4.3 HYDROLOGY AND WATER QUALITY

4.3.1 INTRODUCTION

The Hydrology and Water Quality chapter of the EIR describes existing drainage patterns on the project site, current stormwater flows, and stormwater infrastructure. The chapter also evaluates potential impacts of the proposed project with respect to increases in impervious surface area and associated stormwater flows, degradation of water quality, and increases in on- and off-site flooding. Information used for the chapter was primarily drawn from a Hydraulic Assessment prepared for the proposed project by WEST Consultants, Inc. (see Appendix E of this EIR)[1] and a Stormwater Control Plan prepared for the project by Steven J. Lafranchi & Associates, Inc. (see Appendix F of this EIR).[2] Additional information was drawn from the City of Petaluma General Plan 2025,[3] the associated City of Petaluma General Plan EIR,[4] and the Environmental Background Report for the City of Petaluma General Plan 2045 Update.[5] It should be noted that issues associated with water supply availability are addressed in Section XIX, Utilities and Service Systems, of the Initial Study prepared for the proposed project (see Appendix A of the EIR).

4.3.2 EXISTING ENVIRONMENTAL SETTING

The section below describes regional hydrology, the existing drainage patterns within the project site, including peak flows, existing water quality, and groundwater conditions.

Regional Hydrology

The 5.2-acre project site consists of two parcels (identified by Assessor's Parcel Numbers (APNs) 017-040-051 and 017-040-016) and is located at 270 Casa Grande Road and 280 Casa Grande Road in the City of Petaluma, California. According to the Environmental Background Report for the City's General Plan 2045 Update, the majority of the City is located in the Petaluma River watershed, which encompasses the southern portion of Sonoma County and northern portion of Marin County and includes the 550-acre Adobe Creek (Creek) watershed within which the project site is located. Tributaries to the Petaluma River include the Creek, as well as Petaluma Creek, Willow Brook Creek, Lichau Creek, Liberty Creek, Marin Creek, Wiggins Creek, Wilson Creek, Corona Creek, Capri Creek, Lynch Creek, Washington Creek, East Washington Creek, Thompson Creek, and Kelly Creek. The lower 11 miles of the Petaluma River flow through the Petaluma Marsh and ultimately empty into the northwest portion of the San Pablo Bay watershed, which includes the easternmost portion of the City. Tidal influence extends approximately 14 miles upstream of San Pablo Bay, near the confluence of Lynch Creek above Downtown Petaluma. Due to its flow, the Petaluma River has great importance to ecological systems in the Petaluma region, as well as a direct impact on the health of San Pablo Bay. Originally, the Petaluma River was a tidal marsh that was fully influenced by the ebb and flow of tides. Prior to dredging by the U.S. Army Corps of Engineers (USACE), the Petaluma River could be difficult to navigate due to

1 WEST Consultants, Inc. *Creekwood Condominium Project Hydraulic Assessment*. September 2023.
2 Steven J. Lafranchi & Associates, Inc. *Stormwater Control Plan For a Regulated Project, Creekwood Condominiums*. July 14, 2023.
3 City of Petaluma. *City of Petaluma General Plan 2025.* Adopted May 19, 2008.
4 City of Petaluma. *City of Petaluma General Plan 2025 Environmental Impact Report*. February 2008.
5 City of Petaluma. *Environmental Background Report: Water Quality and Resources*. September 2022.

sediment buildup caused by tidal flows. Currently, the river remains tidal from the Petaluma River-Frontal San Pablo Bay Estuary to San Pablo Bay.

Due to surrounding surface hydrology, which consists of steep, dry terrain, stream flows in the project region are highly correlated with rainfall intensity. Rainfall is generally most prevalent in the City over an eight-month period, starting in late-September and extending until late-May.[6] The month with the most rain in Petaluma is February, with an average rainfall of 5.1 inches. Flood events are almost exclusively associated with rainfall events that occur in January or February. Petaluma's location at the convergence of multiple rivers, creeks, and streams in the region causes low-lying parts of the City to be designated by the Federal Emergency Management Agency (FEMA) as being within the 100-year or 500-year floodplains. The Petaluma River is known to flood into low-lying areas of the City during periods of heavy precipitation. The most recent occurrence of flooding was in 2019.

Project Site and Surrounding Area Drainage

With respect to the project site, the 280 Casa Grande Road parcel (APN 017-040-016) contains an existing residence and undeveloped land covered in grasses. The 270 Casa Grande Road parcel (APN 017-040-051) contains an existing residence, several associated outbuildings, a landscaped backyard, and a small orchard within a depressed area near the Creek. The Creek is an ephemeral creek that flows in a north-south direction and is tributary to the Petaluma River to the south. Along with its associated vegetation, the Creek forms the eastern boundary of the project site. The remaining portions of the 270 Casa Grande Road parcel are generally characterized by grasses that are routinely mowed or grazed.

Currently, neither the project site, nor the portion of Casa Grande Road fronting the site include a storm drain system. According to the Phase I Environmental Site Assessment (ESA) prepared for the proposed project by Montrose Environmental, the rock stratigraphic unit of the project site is of the Mesozoic era, Cretaceous system, and Washita Group series, and the on-site soil is composed of Clear Lake clay, sandy substratum.[7] Clear Lake clay is a fine-grained soil composed of silt-clay materials that feature a very low infiltration rate and a high water table. In addition, elevations change across the project site by approximately four feet.[8] During and following rainfall events, surface runoff within the majority of the project site flows towards the southeast to the Creek. The Creek flows south to where the waterway confluences with the Petaluma River, thence the San Pablo Bay, thence the San Francisco Bay, and finally, the Pacific Ocean.

According to a Letter of Map Revision (LOMR) issued by FEMA on May 11, 2023 for Flood Insurance Rate Map (FIRM) 06097C1001G, the majority of the project site, including the portions of the site in which the proposed residences would be developed, are designated as being within Zone X (see Figure 4.3-1).[9] The Zone X portions of the project site include areas within the 500-year floodplain, as well as areas outside the 100-year and 500-year floodplain. In addition, the Creek corridor is shown as being within Zone AE, which is the 100-year floodplain and a Special Flood Hazard Area (SFHA).

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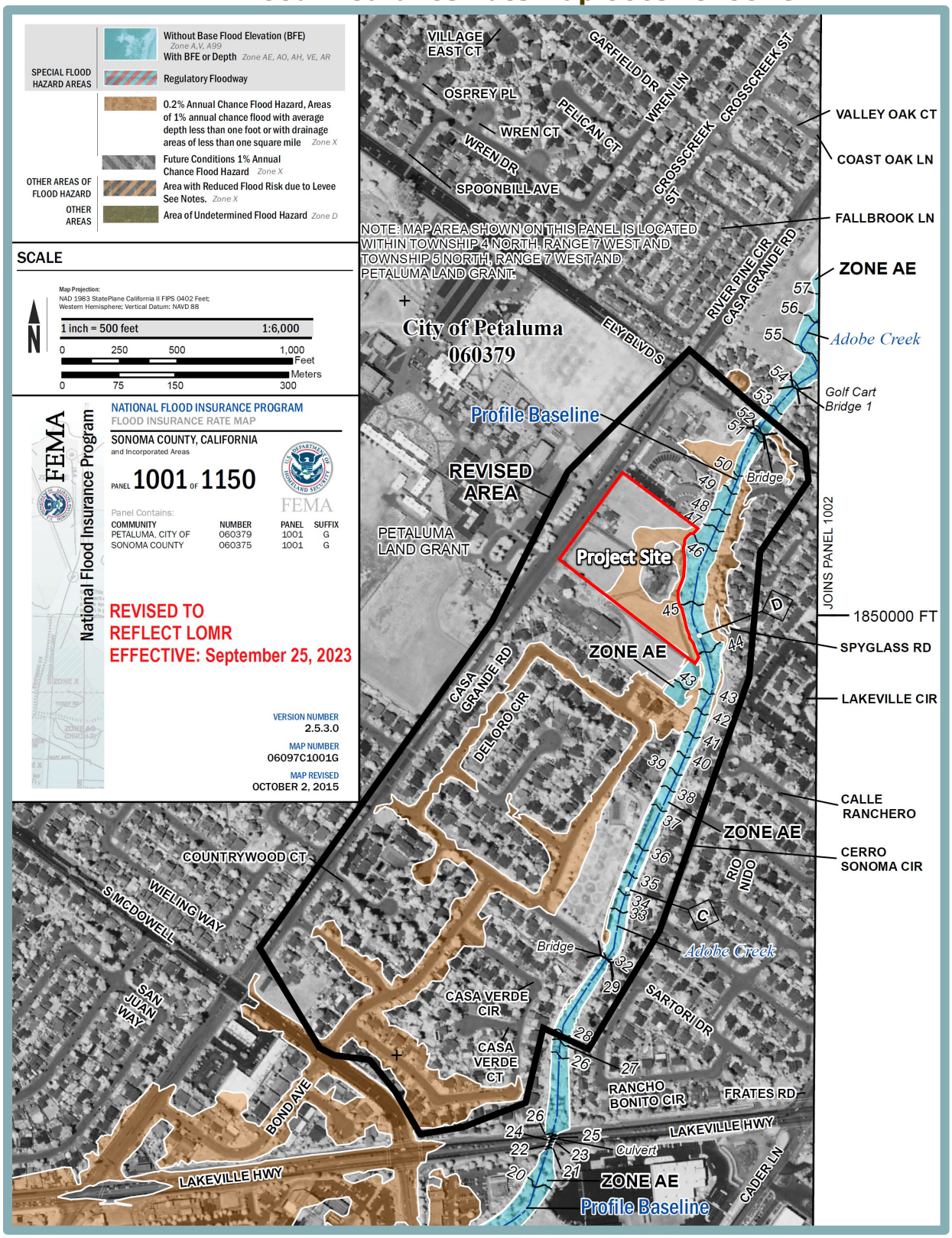
6 Weather Spark. *Climate and Average Weather Year Round in Petaluma*. Available at: https://weatherspark.com/y/619/Average-Weather-in-Petaluma-California-United-States-Year-Round. Accessed May 2024.

7 Montrose Environmental. *Phase I Environmental Site Assessment: Falcon Point Associates, LLC, Creekwood Housing Development Project*. June 2022.

