Chapter 3. Affected Environment

3.1 Introduction

This section describes the affected environment of Contra Loma at a level of detail commensurate with the programmatic/planning nature of this RMP. Subsequent project-level environmental compliance documents may need to be prepared by Reclamation or the managing partner(s) in the future to address environmental resources that may be affected by management actions and projects carried out under the selected RMP alternative. This chapter describes resources and features that could be affected under any of the alternatives. Some resources such as climate are described for the purpose of context, although project-related impacts to these resources, regardless of the selected project alternative, would be minor.

Much of the data used to describe the environmental setting of Contra Loma was collected using a GIS format. Figures are used to show Contra Loma's layout, including features, facilities, and infrastructure, as well as areas of sensitive resources (e.g., vegetation communities) and potential hazards (e.g., geological faults). The discussion and figures in this chapter, and the impact analyses presented in Chapter 4, are intended to serve as a guide to future development plans within the planning horizon by identifying potential environmental constraints.

3.2 Land Use and Management

3.2.1 Existing Conditions

Current uses at Contra Loma include recreational uses, grazing, operations and maintenance, and reservoir management. EBRPD has constructed recreational facilities on the south side of the reservoir to support the various recreational opportunities offered at Contra Loma and has developed trails throughout the area for hiking, biking, and equestrian uses. The City has developed community facilities on the land it manages to support soccer, baseball, picnicking, and other sports and community activities. Recreational uses are allowed in most areas of Contra Loma, with the exception of the Reclamation Zone north of the dam. Group activities, such as parties, performances, special events, or similar gatherings, are allowed with a special use permit from EBRPD.

EBRPD's park office is located south of, and adjacent to, the swim lagoon. The office adjoins the buildings housing the showers and changing rooms. The park office building also includes the corporation yard where EBRPD stores vehicles and maintenance equipment. The corporation yard is enclosed on all sides by cinder block walls and by the office building, except for a 16-foot wide driveway on the south side of the yard. A storm drain system provides drainage for the corporation yard; this system drains to the reservoir. The EBRPD police substation is located in the former park residence building approximately 250 feet southwest of the park office. There is currently no park residence at Contra Loma. A service yard and materials storage area is located 500 feet west of the park office.

Grazing is allowed on the 454 acres of rolling grasslands surrounding the reservoir in accordance with the current grazing license. Grazing is used for fire suppression in order to protect the recreational facilities and nearby residential areas. The grazing license allows for a livestock carrying capacity of 389 animal unit months (i.e., the amount of grazing forage needed for one mature cow and nursing calf per month) for the grazed land (Figure 1-2). Livestock grazing is currently rotated between multiple enclosures, and cattle are not allowed near the reservoir in order to protect water quality. EBRPD grazes livestock on about 60 percent (about 68,000 acres) of its regional parklands, including its Black Diamond Mines Regional Preserve adjacent to Contra Loma. Grazing and pasture are important land uses in Contra Costa County. In 2000, 168,890 acres of the County were in pasture and range land, which includes land used for grazing of large farm animals and dry farming of grains for feed (Contra Costa County 2005).

Contra Loma is located entirely within the City and has been designated by the City's General Plan as open space (City of Antioch 2003a) as it serves as a transitional area between the developed portions of the City and extensive open space to the southwest. Contra Loma is surrounded by residential uses to the north and south, the City golf course to the east, residential uses along the eastern half of the southern boundary, open space along the western half of the southern boundary, and open space and undeveloped land to the west (Figure 3-1).

The City owns the adjacent 201-acre parcel to the east of Contra Loma that comprises the majority of the golf course (i.e., excluding the 5.7 acres of land leased to the City by Reclamation). The golf course includes 18 holes, a driving range and practice area, a pro shop, and a clubhouse with dining and beverage facilities.

EBRPD owns the open space lands to the south and west and manages them as part of the 5,300-acre Black Diamond Mines Regional Preserve. The preserve provides recreational opportunities and preserves a portion of the area's history relating to Native American uses, ranching, as well as coal and sand mining. A portion of land directly west of Contra Loma is privately-owned. The City's general plan land use designation for the privately-owned land is Estate Residential and the City has zoned the land as Planned Development District.

Land Ownership and Management in Contra Loma

The U.S. Government owns Contra Loma, which consists of the 80-acre reservoir and approximately 661 acres of land surrounding the reservoir (Figure 3-1). Reclamation is the Federal agency charged with administering Contra Loma. EBRPD, the City, and CCWD are responsible for managing Contra Loma in accordance with each agency's management agreement, license, or contract.

CCWD has been operating and maintaining the reservoir for domestic water supply under contract with Reclamation since 1967. On September 18, 1972, Reclamation and EBRPD entered into a management agreement transferring responsibility from Reclamation to EBRPD for the development, construction, administration, operation, and maintenance of public recreation, recreation facilities, and other uses within Contra Loma, including the water surface area of the reservoir but excluding 20 acres directly north of the dam known as the Reclamation Zone. This agreement clarifies that the rights of EBRPD under this agreement are subordinate to the rights of the United States relating to the use of the lands and water areas for water regulation and other project purposes. Reclamation and its contractor CCWD retained responsibility for the

G:\Projects\30019 Contra Loma\GIS\Working Mxds\30019 Figure 3-1 Land Ownership and Management.mxd 2013-05-29 tmooney

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Figure 3-1
Land Ownership and Management

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Reclamation Zone and management authority for the reservoir for purposes of its operation and use of CVP water supplies. According to the current management agreement with Reclamation, EBRPD has the authority to issue special use permits, licenses, and concession contracts to other entities as well as the responsibility to manage and maintain recreational facilities and uses at Contra Loma. The City operates and manages the Community Park in the northeastern portion of Contra Loma under a license agreement granted by EBRPD.

In 1981, 5.7 acres of land on the eastern side of Contra Loma adjacent to the City's Lone Tree Golf Course was removed from EBRPD's management area and has been leased to the City for golf course. The lease expired in 2011; however, Reclamation and the City are pursuing issuance of a new license in order to allow continued use of the land for golf. Although, this land is owned by the U.S. Government, it is not part of the Contra Loma Recreation Area and is, therefore, not covered in this RMP/EIS. Issuance of a new license to the City will require separate environmental analysis and approval from Reclamation. In conjunction with this lease of land to the City in 1981, EBRPD agreed to accept the use of a 3.9-acre City-owned parcel adjacent to the northeast corner of the Recreation Area (Figure 3-1). The lease between the City and EBRPD for the 3.9 acres of City-owned land also expired in 2011. Because this 3.9-acre parcel is owned by the City, it is not part of Contra Loma, and future use of this area will be determined by the City.

In 1985, EBRPD transferred management of approximately 47 acres of Contra Loma to the City under a license agreement that allowed the creation of the Community Park. The license agreement was amended in 1990 and it has been extended through December 31, 2013. Pursuant to this license agreement, management and maintenance of the Community Park is the responsibility of the City.

Land Uses and Zones

Reclamation uses WALROS as a management tool for classifying water and land use zones in terms of recreational experience. The primary goal of WALROS is to provide planners and managers with a framework and procedure for making better decisions in order to conserve a spectrum of high-quality and diverse water- and land-based recreation opportunities. In 2009, the WALROS system replaced its predecessor, WROS, which placed more emphasis on water-based recreation than land-based recreation.

