4.4 HYDROLOGY AND WATER QUALITY

4.4.1 Introduction

This section describes potential hydrologic effects related to drainage and water quality associated with development of the Roberts' Ranch Specific Plan (proposed project).

One comment letter was received from the Central Valley Regional Water Quality Control Board (CVRWQCB) that reiterated the need for the project applicant to comply with the general NPDES/WDR permits applicable to the site. General permits applicable to the proposed project are discussed in Section 4.4.3, Regulatory Setting and Section 4.4.4, Impact Analysis. In addition, the County of Solano submitted a comment letter requesting that the stormwater detention area proposed to serve the proposed project and the Brighton Landing project be evaluated for conformance with County general plan policies and zoning ordinance. The County also requests that the possibility of a City annexation of the detention basin be addressed in this EIR. The detention area is discussed under Impact HYDRO-1 in the context of stormwater runoff. Annexation of the detention area is not a component of the proposed project and thus is outside the scope of this EIR. A copy of the NOP and letters received in response to the NOP are included in Appendix A.

Information to prepare this section is derived primarily from the Roberts' Ranch Hydrology and Water Quality Evaluation prepared by West Yost Associates and previous work done by Phillipi Engineering, Inc. (PEI), who prepared a Storm Drain Modeling Study for the Brighton Landing project (Appendix F), and is supplemented by information from the City of Vacaville General Plan (City of Vacaville 2015) and City of Vacaville General Plan and Energy Conservation Action Strategy Environmental Impact Report (General Plan EIR) (City of Vacaville 2013).

4.4.2 Environmental Setting

Hydrology and Watersheds

The project site is located in the Old Alamo Creek watershed (Figure 4.4-1). Alamo Creek flows through the City from the eastern slopes of Mount Vaca to Ulatis Creek roughly six miles east of the project site. Ulatis Creek flows east and southeast ultimately draining into the Sacramento River via Cache Slough (Appendix F). Old Alamo Creek is located north of Elmira Road just north of the project site. During the 1960s, Alamo Creek was modified to redirect flows along a more southerly alignment known as New Alamo Creek. The modifications to Alamo Creek reduced the drainage area to Old Alamo Creek to a localized section of the eastern City as well as unincorporated areas to the east. The Old Alamo Creek watershed, which includes the proposed project, is approximately 990 acres. The modifications to Old Alamo Creek were part of a series of modifications to the Ulatis

Creek watershed in order to protect local agricultural lands from historical flooding along several of the major creeks in the area, including Alamo Creek (Appendix F).

There are no natural water features on the proposed project site; however, several irrigation well standpipes, weir gates, and irrigation canals are located on the property, along with water measurement and control systems, and flow meters (KC Engineering 2016).

Topography and Soils

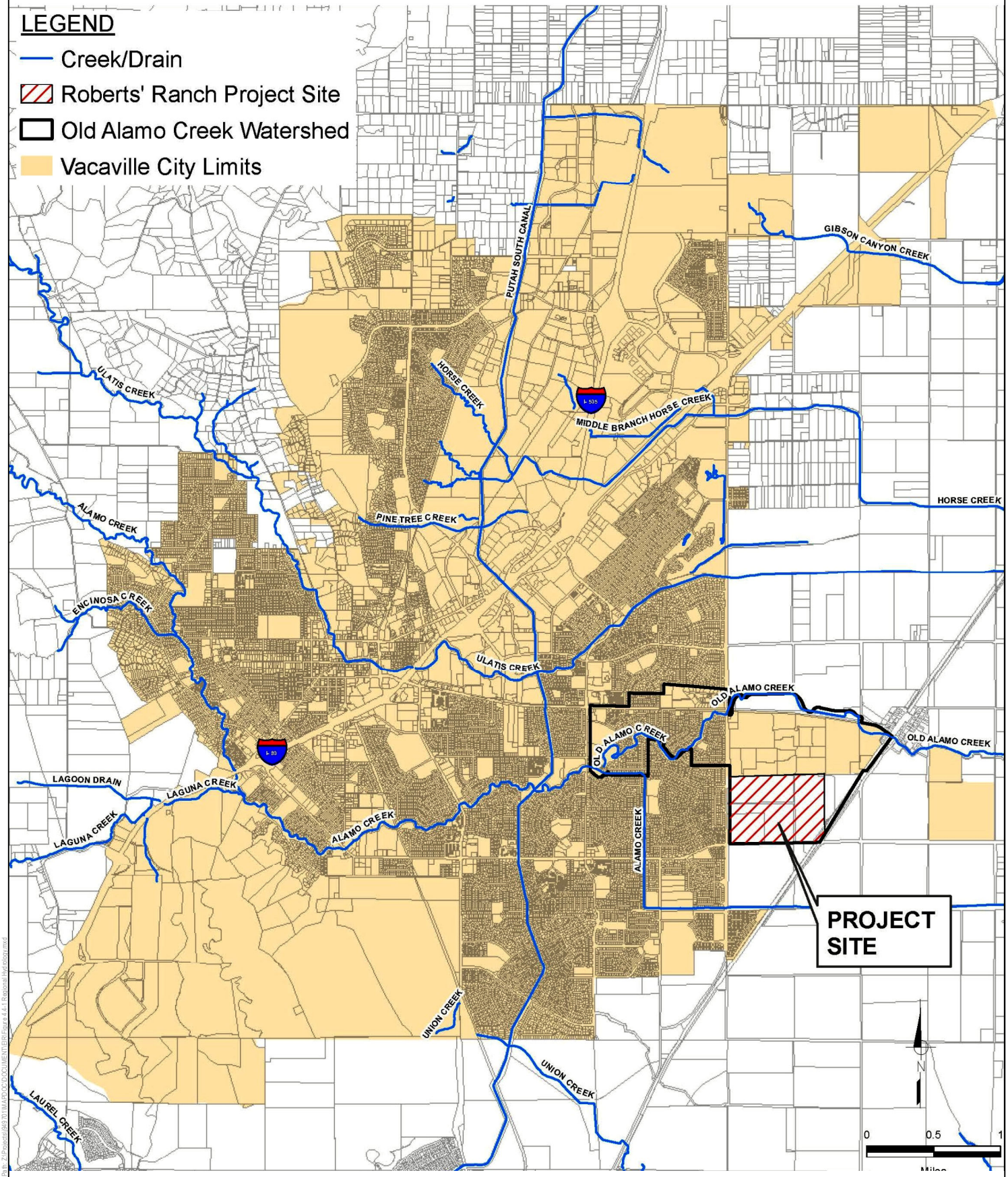
The project site is relatively flat with uniform west to east slopes ranging from 0.2% to 0.3%. Soil data from the Natural Resource Conservation Service maps soils on the project site Brentwood clay loam, Rincon clay loam, and Capay silty clay loam. These soils are generally considered to have moderate potential for erosion and fall within Hydrologic Soil Groups B, C, and D indicating that the infiltration capacities range from moderate (B) to very low (D) (Appendix F).

