter of Map Revision (LOMR) request is submitted to FEMA to officially change the Flood Insurance Rate Map (FIRM).[3]

(2) State Regulations

(a) Cobey-Alquist Flood Plain Management Act

The Cobey-Alquist Flood Plain Management Act (FPMA) (California Water Code [CWC] Sections 8400, et seq.) acknowledges that a portion of the State is subject to recurrent flooding by the overflow of streams and watercourses. The FPMA indicates that the public interest necessitates sound development of land and that state floodplains represent a land resource to be developed in a manner which, in conjunction with economically justified structural flood control measures, will prevent human and economic losses caused by excessive flooding. The FPMA encourages local governments to adopt and enforce land use regulations to accomplish floodplain management.

Public Works oversees the County's ongoing floodplain management program, which includes mapping flood hazard areas, adopting associated ordinances, and regulating and enforcing safe building practices. These activities promote flood protection in the County and maintain the County's eligibility to participate in FEMA's NFIP.

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[3] *National Flood Insurance Program, Flood Insurance Manual, FEMA, October 2021; and County of Los Angeles Department of Public Works, Hydrology Manual, Chapter 4, p. 33, January 2006.*

(b) California Fish and Game Code

Per California Fish and Game Code Sections 1600–1603, the CDFW regulates activities that alter the flows, beds, channels, or banks of streams and lakes.[4] Further discussion of applicable CDFW permits and requirements is provided in **Section 5.2**, Biological Resources, of this SEIR.

(c) Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act of 1970 (embodied in CWC Sections 13000 et seq.; Porter-Cologne Act) authorizes the SWRCB, through each Regional Water Quality Control Board (RWQCB), to regulate and control discharges into WOTUS. Each RWQCB must formulate and adopt a water quality control plan for its region, which must conform to the policies set forth in the Porter-Cologne Act and established by the SWRCB in its state water policy. The LA Regional Water Board has developed the Water Quality Control Plan (Basin Plan) for the Los Angeles region, which guides conservation and enhancement of water resources and establishes beneficial uses for surface waters within the region. Beneficial uses and water quality objectives necessary to sustain those beneficial uses are designated for receiving waters (including both groundwater and surface waters).[54] Please refer to **Section 5.6**, Hydrology and Water Quality—Water Quality, of this SEIR for further discussion of the Porter-Cologne Act and associated requirements.

(d) Sustainable Groundwater Management Act

The Sustainable Groundwater Management Act of 2014 (SGMA) requires the designation of groundwater sustainability agencies (GSAs) by one or more local agencies and the adoption of groundwater sustainability plans (GSPs) for basins designated as medium- or high-priority by DWR. SGMA grants new powers to GSAs, including the power to adopt rules, regulations, ordinances, and resolutions; regulate groundwater extractions; and to impose fees and assessments. SGMA also allows the SWRCB to intervene if local agencies will not or do not meet the SGMA requirements, in addition to mandating that critically overdrafted basins be sustainable by 2040, and medium- or high-priority by 2042.

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[4] *Effective January 1, 2013, the California Department of Fish and Game became known as the California Department of Fish and Wildlife. The name of the California Fish and Game Code has not changed, however.*

[5] *Water Quality Control Plan (Basin Plan) for the Los Angeles Region, California Regional Water Quality Control Board, Los Angeles Region 4, February 23, 1995 (with approved updates through 2022).*

(3) Regional Regulations

(a) Stormwater Permit/Waste Discharge Requirements

In 2021, the LARWQCB issued a NPDES Permit and Waste Discharge Requirements (WDRs) (Order No. R4-2021-0105) under the CWA and the Porter-Cologne Act for discharges of urban runoff in public storm drains within the coastal watersheds of Los Angeles and Ventura Counties. The Permittees are Los Angeles Los Flood Control District, Los Angeles County, 85 incorporated cities within the coastal watersheds of Los Angeles County, Ventura County, and 10 incorporated cities within Ventura County. This permit regulates stormwater discharges from MS4s in the Modified Project area. The MS4 Permit details specific requirements for new development and significant redevelopment projects, including selection, sizing, and design criteria for LID, treatment control, and hydromodification control best management practices (BMPs). These requirements and the Modified Project's actions to comply with such requirements are outlined in **Section 5.6**, Hydrology and Water Quality—Water Quality, of this SEIR and the Water Quality Technical Report provided in **Appendix 5.6** of this SEIR.

(4) County Regulations

(a) County of Los Angeles Department of Public Works

Drainage and flood control in the Modified Project vicinity is regulated by Public Works, which has jurisdiction over both regional and local drainage facilities throughout the unincorporated portions of the County.

(i) Flood Control District

Any proposed drainage improvements of County-owned storm drain facilities, such as catch basins and storm drains lines, require review and approval from the County Flood Control District. This division of Public Works is responsible for collecting and analyzing hydrologic data to support the design, operation, and maintenance of flood control facilities within the County. Among other duties, the Flood Control District performs hydrology and sedimentation studies; collects stream flow, precipitation, and evaporation data; forecasts rainfall runoff; and analyzes flood flows. The Flood Control District uses site-specific data to prepare maps of watersheds burned by brush fires, potential mudflow areas, and debris flow zones. Additionally, hydrologic and topographic information is used to prepare detailed flood hazard zone maps. These maps are more detailed than FEMA's NFIP rate maps, because impervious and burned surfaces (which can increase flood flows) are taken into account. The County also has the County Floodway Revision process for updating the maps similar to the FEMA process discussed above. The data collected is used in conjunction with design standards developed by Public Works to ensure flood control facilities are adequately sized, maintained, and operated. The Flood Control District

operates and maintains County flood control facilities, including open flood control channels, underground storm drains, catch basins, debris retaining structures, and streambed stabilization structures.

(ii) Public Works Hydrology Manual

The Public Works Hydrology Manual requires a storm drain conveyance system to be designed for a minimum 25-year storm event, and the combined capacity of a storm drain and street flow system must accommodate flows from a 50-year storm event. Areas with sump conditions are required to have a storm drain conveyance system capable of conveying flows from a 50-year storm event. The County also limits the allowable discharge into existing storm drain facilities. The Public Works Hydrology Manual also provides various analysis tools and calculation methodologies required for hydrologic evaluations.

The design flow rate of Public Works' 50-year capital storm event (capital storm) exceeds FEMA's 100-year flow rate. This 50-year capital storm (or Qcap) hydrology is based on a theoretical or "design" storm event derived from 50-year frequency rainfall values and is patterned after actual major storms observed in the Los Angeles region. The 50-year capital storm is assumed to occur over a period of four days, with the maximum rainfall falling on the fourth day on a watershed that has experienced a fire event.

As reported in the Public Works Hydrology Manual, analysis of recorded major storms reveals that during the 24-hour period of maximum rainfall, rainfall intensity typically increases during the first 70 to 90 percent of the period and decreases during the remaining time. Furthermore, approximately 80 percent of the amount of this 24-hour rainfall occurs within the same 70 to 90 percent of the period. In developing the capital storm methodology, the 50-year frequency design storm is assumed to fall on saturated soils. In converting rainfall to runoff, rainfall that is not lost due to the hydrologic processes of interception, evaporation, transpiration, depression storage, infiltration, or percolation is assumed to be surface runoff.

Another assumption regarding the capital storm flow rate is that natural portions of the watershed have been burned by fire. When a watershed burns, the soil infiltration rate decreases due to the loss of vegetation and physical changes in the soil. The County has tested and quantified the effect of burning on runoff coefficients and determined that burning the watershed can increase the design runoff rate by 10 to 20 percent.

The final factor in adjusting the capital storm design flow rate is referred to as a bulking factor. In a watershed that has burned, runoff carries with it a layer of eroded topsoil. This sediment, along with the associated burned trees and brush, is referred to as

debris. To account for debris, the design flow rate is artificially increased using a prescribed bulking factor, which is a function of soil type, steepness of the terrain, and size of the drainage basin. The bulking factors for large drainage basins range from about 20 to 50 percent over the burned flow rate.

In summary, the County's capital storm (or Qcap) is based on a theoretical four-day storm event occurring right after the watershed has been burned, with the resulting flow rate being increased again by a bulking factor that accounts for debris generated in burned areas, thereby yielding a peak flow rate that is greater than a 50-year storm over an unburned/unbulked drainage basin. The probability of all of these theoretical assumptions occurring at the same time is extremely small and yields greater design flows than FEMA's method for calculating 100-year and 500-year floods. As a result, the County's methodology is more conservative than the FEMA 100-year flow rate. A summary of Public Works Hydrology Manual standards for various types of drainage conditions is provided below.

- **Urban Flood Protection.** All facilities in developed areas that are not covered under the capital storm protection conditions described above must be designed for the urban flood. The urban flood is defined as runoff from a 25-year frequency design storm falling on a saturated watershed. Like the capital storm, this design storm is a four-day event with the maximum rainfall occurring on the fourth day. Per the Public Works Hydrology Manual, urban flood runoff flowing within the street right-of-way may not exceed the private property line elevation. When flows exceed the street capacity, runoff can be conveyed both on the street surface and in storm drains under the street.

- **Urban Drains.** Urban drains typically are designed to carry runoff from a 10-year frequency storm. The runoff resulting from the 25-year frequency design storm must be carried within the drain and within the street right-of-way, below the private property line elevation.

- **Sumps.** Sumps are structures used to capture runoff that must be designed for the capital storm in urban areas. Drains leaving the sump must have capacity to carry the runoff resulting from a 50-year frequency rainfall event.

- **Multiple Levels of Flood Protection.** Public Works has established policies for multiple levels of flood protection for instances where a drainage system needs to provide more than a single type of flood protection. An example is a natural canyon that drains to a proposed urban drain or sump. In this case, the drainage system must protect the developed area from an urban flood and must capture debris and stormwater from the natural canyon, thus requiring additional capacity.

- **Debris Production Zones.** Within the "Modified Project Site," debris production zones have been mapped by the Hydraulic/Conservation Division of Public Works. Specific debris production maps are provided in the Public Works Hydrology Manual. Public Works has constructed and maintains several debris control structures within the Santa Clara River watershed to minimize the chance of channels clogging with debris. Debris control structures, volumes, and transportation rates are provided in the Public Works Sedimentation Manual (2nd Edition, 2006) (Sedimentation Manual).

(b) Low Impact Development

Title 31 of the County Code, known as the Green Building Standards Code, adopts by reference the 2022 California Green Building Standards Code (CALGreen Code), which is designed to improve public health, safety, and general welfare by utilizing design and construction methods that reduce the negative environmental impact of development and encourage sustainable construction practices. Title 31 references County Code Chapter 12.84, which sets forth low impact development (LID) requirements that focus on the control of stormwater at its source to mimic the drainage conditions of an undisturbed (undeveloped) site. Please refer to **Section 5.6**, Hydrology and Water Quality—Water Quality, of this SEIR for further discussion of the County's LID requirements.

(c) Santa Clara River and Major Tributaries Drainage Policy

Public Works has determined the Santa Clara River basin is a major source of sediment for coastal beaches, and groundwater basins that underlie the Santa Clara River are an important source of water for the Santa Clarita Valley and that it is important that the groundwater basins continue to be recharged by streambed percolation. Accordingly, Public Works has adopted a specified drainage policy and design criteria for flood protection facilities for the Santa Clara River and its major tributaries, as set forth in its Sedimentation Manual.

(d) County of Los Angeles General Plan

The Los Angeles County General Plan directs future growth and development in the County's unincorporated areas and establishes goals, policies, and objectives that pertain to the entire County. The current General Plan, adopted in 2015, includes a Conservation and Natural Resources Element that sets policy direction for the open space resources of the County, including water resources, and a Safety Element that addresses hydrology-related issues such as flooding. Relevant policies focus on watershed protection and minimizing injury, loss of life, property damage, and economic and social disruption caused by flooding and inundation hazards.

(e) Santa Clarita Valley Area Plan: One Valley One Vision 2012

The Santa Clarita Valley Area Plan: One Valley One Vision 2012 (Area Plan) serves as a long-term guide for development in the Santa Clarita Valley (Valley) Planning Area over a 20-year planning period. The Area Plan ensures consistency between the General Plans of the County and the City of Santa Clarita (City) in order to achieve common goals and encourages the coordination of land use plans with public services and other departments or agencies. The Area Plan depicts the 100-year flood event boundaries for the major watercourses in the Valley Planning Area, which are generally located within and directly adjacent to the Santa Clara River and its tributary drainages. Relevant polices address the protection of public safety and property from flood risks, including through watershed management and the provision of adequate drainage and flood control infrastructure.

b. Existing Conditions

(1) Santa Clara River

The Modified Project Site is located within the Santa Clara River basin. The Santa Clara River watershed comprises a total of 1,634 square miles and drains portions of Los Padres National Forest, Angeles National Forest, and the Santa Susana Mountains. Near the Ventura County line, the Santa Clara River's drainage area encompasses approximately 640 square miles, of which the approximately 710-acre Modified Project Site (total combined Entrada South and VCC Planning Areas) represents approximately 0.17 percent.

The reach of the Santa Clara River south of the VCC Planning Area has multiple channels, which is referred to as braided. High sediment loads, bank erodibility, and intense and intermittent runoff conditions characterize this kind of system. The Santa Clara River also has the potential for aggradation (sediment deposition) and degradation (scouring or sediment removal) in various locations based upon localized hydraulic conditions. Velocities and water surface elevations vary from section to section based on a number of hydraulic and hydrologic parameters. In general, velocity and water depth increase with higher discharge; however, under flood conditions the wide river channel allows flows to spread across the Santa Clara River's cross-section, thus limiting the increases in velocity and depth.[6]

[6] *Newhall Ranch Resource Management and Development Plan and Spineflower Conservation Plan, Final Joint Environmental Impact Statement and Environmental Impact Report, revised Section 4.1, pp. 4.1-6 through 4.1-8, June 2010.*

(2) Tributary Drainages

Portions of four tributary drainages to the Santa Clara River are located within the Entrada South Planning Area: Magic Mountain Canyon, Unnamed Canyon 1, Unnamed Canyon 2, and Unnamed Canyon 3. Of these, only Magic Mountain Canyon is a major drainage course. Within the Entrada South Planning Area, there are four debris basins that currently intercept natural flow and debris and a prior storm drain that flows into the existing storm drain system in Magic Mountain Parkway. The existing storm drain along Magic Mountain Parkway is designed for both the Mission Village development and the proposed Entrada South development.

