D. HYDROLOGY AND WATER QUALITY

This section describes the existing hydrological setting for the Study Area, including runoff, drainage, and water quality. Based on the information collected, this section identifies baseline conditions related to hydrology and water quality in the Study Area that could potentially be affected by proposed fuel reduction and resource management activities included as part of the proposed project, the East Bay Regional Park District's (EBRPD's) Wildfire Hazard Reduction and Resource Management Plan (Plan). The Plan's potential impacts related to hydrology and water quality are evaluated, and mitigation measures to reduce these impacts, where necessary, are included.

1. Setting

The following section describes the existing hydrologic and water quality conditions of the Study Area. Climate, runoff and drainage, water resources, and flooding are discussed. The information included herein is based on available data from regional mapping, aerial photographs, published reports, and a reconnaissance of the Study Area.

a. Climate. The climate of the San Francisco Bay Area is characterized as dry-summer subtropical (often referred to as Mediterranean), with cool wet winters and relatively warm dry summers. The mean annual rainfall in the vicinity of the Study Area ranges from about 28 inches per year in the central uplands to about 22 inches per year in the lower elevations of the northern and southern portions of the Study Area and near the San Francisco Bay. The vast majority of rainfall occurs between October and May.[1] Analysis of long-term precipitation records indicates that wetter and drier cycles lasting several years are common in the region. Severe, damaging rainstorms occur in the Bay Area at a frequency of about once every 3 years.[2] The western United States, including the Study Area, periodically experiences two distinct weather patterns that can cause severe storms and heavy precipitation: "El Nino" and the "Pineapple Express."

(1) El Niño. The term El Niño refers to a warm ocean current that typically appears around late December and lasts for several months, but may persist into May or June. The warm current influences storm patterns around the globe. As a result, these climatic events commonly bring heavy rains and blustery storms and, in some locations, drought. During the past 40 years, nine El Niños have affected the western coasts of North and South America.[3]

(2) Pineapple Express. The Pineapple Express is a Pacific Ocean subtropical jet stream that brings warm moist air from Hawaii into the region. The combination of moisture-laden air, atmospheric dynamics, and orographic enhancement that results as this air passes over the mountain ranges of the West Coast causes some of the most torrential rains to occur in the region. Many major West Coast flooding events, such as the 1997 floods, came about because of this weather phenomenon.

[1] Western Regional Climate Center, 2004. Website: http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?carchm+sfo.

[2] Brown, William M. III, 1988. Historical Setting of the Storm: Perspectives on Population, Development, and Damaging Rainstorms in the San Francisco Bay Region, in Landslides, Floods, and Marine Effects of the Storm of January 3-5, 1982, in the San Francisco Bay Region, California, Stephen D. Ellen and Gerald F. Wieczorek, Eds., U.S. Geological Survey Professional Paper 1434.

[3] US Geological Survey, 2006. USGS Information on El Niño website: http://geology.wr.usgs.gov/wgmt/elnino/what.html