Drainage and Stormwater Runoff

Runoff on the project site sheet flows west to east until joining one of the small agricultural ditches on the site. These agricultural ditches convey runoff to the eastern boundary of the project site and on to the existing Solano Irrigation District Frost Canal, located west of the Union Pacific Railroad (UPRR). The Frost Canal conveys project flows north to the Old Alamo Creek near Elmira Road. Significant storm events can cause the Frost Canal to overtop its banks. In the event of flooding, flows from the canal will spill toward the east, over a dirt road, and into a ditch located immediately adjacent to the UPRR. This ditch would then convey flows north to a culvert just south of Elmira Road and continue to the east side of the UPRR. Runoff is then conveyed through a ditch north to Old Alamo Creek (Appendix F).

Surface Water Quality

The ultimate receiving water for storm flows from the project site and Alamo Creek is the Sacramento River. Beneficial uses and water quality objectives are established in the *Water Quality Control Plan (Basin Plan) for the California Regional Water Quality Control Board*, *Central Valley: Sacramento River Basin and San Joaquin River Basin* (CVRWQCB 2016). Beneficial uses for the Sacramento River include providing water supply for agriculture, recreation, and industrial uses, in addition to freshwater habitat, spawning grounds and wildlife habitat (CVRWQCB 2016). Ambient water quality in the Sacramento River is influenced by numerous natural and artificial surfaces including soil erosion, discharges from wastewater plants, stormwater runoff, agriculture, recreation activities, mining, timber harvesting, and flora and fauna. The Sacramento River is listed as “impaired” under Section 303(d) of the Clean Water Act (CWA) for chlordane, DDT, dieldrin, mercury, PBCs and unknown toxicity (SWRCB 2012).



DUDEK

SOURCE: West Yost Associates, 2016

FIGURE 4.4-1

Regional Hydrology

Roberts' Ranch Specific Plan EIR

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Urban Stormwater Quality

Water quality within the watershed is influenced by surrounding land uses and urban runoff varies due to factors such as differences in rainfall intensity, geographic features, vehicle traffic and percentage of impervious surfaces (City of Vacaville 2013). The project site is undeveloped and previous land uses include agriculture, which elevates the potential to contribute pollutants such as sediment, pesticides, and fertilizers within stormwater runoff. However, the Phase I Environmental Site Assessment conducted for the project site did not report any detectable level of organchlorine pesticides in the soil (KC Engineering 2016).

4.4.3 Regulatory Setting

Federal Regulations

Clean Water Act

The CWA (33 U.S.C. 1251 et seq.), as amended by the Water Quality Act of 1987, is the major legislation governing water quality. The main objective of the CWA is "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters." Important sections of the act are as follows:

- CWA Section 303 requires states to adopt water quality standards for all surface waters of the United States. Water quality standards are defined as consisting of two elements: (1) designated beneficial uses of the water body and (2) criteria that protect the designated uses. States are also required to develop a list of impaired water bodies that do not meet water quality standards and objectives and establish a Total Maximum Daily Load (TMDL) for each pollutant/stressor. A TMDL defines how much of a specific pollutant/stressor a given water body can tolerate and still meet relevant water quality standards. In California, the EPA has designated the State Water Resources Control Board (SWRCB) and its nine Regional Water Quality Control Boards (RWQCBs) with the authority to identify beneficial uses and adopt applicable water quality objectives.
- CWA Section 304(a) requires that the U.S. Environmental Protection Agency (U.S. EPA) publish advisory water quality criteria based on the latest scientific knowledge on the kind and extent of all effects on health and welfare that may be expected from pollutants in water. If multiple beneficial uses exist for a water body, water quality standards must protect the most sensitive use.
- CWA Section 401 (Water Quality Certification) requires an applicant for any federal permit that proposes an activity which may result in discharge to waters of the United States, obtain certification from the state that the discharge will comply with all provisions of the act.

- CWA Section 404 establishes a permit program for the discharge of dredge and fill material into waters of the United States, which is jointly administered by the U.S. Army Corps of Engineers and the EPA. Refer to Section 4.2, Biological Resources, Impact 4.2-3 for a discussion of jurisdictional waters.

Numerous agencies have responsibilities for administration and enforcement of the CWA. At the federal level this includes the EPA, the U.S. Army Corps of Engineers, the Bureau of Reclamation, and the major federal land management agencies such as the U.S. Forest Service and the Bureau of Land Management. At the state level, with the exception of tribal lands, the California EPA and its sub-agencies, including the SWRCB, have been delegated primary responsibility for administering and enforcing the CWA in California.

Federal Antidegradation Policy

The federal antidegradation policy is designed to protect water quality and water resources. The policy directs states to adopt a statewide policy that includes the following primary provisions: (1) existing instream uses and the water quality necessary to protect those uses shall be maintained and protected; (2) where existing water quality is better than necessary to support fishing and swimming conditions, that quality shall be maintained and protected unless the state finds that allowing lower water quality is necessary for important local economic or social development; and (3) where high-quality waters constitute an outstanding national resource, such as waters of national and state parks, wildlife refuges, and waters of exceptional recreational or ecological significance, that water quality shall be maintained and protected.