In October 2008, Reclamation identified two WROS classifications for Contra Loma Reservoir. The southern half of the reservoir is classified as S4 and the northern half of the reservoir is classified as RD6 (Figure 1-2). The S4 zone is influenced by the developed recreation areas, high visitor use, and corresponding managerial presence along the southern shore. Facilities along the south shore include the swim lagoon, picnic areas, concessions, boat launch, parking lots, and Regional Park administrative facilities. The RD6 zone receives less use and has fewer facilities than the S4 zone, and is less developed than the S4 zone (Bureau of Reclamation and California Department of Parks and Recreation 2008). These zones are similar, though not identical, to the S and RD zones under the WALROS system. The 2008 WROS inventory did not identify classifications for the land portions of Contra Loma.

As the managing partner, EBRPD prepared a park-specific LUDP for Contra Loma to define allowed uses, describe the desired park character, provide guidance for future development and

use of the Regional Park, describe access and circulation, and designate areas for development or preservation (East Bay Regional Park District 1975a). The LUDP established a natural environment unit and recreation clusters in Contra Loma based on the anticipated and desired uses of each area (East Bay Regional Park District 1975a). The natural environment unit and recreation clusters encompass the 80-acre reservoir and all of the surrounding land except for the 20-acre Reclamation Zone, which encompasses the dam and its pumping facilities. The Reclamation Zone is reserved for use by Reclamation and CCWD.

The natural environment unit was designated to protect natural resources and provide more passive recreational opportunities with minimal development (East Bay Regional Park District 1975a). This unit encompasses the steeper hillsides and the majority of the reservoir surface and shoreline. This unit offers hiking trails, scenic views, fishing, and informal picnicking. Some of this unit is used for livestock grazing.

The recreation clusters were designated in Contra Loma to focus recreational activities and facility development within specified areas that are most conducive to recreation, such as those areas that have ease of access, are generally flat, and are close to water or other facilities (East Bay Regional Park District 1975a). The following four use areas were designated within the recreation clusters: the beach-marina cluster on the south shore of Contra Loma Reservoir, the day camp cluster in the northeast portion of Contra Loma (where the current Community Park is), the picnic meadow cluster to the east of the reservoir, and the equestrian facility or special use area in the southeast corner. These areas include the lands south, east, and northeast of the reservoir and in the southeast portion of Contra Loma adjacent to residential development.

3.3 Recreation

3.3.1 Existing Conditions

The Contra Loma Recreation Area was opened to the public in 1968 with limited recreational development. Currently, recreation at Contra Loma is available within the Contra Loma Regional Park and the Community Park managed by EBRPD and the City, respectively.

Contra Loma Regional Park

EBRPD classifies Contra Loma as a regional park because of its outstanding natural features and its outdoor recreational opportunities for public enjoyment and education (East Bay Regional Park District 1975a).

EBRPD operates the Regional Park to provide outdoor recreational and educational opportunities, while managing the park's natural and cultural resources. Recreational activities at the park include picnicking, fishing, boating, windsurfing, kayaking, canoeing, swimming, hiking, bicycling, horseback riding, and wildlife viewing. The Regional Park is open to the public daily from 5:00 a.m. to 10:00 p.m., although the park's vehicle entrance gate hours vary throughout the year. EBRPD collects fees for parking, dogs, swimming, boat inspection and launching, windsurfing, and fishing. Visitation has increased annually in recent years, as shown in Table 3-1.

Table 3-1. Annual Visitation to Contra Loma Regional Park (2005–2010)

Year	Visitors
2005	123,147
2006	124,122
2007	133,629
2008	145,556
2009	141,986
2010	147,395

Source: Rivoire, pers. comm. 2010; Bondurant, pers. comm. 2011a

The Regional Park contains various facilities that support the recreational uses offered at the park, such as trails, picnic tables, a large swimming pool (i.e., "swim lagoon"), food concession, parking areas, fishing docks, and a boat launch, as well as facilities for managing the land, such as fencing, access gates, and roads. EBRPD has offices, maintenance equipment and facilities, law enforcement vehicles, and a radio communication system onsite. The Regional Park has potable (drinking) water, restrooms and showers, portable chemical toilets, electricity, and telephones. Many, but not all, of the recreational facilities are ADA-compliant. The Regional Park has wheelchair accessible drinking water, parking, and restrooms. The shaded picnic areas near the swim lagoon are wheelchair accessible, and the swim lagoon has an accessible pool lift.

Most of the developed recreational facilities are located along the south side of the reservoir, which corresponds with the beach-marina recreational cluster identified in EBRPD's LUDP. A large manicured lawn with planted shade trees covers much of this area. Developed facilities in this area include picnic sites, the swim lagoon, the boat launch, a fishing dock, a fish cleaning station, restrooms, showers, changing rooms, drinking fountains, a food concession, an equestrian staging area, and several trails. Most of the parking areas are also located here (Figure 1-2).

Contra Loma Reservoir provides recreational fishing opportunities for children and adult anglers of varying skill levels. Annual visitation data suggest that angler use has been increasing and will continue to increase. The reservoir supports 14 species of fish, including eight species of game fish. EBRPD and the California Department of Fish and Wildlife (CDFW) stock rainbow trout and channel catfish in the reservoir. The reservoir also supports self-sustaining populations of largemouth bass, crappie, redear sunfish, and bluegill, which are also popular with anglers. A state fishing license and an EBRPD Fishing Access Permit are required for all anglers 16 years and older. Additional details about the reservoir's fishery are provided in Section 3.11 (Fisheries).

To protect the reservoir's domestic water supply from pathogens such as *Cryptosporidium*, the Department of Health Services (DOHS) (predecessor to California Department of Public Health [CDPH]) issued a compliance order to CCWD in 1999 requiring CCWD to either cease body contact activities in the reservoir or discontinue using the reservoir for drinking water supply. In response to this order, CCWD and EBRPD built the swim lagoon along the south side of the reservoir in 2001 (Figure 1-2) and swimming is no longer allowed in the reservoir. The swim lagoon is separated from the reservoir, ensuring that water from the lagoon does not enter the

reservoir. The lagoon has a concrete bottom; water is recirculated through filters and is disinfected and treated before it is returned to the lagoon, similar to a large swimming pool. The swim lagoon is surrounded on three sides by a manicured lawn, and four permanent umbrellas installed in the lawn provide shade. The swim lagoon and an adjacent lawn area are surrounded by a fence. The swim lagoon is staffed with life guards when it is open (seasonally from May through September) with varying hours throughout the season. Swim lagoon entrance fees are collected in addition to park entrance fees. Showers, changing rooms, picnic tables, and a food concession stand are available adjacent to the lagoon outside the fence. Concession stand hours are the same as swimming hours.

Windsurfing and limited boating are allowed on the reservoir. Body contact with the reservoir is highly restricted to protect the reservoir's domestic water supply from pathogens. To minimize body contact with the water, windsurfers must shower before entering the water and wear wet suits. Visitors may launch small boats (up to 17 feet long). To protect water quality, only electric motors are allowed; gasoline-powered engines are prohibited. Kayaks and canoes are allowed on the reservoir; however, paddlers using self-bailing kayaks must shower before launching and wear wet suits while boating. To protect against potential infestations of invasive zebra and quagga mussels, all boats are inspected by trained EBRPD staff prior to launching. All boats and aquatic gear must be dry prior to entering the reservoir.