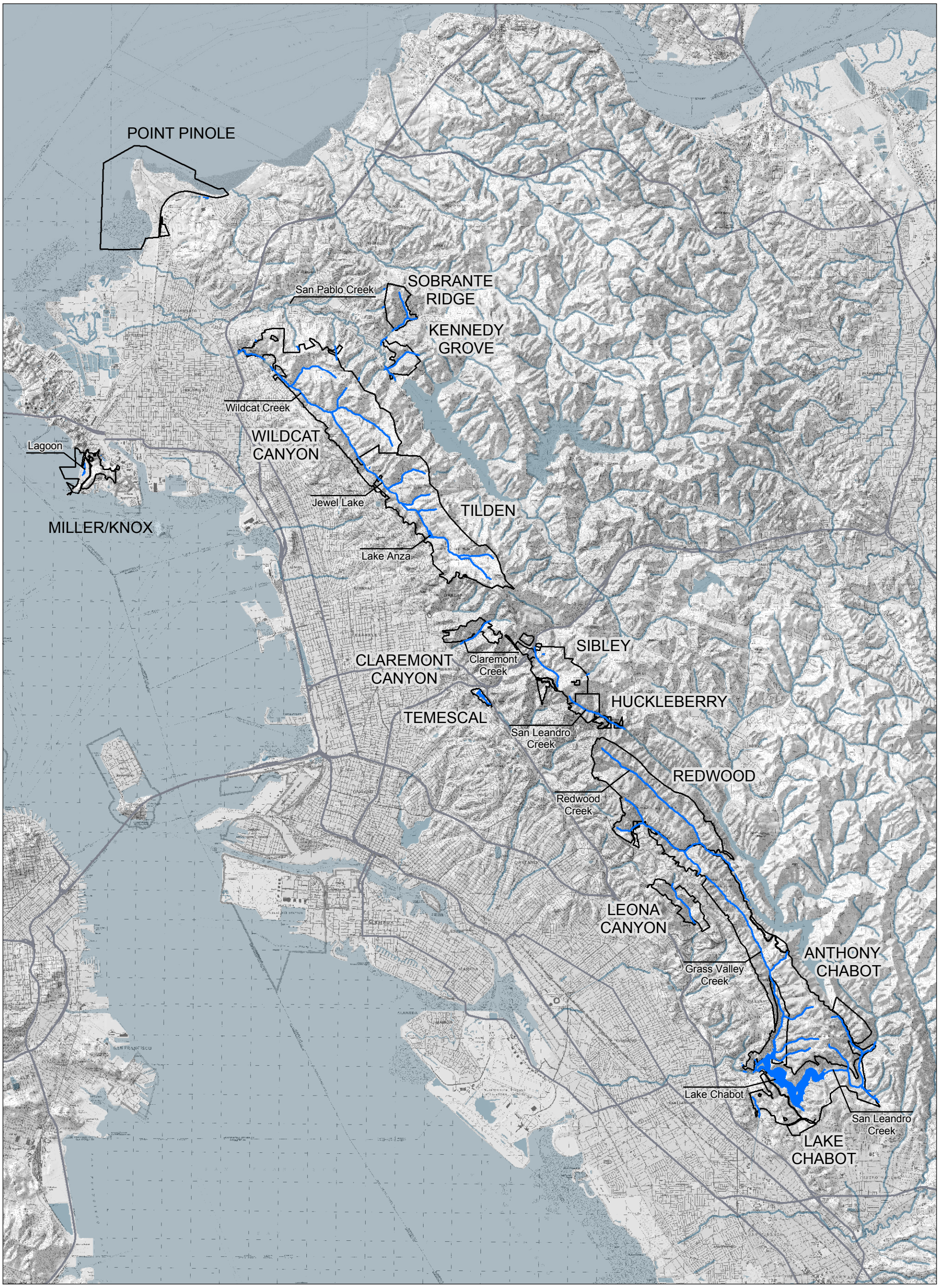
b. Runoff and Drainage. The East Bay Hills portion of the Study Area is predominantly characterized as an elongated band (approximately 26 miles long and 6.5 miles wide) with the long western border parallel to the shoreline of San Francisco Bay and extending east to include uplands in the East Bay Hills. The parks in the upland areas consist mostly of open space with few developed facilities, buildings, and access roads. The upland Study Area in many locations is adjacent to urban/ suburban development. When precipitation falls on the Study Area, the water infiltrates into surface soils until the infiltration capacity of the soils is exceeded by the rate of rainfall. At this point the rainfall becomes runoff and flows overland until the flows are concentrated into established swales, creeks, or storm drains. In the Study Area's shoreline parks, runoff is directed to natural or manmade stormwater collectors, and from there to the Bay.

All the creeks within and in the vicinity of the Study Area eventually flow into the San Francisco Bay, as shown in Figure IV.D-1. For the shoreline portion of the Study Area and the East Bay Hills, the creeks flow directly across the alluvial plains into the Bay. The dominant creeks with headwaters in the Study Area that flow directly across the alluvial plain include Cerrito, Marin, Codornices, Strawberry, Derby, Temescal, Glen Echo, Indian Gulch, Sausal, Peralta, Lion, Arroyo Viejo, and San Leandro (below Lake Chabot).[4] Creeks within the eastern upland Study Area and to the east of the ridgelines tend to take a more circuitous path, flowing parallel to the northwest-southeast trending ranges and valleys. For example, Wildcat Creek, the dominant hydrologic feature in the northern portion of the Study Area, flows from the vicinity of the U.C. Berkeley campus northwest through the Berkeley Hills to El Cerrito and Richmond and eventually discharges to the San Pablo Bay, south of Point Pinole. In the southern portion of the Study Area, Redwood, Indian and San Leandro (above Lake Chabot) Creeks flow southeast into constructed reservoirs (Upper San Leandro Reservoir and Lake Chabot). Water released from these reservoirs eventually reaches the Bay through lower San Leandro Creek.