National Pollution Discharge Elimination System

CWA Section 402 establishes the National Pollutant Discharge Elimination System (NPDES), which is a permitting system for the discharge of pollutants into waters of the United States. The permit program is administered by the SWRCB and the nine RWQCBs, who have programs that implement individual and general permits related to construction activities, stormwater quality runoff, and various types of non-stormwater discharges. Large communities with the potential to cause larger impacts to receiving waters are issued permits with requirements specific to that community. The SWRCB elected to adopt a statewide general permit (Water Quality Order No. 2003-0005-DWQ) for Small Municipal Separate Storm Sewer System (MS4) operators in small communities. Cities permitted under the general MS4 permit are required to develop and implement a Stormwater Management Plan (SWMP) outlining measures to reduce the discharge of pollutants to the maximum extent practicable. MS4 permits are described in more detail under State Regulations and the City's adopted SWMP is described further under Local Regulations.

State Regulations

Porter-Cologne Water Quality Control Act

The Porter–Cologne Act (codified in the California Water Code, Section 13000 et seq.) is the primary water quality control law for California. Whereas the CWA applies to all waters of the United States, the Porter–Cologne Act applies to waters of the state, which includes isolated wetlands and groundwater in addition to federal waters. Under the Act, that State must adopt water quality policies, plans, and objectives that project the State's waters for the use and enjoyment of the people. The act is implemented by the SWRCB and the nine RWQCBs, who are required to adopt and periodically update water quality control plans (Basin Plans). Basin Plans are the regional water quality control plan that detail beneficial uses, water quality objectives, and implementation programs as required under the CWA and the Porter-Cologne Act. The act requires a "Report of Waste Discharge" for any discharge of waste (liquid, solid, or otherwise) to land or surface waters that may impair a beneficial use of surface or groundwater of the state. Waste Discharge Requirements (WDRs) are required and are issued exclusively under state law. WDRs typically require many of the same best management practices (BMPs) and pollution control technologies as required by NPDES-derived permits.

Basin Planning

The primary enforcement authority for the Porter-Cologne Act and portions of the CWA has been given to the SWRCB and its nine RWQCBs. The SWRCB provides state-level coordination of the water quality control program by establishing statewide policies and plans for implementation of state and federal regulations. Each of the nine RWQCBs are responsible for adopting and implementing Basin Plans that recognize the unique characteristics of each region with regard to natural water quality, actual and potential beneficial uses, and water quality problems. The CVRWQCB is responsible for the protection of the beneficial uses of waters draining to the Sacramento–San Joaquin Delta. The project site is located within the Old Alamo Creek watershed. Runoff from the project site would flow from west to east to the existing Solano Irrigation District Frost Canal, which would convey runoff north to Old Alamo Creek near Elmira Road. Old Alamo Creek connects to Ulatis Creek approximately six miles downstream (east) of the project site. Ulatis Creek flows east and southeast ultimately draining to the Sacramento River via Cache Slough (Appendix F).

The *Water Quality Control Plan (Basin Plan) for the California Regional Water Quality Control Board, Central Valley: Sacramento River Basin and San Joaquin River Basin* designates beneficial uses, establishes water quality objectives, and contains implementation programs and policies to achieve those objectives for all waters addressed through the plan (California Water Code Sections 13240–13247) (CVRWQCB 2016). The most water quality-sensitive beneficial

uses applicable to the Sacramento–San Joaquin Delta include REC-1 (Water Contact Recreation), WARM (Warm Freshwater Habitat), COLD (Cold Freshwater Habitat), WILD (Wildlife Habitat), and migration and spawning (MIGR and SPWN).

State Nondegradation Policy

In 1968, as required under the federal antidegradation policy described previously, the SWRCB adopted a nondegradation policy aimed at maintaining high water quality in California. . The nondegradation policy states that the disposal of wastes into state waters shall be regulated to achieve the highest water quality consistent with maximum benefit to the people of the state and to promote the peace, health, safety, and welfare of the people of the state. The policy includes a provision stating that when existing water quality is better than required under the water quality control plan, such quality would be maintained until it can be demonstrated that a change would be consistent with maximum public benefit. Additionally, the policy requires any waste producing activities which would discharge into high-quality waters be required to meet discharge requirements ensuring that pollution or nuisance would not occur and that the highest water quality for maximum public benefit would be maintained.

Regional Water Quality Control Board (Central Valley Region)

NPDES Construction General Permit (Order No. 2009-0009 DWQ, as amended)

For stormwater discharges associated with construction activity in the State of California, the SWRCB has adopted the General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities (Construction General Permit) to avoid and minimize water quality impacts attributable to such activities. Construction General Permits regulate stormwater flows from construction activities that disturb one acre or more of land and construction on smaller sites that are part of a larger project. The permit requires preparation of and implementation of a Stormwater Pollution Prevention Plan (SWPPP), which includes Best Management Practices (BMPs) designed to reduce potential impacts to surface water quality through construction and operation of the project. The Construction General Permit requires routine inspection of all BMPs to monitor effectiveness of the SWPPP. The project applicant must submit a Notice of Intent (NOI) to the SWRCB to be covered by a NPDES permit and prepare the SWPPP prior to the beginning of construction. Since the proposed project would disturb more than one acre of land, the project would require coverage under the Construction General Permit.

The City's standard conditions of approval requires development project applicants to prepare and submit a Storm Water Pollution Prevention Plan (SWPPP) for review by the City Engineer in conjunction with the submittal of the Improvement Plans, Grading Plans, and Final Map.