A trail network within the Regional Park provides hiking, bicycling, and equestrian access to most areas of the park, as well as connections to the Community Park and other nearby trail systems (Figure 1-2). The trail system includes 0.75 mile of paved trails along the east and south shores of the reservoir. These paved trails provide access to the gravel-surfaced West Shore Trail, which is wheelchair accessible when trail conditions are favorable with respect to mud and the quality of the gravel surface. The West Shore Trail has a gravel surface. Several trails on the south side of the Regional Park connect with the trail system in EBRPD's Black Diamond Mines Regional Preserve, which provides connections to Mt. Diablo and other parks and trails within the EBRPD system.

The East Shore Trail and other trails on the north side of the Regional Park provide access to the Community Park, the Delta De Anza Regional Trail (also known as the Contra Costa Canal Trail), and the Mokelumne Trail. Trails in the northwest portion of the park provide access to adjacent residential communities. Bicycles may be ridden on designated trails and on fire or service roads, unless otherwise posted. Bicycles are not permitted in areas posted "No Bicycles," or on narrow (e.g., single track) hiking or narrow equestrian trails. Horses may be ridden on most trails within the Regional Park. An equestrian staging area with a hitching post, a horse watering trough, picnic tables, and a large gravel parking lot for trailers is located near the south shore of the reservoir.

Dogs are allowed in the Regional Park provided they are leashed and under control while in developed areas and areas posted with signs requiring use of leashes. Dogs are allowed off-leash in open space and undeveloped areas of the Regional Park.

Alcoholic beverages are not allowed in the Regional Park.

Special events and programs are allowed in the Regional Park with prior authorization from EBRPD. Running meets and day-camp programs, sometimes including swimming lessons and a junior lifeguard program, are held at the Regional Park. No camping facilities are provided, and overnight camping in the park is prohibited.

Antioch Community Park

The Community Park currently receives approximately 50,000 visitors annually. The most popular activities at the park involve use of the sports fields for softball, soccer, football, league sports and tournaments. Other popular activities include picnicking, walking, jogging, and bicycling.

The Community Park includes various facilities that support the recreational uses offered at the park, such as barbeque pits, picnic areas, restrooms, multi-use sports fields, a children's play area, youth play area, horseshoes, trails, and parking areas, as well as management facilities such as fencing, access gates, and driveways (Figure 1-3). Many, but not all, of the recreational facilities are in compliance with ADA. The Community Park has potable (drinking) water, restrooms, and electricity.

Most facilities are located in the western half of the Community Park. The driveway entrance at the intersection of James Donlon Boulevard and Blythe Drive is the primary access point to the Community Park. Facilities in this location include the main parking lot with approximately 230 spaces, a large group picnic area known as the Jensen Family Picnic Grove, individual picnic tables, barbeque pits, three multi-use sports fields (fields 1, 2, and 3; see Figure 1-3) with flood lights, children's and youth play areas, and restrooms. A paved trail from the western end of the parking lot leads to the Regional Park.

The eastern half of the Community Park includes two sports fields (fields 4 and 5), a second parking lot with approximately 230 spaces, and open space areas. An unpaved trail from the eastern end of the parking lot leads to the Regional Park. The Contra Costa Canal and the adjacent Delta De Anza Regional Trail run along the entire northern boundary of the Community Park.

The Community Park has a total of five sports fields. The three multi-use sports fields in the western half of the park (fields 1, 2, and 3) have softball diamonds, dugouts, bleachers, water fountains, nearby restrooms, and flood lights for nighttime use. These fields are used for softball, baseball, football, soccer, and kickball. The two sports fields in the eastern half of the Community Park (fields 4 and 5) are used primarily for soccer, but are also used for baseball, softball, football, rugby, and outdoor volleyball. The City has recently improved these fields by replacing the grass surface with synthetic turf, installing furnishings, perimeter fencing, concrete paving, an electrical/storage building, sports field lighting, perimeter irrigation and landscaping, drainage structures, and pavement. With the installation of lights, these fields are now used at night.

Sports fields 1, 2, and 3 develop muddy conditions during the rainy season that can render them temporarily unusable. To protect the turf and public safety, the City does not allow the fields to be used when wet.

3.4 Visitor Access and Circulation

3.4.1 Existing Conditions

Contra Loma is located in Antioch in northeastern Contra Costa County near the junction of State Route (SR) 4 and SR 160 (Figure 1-1). SR 4 is located approximately 1.5 miles north of Contra Loma and is the primary freeway serving the recreation area. SR 4 connects with Interstate (I-) 680 15 miles west of Antioch, providing access to and from other parts of the San Francisco Bay Area. East of Antioch, SR 4 passes through the City of Brentwood, providing access to and from the San Joaquin Valley. From Antioch, SR 160 heads north toward Rio Vista. Lone Tree Way and Contra Loma Boulevard are the primary surface streets connecting SR 4 to Contra Loma. Lone Tree Way also provides access to Contra Loma from Brentwood.

Vehicle access to the Regional Park is from Contra Loma Boulevard on the south side of the park. Frederickson Lane provides vehicle access to Contra Loma Boulevard from Golf Course Road (a major collector road) and several other streets providing access from Lone Tree Way (Figure 3-2). Vehicle access to the Community Park is from James Donlon Boulevard, which runs along the northern boundary of Contra Loma. James Donlon Boulevard is a four-lane street that provides access to Contra Loma Boulevard and Lone Tree Way. Lone Tree Way and James Donlon Boulevard are primary arterial streets. The section of Contra Loma Boulevard between SR 4 and James Donlon Boulevard is also an arterial street. Pedestrians and bicyclists may also reach Contra Loma via the Delta De Anza Trail, which connects to the Mokelumne Trail.

Within the City, peak hour congestion at freeway intersections and other major local intersections that serve the freeway system or local employment centers generally occurs during weekday mornings and afternoons (City of Antioch 2003a).

The Bay Area Rapid Transit District (BART) provides commuter rail service throughout much of the San Francisco Bay Area. The nearest BART station to Contra Loma is the Pittsburg/Bay Point station located 7 miles west of Antioch. Tri Delta Transit provides bus service to Antioch and nearby cities. Tri Delta Transit has several routes serving the Contra Loma area; however, most of these routes are commuter routes limited to weekdays. Tri Delta Transit has one weekend route that provides service to Contra Loma and the BART station. The nearest bus stop to Contra Loma is located at the intersection of Contra Loma Boulevard and James Donlon Boulevard, about a third of a mile from the Community Park entrance.

Contra Loma Regional Park

Visitor access to the Regional Park is by car, foot, bicycle, or horseback. Car access is from the southern park entrance and pedestrian access is through one of several pedestrian entrances (Figure 3-2). Two pedestrian entrances provide access to the Regional Park from the Community Park. A paved trail leading from the west side of the Community Park provides access to the Regional Park at the eastern end of Contra Loma Dam. An unpaved trail provides access from the eastern end of the Community Park to the northeast corner of the Regional Park. Three other pedestrian entrances are located on the northwest side of the Regional Park, and provide access to adjacent residential areas. All of these pedestrian entrances have gates that prohibit vehicle access. Visitors may also access the southern portion of the Regional Park by hiking, bicycling, or riding on horseback on one of several trails leading from the adjacent Black Diamond Mines Regional Preserve.