Natural drainage patterns have been substantially modified at the margins of the Study Area where urban and suburban development has occurred. Under predevelopment conditions precipitation typically infiltrates into soil or is held in vegetation and soil litter to be dispersed slowly. In the current developed condition, in many cases stormwater runoff volumes have been increased (by reduced infiltration associated with placement of impervious surfaces like roads, driveways, and roofs) and concentrated, and the velocities increased by constructed drains and culverts. In many cases, these concentrated flows are discharged to slopes in an uncontrolled manner (i.e., there are no erosion control or energy dissipation structures). Previous investigations have noted that in some cases these flows are discharged to active landslides.[5]

[4] In the upper watershed San Leandro Creek flows into the Upper San Leandro Reservoir and in turn to Lake Chabot. From Lake Chabot the creek flows out of the reservoir and the downstream end. When the discussion presented here refers to "upper" San Leandro Creek, it is referring to the creek segment upstream of the Lake Chabot. When the discussion refers to "lower" San Leandro Creek, it is referring to the creek segment below the Lake Chabot.

[5] Seidelman Associates, Inc., 1985. The Effects of Land and Vegetative Management on the Stability of Slopes along the Wildland/Urban Interface, Wildcat Canyon and Tilden Regional Parks, August 27.



LSA

FIGURE IV.D-1

EBRPD Wildfire Hazard Reduction and Resource Management Plan EIR

Hydrological Resources

Lake, Pond, or Reservoir

Stream or River

Project Area

N

0 1 2
MILES

SOURCE: San Francisco Bay Region Landslide Folio, Open File Report 97-745 (USGS 1997)

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Back of IV.D-1

c. Water Resources. Water resources occur throughout the Study Area in the form of perennial creeks, streams, springs, ponds, intermittent water sources, and reservoirs, as shown in Figure IV.D-1 Many of the upland creeks in the Study Area flow directly into drinking water reservoirs and therefore contribute to municipal water supplies. In general, due to the relatively undeveloped nature of the upland portion of the Study Area, the runoff in creeks and streams is of good quality. An exception in the vicinity of the Study Area (on non-EBRPD lands) is acidic drainage related to the abandoned Leona Mine,[6] where pyrite and related minerals were mined, mostly in the 1920s.[7]

The reservoirs in the vicinity of the Study Area include the San Pablo Reservoir, Briones Reservoir, Upper San Leandro Reservoir and Lake Chabot. A portion of the northern Study Area drains to the east either directly into San Pablo Reservoir or upper San Pablo Creek which in turn discharges to the reservoir. However, the Study Area does not directly contribute runoff to Briones Reservoir.

A substantial portion of the southern upland Study Area drains to the Upper San Leandro Reservoir. This reservoir, constructed in 1926, is a water supply reservoir operated by the East Bay Municipal Utilities District (EBMUD). Drainages that feed the reservoir include Indian, Redwood, and upper San Leandro Creeks. Southern Study Area lands also drain to Lake Chabot, a 315-acre emergency water supply reservoir constructed in 1874 and 1875. Lake Chabot is leased to EBRPD by EBMUD for recreational use.[8]

d. Flooding. In general, the uplands of the Study Area are not subject to regional storm-related flooding. Several narrow bands along the dominant drainage systems have been mapped as 100-year flood hazard zones by the Federal Emergency Management Agency (FEMA).[9] The shoreline parks drain directly to the Bay, and generally are not mapped in the 100-year flood plain. Limited areas may be subject to short term local flooding hazards due to drainage impediments, structures, and accumulated sediment or debris in drainage conveyances.

e. Regulatory Framework. The following sections describe applicable regulations concerning hydrology and water quality in the Study Area.

(1) Regional Water Quality Control Board. Water quality in surface and groundwater bodies is regulated by the State Water Resources Control Board and Regional Water Quality Control Boards. The Study Area is under the jurisdiction of the San Francisco Bay Regional Water Quality Control Board (RWQCB), which is responsible for implementation of State and federal water quality protection guidelines in the Bay Area. The RWQCB implements the Water Quality Control Plan (Basin Plan),[10] a master policy document for managing water quality issues in the region. The Basin Plan establishes beneficial water uses for waterways and water bodies within the region. Beneficial

[6] URS Corporation, 2003. Final Environmental Assessment for the East Bay Regional Park District Vegetation Management Projects, Alameda and Contra Costa Counties, California. HMGP #919-515-24. Prepared for the Federal Emergency Management Agency. April.

[7] California Department of Natural Resources Division of Mines, 1951. Geologic Guidebook of the San Francisco Bay Counties, Bulletin 154.

[8] URS Corporation, 2003, Op.cit.