8 Steven J. Lafranchi & Associates, Inc. *Stormwater Control Plan For a Regulated Project, Creekwood Condominiums*. July 14, 2023.

9 Federal Emergency Management Agency. *Letter of Map Revision Determination Document*. May 11, 2023.

Figure 4.3-1
FEMA Flood Insurance Rate Map 06097C1001G



Nonetheless, to ensure consistency with the citywide hydraulic model developed by WEST Consultants for the City's General Plan 2045 Update (discussed further in the Method of Analysis section of this chapter), the City has elected to employ the same modeling results to the project site as part of this EIR in order to provide a conservative analysis.

Based on modeling of the project site conducted as part of the Hydraulic Assessment, the majority of the project site is located in the 100-year floodplain (see Figure 4.3-2). The on-site baseline hydraulic conditions (e.g., water surface elevations and floodplain extents) were calculated using the citywide hydraulic model developed by WEST Consultants (discussed further in the Method of Analysis section of this chapter) and consist of the following:

- The peak 100-year flood flow rate in the Creek is approximately 1,400 cubic feet per second (cfs);
- The maximum 100-year floodplain water surface elevation[10] in the Creek immediately upstream of the project site is approximately 47.2 feet;
- The maximum 100-year floodplain water surface elevation in the Creek immediately downstream of the project site is 46.7 feet; and
- The 100-year floodplain depth on the project site is generally less than half a foot, with a maximum depth of two feet.

Water Quality

Activities and/or conditions that have the potential to degrade water quality include, but are not limited to, construction activities and urban stormwater runoff. Construction activities have the potential to cause erosion and sedimentation associated with ground-disturbing and clearing activities, which could cause unstabilized soil to be washed or wind-blown into nearby surface water. In addition, the use of heavy equipment during construction activities, especially during rainfall events, has the potential to cause petroleum products and other pollutants to enter nearby drainages.

Water quality degradation from urban stormwater runoff is primarily the result of runoff carrying pollutants from the land surface (i.e., streets, parking lots, etc.) to the receiving waters (i.e., streams and lakes). Pollutants typically found in urban runoff include facility maintenance and lawn-care/landscaping chemicals (insecticides, herbicides, fungicides and rodenticides), heavy metals (such as copper, zinc and cadmium), oils and greases from automobiles and other mechanical equipment, and nutrients (nitrogen and phosphorus). As discussed further in Section IX, Hazards and Hazardous Materials, of the Initial Study (see Appendix A of this EIR), the Phase I ESA prepared for the proposed project determined that past and existing uses within the project site have not included activities resulting in improper storage of hazardous materials or substantial levels of pesticides.[11] It should be noted that the Phase I ESA determined that due to the age of the existing residence at 280 Casa Grande Road, which was constructed as early as 1942, the residence potentially contains asbestos-containing insulation and lead-based paints (LBPs). In addition, both on-site residences use septic tanks for wastewater disposal.

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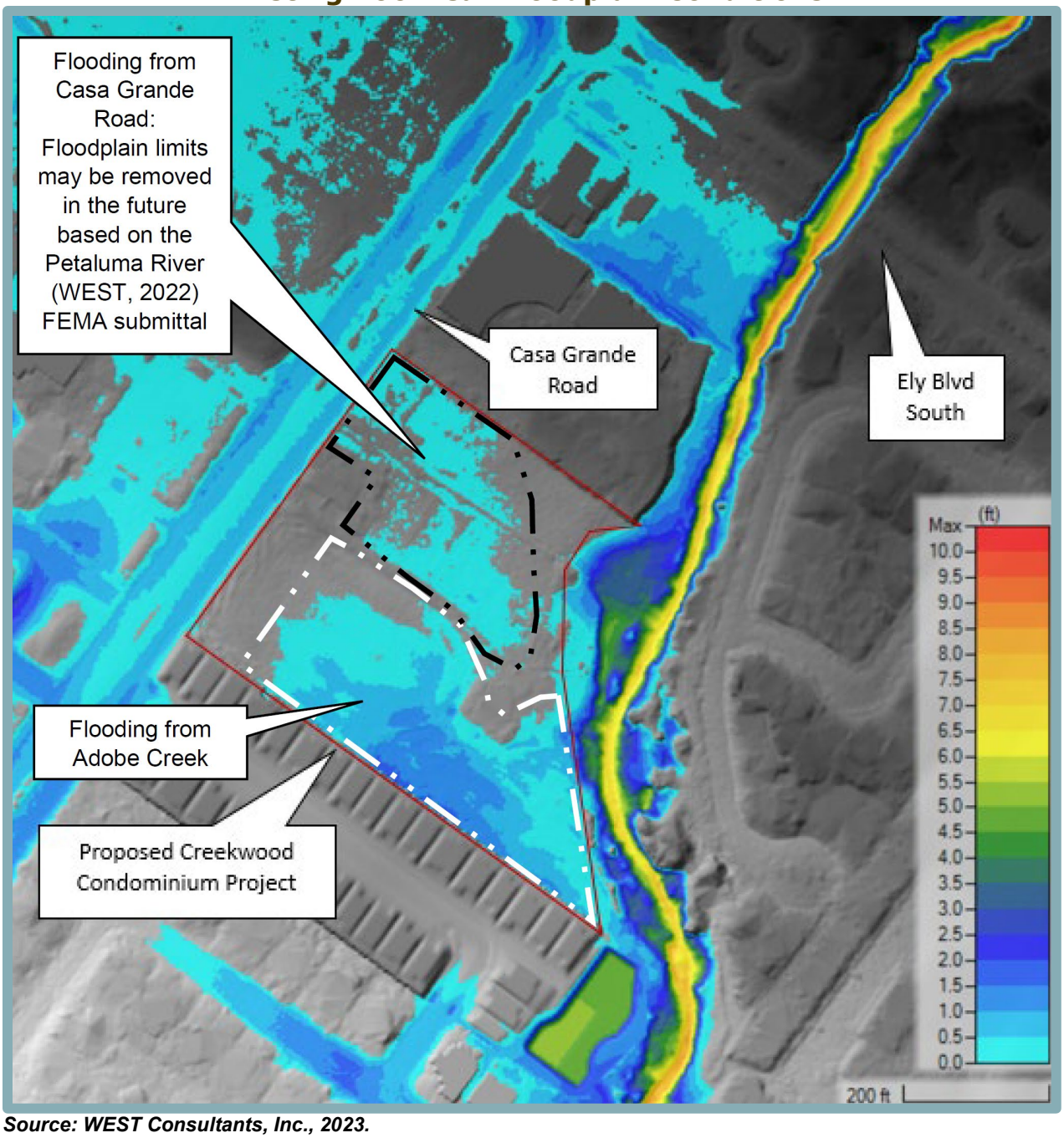
[10] Water surface elevation refers to the height, in relation to the North American Vertical Datum (NAVD) of 1988, of floods of various magnitudes and frequencies in the floodplains of coastal or riverine areas. NAVD 88 consists of a leveling network on North America, ranging from Alaska, through Canada, across the U.S., affixed to a single origin point on the continent. NAVD 88 was established for vertical control surveying in the U.S.

[11] Montrose Environmental. *Phase I Environmental Site Assessment: Falcon Point Associates, LLC, Creekwood Housing Development Project*. June 2022.

Figure 4.3-2
Existing 100-Year Floodplain Conditions



Source: WEST Consultants, Inc., 2023.

Thus, if the 280 Casa Grande Road residence and septic tanks are improperly demolished and disposed of, the hazardous materials located on the project site could potentially act as pollutants in the Creek.

4.3.3 REGULATORY CONTEXT

A number of federal, State, and local policies provide the regulatory framework that guides the protection of water resources. The following discussion summarizes those laws that are most relevant to hydrology and water quality in the vicinity of the project site.

Federal Regulations

The following are the federal environmental laws and policies relevant to hydrology and water quality.

Federal Emergency Management Agency

The FEMA is responsible for determining flood elevations and floodplain boundaries based on USACE studies. FEMA is also responsible for distributing the FIRMs, which are used in the National Flood Insurance Program (NFIP). The FIRMs identify the locations of SFHAs, including the 100-year floodplains.

FEMA allows non-residential development in the floodplain; however, construction activities are restricted within SFHAs, depending upon the potential for flooding within each area. Federal regulations governing development in a floodplain are set forth in Title 44, Part 60 of the Code of Federal Regulations (CFR). The standards are implemented at the State level through construction codes and local ordinances; however, the regulations only apply to residential and non-residential structure improvements. Although roadway construction or modification is not explicitly addressed in the FEMA regulations, the California Department of Transportation (Caltrans) has also adopted criteria and standards for roadway drainage systems and projects situated within designated floodplains. Standards that apply to floodplain issues are based on federal regulations (Title 23, Part 650 of the CFR). At the State level, roadway design must comply with drainage standards included in Chapters 800-890 of the Caltrans Highway Design Manual. CFR Section 60.3(c)(10) restricts cumulative development from increasing the water surface elevation of the base flood by more than one foot within the floodplain.

Federal Clean Water Act

The National Pollutant Discharge Elimination System (NPDES) permit system was established in the federal Clean Water Act (CWA) to regulate municipal and industrial discharges to surface waters of the U.S. Each NPDES permit contains limits on allowable concentrations and mass emissions of pollutants contained in the discharge. Sections 401 and 402 of the CWA contain general requirements regarding NPDES permits. Section 307 of the CWA describes the factors that the U.S. Environmental Protection Agency (USEPA) must consider in setting effluent limits for priority pollutants.

Nonpoint sources are diffuse and originate over a wide area rather than from a definable point. Nonpoint pollution often enters receiving water in the form of surface runoff, but is not conveyed by way of pipelines or discrete conveyances. As defined in the federal regulations, such nonpoint sources are generally exempt from federal NPDES permit program requirements. However, two types of nonpoint source discharges are controlled by the NPDES program – nonpoint source discharge caused by general construction activities, and the general quality of stormwater in municipal stormwater systems. The 1987 amendments to the CWA directed the USEPA to

implement the stormwater program in two phases. Phase I addressed discharges from large (population 250,000 or above) and medium (population 100,000 to 250,000) municipalities and certain industrial activities. Phase II addresses all other discharges defined by USEPA that are not included in Phase I.