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Figure 3-2
Roads and Access

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Circulation within the Regional Park is provided by the park's road and trail network. Immediately north of the entry kiosk the entrance road splits in three directions. The boat launch and a parking area are located approximately 500 feet north of the intersection. The road to the east leads to the east shore of the reservoir and the road to the west leads to the south shore of the reservoir (Figure 3-2).

The half-mile-long park road that leads to the east shore of the reservoir has a gravel surface. This road provides access to two parking lots, the east shore, and the trail system in the eastern portion of the Regional Park. The trails east of the reservoir include Old Ranch Loop, Swale Trail, and East Shore Trail. These trails provide access to areas north and east of the reservoir, including the Community Park, the Contra Loma Dam, and the east shore of the reservoir.

The road that leads west from the entry kiosk provides access to the south shore recreation areas. Parking is available in three lots and the equestrian staging area. Some parking lots are paved, and others have a gravel surface. The visitor road ends at the western parking lot near the park office. Several service roads for EBRPD staff continue west, providing access to the park office, corporation yard, police substation, and storage area. These service roads also serve as walking trails.

A network of trails provides access to the southern, western, and northwestern areas of the Regional Park, and connects with trails to the to the east shore (Figure 3-2). These trails include the West Shore, Stewartville, Ridge, Lake View, and Old Homestead Loop trails. The West Shore Trail runs along the west shore of the reservoir and provides access to the west shore fishing dock and the dam. Stewartville Trail runs along the park entrance road south shore of the reservoir.

The Ridge and Lake View trails provide access to the ridges south and west of the reservoir with views of the reservoir and beyond. An unnamed paved trail runs along the south shore of the reservoir from the entry kiosk to the swim lagoon, and provides wheelchair access to the swim lagoon, park office, several picnic areas, restrooms, and the south shore fishing dock.

The Regional Park has a parking capacity of 1,093 vehicles. Visitation is generally highest on weekends and holidays from Memorial Day weekend through Labor Day. Parking shortages are rare and typically only occur on hot weekend days once or twice every couple of years (Bondurant, pers. comm. 2011a).

Antioch Community Park

The primary access point to the Community Park is the driveway entrance at the intersection of James Donlon Boulevard and Blythe Drive. Vehicles entering the Community Park here may park in the main parking lot, which has approximately 230 spaces. The parking lot provides access to the Jensen Family Picnic Grove, picnic tables, barbeque pits, play areas, restrooms, and sports fields 1, 2, and 3. A paved trail from the western end of the parking lot leads to the Regional Park (Figure 3-2). A second vehicle entrance and another parking lot are located on James Donlon Boulevard at the northeast corner of the Community Park. This parking lot has approximately 230 spaces and provides access to sports fields 4 and 5. An unpaved trail from the eastern end of the parking lot leads to the Regional Park. Several paved trails provide internal

access within the Community Park. The Delta De Anza Regional Trail runs along the entire northern boundary of the Community Park.

3.5 Utilities

Public utilities at Contra Loma include water service, wastewater service, solid waste disposal, electricity, and telephone and radio service. Information was obtained from staff of the EBRPD and the City, and from the EBRPD Master Plan and the City's General Plan.

3.5.1 Existing Conditions

Water Service

Water service at Contra Loma is provided by the City via their contractual agreement with CCWD for CVP water. Drinking water is available at eight locations in the Regional Park; most of these locations are near the swim lagoon, park office, concession stand, and boat launch area (Figure 3-3). A watering station for horses is also provided at the equestrian staging area near the Lake View Trail between the boat launch area and main parking lot. EBRPD irrigates the cattle grazing and landscaped portions of the Regional Park from an allocation of up to 100 acre-feet per year of water from the reservoir (Rivoire, pers. comm. 2010; Miller, pers. comm. 2011).

At the Community Park, the City provides potable water to two restrooms, the concession building/snack bar, one community picnic area, and five individual picnic areas. Irrigation water is used over most of the park, which has turf, low ground cover, and approximately 100 mature trees. The Community Park experiences heaviest use of both potable and irrigation water during the peak visitor season, May through October (City of Antioch Recreation Department 2010).

Wastewater Service

The Regional Park has eight restroom facilities. These facilities are cleaned and visually inspected daily by park staff. The restrooms at the park office and the shower facility near the swim lagoon are connected to the City's sewer service through a lift station; although EBRPD drawings do not show the connection, EBRPD believes it may be in the area of Grimsby Drive (Stoneham, pers. comm. 2011). The other six restrooms are chemical toilets that are visually inspected daily and pumped biweekly by EBRPD. EBRPD has stated that the existing chemical toilets are not sufficient for the current level of use (Rivoire, pers. comm. 2010).

All wastewater service at the Community Park is handled by the Delta Diablo Sanitation District (DDSD) which includes two restrooms and the concession building/snack bar (City of Antioch Recreation Department 2010).

Solid Waste Disposal

Allied Waste provides solid waste collection, disposal, recycling, and yard waste services to the City, including Contra Loma (City of Antioch 2003b). Trash bins and recycling bins are distributed throughout Contra Loma. The park staff gathers the trash and deposits it in one main dumpster, which is emptied by Allied Waste.

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Figure 3-3
Utilities

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Electricity

Electric service is provided by Pacific Gas and Electric (PG&E) to the office, the kiosk, the police substation, the boat ramp, and several irrigation pumps throughout the recreation area (Miller, pers. comm. 2011). No electric outlets are available at picnic sites. The Regional Park's monthly electrical usage ranges from approximately 25,610 to 70,579 kilowatt hours per month. PG&E also provide electrical service to the Community Park, but the City receives a combined electrical bill for all City properties, so electrical usage at the Community Park is difficult to determine. Separate electrical service is provided by PG&E to the dam.

No natural gas service is provided to Contra Loma.

Telephone and Radio

Telephone service is provided by AT&T to the park office, police substation, and entry kiosk (via microwave connection to the office phone system). Public telephones are available at the park office/concession area.

Radio communication is used by public safety personnel and other staff, and communication problems have been noted (Rivoire, pers. comm. 2010).

3.6 Public Health and Safety

This section addresses existing conditions and management policies regarding public health and safety at Contra Loma. Specific topics addressed are fire protection, police service, boating and swimming safety, natural hazards, and general public safety. Safety issues related to wildland fires, dam failure, and hazardous materials are described in Section 3.16 (Hazards), and safety issues related to seismicity and other potential geologic hazards are described in Section 3.12 (Geologic and Soils Resources).

3.6.1 Existing Conditions

Fire Protection

Since 1963, the EBRPD Fire Department has provided fire protection and emergency medical services to visitors of the East Bay regional parks under the authority of California Public Resources Code Section 5561.6. The fire department is responsible for providing fire protection in Contra Loma. Strategies include fire abatement and suppression, comprehensive fire prevention programs, fire investigation services, delivery of pre-hospital emergency medical care, and emergency medical transportation (East Bay Regional Park District 2011a). The department has local mutual aid agreements with Contra Costa and Alameda counties and the California Department of Forestry and Fire Protection (Cal Fire) and is a party to the Statewide Master Mutual Aid Program.