Within the VCC Planning Area, Castaic Creek and Hasley Creek flow through the VCC Planning Area to the Santa Clara River. Under existing conditions, surface runoff flows to the creeks.

Neither the Entrada South nor VCC Planning Areas contain any land that falls within the 100-year floodplain of the Santa Clara River, although both Castaic and Hasley Creeks have 100-year floodplains mapped by FEMA. The following summarizes the existing conditions for the tributaries within the Modified Project area.

(a) Magic Mountain Canyon

The 1.32 square mile Magic Mountain Canyon watershed is a tributary to the southern bank of the Santa Clara River. The total length of the mainstem channel is approximately 4,813 feet, with an average overall slope of 3.4 percent. Approximately 90 percent or more of the watershed consists of rugged foothill topography with the remainder being the narrow valley floor. Generally, the soils in the watershed are characterized as Castaic and Saugus soils and Castaic-Balcom silty clay loams and are predominately classified as being in hydrologic soil group “C” (higher runoff potential). The associated vegetative cover within the watershed varies, but includes California sagebrush scrub, as well as developed and disturbed land. Under the 2017 Project, the Magic Mountain Canyon drainage was permitted to be converted to a buried storm drain, including those portions within the Entrada South Planning Area.

(b) Unnamed Canyon 1

The 0.16 square mile Unnamed Canyon 1 watershed is a tributary to the southern bank of the Santa Clara River. The total length of the mainstem channel is approximately 2,020 feet, with an average overall slope of 2.7 percent. Approximately 90 percent or more of the watershed consists of rugged foothill topography with the remainder being the narrow valley floor. The topography for the watershed varies from a maximum elevation of 1,427 feet in the headwaters to a low elevation of 1,160 feet near the mouth of the canyon

at the Santa Clara River valley. Generally, the soils in the watershed are characterized as Castaic-Balcom silty clay loams and are predominately classified as being in hydrologic soil group "B" (lower runoff potential). The associated vegetative cover within the watershed varies and includes California sagebrush scrub.

(c) Unnamed Canyon 2

The 0.6 square mile Unnamed Canyon 2 watershed is a tributary located south of the Santa Clara River. The total length of the mainstem channel is approximately 3,126 feet, with an average overall slope of 3.1 percent. Approximately 90 percent or more of the watershed consists of rugged foothill topography with the remainder being the narrow valley floor. The topography for the watershed varies from a maximum elevation of 1,858 feet in the headwaters to a low elevation of 1,161 feet near the mouth of the canyon at the Santa Clara River valley. Generally, the soils in the watershed are characterized as Saugus loam and are predominately classified as being in hydrologic soil group "B" (lower runoff potential). The associated vegetative cover within the watershed varies and includes developed and disturbed land.

(d) Unnamed Canyon 3

The 0.13 square mile Unnamed 3 Canyon watershed is a tributary located south of the Santa Clara River. The total length of the watershed is approximately 2,907 feet, with an average overall slope of 5.3 percent. Approximately 90 percent or more of the watershed consists of rugged foothill topography with the remainder being the narrow valley floor. The topography for the watershed varies from a maximum elevation of 1,275 feet in the headwaters to a low elevation of 1,100 feet near the mouth of the canyon at the edge of The Old Road where it enters a local storm drain that is tributary to the Santa Clara River. Generally, the soils in the watershed are characterized as Saugus loam and are predominately classified as being in hydrologic soil group "C" (higher runoff potential). The associated vegetative cover within the watershed varies and includes California sagebrush scrub and disturbed land.

(e) Castaic Creek

Castaic Creek is located within the boundaries of the VCC Planning Area. The 8.7 square mile Castaic Creek watershed is a tributary located north of the Santa Clara River. The total length of the mainstem channel is approximately 36,819 feet, with an average overall slope of 3.7 percent. Approximately 90 percent or more of the watershed consists of rugged foothill topography with the remainder being the narrow valley floor. The maximum elevation difference from the headwaters to the mouth of the creek at the Santa Clara River is 1,378 feet. Generally, the soils in the watershed are characterized as Saugus loam and are predominately classified as being in hydrologic soil group "B" (lower

runoff potential). The associated vegetative cover within the watershed varies and includes California sagebrush scrub.

Existing improvements along Castaic Creek (see **Figure 5.5-1**, Comparison of Bank Protection Alignments for Castaic and Hasley Creeks, on page 5.5-17) consist of approximately 1,600 feet of concrete slope lining on the west bank, PD No. 1982,[7] extending from approximately 1,850 feet downstream of The Old Road bridge, to approximately 250 feet downstream of The Old Road bridge. There is approximately 2,000 feet of un-grouted rip-rap bank protection on the east side bank extending from approximately 3,600 feet downstream of the Old Road bridge, to about 1,600 feet downstream of the Old Road bridge, described in PD No. 2441 Unit II, dated May 1998. An existing concrete/rip-rap lined berm, described in PD No. 2298, Unit III, constructed in 1998 and 1999, extends approximately 420 feet northeast along the streambed from the Commerce Center Drive bridge where Hasley Creek confluences with Castaic Creek. In addition, another existing concrete/rip-rap lined berm extends approximately 725 feet southeast along the south bank from the Commerce Center Drive bridge where Hasley Creek confluences with Castaic Creek.

CLOMR and County Floodway Revision applications related to the Castaic Creek Soil Cement Bank Protection Project were submitted to FEMA and the County in May 2023. The CLOMR application applies to FIRM panels 06037C0805G, 06037C0815G, and 06037C0792G and the County application applies to Map Nos. 335-ML-1 and 2. The FEMA maps were last revised in 2021 and the County maps were last revised in the 1980s. Both baseline and post-construction hydrology are calculated by PACE and the revised maps would be based on the PACE report. The bank stabilization is designed to the County's capital floodplain standards, which are more stringent than the FEMA standards. Upon completion of the CLOMR, LOMR, and County Floodway Revision process, flood hazards associated with Castaic Creek within the Project Site would be removed. Following construction, the County Board of Supervisors would adopt the revised maps.

(f) Hasley Creek

Hasley Creek is located within the boundaries of the VCC Planning Area. The 89.7-square-mile Hasley Creek watershed is a tributary located north of the Santa Clara River. The total length of the mainstem channel is approximately 112,708 feet, with an average overall slope of 2.2 percent. Approximately 90 percent or more of the watershed consists of rugged foothill topography with the remainder being the narrow valley floor. The

[7] *PD denotes a Private Drain, a publicly maintained storm drain facility that outlets to the creek or publicly maintained bank protection improvements along the creek.*

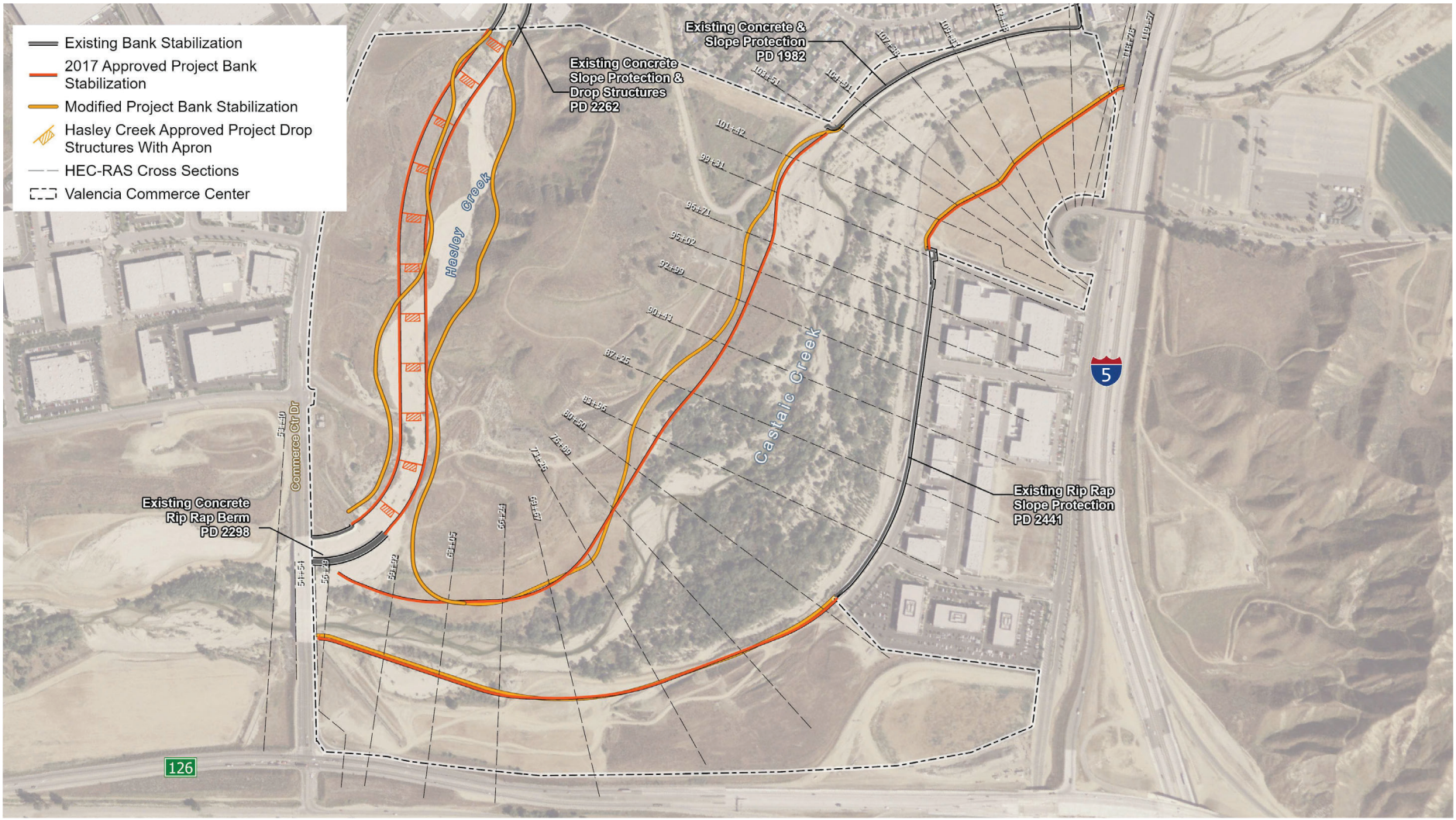

Figure 5.5-1
Comparison of Bank Protection Alignments for Castaic and Hasley Creeks

Source: PACE, 2024.

maximum elevation difference from the headwaters to the mouth of the creek at the Santa Clara River is 2,430 feet. Generally, the soils in the watershed are characterized as Stonyford-Millsholm Family soils and are predominately classified as being in hydrologic soil group "D" (high runoff potential). The associated vegetative cover within the watershed varies and includes Chamise chaparral.

Existing improvements on Hasley Creek within the VCC Planning Area, constructed prior to the design of either the Approved Project or Modified Project, consist of concrete slope lining on both embankments, extending from approximately 3,200 feet upstream of the Commerce Center Drive bridge to approximately 6,900 feet upstream of the Commerce Center Drive bridge, with a natural bottom and grade control ("drop") structures as described in PD No. 2262 (see **Figure 5.5-1**, Comparison of Bank Protection Alignments for Castaic and Hasley Creeks).

3. SUMMARY OF IMPACTS FOR THE 2017 PROJECT

Section 4.1, Surface Water Hydrology and Flood Control, and Section 4.2, Geomorphology and Riparian Resources, of the State-certified EIR analyzed impacts related to hydrology resulting from the development of the Entrada South and VCC Planning Areas, as summarized below.

a. Summary of State-certified EIR's Analysis of the Entrada South Planning Area

As described in Section 4.1, Surface Water Hydrology and Flood Control, of the State-certified EIR, hydrology impacts related to flooding/flood hazards and storm water conveyance within the Entrada South Planning Area would be less than significant. Nonetheless, Mitigation Measures RMDP/SCP-HY-1 through RMDP/SCP-HY-7 (not all of which are applicable to development within the Entrada South Planning Area) were adopted to ensure impacts related to flood hazards would be less than significant with mitigation.

Section 4.2, Geomorphology and Riparian Resources, of the State-certified EIR evaluated the hydraulic impacts on sensitive aquatic/riparian resources in the Santa Clara River Corridor and tributaries due to implementation of the 2017 Project. Geomorphic processes include sediment production, transport, and storage through the stream corridor, which have the potential to influence river systems and landforms. Within the Entrada South Planning Area, the following impacts were found to be less than significant with Mitigation Measures SP 4.2-1 through 4.2-8 and RMDP/SCP-GRR-1 through RMDP/SCP GRR-7 (not all of which are applicable to development within the Entrada South Planning Area): construction-related changes to drainage patterns that could result in erosion; long-term erosion and downstream deposition; reductions in geomorphic function (i.e., channel

stability); and riverbed and floodplain scouring affecting riparian vegetation. Impacts related to seasonal flows in the "Dry Gap" and reductions in sediment delivered from the Santa Clara River to Ventura County beaches were determined to be less than significant.

b. Summary of State-Certified EIR's Analysis of the VCC Planning Area

Section 4.1, Surface Water Hydrology and Flood Control, of the State-certified EIR determined that hydrology impacts related to flooding/flood hazards and storm water conveyance within the VCC Planning Area would be less than significant. Nonetheless, Mitigation Measures RMDP/SCP-HY-1 through RMDP/SCP-HY-7 (not all of which are applicable to development within VCC) were adopted to ensure no flood hazards would occur. In addition, Mitigation Measures VCC-HY-1 through VCC-HY-3 were previously adopted by the County and would apply.

