3.8 HYDROLOGY AND WATER QUALITY

Introduction

The project corridor traverses three watersheds: the Kirker Creek, West Antioch Creek, and East Antioch Creek that ultimately discharge into the Sacramento-San Joaquin Delta. These hydrological systems support aquatic habitat, receive and drain water from urban runoff and precipitation, and are an important part of the municipal stormwater system.

The Proposed Project could have potential significant impacts on water quality, water supply, and flooding through discharge of pollutants into storm drains or local water bodies, creation of additional surface runoff, and placement of facilities in the floodplain. This section describes the existing hydrology and water quality conditions along the project corridor, and examines the Proposed Project with respect to potential impacts on surface water quality, groundwater, flooding, hydrology, and stormwater runoff. Issues related to water supply are not addressed in this section but can be found later in Section 3.14, Utilities, of this document.

Comments in response to the Notices of Preparation from 2005 and 2008 (see Appendix A) identified concerns pertaining to the amount of runoff that would be generated by the Proposed Project and the adverse impacts of the runoff to existing drainage facilities. These issues are addressed in this section.

Existing Conditions

Climate

Contra Costa County is characterized as having a "Mediterranean" climate with a semi-arid environment of mild winters, warm summers, and moderate rainfall. The western portion, which lies adjacent to the San Francisco and San Pablo Bays, experiences cool summers and mild winters, while the eastern portion of the County experiences hot, dry summers and cool winters. Annual average precipitation is approximately 13 inches. Temperatures range from 30 degrees Fahrenheit (°F) in the winter season to 90°F in the summer.

Drainage

Contra Costa County is bounded by the San Francisco Bay and Sacramento-San Joaquin Delta (Delta) to the east, north, and west. The western portion of the County drains directly into the San Pablo and San Francisco Bays; the eastern portion drains northward into the Delta, which eventually flows into the San Francisco Bay.

Waterways within the County consist of creeks, streams, canals, and unnamed drainage features, many of which have been modified to accommodate increases in the volume of runoff and reduce flooding and erosion. The project corridor traverses three major watersheds: Kirker Creek, West Antioch Creek, and East Antioch Creek. These watersheds all drain into the Delta. Figure 3.8-1 indicates the locations of these three watersheds.

Kirker Creek Watershed. Kirker Creek is the main and westernmost watershed within the project corridor and drains much of the City of Pittsburg and a portion of the City of Antioch. It covers a drainage area of approximately 17.4 square miles and a channel reach length of 9.4 miles.[1] Kirker Creek is a seasonally intermittent creek and experiences high flows from November through April. Parts of the creek receive irrigation and urban runoff that maintain reaches of the creek wet throughout the year. The creek remains largely a natural open channel; however, the lower reaches and its tributaries have been culverted, concreted, and redirected to accommodate urban runoff.[2] Culverts divert the creek underground at road crossings and along a few segments near the Pittsburg-Antioch Highway. Kirker Creek flows under State Route 4 (SR 4), west of Loveridge Road.

West Antioch Creek Watershed. This watershed covers a drainage area of 12.8 square miles and encompasses West Antioch Creek and Markley Creek and two minor water reservoirs.[3] The creeks generally flow north from the hills south of Antioch before merging immediately after crossing SR 4 and ultimately draining into the Delta. The lower watershed has been heavily urbanized, resulting in increased stormwater runoff and cumulative needs for increased conveyance capacity. Channels of West Antioch Creek are open, except where culverts divert creeks underground at road crossings and along a few reaches.

East Antioch Creek Watershed. East Antioch Creek flows from east to northwest, covering a drainage area of 11.4 square miles with channel reach of 7.9 miles.[4] The creek flows north from the hills south of Antioch and drains into the Delta. Several detention basins and levees have been built along East Antioch Creek to promote infiltration and prevent the floodwaters from moving into adjacent subbasins.[5]

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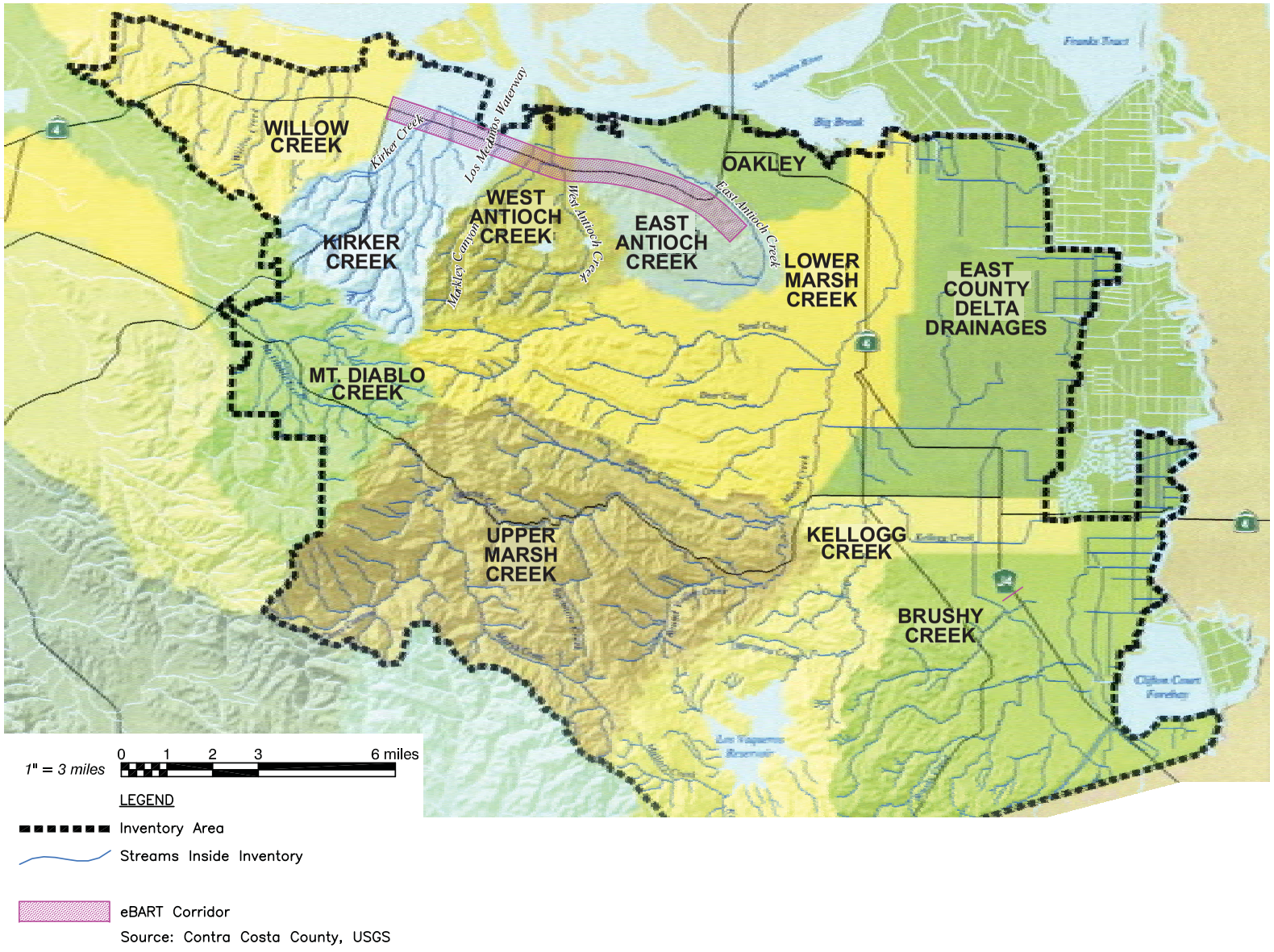
1 Kirker Creek Watershed Planning Group (KCWPG), *Kirker Creek Watershed Management Plan*, Prepared in cooperation with the Contra Costa Water District, January 2004, Available at: http://www.ccrcd.org/Kirker/ full%20book.pdf.

2 Contra Costa County Community Development Department, *Draft Aquatic Resources Inventory, Classification, and Function for East Contra Costa County HCP/NCCP Inventory Area*, 2004.

3 Contra Costa County Community Development Department, *Draft Aquatic Resources Inventory, Classification, and Function for East Contra Costa County HCP/NCCP Inventory Area*, 2004.

4 Contra Costa County Community Development Department, *Draft Aquatic Resources Inventory, Classification, and Function for East Contra Costa County HCP/NCCP Inventory Area*, 2004.

5 Contra Costa County Community Development Department, *Draft Aquatic Resources Inventory, Classification, and Function for East Contra Costa County HCP/NCCP Inventory Area*, 2004.



Source: Contra Costa County, USGS, 2008.

WATERSHEDS IN THE PROJECT CORRIDOR VICINITY
FIGURE 3.8-1

Other Major Surface Waters. In addition to these watersheds and multiple unnamed drainages, the project corridor also crosses the following surface water bodies, as shown in Figure 3.8-2:

- Contra Costa Canal
- Los Medanos Wasteway
- Mokelumne Aqueduct
- Main Canal

Flooding

100-Year Floodplain. The Federal Emergency Management Agency (FEMA) has mapped areas that may be flooded in a 100-year and 500-year storm. Statistically, a 100-year flood has a one-percent chance of occurring in any given year (a flood that would equal or exceed the highest flood recorded in the last 100 years). Similarly, the 500-year flood has a 0.2-chance change of occurring any given year. FEMA Flood Insurance Rate Maps (FIRM) for Contra Costa County were reviewed to identify areas that would be inundated by a 100-year flood. The Proposed Project traverses four major floodplain locations in the segment between the Pittsburg/Bay Point BART Station and Hillcrest Avenue (see Figure 3.8-2):