In general, EBRPD lands are predominately classified as State Responsibility Areas for fire protection. Contra Loma, like several other EBRPD parks, is located within a Local Responsibility Area, meaning that the Contra Costa County Fire Protection District (CCCFPD), which is the local fire protection district, has the legal responsibility to provide fire protection in the Regional Park. The EBRPD's role is to provide a strong secondary wildland fire response in

support of the local fire protection district. EBRPD maintains a Type 4 engine (designed for wildland fires) at Contra Loma Station 8, located at the west end of Frederickson Lane in Antioch. The station is usually unstaffed, but when nearby fires or extreme fire danger conditions occur, three firefighters are stationed there.

EBRPD provides fire suppression, prevention, emergency medical services, rescue, and initial hazardous materials response to incidents within the parks. From 2006 to 2008, EBRPD responded to the Regional Park for five fires and 51 emergency medical incidents. Compared with other EBRPD parks, this is a low rate of fire occurrence and a high rate of medical responses (Bondurant, pers. comm. 2011a). EBRPD's Wildfire Hazard Reduction and Resource Management Plan does not apply directly to Contra Loma, as this park was outside the study area of the plan. However, EBRPD uses the state-of-the-art fuels treatment methods (including grazing and mowing), mitigation measures, and BMPs outlined in the plan at Contra Loma (East Bay Regional Park District 1996). More information about wildfire protection and prevention is provided in Section 3.16 (Hazards).

Emergency response time standards vary by the level of urbanization of a service area, with faster target response times for urbanized areas (Burr Consulting 2009). National Fire Protection Association guidelines call for career fire departments to respond within 6 minutes 90 percent of the time. The response time guideline established by the California Emergency Medical Services Authority for emergency medical calls is 5 minutes in urban areas, 15 minutes in suburban or rural areas, and as quickly as possible in wilderness areas. EBRPD responds to all incidents as quickly as possible. In 2007, EBRPD's 90th percentile response time was 18 minutes and its median response time for all calls was 12 minutes. Although EBRPD met response time guidelines for suburban or rural areas in most instances, it did not meet the guidelines 90 percent of the time due to the remote locations of many incidents.

According to Contra Costa Local Agency Formation Commission, EBRPD fire stations have significant deficiencies, as many are merely unstaffed storage sheds for equipment (Burr Consulting 2009). Rather than undertaking major improvements to the old stations, EBRPD prefers to construct new stations and demolish the older stations. This is due in part because none of the existing fire stations have sleeping quarters, and EBRPD is often requested to perform overnight fire-watches by Cal Fire.

The CCCFPD provides fire suppression, paramedic emergency medical services, technical rescue, water rescue, and fire prevention and investigation services to much of the County (Contra Costa County Fire Protection District 2010). The CCCFPD operates 30 fire stations and responds to approximately 45,000 incidents annually. CCCFPD's service area includes the City, including Contra Loma. The nearest fire stations to Contra Loma are Station 83 at 2717 Gentrytown Drive, approximately 1.5 miles north of Contra Loma, and Station 82 on Bluerock Drive between Lonetree Way and Boulder Drive, approximately 1.25 miles east of Contra Loma (City of Antioch 2003b).

Police Service

EBRPD operates an independent Public Safety Division that patrols its entire regional park system, including Contra Loma. At the height of the summer season, the Public Safety Division is staffed by approximately 500 personnel, with 67 sworn police officers who derive their

authority under California Penal Code Section 830.1. In addition, the division employs 195 seasonal lifeguards, 175 members in Volunteer Trail Safety Patrols, and 48 firefighters (see "Fire Protection" above). Specialized units include the Air Support Unit, Marine Patrol, Equestrian Patrols, K-9 Unit, Special Enforcement Unit, Investigations Unit, and a 24-hour 9-1-1 Communications Center.

Contra Loma is located in Beat 2 of the EBRPD Police Department (East Bay Regional Park District 2010a). A substation of the EBRPD Public Safety Division is located within the Regional Park in the former park residence (East Bay Regional Park District 2011b). EBRPD public safety officers regularly patrol EBRPD parklands. In addition, the park is patrolled by helicopter as part of EBRPD's routine park management program. Initial response and reporting of incidents is generally provided by park rangers performing routine maintenance and safety patrols, although members of the public sometimes report incidents directly to the Antioch police or the CCCFPD. The Volunteer Trail Safety Patrol supports the EBRPD staff. Patrol members educate park visitors about EBRPD resources, programs, facilities, and rules. They operate in an observe-and-report role, working to foster positive relationships among user groups. Volunteers also assist with other related services within the parks.

The Antioch Police Department provides crime prevention and law enforcement services within the City's boundaries, including backup services to Contra Loma (City of Antioch 2003a). Operating from a central station at 300 L Street, the Antioch Police Department maintains a combination of professional sworn officers, non-sworn positions, and volunteer positions. The City is divided into six geographical areas, or beats. Beat 3 encompasses the western and southwestern portions of the City, including Contra Loma (City of Antioch 2003b). Police calls are categorized by the City's Police Department under the following priorities:

- Priority 1 designates crimes in progress or life-threatening situations.
- Priority 2 designates calls that demand immediate attention, but are not crimes in progress or life threatening situations.
- Priority 3 designates those calls that do not require immediate response and can be dealt with as soon as is practical.

In 2000, response times in Beat 3 were 7:02 minutes for Priority 1 calls; 11:27 minutes for Priority 2 calls; and 27:30 minutes for Priority 3 calls (City of Antioch 2003b). As of July 2011, the police department reports that the Community Park has been the site of three grand thefts, but no automobile thefts or personal crimes (City of Antioch 2011a).

Boating and Swimming

Water-related recreation at the Contra Loma Reservoir is managed by EBRPD and is open year-round for anglers and boats up to 17 feet long. CCWD operates the reservoir for domestic water supply. CDPH prohibits body contact recreation in water supply reservoirs. To comply with this prohibition, in June 2002 EBRPD placed the following restrictions on activities permitted in the reservoir (Contra Costa Water District 2009):

- No body contact swimming is allowed in the main reservoir. Swimming may only be done in the swim lagoon.

- Kayaking (with a self-bailing bilge) and windsurfing are allowed only after an individual has showered at the installed outdoor shower. Wetsuits must be worn by windsurfers and float tubers.

- Recreational boating is only allowed for boats powered by electric motors, sails, or paddles and oars. No gasoline-powered engines are allowed.

The swim lagoon is separated from the reservoir by a concrete-lined earthen berm that has a built-in synthetic liner. The lagoon water is circulated through a drainage and pumping system, which includes an on-site treatment plant; and the water is chlorinated using sodium hypochlorite. Wastewater from the treatment plant is discharged to the sanitary sewer. The lagoon water does not mix with the water in the main body of the reservoir at any time.

For safety reasons, swimming is permitted in the swim lagoon only when a lifeguard is on duty. The lagoon is open daily during summer and on weekends during April, May, and September (East Bay Regional Park District 2008).

In 2009, there were 956 boaters recorded at Contra Loma Reservoir, and in 2010, there were 911. Many more people go to Contra Loma to swim than to use boats, with more than 57,000 swimmers recorded in 2010. Table 3-2 provides a summary of lifeguard activity at the swim lagoon from 2006 to 2010.

