3.9 Hydrology and Water Quality

This section provides a description of the existing storm water drainage conditions, groundwater occurrence, water quality, and flooding issues within, adjacent to, and downstream of the Hillcrest Station Area Specific Plan Planning Area (referred to throughout this section as "Planning Area"). Relevant regulatory information is provided, and potential impacts related to water quality, floodplain development, drainage, and groundwater are identified. Additional analysis of the storm drainage system is discussed in Section 3.13 Utilities.

ENVIRONMENTAL SETTING

SURFACE WATER HYDROLOGY

Climate and Topography

The climate of East Contra Costa County is characterized as Mediterranean with warm, dry summers and mild, wet winters. The region's rainy season extends from October to April, with relatively dry conditions for the remainder of the year. Average annual rainfall in the vicinity of the Planning Area is 14 inches. Temperatures are generally moderate with a comparatively small range of temperatures between the winter low and summer high. Average temperatures range from 37 degrees Fahrenheit in winter months to 91 degrees Fahrenheit in summer months (Western Regional Climate Center, 2008).

The Planning Area is located on the northern flank of Mount Diablo at the southern edge of the Pittsburg-Antioch Plain. The Pittsburg-Antioch Plain is an alluvial plain that slopes gently north away from the base of the foothills of Mount Diablo to the tidal marshes of the Sacramento-San Joaquin Delta. With the exception of two hills adjacent to SR 4, the Planning Area is a shallow valley bisected by East Antioch Creek, which meanders in a northwest direction across the site. The topography of the Planning Area varies from gentle slopes of 2-3 percent on the valley floor to 15-30 percent slopes on the hilly areas in the southeast. Ground elevations range from approximately 20 feet above mean sea level (msl) at the western boundary, to approximately 200 feet above msl in the southeast (see Figure 3.7-1 Topography in Section 3.7 Geological and Seismic Hazards).

East Antioch Creek Watershed

The Planning Area is located in the East Antioch Creek Watershed. The East Antioch Creek Watershed drains approximately 11.4 square miles from its low elevation headwaters in the northernmost foothills of Mount Diablo near the city boundaries of Antioch and Brentwood to the Sacramento-San Joaquin River Delta. The East Antioch Creek Watershed is shown in Figure 3.9-1. The watershed contains only one primary tributary – East Antioch Creek, which flows in a generally northwest direction, eventually emptying into the San Joaquin River 1.5 miles northwest of the Planning Area. With the exception of a 1-mile reach south of SR 4, most of the creek is an aboveground earthen channel. Several detention basins and levees have been built along the creek to promote infiltration and contain storm flows. Lake Alhambra, located about 0.5 miles northwest of the Planning Area, serves recreational purposes while also absorbing flood flows from storm events, and improving the water quality of East Antioch Creek by allowing for sediments and contaminants from urban runoff to settle prior to discharging into the Delta.

Restoration projects in the lower watershed are underway just upstream of Alhambra Lake and in the tidal marsh areas close to the Delta (Jones and Stokes, 2004).

Site Drainage

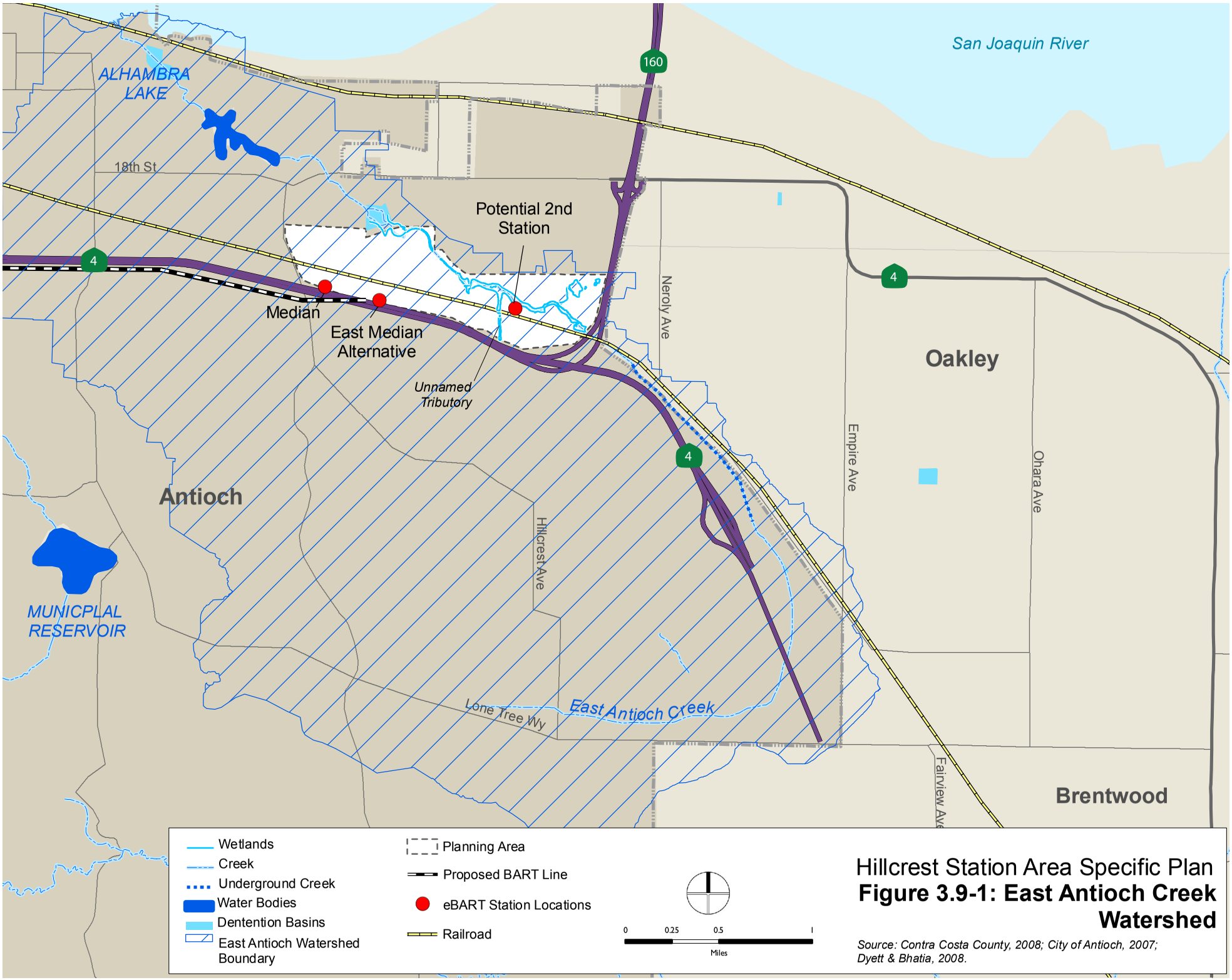
The hydrology of East Antioch Creek has been modified to accommodate development and for flood control. In the vicinity of the Planning Area, East Antioch Creek is perennial and is supported by precipitation runoff and groundwater during wet months, but also receives major dry-season inputs from both natural and artificial sources (e.g., upwelling springs, surface or subsurface flows from local irrigation, respectively). Other surface hydrological features within the Planning Area include: an unnamed tributary that originates south of SR 4 and flows north under the Southern Pacific Railroad crossing to its confluence with East Antioch Creek; a drainage swale and seasonal wetland complex in the northeast corner of the Planning Area that captures runoff from SR 160, Oakley Road, and adjacent residences; and two Contra Costa County Flood Control and Water Conservation District (CCCFCWCD) basins that help to promote infiltration and detain storm flows – the Oakley and Trembath Detention Basins. Two seasonal ponds exist within the Planning Area. The larger 0.26-acre pond is within the East Antioch Creek channel just east of Willow Ave; the smaller 0.03-acre pond is within the unnamed tributary just south of the Southern Pacific Railroad Crossing. Storm water from the Planning Area and surrounding areas originates as overland sheet flow and is either captured in the detention basins, ponds, or wetlands, or is conveyed downstream by East Antioch Creek.