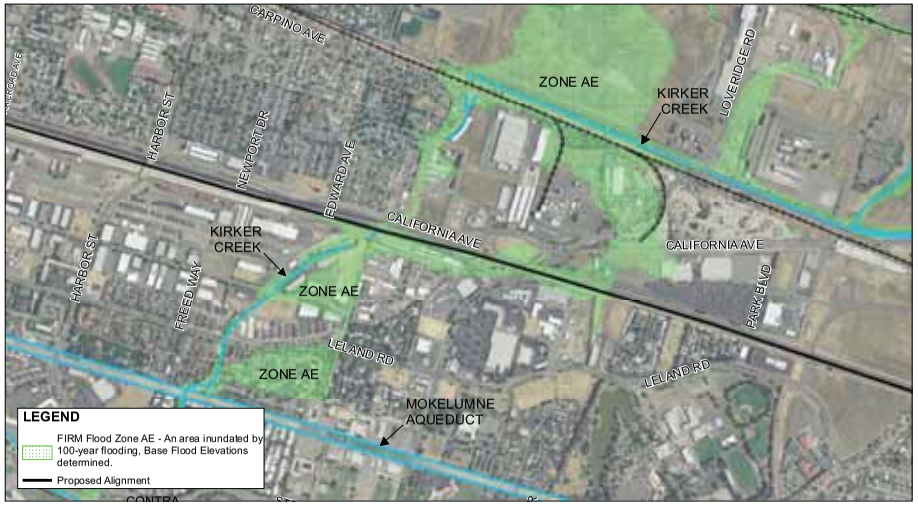
- Kirker Creek and Old Kirker Creek Crossing at Loveridge Road Overcrossing
- A narrow strip along Los Medanos Wasteway
- Markley Creek (predominantly on the southeast quadrant of the SR 4/Contra Loma-L Street Interchange)[6]
- West Antioch Creek Crossing at Contra Loma Boulevard/L Street

The SR 4 profile at the Loveridge Road interchange is depressed, and the low point of the road is below the 100-year water surface elevation of the Kirker Creek and Old Kirker Creek crossing SR 4. The existing pump at Loveridge Road is designed for a 50-year storm and would need to be upgraded to handle a 100-year storm. As a result, the Loveridge Road area has historically experienced flooding. The 1997 and 1998 floods resulted in extended closures of SR 4.[7]

In the Los Medanos Wasteway, Markley Creek, and West Antioch Creek floodplains, there are cross culverts made of reinforced concrete boxes or reinforced concrete pipes. The roadway low points at these elevations are similar to surrounding ground elevations, and therefore

[6] Department of Transportation, *State Route 4 (East) Widening Project – Loveridge Road to State Route 160, Environmental Assessment/Initial Study,* 1994.

[7] Kirker Creek Watershed Planning Group, Contra Costa Resource Conservation Group, *Kirker Creek Watershed Management Plan,* 2004.



A. Kirker Creek Crossing SR 4

B. Los Medanos Wasteway and Markley Creek Crossing SR 4

C. West Antioch Creek Crossing SR 4

D. West and Hillcrest Branch of East Antioch Creek Crossing SR 4

Source: FEMA, September 1987, ESRI

FLOOD HAZARDS ALONG PROJECT CORRIDOR
FIGURE 3.8-2

experience minor flooding.[8] Information on flood hazards and the flooding condition for the 100-year flood within the project corridor is presented in Table 3.8-1.

Table 3.8-1
Floodplain Hydraulic Data in the Project Corridor

Reach	100-Year Peak Discharge in cubic feet per second (cfs)	U/S WS[a] Elevation (ft)	D/S WS[b] Elevation (ft)	Flooding Condition for 100-year flood	SR 4 Encroachment into Floodplain (sq ft)
Kirker Creek	2,168	62.5	54.5	Overtops	113,600
Los Medanos Wasteway	290	55	51.5	Does not overtop	1,200
Markley Creek	470	49	42.5	Does not overtop	1,200
West Antioch Creek	1,380	38	34	Does not overtop	2,400

Source: WRECO, *East Contra Costa BART Extension Hydrology Report*, 2008.

Notes:

a. U/S WS = Upstream Water Surface Elevation

b. D/S WD = Downstream Water Surface Elevation

Each of the above floodplains is rated by FEMA according to risk of flooding and depth of flooding. The relevant flood hazard zones in the project corridor are described below.

- **Zone X** – areas protected from a 500-year flood, areas where average depth of 100-year flood is less than one foot, and areas where the 100-year flood would expand less than one-square mile and be protected by levees. The majority of the project corridor is classified as FEMA Floodplain Zone X.
- **Zone AE** – 100-year floodplains, which include Kirker Creek, Los Medanos Wasteway, Markely Creek, West Antioch Creek crossings and East Antioch Creek as outlined in Figure 3.8-2 and Figure 3.8-3.
- **Zone AH** – areas that would result in shallow ponding (average depth of one to three feet) during a 100-year flood. This zone includes SR 4 at Loveridge Road Overcrossing.
- **Zone AO** – areas of shallow flow in a 100-year flood, which is usually sheet flow or, in sloping terrain, areas with water elevation between one and three feet.

[8] WRECO, *East Contra Costa BART Extension Draft Hydrology Report*, 2008.

Drainage and Flood Control. Drainage facilities in the project corridor are under the jurisdiction of local cities, the County for unincorporated areas, and the Contra Costa County Flood Control and Water Conservation District (CCCFCWCD). The CCCFCWCD has prepared and adopted drainage plans for cities and unincorporated areas of the County. Drainage infrastructure is financed through a variable drainage area flood control improvement fee on new development.

The City of Pittsburg has initiated a SR 4 flood relief project (Stormwater Management Plan) that proposes improvements to all undersized pipes, culverts, and channels located upstream of the Pittsburg-Antioch Highway. The flood relief project would be designed to accommodate a 100-year storm event. At Loveridge Road, the flood relief project would accommodate and convey up to a 100-year storm (3,210 cfs).[9]

In the City of Antioch, shallow flooding often occurs due to insufficient culvert capacity.[10] Flood hazard zones within the project corridor are intermittently located adjacent to East Antioch Creek, and north of the proposed Hillcrest Avenue Station area (see Figure 3.8-3). CCCFCWCD has proposed to enlarge the capacity of the existing Oakley Detention Basin and construct a new detention basin (Trembath Detention Basin). Funding for these drainage improvements has been secured; however, a schedule for implementation has yet to be determined. The two basins would have a combined capacity to accommodate the 100-year peak flows for the entire East Antioch Creek Watershed.

Surface Water Quality

Beneficial Uses. The San Francisco Bay and Central Valley Regional Water Quality Control Boards (RWQCBs) are responsible for developing and enforcing surface water and groundwater quality objectives and implementing plans that will best protect beneficial uses of the waters of the state in the project corridor. The RWQCBs are required to prepare Basin Plans, which determine the beneficial water uses to be protected, water quality objectives needed to protect the designated beneficial water use, and strategies and time schedules for achieving the water quality objectives.

There are no listed beneficial uses for any of the receiving water bodies within the project corridor. According to the San Francisco and Central Valley RWQCBs, where specific water bodies are not identified, the beneficial uses identified in the Basin Plan for the downstream waters are applicable to the water body into which discharge occurs.[11] The Sacramento-San

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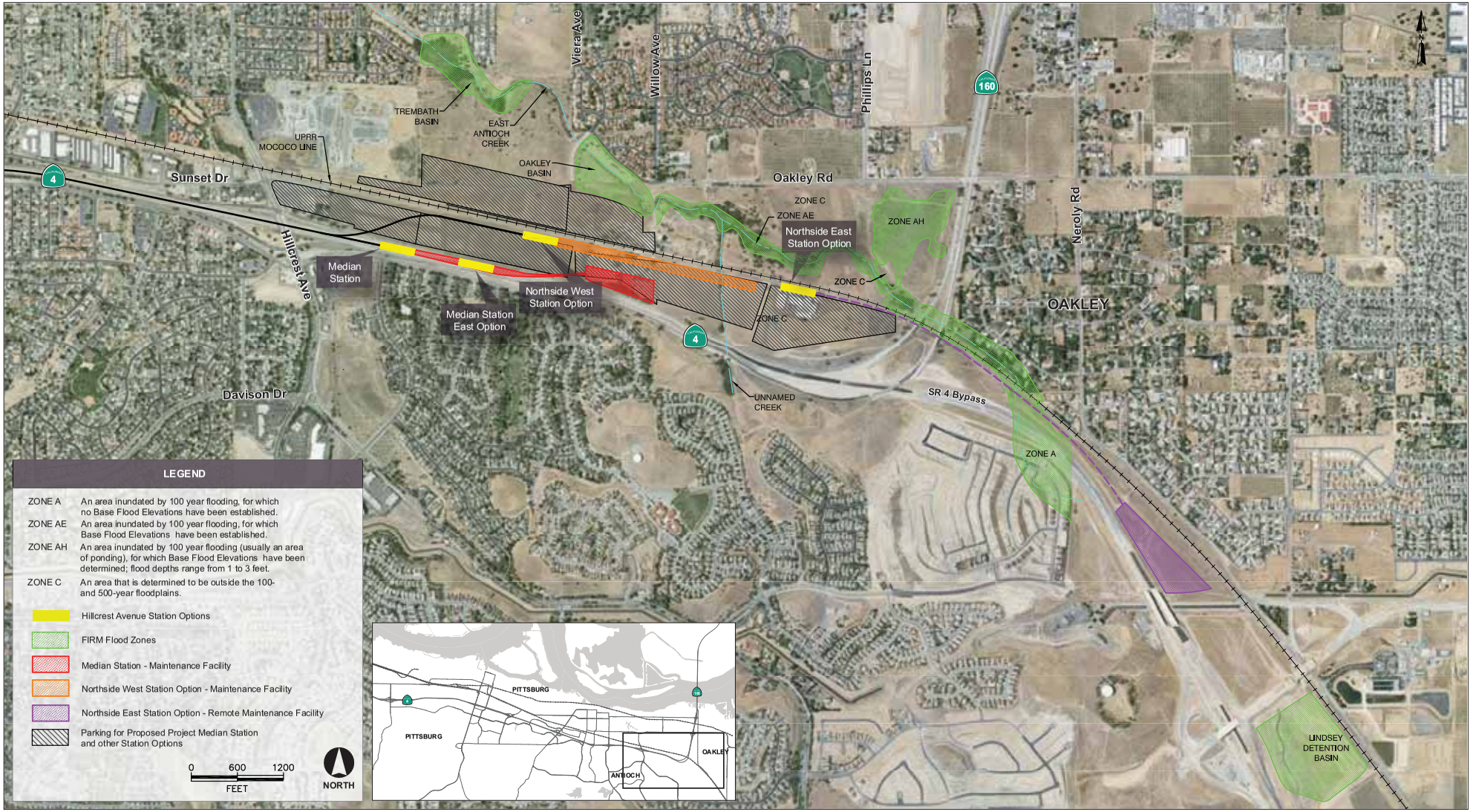
9 Kirker Creek Watershed Planning Group, Contra Costa Resource Conservation Group, *Kirker Creek Watershed Management Plan,* 2004.

10 City of Antioch*, Flood Insurance Study,* 1987-revised.

11 California Regional Water Quality Control Board, Central Valley Region, NPDES Waste Discharge Requirements General Order No. 5-00-175 for Dewatering and other Low Threat Discharge to Surface Waters, 2000.