Municipal Stormwater Permit (CVRWQCB Order 2013-0001-DWQ, as amended)

For discharges from municipal storm sewer systems, the CVRWQCB has adopted revisions to the City's 2003 NPDES Permit and Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (Small MS4 Permit) in February 2013. The Small MS4 Permit is designed to avoid and minimize water quality impacts attributable to discharge from the stormwater drainage systems owned and/or operated by the co-permittees, which includes the City of Vacaville. This permit regulates stormwater runoff by requiring implementation of BMPs to reduce pollutants in runoff to the maximum extent practicable to protect water quality. The provisions of the Phase II General Permit are implemented in the City through Municipal Code Chapter 14.26, Urban Storm Water Quality Management and Discharge Control, which is described in more detail under Local Regulations.

The City's standard conditions of approval require development project applicants to demonstrate to the City Engineer and Director of Public Works that the proposed development meets the requirements of the MS4/Phase 2 storm water general permit and corresponding design standards.

Local Regulations

City of Vacaville Storm Drainage Master Plan

The City's Storm Drainage Master Plan (SDMP), first adopted in 1996 and last updated in 2001, evaluates existing storm drain systems and identifies existing deficiencies and required improvements. The SDMP's main focus is identifying improvements required to provide 100-year level flood protection to areas of the City proposed for new development while maintaining the current level of protection in already developed areas of the City. Improvement projects to resolve current deficiencies in the system are outlined in the SDMP and development impact fees were determined in order to ensure future development does not impact storm drainage for existing development within the City.

City of Vacaville Stormwater Management Plan

The City has developed a Stormwater Management Plan (SWMP) in compliance with the NPDES General Permit, which aims to reduce the discharge of pollutants to stormwater to the maximum extent practicable and protect water quality. The SWMP describes pollutant sources and outlines a strategy for how to control pollutants in local stormwater runoff including BMPs designed to address the six minimum measures: Public Education and Outreach, Public Involvement and Participation Program, Illicit Discharge Detection and Elimination, Construction Site Stormwater Runoff Control Programs, Post-Construction Stormwater Management In New and Redevelopment Program, and Pollution Prevention and Good Housekeeping for Municipal Operations (City of Vacaville 2003).

City of Vacaville Standard Specifications and Standards Drawings

The City of Vacaville Standard Specifications and Standard Drawings includes Design Standards and Construction Standards for storm drain systems (City of Vacaville 2006, 2007). The Design Standards outline procedures for determining the appropriate design for storm drain facilities including hydrologic design and adequate sizing. Additionally, the Design Standards indicate that storm drain system improvements shall be designed to prevent a net change in runoff resulting from new development and that Best Management Practices (BMPs) be implemented to comply with the NPDES permit (City of Vacaville 2006). The Construction Standards include requirements for allowable pipe materials, pipe installation, final cleaning, and inspection (City of Vacaville 2007).

City of Vacaville General Plan

The City of Vacaville General Plan (City of Vacaville 2015a) Safety Element and Open Space and Conservation Element include several goals and policies relating to hydrology and water quality. The following goals and policies are applicable to the proposed project:

Flood Protection

Goal SAF-2 Collect, convey, store, and dispose of stormwater in ways that provide an appropriate level of protection against flooding, account for existing and future development, and address applicable environmental concerns.

Policy SAF-P2.5 Maintain open areas needed to retain stormwater and prevent flooding of urban or agricultural land.

Goal SAF-3 Provide effective storm drainage facilities for development projects.

Policy SAF-P3.1 Evaluate the storm drainage needs for each project; this evaluation should account for projected runoff volumes and flow rates once the drainage area is fully developed. In the Alamo Creek watershed upstream of Peabody Road (including Alamo, Laguna, and Encinosa creeks), require post-development 10-year and 100-year peak flows to be reduced to 90 percent of predevelopment levels. In the remainder of Vacaville, for development involving new connections to creeks, peak flows shall not exceed predevelopment levels for 10- and 100-year storm events.

Policy SAF-P3.2 Continue to require development impact fees to fund necessary storm drainage improvements, including drainage detention basins.

Policy SAF-P3.3 Require a Storm Drainage Master Plan to be prepared for new development projects to ensure new development adequately provides for on-site drainage facilities necessary to protect the new development from potential flood hazards and ensure that potential off-site impacts are fully mitigated.

Policy SAF-P3.4 Require that new development designate storm drainage easements or routes when tentative maps or specific plans are approved.

Goal SAF-4 Protect people and property from flood risk.

Policy SAF-P4.1 Prohibit development within mapped flood-prone areas unless mitigation of flood risk is assured.

Policy SAF-P4.2 Require that the lowest floor of any new construction or substantial improvement be elevated a minimum of 1 foot above the 200-year flood elevation.

Policy SAF-P4.4 Require that new development mitigate its additional runoff and mitigate removal of any floodplain areas.

Water Resources

Goal COS-14 Protect the quality and supply of surface water and groundwater resources.

Policy COS-P14.2 Integrate City planning and programs with other watershed planning efforts, including Best Management Practices (BMPs), guidelines, and policies of both the Sacramento and San Francisco Bay Regional Water Quality Control Boards.

Policy COS-P14.5 Require the implementation of Best Management Practices (BMPs) to minimize erosion, sedimentation, and water quality degradation resulting from construction or from new impervious surfaces.

Policy COS-P14.7 Protect groundwater recharge and groundwater quality when considering new development projects.

Vacaville Municipal Code

13.12 Water, 13.14 Control of Backflow and Cross-Connections, 13.20 Water Conservation

These chapters provide guidelines for water service provision and describe standards for connection sizes. In addition, the ordinances implement regulations to protect and maintain the potable water system, reduce water consumption and protect water quality.

Chapter 14.19 Grading Ordinance

The Vacaville Grading Ordinance regulates grading and earth moving activities within the City. Per the Grading Ordinance all grading within the City is subject to the standards contained in the California Building Code. The Grading Ordinance also contains provisions for minimum setbacks, erosion control measures, and dust and debris control measures to reduce sedimentation and runoff during construction (City of Vacaville 2008).