[9] Federal Emergency Management Agency (FEMA)/Environmental Systems Research Institute, U.S. Flood Hazard Maps: http://www.esri.com/hazards/

[10] San Francisco Bay Regional Water Quality Control Board, 1995. *Water Quality Control Plan*, June 21.

uses of surface waters in the Study Area include contact and non-contact water recreation, agricultural and municipal supply, fish spawning, cold and warm freshwater habitat, and wildlife habitat. Beneficial uses of the groundwater aquifer include municipal and domestic supply, industrial process supply, industrial service supply, and agricultural supply.

Based on interviews with RWQCB staff,[11] EBRPD's fuel reduction and resource management activities would be required to be managed so that the quality of receiving waters is protected in compliance with the general requirements of the Porter-Cologne Water Quality Control Act (California Water Code, Division 7).[12] RWQCB staff indicated that there are no specific permits that would be required for most fuel reduction and resource management activities, but that EBRPD land managers use erosion control practices to prevent sediment-laden discharges to receiving waters. The RWQCB is empowered to levy considerable fines if erosion and sedimentation impact receiving waters as a result of land manager negligence.

Most standard fuel reduction and resource management activities (e.g., goat grazing, select tree removal, understory clearing) would not result in the complete removal of vegetation or forest litter down to bare soil over large areas. However, if any fuel reduction or resource management activities would disturb (i.e., denude vegetation down to bare soil) more than 1.0 acre, the District may be required to file a Notice of Intent (NOI) with the RWQCB to be covered under the State NPDES Construction General Permit for discharges of stormwater associated with construction activity. If applicable, managers of fuel removal activities must propose control measures that are consistent with the State General Permit. A Stormwater Pollution Prevention Plan (SWPPP) must be developed and implemented for each site covered by the general permit. A SWPPP should include Best Management Practices (BMPs) designed to reduce potential impacts to surface water quality during implementation of fuel reduction and resource management activities.

The San Francisco Bay has been identified as an "impaired waterway" by the RWQCB in compliance with Section 303 of the Federal Clean Water Act. This designation indicates that the water quality within a waterway has been adversely affected by one or more pollutants. Listed waterways do not meet water quality objectives, even after point (individual) sources of pollution have installed the minimum required levels of pollution control. The San Francisco Bay has been characterized as impaired due to Chlordane, DDT, Dieldrin, Dioxin Compounds, Mercury, PCBs, Selenium and Exotic Species by the RWQCB and any additional input of these materials is in violation of the Basin Plan.[13] The identified potential sources of these pollutants include urban runoff, agricultural operations, construction and land development, and atmospheric fallout. The RWQCB is responsible for defining regulatory thresholds, or "total maximum daily loads" (TMDL), for the listed pollutants. RWQCB TMDL projects, defining plans for restoration of water quality due to impairment by specific pollutants, are in various stages of development for the San Francisco Bay. None of the

[11] Hopkins, Dale, 2006. Watershed Coordinator (Staff Environmental Scientist), personal communication with Bruce Abelli-Amen of BASELINE, August 3.

[12] Water quality in California is governed by the Porter-Cologne Water Quality Control Act. This law assigns overall responsibility for water rights and water quality protection to the State Water Resource Control Board and directs the nine statewide Regional Water Quality Control Boards to develop and enforce water quality standards within their boundaries.

[13] State Water Resources Control Board, 2006. Proposed 2006 CWA Section 303(d) List of Water Quality Limited Segments, SWRCB Approval Date: October 25, 2006.

materials listed above would be expected to be used in the implementation of the Plan; however lowland soils near the Bay, particularly areas of Urban Land (consisting of man-made fill of unknown origination), may contain residual amounts of the materials in question from past land uses. In addition, sediment leaving the sites due to fire suppression or fuel treatment activities could be detrimental to the beneficial uses of the Bay, and be in violation of the Basin Plan. Activities conducted under the Plan will need to be in compliance with the SWPPP (as outlined above) and will require limiting operational period pollutant discharge to the maximum extent practicable.

The lower San Leandro, Wildcat, and San Pablo Creeks have been identified as a Water Quality Limited Segment under section 303(d) of the Clean Water Act. The RWQCB has designated these creeks as water quality impaired for diazinon (a pesticide). The TMDLs for diazinon for each of these creeks are designated as "high" priority. The RWQCB has issued Resolution R2-2005-0063, which includes a plan for addressing pesticide toxicity in urban creeks of the Bay Area.[14] Fuel modification activities would not be expected to include the use of diazinon.

(2) EBRPD Master Plan. The following policy from the 1997 EBRPD Master Plan[15] would apply to the Plan: Park water resources will be used for beneficial purposes. Water quality will be monitored to comply with established standards. The District will participate in cooperative efforts to plan comprehensive watershed management, and will adopt "best management practice" guidelines for District land use activities to minimize potential stormwater pollution. The District will monitor land use planning and development activities by other agencies and cities to avoid potential adverse impacts to park land from pollutants generated by offsite or upstream sources.