As evaluated in Section 4.2, Geomorphology and Riparian Resources, of the State-certified EIR, within the VCC Planning Area, the following impacts were found to be significant: construction-related changes to drainage patterns that could result in erosion; long-term erosion and downstream deposition; reductions in geomorphic function (i.e., channel stability); and riverbed and floodplain scouring affecting riparian vegetation. However, Mitigation Measures SP 4.2-1 through 4.2-8 and RMDP/SCP-GRR-1 through RMDP/SCP-GRR-7 (not all of which are applicable to development within the VCC Planning Area) would reduce these impacts to a less than significant level. Impacts related to seasonal flows in the "Dry Gap" and reductions in sediment delivered from the Santa Clara River to Ventura County beaches were determined to be less than significant.

The mitigation measures referred to above are included below in Subsection 8, Mitigation Measures.

4. REGULATORY REQUIREMENTS AND MODIFIED PROJECT DESIGN

The Modified Project shall comply with the following regulatory requirements, as applicable.

a. Regulatory Compliance Measures

The proposed drainage system for the Modified Project would be designed in accordance with the Public Works Hydrology Manual. In addition, based on the applicable regulations and requirements previously discussed, the following compliance measures would be implemented as part of the Modified Project:

- Storm drains (pipes and reinforced concrete boxes) and open channels shall be designed and constructed pursuant to Public Works requirements, including for

50-year capital storms in sump areas and for 25-year urban storm in non-sump areas.

- Debris basins shall be constructed pursuant to Public Works requirements to intercept storm flows from undeveloped areas before they discharge into the developed portions of the Modified Project Site.

- Energy dissipation consisting of either rip-rap or energy dissipaters shall be installed as required by Public Works at outlet locations to reduce runoff velocities into the channel to prevent erosion.

- A final developed condition hydrology analysis (Public Works Drainage Concept Report and Final Design Report) shall be prepared in conjunction with final Modified Project design plans when final engineering occurs. This report shall confirm the final Modified Project's design is consistent with the hydrology analysis within the Modified Project's Hydrology Study and that the design and sizing of all hydrologic and water quality control BMPs comply with County requirements. All elements of the storm drain system shall conform to the policies and standards of the Public Works Flood Control Division, as applicable.

- Ultimate Modified Project hydrology and debris production calculations shall be prepared by an engineer during final Modified Project design to verify the requirements for debris basins and/or desilting inlets.

These regulatory compliance measures, combined with additional compliance measures listed in **Section 5.6**, Hydrology and Water Quality—Water Quality, of this SEIR are generally consistent with and implement the hydrology-related mitigation measures specified in the State-certified EIR, as described above in subsection 3, Summary of Impacts for the 2017 Project.

b. Project Design Features

An extensive list of BMPs to be implemented during both construction and operation of the Project is also provided in **Section 5.6**, Hydrology and Water Quality—Water Quality, of this SEIR. As discussed therein, such measures would include erosion and sediment control BMPs to be implemented during the Modified Project's construction phase, and site design, source control, LID, treatment control, and hydromodification control BMPs to be implemented during the post-development (operational) phase.

Beyond the proposed drainage and water quality plan and associated improvements (discussed below), in addition to the above-referenced regulatory compliance measures and BMPs, as with the 2017 Project, no specific PDFs are proposed with respect to hydrology. However, the PDFs presented in **Section 5.6**, Hydrology and Water Quality—Water Quality, would also be beneficial to hydrology and hydromodification.

c. Relevant Modified Project Characteristics

(1) Entrada South Planning Area

The Modified Project would meet ongoing NPDES requirements by providing drainage, flood control, and water quality improvements such as storm drains, biofiltration strips, water quality basins, debris basins, and inlet and outlet structures. **Figure 5.5-2**, Entrada South Drainage Infrastructure, on page 5.5-22 depicts the proposed drainage infrastructure. As shown, the storm drain system would connect to existing storm drains in the surrounding roadways and/or to the restored Unnamed Canyon 2 drainage channel (discussed below). More specifically, on-site surface runoff would be intercepted by curb inlets and debris basins and conveyed to a network of storm drains that would lead to a series of treatment facilities, including water quality basins, prior to discharge into existing drains that outlet to the Santa Clara River. To reduce debris discharged through and from the Entrada South Planning Area, debris basins are proposed at the downstream ends of natural areas to intercept flows from undeveloped upland areas prior to their discharge into the on-site storm system. A majority of these debris basins would be located in the southern portion of the Entrada South Planning Area, where proposed development abuts natural land. In addition, BMPs have been incorporated into the Modified Project's design to address site design, source control, treatment control, and hydromodification control, as described further in **Section 5.10**, Hydrology and Water Quality—Water Quality, of this SEIR.

As part of Entrada South development, the drainage course referred to as Unnamed Canyon 2 would be restored from the storm drain outlet at the southern site boundary to Magic Mountain Parkway.[8] The drainage channel would be enhanced as natural, open, vegetated drainage channel with grade control structures and would largely retain the look and feel of a natural drainage course, thus reducing permanent impacts to biological resources and jurisdictional waters (as compared with 2017 Project) and providing additional open space within the developed portions of the Entrada South Planning Area. In addition, similar to the 2017 Project, dry-weather flows would be diverted to water quality/treatment basins, with peak flows diverted to sediment debris basins, thus providing water quality benefits.

[8] *As part of the Modified Project's environmental enhancements within Entrada South, temporary disturbance of a previously disturbed 0.6-acre area within The Oaks Club at Valencia golf course, which is located off-site and immediately south of Entrada South within the Westridge community, would be required to accommodate a necessary storm drain connection. This previously disturbed golf course area would experience temporary impacts during a brief construction period and would be revegetated and restored as a portion of the golf course following completion of the storm drain connection associated with Unnamed Canyon 2.*

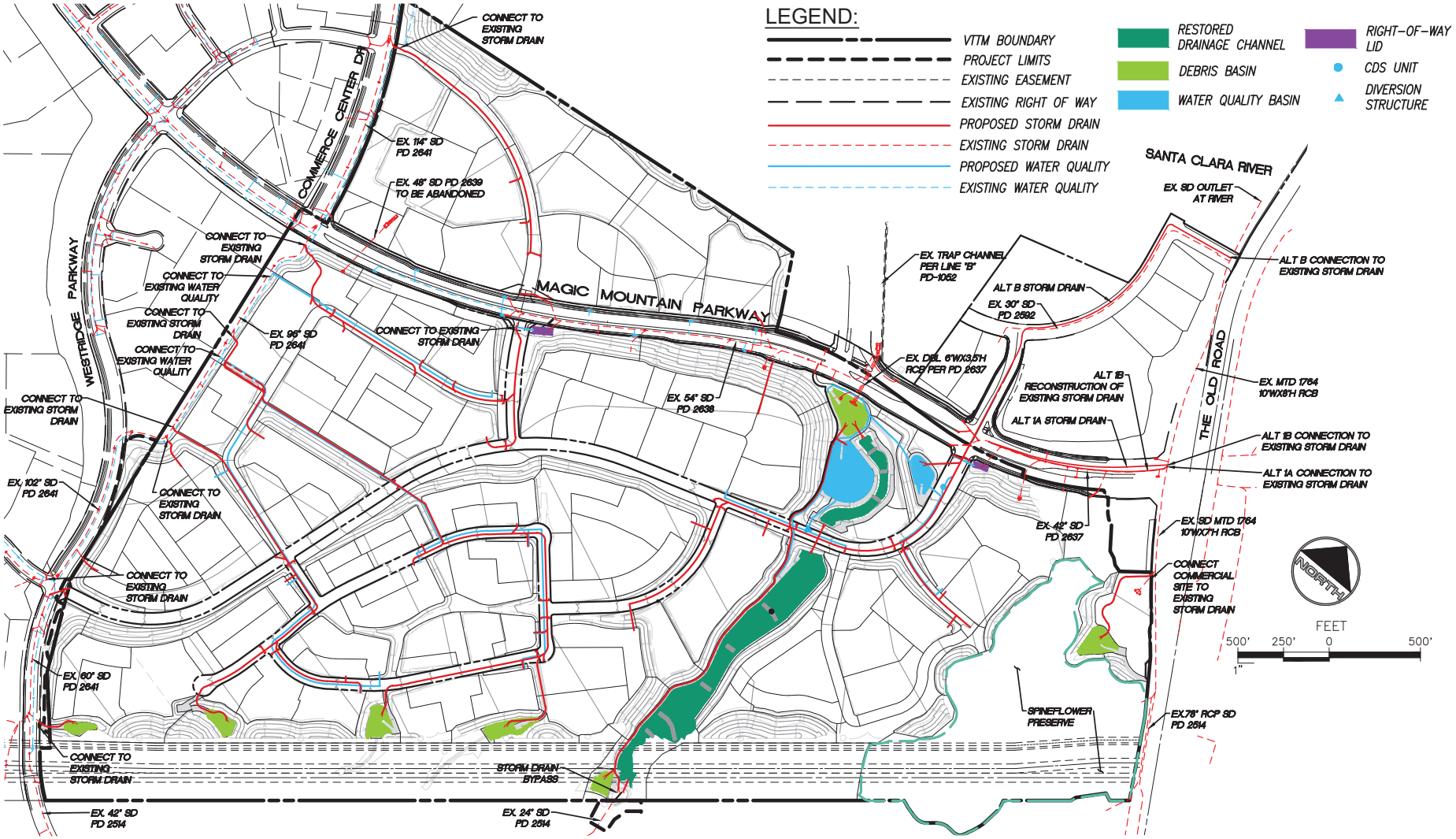

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Figure 5.5-2
Entrada South Drainage Infrastructure

Source: Hunsaker & Associates, 2024.

(2) VCC Planning Area

The Modified Project also would include all necessary drainage and water quality infrastructure within the VCC Planning Area to protect proposed development, minimize impacts to Hasley and Castaic Creeks, and ensure compliance with NPDES permit requirements. A system of storm drains, bioinfiltration/biofiltration strips, and inlet and outlet structures would be installed, as illustrated in **Figure 5.5-3**, VCC Drainage Infrastructure, on page 5.5-24. As shown, the storm drain system would outlet to Hasley and Castaic Creeks. On-site runoff from VCC increases to both Hasley and Castaic Creeks and is accommodated by improvements to the creeks.

As discussed further below, as part of VCC development, soil cement bank protection would be installed along the banks of both Hasley and Castaic Creeks to protect against flooding and erosion. The existing natural channel bed of Hasley Creek would be maintained and generally follow the existing sinuous creek alignment. The series of grade control structures included in the 2017 Project's design would be eliminated, although two grade control structures would be installed to maintain the stability of the natural streambed. In addition, more of the Castaic Creek floodplain would be retained as compared to the 2017 Project since the planned bank protection alignments on the east and west banks would be pulled back from the creek bed. These represent environmentally beneficial changes, as discussed further below.

d. Refinements in the Modified Project Design

The proposed Modified Project reflects refinements to the development of the Entrada South and VCC Planning Areas, as compared with what was evaluated in the State-certified EIR. Specifically, the Modified Project would:

- Enhance and restore the Unnamed Canyon 2 drainage channel from the storm drain outlet at the southern Entrada South boundary to Magic Mountain Parkway. The Unnamed Canyon 2 drainage channel would be enhanced as a natural, open, vegetated drainage channel with grade control structures that would largely retain the look and feel of a natural drainage course, thus providing open space within the developed portions of the Modified Project Site and reducing permanent impacts to biological resources and jurisdictional waters as compared with 2017 Project, which included conversion of the channel to a buried storm drain. In addition, similar to the 2017 Project, dry-weather flows would be diverted to water quality/treatment basins, with peak flows diverted to sediment debris basins, thus providing water quality benefits.

- Changes to Castaic Creek would consist of a revised bank protection design that pulls back from the existing streambed as compared to the 2017 Project.