Table 3-2. Lifeguard Activity at the Contra Loma Swim Lagoon (2006–2010)

Activity	2006	2007	2008	2009	2010
Attendance	56,586	59,325	60,955	53,394	57,319
Rescues	11	15	7	11	14
Missing Person	21	6	11	6	6
First Aid (minor)	287	305	220	139	135
First aid (major)	1	10	2	7	3

Source: Bondurant, pers. comm. 2011b

Natural Hazards

Hiking trails can bring the public into contact with wildlife and natural pests, including snakes, ticks, and mosquitoes.

EBRPD has prepared a public information pamphlet on the various types of snakes that are present on its properties (East Bay Regional Park District 2005). The pamphlet emphasizes how to avoid snakes, their value to the ecosystem, and emergency procedures in case of snakebite.

General Public Safety

Even though CCWD manages and operates Contra Loma Reservoir, Reclamation maintains ultimate jurisdiction over the reservoir as a water supply facility of the CVP. The 20-acre Reclamation Zone north of the dam is reserved for operation and maintenance of the facility. Access to this area is restricted to authorized personnel only.

The City Office of Emergency Services provides disaster preparedness information and training to City residents (City of Antioch 2011b). The City maintains a community emergency disaster warning system using television and radio to address the full range of potential emergencies, including earthquakes, severe winter storms, wildland fires, and hazardous materials events.

Contra Loma contains paved and unpaved hiking, bicycling, and equestrian trails. EBRPD strongly encourages all bicycle riders to wear helmets while using trails.

Dogs are allowed off leash in open spaces and undeveloped areas of the Regional Park; these areas must be at least 100 yards from developed areas or separated by fences. Dogs on leashes are allowed in parking lots, picnic sites, lawns, and other developed areas. However, dogs are not permitted at the swim lagoon or on the beach, in wetlands or marshes, or in designated nature study areas (East Bay Regional Park District 2011c).

3.7 Hydrology

3.7.1 Existing Conditions

Contra Loma Recreation Area generally drains to the north from the foothills of the Diablo Range toward the Sacramento-San Joaquin Delta (Delta). About 350 acres of the 741-acre recreation area drains to Contra Loma Reservoir and the remainder drains to the municipal reservoir east of Contra Loma, the Contra Costa Canal, or the City's storm drain system.

Contra Loma Reservoir

Contra Loma Dam is 107 feet high, and its crest is 30 feet wide and 1,050 feet long. Contra Loma Reservoir is classified as an off-stream reservoir, which means that its water is primarily supplied from a source other than direct surface runoff. The reservoir is impounded by Contra Loma Dam and by two dikes along its eastern shore (Contra Costa Water District 2009). The majority of the reservoir's water originates in the Delta and is made available under Contract No. 175r-3401A-LTR1 between Reclamation and CCWD. Water for the reservoir is diverted from the Delta at the Rock Slough and Old River intake sites, and is then conveyed by the Contra Costa Canal to Contra Loma where it is pumped uphill from the canal to the reservoir. The pumping plant is located near the toe of the dam and uses three pumps that can deliver a combined maximum of up to 21.16 cubic feet per second of water to the reservoir.

The reservoir also catches a small amount of surface runoff from the Oil Canyon watershed, which drains a portion of the Diablo Range to the southeast of Contra Loma. Runoff from Oil

Canyon comingles with the water pumped from the Contra Costa Canal and is used by CCWD. Water that flows over the spillway during unusual storm events goes into the City's storm drain system and eventually drains to the Delta.

The reservoir's total watershed is about 680 acres; about 350 acres of which are within the Regional Park. Most of remaining acres are located in EBRPD's Black Diamond Mines Regional Preserve located adjacent to the southern boundary of Contra Loma (Figure 3-4). The portion of the reservoir's watershed that lies within the recreation area is roughly bound by the rolling hills to the west and south, and by the Regional Park's main entrance road. The Community Park does not drain to the reservoir and, therefore, is not located within its watershed.

Soils within the reservoir's watershed are made up primarily of clays, and its land cover is characterized by grass, brush, and some tree cover. These conditions indicate a good potential for surface runoff; however, the watershed's relatively small area limits the amount of precipitation that is captured.

In order to quantify the amount of surface runoff captured by the reservoir's contributing watershed, an approximate hydraulic model was developed using the Soil Conservation Service (SCS) method outlined in *Urban Hydrology for Small Watersheds* (States Department of Agriculture 1986) in conjunction with the Army Corps of Engineers' (Corps) Hydraulic Modeling Software (HEC-HMS). This method estimates surface runoff using a number of parameters, including watershed area, watershed length, slope, soil type(s), and rainfall.

The SCS method assigns an empirical parameter called the SCS Curve Number to each hydrologic soil group to help predict the surface runoff associated with the soil type. The soil type in this watershed consists mostly of the Altamont-Fontana complex underneath lightly grazed open pasture and grasslands, resulting in an average curve number of 71 (Department of Agriculture 1986).

G:\Projects\30019 Contra Loma\GIS\Working Mxds\30019 Figure 3-4 Drainage.mxd Created: 2011-09-29 edouglas revised 2013-05-29 tmooney

North State Resources, Inc.

Figure 3-4
Drainage

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In general, hydraulic modeling is used to predict the amount of surface runoff for 10-, 20-, 50-, and 100-year storm events so that downstream facilities can be designed to accommodate those flow regimes. Because the reservoir's watershed is relatively small and the only downstream facility is the reservoir, the hydraulic model was designed to estimate only the total monthly runoff based on average monthly precipitation for the City (Figure 3-5).

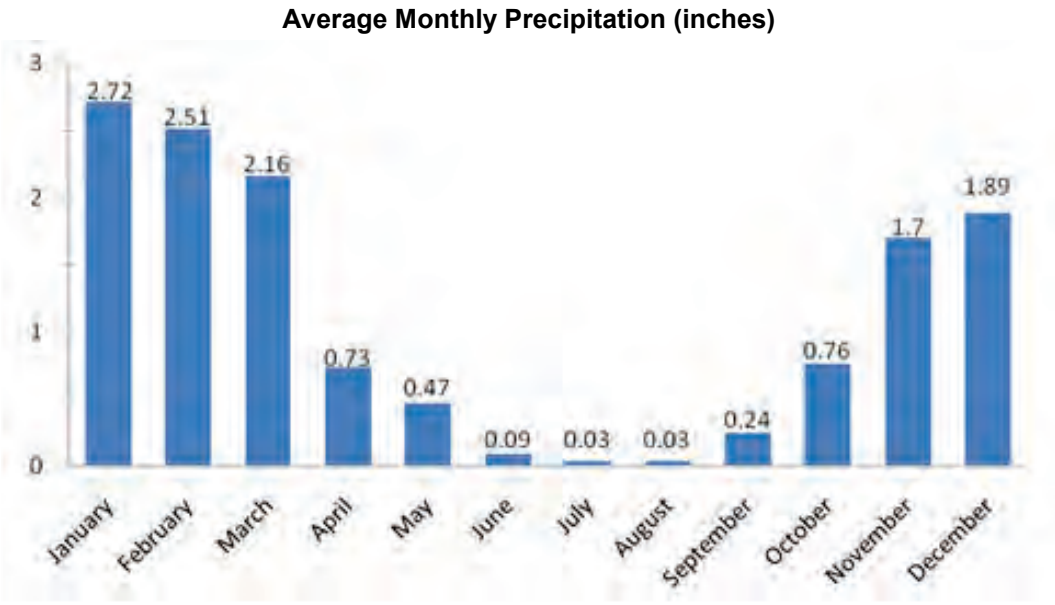

Figure 3-5. Average Monthly Precipitation for Antioch, CA

The following worst-case scenario assumptions were built into the reservoir watershed model: the soil within the watershed is assumed to be saturated before the rainfall event and the average monthly rainfall is distributed on a continuous basis throughout the entire month. These assumptions tend to produce a higher estimate of the total runoff volumes, and actual runoff volumes may be lower depending on existing conditions.