2. Impacts and Mitigation Measures

This section analyzes the impacts related to hydrology and water quality that could result from implementation of the Plan. The section begins with criteria of significance, which establish the thresholds for determining whether a project impact is significant. The latter part of this section presents the potential hydrology and storm drainage impacts associated with the proposed project. Mitigation measures are provided as appropriate.

a. Significance Criteria. The project would have a significant impact on hydrology or water quality if it would:

- Violate any water quality standards (including turbidity limitations for discharged water) or waste discharge requirements, including the potential for the project to affect impaired water bodies listed on the State's 303(d) list and/or to conflict with designated beneficial uses;
- Substantially deplete groundwater supplies, interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level, or alter the flow of groundwater;

[14] Regional Water Quality Control Board, 2005. Resolution R2-2005-0063 Amending the Water Quality Control Plan for the San Francisco Bay Region to Establish a Water Quality Attainment Strategy and Total Maximum Daily Load (TMDL) for Diazinon and Pesticide-related Toxicity in Bay Area Urban Creeks.

[15] East Bay Regional Park District, 1996 (adopted), Master Plan 1997. Resolution No. 1996-12-349, December 17, page 21.

- Substantially alter the existing drainage pattern of the site or area, including alteration of the course of a stream or river, in a manner which would result in substantial erosion, siltation, or flooding on-site or off-site;
- Create or contribute runoff water of a quantity or volume that would exceed the capacity of existing or planned stormwater drainage systems or create an increase in calculated peak flood discharges, requiring the construction or substantial expansion of existing facilities.
- Result in the construction and/or occupation of structures within an identified flood hazard area;
- Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam; or
- Expose people or structures to a substantial risk of inundation by seiche, tsunami, extreme high tides, and/or sea level rise.

b. Less than Significant Hydrology and Water Quality Impacts. Potential impacts related to implementation of the Plan that were determined to be less than significant are described below.

(1) Depletion of Groundwater Supplies. The Plan does not propose to use groundwater supplies as part of the Plan's implementation, nor does it include any other activities that would lead to the depletion of groundwater supplies. The Plan does not propose the construction of infrastructure or facilities that would increase impervious surfaces leading to a substantial interference with groundwater recharge.

(2) Flooding. The Plan does not propose the construction of any residential housing; therefore, the Plan would not place housing within a 100-year flood hazard area. The Plan does not propose the construction of infrastructure, facilities, or structures that would potentially impede or redirect flood flows.

(3) Coastal Hazards. Because the location of some parks included in the Study Area are on the San Francisco Bay shoreline, portions of those parks may be affected by coastal hazards. Sea level rise is estimated at up to 1.0 meter by the year 2100. The 200-year recurrence interval tsunami has an estimated run of up to 7 to 10 feet in the vicinity of those shoreline parks. A seiche in San Francisco Bay is unlikely to be greater than 4 inches, and extreme high tides are approximately 7 feet.[16,17,18,19] The Plan does not propose the construction of infrastructures, facilities, or structures along the shoreline or in locations that would be affected by a tsunami, seiche, mudflow, sea level rise, or extreme high tide.

[16] Titus, James G. and Narayanan, Vijay. 1995. *The Probability of Sea Level Rise,* U.S. Environmental Protection Agency, Washington, D.C., 186 pp. EPA 230-R95-008. October.

[17] National Oceanic & Atmospheric Administration (NOAA), 2007. Mean Sea Level Trend (station) 9414290 San Francisco, California, accessed 9/12/08 at: tidesandcurrents.noaa.gov/sltrends/sltrends_station.shtml?stnid=9414290

[18] Ritter, J., Dupre, W., 1972. *Maps Showing Areas of Potential Inundation of Tsunamis in the San Francisco Bay Region, California*, Department of the Interior, U.S. Geological Survey, Misc. Field Studies, MF480.

[19] Thieler, E. Robert, and Hammar-Klose, Erika S., 2000. *National Assessment of Coastal Vulnerability to Sea-Level Rise: Preliminary Results for the U.S. Pacific Coast,* U.S. Geological Survey Open-File Report 00-178, available at: pubs.usgs.gov/of/2000/of00-178/.