Source: Google Earth Pro Ver 4.0.2737, 2007; ERM, 2008.

FLOOD HAZARDS IN THE HILLCREST AVENUE STATION AREA
FIGURE 3.8-3

Joaquin River Delta, located 1.3 miles north of SR 4, drains the project corridor waterways and would be the applicable water body. 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.

Impaired Water Bodies. *S*ection 303(d) of the Clean Water Act (CWA) requires that the RWQCBs identify water bodies that do not meet, or are not expected to meet, state or federal water quality standards, or are considered impaired. The affected water bodies, and associated pollutants or stressors, are prioritized in a "303(d)" list. Section 303(d) is further discussed under "Applicable Policies and Regulations." However, none of the direct receiving surface water bodies (Kirker Creek, East Antioch Creek, West Antioch Creek, Markely, Los Medanos Wasteway, Old Kirker Creek) in the project area are listed as impaired water bodies on the 2006 303(d) list.

The Sacramento-San Joaquin River Delta is the indirect receiving water body as it drains the project corridor waterways. This body of water is listed on the 2006 303(d) list[12] for chlordane, DDT (dichlorodiphenyl trichloroethane), dieldrin, dioxin compounds, exotic species, furan, mercury, nickel, PCBS (polychlorinated biphenyls), PCBS (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, urban runoff, and abandoned mine discharges.

Groundwater

The western portion of the project corridor (encompassing the City of Pittsburg) is underlain by the Pittsburg Plain Groundwater Basin (located within the San Francisco Bay hydrologic region). The Pittsburg Plain Groundwater Basin is bounded by Suisun Bay to the north, the Tracy groundwater subbasin of the San Joaquin Valley to the east, and the Clayton Basin to the west. Hydrographs created by the State Department of Water Resources indicate that groundwater levels in the Pittsburg Plain have remained fairly stable over the period of record with the exception of static water level drops and subsequent recovery associated with the 1976 to 1977, and the 1987 to 1992 drought periods.[13]

The eastern part of the project corridor is underlain by the Tracy subbasin (located within the San Joaquin River hydrologic region). The Tracy subbasin is adjacent to, and immediately east

[12] Central Valley Regional Water Quality Control Board, 2006 CWA 303 (d) List, June 2007.

[13] Department of Water Resources, Bulletin No. 118, *Groundwater Basins in California, Pittsburg Plain Groundwater Basin,* Updated February 27, 2004.

of, the Pittsburg Plain.[14] Review of hydrographs indicates that, except for seasonal variation resulting from recharge and pumping, the majority of groundwater in the Tracy subbasin has remained relatively stable over the last 10 years.[15] The primary source of recharge to the area is seepage from streams and percolation of applied irrigation water. Groundwater at East Antioch Creek, in the vicinity of the project area at the site of the proposed 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 (see Figure 3.8-3).[16] Groundwater in the vicinity of the Median Station was recorded at approximately 70 feet bgs.[17] Groundwater flow is generally to the north-northeast.[18]

Groundwater Quality

In general, groundwater quality throughout most of the San Francisco Bay and Central Valley groundwater hydrologic regions is potentially suitable for most urban and agricultural uses with only local impairments. The primary constituents of concern in the San Francisco Bay and Central Valley regions are high total dissolved solids (TDS), nitrate, boron, and organic compounds. Historical and ongoing discharges related to industrial and agricultural activities such as chemical use and spills, underground and aboveground tank leakages, landfill leachate, and gas releases have potentially impacted groundwater quality.

The Pittsburg Plain Groundwater Basin has historic groundwater TDS values ranging from 450 milligrams per liter (mg/L) to 5,737 mg/L, with an average TDS of 1,821 mg/L (historic data from five Department of Water Resources [DWR] wells). These levels are considered within normal range. Other groundwater constituents include inorganics, nitrates, pesticides, and volatile organic compounds (VOCs), all which have been measured (historically) below the maximum contaminant levels (MCLs).[19]

The Tracy Subbasin is characterized by sodium and calcium-type water. The northern region of the subbasin is also characterized by wide anionic water constituents including bicarbonate and chloride (all of these constituents have been measured below the MCL). Based on analysis

[14] Department of Water Resources, Bulletin No. 118, *Groundwater Basins in California*; *San Joaquin Valley Groundwater Basins, Tracy Subbasin*, updated January 20, 2006.

[15] Department of Water Resources, Bulletin No. 118, *Groundwater Basins in California; San Joaquin Valley Groundwater Basins, Tracy Subbasin*, updated January 20, 2006.

[16] Engeo Incorporated, Geotechnical Exploration Oakley and Trembath Detention Basins, Antioch, California, 2006.

[17] Don Dean, BART Contractor, email to PBS&J, May 21, 2008.

[18] Engeo Incorporated, Phase One Environmental Assessment, County Crossings Project, Antioch, California, 2007.

[19] Department of Water Resources, Bulletin No. 118, *Groundwater Basins in California, Pittsburg Plain Groundwater Basin,* Updated February 27, 2004.

of 36 groundwater supply wells within Contra Costa County, TDS historic values ranged between 210 mg/L to 7,800 mg/L with an average of about 1,190 mg/L.[20]

Beneficial Uses. The Pittsburg Plain has potential uses for municipal and domestic water supply, industrial processes water supply, industrial service water supply, and agricultural water supply. The City of Pittsburg supplements its Contra Costa Water District (CCWD) water supply with groundwater from two wells located at City Park and at Dover Way and Frontage Road.[21] Groundwater is not considered a long-term reliable source because of the lack of sufficient high quality water available year round.[22] No beneficial use is documented for the Tracy Subbasin.

Impaired Groundwater. Groundwater at the site of the former Hickson-Kerley property located northeast of the proposed Median Station site and immediately north of the Union Pacific Mococo Line is contaminated with ammonium, manganese, nitrate as nitrogen, and sulfate from the previous fertilizer manufacturing plant. Groundwater monitoring and cleanup activities at the site are under the oversight of the Central Valley RWQCB. Groundwater concentrations have decreased from 820 parts per million (ppm) to 530 ppm ammonium; 380 ppm to 13 ppm manganese; 2,300 ppm to 64 ppm nitrate as nitrogen; and 5,500 ppm to 5,000 ppm sulfate.[23]

Applicable Policies and Regulations

Federal Clean Water Act. The Clean Water Act (CWA) is the primary federal law regulating the discharge of pollutants to waters of the U.S. Under the CWA, the U.S. Environmental Protection Agency (US EPA) has the authority to implement pollution control programs. The US EPA is required to create effluent discharge limits for point sources based on Best Available Technology standards or local water quality standards. The CWA authorizes states to adopt water quality standards for point source and nonpoint sources. The CWA requires all dischargers to obtain National Pollutant Discharge Elimination System (NPDES) permits before discharging any pollutant from point sources into navigable waters.

Section 303(d) requires states and territories to develop a list of water quality limited segments. These are waters that do not meet water quality standards, even after point sources of pollution have installed the minimum required levels of pollution control technology. Jurisdictions are required to establish a priority ranking for water on the lists and develop action plans to improve water quality.

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[20] Department of Water Resources, Bulletin No. 118, *Groundwater Basins in California*; *San Joaquin Valley Groundwater Basins, Tracy Subbasin*, updated January 20, 2006.

[21] City of Pittsburg, *City of Pittsburg General Plan,* December 2004.

[22] Kirker Creek Watershed Planning Group, Contra Costa Resource Conservation Group, *Kirker Creek Watershed Management Plan,* 2004.

[23] California Regional Water Quality Control Board, Central Valley Region, *Executive Officer's Report,* September 2001.

Section 401 and 404 Clean Water Act provisions relating to permits for dredging and filling of wetlands are addressed in Section 3.9, Biological Resources, of this report.

Porter-Cologne Water Quality Control Act. Activities in areas defined as waters of the state, including but not limited to waters of the state that are outside the jurisdiction of the Corps are regulated by the State Water Resources Control Board (SWRCB) under the authority of the Porter-Cologne Water Quality Control Act. The law governs surface and groundwater quality in California and establishes a comprehensive program to protect the quality and beneficial uses of surface and groundwater. The RWQCBs are responsible for the protection of beneficial uses, issuing waste discharge permits, and implementing monitoring programs of pollutant effects.

National Pollutant Discharge Elimination System. The NPDES is a permit system established under the CWA to control water pollution by regulating sources that discharge pollution into waters of the U.S., such as suspended sediment, hydrocarbons, and metals. In California, this system is administered by the SWRCB through the RWQCBs. General NPDES permits have been issued to individual jurisdictions such as Contra Costa County and the cities of Pittsburg and Antioch. These permits require the jurisdictions to enact ordinances and programs to control stormwater pollution.

- **Construction General Permit.** Federal regulations allow for two permitting options for stormwater discharges (general permits and individual permits). The SWRCB adopted one statewide General Permit for Stormwater Discharges Associated with Construction Activity (General Permit Order No. 99-08-DWQ). The General Permit is implemented by the nine RWQCBs, including the San Francisco and Central Valley RWQCBs.

  The NPDES General Permit for Stormwater Discharge associated with construction activities requires that any construction affecting 10,000 square feet or more and has the potential to discharge stormwater to a water body of the U.S. must obtain coverage under the NPDES General Permit. The permit requires that a Stormwater Pollution Prevention Plan (SWPPP) be prepared to identify pollutant sources that may affect the quality of discharges of stormwater associated with construction activities.

  The cities require that all stormwater generated on site after construction that enters surface waters, be pre-treated to reduce oil, sediment, and other contaminants prior to discharge. The cities require that post-construction Best Management Practices (BMPs) be incorporated into development projects to protect water quality and control runoff flow. To obtain coverage under the Construction General NPDES Permit, a complete Notice of Intent (NOI) package to discharge stormwater, and a Notice of Termination (that specifies that activities in the SWPPP have been completed) must be filed with each RWQCB that has jurisdiction over the project.

- **Industrial Stormwater General Permit.** The Industrial Stormwater General Permit (General Permit Order No.97-03-DWQ), also referred to as the General Industrial Permit, regulates discharges associated with 10 broad categories of industrial activities, including transportation maintenance and rail yard facilities. The General Industrial Permit requires the implementation of management measures that will achieve the performance standard of best available technology economically achievable (BAT) and best conventional pollutant control technology (BCT). The General Industrial Permit also requires the development of a SWPPP and a monitoring plan. Through the SWPPP, the permit regulates stormwater discharges associated with equipment fueling, maintenance, and waste disposal (as applicable to the Proposed Project). In addition, the SWPPP identifies sources of pollutants and describes the means to manage the sources to reduce stormwater pollution. The General Industrial Permit requires that an annual report be submitted each July 1. To obtain the Industrial Stormwater Permit, a complete NOI package to discharge stormwater, and a Notice of Termination must be filed with each RWQCB that has jurisdiction over the project.