Flooding

100-Year Floodplain

Flooding is inundation of normally dry land as a result of rise in the level of surface waters or rapid accumulation of storm water runoff. Regional flooding hazards, as evaluated by the Federal Emergency Management Agency (FEMA), are presented in community Flood Insurance Rate Maps (FIRMs) as part of the flood hazard mapping program. Official FEMA FIRMs encompassing the Planning Area are presented in Figure 3.9-2. (FEMA, 1987a, b) The FIRMS indicate portions of the Planning Area are subject to inundation during 100-year flood event (i.e. storm with a likelihood of occurring every 100 years), as follows:

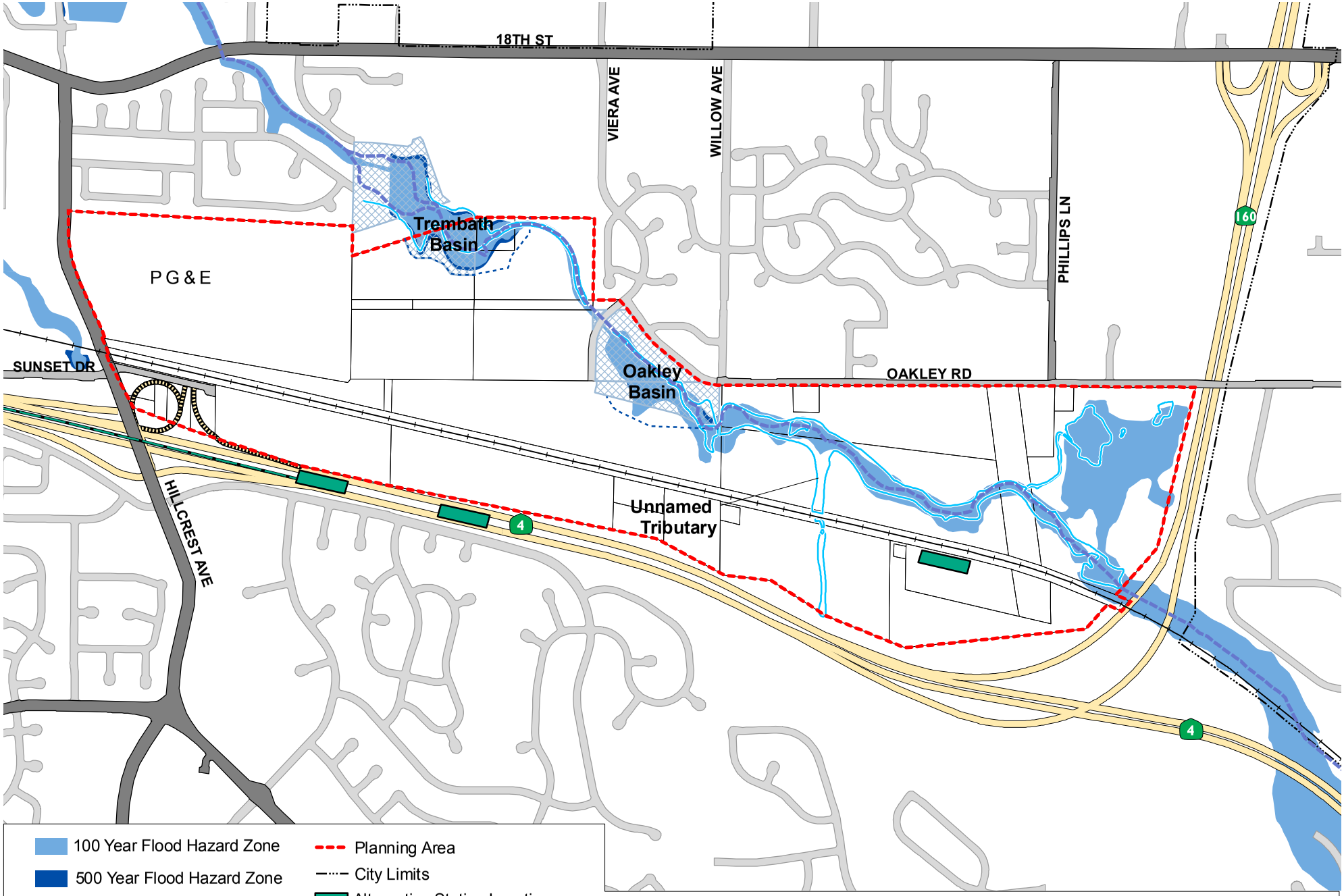
- *East Antioch Creek Channel* - A 200- to 300-foot-wide band along East Antioch Creek between SR 4 and Willow Avenue is mapped as being within the 100-year flood hazard zone. East of Willow Avenue, a 100- to 150-foot-wide band along the creek west of Willow Avenue, is mapped as a floodway area in the 100-year flood hazard zone.
- *Wetland Complex* - The footprint of the wetland complex located at the northeast corner of the Planning Area is mapped as being within the 100-year flood hazard zone with flood depths of 1 to 3 feet.
- *Oakley and Trembath Detention Basins* – The footprints of the detention are within the 100-year flood hazard zone.