The results from the HEC-HMS model are illustrated in Figure 3-6. As shown, the Contra Loma Reservoir receives nearly all of its surface runoff from November through March. The total yearly amount of runoff is only about 106.5 acre-feet, which is equal to about 4 percent of the reservoir's total storage capacity.

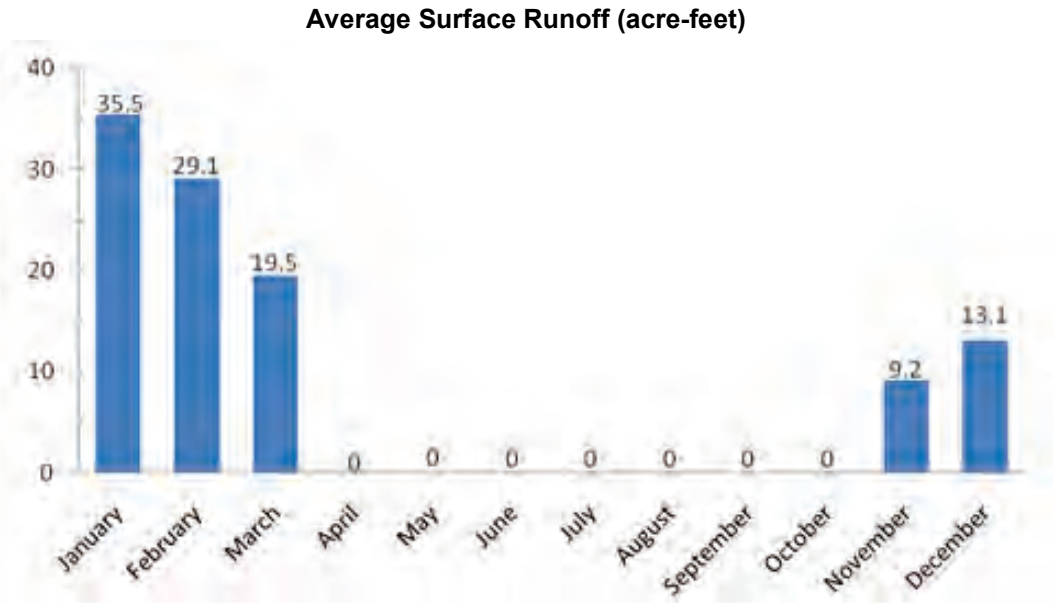

Figure 3-6. Average Monthly Surface Runoff into Contra Loma Reservoir

The contributing watershed area within the recreation area boundary accounts for approximately 51 percent of the total watershed area. Because the soil types within the recreation area are generally similar to one another, it is reasonable to assume that about 51 percent of the total surface runoff volume is generated within the recreation area boundary. Based on this assumption, runoff from within the recreation area equals about 2 percent of the reservoir's total storage capacity.

Other Drainages

About 350 acres of the 741-acre recreation area drains to the Contra Loma Reservoir, and the remainder drains elsewhere. Approximately 95 acres in the southeast corner of the recreation area drain to an unnamed creek that parallels Frederickson Lane and which then flows into the municipal reservoir (Figure 3-4). Another 89 acres on the east side of the recreation area drain east overland toward the municipal reservoir. Approximately 160 acres in the northeast corner of the recreation area (including the Community Park) drain northward toward the Contra Costa Canal. Some of this water may be pumped into Contra Loma Reservoir, and the rest flows westward toward other CCWD facilities. Approximately 33 acres in the northwest portion of the recreation area drain to the northwest toward the adjacent neighborhood, where flows join the

City's storm drain system. Approximately 14 acres drain west toward an unnamed creek that flows northward to the City's storm drain system.

Reservoir Operations

Contra Loma Reservoir has a maximum capacity of 2,627 acre-feet at a maximum stage height of 211 feet (i.e., the spillway elevation). The reservoir surface area is 115 acres at the spillway elevation (Contra Costa Water District 2009). Under typical operating conditions, reservoir storage ranges between approximately 690 and 2,000 acre-feet, depending on supply needs and hydrologic conditions (Contra Costa Water District 2009). From 2005 to 2009 the dam was operated at stage elevations between 190.80 feet and 205.70 feet (1,179 acre-feet and 2,152 acre-feet, respectively), with an average monthly stage elevation of 202.19 feet (1,887 acre-feet). As shown in Figure 3-7, stage elevations during that period varied widely during the rainy season (November to March) but typically remained at an elevation of around 204 feet during dry months (Contra Costa Water District, unpublished data).

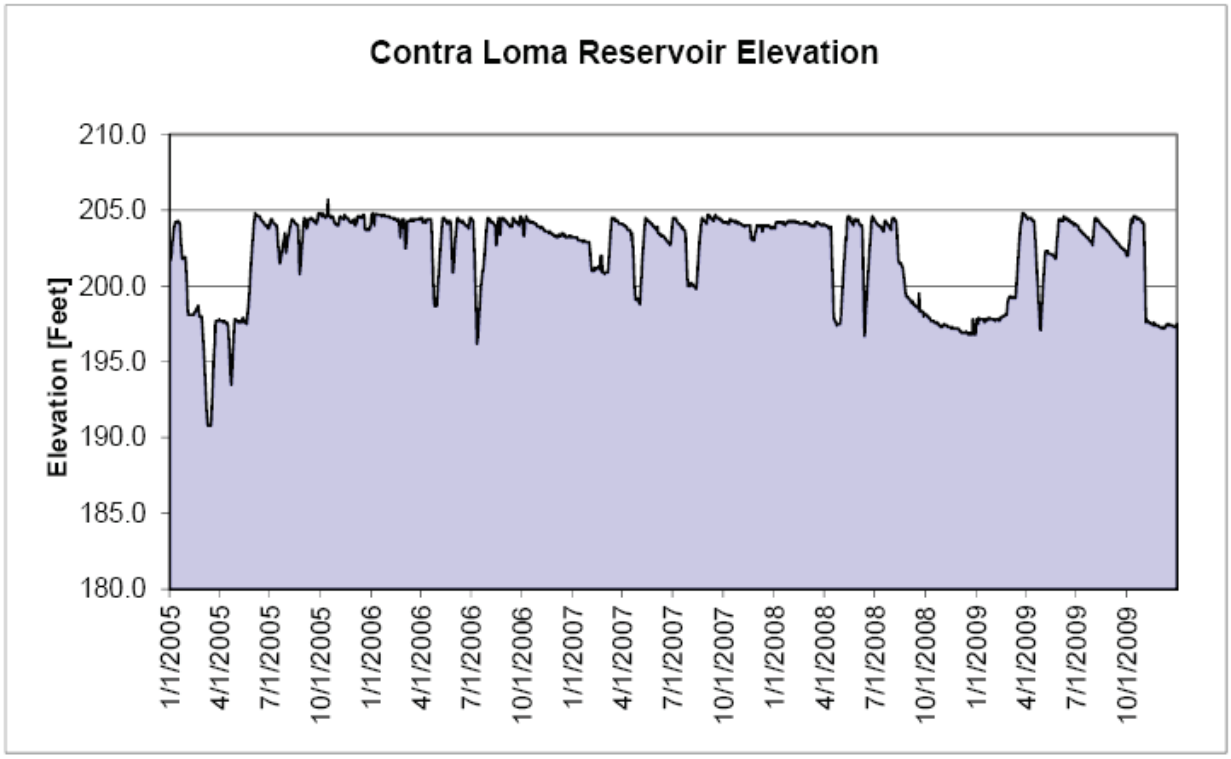

Figure 3-7. Reservoir Elevation Changes (2005-2009)