Contra Costa County Agencies. Multiple agencies, departments, and divisions are responsible for regulating flooding and drainage, and maintaining water quality in the County.

Contra Costa Public Works Department County Flood Control Engineering Division in cooperation with local municipalities oversees flood control within Contra Costa County. This Division provides technical support to the CCCFCWCD, which controls flood and stormwaters in the County. The CCCFCWCD develops drainage plans, specifying flood control improvements needed to serve planned development in the area. Staff coordinates and assists in the development and implementation of storm drainage systems; sets drainage fees; and reviews drainage aspects of land development applications, and flood control and drainage permit applications.

Contra Costa Clean Water Program (CCCWP) encompasses Contra Costa County, 19 incorporated cities, and CCCFWCD. The program monitors the NPDES program and the Storm Water Utility areas for most of Contra Costa County. 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." The CCCWP obtained a Joint Municipal NPDES permit from the San Francisco Bay and Central Valley RWQCBs and have been adopted by the cities of Pittsburg and Antioch.

The San Francisco and Central Valley RWQCBs added Provision "C.3" to the NPDES permit governing discharges from the municipal storm drain systems in the cities of Contra Costa County. The "C.3" requirements are separate from, and in addition to, requirements for erosion and sediment control and pollution prevention measures. The provisions require that developers detain or infiltrate runoff so that peak flows and flow durations match pre-project

flows, and require that project plans implement water treatment measures to treat runoff prior to discharge.

General Plans. The Contra Costa County General Plan (2005-2025) contains various policies regarding potential flooding and protection of water resources in the County. The cities of Pittsburg and Antioch have developed General Plan policies related to flooding and stormwater runoff conveyance that apply within their city limits. Development within the floodplain is regulated through the city zoning ordinances. Floodplain regulations are intended to ensure that floodplain development is safe from flooding and causes no adverse impact on adjacent property and generally includes floodplain mitigation.

Impact Assessment and Mitigation Measures

Standards of Significance

The project would result in significant impacts to hydrology and water quality if it would:

- Alter the existing drainage pattern of the site or area in a manner that would cause substantial flooding, erosion, or siltation;
- Substantially degrade groundwater quality or interfere with groundwater recharge, or depletes groundwater resources;
- Create or contribute to runoff that would exceed the drainage and flood control capacity of existing or planned stormwater drainage systems;
- Place within a 100-year flood hazard area structures that would impede or redirect flood flows, or otherwise expose people and/or property to water-related hazards, such as flooding; and
- Conflict with applicable legal requirements related to hydrology or water quality, including a violation of state water quality standards or waste discharge requirements.

For each water resource and water quality impact topic analyzed below, a level of significance is determined and reported in the italicized summary impact statement that precedes the analysis of each impact topic. Conclusions of significance are defined as follows: significant (S), potentially significant (PS), less than significant (LTS), no impact (NI), and beneficial (B). If the mitigation measures would not diminish potentially significant or significant impacts to a less-than-significant level, the impacts are classified as "significant and unavoidable effects" (SU). For the purposes of this section, HY refers to Hydrology and Water Quality.

Project-Specific Environmental Analysis

Operational Impacts

Impact HY-1 *The Proposed Project would not substantially increase impervious areas, except in the vicinity of the Hillcrest Avenue Median Station where the parking, access improvements, and maintenance annex would introduce considerably more impervious acreage, contribute to additional runoff, and potentially create a flood hazard. (PS)*

SR 4 Median. Project elements proposed within the SR 4 median include the Pittsburg/Bay Point Transfer Platform, the Railroad Avenue Station, and the Hillcrest Avenue Median Station and maintenance facility (with its associated tailtracks).

The Pittsburg/Bay Point Transfer Platform and the Railroad Avenue Station would consist of at-grade station platforms. These two stations and the associated surface parking lots at the Railroad Avenue Station would be sited on existing developed land, and as such, would not contribute more impervious acreage. Additionally, the Proposed Project includes construction of staff building either at the east end of the transfer platform or on the narrow strip of land between SR 4 and Canal Road near the transfer platform. The staff building would include a parking lot, which would also be sited on the strip of land between SR 4 and Canal Road. The staff building and associated parking lot would be sited next to already developed land (SR 4, Canal Road, and an existing parking lot) and would require a relatively small area; therefore, would not contribute impervious acreage that would substantially increase local runoff. As such, the Pittsburg/Bay Point Transfer Platform, the staff building and associated parking lot, and Railroad Avenue Station would not result in additional runoff that could exceed the existing drainage capacity of the stormwater drainage system and result in a flood hazard.

Drainage along the SR 4 median consists of a longitudinal underdrain system collecting stormwater flow and discharge points at various existing highway cross culverts. Deficiencies in culvert capacity have been identified at East Kirker Creek and east of Loveridge Road, due to downstream constrictions. However, the City of Pittsburg and Contra Costa Transportation Authority (CCTA) are proposing storm drain improvements in the SR 4 median as part of the SR 4 widening project which would improve the existing system

deficiencies. The upgraded storm drain improvements would provide adequate system infrastructure to accommodate a 100-year storm.[24,25]

Minimal surface runoff is expected as a result of operational activities from the Median Station and maintenance facility proposed within the SR 4 median. The proposed station and maintenance facility would encompass 0.2 and 3.7 acres, respectively. Drainage for the proposed guideway would be designed for a 100-year storm, as indicated in the Hydrology Report for the Proposed Project.[26] The longitudinal underdrains that would drain the proposed guideway would be designed to tie into the several inlets that provide discharge into the SR 4 cross drains. The SR 4 widening project would upgrade all culverts crossing beneath the proposed guideway in the SR 4 median. Additionally, runoff collected from the project alignment would filter through the pervious ballast and flow into the median underdrain pipe running along SR 4.

Therefore, the Proposed Project elements within the SR 4 median would not substantially increase stormwater runoff as a result of increased impervious areas. No flood hazards are expected as a result of project operations within the SR 4 median, and impacts of increased runoff volumes would be less than significant.

Outside of SR 4 Median. The Proposed Project would site the maintenance annex and surface parking north of the SR 4. In addition, the Proposed Project would extend Slatten Ranch Road and Viera Avenue to provide access to the parking areas for the Median Station. The additional impervious surface area from these components total approximately 51 acres, of which approximately 14 acres would be for year-of-opening parking, 9.8 acres for the extension of Slatten Ranch Road and Viera Avenue, 2.8 acres for the maintenance annex, and another 24 acres for future parking lots.

Furthermore, the Proposed Project would require train control huts along the project corridor to enable the vehicles to be tracked. The train control huts would be located approximately every 1.5 miles along the project alignment and accessible from public roads. The huts would be placed in fenced areas, each approximately 384 square feet. Eight potential locations for train control

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[24] Kirker Creek Watershed Planning Group, Contra Costa Resource Conservation Group, *Kirker Creek Watershed Management Plan,* 2004.

[25] This number is based on the CCCFCWD's Hydro6 and Hydro2 rainfall/runoff program, which computes peak flow rates, runoff volumes and flood hydrographs for storms of various frequencies. It is based on a built-out land use from the 1988 City of Pittsburg General Plan.

[26] WRECO, *East Contra Costa BART Extension Draft Hydrology Report*, 2008.

huts have been identified. All eight huts would cover approximately 0.07 acres.

These undeveloped lands that are proposed for Proposed Project facilities are not served by a municipal storm water drainage system. Existing drainage at these sites either percolates into the soil or flows into nearby drainages; in the case of the Hillcrest Station area, from south to north into culverts that pass under the Mococo Line and discharge into East Antioch Creek. The additional acres of impervious surface at Hillcrest Station would contribute significant surface water runoff which would result in the potential exacerbation of existing constraints in the stormwater drainage system, resulting in local flood hazards. The additional impervious surfaces resulting from the train control huts would be minimal and would not result in local flood hazards.

The project design for the year-of-opening surface parking lot would include bioswales at both ends of the parking lot. The bioswales are proposed to capture and treat surface water runoff from the surrounding parking lot, thereby reducing surface runoff. While the bioswales would capture some of the runoff, there is a potential that additional runoff would drain into the stormwater drainage system.

Furthermore, the additional runoff from the parking lots, maintenance annex, and Slatten Ranch Road would be accommodated by a proposed CCCFWCD detention basin – the Trembath Basin, which would serve to reduce peak runoff into the main channel of East Antioch Creek during periods of heavy rainfall. The proposed Trembath Basin anticipated urban development in this area of the East Antioch Watershed, providing for an estimated storage of 100 acre-feet at maximum level that would be sufficient to accommodate a 100-year flood event. Construction of the basin is anticipated to commence in 2008.[27]

While compliance with the C.3 provisions would maintain peak runoff volumes at existing levels, the drainage facilities for the parking areas and access roads have not yet been designed. During the next stage of design, BART will be responsible for quantifying runoff volumes and rates and designing the detention and drainage facilities to comply with C.3 requirements. In the absence of that information, this EIR conservatively assumes that the increase in runoff could contribute to localized flood hazards in the area north of SR 4 and east of Hillcrest Avenue. This would be a potentially significant impact.

[27] CCCFWCD website, http://www.co.contra-costa.ca.us/depart/pw/design/Project%20Info/trembath.htm. accessed May 22, 2008.

MITIGATION MEASURE. Implementation of Mitigation Measure HY-1.1 would reduce operational impacts of the Proposed Project related to storm and flood capacity to less than significant. (LTS)

HY-1.1 Implement BMPs to control surface water runoff. BART shall ensure that its contractor complies with the Contra Costa County Water Program Phase I NPDES Permit C.3 Provisions to detain and treat the additional surface water runoff generated by the Proposed Project. The permit requires the completion and implementation of a Stormwater Control Plan (SCP), which will contain design measures to minimize surface runoff and amounts of pollutants that enter the storm drain system and/or the natural landscape. BMPs include, but are not limited to, construction of additional basins and/or swales to capture and treat runoff or allow it to infiltrate to groundwater; building roofs and berms over work or storage areas and providing connections to sanitary sewers rather than storm drains; installing flow-through planters or in-ground planters; and construction of bioretention areas and infiltration trenches, among others. BART shall ensure that the contractor incorporates these and/or other BMPs into the Proposed Project with the goal of reducing stormwater runoff volumes and pollutants loading to comply with the C.3 provisions.