Hillcrest Station Area Specific Plan

Figure 3.9-1: East Antioch Creek Watershed

Source: Contra Costa County, 2008; City of Antioch, 2007; Dyett & Bhatia, 2008.



Hillcrest Station Area Specific Plan

Figure 3.9-2: Flood Hazard Zones

Source: ESA, 2008; Contra Costa County, 2008; City of Antioch, 2007; Dyett & Bhatia, 2008.

A FEMA Letter of Map Revision (LOMR) dated April 30, 2007 revised the flood hazard designation for the reach of the creek located southeast of State Route 4 (SR 4) but did not affect FEMA flood zone designations or elevations on the Planning Area (FEMA, 2007).

Data from FEMA also shows the 500-year flood hazard zone. All the areas within the 500-year zone are within detention basins, and therefore there is no potential for development within the 500-year flood hazard zone.

Tsunamis, Seiches, and Dam Inundation

Flooding can also occur due to tsunamis, seiches, or failure of dams. Tsunamis are waves caused by an underwater earthquake, landslide, or volcanic eruption. Low-lying portions of the City of Antioch adjacent to the San Joaquin River could be affected by a tsunami. However, projected wave height and tsunami run-up is expected to be small in the interior portions of the San Francisco Bay and the Delta (City of Antioch, 2003). A seiche is a rhythmic motion of water in a partially or completely landlocked water body caused by landslides, earthquake-induced ground accelerations, or ground offset. As the Planning Area is not located in close proximity to a closed body of water such as a lake or reservoir (Oakley and Trembath Detention Basins are located along East Antioch Creek and are therefore not closed bodies of water), there is no risk of flooding from seiche. The Planning Area is located approximately 1.5 mile downstream of Antioch Reservoir and two miles downstream of Contra Loma Reservoir. According to dam failure inundation maps prepared by the Association of Bay Area Governments (ABAG), the Planning Area is not located within a dam failure inundation zone (ABAG, 2007).

Drainage and Flood Control

Drainage facilities in the Planning Area are under the jurisdiction of the City of Antioch and CCCFCWCD. The CCCFCWCD is responsible for Drainage Area 56 which includes the Oakley and Trembath Detention Basins, as well as the Lindsey Detention Basin located southeast of the Planning Area along East Antioch Creek. Generally, the CCCFCWCD purchases the land needed for detention basins, makes the improvements, and then works with the City to operate and manage the basins. The City of Antioch maintains catch basins, storm channels, creeks, culverts, and concrete lined “V” ditches in open space that handle storm water runoff within the its jurisdiction. Drainage infrastructure is financed through a variable drainage area flood control improvement fee on new development.

The Oakley and proposed Trembath Detention Basins provide flood protection for the portions of the City of Antioch within the East Antioch Creek Watershed, including the Planning Area. Since 1982, the CCCFCWCD has planned to expand Oakley Basin and construct Trembath Basin to accommodate increased storm flows from new development, increase flood storage, and control downstream flooding. In 1986, the first phase of the expansion project was completed. Since then, CCCFCWCD has secured the funding necessary for the next phase through Drainage Area 56 development fees. The next phase of expansion improvements is scheduled for 2010-2011 (Standafer, 2008). CCCFCWCD plans to acquire adequate temporary or permanent rights-of-way to accommodate elevated floodwaters during the final design process.

The Oakley Basin was built to serve development in the City of Oakley and has a storage capacity of 50 acre-feet. The City of Antioch owns a portion of the existing basin. The CCCFCWCD has plans to expand the basin to approximately 70 acre-feet storage capacity, which would place the dam at the Oakley Basin under the jurisdiction of the California Department of Water Resources

Division of Safety of Dams (DSOD)[1]. The dam at Oakley Basin would be retrofitted to meet current state standards.

The storage capacity of the Trembath Basin is designed for 100 acre-feet. The district plans to use the dirt excavated from the Oakley Basin to build a dam as the western edge of the Trembath Basin. The 14-foot high embankment dam would better control flow released to Lake Alhambra. With the improvements in place, the two basins will have a combined storage capacity to accommodate the 100-year flood event. Funding for these drainage improvements has been secured; however, a schedule for implementation has not been determined.

SURFACE WATER QUALITY

Beneficial Uses

The San Francisco Bay Regional Water Quality Control Board (RWQCB) is responsible for developing and enforcing surface water and groundwater quality objectives in the Planning Area. The SF Bay RWQCB is also responsible for preparation and implementation of the San Francisco Bay Water Quality Control Plan (Basin Plan). The Basin Plan is the master policy document that contains descriptions of the legal, technical, and programmatic bases of water quality regulation in the San Francisco Bay region. The Basin Plan identifies beneficial uses of surface waters and groundwater within its region, and specifies water quality objectives to maintain the continued beneficial uses of these waters.

Although the beneficial uses of East Antioch Creek have not been specified, under the "tributary rule," which provides that water quality standards for specific waterbodies apply upstream to tributaries for which no site-specific standards have been adopted, the beneficial uses of the Sacramento-San Joaquin River Delta, located approximately 1.5 miles northwest of the Planning Area, can be applied to East Antioch Creek.

According to the Basin Plan, the Delta is designated for the following beneficial uses: agricultural supply; municipal and domestic supply; groundwater recharge; industrial service and process supply; ocean, commercial and sport fishing; estuarine habitat; fish migration; preservation of rare and endangered species; fish spawning; wildlife habitat; water contact recreation; non-contact recreation; and navigation (SF Bay RWQCB, 2006).

Impaired Water Bodies

Section 303(d) of the Clean Water Act (CWA) requires that the RWQCBs identify waterbodies that do not meet water quality standards and are not supporting their beneficial uses. The affected water bodies, and associated pollutants or stressors, are prioritized on the 303(d) List of Impaired Water Bodies. In addition to identifying the water bodies that are not supporting beneficial uses, the Section 303(d) List also identifies the pollutant or stressor causing impairment, and establishes a schedule for developing a control plan to address the impairment.

East Antioch Creek is not listed on the Section 303(d) List. However, the Sacramento-San Joaquin

[1] Dams under the DSOD jurisdiction are periodically reviewed by DSOD to evaluate the stability of the dams and their major appurtenances. The DSOD may impose reservoir storage restrictions if it is determined that a dam is unsafe or does not meet current state standards

River Delta, the receiving water body to East Antioch Creek, is listed as impaired due to chlordane, DDT (dichlorodiphenyl trichloroethane), dieldrin, dioxin compounds, exotic species, furan, mercury, nickel, PCBs (polychlorinated biphenyls), PCBs (polychlorinated biphenyls, dioxin-like), and selenium. These contaminants are transported into the Delta water system through watersheds that drain into the Delta as a result of agricultural activities, industrial and municipal point sources, urban runoff, and abandoned mine discharges (U.S. EPA, 2007).