Section 402 of the CWA mandates that certain types of construction activities comply with the requirements of the NPDES stormwater program. The Phase II Rule, issued in 1999, requires that construction activities that disturb land equal to or greater than one acre require permitting under the NPDES program. In California, permitting occurs under the General Permit for Stormwater Discharges Associated with Construction Activity, issued to the State Water Resources Control Board (SWRCB), implemented and enforced by the nine Regional Water Quality Control Boards (RWQCBs).

As of July 1, 2010, all dischargers with projects that include clearing, grading or stockpiling activities expected to disturb one or more acres of soil are required to obtain compliance under the NPDES Construction General Permit Order 2009-0009-DWQ. The Construction General Permit requires all dischargers, where construction activity disturbs one or more acres, to take the following measures:

1. Develop and implement a Stormwater Pollution Prevention Plan (SWPPP) to include a site map(s) of existing and proposed building and roadway footprints, drainage patterns and stormwater collection and discharge points, and pre- and post- project topography;
2. Describe types and placement of Best Management Practices (BMPs) in the SWPPP that will be used to protect stormwater quality;
3. Provide a visual and chemical (if non-visible pollutants are expected) monitoring program for implementation upon BMP failure; and
4. Provide a sediment monitoring plan if the area discharges directly to a water body listed on the 303(d) list for sediment.

To obtain coverage, a SWPPP must be submitted to the RWQCB electronically and a copy of the SWPPP must be submitted to the City of Petaluma. When project construction is completed, the landowner must file a Notice of Termination (NOT).

State Regulations

The following are the State environmental laws and policies relevant to hydrology and water quality.

State Water Resources Control Board

The SWRCB and the RWQCBs are responsible for ensuring implementation and compliance with the provisions of the federal CWA and California's Porter-Cologne Water Quality Control Act. The project site is situated within the jurisdictional boundaries of the San Francisco Bay RWQCB (Region 2). The San Francisco Bay RWQCB has the authority to implement water quality protection standards through the issuance of permits for discharges to waters at locations within their jurisdiction.

San Franscisco Bay Regional Water Quality Control Board

As authorized by the Porter-Cologne Water Quality Control Act, the San Francisco Bay RWQCB's primary function is to protect the quality of the waters within its jurisdiction for all beneficial uses. State law defines beneficial uses of California's waters that may be protected against quality

degradation to include, but not be limited to, the following: domestic, municipal, agricultural and industrial supply, power generation, recreation, aesthetic enjoyment, navigation, and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves.

The San Francisco Bay RWQCB implements water quality protection measures by formulating and adopting water quality control plans (referred to as basin plans, as discussed below) for specific groundwater and surface water basins, and by prescribing and enforcing requirements on all agricultural, domestic, and industrial waste discharges. The San Francisco Bay RWQCB oversees many programs to support and provide benefit to water quality, including the following major programs: Agricultural Regulatory; Above-Ground Tanks; Basin Planning; CALFED; Confined Animal Facilities; Landfills and Mining; Non-Point Source; Spills, Leaks, Investigations, and Cleanups (SLIC); Stormwater; Total Maximum Daily Load (TMDL); Underground Storage Tanks (UST), Wastewater Discharges (including the NPDES); Water Quality Certification; and Watershed Management.

The San Francisco Bay RWQCB is responsible for issuing permits for a number of various activities. Activities subject to the San Francisco Bay RWQCB permitting requirements include stormwater, wastewater, and industrial water discharge, disturbance of wetlands, and dewatering. Permits issued and/or enforced by the San Francisco Bay RWQCB include, but are not limited to, the NPDES Construction General Permit, NPDES Municipal Stormwater Permits, Industrial Stormwater General Permits, CWA Section 401 and 404 Permits, and Dewatering Permits.

Basin Plans and Water Quality Objectives

The Porter-Cologne Water Quality Control Act provides for the development and periodic review of water quality control plans (basin plans) that are prepared by the RWQCBs. Basin plans designate beneficial uses of California's major rivers and groundwater basins, and establish narrative and numerical water quality objectives for those waters. Beneficial uses represent the services and qualities of a water body (i.e., the reasons why the water body is considered valuable), while water quality objectives represent the standards necessary to protect and support those beneficial uses. Basin plans are primarily implemented through the NPDES permitting system and by issuing waste discharge regulations to ensure that water quality objectives are met.

Basin plans provide the technical basis for determining waste discharge requirements and taking regulatory enforcement actions if deemed necessary. The project site is located within the jurisdiction of the San Francisco Bay RWQCB. The City of Petaluma is located within the plan area of the Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan).[12]

The Basin Plan sets water quality objectives for the surface waters in its region for the following substances and parameters: bacteria, bioaccumulation, biostimulatory substances, color, dissolved oxygen, floating material, oil and grease, population and community ecology, pH, radioactivity, salinity, sediment, settleable material, suspended material, sulfide, taste and odor, temperature, toxicity, turbidity, and un-ionized ammonia. For groundwater, water quality objectives applicable to all groundwater have been set for bacteria, chemical constituents, radioactivity, taste, odors, and toxicity.

[12] San Francisco Bay Regional Water Quality Control Board. *The Water Quality Control Plan for the San Francisco Bay Basin*. Amended March 7, 2023.

Local Regulations

The following are the local environmental laws and policies relevant to hydrology and water quality.

City of Petaluma General Plan

The following goals and policies from the Petaluma General Plan related to hydrology and water quality are applicable to the proposed project.

Goal 4-G-1 Protect and enhance biological and natural resources within the UGB.[13]

Policy 4-P-1 Protect and enhance the Petaluma River and its tributaries through a comprehensive river management strategy of the following programs:

A. Fully adopt and incorporate the Goals, Objectives, Policies and Programs of the Petaluma River Access and Enhancement Plan as an integral part of the General Plan 2025. Implement the Petaluma River Access and Enhancement Plan including expanded improvements identified through project specific environmental assessment.
B. Institute and maintain public access to and along the entire length (on one or both sides), of the river while ensuring that natural resources and river dependent industry are protected.
C. Require design review to address the relationship and stewardship of that project to the river or creek for any development on sites with frontage along the river and creeks.
D. Create setbacks for all tributaries to the Petaluma River extending a minimum of 50 feet outward from the top of each bank, with extended buffers where significant habitat areas, vernal pools, or wetlands exist. Development shall not occur within this setback, except as part of greenway enhancement (for example, trails and bikeways). Where there is degradation within the zone, restoration of the natural creek channels and riparian vegetation is mandatory at time of adjacent development.
E. Facilitate compliance with Phase II standards of the National Pollutant Discharge Elimination System (NPDES) to improve the water quality and aesthetics of the river and creeks.
F. Work with the State Lands Commission, State Department of Fish and Game, the Sonoma County Water Agency, and other jurisdictional agencies on preservation/enhancement of the Petaluma River as a

[13] "UGB" in Policy 4-P-1 refers to the City's Urban Growth Boundary.

component of reviewing major development along the River.

G. Expand the planting and retention of trees along the upper banks of the river and creeks to reduce ambient water temperature and shade out invasive, non-native species.
H. Revise the Development Code to include:

- Standards for the four management zones that run the entire length of the river: 1) Restoration Zone, 2) Buffer Zone, 3) Preservation Zone, and 4) River Oriented Development Zone. These standards shall be based on the River Plan's text and sections A-A through O-O as augmented by the cross-section needs identified through the XP-SWMM analyses;
- Design review requirements as articulated in the River Plan for any development on sites with frontage along the river or within 300 ft. of the river;
- The use of transfer of development rights (TDR) from portions adjacent to the river to elsewhere on the parcel by allowing property owners an increase in residential densities or in allowable Floor-to-Area Ratio (FAR) and/or smaller/clustered lots to compensate for the loss of development opportunity on land within the Restoration, Buffer, or Preservation zones of the River Plan. The overall development potential on a site shall be consistent with the General Plan. TDRs shall not be applied to lands within the Floodway as there is no development potential within the Floodway.

I. Develop a consistent design for site furniture, a wayfinding system, and educational signage in the PRC and along the creeks and tributaries leading to it to heighten the recognition and value of the river and its ecosystem.
J. Utilize the Parks and Recreation, Water Resources & Conservation, Public Works departments, property owners (e.g. Landscape Assessment Districts) and/or other appropriate public agencies (e.g. Sonoma County Water Agency) to manage the long term operations, maintenance responsibilities, and stormwater capacity associated with the river and tributary greenways.
K. Prohibit placement of impervious surfaces in the Floodway (i.e. Parking lots, roadways, etc.) with the

exception of pathways and emergency access improvements.

L. Continue to implement, where appropriate, flood terrace improvements to reduce localized flooding in concert with habitat enhancement projects.
M. Cooperate with State and Federal agencies to address and/or eradicate issues and environmental problems associated with possible infestation of the midden crab into the Petaluma River and adjacent tributaries.

Goal 8-G-9 Preserve the design conveyance capacity of the surface water drainage system.

Policy 8-P-35 Protect private and public properties and capital investments including those designed to minimize flooding potential.

A. Work with SCWA, regulatory agencies, and/or property owners, as appropriate given maintenance authority, to insure maintenance of the engineered channels, natural creeks, and enclosed surface water system.
B. Support continuation of Zone 2A parcel tax for funding regional surface water improvements.
C. Work with regulatory and advisory agencies to facilitate preservation and environmental enhancement of the natural corridor for species of importance and native to the area.
D. Promote public education and stewardship of the riparian corridors.
E. Work with the U.S. Army Corps of Engineers to dredge the river channel downstream of the transition weir to maintain the 100-year design conveyance capacity and navigable channel.
F. Initiate the formation of an Assessment District, or other funding mechanism, to ensure periodic dredging occurs and the dredge materials disposal site is maintained.
G. The City shall continue to inspect and maintain the conveyance capacity of open channels and the piped system within our authority.
H. The City shall facilitate and advise property owners to ensure the maintenance of privately owned creeks and channels (e.g. Kelly Creek). Assistance may include facilitation of regulatory permitting and design standards.
I. Continue to evaluate, and take appropriate action, to monitor and maintain the adequacy, safety, and strength of existing berms and levees and other flood protection/reduction facilities.
J. The Development Code shall require the identification of any disposal site for excavated soil and require that any disposal be located outside the regulatory floodplain within the Planning Referral Area.