Impact HY-2 Operation of the Proposed Project would have a less-than-significant impact on the depletion of groundwater resources or groundwater recharge. (LTS)

SR 4 Median. Operation of the Proposed Project in the SR 4 median would not involve extraction of groundwater. Additionally, the DMU alignment would be constructed with permeable ballast that would allow water to percolate into the ground and, thus, the Proposed Project would not interfere with groundwater recharge. Finally, the proposed sites for the transfer platform and Railroad Avenue Station are currently developed, and, as such, are not expected to contribute any additional impervious surface area or impede groundwater recharge. Therefore, impacts to groundwater recharge from these facilities are expected to be less than significant.

The proposed Median Station platform and maintenance facility (excluding the annex) would encompass 0.2 and 3.7 acres, respectively. As such, these project elements would not substantially increase impervious surface area, and would not result in a significant loss of groundwater recharge potential. Furthermore, the underlying soils in this area are characterized by clay loam, which has low groundwater recharge potential. The natural characteristics of clay loam do not allow for significant groundwater recharge (as baseline

conditions). Therefore, the Proposed Project elements would not significantly alter the existing groundwater recharge rate. Impacts to groundwater resources and/or groundwater recharge as a result of the Median Station and the maintenance facility would be less than significant.

Outside of SR 4 Median. Proposed Project elements outside of the SR 4 median include the parking area (initial year-of-opening and future parking lots), the maintenance annex, and access improvements, such as the extension of Slatten Ranch Road. All of these project components would result in approximately 51 acres of new impervious surface. The increase of impervious surfaces would impede groundwater recharge at these locations.

However, the underlying soils of the project area are characterized by low permeability. Under undeveloped conditions (baseline conditions), these soils have a low recharge potential, and do not significantly contribute to groundwater recharge. As such, new development (or operations) on these soils would not alter the already existing condition of low groundwater recharge potential. Additionally, the initial parking lots to serve the Proposed Project in the year of opening would include bioswales to capture stormwater runoff from the surface lots. These swales would allow for natural treatment of stormwater and potential groundwater recharge. Given the nature of the soils (low recharge potential) and the inclusion of the bioswales, impacts to groundwater resources as a result of the Proposed Project are less than significant.

Furthermore, the Proposed Project would require train control huts along the project corridor. The huts would be placed in fenced areas, each approximately 384 square feet. Eight potential locations for train control huts have been identified, which collectively would cover about 0.07 acres. The Proposed Project also includes possible construction of a staff building at the east end of the transfer platform or on the narrow strip of land between SR 4 and Canal Road near the transfer platform. The staff building would include a parking lot, which would also be sited on the strip of land between SR 4 and Canal Road. The staff building and associated parking lot would be sited next to already developed land (SR 4, Canal Road, and an existing parking lot). These facilities would not contribute significantly to the amount of impervious surface in the project corridor and thus would not impede groundwater recharge. Additionally, no drinking extraction wells are proposed as part of the Proposed Project. Accordingly, no impacts would occur on groundwater resources and/or groundwater recharge.

Impact HY-3 The proposed tunnel between the maintenance facility and the maintenance annex would not affect local groundwater flow. (LTS)

The Median Station would include a tunnel under SR 4 for access between the maintenance facility in the SR 4 median and the maintenance annex just north of SR 4. The tunnel depth would be up to 30 feet deep.[28] Groundwater in the vicinity of the Median Station is encountered at approximately 70 feet bgs.[29] The maintenance annex would be built on hilly terrain at a higher elevation than the Median Station and maintenance facility. As a result, it is unlikely that the tunnel between the maintenance facility and the maintenance annex would encounter groundwater.

However, in the unlikely case that groundwater is present (at some point) during the operation of the tunnel, impacts are not anticipated. This is because during construction, BART would require that exterior membrane waterproofing be applied to the subway box. Any potential leakage into the tunnel through the walls would be conveyed away by the track drainage. Therefore, the tunnel between the maintenance facility and the maintenance annex would have less-than-significant impacts on groundwater flow.

Impact HY-4 The Proposed Project would not place people and property within a 100-year flood hazard area. (LTS)

The DMU guideway in the SR 4 median traverses four floodplain areas: Kirker Creek and Old Kirker Creek Crossing at Loveridge Road, Los Medanos Wasteway, Markley Creek, and West Antioch Creek at L Street/Contra Loma Boulevard. The floodplains associated with Los Medanos Wasteway, Markley Creek, and West Antioch Creek are minor floodplains and stormwaters would not overtop the banks of these waterways during a 100-year storm. These three floodplains would not significantly affect the Proposed Project facilities or operations.

At Loveridge Road, SR 4 is below the 100-year storm elevation of Kirker Creek and Old Kirker Creek. During a 100-year storm, the depressed area at the Loveridge Road interchange normally floods. As indicated in the Hydrology Report,[30] the SR 4 profile at this location would result in stormwaters overtopping SR 4 during the 50-year storm. As a result, Proposed Project passengers could be exposed to a flood hazards in this stretch of the alignment.

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28 Don Dean, BART Contractor, email to PBS&J, May 21, 2008.

29 Don Dean, BART Contractor, email to PBS&J, May 21, 2008.

30 WRECO, *East Contra Costa BART Extension Draft Hydrology Report*, 2008.

The SR 4 widening project was evaluated for flood impacts as part of that project's Initial Study/Environmental Assessment (IS/EA). Because of potential flood hazards, measures were identified to upgrade the existing pump station at the Loveridge Road interchange (to provide SR 4 with protection from a 100-year storm), improve the existing outfall for the Loveridge drainage system, and aggressively clean out the box culverts and pipes downstream of SR 4. In addition, Caltrans would install box culverts designed for a 100-year storm at the Loveridge Road interchange.

Furthermore, in recognition of this flood hazard and separate from the Caltrans proposal, the City of Pittsburg has initiated a SR 4 flood-relief project to alleviate flooding impacts at the Loveridge Road interchange and other surrounding areas. At Loveridge Road, the flood relief project would be designed to accommodate and convey up to a 100-year storm (3,210 cfs).[31]

In recognition of the flood hazards at this low point in the SR 4 profile, BART has designed the vertical alignment of the project guideway so that the sub-ballast would be above the surface water elevation of the 100-year storm of Kirker Creek.[32] In addition, the sub-ballast would be permeable, which would allow the surface water runoff to seep into the subsurface and/or drain into the surface water inlets, reducing the potential for flooding. The longitudinal underdrains that would provide drainage for the DMU guideway would tie into several inlets, which provide discharge into the SR 4 crossdrains.

In summary, given the proposed design features for the project alignment and the on-going drainage facility upgrades, the Proposed Project is not expected to exacerbate flooding and/or place people and structures in a flood hazard area. Therefore, the Proposed Project would have less-than-significant impacts with regards to the potential of exposing people and/or properties to a flood hazard area.

Impact HY-5 *Operation of the Proposed Project would increase the pollutant load of stormwaters that could affect water quality in local water bodies. (PS)*

During the operation of the Proposed Project, major sources of pollutants that can be conveyed by stormwater runoff include contaminants that have accumulated on impervious surfaces such as parking lots and pedestrian walkways; paved areas and rooftops of the station, maintenance facility, and maintenance annex; and railroad tracks (including tailtracks). The transport of

[31] Kirker Creek Watershed Planning Group, Contra Costa Resource Conservation Group, *Kirker Creek Watershed Management Plan,* 2004.

[32] WRECO, *East Contra Costa BART Extension Draft Hydrology Report*, 2008.

these contaminants and the subsequent discharge into receiving waters could degrade water quality in the receiving waters.

Common pollutants associated with the operation of the Proposed Project include nutrients, oil and grease, metals, organics, pesticides, and gross pollutants (including bacteria). The parking lots would contain pollutants such as hydrocarbons, oils, and trace metals related to automobiles. The maintenance facilities could be a source for hydrocarbons, oil, and trace metals from automated train washing of the exterior of the vehicles, blowdown from undercarriage cleaning and maintenance of the DMU vehicles, and potential spill or leaks from the fueling of vehicles and from vehicles in the parking area. Other sources of water quality impacts could be the mismanagement in the handling, storage, and disposal of chemicals at the station areas, as well as the maintenance facilities. These pollutants could be transported by runoff, delivered to local waterbodies, and affect the water quality and aquatic resources. The main local waterbody in the area of the Proposed Project that could be affected by these pollutants is East Antioch Creek, which, if polluted, could affect San Joaquin River and eventually the Bay Delta.

Landscaping around the surface parking lots could be a source for nutrients, such as nitrogen and phosphorous derive from fertilizers applied to landscaping, degradation of organic material, and atmospheric deposition. Similarly pesticides applied to landscaped areas of the Proposed Project can enter receiving waters and, if in sufficient concentrations, be toxic to aquatic organisms and bioaccumulate in larger species such as birds and fish.

The Proposed Project calls for wastewater from the maintenance facility activities, such as train washing, to be collected by an underground system and routed to an on-site treatment facility prior to discharge into the municipal sewer system. The on-site treatment facility would consist primarily of an oil-water separator in which the oil and sediment would be captured prior to discharging the wastewater into the sanitary sewer system. Runoff from the maintenance facility parking area would be treated prior to discharge into local storm drains and water bodies. These project design features would minimize the potential water quality impacts from operations of the maintenance facility.

While the above mentioned project elements would help minimize potential surface water quality impacts, such impacts could still pose a significant impact to water quality.

MITIGATION MEASURE. In addition to project design elements already included as part of the Proposed Project, the following measure would reduce water quality impacts to a less-than-significant level. (LTS)

HY-5.1 Implement stormwater management BMPs. BART shall ensure that its contractor implements stormwater BMPs in accordance with the NPDES General Industrial Permit. As required by the permit, a SWPPP shall be prepared in order to document and identify pollutants and describe BMPs to reduce stormwater pollution. Through the SWPPP, the permit regulates stormwater discharges associated with equipment fueling, maintenance, and waste disposal. BMPs that could be included in the SWPPP and implemented for the Proposed Project include:

- strip retention system to treat runoff prior to discharge;
- oil/water separators to prevent contaminated stormwater from entering drainage system;
- construction of additional detention basins and/or use of pervious pavement in order to allow infiltration of stormwater into the soil where runoff could be filtered naturally and pollutants removed; and
- installation of rain barrels near the roofs at the Median Station and/or maintenance facilities.[33]

Construction Impacts

Impact HY- 6 Construction of the Proposed Project would involve ground-disturbing activities, which could result in soil erosion and siltation that could exacerbate and/or cause flooding. (PS)

Construction activities, such as site clearing, grading, and excavation, can expose soil to erosion. If transported by wind or water, silt from erosion can accumulate in storm drains and local water bodies, restricting stormwater flow and reducing capacity. Accumulation of silt in storm drains and water bodies can exacerbate and/or result in localized flooding.