GROUNDWATER

The California Department of Water Resources (DWR) delineates state groundwater basins based on geologic and hydrogeologic conditions. The Planning Area is located within the Tracy Groundwater Subbasin (located within the greater San Joaquin Valley Groundwater Basin). The Tracy Groundwater Basin has a surface area of approximately 539 square miles in Contra Costa, Alameda, and San Joaquin Counties and drains north to the San Joaquin River. With the exception of seasonal variations, the majority of wells in the subbasin have remained relatively stable for at least the last 10 years (DWR, 2006).

In the vicinity of the Planning Area, the primary source of recharge is from seepage from streams and percolation of applied irrigation water. Groundwater at East Antioch Creek, at the Trembath Basin, was encountered at 5 feet below ground surface (bgs), and groundwater depth at the site of the Oakley Basin area further east was approximately 15 feet bgs. Groundwater in the vicinity of the Median Station has been recorded at approximately 70 feet bgs (Bay Area Rapid Transit, 2008).

Beneficial Uses

Although no beneficial use is specified for the Tracy Subbasin, unless otherwise designated by the RWQCB, all groundwater is considered suitable, or potentially suitable, for municipal and domestic water supply (SF Bay RWQCB, 2006). The City of Antioch does not use groundwater for its municipal water supply.

Impaired Groundwater

Areas of poor water quality related to elevated concentrations of chloride, nitrate, and boron exist throughout the Tracy Subbasin (DWR, 2006). Within the Planning Area, historical agricultural and industrial land uses and activities resulted in releases of contaminants to groundwater, including agrichemicals, petroleum hydrocarbons. Groundwater remediation and monitoring activities is on-going on multiple parcels within the Planning Area (Dyett & Bhatia, 2008).

REGULATORY FRAMEWORK

Federal Laws and Regulations

Clean Water Act

The Clean Water Act (CWA) was enacted in Congress in 1972 and amended several times since inception. It is the primary federal law regulating water quality in the U.S. and forms the basis for several state and local laws throughout the country. Its objective is to reduce or eliminate water pollution in the nation's rivers, streams, lakes, and coastal waters. The CWA prescribes the basic federal laws for regulating discharges of pollutants and sets minimum water quality standards for all surface waters in the U.S. At the federal level, the CWA is administered by the U.S.

Environmental Protection Agency (EPA). At the state and regional levels, the CWA is administered and enforced by the State Water Resources Control Board (SWRCB) and the RWQCBs.

FEMA National Flood Insurance Program

FEMA operates the National Flood Insurance Program, which issues maps of Special Flood Hazard Areas (SFHA), based on water surface elevations of the 1 percent (100-year) flood event. For any project that would result in a change to the designated 100-year floodplain, a Conditional Letter of Map Revision (CLOMR) is required to be issued by FEMA prior to the initiation of any construction activities. Upon approval of the proposed changes, FEMA will then issue a CLOMR to modify the elevations and/or boundaries of the Special Flood Hazard Area in question (based on the 100-year flood event). These revisions are then identified on FEMA FIRMs.

FEMA requires assurance by the participating community that minimum floodplain management requirements are complied with, including minimum floor elevations above the "base flood"; that existing lands and structures or proposed structures are "reasonably safe from flooding"; and that all supporting analysis and documentation used to make that determination is on file and available upon request. The supporting hydraulic analysis and documentation includes topographic data and certification by a registered professional engineer or licensed land surveyor.

State Regulations

Porter-Cologne Water Quality Control Act State and Regional Water Quality Control Boards

The Porter-Cologne Water Quality Control Act establishes the SWRCB and the RWQCBs as the principal state agencies having primary responsibility in coordinating and controlling water quality in California. The Porter-Cologne Act establishes the responsibility of the RWQCBs for adopting, implementing, and enforcing water quality control plans (i.e. Basin Plans), which set forth the state's water quality standards (i.e. beneficial uses of surface waters and groundwaters) and the objectives or criteria necessary to protect those beneficial uses. The Project Site lies within the jurisdiction of the San Francisco Bay RWQCB, which has adopted the Water Quality Control Plan for the San Francisco Bay Region (Basin Plan) to implement plans, policies, and provisions for water quality management.

National Pollutant Discharge Elimination System

In 1987, amendments to the CWA added section 402(p), which established a framework to protect water quality by regulating industrial, municipal, and construction-related sources of pollutant discharges to waters of the U.S. In California, the National Pollutant Discharge Elimination System (NPDES) is administered by the SWRCB through the RWQCBs and requires that municipalities obtain permits which outline programs and activities to control storm water pollution. To comply with these regulations, Contra Costa County, the CCFCWCD, and nineteen incorporated cities including the City of Antioch have joined together to create the Contra Costa Clean Water Program (CCCWP). The CCCWP develops and implements specific programs to meet NPDES requirements and consists of a comprehensive plan to reduce the discharge of pollutants to the "maximum extent practicable."

Municipal Storm Water NPDES Permit

The members of the CCCWP receive coverage under a Joint Municipal Storm Water NPDES permit from the SF Bay and Central Valley RWQCBs. The Joint Municipal NPDES permit requires that participating municipalities (i.e. members of the CCCWP) implement an approved storm water management plan. The storm water programs incorporate best management practices (BMPs) that include construction controls (such as a model grading ordinance), legal and regulatory approaches (such as storm water ordinances), public education and industrial outreach (to encourage the reduction of pollutants at various sources), inspection activities, wet-weather monitoring, and special studies.

In 2003, the SF Bay and Central Valley RWQCBs added Provision C.3 to the municipal storm water permit requirements. In accordance with these updated requirements, new development and redevelopment projects that involve the creation or replacement of 10,000 square feet or more of impervious surfaces are required to incorporate treatment measures and other appropriate source control and site design features to reduce the pollutant load in storm water discharges and manage runoff flows. Project site designs must minimize the area of new roofs and paving. Where feasible, pervious surfaces should be used instead of paving so that runoff can percolate to the underlying soil. Runoff from impervious areas must be captured and treated. The municipal permit specifies ways to calculate the required size of treatment devices. Further, in addition to incorporating treatment controls, projects creating or replacing an acre or more of impervious area must also provide flow control so post-project runoff does not exceed estimated pre-project rates and durations.