K. Monitor changes in tide elevations and related effects on Petaluma River tidal levels over time in order to determine if there is a trend that increases the level of Mean Higher High Water, as determined by the Corps of Engineer.

    - Assess the effect of any such trend or changes on habitable structures in the regulatory floodplain.

L. Require flood protection of new or significantly remodeled first floor habitable structures within the regulatory floodplain.
M. Continue to monitor precipitation data in order to maintain current data in the XPSWMM model.
N. Improve the data available for the XPSWMM model. Add stream level gages at the following locations:

    - Petaluma River at Petaluma Blvd. (southbound bridge)
    - Petaluma River at the railroad trestle bridge downstream of Corona Creek
    - Corona Creek at McDowell Blvd.
    - Capri Creek at McDowell Blvd.
    - Adobe Creek at Lakeville Road
    - Lynch Creek at Maria Dr.
    - Lynch Creek at McDowell Blvd. or HWY 101 (northbound)
    - Washington Creek at McDowell Blvd. or HWY 101 (northbound)
    - East Washington Creek at Washington St.
    - Petaluma River at HWY 101 (southbound bridge)

Policy 8-P-37 No new inhabited structure or development shall be permitted within that portion of properties containing areas of water depths exceeding one foot as illustrated in Figure 8-2, unless mitigation and/or on-site or off-site improvements are constructed to reduce the 100-year flood depth to less than one foot.

A. The City shall maintain a 2-D model of the Petaluma River within the City of Petaluma and continue to work with SCWA to achieve a 2-D model for the Petaluma Watershed.
B. Utilizing the 2-D model, the City of Petaluma will work with SCWA to identify, design, fund, and construct regional solutions to minimize the flooding impacts associated with historic and increasing out-of-bank flows

which occur from increasing storm flow and velocity from out-of-City areas into the City.

C. Working with Sonoma County, the City will continue to ensure that zero net fill policies are enforced within the unincorporated area for areas encumbered by the regulatory floodplain of the Petaluma River.
D. Utilizing an approved modeling tool, the City shall diligently pursue the remapping of the regulatory Floodway and Floodplain, through the Corps of Engineers, following the completion of the Payran Reach Corps project.
E. Working with Sonoma County, the City shall develop a plan and identify funding opportunities to acquire and move, relocate, or demolish housing, which remain located within the regulatory Floodway, once remapping occurs.
F. Until remapping of the regulatory floodplain occurs, new residential development in the 100-year flood boundary area as illustrated in Figure 8-1 [of the City's General Plan], with depths of less than one foot of water during a 100-year storm event will be required to elevate the lowest floor two feet (2') above the BFE as determined by the City 2-D model.
G. New non-residential development in the 100-year flood boundary area, identified in Figure 8-1 [of the City's General Plan], with less than one foot of water depth during a 100-year storm event will be required to provide flood protection at least 1 foot above the BFE, or elevate the lowest floor two feet above the BFE.
H. Residential development shall be prohibited on the first floor of new structures within the regulatory floodplain after remapping of the FEMA floodway/floodplain.
I. After remapping the City should pursue acquisition of properties in the regulatory Floodway and seek funding for implementation of surface water improvements and riparian habitat enhancements.
J. Consider development of a program whereby projects may acquire property(ies) and construct planned flood terracing and/or detention/retention facilities as mitigation for surface water impacts. The result of the improvements must result in an improvement to the pre-project conditions by way of a net reduction in storm water elevations and downstream flows.

Goal 8-G-10 Reduce pollutant load in surface water runoff, thereby improving water quality within the Petaluma River and its tributaries.

Policy 8-P-38 All development activities shall be constructed and maintained in accordance with Phase 2 National Pollutant Discharge Elimination System (NPDES) permit requirements.

A. The Water Resources and Conservation Department shall review, and have the authority to conditionally approve, all development permits to insure compliance with NPDES Phase 2 requirements.
B. Maintain, update as needed, and implement the City's Storm Water Management Plan to retain a current storm water discharge permit with the California Regional Water Quality Control Board.
C. A funding mechanism, such as a storm water utility fee, shall be implemented by the City to insure a dedicated source of funds is available for all surface water drainage system maintenance and improvement needs.

NPDES Small Municipal Separate Storm Sewer System General Permit

The NPDES Municipal Stormwater Permitting Program regulates stormwater discharges from municipal separate storm sewer systems (MS4s). NPDES Municipal Stormwater Permits are issued in two phases. Phase I regulates stormwater discharges from large- and medium-sized municipal separate storm sewer systems (those serving more than 100,000 persons). Most Phase I permits are issued to a group of co-permittees encompassing an entire metropolitan area. Phase II provides coverage for smaller municipalities, including nontraditional MS4s, which include governmental facilities such as military bases, public campuses, and prison and hospital complexes. The NPDES Municipal Stormwater Permits require the discharger to develop and implement a Stormwater Management Plan/Program with the goal of reducing the discharge of pollutants to the maximum extent practicable.

The San Francisco Bay RWQCB issued NPDES Permit No. CAS612008, Order No. R2-2022-0018, Waste Discharge Requirements for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems, which became effective on May 11, 2022. An "MS4" is a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains): (i) designed or used for collecting or conveying stormwater; (ii) which is not a combined sewer; and (iii) which is not part of a Publicly Owned Treatment Works (POTW). The City of Petaluma is a Phase II MS4 permittee. Projects subject to the requirements of the Phase II MS4 NPDES permit (Regulated Projects) must submit the appropriate Post-Construction Stormwater Plan based on the project type/development category. Regulated Projects include projects that create or replace 5,000 square feet (sf) or more of impervious surface. Regulated Projects that create and/or replace one or more acres of impervious surface are considered regulated hydromodification management projects. The proposed project would create more than one acre of impervious area, and, thus, is considered a Regulated Hydromodification Management Project subject to Phase II MS4 NPDES permit post-construction stormwater-treatment requirements.

Regulated Projects are required to divide the project area into Drainage Management Areas (DMAs) and implement and direct water to appropriately sized Site Design Measures (SDMs) and Baseline Hydromodification Measures to each DMA to the Maximum Extent Practicable (MEP). Regulated Projects must additionally include Source-Control BMPs where possible. SDMs and Baseline Hydromodification Measures include, but are not limited to:

- Rooftop and impervious area disconnection;
- Porous pavement;
- Rain barrels and cisterns;
- Vegetated swales;
- Bio-retention facilities;
- Green roofs; or
- Other equivalent measures.

Petaluma Municipal Code

The following regulations from the Petaluma Municipal Code (PMC) related to hydrology and water quality are applicable to the proposed project.

Stormwater Management and Pollution Control Ordinance

PMC Chapter 15.80 establishes the City's Stormwater Management and Pollution Control Ordinance. Pursuant to PMC Section 15.80.060, discharges of any materials, including, but not limited to, pollutants or waters containing any pollutants that cause or contribute to a violation of applicable water quality standards, other than stormwater, to the City's MS4 or watercourses is prohibited. In accordance with PMC Section 15.80.150, new development and redevelopment must install, implement, and maintain BMPs consistent with the appropriate California Stormwater Quality Association (CASQA) Stormwater BMP Handbooks, or equivalent. In addition, the selection and the design of the BMPs, including post-construction treatment control measures, must be consistent with the City's Storm Drain System Construction Standards.

Grading Ordinance

PMC Chapter 17.31 establishes the City's Grading Ordinance. Pursuant to PMC Section 17.31.040, the City prohibits discharges of stormwater or non-stormwater to surface waters associated with any construction activity that is subject to the NPDES Construction General Permit, without first having complied with the provisions contained in said permit. Additionally, grading in such a manner as to cause erosion or sedimentation on other property or on public streets or to obstruct or otherwise interfere with drainage, or deposit sediment in natural or artificial drainage facilities is prohibited.

Grading work cannot be commenced within the City limits without a developer first obtaining a grading permit in accordance with the provisions of PMC Chapter 17.31. According to PMC Section 17.31.170, a site map and grading plan (grading plan) must be submitted to the City as part of obtaining a grading permit. The grading plan must include, among other things, runoff calculations, details of any drainage structures or retaining walls, and the proposed construction methods and materials that would be used. The grading plan must be prepared by a State-registered civil engineer.

In addition, as established by PMC Section 17.31.190, a final erosion and sediment control plan, prepared by a State-registered civil engineer, must be submitted to the City as part of obtaining a grading permit. The final erosion and sediment control plan must demonstrate how a development project would minimize soil erosion and sedimentation from the developed project site and control for runoff from the site and include, among other things, a description and delineation of the BMPs to be taken to minimize erosion and sedimentation and to retain sediment on-site.

Petaluma Implementing Zoning Ordinance

Petaluma Implementing Zoning Ordinance (IZO) Chapter 6 defines the City's Floodway as the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than one foot. According to the City's Zoning Map, while the Petaluma River and other watercourses are zoned as Floodway, the Creek is not zoned as such.

All areas within the boundaries of an SFHA, but outside Floodway areas, are considered Flood Plain-Combining District (FP-C) areas. As previously discussed, based on modeling of the project site conducted as part of the Hydraulic Assessment, the majority of the project site may be located in the 100-year floodplain (see Figure 4.3-2). Thus, the project site may meet the criteria for being considered an FP-C area. Development projects within FP-C areas must obtain a development permit, the application for which must include, among other things, the proposed elevation in relation to mean sea level of the lowest floor of all structures, proposed elevation in relation to mean sea level of any structure that would be floodproofed, and a description of the extent to which any watercourse would be altered or relocated as a result of the proposed development.

4.3.4 IMPACTS AND MITIGATION MEASURES

The following section describes the standards of significance and methodology used to analyze and determine the proposed project's potential impacts related to hydrology and water quality. In addition, a discussion of the project's impacts, as well as mitigation measures where necessary, is also presented.

Standards of Significance

Consistent with Appendix G of the CEQA Guidelines, a significant impact would occur if the proposed project would result in any of the following:

- Violate any water quality standards or waste discharge requirements, or otherwise substantially degrade water quality;
- Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin;
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:
    - Result in substantial erosion or siltation on- or off-site;
    - Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site;
    - Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff;
    - Impede or redirect flood flows;
- In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation; or
- Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan.