Construction within the SR 4 Median. The Pittsburg/Bay Point Transfer Platform would consist of an at-grade, 700-foot station platform and no parking. The Railroad Avenue Station would also consist of an at-grade station platform and parking on land that is currently developed as a park-and-ride lot. Ground-disturbing activities at these two facilities would not expose soil to substantial erosion since the areas are already disturbed or relatively small in size. Construction activities from these project elements would have less-than-significant impacts on potential flooding caused by soil erosion and siltation.

[33] Aboveground water storage container that captures runoff from the roof.

In addition to the construction of the transfer platform and the Railroad Avenue Station, construction of the Proposed Project within the SR 4 median would involve site clearing, grading, and minor excavation for the installation of track sub-ballast, ballast, ties, rails, and an underdrain system along portions of the corridor,[34] and construction of aerial and bridge structures and pedestrian walkways. Project components proposed in the SR 4 median include the Median Station and maintenance facility.

Caltrans is currently widening SR 4 between Loveridge Road and SR 160. The highway widening would involve installation of piles and foundations for the aerial structures and bridges at Loveridge Road, on the west side of Century Boulevard, and at Somersville Road, L Street, A Street, Cavallo Road, and the utility corridor. These activities would not disturb natural ground surfaces, and thus would not result in significant erosion and sedimentation during construction such that eroded soils could obstruct waterways and cause flooding. Therefore, construction of the Proposed Project within the SR 4 median would result in a less-than-significant impact with regards to potential flooding caused by erosion and sedimentation.

Construction outside the SR 4 Median. Outside the SR 4 median, the Proposed Project would involve construction of a pedestrian bridge for access to the Median Station, approximately 40 acres of surface parking, a 2.8-acre maintenance annex northeast of the Median Station, and 9.8 acres for extensions of Slatten Ranch Road and Viera Avenue to access the station and parking areas. Existing stormwater runoff in this area of the Proposed Project flows from south to north into culverts that pass under the Mococo Line and discharges into East Antioch Creek. CCCFCWD is proposing to construct the Trembath Basin, which would accommodate stormwater flows from East Antioch Creek and the surrounding area, which includes the Median Station area. Construction of the basin is proposed to commence in 2008 and would be in place by the opening of the Proposed Project in 2015.

Construction of these project components could have significant erosion and siltation impacts from construction because the activities would temporarily disturb a substantial area (approximately 51 total acres) and expose soils and soil stockpiles to erosion. Eroded silt could accumulate and clog culverts to the north, restricting runoff into East Antioch Creek and causing localized flooding upstream of the Mococo Line. As such, erosion during construction activities for project components outside the SR 4 median could result in potentially significant flood impacts.

[34] PGH Wong Engineering, Inc., *East Contra Costa County Transit Project (eBART), Service from Pittsburg to Hillcrest Avenue, Construction Implementation Report*, 2007.

In contrast, the staff building and associated parking lot at the Pittsburg/Bay Point Transfer Platform would entail minimal grading and construction, and therefore would not contribute substantially to construction-period soil erosion and siltation. Similarly, construction of the train control huts would entail minimal grading work along the project corridor, since they collectively affect about 0.07 acres. Accordingly, these project components would result in negligible amounts of silt and erosion.

MITIGATION MEASURE. The following mitigation measure would reduce erosion impacts as a result of construction outside of the SR 4 right-of-way to less-than-significant levels. The measure, which calls for development of a SWPPP with specific erosion and sediment BMPs, may be combined with Mitigation Measure GEO-7.1, Mitigation Measure HY-1.1, and Mitigation Measure HY-5.1, all of which involve adoption and implementation of BMPs. (LTS)

HY-6.1 Develop and implement a SWPPP outlining specific erosion and sediment BMPs. BART shall ensure that the contractor obtains an NPDES permit and prepares a SWPPP prior to construction. The SWPPP shall identify specific erosion and sediment BMPs to be implemented during construction to control and minimize erosion impacts. Measures that could be implemented include, but are not limited to:

- Use of erosion blankets and silt fences and sedimentation ponds to remove suspended fine material from runoff;
- Temporary and permanent seeding of disturbed areas and soil stockpiles;
- Stabilization of construction area entrances and exits;
- Use of straw rolls, sediment fences, straw bales, and/or sediment traps to prevent sediment-laden runoff from leaving the construction area;
- Use of temporary dikes to re-direct or control runoff;
- Construction scheduling, such as phasing and season avoidance, to minimize erosion and sediment;
- Perimeter protection such as straw wattles or silt fences;
- Check dams to prevent gully erosion and/or slow runoff flow rates to allow sediment to settle out;

- Gravel bag berm/barriers to prevent runoff or run-on of surface water flows;
- Street sweeping and vacuuming to remove vehicle-tracked soil and sediment;
- Storm drain inlet protection such as filter bags and perimeter protection;
- Stabilized construction entrances to prevent vehicle tracking of sediment and debris on roadways; and
- Wind erosion control BMP such as soil stabilizers (would require more water quality modeling), wetting down of dry sediment, or covering exposed surfaces.

Impact HY-7 *Excavation of the tunnel to the maintenance annex would not be expected to encounter groundwater or require dewatering activities. However, if encountered, groundwater impacts and construction dewatering would be minimal and would not adversely affect groundwater resources. (LTS)*

The Proposed Project involves construction of a tunnel under SR 4 for access from the maintenance facility in the SR 4 median to the maintenance annex located just north of SR 4. The tunnel depth would be at most approximately 30 feet bgs. Groundwater in the vicinity of the Median Station is encountered below 70 feet bgs.[35] Due to the variability in topography in this area (very hilly), the maintenance annex would be sited at a higher elevation than the Median Station and maintenance facility. At the elevation of the proposed maintenance annex, the groundwater level is expected to be more than 70 feet bgs, making it very unlikely that groundwater would be encountered during construction activities. Therefore, groundwater intrusion and dewatering, if any, would be minimal. As a result, impacts to groundwater resources from construction activities would be less than significant.

Impact HY-8 *Construction activities for the Proposed Project could violate water quality standards. (PS)*

Construction activities associated with the Proposed Project could result in water quality impacts to local water bodies (e.g., East Antioch Creek). As previously discussed in Impact HY-6, sediment release would occur as a result of ground-disturbing activities exposing soil to erosion and siltation. Erosion and siltation, in addition to other potential contaminants (described below),

[35] Gary Parikh, Parikh Consulting, email to BART, May 20, 2008.

would result in the accumulation of surface water contaminants which could degrade water quality.

Within the SR 4 median, construction activities would occur for the Median Station, the maintenance facility, and associated tracks. Outside the SR 4 median, construction activities would occur for the surface parking lots (both Phase 1 and future parking), the maintenance annex, and requisite access improvements. In total, approximately 54 acres would be disturbed within the SR 4 median and approximately 51 acres would be disturbed outside the median.

Construction activities associated with the above mentioned project elements would include excavation and trenching for foundations and utilities, soil compaction, and site grading, all of which would temporarily disturb soils. Disturbed soils are susceptible to high rates of erosion from wind and rain. Erosion and sedimentation affects water quality through interference with photosynthesis, oxygen exchange, and the respiration, growth, and reproduction of aquatic species. Additionally, other pollutants, such as nutrients, trace metals, and hydrocarbons, can attach to sediment and be transported downstream, which could contribute to the degradation of water quality. For the Proposed Project, surface water pollutants can be transported downstream from East Antioch Creek and into the Sacramento-San Joaquin River Delta.

Additionally, the delivery, handling, and storage of construction materials and wastes, as well as the use of construction equipment, could result in accidental releases of oil and grease, hydrocarbons, and other pollutants. Staging areas and the maintenance facilities can also be sources of paints, solvents, cleaning agents, and metals during construction. The effects associated with metals in stormwater include toxicity to aquatic organisms, such as bioaccumulation, and the potential contamination of drinking supplies.

Pesticide use (including herbicides, fungicides, and rodenticides) associated with site preparation work is another potential source of stormwater contamination. Pesticide impacts to water quality include toxicity to aquatic species and bioaccumulation in larger species. Larger pollutants, such as trash, debris, and organic matter, are additional potential sources of water quality degradation during construction.

There are no direct receiving water bodies listed as impaired (by the 2006 303 (d) list). The nearest applicable body of water in the vicinity of the Proposed Project is the Sacramento-San Joaquin River Delta. The Sacramento-San Joaquin River Delta is the indirect receiving water body, as it captures all of

the major water drainage from West Antioch Creek, East Antioch Creek, and Kirker Creek. The Sacramento-San Joaquin River Delta is listed on the 2006 CWA 303(d) for chlordane, DDT (dichlorodiphenyl trichloroethane), dieldrin, dioxin compounds, exotic species, furan, mercury, nickel, PCBs (polychlorinated biphenyls), PCBs (dioxin-like), and selenium. While most of these pollutants are generally not anticipated to result from construction activities of the Proposed Project, a possibility still exists that some of these contaminants, such as metals, could be introduced into East Antioch Creek which would further degrade water quality downstream.

Therefore, construction activities associated with all project elements would result in potentially significant impacts to water quality and water quality standards.

MITIGATION MEASURES. In addition to implementing Mitigation Measure GEO-7.1 and Mitigation Measure HY-6.1, which require adoption and implementation of BMPs, the following measures would further reduce water quality impacts from construction to less-than-significant levels. (LTS)

HY-8.1 Develop and implement a SWPPP outlining specific stormwater discharge BMPs. BART shall ensure that its contractor complies with the NPDES Construction General Permit including preparation of the SWPPP for construction activities. The SWPPP may include, but would not be limited to, BMPs listed below:

a) Vehicle and Equipment Operation BMPs

- Construction equipment to be brought to the site no sooner than it is needed and removed from the site as soon as practical. Major equipment overhaul will take place off site.
- Vehicle and equipment maintenance to occur off-site to prevent discharges of fuel and other vehicle fluids.
- Vehicle and equipment fueling to take place in a contained staging area to prevent discharges of fuel and other vehicle fluids.

b) Waste Management and Materials Management BMPs

- Materials to be stored either off-site or under cover. Hazardous materials to be stored in contained areas.