Construction General NPDES Permit

The SWRCB is the permitting authority in California and has adopted a Statewide General Permit for Storm Water Discharges Associated with Construction Activity (Construction General Permit) that encompasses one or more acres of soil disturbance. Construction activity includes clearing, grading, excavation, stockpiling, and reconstruction of existing facilities involving removal or replacement.

In general, the NPDES storm water permitting requirements for construction activities require that the landowner and/or contractor submit a notice of intent to the SWRCB and prepare and implement a site-specific storm water pollution prevention plan (SWPPP) to minimize the discharge of pollutants during construction. The SWPPP includes a site map(s) showing the construction site perimeter, existing and proposed buildings, lots, roadways, storm water collection and discharge points, general topography both before and after construction, and drainage patterns across the site. The SWPPP must also specify BMPs that will be used to protect storm water runoff as well as the placement of those BMPs; a visual monitoring program; a chemical monitoring program for non-visible pollutants to be implemented if there is a failure of BMPs; and a sediment monitoring plan if the site discharges directly to a water body listed as an impaired water body for sediment. Measures for erosion and sediment control, construction waste handling and disposal, disposal of groundwater produced during dewatering, and post-construction erosion and sediment control must also be addressed, along with methods to eliminate or reduce non-stormwater discharges to receiving waters.

Regional and Local Regulations

Contra Costa Clean Water Program

The Contra Costa Clean Water Program (CCCWP) is a collaborative effort by Contra Costa County, 19 incorporated cities, and the CCCFWCD, to protect water quality and comply with NPDES requirements. The CCCWP develops and implements specific programs to meet NPDES requirements and provides a comprehensive plan to reduce the discharge of pollutants to the "maximum extent practicable."

Contra Costa County Flood Control and Water Conservation District

The Contra Costa County Flood Control and Water Conservation District (CCCFCWCD) is responsible for flood control throughout the county and assists in the development and implementation of storm drainage infrastructure in both unincorporated and incorporated areas. The CCCFCWCD maintains facilities in their rights-of-ways and easements, including large improved drainage channels, detention basins, and dams that serve as regional drainage facilities. The CCCFCWCD also reviews the drainage aspects of land development applications, flood control and drainage permit applications, and environmental impact documents. Drainage and floodplain permits are required by the CCCFCWCD for construction in flood hazard zones. The CCCFCWCD also administers County Ordinance No. 90-74, which establishes the requirement to collect drainage fees from new development based on the amount of new impervious surfaces. The fees support upgrades to and maintenance of existing drainage systems.

CCCFCWCD Drainage Area Fees

The CCCFCWCD separates their service area into major drainage areas, each of which has an individual master plan and fee schedule intended to ensure that drainage facilities are adequate for anticipated future needs. Where storm drain improvements are needed within parcels under development, the construction of such facilities is designated as a condition of project approval.

The Planning Area is located within CCCFCWCD Drainage Area 56. Drainage area 56 has drainage fees based on $0.069 per square foot for newly created impervious surface area. CCCFCWCD requires payment of fees prior to the filing of final maps, parcel maps, or the issuance of building permits, whichever the case may be within the above drainage areas. (CCCFCWCD, 2007)

CCCFCWCD General Flood Protection Standards

The following general flood standards are required for all structures constructed within a designated floodplain:

1. All new or substantial improvements constructed within a floodplain shall have the finished floor and all electrical and mechanical equipment and/or services elevated one to two feet, minimum, above the Base Flood Elevation (BFE).

2. The area below the BFE plus freeboard, shall be used only for vehicle parking, storage, and building access.

3. Electrical outlets (but not service panels) can be allowed below the BFE plus free board if, and only if, they are of the GFI type.

4. All enclosed space below the BFE shall be adequately ventilated or enclosed with breakaway walls.

5. All tanks (including propane, septic and water) located below BFE shall be anchored.

City of Antioch Municipal Code

Building requirements for floodplain development are specified in Title 9, Chapter 4, Article 20 of the Municipal Code.

Floodplain Development Permits. Municipal Code requires that a development permit be obtained before construction or development begins within any area of special flood hazard. Applications for development permits shall be made on forms furnished by the Floodplain Administrator and may include, but not be limited to: plans in duplicate drawn to scale showing the nature, location, dimensions, and elevation of the area in question; existing or proposed structures, fill, storage of materials, and drainage facilities; and the location of the foregoing.

Permit requirements include the provision that the proposed development does not adversely affect the carrying capacity of the altered or relocated watercourse such that the cumulative effect of the proposed development, when combined with all other existing and anticipated development, will not increase the water surface elevation of the base flood more than one foot at any point.

City of Antioch General Plan

The Public Services and Facilities element of the City of Antioch General Plan contains several policies related to storm drainage and flood control policies. The Resource Management element contains several policies related to storm water quality. The Environmental Hazards element contains a variety of recommendations for the prevention of damage and injury or death from flooding hazards.

8.7.2 Storm Drainage and Flood Control Policies

a. Continue working with the Contra Costa County Flood Control District to ensure that runoff from new development is adequately handled.

b. Require adequate infrastructure to be in place and operational prior to occupancy of new development, such that:

- new development will not negatively impact the performance of storm drain facilities serving existing developed areas and
- the performance standards set forth in the Growth Management Element will continue to be met.

c. Design flood control within existing creek areas to maximize protection of existing natural settings and habitat.

d. Provide retention basins in recreation areas where feasible to reduce increases in the amount of runoff resulting from new development.

e. Require new developments to provide erosion and sedimentation control measures to maintain the capacity of area storm drains and protect water quality.

f. Require implementation of Best Management Practices in the design of drainage systems to reduce discharge of non-point source pollutants originating in streets, parking lots, paved industrial work areas, and open spaces involved with pesticide applications.

10.7.2 Water Resources Policies

f. Require public and private development projects to be in compliance with applicable National Pollution Discharge Elimination System (NPDES) permit requirements, and require the implementation of best management practices to minimize erosion and sedimentation resulting from new development.

g. Participate in regional watershed planning efforts to enhance area water quality.

h. Design drainage within urban areas to avoid runoff from landscaped areas and impervious surfaces from carrying pesticides, fertilizers, and urban and other contaminants into natural streams.