(4) Erosion and Degradation of Water Quality. The project consists of different treatment options for fuel reduction and resource management. Some of the treatment options involve actions that will result in ground disturbance. The hydrology and water quality of the Study Area may be adversely impacted as a result of these treatment actions. Examples of such impacts could include the violation of water quality standards through the introduction of contaminants, increased turbidity of surface water, increases in stormwater runoff volume or duration, increased erosion and/or sedimentation, or changes to drainage patterns. Unless avoided or mitigated the impacts may be considered significant under CEQA if the affected hydrology and water resources contribute to a substantial, or potentially substantial, adverse change to the environment. Protecting and maintaining the hydrologic and water quality conditions that characterize EBRPD lands was a consideration when Plan goals and objectives were formulated. Accordingly, the Plan includes numerous guidelines and BMPs designed to avoid or minimize potential impacts to hydrology and water quality resources.

Five treatment options are proposed to achieve the Plan's objectives, and each is geared toward achieving different fuel reduction and resource management results. These treatment options include:

- Hand Labor. This option includes minor pruning, mulching, weed pulling by hand, and shrub removal. These activities generally pose a low risk of impacts to water quality because the disturbance would be minimal.
- Mechanical Treatment. This option generally includes grading, mowing, overstory removal, the use of landings, yarding, mechanical cutting, and mulching or chipping. These options often use large, tracked equipment that require site preparation of their operating areas or access corridors. As such, these options pose a high risk of impacts to water quality because soils could be deeply disturbed and vegetative cover removed, which could allow for substantial erosion and sedimentation.
- Chemical Treatment. This option includes the application of herbicides to control the growth of vegetation. This option generally poses little-to-no risk of ground disturbance since the application would predominantly be by hand. The potential for erosion-related water quality impacts using this treatment option would be low. Potential water quality impacts related to pesticides entering runoff or directly landing on water bodies could cause water quality degradation.
- Prescribed Burning. This option includes the burning of larger areas (broadcast burning) or the burning of piles of cut brush (pile burning). This option poses little-to-no risk of ground disturbance, as ignition is done by hand. However, burning can expose soils to erosion where the majority of vegetation is removed.
- Grazing. This option includes the use of grazing animals to reduce the fuel load in a given area, primarily grasslands or shrublands. This option generally poses a low risk of ground disturbance, although cattle wallows or the creation of animal trails may result in soil displacement and subsequent erosion.

It should be noted that wildfire accelerates erosion rates to the degree that post-fire erosion is considered a major factor in overall sediment production.[20] If the Plan (or something similar) were not

[20] Forrest, C.L., Harding, M.V., 1996. Erosion and Sediment Control: Preventing Additional Disasters after the Southern California Fires, in US Environmental Protection Agency Proceedings, Watershed 96.

implemented to prevent and/or minimize the potential for wildfires, overall erosion rates could increase due to accelerated post-fire erosion and sedimentation. The project includes policies and BMPs designed to avoid or minimize potential impacts related to erosion, sedimentation, and water quality degradation, as follows:

The Plan goals, polices, and BMPs described below address potential erosion and water quality impacts that could occur if any of the vegetation management methods described in the Plan were to be used. Implementation of these goals, guidelines, and BMPs by the District will mitigate potential impacts related to erosion and water quality to a less-than-significant level.

Plan Chapter II. Goals, Objectives, and Guidelines

2.6 Riparian and other wetland environments will be managed to preserve and enhance the natural and beneficial values of these areas and prevent the destruction, loss, or degradation of habitat. Creeks, streams, and other wetlands will be retained in their natural state whenever possible to maintain water quality, biotic diversity, aesthetic values, and recreational opportunities. Vegetation management actions that may potentially impact wetland areas will be reviewed by qualified personnel prior to implementation, and will include protective measures where feasible to prevent destruction, loss, or degradation of these areas. Post-treatment monitoring and follow-up actions will be undertaken to ensure wetland areas are preserved and/or enhanced during and following any vegetation management actions in the surrounding areas.

Plan Chapter IV. Fuel Reduction Methods

Best Management Practices for Hand Labor Methods - Water Quality

- Treatment actions should not be conducted during storms.
- Treatment actions should avoid, when feasible, excessive foot traffic on steep slopes which could cause compaction and/or erosion to occur.
- Hand labor personnel should avoid driving support and haul trucks off established roads. If such traffic is determined by EBRPD and hand labor personnel to be necessary, inspection will be conducted to ensure that the ground is not saturated prior to traveling off-road, and that the ground can fully support the vehicles without excessive rutting of surface soils. Any ruts created as a result of off-road activities will be repaired and covered with mulch and/or wood chips to reduce potential runoff from these areas and reduce their potential for erosion.
- Hand labor personnel should take care to handle fuels and lubricants such that spilling and runoff of these substances does not occur.