Issues Not Discussed Further

The Initial Study prepared for the proposed project (see Appendix A of this EIR) determined that development of the proposed project would result in a less-than-significant impact related to the following:

- Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin; and
- Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan.

For the reasons cited in the Initial Study (Section X, Hydrology and Water Quality), the potential impacts associated with the above are not analyzed further in this EIR.

The analysis in this chapter takes account of the California Supreme Court's decision in *California Building Industry Association v. Bay Area Air Quality Management District* (2015) 62 Cal.4th 369, 377-378, in which the court held that "agencies subject to CEQA generally are not required to analyze how existing environmental conditions will impact a project's future users or residents. But when a proposed project risks exacerbating those environmental hazards or conditions that already exist, an agency must analyze the potential impact of such hazards on future residents or users. In those specific instances, it is the project's impact on the environment—and not the environment's impact on the project—that compels an evaluation of how future residents or users could be affected by exacerbated conditions."

Under this precedent, CEQA does not consider the impact of the environment on a project (such as the impact of existing flooding on new project receptors) to be an impact requiring consideration under CEQA. Rather, CEQA is only concerned with the extent to which, if any, a proposed project would exacerbate an existing environmental hazard. Existing hazards are considered to be part of baseline conditions.

Method of Analysis

The information contained in the analysis is primarily based on the Hydraulic Assessment prepared for the proposed project by WEST Consultants, Inc. (see Appendix E of this EIR) and the Stormwater Control Plan prepared for the project by Steven J. Lafranchi & Associates, Inc. (see Appendix F of this EIR). The Hydraulic Assessment and Stormwater Control Plan are discussed further below.

Hydraulic Assessment

The 2022 citywide hydraulic model developed by WEST Consultants, Inc. as part of the City's General Plan 2045 Update, which has not yet been adopted and is currently underway, was used in the Hydraulic Assessment to establish the on-site water surface elevations and floodplain extents.

The USACE Hydraulic Engineering Center's River Analysis System (HEC-RAS) two-dimensional (2D) model (version 6.3.1) was used to perform the post-development hydraulic calculations, which is consistent with the software implemented in the 2022 citywide hydraulic model. Potential 100-year flooding impacts associated with the proposed residences, local roadway grading, and bridge connection across the Creek were evaluated as part of the "Development With Bridge" scenario in the Hydraulic Assessment. The approach walkway and transition grading

specifications were provided by Steven J. Lafranchi & Associates, Inc. The bridge connection was assumed to be a single-span, 85-foot-long (from abutment to abutment), and eight-foot-wide bridge. The Development With Bridge model was created by adding the bridge geometry and approach grading to the "Development Without Bridge" model, which is detailed in Section 3.1.1 of the Hydraulic Assessment.

Stormwater Control Plan

The Stormwater Control Plan evaluated the preliminary design of the proposed stormwater-treatment facilities and other BMPs in accordance with the current edition of the Bay Area Stormwater Management Agencies Association (BASMAA) Post-Construction Manual.[14] Specifically, the Stormwater Control Plan assessed the proposed stormwater facilities consistency with Appendix A of the Post-Construction Manual. Appendix A includes a Construction Checklist that requires preparers to list each stormwater source-control and treatment measure and identify where in the project plan sheets the measure is shown. In addition, documentation of the proposed drainage design was completed in accordance with Table 4.5 of the Post-Construction Manual, which requires tabulation of areas draining to bioretention facilities and calculation of minimum bioretention facility size.

Project Impacts and Mitigation Measures

The following discussion of impacts is based on the implementation of the proposed project in comparison with the standards of significance identified above.

4.3-1 Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality during construction. Based on the analysis below and with implementation of mitigation, the impact is *less than significant*.

Project construction activities such as grading, excavation, and trenching for site improvements would result in the disturbance of on-site soils. During the early stages of project construction activities, topsoil would be exposed due to grading and excavation of the project site. After grading and prior to overlaying the ground surface with impervious surfaces and structures, the potential exists for wind and water erosion to discharge sediment and/or urban pollutants into stormwater runoff, which could adversely affect water quality downstream.

Exposed soils have the potential to affect water quality in two ways: 1) suspended soil particles and sediments transported through runoff; or 2) sediments transported as dust that eventually reach local water bodies. Spills or leaks from heavy equipment and machinery, staging areas, or building sites also have the potential to enter runoff. Typical pollutants include, but are not limited to, petroleum and heavy metals from equipment and products such as paints, solvents, and cleaning agents, which could contain hazardous constituents. Sediment from erosion of graded or excavated surface materials, leaks or spills from equipment, or inadvertent releases of building products could result in water quality degradation if runoff containing the sediment or contaminants enters receiving waters in sufficient quantities. Impacts from construction-related activities would generally be short-term and of limited duration.

[14] Bay Area Stormwater Management Agencies Association. *BASMAA Post-Construction Manual*. July 14, 2014.

Because the proposed project would require construction activities that would result in on-site land disturbance of up to approximately 5.2 acres, as well as disturbance of off-site areas through installation of the off-site public multi-use pathway, bridge connection, and two outfall structures (greater than one acre), the project applicant would be required by the State to comply with the most current NPDES Construction General Permit requirements. Consistent with the requirements, a SWPPP would be required to be prepared for the proposed project, comprised of the site plan, drainage patterns and stormwater collection and discharge points, BMPs, and a monitoring and reporting framework for implementing the proposed BMPs, as necessary. In addition, a Notice of Intent (NOI) would be filed with the San Francisco Bay RWQCB. Development of the SWPPP would include plans to treat stormwater runoff in accordance with the standards of the CASQA Stormwater BMP Handbook for New Development and Redevelopment.

Additionally, non-stormwater management and material management controls reduce non-sediment-related pollutants from potentially leaving the construction site to the extent practicable. The Construction General Permit prohibits the discharge of materials other than stormwater and authorized non-stormwater discharges (such as irrigation and pipe flushing and testing). Non-stormwater BMPs tend to be management practices with the purpose of preventing stormwater from coming into contact with potential pollutants. Examples of non-stormwater BMPs include preventing illicit discharges, and implementing good practices for vehicle and equipment maintenance, cleaning, and fueling operations, such as using drip pans under vehicles. Waste and materials management BMPs include implementing practices and procedures to prevent pollution from materials used on construction sites. Examples of materials management BMPs include the following:

- Good housekeeping activities, such as storing of materials covered and elevated off the ground, in a central location and covering and/or containing stockpiled materials;
- Securely locating portable toilets away from the storm drainage system and performing routine maintenance;
- Providing a central location for concrete washout and performing routine maintenance;
- Providing several dumpsters and trash cans throughout the construction site for litter/floatable management; and

While the final materials management BMPs to be used during construction of the proposed project are currently unknown, the project would likely include a combination of the BMP examples listed above. Final BMPs for the proposed construction activities would be selected in accordance with the applicable CASQA Stormwater BMP Handbooks and implemented by the project contractor.

As necessitated by the NPDES Construction General Permit, the project site would be inspected during construction before and after storm events and every 24 hours during extended storm events in order to identify maintenance requirements for the implemented BMPs and to determine the effectiveness of the implemented BMPs. As a “living document”, the site-specific SWPPP prepared for the proposed project would be modified as construction activities progress. A Qualified SWPPP Practitioner (QSP)

would ensure compliance with the SWPPP through regular monitoring and visual inspections during construction activities. The QSP for the project would amend the SWPPP and revise project BMPs, as determined necessary through field inspections, to protect against substantial erosion or siltation on- or off-site. To ensure the implementation of the above measures, Mitigation Measure 4.3-1(a) shall be required to ensure preparation of a SWPPP, as detailed below.

Additionally, PMC Chapter 17.31 prohibits commencement of grading activities by new development without the developer first obtaining a grading permit. According to PMC Section 17.31.170, a grading plan must be prepared by a State-registered civil engineer and submitted to the City in order to obtain a grading permit. The contents of the grading plan must include, but not be limited to, a project vicinity map that shows the location of the proposed grading activities; the property line boundaries of the project site; the existing and proposed contours of the site and off-site areas proposed for disturbance, the existing and proposed drainage of the project site and off-site areas, the extent and manner of tree cutting and vegetation clearing within on- and off-site areas, and specifications of the proposed construction methods and materials to be used.

Finally, it should be noted that demolition of the existing residence at 280 Casa Grande Road and removal and disposal of the on-site septic tanks could result in the release of pollutants associated with asbestos-containing insulation, LBPs, and wastewater. Therefore, the proposed project would be subject to Mitigation Measures IX-1 through IX-4 of the Initial Study (see Appendix A of this EIR). Mitigation Measures IX-1 and IX-2 require verification of the presence of asbestos or LBP in the existing on-site residence and additional protective measures, if such pollutants are found, that would require disposal of the contaminants, consistent with applicable standards and/or regulations established by the Bay Area Air Quality Management District (BAAQMD), Occupational Safety and Health Administration (OSHA), Department of Toxic Substances Control (DTSC), and Sonoma County Environmental Health and Safety Division (SCEHSD). Mitigation Measures IX-3 and IX-4 require that the on-site septic tanks be abandoned in compliance with applicable SCEHSD standards by a licensed well contractor. Thus, through compliance with Mitigation Measures IX-1 through IX-4 of the Initial Study, potential degradation of water quality as a result of the proposed demolition activities and removal of existing on-site septic systems would not occur.

Based on the above, compliance with the NPDES Construction General Permit and PMC Chapter 17.31 for the proposed on-site and off-site project components would minimize the potential for degradation of surface or groundwater quality to occur during project construction. However, because a SWPPP and grading plan have not yet been prepared for the proposed project, proper compliance with the aforementioned regulations cannot be ensured at this time. Thus, project construction activities could violate water quality standards or waste discharge requirements or otherwise degrade water quality, and a ***significant*** impact could occur. In order to address the potentially significant impact, Mitigation Measures 4.3-1(a) and 4.3-1(b) shall be required to ensure preparation of a SWPPP, incorporation of industry standard BMPs, and preparation of a final grading plan by a State-registered engineer. With implementation of Mitigation Measures 4.3-1(a) and 4.3-1(b), the potential impact would be reduced to a less-than-significant level.