11.4.2 Flood Protection Policies

a. Prohibit all development within the 100-year floodplain, unless mitigation measures consistent with the National Flood Insurance Program are provided.

b. Minimize encroachment of development adjacent to the floodway in order to convey flood flows without property damage and risk to public safety. Require such development to the capable of withstanding flooding and to minimize the use of fill.

c. Prohibit alteration of floodways and channelization of natural creeks if alternative methods of flood control are technically and financially feasible. The intent of this policy is to balance the need for protection devices with land use solutions, recreation needs, and habitat preservation.

d. Require new development to prepare drainage studies to assess storm runoff impacts on the local and regional storm drain and flood control system, along with implementation of appropriate detention and drainage facilities to ensure that the community's storm drainage system capacity will be maintained and peak flow limitations will not be exceeded.

e. Where construction of a retention basin is needed to support new development, require the development to provide for the perpetual funding and ongoing maintenance of the basin.

f. Eliminate hazards caused by local flooding through improvements to the area's storm drain system or creek corridors.

IMPACT ANALYSIS

SIGNIFICANCE CRITERIA

Implementation of the proposed Plan would have a potentially significant adverse impact if the Plan would:

- Violate any water quality standards or waste discharge requirements;
- Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted);
- 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;
- Otherwise substantially degrade water quality;
- Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map;
- Place within a 100-year flood hazard area structures which would impede or redirect flood flows;
- Expose people or structures to a significant risk of loss, injury or death involving flooding,including flooding as a result of the failure of a levee or dam;
- Inundation by seiche, tsunami, or mudflow; or
- Provide sufficient facilities development to protect structures for human occupancy and roadways identified as evacuation routes from inundation during the 100-year flood event.

METHODOLOGY AND ASSUMPTIONS

This impact analysis focused on potential effects on water quality, drainage patterns, and floodplains associated with implementation of the Hillcrest Station Area Specific Plan. The evaluation was made in light of current conditions in the Planning Area, proposed future land uses under the proposed Plan, and applicable regulations and guidelines.

SUMMARY OF IMPACTS

Construction-related impacts on water quality would be reduced by compliance with NPDES General Construction Permit requirements. Long-term impacts to water quality would be mitigated through adherence to the requirements of Provision C.3 of the NPDES Municipal Stormwater Permit. The increased intensity of land uses and development within a designated

100-year flood hazard zone could increase flood hazards on- and off-site, but cooperative flood management planning with CCCFCWCD would ensure appropriate flood control improvements are implemented to address future storm flows. The Planning Area is not subject to inundation by seiche, tsunami, or mudflow; therefore, no impacts related to these hazards would result. Implementation of the Hillcrest Station Area Specific Plan would not deplete local groundwater supplies, nor would it significantly affect groundwater recharge or elevations.

IMPACTS AND MITIGATION MEASURES

3.9-1 *Project construction activities could result in increased erosion and sedimentation, resulting in adverse impacts to water quality along East Antioch Creek and downstream waterbodies. (Less than Significant)*

Construction activities, such as site clearing, grading, and excavation, can result in a temporary increase in soil erosion. During the construction period, exposed soils from soil stockpiles and excavated area can be transported by wind or water and, if not managed properly, can accumulate in storm drains and nearby waterbodies, restricting stormflows, reducing storage capacity, and adversely affecting water quality.

Construction activities can also result in the accidental release of hazardous waste products such as adhesives, solvents, paints, and drilling and petroleum lubricants that, if not managed appropriately, can adhere to soil particles, become mobilized by rain or runoff, and degrade water quality. Hazardous waste products used during construction could also infiltrate into groundwater and degrade groundwater quality.

Under the proposed Specific Plan, project construction activities would be required to comply with the City of Antioch's standard conditions of approval regarding grading, drainage, and erosion and sedimentation control, and NPDES General Construction Permit requirements. Full compliance with these standard conditions of approval and NPDES requirements would maintain construction-related erosion impacts at less than significant levels.

As required by City of Antioch Municipal Code, all construction activities are required to implement generally accepted engineering practices for erosion control as deemed necessary by the City Engineer. Construction activities resulting in the disturbance of more than one acre of land would also comply with the NPDES General Construction Permit requirements. In accordance with NPDES permit requirements, project applicant(s) would first submit a Notice of Intent to the SWRCB that includes general information on the types of construction activities that would occur at the site. The applicant(s) or its contractor(s) would develop and submit a Stormwater Pollution Prevention Plan (SWPPP) to the SWRCB describing the erosion control and storm water quality best management practices (BMPs) that would be employed to reduce storm water pollutants to the Maximum Extent Practicable. Construction contractors would be responsible for implementation of the SWPPP, including maintenance, inspection, and repair of BMPs throughout the construction period. Mandatory compliance with the NPDES General Construction Permit requirements and implementation of the site-specific SWPPP would control and reduce discharges of sediments and pollutants associated with runoff from the Planning Area during construction into East Antioch Creek and downstream receiving waters.

Specific Plan Policy that Reduces the Impact

EH-45 Development projects in the Station Area shall comply with the requirements of Provision C.3 of the NPDES Municipal Stormwater Permit issued to the Contra Costa County Clean Water Program. As required by the C.3 Provisions, building permit applications must be accompanied by a Stormwater Control Plan, for review and approval by the City Engineer, which specifies the treatment measures and appropriate source control and site design features that will be incorporated into project design and construction to reduce the pollutant load in storm water discharges and manage runoff flows.

EH-46 Design storm drainage and flood control structures to minimize erosion and creek sedimentation, and to preserve and enhance the wildlife habitat and vegetation of East Antioch Creek.

Mitigation Measures

No mitigation measures required.

3.9-2 ***New and increased intensity of urban land uses could result in increased levels of non-point source pollutants in storm water runoff, adversely affecting water quality in receiving waterbodies and East Antioch Creek. (Less than Significant)***

Implementation of the Hillcrest Station Area Specific Plan would result in an increase in the intensity of urban land uses in the Planning Area, including associated traffic increases. The increase in impervious surfaces and the influx of a larger number of residents, workers, and visitors to the area could result in an increase in non-point source (NPS) pollutants in stormwater runoff. Common NPS pollutants include nutrients, oil and grease, metals, pesticides, and gross pollutants (including bacteria) that are washed by rainwater from rooftops, landscape areas, and streets and parking areas into the drainage network. Pollutant concentrations in site runoff are dependent on a number of factors including: (1) land use conditions; (2) site drainage conditions; (3) intensity and duration of rainfall; (4) the climatic conditions preceding the rainfall event; and (5) implementation of water quality BMPs. Due to the variability of urban runoff characteristics, it is difficult to estimate pollutant loads for NPS pollutants. However, pollutants from the Planning Area would be consistent with residential areas, commercial areas, landscape areas, and parking lots. Elevated levels of oil and grease, petroleum hydrocarbons, metals, and nutrients in site runoff are likely. Without proper mitigation, implementation of the Hillcrest Station Area Specific Plan could contribute to NPS pollutants in East Antioch Creek and the San Joaquin River, and adversely affect water quality.