Best Management Practices for Mechanical Treatment - Water Quality

Mechanical treatment techniques generally result in increased ground disturbance relative to hand labor techniques, and therefore require the use of additional BMPs to mitigate potential effects. For all mechanical treatment actions that could result in substantial ground disturbance, EBRPD will implement erosion control BMPs that are consistent with the San Francisco Bay Regional Water Quality Control Board's standards. Based on site-specific conditions and the type of treatment action proposed, EBRPD and its contractors should consider one or more of the following BMPs, at a minimum to be included in any necessary erosion control plan, where mechanical treatment techniques will be used for fuel management:

- Use caution when conducting any mechanical treatment actions during the area's rainy season. Treatment actions should be stopped temporarily if rainfall or other inclement weather makes access inadvisable, or if continued vehicular travel or mechanical action is determined to cause unacceptable damage to roads, trails, or other lands.
- Surveys should be conducted that identify and delineate on-site soil and hydrological conditions prior to initiation of any mechanical treatment techniques. Any planned mechanical treatment actions should include all necessary measures to minimize activity in sensitive areas that could be wetter than normal, or in areas near hydrological resources. Wet areas will be clearly marked for high visibility and avoided by treatment operations until such time as they are determined to be sufficiently capable of supporting any mechanical treatment activities without causing excess rutting, erosion, or sedimentation to occur.

- All mechanical treatment actions should use equipment, methods, and/or techniques that minimize alterations to the existing soil structure.
- Heavy equipment use (e.g., tractor-based yarding activities) should be concentrated at primary skid trails and landings. Skidding should be allowed only along clearly designated skidding trails. Mechanical treatment actions should be temporarily stopped and alternative treatment or removal methods considered if a single pass of equipment produces ruts deeper than 6 inches across a significant area of the site beyond primary skid trails and landings.
- Materials should not be dragged across park roads and drainage areas unless specifically allowed by EBRPD, and only then along routes recommended by equipment operators and approved by EBRPD. These routes should be created to minimize the total skidding distance needed; total area occupied by skidding trails should not exceed 15 percent of the treatment area.
- Skid trails should not cross streams except where absolutely necessary, and only at locations previously determined by EBRPD staff and included in the site treatment prescription. Trees identified for removal growing near a drainage channel (based on stream type and approved buffer width) should be hand-felled perpendicular to the drainage channel rather than cleared using mechanical equipment. These trees should only be processed by a skidder where EBRPD determines that the skidder could safely handle the stems at a reasonable distance from the drainage channel based on stream type and approved buffer width; if it is determined that the tree cannot be safely handled by mechanized means at this distance, the tree should be lopped and scattered by hand labor treatment or left as a long log. Branches and debris should not be felled, loaded, skidded, or hauled across any stream or watercourse unless EBRPD approves such a measure. No drainage channel with running or standing water should be crossed by mechanical equipment while water is present to avoid runoff and contamination from vehicle use as well as rutting and erosion. Crossing should not occur until the drainage completely dries out.
- Personnel will avoid driving support and haul trucks off of established roads. Where this is necessary, personnel should ensure that the ground is not saturated before traveling off-road and that the ground can support the vehicles without excessive rutting. Any ruts created should be repaired and covered with mulch and/or wood chips.
- Personnel will install and use waterbars, brush barriers, vehicle turnouts, or other methods as needed to control and capture potential runoff resulting from mechanical treatment actions. Other methods for controlling and capturing potential runoff could include broad-based dips, creating ditchlines inside of current drainage patterns (i.e., closer to treatment actions to capture runoff prior to reaching the drainage area), cross-drains, filter areas, sediment traps or pits, silt fences, hay bales, check dams or the in/outsloping and crowning of roads.
- All waste and trash generated by any treatment actions must be removed from the treatment site. Leftover materials can create a water pollution risk if they remain onsite and are later washed into water bodies through runoff.
- Maintain all roads in a desirable condition to prevent problems that may result from their use, such as washouts, slumping, clogging or bending culverts, and drainage erosion. Any damages that occur to roads as a direct result of treatment actions should be repaired upon completion of the treatment action.
- Upon abandonment of an access road or skid trail, all refuse and unstable fill material must be removed and road banks restored to original contours. Road banks must also be revegetated or have permanent waterbars installed.
- Refueling areas will be designated for larger projects requiring mechanical treatment actions. Fuel tanks and refueling areas will be provided with secondary containment, where feasible. Materials and supplies needed to promptly clean up spills will be adequately maintained and located onsite, and personnel will be familiar with proper cleanup and disposal techniques. Examples of containment and cleanup methods and materials include using drip pans and absorbent pads for all vehicle and equipment fueling; equipping all fuel nozzles with automatic shut-off capability to contain fuel dripping and leakage; ensuring all vehicle fueling operations are not left unattended; inspecting vehicles and equipment each day to identify any fuel, oil, or hydraulic leaks; and repairing any identified leaks immediately prior to further use or storage of the leaking equipment to minimize further impact to the site. Vehicles with persistent or recurring leaks will be removed from the site until such leaks are properly repaired. Onsite fueling of vehicles and equipment will only be performed when offsite fueling is determined by EBRPD to be impractical.