Mitigation Measure(s)

Implementation of the following mitigation measures would reduce the above potential impact to a *less-than-significant* level.

4.3-1(a) *Prior to issuance of grading permits, the applicant shall prepare a Storm Water Pollution Prevention Plan (SWPPP). The developer shall file the Notice of Intent (NOI) and associated fee to the State Water Resources Control Board (SWRCB). The SWPPP shall serve as the framework for identification, assignment, and implementation of Best Management Practices (BMPs). The SWPPP shall be submitted to the Director of Public Works and Utilities/City Engineer for review and approval and shall remain on the project site during all phases of construction. Following implementation of the SWPPP, the contractor shall subsequently demonstrate the SWPPP's effectiveness and provide for necessary and appropriate revisions, modifications, and improvements to reduce pollutants in stormwater discharges to the maximum extent practicable. The contractor shall implement BMPs to reduce pollutants in stormwater discharges to the maximum extent practicable.*

4.3-1(b) *Prior to issuance of grading permits, the project applicant shall ensure that a final grading plan is prepared by a State-registered civil engineer in accordance with Petaluma Municipal Code (PMC) Chapter 17.31. The final grading plan shall include, but not be limited to, the following:*

- *A project vicinity map that shows the location of the proposed grading activities within the project site and off-site areas associated with Adobe Creek (Creek);*
- *The property line boundaries of the project site and off-site areas of disturbance associated with the Creek;*
- *All existing improvements on and adjacent to the project site;*
- *The existing and proposed contours of the project site and off-site areas proposed for disturbance;*
- *The existing and proposed drainage of the project site and off-site areas;*
- *The extent and manner of tree cutting and vegetation clearing, the disposal of vegetation, and the measures to be taken for the protection of undisturbed trees and vegetation in on-site and off-site areas proposed for disturbance, unless the foregoing information is provided on the final erosion and sediment control plan;*
- *Specifications of the proposed construction methods and materials to be used in on-site and off-site areas; and*
- *Any other information required by the Director of Public Works and Utilities.*

The final grading plan shall be submitted for review and approval to the City of Petaluma Public Works and Utilities Department.

4.3-2 Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality during operation. Based on the analysis below and with implementation of mitigation, the impact is *less than significant*.

Following project construction activities, pollutants associated with the operational phase of the proposed project could include nutrients, oil and grease, metals, organics, pesticides, bacteria, sediment, trash, and other debris. Nutrients that could be present in post-construction stormwater include nitrogen and phosphorous resulting from fertilizers applied to landscaping. Excess nutrients could affect water quality by promoting excessive and/or a rapid growth of aquatic vegetation, which reduces water clarity and results in oxygen depletion. Pesticides, which are toxic to aquatic organisms and can bioaccumulate in larger species, such as birds and fish, can potentially enter stormwater after application to landscaped areas within the project site. Oil and grease could enter stormwater from vehicle leaks, traffic, and maintenance activities. Metals could enter stormwater as surfaces corrode, decay, or leach. Clippings associated with landscape maintenance and street litter could be carried into storm drainage systems. Pathogens (from wildlife and human activities) have the potential to affect downstream water quality.

Development of the proposed project could also increase polluted non-stormwater runoff (e.g., wash water and landscape irrigation runoff). Such non-stormwater runoff could flow down sidewalks, parking areas, and streets, and pick up additional pollutants deposited on impervious surfaces prior to discharge into the storm drain system and surface waters. Discharge of polluted stormwater or non-stormwater runoff could violate waste discharge requirements.

The project site is located within the permit area covered by the City of Petaluma's Phase II MS4 general permit (NPDES General Permit No. CAS612008, Order No. R2-2022-0018). Thus, consistent with NPDES permitting program and PMC Section 15.80.150, project-related stormwater discharges would be subject to all applicable requirements of said permit. Specifically, as previously discussed, regulated projects are required to divide the project area into DMAs and implement and direct water to appropriately sized SDMs and Baseline Hydromodification Measures within each DMA. Source-control measures must be designed for pollutant-generating activities or sources consistent with recommendations from the CASQA Stormwater BMP Handbook for New Development and Redevelopment, or equivalent manual, and must be shown on the improvement plans.

As shown in Figure 3-7 of the Project Description chapter of this EIR, the project site's stormwater facilities would be installed across five DMAs. DMAs 1 through 4 would encompass the Block 1 units and would each contain corresponding Basin Retention Areas 1 through 4 (see red areas in Figure 3-7). DMA 5 would encompass the new internal street, Blocks 2 and 3 units, and Basin Retention Area 5 (see blue areas in Figure 3-7). Within DMAs 1 through 4, runoff from impervious surfaces would be directed to grassy areas, where flows would be collected by inlets and conveyed by way of private storm drain lines to each DMA's Basin Retention Area for retention and treatment. Following retention and treatment, excess flows would be routed to a

detention basin in the northeast corner of the project site, where peak flows that do not percolate into underlying soils would be metered and released through a new outfall structure to the Creek. In addition, the detention basin would accept surface flow from waters overtopping the Creek bank or backing up through the storm drain system during storm events. Similarly, within DMA 5, runoff would be directed to inlets installed in each dwelling unit's backyard area and to gutters installed along the new internal street. From the inlets and gutters, flows would be conveyed by way of new private storm drain lines to Basin Retention Area 5 for retention and treatment. From Basin Retention Area 5, peak flows would be metered to the Creek through a new outfall structure. All new storm drain infrastructure would be designed in accordance with the applicable Sonoma Water (formerly Sonoma County Water Agency) standards. As discussed further under Impact 4.3-3, the proposed storm drain system would consist of a total of 5,530 sf of new stormwater-treatment facilities, which would exceed the minimum square footage of facilities necessary for containing and treating all stormwater runoff from the developed project site in such a manner to reduce runoff and mimic the project site's predevelopment hydrology. Thus, the proposed project would comply with the City's Phase II MS4 general permit.

According to the Stormwater Control Plan, each Basin Retention Area would feature a minimum depth of 30 inches (18-inch minimum planting medium above a 12-inch gravel layer) and a hydraulically flat bottom, ensuring that all points within the bottom of the basins have the same elevation. In addition, as established by the Stormwater Control Plan, the proposed stormwater facilities would be required to be annually inspected prior to October 15 by a State-registered civil engineer. As part of inspection activities, inlets and swales leading to the Basin Retention Areas would be inspected for erosion and damage due to foot or vehicle traffic and repaired accordingly. The Basin Retention Areas would be checked to ensure that they are free of silt and draining freely to the 12-inch gravel layer, with each basin's upslope berm also verified to be intact and functioning, as intended. The civil engineer would prepare a report that indicates the results of the inspection and identifies any actions necessary to ensure proper operation of the storm drain system and would submit the report to the City of Petaluma. To ensure the implementation of the above measures, Mitigation Measure 4.3-2 shall be required to ensure the submission and implementation of a final Stormwater Control Plan, as detailed below.

Following significant rain events, which are defined as those producing approximately 0.5-inch or more of rainfall in a 24-hour period, the surface of the stormwater-treatment facilities would be observed to confirm ponding has not occurred. In addition, inlets would be inspected and any accumulated trash and debris would be removed. Any erosion at the inlets would be restored to grade. Outlet structures would also be inspected to check for obstructions. Prior to the start of the annual rainy season, inlets and outlets would also be checked for debris accumulation to prevent blockages. Finally, each year during the winter, occurring at a point between December and February, vegetation associated with each Basin Retention Area would be cut back, debris removed, and plants replaced, as needed. Concrete work would also be checked for damage.

Based on the above, the proposed project includes Basin Retention Areas to ensure that stormwater runoff is properly treated prior to discharging to the Creek. Thus, urban pollutants entering and potentially degrading local water quality are not expected to

occur as a result of the project. However, because a final Stormwater Control Plan has not been prepared, ongoing maintenance of the proposed stormwater treatment system and incorporation of proper source-control measures cannot be ensured at this time. Thus, project operation could violate water quality standards or waste discharge requirements or otherwise degrade water quality, and a ***significant*** impact could occur. In order to address a potentially significant impact, Mitigation Measure 4.3-2 shall be required to ensure preparation of a final Stormwater Control Plan. With implementation of Mitigation Measure 4.3-2, the potential impact would be reduced to a less-than-significant level.

Mitigation Measure(s)

Implementation of the following mitigation measure would reduce the above potential impact to a *less-than-significant* level.

4.3-2 *Prior to approval of final project improvement plans, a final Stormwater Control Plan shall be submitted to the Director of Public Works and Utilities/City Engineer for review and approval. The final Stormwater Control Plan shall be in compliance with all applicable provisions of the National Pollutant Discharge Elimination System (NPDES) Phase II MS4 General Permit (NPDES General Permit No. CAS612008, Order No. R2-2022-0018) and shall meet the standards of the California Stormwater Quality Association (CASQA) Stormwater BMP Handbook for New Development and Redevelopment. Site design measures, source-control measures, hydromodification management, and Low Impact Development (LID) standards, as necessary, shall be incorporated into the design and shown on the improvement plans. The final plans shall include calculations demonstrating that the water quality BMPs are appropriately sized, using methodology in the CASQA Stormwater BMP Handbook for New Development and Redevelopment. The final plans shall also incorporate the proposed components for maintaining the stormwater-treatment facilities. The final plans shall be submitted to the City of Petaluma Public Works and Utilities Department for review and approval.*

4.3-3 Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would: substantially increase the rate or amount of surface runoff in a manner which would result in substantial erosion or siltation on- or off-site; substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site; create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or impede or redirect flood flows. Based on the analysis below, the impact is *less than significant*.

Impervious surfaces that currently exist on-site include the existing residences at 270 and 280 Casa Grande Road, several associated outbuildings, and the driveway associated with the 280 Casa Grande Road residence. Development of the proposed project would result in a substantial increase in the on-site impervious surface area, which would be related to new roofs, driveways, and the proposed internal looped private street, all of which would total approximately 120,654 sf. As such, the proposed project would alter the existing drainage pattern of the site and could potentially result in the increase of stormwater runoff. The potential for the proposed project to result in substantial additional sources of polluted runoff, including erosion and siltation, is addressed under Impacts 4.3-1 and 4.3-2 above. Further discussion regarding erosion is provided in Section VII, Geology and Soils, of the Initial Study prepared for the proposed project (see Appendix A of this EIR).