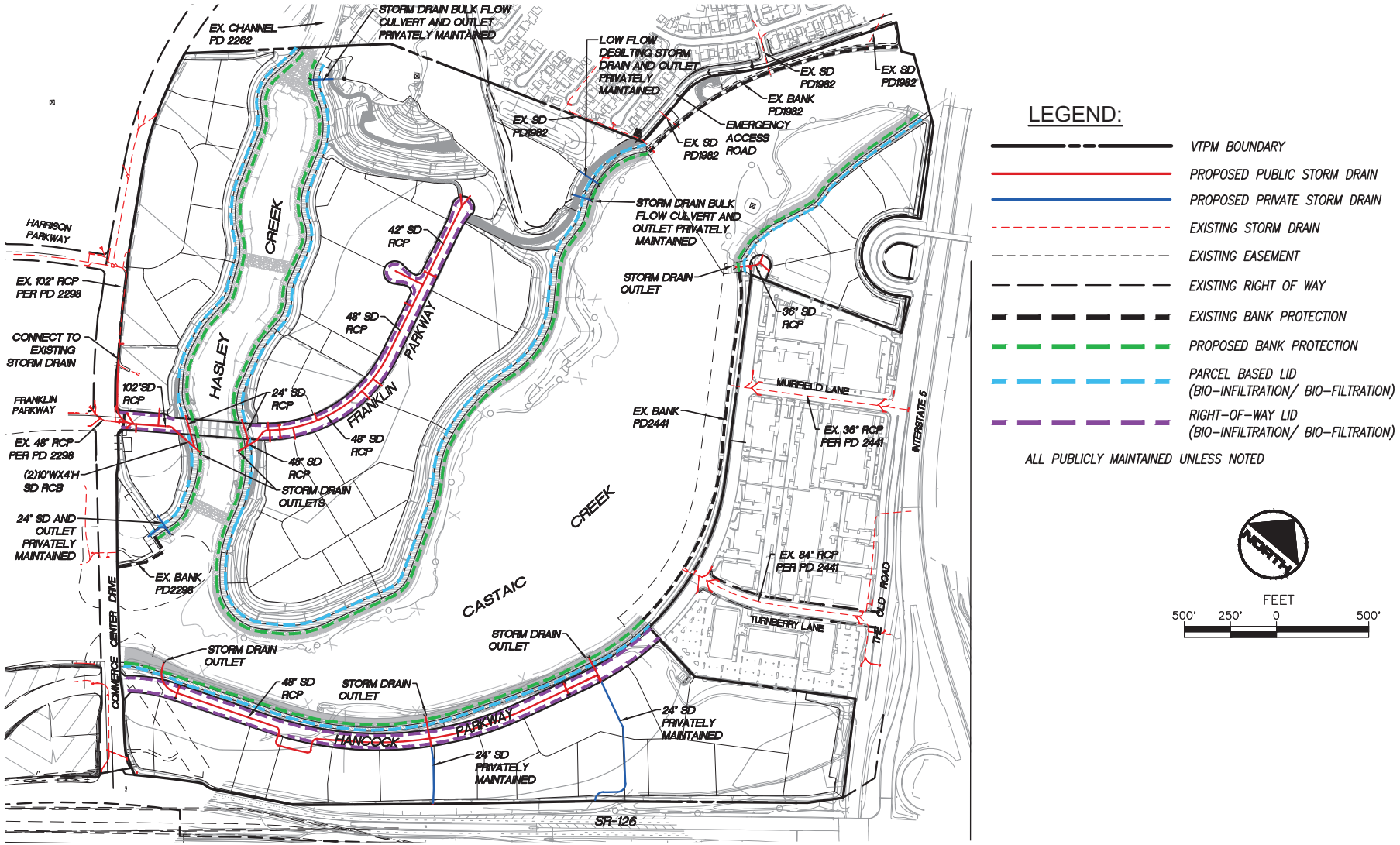

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Figure 5.5-3
VCC Drainage Infrastructure

Source: Hunsaker & Associates, 2024.

- Changes to the planned Hasley Creek improvements include a new alignment to ore closely follow the existing streambed, thus allowing for a wider channel and eliminating 11 six-foot-high drop structures that were included in the 2017 Project. The Modified Project includes the construction of two grade control structures to maintain the stability of the natural streambed by controlling head-cutting and reducing long-term scour in the channel. The top of the proposed grade control structures would be set at existing grade, and the structures would be buried deep enough to ensure they would not be undermined during peak flows. The Modified Project design changes would maintain substantially more existing streambed, preserve more jurisdictional area, and provide stable systems for conveyance and flood protection through the on-site reaches of both Castaic Creek and Hasley Creek as compared to the 2017 Project.

5. THRESHOLDS OF SIGNIFICANCE

Based on Appendix G of the CEQA Guidelines and other relevant criteria, the Los Angeles County Department of Regional Planning has determined that a project would have a significant impact related to hydrology based on the criteria detailed below. Although the proposed drainage and water quality infrastructure would function as a single system, the impact analysis herein focuses on the hydrological and flood-related impacts of the Modified Project associated with stormwater runoff as compared to the 2017 Project. The Modified Project's impacts on water quality are addressed in **Section 5.6**, Hydrology and Water Quality—Water Quality, of this SEIR. Additionally, the Modified Project's impacts on biological resources within and around drainages, including jurisdictional drainage courses, are addressed in **Section 5.2**, Biological Resources, of this SEIR.

Threshold 5.5-1: Would the Project substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?

Threshold 5.5-2: Would the Project 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 a substantial erosion or siltation on- or off-site?

Threshold 5.5-3: Would the Project 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?

Threshold 5.5-4: Would the Project 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 or provide substantial additional sources of polluted runoff?

Threshold 5.5-5: Would the Project 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 impede or redirect flood flows?

As evaluated in the Initial Study (see **Appendix 1** of this SEIR), the Modified Project would not result in new or more severe significant impacts than the 2017 Project with respect to the depletion of groundwater supplies or substantial interference with groundwater recharge per Threshold 5.5-1. Accordingly, the Initial Study analysis concluded no further analysis of these issues is required. Please refer to the Initial Study for discussion related to Threshold 5.5-1. Thus, no further analysis of these issues is necessary or provided herein.

6. ENVIRONMENTAL IMPACTS OF THE MODIFIED PROJECT

a. Methodology

In accordance with the Public Works Hydrology Manual, described above, this analysis employs the 50-year capital storm methodology to evaluate the Project's hydrology impacts and to size the proposed drainage system. The design flow rate of Public Works' 50-year capital storm event (capital storm) exceeds FEMA's 100-year flow rate. This 50-year capital storm (or Qcap) hydrology is based on a theoretical or "design" storm event derived from 50-year frequency rainfall values and is patterned after actual major storms observed in the Los Angeles region. The 50-year capital storm is assumed to occur over a period of four days, with the maximum rainfall falling on the fourth day on a watershed that has experienced a fire event. In an undeveloped watershed, the capital storm flow rate assumes a burned condition (i.e., a recent fire event that consumes much of the vegetation that would otherwise absorb storm runoff), which further increases the runoff coefficient. The flow rate is then multiplied by a bulking factor, which accounts for the amount of mud and debris contained within the flow from the burned watershed. The resulting flow rate or runoff coefficient is referred to as "burned/bulked."

The hydrologic and hydraulic calculation methods used to assess existing conditions, conditions under the 2017 Project, and proposed conditions of the Modified Project are summarized herein to provide background information regarding the calculation of pre- and post-development runoff quantities, the capacities of proposed improvements, and the effects of development on adjacent infrastructure and waterways. **Table 5.5-2**, Developed and Open Space Acreage within Entrada South Planning Area, and **Table 5.5-3**, Developed and Open Space Acreage within VCC Planning Area, on

page 5.5-28 summarize the changes in developed and open space areas for the 2017 Project compared with the Modified Project for the Entrada South and VCC Planning Areas, respectively. For the purposes of this analysis, the change in developed area for the Modified Project represents a relative decrease in impervious area (and associated runoff) as compared to the 2017 Project.

The runoff calculations for both pre- and post-development conditions take into account the soil types present on-site, which are factored into the analysis of infiltration capability within the Water Quality Technical Report included as **Appendix 5.6** of this SEIR. Imperviousness rates from the Land Use and Impervious Table provided in the Public Works Hydrology Manual were applied to the proposed land uses to account for those portions of each developed parcel (e.g., yards, landscaping, open space, etc.) that would remain pervious to infiltration by stormwater. For proposed runoff conditions, this analysis considers conditions based on the Capital Flood event, which assumes a burned watershed and resulting bulked peak flows.

For the bank protections within the Castaic Creek and Hasley Creek channels, this analysis compares the Modified Project's design conditions with the 2017 Project's design conditions and evaluates changes in the floodplain hydraulics caused by the proposed design revisions. As described in the VCC Flood Tech Report, provided in **Appendix 5.5** of this Draft SEIR, consistent data and techniques were used to model both the 2017 Project design configuration and Modified Project design configurations and to compute floodplain hydraulic differentials caused by the Castaic Creek bank protection adjustments and the Hasley Creek bank alignment modifications. The analyses in the study use the same existing conditions topography, the same Manning's roughness value coverage scheme,[9] and the same flowrates and boundary conditions, as described in the State-certified EIR.

The State-certified EIR analyzed the impacts of the 2017 Project using the most up-to-date versions of the Hydrologic Engineering Center's River Analysis System (HEC-RAS) modelling software available at that time. More specifically, the surface model and HEC-RAS geometry models were created with the most up to date version of the Geographic Information Systems (GIS) based HEC-GeoRAS software available at that time. Those same software versions have been superseded and are no longer available to analyze the Modified Project design.

[9] *Manning's equation is used to calculate flow in open channels.*

Table 5.5-2
Developed and Open Space Acreage within Entrada South Planning Area

Land Use	2017 Project[a]		Modified Project[b]		Delta (acres)
	Acreage	Percentage	Acreage	Percentage	
Developed Area[c]	252.6	66%	245.5	64%	-7.1
Open Space Area	129.5	34%	136.8	36%	+7.3
Total	382.1	100%	382.3	100%	+0.2

[a] *From RMDP/SCP State-certified EIR, Table 2.0-3.*

[b] *Per VTTM No. 53295.*

[c] *As studied in the State-certified EIR and approved by CDFW in 2017, Entrada South was represented by the Entrada South Planning Area (316 acres), as well as the extension of Magic Mountain Parkway (approximately 66 acres) through the anticipated tract map boundary, which has already been constructed as part of the Mission Village project.*

Source: Newhall Ranch Resource Management and Development Plan and Spineflower Conservation Plan Final EIR, 2010; and Hunsaker & Associates, 2022.

Table 5.5-3
Developed and Open Space Acreage within VCC Planning Area

Land Use	2017 Project[a]		Modified Project[b]		Delta (acres)
	Acreage	Percentage	Acreage	Percentage	
Development Acreage	177.7	55%	131.9	40%	-45.8
Open Space Acreage	143.6	45%	196.9	60%	+53.3
Total	321.3	100%	328.8[c]	100%	+7.5

[a] *From RMDP/SCP State-certified EIR, Table 2.0-2.*

[b] *Per VTPM No. 18108.*

[c] *The acreage for the 2017 Project is based upon the State-certified EIR. The Modified Project boundary incorporates a slight additional undeveloped area in the Castaic Creek bottom that will remain undeveloped with the Modified Project (no change in disturbance).*

Source: Newhall Ranch Resource Management and Development Plan and Spineflower Conservation Plan Final EIR, 2010; and Hunsaker & Associates, 2022.

To avoid analysis results differentials caused by using different software versions, the 2017 Project and Modified Project design configurations were all modelled using the latest current software packages. The Castaic Creek approved project condition and modified project condition were analyzed using HEC-RAS version 6.4.1, with model geometries and model results (floodplain extents and velocity distribution) developed with RAS Mapper. The Hasley Canyon Creek analysis was prepared in 2019 using HEC-RAS version 5.1, with model geometries developed with HEC-GeoRAS, version 10.6.

Accordingly, hydraulics models of the 2017 Project conditions and Modified Project conditions, of Castaic Creek and of Hasley Creek, were developed for the 2-year, 5-year, 10-year, 20-year, 50-year, and 100-year return storm events. The flowrates used in this study follow the hydrology in the State-certified EIR as summarized in **Table 5.5-4**, Flowrates in Castaic Creek and Hasley Creek, on page 5.5-30.

Hydraulic analyses were performed for each of the flowrates, for Castaic Creek and for Hasley Creek in 2017 Project conditions and Modified Project conditions. Note that Public Works requires exceedance probability calculations for the design and analysis of all drainage infrastructure. By employing this methodology, the impact analysis presented below meets County design standards.

b. Project Impacts

Threshold 5.5-2: Would the Project 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 a substantial erosion or siltation on- or off-site?

Threshold 5.5-3: Would the Project 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?

Threshold 5.5-4: Would the Project 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 or provide substantial additional sources of polluted runoff?

Project impacts with respect to Thresholds 5.5-2 through 5.5-4 are addressed in the following combined analysis since these criteria all relate to surface water runoff, drainage patterns, and storm drain systems.

(1) Construction

The primary hydrological concern during Modified Project construction would be erosion and sedimentation impacts during site clearing and grading. Erosion and sedimentation caused by construction activities are dependent upon climatic and site conditions, as well as the degree of soil disturbance during construction. Site clearing and

Table 5.5-4
Flowrates in Castaic Creek and Hasley Creek

Location	2-Year	5-Year	10-Year	20-Year	50-Year	100-Year
US Castaic Creek	752	2,069	4,701	10,907	14,480	18,805
US Hasley Creek	222	610	1,386	3,216	4,269	5,544

Source: PACE, 2024.

grading operations, in particular, would have the greatest potential for discharging sediment downstream during storm events. Given the similarities between the Modified Project and the 2017 Project relative to the types of land uses to be developed, land area disturbed, and the amount and nature of construction, the potential for sedimentation and debris production on the site during construction would be similar as well. Increases in sedimentation and debris production on the site during construction would be temporary and the Modified Project does not include changes that would substantially increase sedimentation or debris production compared to the 2017 Project. Similarly, like the 2017 Project, the Modified Project would not result in changes to drainage patterns that would exceed the capacity of the storm drain systems. Entrada South does increase flow to existing MTD 1764 and PD 2637; however, the increased runoff does not exceed the capacity of the systems.[10]

Drainage impacts would be further reduced through implementation of the construction-related BMPs specified in **Section 5.6**, Hydrology and Water Quality—Water Quality, of this SEIR. Please refer to that analysis for a more detailed discussion of erosion and sedimentation impacts. As indicated therein, construction impacts would be less than significant with compliance with applicable regulatory requirements and implementation of appropriate BMPs. Therefore, the Modified Project would not result in any new or substantially more severe significant impacts related to drainage during construction as compared to those identified in the State-certified EIR for the 2017 Project.