Best Management Practices for Chemical Treatment - Water Quality

- EBRPD and its contractors will ensure that any pesticide or other chemical applications are performed only by licensed or certified pest control operators registered to perform such services in the County where the treatment is to take place, and only under a prescription prepared by a licensed pesticide advisor. The pest control operator must record and

provide written accounts of the total amount of pesticides and other chemicals applied each month, as well as type(s) of pesticides or chemicals used and total areas treated with each pesticide or other chemical. These data must be reported to the County Agricultural Commissioner as well as to EBRPD's IPM Program. Operators must maintain accurate and calibrated application equipment to ensure correct amounts of pesticides and other chemicals are applied.

- Any chemical treatment actions must be performed according to EBRPD integrated pest management (IPM) policies and practices; pest control operators selected by EBRPD or its contractors should consult and use the advice and recommendations of EBRPD integrated pest management specialists and adhere to EBRPD pest management guidelines. For example, species-specific (instead of broad-spectrum) herbicides should be used wherever possible to avoid injury to non-target plants.
- EBRPD IPM specialists will oversee chemical application practices to ensure compliance with State and federal regulations and EBRPD IPM policies. Pesticide application prescriptions will include suitable distances from wetlands and water bodies, in compliance with the California Department of Food and Agriculture Regulations and State-approved product labeling; the IPM Specialist will review application data to ensure the minimum amount of suitable chemicals are used during treatment actions to achieve the desired results.

Best Management Practices for Prescribed Burning - Erosion Control

- Personnel should ensure that ground cover is retained on 60 percent of the ground surface to prevent soil displacement from rain impact and to allow precipitation to absorb into the ground; where feasible, fire should not be allowed to burn sufficiently hot that the duff layer is destroyed. Actions should attempt to retain more groundcover in areas within 50 feet of a downslope water body. When water soaks into the ground there is less chance that it will run off and cause erosion into and around water bodies.
- Actions will include maintenance of buffer areas between the burn zone and nearby water bodies. Prescribed fires will not be actively ignited within the vegetative buffer zone. A minimum vegetation buffer of 25 feet should be maintained between burn areas and downslope water bodies for slopes under 5 percent, a 75-foot buffer between burn areas and water bodies for 5-10 percent slopes, and a 150-foot buffer for slopes over 10 percent. In most cases, fire can be allowed to "back" into riparian zones; however, no ignition should take place in the stream environment zone (i.e., the stream, its riparian corridor and adjacent marshes and wet meadows). High-intensity burns should be kept away from creeks and drainage buffer zones unless suitable measures, as determined by EBRPD, are used to ensure protection of water quality.
- Personnel will minimize the risk of erosion into water bodies from fire lines by:
  - Using existing barriers such as roads, trails, or wet lines as fire lines to minimize soil disturbance.
  - Constructing fire lines along the contour and avoiding straight up/downhill placement.
  - Establishing erosion control BMPs like water bars, turnouts, and sediment traps.
  - Fire lines must be restored upon completion of the prescribed burn if they are determined not to be used again. Erosion controls features must be placed, as necessary, to minimize the potential for additional impacts.
- Torch fuels will be mixed, and torches filled, only in designated fueling areas to isolate potential areas that could be affected by hazardous materials spills.

Best Management Practices for Grazing

- Livestock will generally be excluded from riparian areas. Only during limited circumstances and under the supervision of qualified personnel should livestock be used to reduce fuel loads in riparian areas.
- Livestock grazing will be closely monitored to determine when performance criteria are achieved. Once goals and desired fuel loads have been reached, livestock should be removed in a timely manner to avoid overgrazing and/or excessive hoof traffic.
- Inspections will occur with regular frequency and should pay particular attention to areas where bare ground is being exposed. Inspections should also note areas where animals are developing worn trails. Where excessive wear is occurring, livestock should be moved to other areas and alternative treatment methods considered if fuel reduction requirements have yet to be sufficiently reached.

c. Potentially Significant Hydrology and Water Quality Impacts. With implementation of the guidelines and BMPs listed above, no significant impacts to hydrology and water quality associated with Plan implementation have been identified.