As discussed previously, runoff from new impervious surfaces created by the proposed project would be captured by the proposed storm drain system before treated peak flows are discharged to the Creek. To assess whether development of the project would have any impact on the Creek, a drainage design analysis was conducted as part of the Stormwater Control Plan prepared for the proposed project. The proposed storm drain system has been designed to accept runoff from a minimum storm intensity of 0.2-inch per hour, consistent with BASMAA requirements. Stormwater runoff exceeding the two-year storm intensity of 0.5-inch per hour would be metered from the Basin Retention Areas to the Creek. The results of the drainage design analysis are presented in Table 4.3-1. As shown therein, the Basin Retention Areas within each DMA would exceed the required minimum facility area. Thus, the proposed Basin Retention Areas would be sized to adequately retain and treat all stormwater flows from the developed project site.

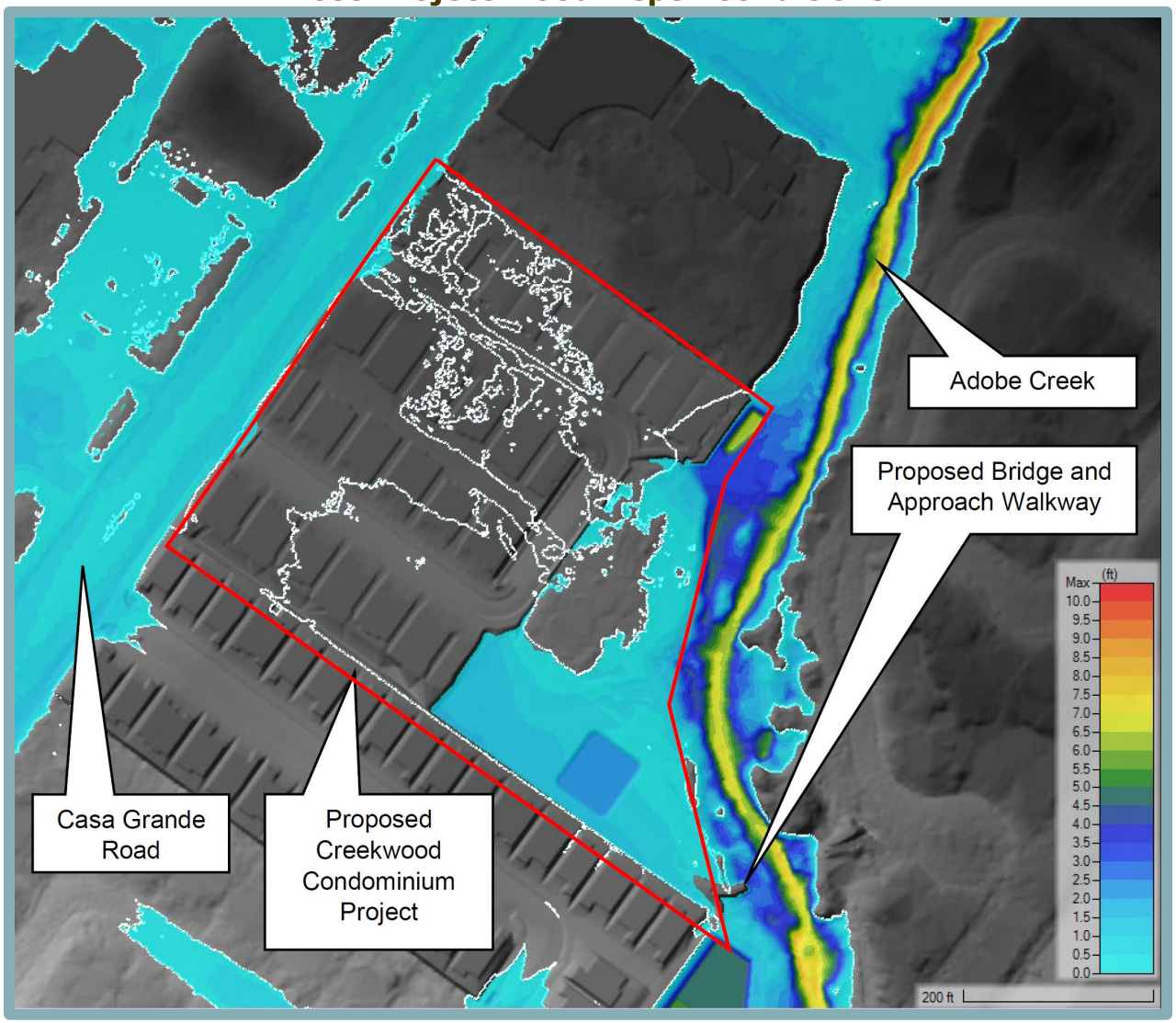
The Hydraulic Assessment evaluated changes under post-project conditions compared to existing conditions to determine potential impacts that could occur as a result of the proposed project related to on- and off-site flooding during and following a 100-year storm event. Under post-project conditions, the 100-year floodplain would not encroach upon the developable areas of the project site (see Figure 4.3-3). As shown in Figure 4.3-4, the Creek would experience water surface elevation changes of approximately +0.3 feet and -0.3 feet upstream and downstream of the proposed bridge connection, respectively, due to the bridge abutments constricting flow and creating a modest increase in water surface elevation upstream and subsequent attenuation of Creek flows immediately downstream of the bridge. During the 100-year storm event, the minor increases to water surface elevation attributable to the proposed project would not result in adverse effects to upstream or downstream properties, as all waters during the 100-year storm would be contained within the existing Creek channel boundaries. In addition, the post-project condition flood modeling accounted for proposed fill necessary for the elevated pads upon which the new residences would be constructed. Based on the height of the elevated fill, the proposed structure pads and new internal looped private street would not be inundated by the 100-year storm event under post-project conditions. Additionally, the floodplain along the western bank of the Creek (looking downstream) under post-project conditions would be generally coterminous with the existing conditions floodplain. Thus, the proposed project is not anticipated to result in on- or off-site flooding as a result to the proposed changes to the on-site drainage pattern.

Table 4.3-1
Drainage Design Analysis

Surface	DMA Area (sf)	Post-Project Surface	DMA Runoff Factor	DMA Area X Runoff Factor	Sizing Factor	Minimum Basin Retention Area (sf)	Proposed Basin Retention Area (sf)
DMA 1							
Roof	4,986	Roof	1.0	4,986	0.04	273.1	295
Landscape	2,436	Landscape	0.1	243.6			
Pavement	1,598	Hardscape	1.0	1,598			
Total				6,827.6			
DMA 2							
Roof	4,913	Roof	1.0	4,913	0.04	268.3	295
Landscape	2,693	Landscape	0.1	269.3			
Pavement	1,524	Hardscape	1.0	1,524			
Total				6,706.3			
DMA 3							
Roof	4,913	Roof	1.0	4,913	0.04	271.3	295
Landscape	2,637	Landscape	0.1	263.7			
Pavement	1,606	Hardscape	1.0	1,606			
Total				6,782.7			
DMA 4							
Roof	4,986	Roof	1.0	4,986	0.04	289.3	295
Landscape	2,836	Landscape	0.1	283.6			
Pavement	1,962	Hardscape	1.0	1,962			
Total				7,231.6			
DMA 5							
Roof	44,993	Roof	1.0	44,993	0.04	3,955.8	4,350
Landscape	60,392	Landscape	0.1	6,039.2			
Pavement	47,864	Hardscape	1.0	47,864			
Total				98,896.2			

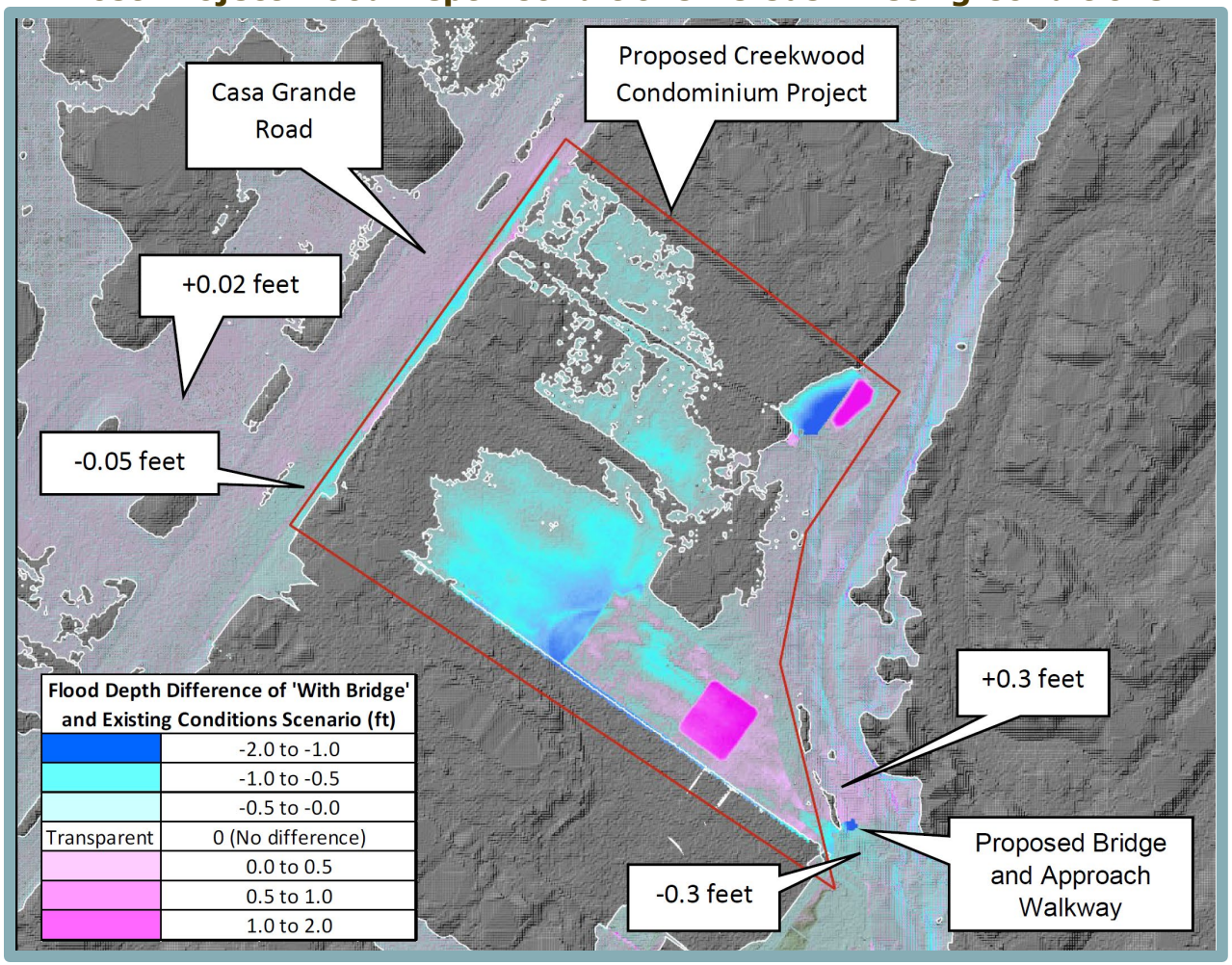
Source: Steven J. Lafranchi & Associates, Inc., 2023.