14.26 Urban Stormwater Quality Management and Discharge Control

The Urban Stormwater Quality Management and Discharge Control Ordinance is designed to reduce pollutants in stormwater discharges to the maximum extent practicable in order to protect and enhance water quality. The ordinance prohibits illegal discharges into the storm drain system and authorizes the City to adopt and enforce BMPs for any activity, operation, or facility that could cause or contribute to pollution or contamination of stormwater, the storm drains or waters of the United States. BMPs for new development are outlined in Section 14.26.030.020 and include post-construction management practices to control the volume, rate, and potential pollutant load of stormwater runoff; maintenance of storm water management facilities; and implementation of a post-construction BMP design plan, which includes a storm water facilities operation and maintenance plan (City of Vacaville 2015b).

4.4.4 Impacts

Methods of Analysis

Hydrology and water quality impacts were evaluated in the *Roberts' Ranch Hydrology and Water Quality Evaluation* prepared by West Yost Associates (Appendix F). This study builds on previous work done by Phillipi Engineering, Inc. (PEI), who prepared a Storm Drain Modeling Study for the Brighton Landing project, the adjacent property to the north of the proposed project (PEI 2011, PEI 2015). Though the focus of PEI's study was to determine the design storm drain flow rates, trunk storm drain pipe sizes and detention facilities necessary to adequately serve the Brighton Landing project, its study area also included the proposed project area for the purpose of planning the location and size of the detention basin to serve both projects. At the time, PEI used generic/conceptual information to model runoff from the proposed project site. The West Yost Associates study, included as Appendix F, provides an update to the original stormwater runoff models to be consistent with the current proposed project and the completed detention basin pump configuration, and provides comparisons of runoff rates for the pre- and post-project conditions.

The impact analysis below considers compliance with regulations pertaining to water quality and implementation of the City's standard conditions of approval for subdivisions as part of the

proposed project (described in Section 4.4.3). Impact determinations are made based on both the magnitude of project-related change from existing conditions, as well as the effectiveness of compliance with existing regulations and standards in addressing the applicable criteria in Appendix F of the CEQA Guidelines.

Issues Addressed in the Modified Initial Study

As discussed in the Modified Initial Study for the proposed project (Appendix B), potential impacts related to groundwater resources, 100-year flood zones, and other flood hazards (e.g., dam/levee failure and inundation by seiche, tsunami or mudflow) were determined to be less than significant. The Modified Initial Study found these impacts to be less than significant because the project is outside of flood hazard zones and because other impacts are adequately addressed under compliance with General Plan policies, implementation of Energy Conservation Action Strategy (ECAS) policies related to water conservation, and consistency with the California Building Code. Therefore, this EIR focuses on topics related to compliance with water quality standards, changes in the rate and volume of stormwater runoff, and stormwater drainage system capacity.

Thresholds of Significance

Consistent with Appendix F of the CEQA Guidelines, the City's General Plan, and professional judgment, a significant impact would occur if development of the proposed project would do any of the following:

- Violate any water quality standards or waste discharge requirements, or otherwise substantially degrade water quality.
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site.
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site.
- Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff.

Impacts and Mitigation Measures

4.4-1: Implementation of the proposed project may violate water quality standards or waste discharge requirements, or otherwise substantially degrade water quality. This would be a less-than-significant impact.

Construction

Construction of the project would result in earth disturbing activities such as site clearing and grading for construction of roads, parking areas, building pads, and park areas. Disturbed areas exposed to rainfall could lead to an increase in erosion and the discharge of sediment to receiving waters resulting in a degradation of water quality. Additional pollutants can be introduced during construction from vehicular use, construction materials, and construction waste products. Pollutants typically present on construction sites include petroleum products and heavy metals from equipment, and products such as paints, solvents, and cleaning agents, which could contain hazardous constituents. Construction activities could result in water quality degradation if runoff entering receiving waters contains pollutants in sufficient quantities to exceed water quality objectives defined in the Basin Plan or TMDLs established under CWA Section 303(d). Impacts from construction-related activities would generally be short term and of limited duration.

Because implementation of the proposed project would collectively require construction activities resulting in a land disturbance of more than 1 acre, the project applicant is required to obtain coverage under the Construction General Permit (SWRCB Order 2009-0009-DWQ, as amended), which pertains to pollution from grading and project construction. Coverage under the Construction General Permit requires a qualified individual (as defined by the SWRCB) to prepare a Stormwater Pollution Prevention Plan (SWPPP) to address the potential for construction-related activities to contribute to pollutants within the project's receiving waterways. The SWPPP must describe the type, location and function of stormwater best management practices (BMPs) to be implemented, and must demonstrate that the combination of BMPs selected are adequate to meet the discharge prohibitions, effluent standards, and receiving water limitations contained in Construction General Permit.

The following list includes examples of construction water quality BMPs that are standard for most construction sites subject to the Construction General Permit:

- Silt fences and/or fiber rolls installed along limits of work and/or the project construction site;
- Stockpile containment and exposed soil stabilization structures (e.g., visqueen, fiber rolls, gravel bags and/or hydroseed);
- Runoff control devices (e.g., fiber rolls, gravel bag barriers/chevrons, etc.) used during construction phases conducted during the rainy season;
- Wind erosion (dust) controls;
- Tracking controls at the site entrance, including regular street sweeping and tire washes for equipment;

- Establishment of vehicle fueling and maintenance areas and material storage areas that are either covered or are designed to control runoff;
- Proper waste/trash management; and
- Regular inspections and maintenance of BMPs.

These BMPs would be refined and/or added to as necessary by a qualitied SWPPP professional to meet the performance standards in the Construction General Permit.

To obtain coverage under the Construction General Permit, the project applicant must submit to the SWRCB a Notice of Intent and associated permit registration documents, including a SWPPP and site plan, and must obtain a Waste Discharge Identification Number. As a standard condition of approval, the project applicant is also required to provide the SWPPP for review by the City Engineer in conjunction with the submittal of the Improvement Plans, Grading Plans, and Final Map. In addition, all earthwork, grading, trenching, backfilling and compaction operations must be conducted in accordance with the City's Urban Stormwater Quality Management and Discharge Control Ordinance (Chapter 14.26 of the City Code) and the Vacaville Grading Ordinance (Chapter 14.19 of the City Code).