[10] *As noted in the Project Description, consistent with the 2017 Project, an existing storm drain in Magic Mountain Parkway will either need to be reconstructed, or a parallel line would need to be installed from the intersection of A Street and Magic Mountain Parkway where it connects into an existing box culvert in The Old Road. Alternatively, the storm drain may be installed in Media Center Lane, Entertainment Drive, and Skyview Lane where it would connect to the same existing box culvert. The alignment will be chosen at the final design stage in collaboration with Public Works. In each case, the storm drain would be installed in existing streets.*

(2) Operation

(a) Entrada South Planning Area

Under pre-development conditions, the Modified Project Site is the same as the 2017 Project Site as a primarily undeveloped natural area with canyons, abandoned oil wells, and associated access roads. The recently constructed extension of Magic Mountain Parkway traverses the Entrada South Planning Area from east to west. There are four debris basins that intercept natural flow and debris and a storm drain that flows into the existing storm drain system in Magic Mountain Parkway. The existing storm drain along Magic Mountain Parkway is designed for both the Mission Village development and the proposed Entrada South development. The post-development Entrada South Planning Area would consist of residential and commercial uses and include debris basins, and water quality basins. Unnamed Canyon 2 would remain in a largely natural state under post-development conditions. As part of the Modified Project, a new storm drain would be installed at the southerly Entrada South boundary to accommodate the increased flows resulting from the proposed development and to collect and convey off-site runoff.

The Modified Project incorporates alterations to the design of the 2017 Project in order to enhance and restore the Unnamed Canyon 2 drainage channel from the storm drain outlet at the southern Entrada South site boundary to Magic Mountain Parkway. The Unnamed Canyon 2 drainage channel would be enhanced as a natural, open, vegetated drainage channel with grade control structures that would largely retain the look and feel of a natural drainage, thus providing open space within the developed portions of the Modified Project Site and reducing permanent impacts to biological resources and jurisdictional waters as compared with 2017 Project, which assumed the conversion of the channel to a buried storm drain. **Table 5.5-2**, Developed and Open Space Acreage within Entrada South Planning Area, summarizes the change in developed and open space areas within the Entrada South Planning Area under the Modified Project and the 2017 Project. The Modified Project would decrease the developed acreage by 8.3 acres and increase the open space acreage by 7.5 acres, as compared with the 2017 Project. This change in developed area for the Modified Project reflects a relative decrease in impervious area and associated runoff as compared to the 2017 Project, which represents an environmentally beneficial improvement. In addition, similar to the 2017 Project, the Modified Project would divert dry-weather flows to water quality/treatment basins, with peak flows diverted to sediment debris basins, thus providing water quality benefits for runoff from the Entrada South Planning Area.

As previously discussed, within the Entrada South Planning Area, the proposed drainage system would include storm drain, flood control, and water quality improvements that would collectively minimize the potential for flooding, erosion, and mudflows and would appropriately capture and retain debris. To demonstrate this, a hydrology analysis was

conducted for the Entrada South planned development as described in the Entrada South Hydrology and Drainage Concept, provided in **Appendix 5.5** of this Draft SEIR. The hydrology analysis was based on the County design criteria using the 50-year capital flood event.

Based on the hydrologic and hydraulic analyses performed, the proposed improvements within Entrada South would not increase runoff compared to the 2017 Project and would not adversely impact the existing storm drain facilities or adjacent properties since the existing and proposed drainage infrastructure are sufficient to convey the design storm flows.[11]

The Modified Project has been designed in accordance with the Public Works LID Performance Standards defined by the MS4 Permit and the Public Works LID Ordinance. In conformance with the LID Performance Standards, the proposed BMPs as described in the Entrada South Hydrology and Drainage Concept are consistent with local codes and ordinances to decrease the potential of slopes and/or channels from eroding and impacting stormwater runoff. Further, the selected BMPs include retention and biofiltration BMPs that would minimize increases in runoff volume from the development area.

The State-certified EIR determined that the 2017 Project, with mitigation, would not result in substantial erosion or siltation, increase the rate or amount of surface runoff in a manner that would result in flooding, or exceed the capacity of the planned stormwater drainage systems. The Modified Project's site design and LID BMPs, especially the retention and infiltration BMPs, would minimize increases in runoff volume from the developed area, which is the preferred method for controlling hydromodification impacts from new development. As with the 2017 Project, with compliance with regulatory requirements, previously approved mitigation measures, and implementation of appropriate BMPs, Modified Project development within the Entrada South Planning Area would not result in substantial erosion or siltation, increase the rate or amount of surface runoff in a manner that would result in flooding, or exceed the capacity of the planned stormwater drainage systems, and impacts would be less than significant. Therefore, the Modified Project would not result in any new or substantially more severe significant impacts related to drainage during operation compared to those identified in the State-certified EIR for the 2017 Project.

[11] *As noted above, Entrada South does increase flow to existing MTD 1764 and PD 2637; however, the increased runoff does not exceed the capacity of the systems.*

(b) VCC Planning Area

(i) Planned Improvements

Castaic Creek

As with the 2017 Project, the Modified Project would include the installation of cement bank stabilization where necessary to protect against flooding and erosion pursuant to FEMA and Public Works requirements. Under the 2017 Project, approximately 8,500 feet of soil cement bank protection would be installed on the east and west sides of Castaic Creek. The soil cement bank protection on the east bank would extend downstream from the I-5 bridge to the existing rip rap bank protection, PD No. 2441, and extend downstream from the existing rip rap to the Commerce Center Drive bridge. The soil cement bank protection on the west bank would extend downstream from the existing concrete slope lining, PD No. 1982, to the confluence with Hasley Creek where it will turn upstream along the east bank of Hasley Creek.

As noted above, CLOMR and County Floodway Revision applications were submitted in May 2023 related to the Castaic Creek Soil Cement Bank Protection Project. Following construction of the bank protection, FEMA will adopt a LOMR and the Board of Supervisors will adopt a revised County floodway map. Refer to **Appendix 5.5g** for the County Floodway Revision and **Appendix 5.5i** for the CLOMR.

Under the Modified Project, the length of the soil cement bank protection along Castaic Creek would be the same as under the 2017 Project, with the same upstream and downstream limits. However, under the Modified Project more of the Castaic Creek floodplain would be retained because the planned bank protection alignments on the east and west sides of Castaic Creek would be pulled back from the creek bed. The revised alignments in the Modified Project conditions would reduce impacts to existing jurisdictional streambed areas in Castaic Creek compared to the 2017 Project, which represents an environmentally beneficial improvement. **Figure 5.5-1**, Comparison of Bank Protection Alignments for Castaic and Hasley Creeks, shows the alignments for the bank protection within the VCC Planning Area under the 2017 Project and the Modified Project.

Hasley Creek

As illustrated in **Figure 5.5-1**, Comparison of Bank Protection Alignments for Castaic and Hasley Creeks, under the 2017 Project, the planned Hasley Creek channel would be relatively straight and aligned approximately downslope, resulting in a steep channel profile that required numerous grade control structures to maintain a stable channel. The 2017 Project channel profile design required substantial grading and infill over the existing streambed and surrounding overbank areas. The design consisted of approximately 6,500 feet of engineered soft bottom channel with soil cement bank protection on the east and

west embankments, and 11 six-foot-high drop structures, spaced out over the on-site reach. The soil cement bank protection on the east side of Hasley Creek extended from the existing channel bank improvements downstream and merge with the soil cement bank protection on the west side of Castaic Creek, forming a continuous embankment protection. The soil cement bank protection on the west side of Hasley Creek extended from the existing channel bank improvements downstream to the Commerce Center Drive bridge. As noted above, CLOMR and County Floodway Revision applications were submitted in May 2023 related to the Castaic Creek Soil Cement Bank Protection Project. Following construction of the bank protection, FEMA will adopt a LOMR and the Board of Supervisors will adopt a revised County floodway map. Refer to **Appendix 5.5f** for the County Floodway Revision and **Appendix 5.5h** for the CLOMR.

The Modified Project takes a different approach and reduces permanent impacts to Hasley Creek and its floodplain, which represents an environmentally beneficial change. Under the Modified Project, the existing natural channel bed of Hasley Creek would be maintained by relying on the existing sinuous creek alignment. The soil cement bank protection would have the same upstream and downstream extents as in the 2017 Project, but the alignments would be revised to follow the existing stream corridor so that the existing natural channel bed area and lengthwise elevation profile would be maintained, thus preserving large amounts of existing jurisdictional area within Hasley Creek. The Modified Project design eliminates all 11 of the six-foot-high drop structures present in the 2017 Project design since the wider creek would reduce velocity and erosion, an environmentally beneficial change. Depending on the precise sediment transport conditions determined during final design, the Modified Project may have up to two grade control structures to prevent head-cutting and preserve streambed stability. The proposed grade control structures would be set at the existing grade and buried deep enough to prevent undermining of the structure during peak flows. Because the grade control structures would be below existing grade, the hydraulic results for the Modified Project conditions are the same with or without the two structures.

For an evaluation of the relative impacts of the Modified Project compared with the 2017 Project, the floodplain extents and floodplain velocity profiles were compared. The impacts relative to erosion/siltation, flooding, and stormwater drainage capacity are discussed below.

(ii) Erosion/Siltation

As discussed in Section 4.2, Geomorphology and Riparian Resources, of the State-certified EIR, the potential for streambed erosion can be evaluated by reviewing changes to hydraulic shear stress or flow velocities, in conjunction with potentially erodible materials. In Los Angeles County, velocities are the preferred indicator for potential streambed

erosion. As detailed in Section 4.2 of the State-certified EIR, a representative velocity of 4 feet per second (fps) was determined to be the appropriate indicator for potential erosion.

For both Castaic Creek and Hasley Creek, the flow velocity profiles across each channel were modeled for the 2017 Project and Modified Project (refer to the VCC Flood Tech Report, provided in **Appendix 5.5** of this Draft SEIR). The data in **Table 5.5-5**, Velocity Distribution Comparison for Castaic Creek (2-Year and 100-Year Event), and **Table 5.5-6**, Velocity Distribution Comparison for Hasley Creek (2-Year and 100-Year Event), on pages 5.5-36 and 5.5-40, respectively, compare the stream acreage within specified velocity ranges for the 2017 Project and Modified Project for 2-year and 100-year storm events for Castaic Creek and Hasley Creek. Because the Modified Project would preserve more of the floodplain area associated with both Castaic Creek and Hasley Creek, the tables do not precisely compare the expected changes. That is, the preservation of the natural channel path and streambed under the Modified Project generally would serve to preserve natural erosion behavior during low flow conditions and increase the area of the floodplain during storm events, as compared to the 2017 Project. This restoration of natural behaviors as compared to the 2017 Project would result in an increase in erosion potential during low flow events and increased area subject to storm flows during larger events, as compared with the controlled 2017 Project.

Accordingly, as described in more detail below, allowing flows to inundate an expanded and more natural floodplain during larger storm events under the Modified Project would increase the erosion potential in areas that would not be inundated under the controlled channel design of the 2017 Project. This represents a beneficial modification compared to the 2017 Project because the more natural riverine behavior associated with the Modified Project would decrease overall velocities during larger storm events, thus reducing the potential for erosion and disruption of established vegetation during the most intense storms. The effect of the greater floodplain area in both creeks is described further in the analysis below.

Castaic Creek

Table 5.5-5, Velocity Distribution Comparison for Castaic Creek (2-Year and 100-Year Event); **Figure 5.5-4**, 2-Year Event Velocity Differential for Castaic Creek, on page 5.5-37; and **Figure 5.5-5**, 100-Year Event Velocity Differential for Castaic Creek, on page 5.5-38 provide a graphical comparison of the flow velocity distribution fields under the 2017 Project and Modified Project within Castaic Creek for the 2-year and 100-year events, respectively. For the 2-year event, the change in area of floodplain within the depicted velocity range categories would vary from 6.1 percent (0–2 fps) to -0.5 percent (6–8 fps), with the total change, summed by velocity range category, equal to 4.9 percent. For the 100-year event, the change in area of floodplain within the depicted velocity range

Table 5.5-5
Velocity Distribution Comparison for Castaic Creek (2-Year and 100-Year Event)

Ranges (fps)	2017 Project (acres)	Modified Project (acres)	Delta (acres)	Delta %
2-Year Event				
0–2	11.8	13.1	1.3	6.1%
2–4	5.7	5.8	0.1	0.5%
4–6	3.2	2.9	-0.3	-1.4%
6–8	0.7	0.6	-0.1	-0.5%
8–10	0.0	0.0	0.0	0.0%
Totals	21.4	22.4	1.0	4.9%
100-Year Event				
0–2	8.9	8.8	-0.1	-0.1%
2–4	34.0	36.1	2.1	2.0%
4–6	22.7	29.3	6.6	6.3%
6–8	18.2	18.3	0.1	0.1%
8–10	11.1	10.8	-0.3	-0.3%
10–12	5.3	5.6	0.3	0.2%
12–15	2.8	2.6	-0.2	-0.2%
15–18	1.1	0.7	-0.4	-0.4%
18–-21	0.1	0.0	-0.1	-0.1%
Totals	104.1	112.0	7.9	7.6%

Source: PACE, 2024.

categories would vary from -6.3 percent (4–6 fps) to -0.4 percent (15-18 fps), with the total change, summed by velocity range category, equal to 7.6 percent.

For the Modified Project during the 2-year storm event, more area of the Castaic Creek flow field would be in the low velocity range, 0–2 fps and 2–4 fps, as compared to the 2017 Project conditions. The area of flow field at higher velocities, 4–6 fps and greater, would be reduced under Modified Project conditions, which indicates a condition of less erosion and less disturbance to vegetation compared to the 2017 Project. A similar trend is seen during the 100-year event, for which the greatest change in the flow velocity field between 2017 Project conditions and Modified Project conditions would be an increase in the balance of flow field area in the 0–2 fps and 4–6 fps range and a decrease in the flow area at velocities of 12 fps and greater.

Accordingly, the changes to the hydraulic conditions in Castaic Creek associated with the Modified Project are anticipated to reduce erosion and reduce disruption of

CASTAIC CREEK VELOCITY DIFFERENTIAL APPROVED vs MODIFIED COMPARISON

	Ranges (fps)	Area (ac)
Velocity Decrease	<= -2.5	0.3
	-2.5 to -1.5	0.3
	-1.5 to 0.5	1.8
	-0.5 to -0.2	1.9
	No Change	13.8
Velocity Increase	0.2 to 0.5	2.1
	0.5 to 1.5	1.8
	1.5 to 2.5	0.2
	>= 2.5	0.2

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Figure 5.5-4
2-Year Event Velocity Differential for Castaic Creek

Source: PACE, 2024.