Figure 4.3-3
Post-Project Flood Depth Conditions



Source: WEST Consultants, Inc., 2023.

Figure 4.3-4
Post-Project Flood Depth Conditions Versus Existing Conditions



Note: The 100-year flood depth differences between post-project and existing conditions are shown above. Positive values (in pink) represent increases in depth. Negative values (in blue) represent decreases. The white line indicates the existing 100-year floodplain.

Source: WEST Consultants, Inc., 2023.

It should be noted that while the proposed project would result in new fill to elevate pads, FEMA FIRM 06097C1001G identifies the portions of the project site that would be developed with the proposed residences and internal roadway as being within Zone X and outside of a SFHA. Therefore, the proposed project would not require FEMA approval of a Conditional LOMR.

Based on the above, the proposed project would not substantially alter the existing drainage pattern of the site in a manner which would result in substantial erosion or siltation on- or off-site, substantially increase the rate or amount of surface runoff in a manner that would result in flooding on- or off-site, or create or contribute runoff water that would exceed the capacity of the proposed storm drain system or provide substantial additional sources of polluted runoff. Thus, a ***less-than-significant*** impact could occur.

Mitigation Measure(s)
None required.

4.3-4 In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation. Based on the analysis below, the impact is *less than significant*.

As discussed under Impact 4.3-3, the proposed Basin Retention Areas would be sized to adequately retain and treat all stormwater flows from the developed project site (see Table 4.3-1).

In addition, the Creek would experience water surface elevation changes of approximately +0.3 feet and -0.3 feet upstream and downstream of the proposed bridge connection, respectively, but the proposed structure pads and new internal looped private street would not be inundated by the 100-year storm event under post-project conditions (see Figure 4.3-3). The floodplain along the western bank of the Creek (looking downstream) under post-project conditions would also be generally coterminous with the existing conditions floodplain. Thus, the proposed project is not anticipated to result in the release of pollutants due to project inundation as a result of flooding.

In addition, a seiche is defined as a wave generated by rapid displacement of water within a reservoir or lake, due to an earthquake that triggers land movement within the water body or land sliding into or beneath the water body. The project site is not located near a water body that is susceptible to seiche hazard. In addition, due to the distance to the nearest coastline, the project site is not subject to tsunami hazards.

Based on the above, the proposed project would not alter the existing drainage pattern of the site in a manner that would impede or redirect flood flows, and a ***less-than-significant*** impact would occur.

Mitigation Measure(s)
None required.

Cumulative Impacts and Mitigation Measures

As defined in Section 15355 of the CEQA Guidelines, "cumulative impacts" refers to two or more individual effects which, when considered together, are considerable, compound, or increase other environmental impacts. The individual effects may be changes resulting from a single project or a number of separate projects. The cumulative impact from several projects is the change in the environment that results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects.

The cumulative setting for impacts related to hydrology and water quality encompasses the Petaluma River watershed. Additional detail regarding the cumulative project setting can be found in Chapter 5, Statutorily Required Sections, of this EIR.

4.3-5 Cumulative impacts related to the violation of water quality standards or waste discharge requirements, and impacts resulting from the alteration of existing drainage patterns. Based on the analysis below, the cumulative impact is *less than significant*.

Cumulative impacts related to stormwater quality, groundwater, and drainage patterns are discussed separately below.

Stormwater Quality

Construction activities have the potential to affect water quality and contribute to localized violations of water quality standards if stormwater runoff from construction activities enters receiving waters. Runoff from additional construction sites within the project area could carry sediment from erosion of graded or excavated surface materials, leaks or spills from equipment, or inadvertent releases of building products, which could result in water quality degradation if runoff containing such sediment or contaminants should enter receiving waters in sufficient quantities. Thus, construction activities associated with the proposed project, in combination with construction activities associated with other reasonably foreseeable projects in the Petaluma River watershed, could result in cumulative impacts related to water quality. However, all construction projects resulting in disturbance of one acre or more of land are required to comply with the most current NPDES Construction General Permit requirements. Conformance with the Construction General Permit would require preparation of SWPPPs for all such projects, and subsequent implementation of BMPs to prevent the discharge of pollutants. Considering the existing permitting requirements for construction activity in the project area, cumulative construction within the Petaluma River watershed would be heavily regulated and impacts related to the degradation of water quality would be minimized to the extent feasible.

Similar to the proposed project, cumulative development within the Petaluma River watershed would be subject to the City's NPDES Phase II MS4 general permit requirements, including implementation of source-control and treatment-control measures. Specifically, regulated projects are required to divide the project area into DMAs and implement and direct water to appropriately sized SDMs and Baseline Hydromodification Measures within each DMA. Source-control measures must be designed for pollutant-generating activities or sources consistent with recommendations from the CASQA Stormwater BMP Handbook for New Development

and Redevelopment, or equivalent manual, and must be shown on improvement plans.

Based on the conceptual stormwater design, during operations, the stormwater runoff would be properly treated prior to discharge from the site. Thus, urban pollutants entering and potentially polluting the local drainage system would not be expected to occur as a result of the project. Mitigation Measure 4.3-2 requires preparation of a final Stormwater Control Plan with submittal of the improvement plans for the City's review and approval to substantiate the preliminary report's Basin Retention Area sizing calculations. In addition, pursuant to the Phase II MS4 general permit requirements, a Post-Construction Stormwater Control Plan would be required for the proposed project. The project would be subject to NPDES Construction General Permit requirements, including implementation of BMPs and preparation of a site-specific SWPPP. Cumulative development projects within the project area would also be subject to Phase II MS4 stormwater requirements, as well as all City requirements related to stormwater treatment and control. Compliance with the foregoing regulations would ensure that impacts related to the alteration of drainage patterns and the discharge of pollutants are minimized to the extent feasible.

Drainage Patterns

Similar to the proposed project, cumulative development that could occur within the Petaluma River watershed would be subject to the applicable provisions of the City's NPDES Phase II MS4 general permit. Regulated projects are required to divide the project area into DMAs and implement and direct water to appropriately sized SDMs and Baseline Hydromodification Measures within each DMA. Source-control measures must be designed for pollutant-generating activities or sources consistent with recommendations from the CASQA Stormwater BMP Handbook for New Development and Redevelopment, or equivalent manual, and must be shown on the improvement plans. In addition, new storm drain infrastructure would be required to be designed consistent with applicable standards set forth by Sonoma Water, ensuring that new drainage features limit the potential for on- or off-site site flooding to occur. Overall, based on compliance with the foregoing regulations and the limited percentage that the project site and Labcon, Shainsky, and Carstansen sites represent within the 550-acre Creek watershed, cumulative development within the Petaluma River watershed would not substantially alter the existing drainage pattern of the area in a manner which would result in substantial adverse effects, and a less-than-significant impact would occur.

Flooding

Petaluma General Plan Policy 4-P-1 prohibits new development from occurring within 50 feet of any tributary of the Petaluma River. As such, cumulative development projects within the project area would be required to be appropriately located beyond a 50-foot setback from creeks within the Petaluma River watershed, which would serve to reduce the potential for flooding impacts to occur. In addition, pursuant to Petaluma IZO Section 6.050, new fill and construction, intensification of existing uses, substantial improvements, and other types of new development are prohibited in areas designated by FEMA as an SFHA without first obtaining a development permit.

Applications for development permits must include, among other things, the proposed elevation in relation to mean sea level of the lowest floor of all structures, proposed elevation in relation to mean sea level of any structure that would be floodproofed, and a description of the extent to which any watercourse would be altered or relocated as a result of the proposed development. Thus, cumulative development projects subject to Petaluma IZO Chapter 6 would be required to satisfactorily demonstrate to the City how floodproofing measures would be implemented into the project design to prevent flooding impacts associated with the 100-year floodplain from occurring.

With respect to the proposed project, as previously discussed, during the 100-year storm event, the minor increases to water surface elevation attributable to the proposed project would not result in adverse effects to upstream or downstream properties. Within the 550-acre Creek watershed, which is a subcomponent of the larger Petaluma River watershed, there are three other undeveloped properties (see Figure 4.3-5) identified by WEST Consultants, Inc. as having potential for future development: Labcon (six acres), Shainsky (two acres), and Carstansen (one acre). Labcon is a City-approved development site with construction pending in 2025. Combined with the 5.2-acre project site, the foregoing sites would represent approximately 0.5 percent of the overall Creek watershed; and the impervious surfaces associated with these three properties would not contribute substantial runoff to the surrounding watershed such that resultant water surface elevation increases would impact downstream and/or upstream properties.

Thus, the proposed project, in combination with cumulative development projects within the Petaluma River watershed, would result in a less-than-significant impact related to flooding.

Conclusion

Based on the above, the potential cumulative impact associated with reasonably foreseeable future development, in conjunction with the proposed project, would be ***less than significant***.

Mitigation Measure(s)

None required.

Figure 4.3-5
Adobe Creek Watershed