The BMPs required for coverage under the Construction General Permit and the erosion control provisions contained in City ordinances would require measures to prevent construction-related contaminants from reaching impaired surface waters and contributing to water quality impacts within Old Alamo Creek, Ulatis Creek, and/or the Sacramento–San Joaquin Delta. For these reasons, water quality impacts resulting from construction-related activities and ground disturbances would be **less than significant.**

Operation and Maintenance

Implementation of the proposed project would convert the existing agricultural lands to urban uses. The increase in impervious area created by the proposed project, as well as on-site activities and uses, could alter the types and levels of pollutants that could be present in project site runoff associated with project operation. Runoff from building rooftops, walkways, parking lots, and landscaped areas can contain nonpoint source pollutants such as oil, grease, heavy metals, pesticides, herbicides, fertilizers, and sediment. Concentrations of pollutants carried in urban runoff are extremely variable, depending on factors such as the following:

- Volume of runoff reaching the storm drains;
- Time since the last rainfall;
- Relative mix of land uses and densities; and
- Degree to which street cleaning occurs.

Under existing conditions, stormwater that is not infiltrated into the soil moves as sheet flow from west to east until joining one of the small agricultural ditches on the site. These agricultural ditches convey runoff to the eastern boundary of the project site and on to the existing Solano Irrigation District Frost Canal. The Phase I Environmental Site Assessment conducted for the project site did not report any detectable level of organchlorine pesticides in the soil (KC Engineering 2016). However, the past agricultural uses of the site mean that low levels of residual nutrients/fertilizers may remain within site soils. Given surface soils are exposed over the entire site, stormwater runoff may contain levels of sediment and/or nutrients characteristic of agricultural land uses.

Where roads, driveways and residences are proposed, the surface soils that are now exposed to stormwater runoff would be stripped and replaced with engineered fills that meet geotechnical specifications and would become impervious. The new site configuration would reduce the exposure of soils containing nutrients/fertilizers to stormwater runoff, and would likely reduce the turbidity levels of runoff when compared to the current agricultural use. However, it would also introduce new uses and activities that have the potential to degrade the quality of stormwater runoff. The primary pollutants of concern for a residential housing development are associated with uncovered parking areas (e.g., leaking fuel or fluids), landscaping and landscape maintenance (e.g., sediment, improper/excessive use of pesticides, and/or fertilizers/nutrients), and/or improper waste management (e.g., fugitive litter/trash). The release of such pollutants would be localized and periodic in nature, minor in magnitude (especially in comparison to the total volume of stormwater discharges entering regional waterways), and would only occur on an improperly designed and maintained development. Nevertheless, because the cumulative effects of past projects have resulted in substantial water quality problems in the region's major waterways, and because water quality problems are generally cumulative in nature, the City's standard conditions of approval, the Small MS4 Permit, and drainage design standards require developers to design and maintain projects in a manner that reduces pollutant concentrations within stormwater discharges to the maximum extent practicable.

Standard conditions of approval require the project applicant to demonstrate to the City Engineer and Director of Public Works that the proposed project meets the requirements of the City's Storm Drain Design Standards, the City's Stormwater Management Plan, and the Small MS4 Permit issued by the SWRCB. The proposed project would convey runoff to the City's detention basin constructed as part of the Brighton Landing project. This detention basin has a capacity of 120 acre-feet, and would provide both stormwater quality treatment and flood control storage for runoff from both the project and the Brighton Landing project to the north (Appendix F). To provide stormwater quality treatment, a detention basin must detain stormwater for a period of time—typically between from 24 to 48 hours—to allow particles and the associated pollutants to settle out before being discharged to the downstream receiving waters. An extended detention basin refers to a design that configures larger detention basins (constructed

for the purpose of flood control) to also serve as mitigation for water quality concerns. The volume-based water quality criteria for the developed condition for both Brighton Landing and Roberts' Ranch developments is 11.25 acre-feet (PEI 2015). Accordingly, the extended detention basin is designed to retain that volume, through a secondary berm around the basin's stormwater inlet, which allows sediment and pollutants from the water-quality design storm to settle out. By locating the main detention basin pumps outside of the extended detention basin, the treatment design volume for water quality is thereby prevented from being prematurely pumped out of the basin during peak storm events.

Based on the study prepared by West Yost Associates (Appendix F), the existing extended detention basin and the associated pump station can be configured to provide sufficient settling time to achieve adequate stormwater quality treatment that meets extended detention basin guidelines. The extended detention basin must meet the design requirements of the California Storm Water Best Management Practices Handbook, which is referenced in the City's design standards. The pump station for the extended detention basin has been modeled with, under ultimate buildout, two 12 cubic feet per second (cfs) and three 22 cfs pumps (total pumping capacity of about 90 cfs) (Appendix F). Additional options for structural stormwater BMPs in Appendix F include infiltration type BMPs such as infiltration trenches or basins where soils provide suitable percolation, or bioretention features such as vegetated swales and buffer strips. In addition to structural BMPs, City standard conditions of approval also require the proposed project to incorporate source control BMPs into the project design to prevent pollutants from entering runoff. Examples of source control BMPs include directing roof spouts to pervious areas, using of porous pavements, enclosing trash storage areas, and stenciling "Drains to Bay" signs at storm drain inlets to educate residents.

Based on the analysis prepared by West Yost Associates, the detention basin would provide adequate water quality treatment. In addition, the project would be conditioned to demonstrate compliance with the City's Storm Drain Design Standards, the City's Stormwater Management Plan, and the Small MS4 Permit. For these reasons, the long term impacts of the proposed project on water quality would be **less than significant.**

Mitigation Measures

None required.

4.4-2: Implementation of the proposed project may alter the existing drainage pattern of the site or area in a manner which would result in substantial erosion or siltation on- or off-site. This would be a potentially significant impact.