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Figure 5.5-5
100-Year Event Velocity Differential for Castaic Creek

Source: PACE, 2024.

established vegetation during all storm events as compared with the 2017 Project. Therefore, the Modified Project would not result in any new or substantially more severe significant impacts related to hydrology or drainage as compared to those identified in the State-certified EIR for the 2017 Project.

Hasley Creek

Table 5.5-6, Velocity Distribution Comparison for Hasley Creek (2-Year and 100-Year Event); **Figure 5.5-6**, 2-Year Event Velocity Differential for Hasley Creek; and **Figure 5.5-7**, 100-Year Event Velocity Differential for Hasley Creek, on pages 5.5-40, 5.5-41, and 5.5-42, respectively, provide a graphical comparison of the flow velocity distribution fields under the 2017 Project and Modified Project within Hasley Creek for the 2-year and 100-year events, respectively. For the 2-year event, the change in area of floodplain within the depicted velocity range categories would vary from -23.2 percent (2–4 fps) to 9.3 percent (4–6 fps), with the total change, summed by velocity range category, equal to -14.9 percent. For the 100-year event, the change in area of floodplain within the depicted velocity range categories would vary from -18.6 percent (12–15 fps) to 40.3 percent (4–6 fps), with the total change, summed by velocity range category, equal to 128.6 percent. This 128.6 percent total change is expected because the Modified Project would restore the natural floodplain and almost double the overall area with which to convey storm flows, as compared with the controlled Hasley Creek channel under the 2017 Project. This represents a beneficial modification compared to the 2017 Project since the more natural riverine behavior associated with the Modified Project would decrease overall velocities during larger storm events, thus reducing the potential for erosion and disruption of established vegetation.

The preservation of the natural channel path and streambed under the Modified Project compared to the 2017 Project also would preserve the natural low-flow incisement that contains the flow during the smallest flow events. Specifically, preserving the naturally existing bedform in Hasley Creek as proposed under the Modified Project would cause an increase in the flow field velocity distribution in the 4–6 fps and 6–8 fps range during the 2-year event. This is a consequence of keeping the existing low-flow incisement that tends to concentrate flows during the smallest events. Natural low flow incisement was not present for the completely graded and controlled 2017 Project. During the 100-year event, the changes to the flow field velocity distribution for the Modified Project would result in a reduction of area within the highest velocity range (12–15 fps) as compared with the 2017 Project. The areas of all other velocity range categories would increase, which is expected since the overall flow area would more than double compared to the 2017 Project.

For Hasley Creek, the Modified Project would preserve the naturally existing bedform and natural riverine incisement behavior during low flow events, whereas the 2017

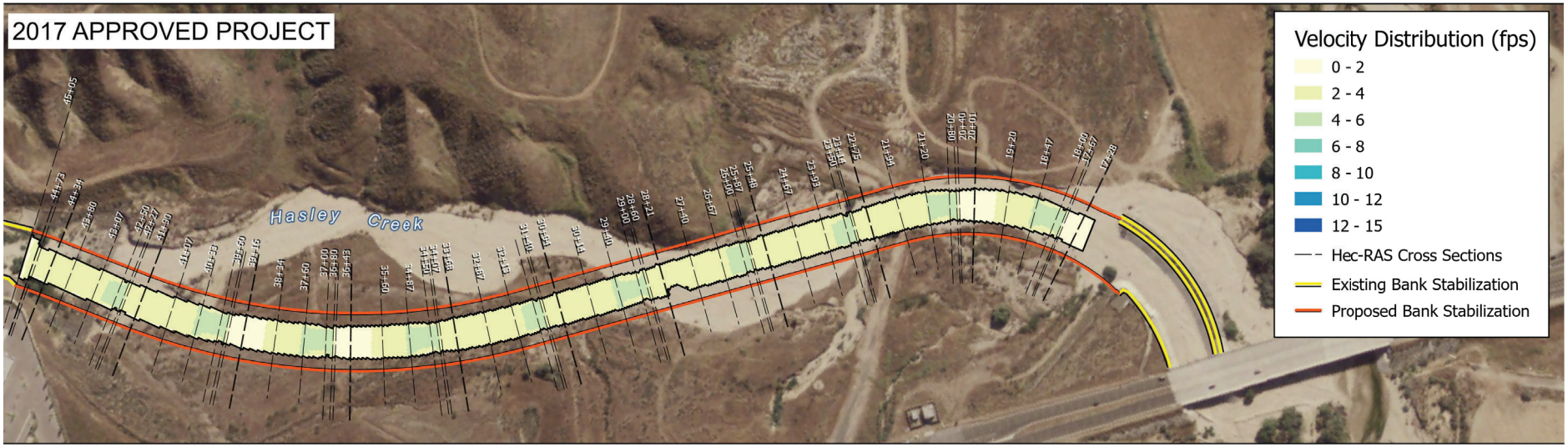
Table 5.5-6
Velocity Distribution Comparison for Hasley Creek (2-Year and 100-Year Event)

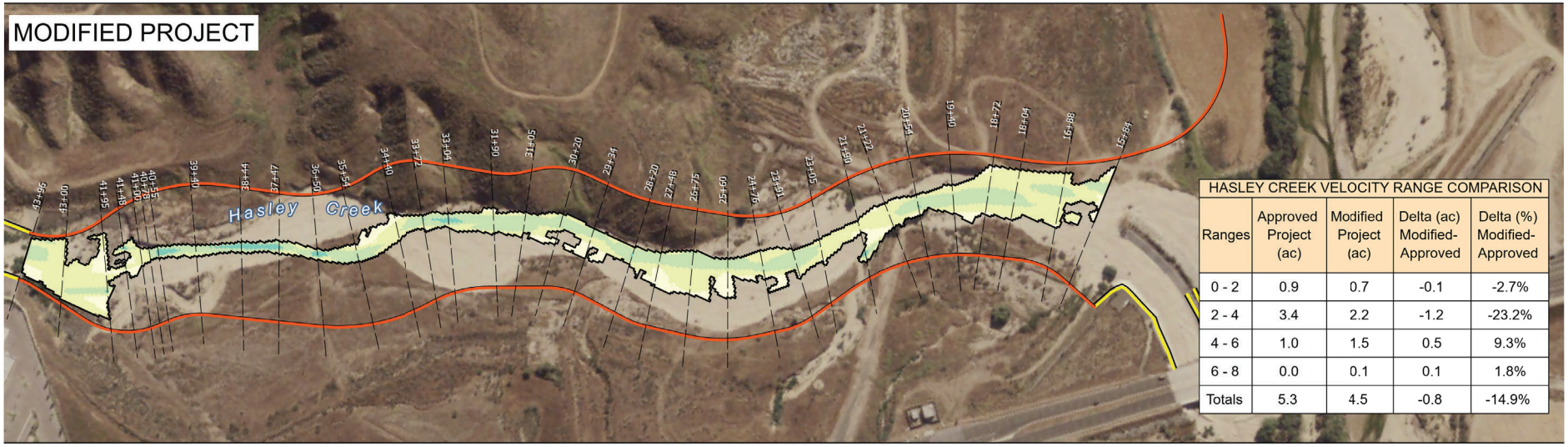
Ranges (fps)	2017 Project (acres)	Modified Project (acres)	Delta (acres)	Delta %
2-Year Event				
0–2	0.9	0.7	-0.1	-2.7%
2–4	3.4	2.2	-1.2	-23.2%
4–6	1.0	1.5	0.5	9.3%
6–8	0.0	0.1	0.1	1.8%
Totals	5.3	4.5	-0.8	-14.9%
100-Year Event				
0–2	0.3	0.8	0.5	8.6%
2–4	0.2	2.1	1.9	29.5%
4–6	0.3	2.9	2.6	40.3%
6–8	0.7	2.8	2.1	32.7%
8–10	1.5	2.8	1.4	21.5%
10–12	1.7	2.7	0.9	14.3%
12–15	1.7	0.5	-1.2	-18.6%
Totals	6.3	14.5	8.2	128.6%

Source: PACE, 2024.

Project would eliminate natural low flow incisement during the low flow events. For all other storm events, 5-year through 100-year, the Modified Project would expand the floodplain compared with the 2017 Project, resulting in an expected increase in area subject to greater velocities. However, for the 100-year event, the Modified Project would result in a reduction of area within the highest velocity range (12–15 fps) as compared with the 2017 Project.

Therefore, the potential for erosion associated with the Modified Project within Hasley Creek would be less than under the 2017 Project. Further, the Modified Project would reduce permanent impacts related to changes in natural riverine behavior for low flow events as compared to the 2017 Project. Accordingly, as under the 2017 Project, development of the VCC Planning Area under the Modified Project would not result in substantial erosion on- or off-site. As such, the Modified Project would not result in any new or substantially more severe significant impacts related to hydrology or drainage as compared to those identified in the State-certified EIR for the 2017 Project.





HASLEY CREEK VELOCITY RANGE COMPARISON

Ranges	Approved Project (ac)	Modified Project (ac)	Delta (ac) Modified-Approved	Delta (%) Modified-Approved
0 - 2	0.9	0.7	-0.1	-2.7%
2 - 4	3.4	2.2	-1.2	-23.2%
4 - 6	1.0	1.5	0.5	9.3%
6 - 8	0.0	0.1	0.1	1.8%
Totals	5.3	4.5	-0.8	-14.9%

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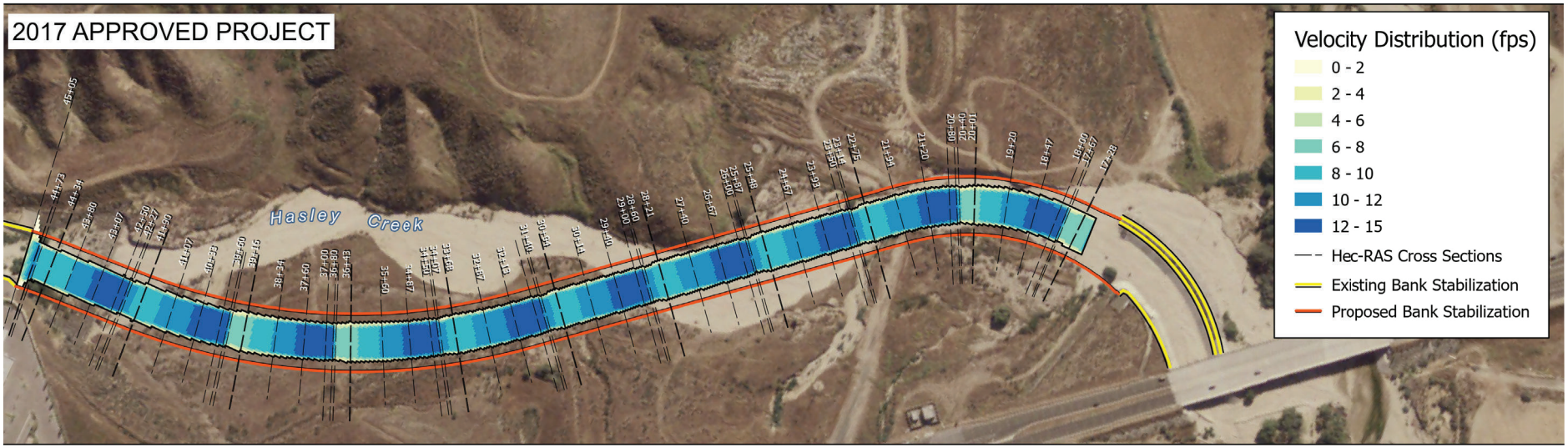
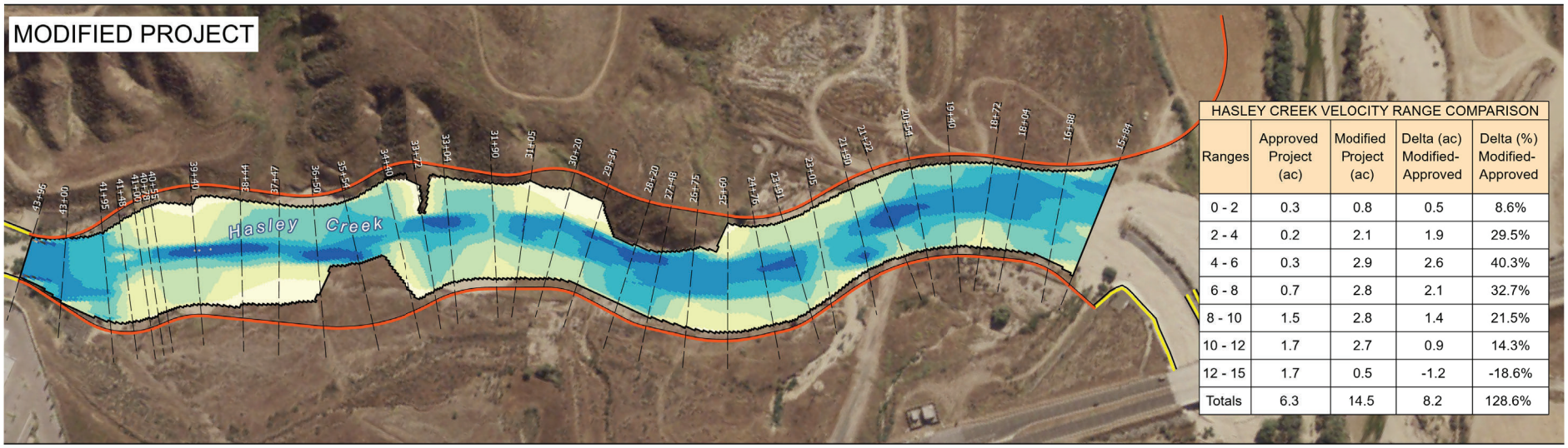
Figure 5.5-6
2-Year Event Velocity Comparison for Hasley Creek

Source: PACE, 2024.