HY-8.2 Develop and implement a SWPPP outlining specific measures to prevent and control hazardous materials releases during construction. BART shall ensure that the contractor prepares a SWPPP that includes a Spill Prevention Plan outlining measures to

control hazardous materials storage. This plan would include, at a minimum, the following measures:

- Periodic inspection of hazardous materials storage area to ensure containers are properly labeled, containers are securely covered, containers are stored on secondary containment, and each site is equipped with spill kits;
- Employee hazardous materials training and awareness;
- Spill reporting procedure; and
- Storage of hazardous materials at a considerable distance from the site of the tunnel.

Hillcrest Avenue Station Options Analysis

The Hillcrest Avenue Station options include the Northside West, Northside East, and Median Station East. All of the station options would have similar sized facilities (parking areas and station facilities) as the Proposed Project, resulting in approximately the same areas of ground disturbances during construction and in impervious surface area post-construction for these project elements. Table 3.8-2 shows the amount of impervious surface area associated with each station option. As a result, the options would have hydrology and water quality impacts similar to those described for the Median Station. The primary differences are that the station options would each involve maintenance facilities north of SR 4, that the lengths of the access roads vary, and that the remote maintenance facility associated with the Northside West and Northside East Station options would be located on a created wetland (described further in Section 3.9, Biological Resources). In addition, construction for the Northside East Station and Median Station East options would involve greater ground-disturbing activities than the Proposed Project. For these project elements and activities, the station options would have hydrology and water quality impacts different than described for the Proposed Project. These differences in impacts are presented below.

Operational Impacts

Impact HY-9 *Operation of the remote maintenance facility would substantially increase impervious acreage in the East Antioch Watershed, further increasing runoff to local storm drains. (PS)*

The analysis below applies to the remote maintenance facility which is a component of the Northside East Station option and an option under the Northside West Station option. The proposed remote maintenance facility would be located near Laurel Road and would encompass about 8.8 acres.

Table 3.8-2
Impervious Surface Area for Hillcrest Avenue Station Options

Hillcrest Avenue Station Option	Total Impervious Area (acres)[a]
Median Station (Proposed Project)	55.1
Northside West Station Option	60/61.2[b]
Northside East Station Option	63.1
Median Station East Option	56.6

Source: PBS&J, 2008.

Notes:

a. These acreages do not include trackwork.

b. The Northside West Station option involves two possible locations for the maintenance facility. One location would be immediately east of the station, and the other location would be at the remote maintenance facility. The greater acreage is associated with the remote maintenance facility.

Under existing conditions, runoff at the site proposed for the remote maintenance facility drains into a conveyance channel flowing northwest and eventually into the City of Antioch's stormwater system. Currently, a created wetland sits at the location of the proposed remote maintenance facility, providing drainage benefits and habitat area.

The remote maintenance facility would potentially replace 1.4 acres of wetlands and 7.4 acres of open space (ruderal habitat) with impervious surface. The increased impervious surface would result in greater surface water runoff from the site and discharge into the local stormwater drainage system. Currently, the SR 4 Bypass is being constructed immediately to the west and construction is underway for a subdivision just west of the SR 4 Bypass. Additionally, there are plans for the Laurel Road interchange with SR 4 Bypass. Drainage plans have been prepared for all of these projects. However, because the expected runoff volume and storm drain capacities are unknown for the area of the proposed remote maintenance facility, incremental runoff as a result of the remote maintenance facility could have a significant impact on local storm drains.

MITIGATION MEASURES. The following measures, in combination with Mitigation Measure HY-1.1, would reduce runoff impacts of the remote maintenance facility to less than significant. Mitigation Measure HY-1.1 recommends the implementation of BMPs to control surface water runoff. (LTS)

HY-9.1 *Prepare and implement drainage plan*. BART shall ensure that the contractor prepares a drainage plan for the Hillcrest Avenue Station option, for review by the City of Antioch and the CCCFCWCD. The purpose of the drainage plan is to help control the additional surface water runoff expected from the project in accordance with the NPDES C.3 provisions and input from the local agencies. BART will then ensure that the contractor implements the drainage plan to safely and efficiently convey stormwaters from the remote maintenance facility.

HY-9.2 *Implement permanent vegetated swales at the remote maintenance facility*. To minimize storm and flood capacity impacts, BART shall ensure that its contractor diverts and controls stormwater runoff by using permanent swales. Vegetated swales would have multiple functions as they would allow infiltration of the stormwater runoff from parking areas and the rooftop of the maintenance facilities to the maximum extent practicable, reduce post-construction storm flow rate, and contribute towards groundwater recharge.

The vegetated swales shall be frequently monitored at least bi-annually or as frequently as needed to maintain their effectiveness. Frequency and recommended monitoring activities are outlined below:

- Inspect grass along side slopes for erosion and formation of rills or gullies and correct;
- Remove accumulated trash and debris;
- Inspect and correct erosion problems in the sand/soil bed of dry swales;
- If original grass cover has not been successfully established, plant alternative grass species;
- Replant wetland species (for wet swale) if not sufficiently established;
- Remove sediment build-up within the bottom of the swale once it has accumulated to 25 percent of the original design volume; and
- Mow grass to maintain a height of 3 - 4 inches.

Impact HY-10 The tracks associated with the proposed remote maintenance facility for the Northside East and Northside West options would encroach into a 100-year floodplain. (PS)

The tracks associated with the remote maintenance facility for the Northside East Station and the Northside West Station options would cross the 100-year floodplain in the vicinity of the SR 160 and SR 4 interchange. While passengers would alight the trains at the Hillcrest Avenue Station and thus not be on the trains in this segment, train operators would direct the trains into the remote maintenance facility, exposing the operators, vehicles, and trackwork to the 100-year flood hazards, a potentially significant impact.

MITIGATION MEASURE. The following mitigation would ensure that operational impacts of the Northside West and Northside East Station options related to flood hazards are reduced to less-than-significant levels. (LTS)

HY-10.1 Elevate structures above the flood zone. The tracks shall be elevated above the flood elevation to minimize flood hazards.

Construction Impacts

Impact HY-11 Construction of the Northside East Station option, and to a lesser degree the Median Station East option, would involve extensive ground-disturbing activities that could cause siltation into East Antioch Creek and the unnamed creek. Siltation could also affect the created wetland at the site of the remote maintenance facility and reduce the flood storage capacity. (PS)

Construction activities, such as site clearing, grading, and excavation, can result in potential soil erosion. If transported by wind or water, silt can accumulate in storm drains and local water bodies, restricting stormwater flow and reducing storage capacity.

Existing runoff at the sites proposed for the remote maintenance facility, parking lots, and access roads either flows north into the unnamed creek and/or into an existing culvert. From the location of the proposed remote maintenance facility, the culvert extends northwest, crosses under the Mococo Line and conveys drainage through the Hillcrest Avenue development area, and into the City of Antioch's stormwater system. The site clearing, grading, and excavation activities would disturb a substantial amount of land for station area components. In particular, the surface parking lots for the Northside East Station option would require grading two hills along the northside of SR 4, which would involve considerably more earthwork than any of the other Hillcrest Avenue Station options. This option would also involve either a short

or long tunnel (to connect the station to the SR 4 median), which would result in further removal and stockpiling of soil. In addition, the maintenance facility of the Median Station East option would require grading of the two hills along the north side of SR 4. This grading would be to a lesser extent than the Northside East Station option but greater than the other two options. The potential erosion and sedimentation from the earthwork associated with the construction of the Northside East Station option and the maintenance facility of the Median Station East option suggests that these options have a greater potential to adversely impact local drainage and cause localized flooding.

In addition, the proposed remote maintenance facility associated with the Northside East and possibly the Northside West options would be sited potentially on a created wetland created as mitigation for the SR 4 Bypass Project. Wetlands reduce erosion by trapping silt flowing into interconnecting water bodies and control flooding by impeding runoff, thereby offering flood control. Construction in the area of the remote maintenance facility could disturb the wetland and remove plants that would otherwise trap silt. Filling the wetland would result in the permanent loss of its flood storage function, thereby contributing to potential on-site and off-site flooding impacts. The sediment and silt from the construction activity could also affect the Contra Costa Canal, immediately south of the proposed site for the remote maintenance facility.

The extensive ground disturbance and resultant erosion and sedimentation of this station option would result in a greater significant impact than identified for the other Hillcrest Avenue Station options.

To a lesser degree, the Median Station East would require grading of the steeper slopes near SR 160 for the maintenance facility and maintenance access tunnel north of SR 4.

MITIGATION MEASURES. Implementation of Mitigation Measures HY-8.1, HY-8.2, and HY-9.1 would reduce erosion, siltation, and flooding construction impacts of the Northside East Station and Median Station East options to less than significant. Mitigation Measure HY-8.1 proposes development and implementation of a SWPPP outlining stormwater discharge BMPs, Mitigation Measure HY-8.2 proposes development and implementation of a SWPPP outlining measures to prevent and control hazardous material releases during construction, and Mitigation Measure HY-9.1 recommends the preparation and implementation of a drainage plan. (LTS)

Cumulative Analysis

The cumulative impact assessment area for the Proposed Project in combination with other foreseeable development would be the Kirker Creek and West and East Antioch watersheds. These watersheds drain the project corridor and development in these watersheds could, combined with the Proposed Project, affect local drainage, flood hazards, and water quality. The East Contra Costa County study area is one of the fastest growing portions of the San Francisco Bay. The Association of Bay Area Governments (ABAG) projections suggest that population along the project corridor would increase from 167,671 to 232,000 between the years 2000 and 2030. The areas surrounding the project corridor are undergoing significant residential and commercial development, with the construction of higher density/mixed-use projects especially near the Railroad Avenue and Hillcrest Avenue Stations. The City of Pittsburg is currently developing a Ridership Development Plan for the potential development of 1,845 new residential units and about one million square feet of commercial space near the Railroad Avenue Station, and the City of Antioch is preparing a plan that envisions up to approximately 2,500 new residential units and 2,150,000 square feet of commercial space near the Hillcrest Avenue Station. In addition, the planning and development of SR 4 can contribute to water resources and water quality impacts. Furthermore, Union Pacific is anticipated to increase use of the Mococo Line in the vicinity of the Proposed Project. However, no impacts would occur on water resources and water quality from the increased use of the Mococo Line.