The proposed project would convert the existing agricultural lands to residential, commercial, school, and park land uses. This would increase the impervious surfaces on the site and would

significantly alter the existing drainage pattern, which would cause an increase in the peak flows and volumes discharged from the site during storm events. As indicated in Appendix F, without construction of the detention basin, the proposed development within the watershed could increase the 10-year peak flow from 330 cfs to 455 cfs and the 100-year peak flow from 550 cfs to 710 cfs. The increase in flows could result in substantial erosion or siltation downstream if discharged directly to the downstream receiving water. However, the proposed project would use the existing detention basin east of the project boundary that would detain storm flows. Flows from the project are to be conveyed into the detention basin via an underground pipe network for storms up to the 10-year event. For larger storms, flows in excess of the pipe system capacity would be conveyed overland in the streets and directed into the detention basin. A pump station constructed at the detention basin would discharge flows from the basin at rates well below the existing peak flow rates.

According to the revised modeling examined by West Yost Associates, with the detention basin, the 10-year and 100-year peak flows from the watershed would be 37 cfs and 83 cfs, respectively (Appendix F). As a result, the proposed detention basin would prevent the project from creating a significant impact due to an increase in erosion or siltation downstream. However, West Yost Associates determined that there is not yet sufficient detail in the drainage designs and associated hydraulic modeling to ensure that all flows, including those in excess of the pipe system, would be adequately directed into the detention basin and the downstream conveyance (Appendix F). Therefore, the possibility for increased downstream erosion or siltation is considered a **potentially significant impact.**

Mitigation Measures

Consistent with General Plan policies SAF P3.1, P3.3, P3.4, and P4.4, and with City Standard Conditions of Approval for storm drain improvements, numbers 8 and 9, the final design of the project shall be required to adequately direct all flows to the existing detention basin and prohibited from increasing the area subject to flooding downstream. In order to demonstrate compliance with these requirements, the project applicant will be required to prepare a Storm Drain Master Plan (SDMP) prior to issuance of improvement plans for the development which would reduce this impact to less than significant.

HYDRO-1 Consistent with General Plan policies SAF P3.1, P3.3, P3.4, and P4.4, and with City standard conditions of approval for storm drain improvements, numbers 8 and 9, the final design of the project shall be required to adequately direct all flows to the existing detention basin and prohibited from increasing the area subject to flooding downstream. In order to demonstrate compliance with these requirements, the project applicant will be required to prepare a Storm Drain Master Plan (SDMP) prior to issuance of improvement plans for the development

which would reduce this impact to less than significant. The SDMP shall provide the necessary calculations to adequately demonstrate that the proposed drainage facilities adequately convey the design runoff from the project and adequately mitigate the impacts of increased runoff. In accordance with the City's Storm Drain Design Standards, the SDMP shall be prepared prior to the approval of the final map/improvement plans and shall include, but is not limited to, the following items:

- A topographic map of the drainage shed and adjacent areas as necessary to define the study boundary. The map shall show existing and proposed ground elevations (including preliminary building pads), with drainage sub-shed areas in acres, and the layout of the proposed drainage improvements.
- A map showing analysis points, proposed street grades, storm drainage facilities, and overland release paths with required easement locations for overland flow across private property.
- Preliminary pipe sizes with hydraulic grade lines, design flows, inverts, and proposed ground elevations at analysis points. This information shall be provided on the map showing the layout of the proposed drainage facilities.
- Summary of the detention basin and pump station including:
    - Additional pumping capacity added with this project.
    - Summary of detention storage capacity.
    - Proposed operations plan.
    - Downstream improvements or maintenance.
    - Proposed alterations required to avoid any increase in peak flows or areas subject to flooding. Such alterations may include, among other measures:
        - Adjustments to grading plans;
        - Adjustments to storm water system design;
        - Adjustments to pump station operations.

4.4-3: Implementation of the proposed project may substantially alter the existing drainage pattern of the site or area or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site. This would be a potentially significant impact.

As discussed previously, development of the project would significantly increase the stormwater runoff rates in the watershed without use of the detention basin. Without a

detention basin, the 10-year peak flow would increase from 330 cfs to 455 cfs and the 100-year peak flow would increase from 550 cfs to 710 cfs. However, these flows would be accommodated by the project's use of the existing detention basin at the downstream end of the project that would detain storm flows and pump them out at a rate well below the 10-year peak flow. With use of the existing detention basin and pump station the project would reduce the post development discharge peak storm water flow from existing 10-year and 100-year peak flows to an ultimate pump station discharge peak flow rate of approximately 100 cfs (PEI 2015). Appendix F found this to be an acceptable approach for mitigating the potential impacts of the project on downstream flooding. Consistent with the City's Standard Conditions of Approval for storm drainage, numbers 8 and 9, the detail needed to determine whether the project drainage facilities would adequately direct all flows, including overland flows during the 100-year storm, into the basin (Appendix F) would be prepared at the improvement plans stage of the project design. As a result, the possibility of increased flooding downstream is considered a potentially significant impact without mitigation to reduce the impact.

Peak discharges from the project site are proposed to be reduced significantly with use of the existing detention basin. The duration of peak discharges would be extended substantially, from about nine hours under pre-development conditions to about 24 hours under post-development conditions (Appendix F). The project would add an additional two pumps to the existing pump station that was constructed with the Brighton Landing project. This would increase the capacity of the pump station to about 100 cfs, which exceeds the capacity of the existing downstream channel. An existing culvert downstream of the detention basin was determined to have a capacity of about 10 to 15 cfs, possibly due to siltation or similar conditions, which means flow rates greater than about 15 cfs would result in overtopping of the downstream channel. The project would increase the peak discharge from the detention basin from about 45 cfs to about 100 cfs during a 100-year storm event (Appendix F). The project would also direct all runoff that currently flows directly from the site into the Frost Spill, to the detention basin for an overall reduction in discharge to the Frost Spill. The analysis from Appendix F indicates that peak flows would be reduced with implementation of the project. The extended peak flow from the detention basin would exceed the capacity of the downstream conveyance for approximately an additional 15 hours. Furthermore, the total volume of water discharged from the detention basin that is above the existing channel capacity would increase from about 85 acre-feet to about 120 acre feet, about a 40% increase, during a 100-year storm event. Consistent with General Plan policies SAF 3.1, 3.3, 3.4, and 4.4 and consistent with City Standard Conditions of Approval for storm drain improvements, numbers 8 and 9, the final design of the project shall be required to adequately direct all flows to the existing detention basin and be prohibited from increasing the area subject to flooding downstream. In order to demonstrate compliance with these requirements, the project applicant would be required to prepare a Storm Drain Master Plan (SDMP) prior to

issuance of improvement plans for the project. Therefore, the possibility of an increase in the area subject to flooding downstream is considered a **potentially significant impact.**