HASLEY CREEK VELOCITY RANGE COMPARISON

Ranges	Approved Project (ac)	Modified Project (ac)	Delta (ac) Modified-Approved	Delta (%) Modified-Approved
0 - 2	0.3	0.8	0.5	8.6%
2 - 4	0.2	2.1	1.9	29.5%
4 - 6	0.3	2.9	2.6	40.3%
6 - 8	0.7	2.8	2.1	32.7%
8 - 10	1.5	2.8	1.4	21.5%
10 - 12	1.7	2.7	0.9	14.3%
12 - 15	1.7	0.5	-1.2	-18.6%
Totals	6.3	14.5	8.2	128.6%

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Figure 5.5-7
100-Year Event Velocity Comparison for Hasley Creek

Source: PACE, 2024.

(iii) Flooding and Stormwater Drainage Capacity

The Modified Project's proposed changes to the Castaic Creek design consist of adjustments to the toe of soil cement bank protection. For Hasley Creek, the Modified Project design consists of substantial changes to the streambed alignment resulting in significant relocation of the channel area as compared to the 2017 Project.

For both Castaic Creek and Hasley Creek, the floodplain extents were modeled for the 2017 Project and Modified Project (refer to the VCC Flood Tech Report, provided in **Appendix 5.5** of this Draft SEIR). The floodplain extents are calculated as the total riverine area that would be inundated to any depth during a storm. The computed floodplain extents for the 2017 Project and Modified Project for the 2-year through 100-year events are summarized for both Castaic Creek and Hasley Creek in **Table 5.5-7**, Floodplain Area Comparison, on page 5.5-44.

As summarized in **Table 5.5-7**, Floodplain Area Comparison, the Modified Project along Castaic Creek would result in a larger floodplain area than the 2017 Project for all storm events. This is expected due to the additional environmental projections associated with the Modified Project and is caused by the embankment alignment that would preserve more existing streambed as compared with the 2017 Project. Floodplain area increases would range from 5.0 percent during the 2-year storm event to 7.8 percent during the 100-year storm event. The largest relative increase would be during the 5-year storm event, during which the floodplain area would increase by 11.4 percent. This is expected since the proposed alignment changes would avoid jurisdictional floodplain area, which loosely corresponds to the existing 5-year floodplain, so the greatest relative increase would be for this specific flood event. **Figure 5.5-8**, Castaic Creek Floodplain Differential for the 5-Year Event, and **Figure 5.5-9**, Castaic Creek Floodplain Differential for the 100-Year Event, on pages 5.5-45 and 5.5-46 show a comparison of the floodplain area in Castaic Creek for the 2017 Project versus the Modified Project during the 5-year and 100-year storm events, respectively.

In Hasley Creek, reflecting the additional environmental protections associated with the Modified Project, the calculated floodplain area for the Modified Project would be larger than the floodplain area for the 2017 Project for all analyzed storm events except the 2-year storm. This is because the sinuous channel allowed by the Modified Project would provide more total floodplain area during all events that can fill most of the streambed. The 2-year event would be more confined, even along the longer proposed alignment, in the existing incised low flow thalweg. **Figure 5.5-10**, Hasley Creek Floodplain Differential for the 2-Year Event, and **Figure 5.5-11**, Hasley Creek Floodplain Differential for the 100-Year Event, on pages 5.5-47 and 5.5-48 show a comparison of the floodplain area in Hasley Creek for the 2017 Project versus the Modified Project during the 2-year and 100-year storm events, respectively.

Table 5.5-7
Floodplain Area Comparison

Flood Event	2017 Project (acres)	Modified Project (acres)	Delta (acres)	Delta %
Castaic Creek				
2-Year	21.4	22.4	1.0	4.7%
5-Year	56.4	62.4	6.0	10.6%
10-Year	80.9	87.6	6.7	8.3%
20-Year	98.8	107.0	8.2	8.3%
50-Year	102.9	110.5	7.6	7.4%
100-Year	104.1	112.0	7.9	7.6%
Hasley Creek				
2-Year	5.3	4.5	-0.8	-14.9%
5-Year	5.5	6.7	1.2	21.0%
10-Year	5.7	9.1	3.3	58.3%
20-Year	6.0	12.3	6.3	105.6%
50-Year	6.2	13.4	7.2	117.2%
100-Year	6.3	14.5	8.2	128.6%

Source: PACE, 2024.

From an impact perspective, the Modified Project's changes to the floodplain extents within 'Castaic Creek and Hasley Creek are environmentally beneficial, as the changes would serve to preserve substantially more existing streambed, preserve more jurisdictional area, and provide stable systems for conveyance and flood protection through the on-site reaches of both Castaic Creek and Hasley Creek. As calculated in the VCC Hydrology and Drainage Concept (**Appendix 5.5** of this SEIR), the channels and storm drains have been designed to contain and convey flows associated with the County's 50-year capital flood event, in accordance with Public Works requirements. The VCC Hydrology and Drainage Concept specifies that parcel-based BMPs would be sized in conformance with Los Angeles County LID standards and concludes that the Modified Project would not create drainage capacity problems that would result in on-site or off-site impacts. Since storm flows from upstream areas would be channeled through the VCC Planning Area in facilities designed for the capital flood event, and since on-site runoff would be accommodated in facilities designed pursuant to Public Works requirements, no on-site or off-site flooding due to inadequately designed storm drainage facilities would occur.

In summary, the Modified Project would not substantially alter drainage patterns within and surrounding the VCC Planning Area, substantially increase the rate or amount of surface runoff in a manner that would result in flooding on- or off-site, create or contribute

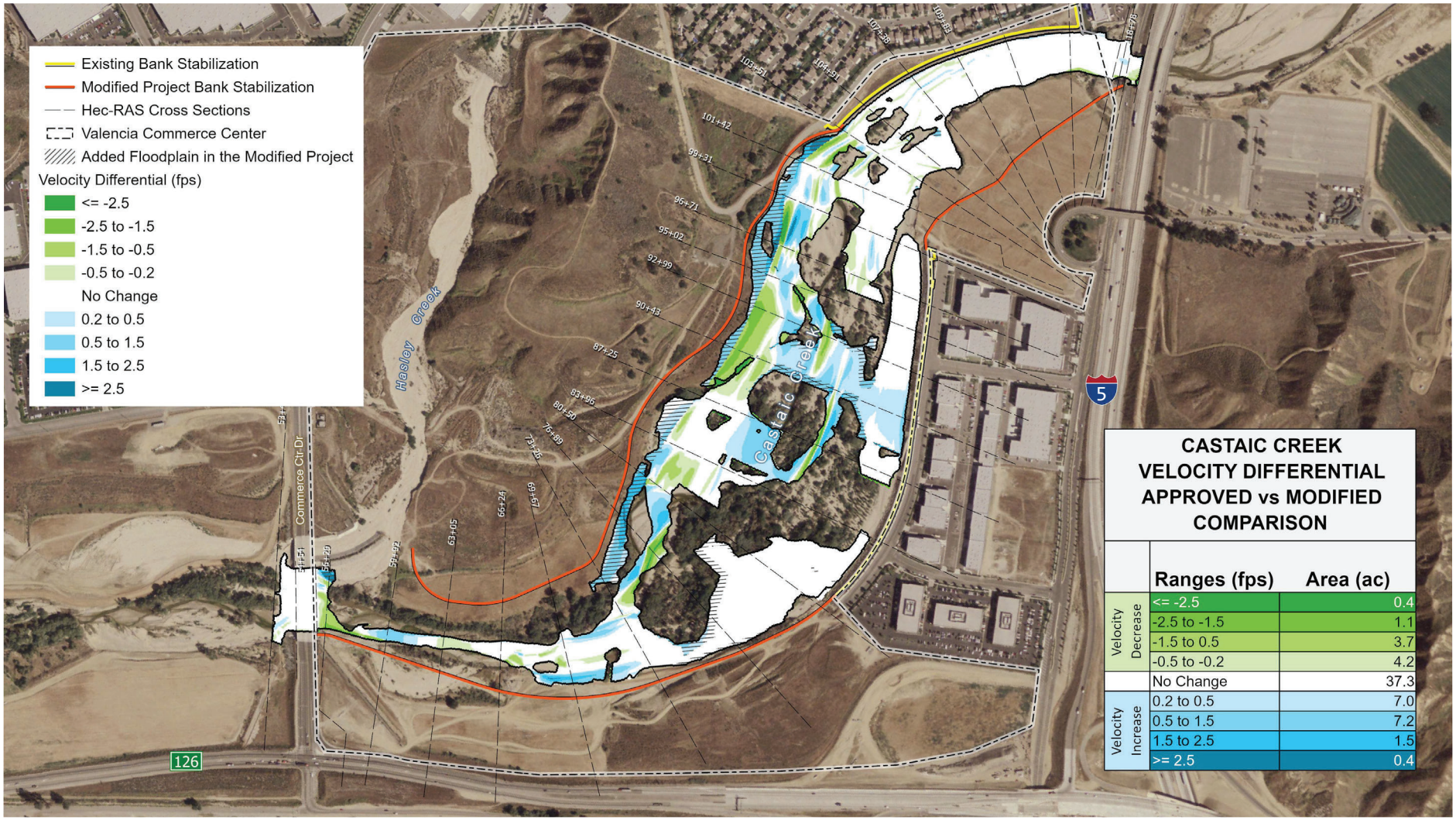

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Figure 5.5-8
Castaic Creek Floodplain Differential for the 5-Year Event

Source: PACE, 2024.

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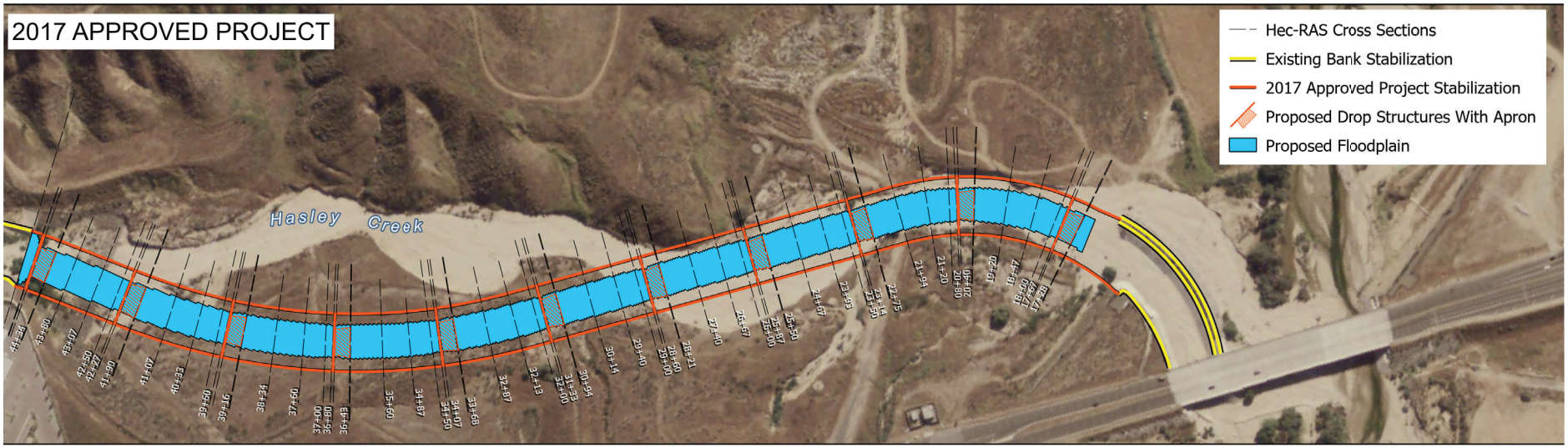
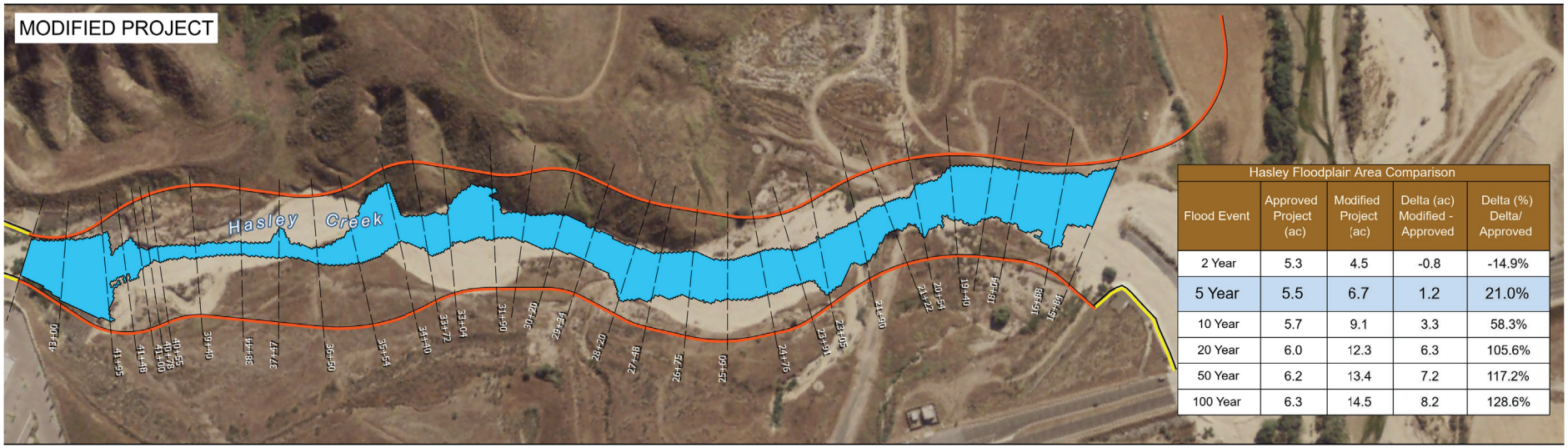
Figure 5.5-9
Castaic Creek Floodplain Differential for the 100-Year Event

Source: PACE, 2024.