New development under the proposed Plan would be required to comply with Provision C.3 of the NPDES Municipal Storm Water Permit. In accordance with these updated requirements, new development and redevelopment projects that involve the creation or replacement of 10,000 square feet or more of impervious surfaces are required to incorporate treatment measures and other appropriate source control and site design features to reduce the pollutant load in storm water discharges and manage runoff flows. The municipal permit specifies ways to calculate the required size of treatment devices. Also, in addition to incorporating treatment controls, projects creating or replacing an acre or more of impervious area must also provide flow control so post-project runoff does not exceed estimated pre-project rates and durations. Applicants for individual development approvals must submit a Stormwater Control Plan in accordance with the criteria in

the *Contra Costa Clean Water Program's Stormwater C.3 Guidebook*. The Stormwater Control Plan must demonstrate that the project would not increase stormwater flows and include the necessary stormwater treatment facilities and measures to control pollutant sources.

Full compliance with NPDES C.3 Provisions and the proposed Plan policies listed under Impact 3.9-1 would ensure that impacts related to NPS pollutants and post-construction storm water quality are less than significant.

Mitigation Measures

No mitigation measures required.

3.9-3 *Future development within FEMA 100-year flood hazard zones could pose significant risks to structures, human health, and private property. (Less than Significant)*

Official FEMA FIRMs indicate portions of the Planning Area lie within 100-year flood hazard zones. Areas subject to inundation during the 100-year flood event include a 100- to 300-foot-wide band along the East Antioch Creek channel, the wetland complex in the northeast corner of the Planning Area, and the Oakley and Trembath Detention Basins. Future structures, homes, occupants, and workers in the designated floodplain would be exposed to increased flood hazards. Development in the 100-year flood hazard zone could also impede or redirect flood flows, reduce the carrying capacity of East Antioch Creek, and/or displace flood flows to other areas on- or off-site not currently designated as 100-year flood hazard zones.

The damage caused by a flood event is dependent upon several factors including rainfall distribution, impervious vs. pervious land cover, soil infiltration rates, and the capacity of drainage and flood storage facilities. Depending on the severity of the flood event, flood flows are capable of causing massive erosion and sedimentation, damaging structures and private property, obstructing emergency access or evacuation, and endangering human health and safety.

Both the CCCFCWCD General Flood Protection Standards and the City of Antioch Municipal Code contain provisions pertaining to development within the 100-year floodplain. These provisions are designed to reduce future losses associated with flooding events and to comply with regulations stipulated by FEMA and the National Flood Insurance Program.

Per the municipal code, applications for a floodplain development permit shall be made on forms furnished by the Floodplain Administrator and include, but not be limited to: plans in duplicate drawn to scale showing the nature, location, dimensions, and elevation of the area in question; existing or proposed structures, fill, storage of materials, and drainage facilities; and the location of the foregoing. Specifically, the following information is required:

1) Proposed elevation, in relation to mean sea level, of the lowest floor (including basement) of all structures in Zone AO, elevation of highest adjacent grade and proposed elevation of lowest floor of all structures; or
2) The proposed elevation in relation to the mean sea level to which any structure will be flood-proofed;
3) All appropriate certifications listed in subdivision (4) of division (C) of this section; and

4) A description of the extent to which any watercourse will be altered or relocated as a result of the proposed development.

The City of Antioch Municipal Code specifies that the net effect of any development in the floodplain may not increase the area, velocity, or elevation of floodwaters within the floodway, unless such changes are part of a flood control plan. Project approvals are conditioned by the provision that no increase in flooding will result. Floodplain development permit applications are reviewed by the Floodplain Administrator who determines whether all requirements have been satisfied and either grant or deny the permits.

CCCFCWCD oversees flood control and assists in the development and implementation of storm drainage infrastructure within the City of Antioch and the Planning Area. Areas of special flood hazards are subject to a number of flood protection standards imposed by CCCFCWCD. All new or substantial improvements within a floodplain must have the lowest floor and all electrical and mechanical equipment and services elevated a minimum of one foot above the base flood elevation plus required freeboard, and be flood-proofed such that below the base flood elevation the structure is watertight with walls substantially impermeable to the passage of water. All new improvements shall be anchored to prevent floatation, collapse, or lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy.

Plans by CCCFCWCD to expand the Oakley Detention Basin and construct the Trembath Detention Basin would serve to reduce peak runoff into the main channel of East Antioch Creek during periods of heavy rainfall, increase flood storage, and control downstream flooding. With these improvements in place, the two basins would have a combined storage capacity to accommodate the 100-year storm event. Although funding for these drainage improvements has been secured, a schedule for implementation has not been determined.

The location of the Planning Area along the East Antioch Creek channel and within a FEMA-designated floodplain indicates that area-wide planning must be employed, and special construction methods applied to development within flood-prone areas. Regional flooding mitigation for floodplain development and loss of flood storage must be developed in coordination with CCCFCWCD requirements. Overall floodplain mitigation for implementation of the Hillcrest Station Area Specific Plan would be described in the Master Drainage and Flood Management Plan prescribed by proposed Specific Plan policies. In addition, funding and responsibility for long-term maintenance of the flood control improvements would be assigned as part of the Master Plan.

Comprehensive flood management planning in advance of zoning permits would also ensure implementation of the Hillcrest Station Area Specific Plan would not result in exacerbated flooding on- or off-site.

Proposed high-density development under the proposed Specific Plan would be subject to flood hazards and could result in the displacement of flood flows such that other on- or off-site areas are affected. In addition to the 15.7 acres of 100-year floodplain in the vicinity of the wetland complex in the northeast corner of the Planning Area, development under the proposed Plan would also encroach on the 100-year floodplain of East Antioch Creek in the vicinity of Willow Avenue (approximately 0.6 acres). It is anticipated that encroached upon floodplains will be filled and leveled as part of the grading and development. The majority of the floodplain areas along the East Antioch Creek corridor is designated as part of the wetland buffer and open space.

Mandatory compliance with flood control standards established by FEMA and adopted by CCCFCWCD and the City of Antioch, and coordination with CCCFCWCD regarding flood control improvements would help to reduce flooding impacts to less than significant levels.