Impact HY-CU-12 *Construction of the Proposed Project in combination with other cumulative development and the SR 4 projects would require substantial grading and excavation that could expose soil to erosion and cause siltation of receiving water bodies and storm drains, thus potentially causing flooding. (PS)*

As described under Impact HY-6, construction of the Proposed Project would require substantial grading and site preparation activities that could potentially result in erosion and sedimentation and potential flooding of local storm drains, Kirker Creek, West and East Antioch Creeks, and adjacent areas. Additionally, potential fill of the created wetland for the construction of the remote maintenance facility near Laurel Road associated with the Northside East and Northside West Station options could have significant sedimentation and flooding impacts on East Antioch Creek and local storm drains.

Other foreseeable projects, such as the development envisioned by the Ridership Development Plans being prepared by the cities of Pittsburg and Antioch and the forecasted population growth projected by ABAG, would entail construction activities involving grading and excavation. These activities could result in increased sedimentation if they disturb unpaved areas and if erosion and sedimentation BMPs are not installed.

Furthermore, the SR 4 widening project covering approximately 6.5 miles from the Loveridge interchange easterly to the SR 160 flyover would likely occur concurrently with construction of the Proposed Project. Construction of these projects together would involve grading, excavating and earthmoving activities that would result in significant cumulative erosion and sedimentation impacts.

In summary, the Proposed Project, in combination with the forecasted growth projected both by the Ridership Development Plans and ABAG, in addition to the SR 4 widening project, would result in significant cumulative effects during the construction period that could result in increased flood hazards. Specifically, the culverts under SR 4, the inlets around the construction sites, and the culverts crossing the Mococo Line could all be temporarily affected during intense rainfall and result in localized flooding.

MITIGATION MEASURE. Implementation of Mitigation Measures HY-1.1, HY-6.1, HY-8.1, and HY-9.1 which recommend the implementation of a SWPPP to reduce erosion, siltation, and stormwater discharges, would reduce potential flooding construction impacts of the Proposed Project. Other projects would also be required to implement similar mitigation measures under the NPDES Stormwater General Permits. The measures implemented by the Proposed Project and by the other projects would be expected to reduce cumulative runoff impacts to less than significant. (LTS)

Impact HY-CU-13 *The Proposed Project in combination with the SR 4 widening project, and foreseeable development projects, could result in water quality impacts to Kirker Creek, West Antioch and East Antioch Creeks, and other local water bodies. (PS)*

The main pollutants of concern associated with the general degradation of water quality include nutrients, oil and grease, metals, pesticides and gross pollutants. As described under Impact HY-5, the Proposed Project would result in stormwater pollutant loading into local water bodies and storm drains, and therefore could affect water quality.

Other foreseeable developments, such as the forecasted growth projected by the Ridership Development Plans and ABAG, would introduce more urban uses that result in the deposition of different pollutants than undeveloped lands. Pollutants associated with developed land uses include hydrocarbons, oils and grease, metals, and gross pollutants. Additionally, new development would most likely include landscaped areas. Nutrients associated with fertilizers are used for landscaping.

The SR 4 widening project would construct new system improvements and introduce roadway surfaces. These additional impervious surfaces would accumulate additional pollutants, such as hydrocarbons, oil and grease, and other automotive fluids.

The potential for these pollutants from foreseeable land development and transportation improvements to be transported by stormwaters and discharged into receiving water bodies is a significant cumulative effect.

All of the above local projects would be required to adhere to measures and provisions set forth by the Contra Costa Clean Water Program and the C.3 requirements. The Contra Costa Clean Water Program develops and implements specific programs to reduce the discharge of pollutants into surface waters to the maximum extent practicable. The C.3 provisions are part of the NPDES permit and require that developers implement water treatment measures to treat runoff prior to discharge. These measures and requirements would help minimize the impacts from foreseeable land development projects on water quality. Similarly, Caltrans is governed by its own NPDES permit which also requires the preparation of SWPPPs and the implementation of BMPs to control construction-related stormwater pollution. Nevertheless, given the extent of the potential impacts from all foreseeable developments, cumulative impacts on water quality would still be potentially significant.

MITIGATION MEASURE. In addition to local measures and requirements, implementation of Mitigation Measure HY-5.1 would reduce the Proposed Project's water quality impacts to less than cumulatively considerable. This measure requires the implementation of a stormwater management BMPs in the project design. Other projects would also be required to implement similar mitigation measures under the Stormwater General Permits. This measure implemented by the Proposed Project would reduce the project's contribution to cumulative impacts to less than cumulatively considerable. As a result, cumulative impacts would be reduced to less than significant. (LTS)

Impact HY-CU-14 *The Proposed Project in combination with other foreseeable development and the SR 4 widening project would substantially increase impervious surfaces and create additional increase runoff to local water bodies and storm drain facilities and exceed storm drain capacity. (PS)*

As discussed under Impact HY-1, the parking lots and maintenance annex associated with the Median Station would substantially increase impervious acreage and result in additional runoff. Additionally, the Hillcrest Avenue Station options, particularly the parking lot surfaces, maintenance facility, and

related road access, would result in even more impervious surface area, and runoff to water bodies and storm drain facilities than the Proposed Project.

The forecasted growth projected by the Ridership Development Plans and ABAG, in combination with the SR 4 widening project, would increase the amount of surface area dedicated for buildings, parking areas, walkways, and roadways. The entire area between SR 4 and East Antioch Creek is planned for commercial development, according to the Antioch General Plan. The Ridership Development Plan under preparation by the City is envisioning up to 2,150,000 square feet of commercial space and up to 2,500 dwelling units in the 375 acres between Hillcrest Avenue and SR 160, north of SR 4. Runoff from this area that would have otherwise percolated into the ground would be released as additional runoff to storm drains, East Antioch Creek, and could potentially exceed flood capacity. The expected development would convert this largely undeveloped area of ruderal and pasture land to impervious surfaces associated with urban development and, thus, increase runoff to local water bodies and storm drain facilities. While CCWD is proposing to improve detention capability (detention basins), the increased runoff could potentially exceed the storm drain system's capacity.

MITIGATION MEASURE. Implementation of Mitigation Measure HY-1.1 would reduce operational impacts of the Proposed Project related to stormwater runoff to less than cumulatively considerable. Mitigation Measure HY-1.1 calls for the implementation of BMPs to control surface water runoff such as construction of additional basins and/or swales, flow-through planters, in-ground planters, bioretention areas, among others. Other projects would also be required to implement similar mitigation measures under the Stormwater General Permits. The measures implemented by the Proposed Project and by the other projects would reduce the cumulative impacts to less than significant. (LTS)

Impact HY-CU-15 *The Proposed Project in combination with other foreseeable development projects and the SR 4 widening project would not place people and property in floodplains and cause significant cumulative flooding impacts that could expose people and property to flood hazards. (LTS)*

As indicated under Impact HY-11, the tracks associated with the remote maintenance facility for the Northside East Station and the Northside West Station options would cross the 100-year floodplain in the vicinity of the SR 160 and SR 4 interchange. This component of the Proposed Project would expose people and/or structures to potential flood hazards.

The SR 4 widening project would also have the potential to expose people and structures to flood hazards. The FIRM maps indicate the that the SR 4 improvements would cross five floodplains (see Figure 3.8-2 and Figure 3.8-3). However, Caltrans, as part of the SR 4 widening, would improve the culvert capacity along SR 4, which would address the flood hazards.[36]

The City of Antioch's General Plan Flood Protection Policy (Section 11.4.2 (a)) prohibits all development within the 100-year floodplain, unless mitigation measures consistent with the National Flood Insurance Program are provided.[37] The City of Pittsburg's General Plan also contains policies that would ensure adequate flood protection for planned development. Under the General Plan's Flood Control Policy 10-G-7, the City of Pittsburg requires that development be located outside of the flood-prone areas unless mitigation of flood risk is assured.[38] These policies govern planned future developments to minimize flooding impacts to people and property .

Additionally, the City of Pittsburg is currently developing a Ridership Development Plan for the potential development of 1,845 new residential units and about one million square feet of commercial space near the Railroad Avenue Station, and the City of Antioch is preparing a plan that envisions up to approximately 2,500 new residential units and 2,150,000 square feet of commercial space near the Hillcrest Avenue Station. While portions of this development would occur in floodplains associated with Kirker Creek in the City of Pittsburg and East Antioch Creek in the City of Antioch, and therefore expose people and structures to a flood hazard, the cities of Pittsburg and Antioch each have local development policies and regulations to protect development from identified flood hazards. In addition, each jurisdiction has coordinated with CCCFWCD so that new development is required to implement flood control improvements and necessary stormwater detention facilities. For example, the proposed Trembath Basin would serve to reduce peak runoff into the main channel of East Antioch Creek during periods of heavy rainfall and is to be upgraded to accommodate a 100-year flood.

The above mentioned policies and facility upgrades related to the anticipated growth in the cities of Pittsburg and Antioch are aimed at reducing flood impacts. While the Proposed Project would have the potential of placing people and structures in a floodplain, as indicated under Impact HY–10, these impacts are reduced to a less-than-significant level by incorporating Mitigation

[36] Caltrans, State Route 4 Widening Project, Loveridge Road to SR 160, Environmental Assessment Study, July 2005.

[37] City of Antioch, *General Plan,* 2003.

[38] City of Pittsburg, *General Plan; Pittsburg 2020: A Vision for the 21st Century,* 2004.

Measure HY-10.1 Moreover, other foreseeable projects would be required to comply with local flood hazard development regulations and to implement or contribute to flood control upgrades to minimize flood hazards. As a result, the overall cumulative impact regarding the exposure of people and structure to flood hazards would be less than significant.

Impact HY-CU-16 *The Proposed Project in combination with other foreseeable development projects and the SR 4 widening project would not have significant impacts on groundwater resources. (NI)*

As explained under Impacts HY-3 and HY-7, the Proposed Project would not encounter groundwater resources, either during construction or operation due to the low groundwater levels (below 70 feet bgs) in the area of the Proposed Project. Other foreseeable projects, such as the forecasted growth projected by the Ridership Development Plans and ABAG, and the new roadways improvements projects proposed for the SR 4 widening project could potentially affect groundwater either during their construction and/or operation activities. Dewatering may be required for some of these activities and if so, the projects would have to conform to a NPDES permit required by the RWQCB for dewatering activities. The requirements of this permit would include measures to minimize impacts on groundwater quality and levels.

It is not expected that other foreseeable projects, including the mix-use development and the SR 4 improvement projects would involve groundwater extraction. Moreover, because the underlying soils in the area have low recharge potential, it is not expected that the new impervious surfaces resulting from the mix-use development and the SR 4 improvement projects would hinder groundwater percolation through the already low-permeable soils. Therefore, the Proposed Project in combination with other foreseeable projects would result in no cumulative impacts on groundwater resources.