Hasley Floodplair Area Comparison

Flood Event	Approved Project (ac)	Modified Project (ac)	Delta (ac) Modified - Approved	Delta (%) Delta/ Approved
2 Year	5.3	4.5	-0.8	-14.9%
5 Year	5.5	6.7	1.2	21.0%
10 Year	5.7	9.1	3.3	58.3%
20 Year	6.0	12.3	6.3	105.6%
50 Year	6.2	13.4	7.2	117.2%
100 Year	6.3	14.5	8.2	128.6%

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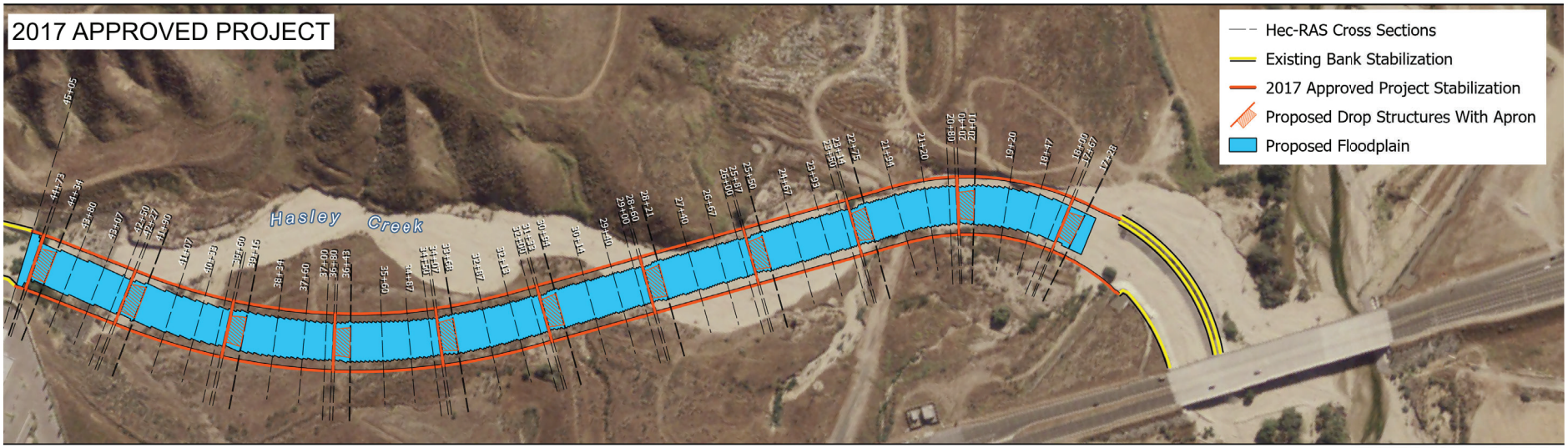
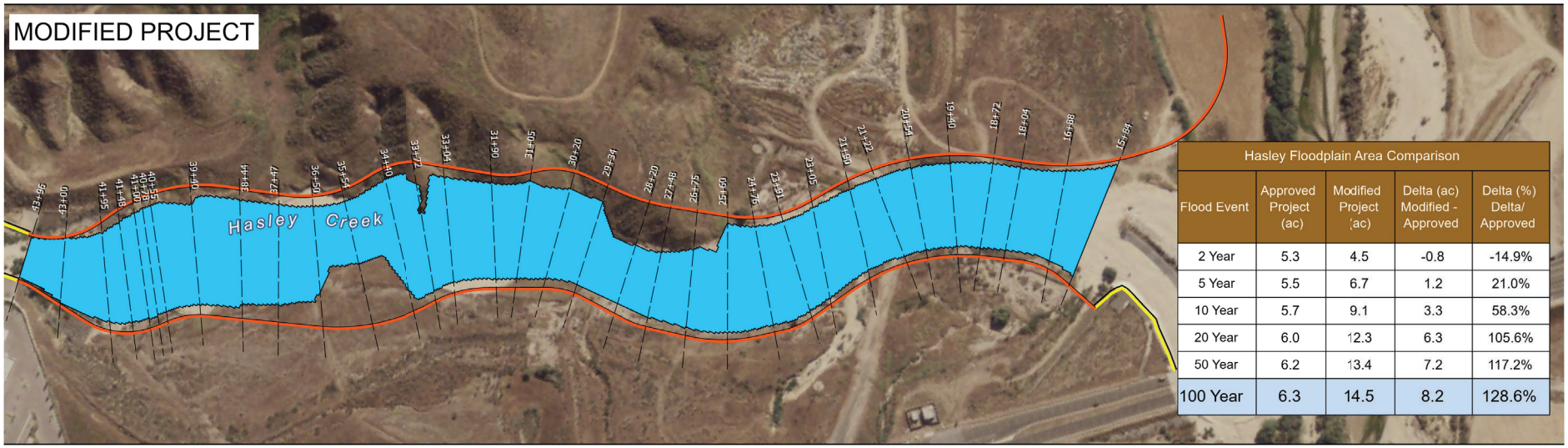
Figure 5.5-10
Hasley Creek Floodplain Differential for the 2-Year Event

Source: PACE, 2024.





Hasley Floodplain Area Comparison

Flood Event	Approved Project (ac)	Modified Project (ac)	Delta (ac) Modified - Approved	Delta (%) Delta/ Approved
2 Year	5.3	4.5	-0.8	-14.9%
5 Year	5.5	6.7	1.2	21.0%
10 Year	5.7	9.1	3.3	58.3%
20 Year	6.0	12.3	6.3	105.6%
50 Year	6.2	13.4	7.2	117.2%
100 Year	6.3	14.5	8.2	128.6%

eyestone ENVIRONMENTAL

Figure 5.5-11
Hasley Creek Floodplain Differential for the 100-Year Event

Source: PACE, 2024.

runoff that exceeds the capacity of existing or planned drainage systems, or create drainage system capacity problems with compliance with regulatory requirements and mitigation measures and with implementation of appropriate BMPs. Therefore, the Modified Project would not result in any new or substantially more severe impacts related to hydrology or drainage as compared to those identified in the State-certified EIR for the 2017 Project.

Threshold 5.5-5: Would the Project 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 impede or redirect flood flows?

(1) Entrada South Planning Area

As described in the analysis for Thresholds 5.5-2 through 5.5-4, the Modified Project's proposed drainage system for the Entrada South Planning Area would include storm drain, flood control, and water quality improvements that collectively would minimize the potential for flooding, erosion, and mudflows, and would appropriately capture and retain debris. To demonstrate this, a hydrology analysis was conducted for the Entrada South planned development as detailed in the Entrada South Hydrology and Drainage Concept, provided in **Appendix 5.5** of this SEIR. As calculated in the Entrada South Hydrology and Drainage Concept, the channels and storm drains have been designed to contain and convey flows associated with the County's 50-year capital flood event in accordance with Public Works requirements. Since storm flows from upstream areas would be channeled through the Entrada South Planning Area in facilities designed for the capital flood event, and since on-site runoff would be accommodated in facilities designed pursuant to Public Works requirements, no on site or upstream flooding due to inadequately designed storm drainage facilities would occur. Therefore, as with the 2017 Project, the Modified Project within the Entrada South development would not result in flooding or exceed the capacity of the planned stormwater drainage systems, and impacts would be less than significant. Therefore, the Modified Project would not result in any new or substantially more severe significant impacts related to the alteration of existing drainage patterns as compared to those identified in the State-certified EIR for the 2017 Project.

(2) VCC Planning Area

The incremental changes to the Modified Project, as compared to the 2017 Project analyzed in the State-certified EIR, include additional environmental protections. Specifically to provide increased environmental enhancements to waters of the United States and related biological resources within the VCC Planning Area compared to the 2017 Project, the Modified Project involves a reduction in permanent impacts to Hasley Creek and Castaic Creek (although such areas may be temporarily impacted during

construction, as analyzed in the State-certified EIR, but would be restored and revegetated after construction based on the Modified Project design) which traverse the VCC Planning Area, including a reduction of permanent impacts to certain vegetation communities and jurisdictional stream habitat. These environmentally beneficial modifications would enhance open space, restore drainage areas, and increase habitat for species compared to the 2017 Project.

For purposes of this analysis, within the VCC Planning Area, the Modified Project includes design changes to preserve more natural area and limit jurisdictional intrusion in both of the creek systems (i.e., Castaic Creek and Hasley Creek). Under the Modified Project, changes on Castaic Creek consist of revised bank protection design that pulls back away from the existing streambed. Under the Modified Project, changes to the planned Hasley Creek improvements include a completely new alignment to follow the existing streambed more closely allows for a wider channel and eliminates eleven 6-foot-high drop structures. The Modified Project design changes will maintain substantially more existing streambed, preserve more jurisdictional area, and provide stable systems for conveyance and flood protection through the subject reaches of both Castaic Creek and Hasley Creek as compared with the 2017 Project. As such, the Modified Project would not result in significant impacts with respect to impediment or redirection of flood flows. Therefore, the Modified Project would not result in any new or substantially more severe significant impacts related to alteration of existing drainage patterns as compared to those identified in the State-certified EIR for the 2017 Project.

7. CUMULATIVE IMPACTS

The geographic context for the cumulative impact analysis of hydrology is Reach 5 of the Santa Clara River, which extends from roughly I-5 (east of the Modified Project Site) to just west of the Los Angeles/Ventura County line. This area includes the approximately 1,500-acre tributary watershed in which the Modified Project Site is located, the Newhall Ranch Specific Plan area to the west, and southerly draining areas located north of the Santa Clara River. Anticipated cumulative growth through 2032 (i.e., the Modified Project buildout year) within the Project vicinity would cumulatively affect hydrological conditions within the Reach 5 drainage area through increased imperviousness and/or changes in drainage patterns and could subject people and property to flood hazards if located within areas subject to flooding or if downstream flooding results.

The State-certified EIR analyzed cumulative impacts related to hydrology and hydromodification through 2032, including the buildout of the Entrada South and VCC Planning Areas. As detailed in the State-certified EIR, the development facilitated on the VCC and Entrada South Planning Areas, would increase runoff into the Santa Clara River from upland areas due to increased impervious surface areas (e.g., pavement, roads, and buildings). The Modified Project would result in less impervious area and associated runoff

as compared with the 2017 Project. Therefore, the Modified Project would reduce the associated cumulative impacts from those analyzed in the State-certified EIR.

In addition, individual planned developments would be subject to project review, grading and building permit issuance processes, and FEMA compliance, as appropriate, which would require design features and characteristics to reduce flood impacts on an individual, and thus, cumulative basis, to acceptable levels. For those projects located within Los Angeles County, all future drainage facilities, whether project-specific or serving cumulative development, would be designed for either the 50-year capital flood event or the 25-year urban design storm pursuant to Public Works requirements. Public Works also prohibits increases in off-site post-development storm flows and increases in storm flow velocities.

Compliance with these requirements would ensure that overall storm runoff discharge quantities from the watershed under post development conditions would be less than or equal to existing conditions, largely because runoff would include less debris than is typical of undeveloped watersheds and flow rates would not increase. Moreover, because all projects must include on-site drainage facilities built for burned/bulked flows from undeveloped areas, those facilities would have more than adequate capacity to accommodate flows as development occurs. The Modified Project would not result in any new significant cumulative impacts related to burned/bulked runoff flows, inundation from 100-year flood events, subjecting downstream uses to flooding generated on-site. As described above, the Modified Project would result in less impervious area and associated runoff as compared with the 2017 Project; therefore, the Modified Project would not result in any new or substantially more severe significant cumulative impacts related to hydrology as compared to those identified in the State-certified EIR for the 2017 Project.

Please refer to **Section 5.6**, Hydrology and Water Quality—Water Quality, of this SEIR for discussion of cumulative impacts related to erosion, sedimentation, and hydromodification.

8. MITIGATION MEASURES

A complete list of mitigation measures to be implemented under the Modified Project is provided in the Mitigation Monitoring and Reporting Program in **Appendix 2** of this SEIR. Previously adopted mitigation measures that are not applicable to the Modified Project or that require no further action as part of the Modified Project (generally because the measure has already been completed or would be achieved or exceeded through compliance with current regulatory requirements) are detailed in **Appendix 3** of this SEIR.

a. Previously Approved Mitigation Measures from the State-Certified EIR

Mitigation was previously adopted by the County for the Entrada South Planning Area as part of the State-certified EIR. In general, those mitigation measures either have been superseded by other more stringent mitigation or would be achieved or exceeded through compliance with updated regulatory requirements. Please refer to **Appendix 3** of the SEIR for a list of Entrada South mitigation measures that are no longer applicable to the Modified Project or that require no further action as part of the Modified Project.

b. Previously Approved Mitigation Measures from the County Certified VCC EIR

Mitigation was previously adopted by the County for the VCC Planning Area as part of the County-certified VCC EIR. In general, those mitigation measures either have been superseded by other more stringent mitigation or would be achieved or exceeded through compliance with updated regulatory requirements. Please refer to **Appendix 3** of the SEIR for a list of VCC mitigation measures that are no longer applicable to the Modified Project or that require no further action as part of the Modified Project.

9. LEVEL OF SIGNIFICANCE AFTER MITIGATION

The State-certified EIR determined that the 2017 Project with mitigation and regulatory compliance would result in less than significant impacts related to hydrology. The Modified Project would not result in any new or substantially more severe impacts with respect to hydrology with implementation of regulatory requirements and project design features (as specified in **Section 5.6**, Water Quality and Hydrology—Water Quality).