Specific Plan Policies that Reduce the Impact

UT-1 Prior to approval of any land subdivisions or development projects within the Hillcrest Station Area, a Drainage and Flood Management Master Plan shall be prepared in collaboration with Contra Costa County Flood Control and Water Conservation District, the City of Antioch Public Works Department, the City of Antioch Planning Department, and the City of Antioch Parks and Recreation Department. The Plan shall:

- Document the overall drainage and flood control concept to be employed within the Hillcrest Station Area to ensure adequate and safe storm flows and to minimize flooding;
- Address funding and responsibility for long-term maintenance of the flood control improvements;
- Demonstrate how the natural hydrologic functions of the site are integrated with the storm drainage system and the overall site design, to the maximum extent feasible; and,
- Identify how improvements can be phased for each development area.

UT-2 Continue the Contra Costa County Flood Control and Water Conservation District Drainage Area Fee Program to fund flood control improvements in the Hillcrest Station Area.

UT-3 Ensure that new development provides needed drainage and flood protection improvements in proportion to a project's impacts, to assure an equitable distribution of costs to construct and maintain drainage infrastructure. Construct new trunk mains along the backbone street alignments and provide connections into East Antioch Creek, as shown conceptually in Figure 6-2, Existing and Future Storm Drains.

UT-4 Minimize total impervious areas by allowing narrow road sections and shared driveways, and using pervious materials on driveways, gutters, and off-street parking areas, where appropriate.

C-7 Promote the use of permeable paving for parking aisles, off-street bike lanes, and parking lots, where feasible.

Mitigation Measures

No mitigation measures required.

3.9-4 *Implementation of the Hillcrest Station Area Specific Plan would alter existing drainage patterns, potentially affecting the volume and/or timing of peak runoff in the municipal storm drain system. (Less than Significant)*

The majority of the Planning Area is currently undeveloped or vacant. A few homes and some industrial uses exist, including a car towing and storage yard and metal smelting facility. Much of the Planning Area is characterized by nonnative grassland, freshwater marsh, and wetlands. Implementation of the Hillcrest Station Area Specific Plan would decrease natural ground cover and increase impervious surfaces (such as paved areas and buildings). Surface water runoff volumes and rates generated from undeveloped, unpaved areas can increase significantly when a site is paved, the impervious surface area increased, and the capability of surface water infiltration reduced or eliminated. Increased runoff volume and peak discharge rates could exacerbate downstream drainage problems, particularly if the capacity of downstream infrastructure is inadequate. Increased detention basin capacity and improvements and expansion of the storm drainage network would be necessary to accommodate future storm flows, provide adequate drainage, and control flooding.

Future expansion of the Oakley Detention Basin and development of the Trembath Basin by CCCFCWCD would serve to reduce peak runoff into the main channel of East Antioch Creek, maintain safe flows, and control downstream flooding during periods of heavy rainfall. The planned improvements to the basins were designed to accommodate runoff from the Planning Area. However, the land use assumptions that were used to plan these improvements must be compared to the land uses and densities proposed in the Specific Plan. Additional detention may be required. As of October 2008, negotiations between private landowners and CCCFCWCD to secure the land and/or flowage easements needed for the planned improvements have not taken place.

In accordance with Provision C.3 of the NPDES Municipal Storm Water Permit, every application for a development project, including but not limited to a rezoning, tentative map, parcel map, conditional use permit, variance, site development permit, design review, or building permit that is subject to the development runoff requirements in the city's NPDES permit must be accompanied by a Stormwater Control Plan that meets the criteria in the most recent version of the *Contra Costa Clean Water Program's Stormwater C.3 Guidebook*. Projects creating or replacing an acre or more of impervious area must provide flow control to ensure post-project runoff does not exceed estimated pre-project rates and durations. The Stormwater Control Plan must demonstrate that the project would not increase storm water flows and include the necessary storm water treatment facilities and measures to control pollutant sources.

Development under the proposed Plan would involve high density residential, office, retail, entertainment, and hospitality uses throughout the Planning Area. Open space would be limited to the East Antioch Creek channel, landscape buffers, and small parks. Surface water runoff volumes and rates are anticipated to increase significantly when the majority of the area is paved and developed. Compliance with the C.3 Provisions of the NPDES Municipal Stormwater Permit, coupled with CCCFCWCD improvements to the Oakley and Trembath Detention Basins in place, would reduce potential impacts related to increases in storm water runoff rates and volume to less than significant.

Specific Plan Measures that Reduce the Impact

Specific Plan policies listed under Impact 3.9-1 and 3.9-3 would contribute to reducing this impact to less than significant levels.

Mitigation Measures

No mitigation measures required.

3.9-5 ***Implementation of the Hillcrest Station Area Specific Plan could inhibit the infiltration of storm water runoff to groundwater, thereby reducing groundwater recharge and aquifer volume. (Less than Significant)***

Potable water supplies for the Planning Area would be derived from surface water sources and would not deplete local groundwater supplies. Water supplies for the City of Antioch and future land uses in the Planning Area would be served by water purchased from Contra Costa Water District, which draws its water from the Sacramento-San Joaquin Delta, and by water pumped by the City of Antioch from the San Joaquin River.

Aside from seasonal variations, groundwater levels in the Tracy subbasin are relatively stable (DWR, 2006). Although an increase in impervious surfaces could inhibit the infiltration of storm water runoff to groundwater within developed areas, planned improvements to the Trembath and Oakley Detention Basins would promote infiltration of storm water. Potential impacts related to groundwater recharge and groundwater levels would be less than significant.

Specific Plan Measures that Reduce the Impact

Specific Plan policies listed under Impact 3.9-1 and 3.9-3 would contribute to reducing this impact to less than significant levels.

Mitigation Measures

No mitigation measures required.

CUMULATIVE IMPACTS

3.9-6 ***Construction activities and urban development resulting from implementation of the Hillcrest Station Area Specific Plan, in conjunction with other foreseeable development in the city, would not result in cumulatively considerable impacts on hydrology and water quality conditions. (Less than Significant)***

Implementation of the Hillcrest Station Area Specific Plan coupled with other reasonably foreseeable future projects in the City would result in adverse cumulative effects on hydrology and water quality including construction impacts related to increases in stormwater runoff and pollutant loading to the East Antioch Creek and San Joaquin River. Future projects, including future development projects under both alternatives of the Hillcrest Station Area Specific Plan, would be required to comply with NPDES C.3 Provision requirements regulate water quality and control runoff and regulate water quality at each development site. New projects would be required to demonstrate that stormwater volumes could be managed by downstream conveyance facilities and would not induce flooding. Therefore, cumulative effects on water quality, drainage, and flooding, in combination with other foreseeable projects, would be less than significant.

Specific Plan Policies that Reduce the Impact:

Specific Plan policies listed under Impact 3.9-1 and 3.9-3 would contribute to reducing this impact to less than significant levels.

Mitigation Measures

No mitigation measures required.

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