Mitigation Measures

Increased runoff generated from the urban land-uses proposed with the project could cause an increase in area subject to flooding downstream of the project. Consistent with General Plan policies SAF P3.1, P3.3, P3.4, and P4.4, and with City standard conditions of approval for storm drain improvements, numbers 8 and 9, the final design of the project shall be required to adequately direct all flows to the existing detention basin and be prohibited from increasing the area subject to flooding downstream. In order to demonstrate compliance with these requirements, the project applicant will be required to prepare a Storm Drain Master Plan (SDMP) prior to issuance of improvement plans for the development which would reduce this impact to less than significant.

HYDRO-2

a. Implement Mitigation Measure HYDRO-1.

b. The applicant shall conduct additional study of off-site drainage and flood conditions to demonstrate to the satisfaction of the City Engineer and Director of Public Works that the project shall not result in an increase in the depth or extent of flooding off-site, consistent with City Standard Conditions of Approval numbers 8 and 9. As part of the Storm Drain Master Plan, the applicant shall conduct a hydraulic analysis of the conveyance facilities downstream of the detention basin to determine the capacity of the downstream conveyance, the extent of the area subject to flooding under pre- and post-development conditions, and to identify the necessary mitigation measures that would reduce flooding to predevelopment levels. If mitigation measures are determined to be necessary based on detailed hydraulic analysis, such measures shall be incorporated into final project improvement plans.

4.4-4: Implementation of the proposed project may create or contribute to runoff water which would exceed the capacity of the existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff. This would be a potentially significant impact.

The proposed project would significantly increase the amount of impervious cover on the project site, which would cause a significant increase in runoff rates compared to existing rates. The project would tie into a detention basin downstream of the project boundary that would help mitigate for potential increases in flow and would also provide stormwater quality treatment. On-site runoff from the project would be conveyed to the detention basin via an underground pipe

network that would be constructed in accordance with the City's Standard Specifications and Drawings. The pipe sizes would vary from 15 to 72 inches in diameter. The proposed pipe network would be sized to convey the peak flow from the 10-year storm in accordance with City standards. Flows from storms larger than the 10-year event must be safely conveyed overland in the streets to the detention basin. City standards require the flow from the 100-year storm water surface elevation to be no more than 0.5 feet above the centerline elevation of a road and must be at least one foot below building pads.

Detailed pipe sizing calculations and overland release calculations are not included in the project drainage report and the adequacy of the proposed on-site systems could not be evaluated. Therefore, the possibility for the proposed on-site stormwater system to be exceeded by a storm event is considered a **potentially significant impact.**

Mitigation Measures

Because the impact mechanism addressed by Impact 4.4-4 is the same as that discussed under Impact 4.4-2 (limited capacity of off-site culvert), Mitigation Measures HYDRO-1 and HYDRO-2 would reduce the impact to a less-than-significant level for the same reasons. The mitigation measures require the final design of the project to adequately direct all flows to the existing detention basin and does not allow for any project-related increase in the area subject to flooding downstream.

HYDRO-3 Implement Mitigation Measures HYDRO-1 and HYDRO-2.

4.4.5 Cumulative Impacts

The geographic scope of cumulative effects on hydrology and water quality is the Old Alamo Creek watershed.

4.4-5: The proposed project, in addition to other projects in the watershed, could result in the generation of polluted runoff that could violate water quality standards or waste discharge requirements for receiving waters. This would be a less-than-significant impact.

Cumulative impacts from development of the project were analyzed in the City's General Plan Update EIR. Policies adopted in the General Plan address the evaluation of development to ensure adequate drainage facilities, the requirement for impact fees to fund storm drain improvements, and provision of storm drain master plans to guide development approvals (SAF P3.1, P3.3, P3.4), and ensure evaluation of drainage patterns, of flood risks, and of the facilities needed to protect water quality and maintain drainage systems (Policies SAF-P4.1 – 4.5). The proposed project and other potential cumulative projects in the vicinity of the project site,

including growth resulting from build-out of the City's General Plan, would be required to comply with the NPDES General Permit for Discharges of Storm Water Discharge Associated with Construction Activities issued by the State Water Resources Control Board. This permit requires projects to implement measures to prevent impacts, individual and cumulative, to water quality during construction. In addition, projects would also be required to comply with the City's NPDES stormwater permit from the CVRWQCB and their Stormwater Management Plan which prevent impacts to water quality after construction of a project. As discussed in the impact analysis above, the off-site detention basin has been designed to address flood control and water quality considerations for both the project and the approved Brighton Landing project, both of which are the primary contributing areas to the Frost Drain. Therefore, the potential for cumulative impacts to water quality is less than significant.

The proposed project and other potential projects that could contribute to cumulative impacts would also be subject to local, state, and federal regulations designed to minimize individual and cumulative impacts related to stormwater runoff rates and flooding. Implementation of mitigation measures for the proposed project and anticipated mitigation measures for other projects that would be required to maintain compliance with these regulations, along with implementation of the General Plan policies cited would reduce the potential cumulative impacts to a **less-than-significant level.**

Mitigation Measures

None required.

4.4.6 References

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