Because Contra Loma Reservoir is not a principal water storage reservoir, the dam is not actively managed on a daily basis. Figure 3-7 is a graphical representaion of the average yearly changes in reservoir level from 2005 through 2009. As shown in Figure 3-8, reservoir storage did not change on 46 percent of the days during this period. On days when storage was adjusted, the most common daily stage differential was about 0.1 feet. This increment equates to between 5 and 8 acre-feet of water exchange per day (depending on stage height), with 8 acre-feet being the statistical mode (Contra Costa Water District, unpublished data).

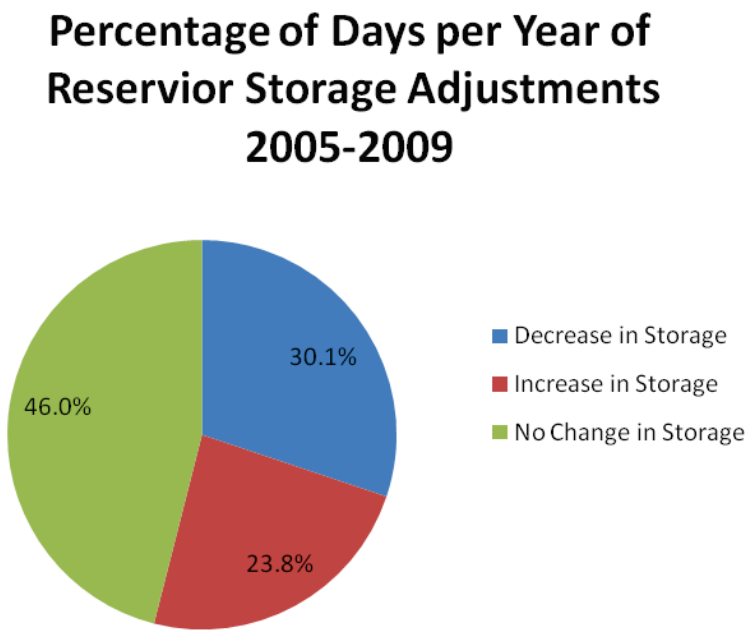

Figure 3-8. Graphical representation of the numbers of days per year (as a percent) that Contra Loma Reservoir undergoes an operational change in storage.

The amount of water stored in the reservoir decreases more often than it increases, which indicates that the water is released from the reservoir more often than it is pumped in (Figure 3-8). However, Figures 3-9 and 3-10 show that reservoir releases occur at lower rates (typically at 8 acre-feet per day) when compared with storage additions (typically between 9 and 39 acre-feet per day) (Contra Costa Water District, unpublished data).

From 2005 through 2009, most operational activity occurred during the months of April and May, with reservoir storage decreasing in April by an average of 341.80 acre-feet and reservoir storage increasing in May by an average of 356.80 acre-feet. During this period, the range of the elevation change in the reservoir in April and May averaged 4.79 and 5.06 feet, respectively. For all other months, total monthly storage increases averaged 52.40 acre-feet while monthly decreases averaged 49.77 acre-feet (Contra Costa Water District, unpublished data).

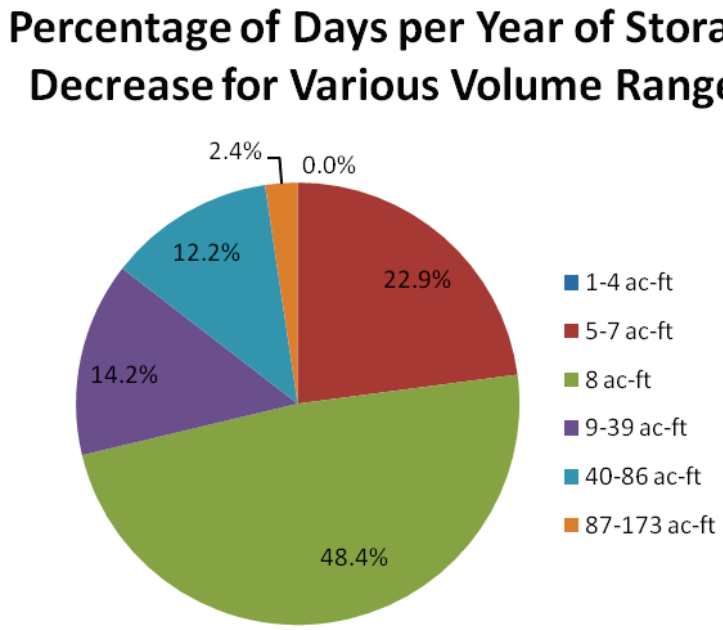

Figure 3-9. Graphical representation of the numbers of days per year (as a percent) Contra Loma Dam decreases reservoir storage volume at various volume ranges.

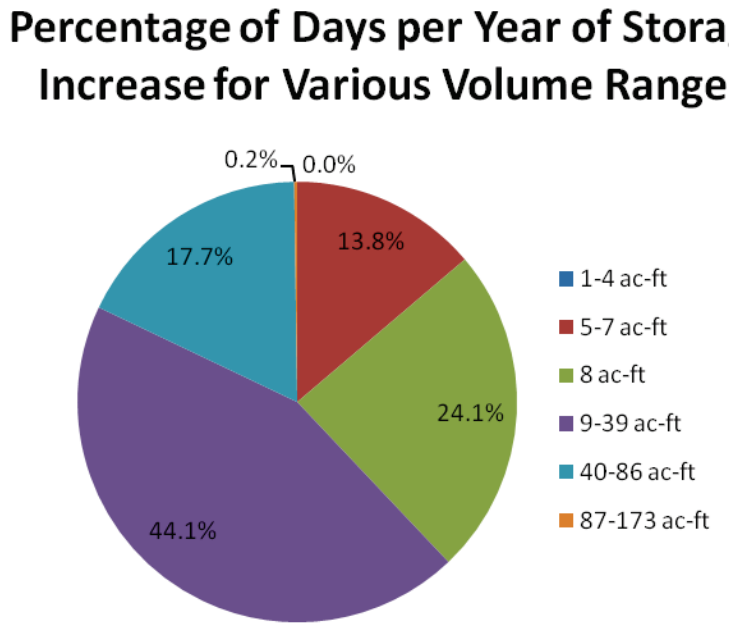

Figure 3-10. Graphical representation of the number of days per year (as a percent) Contra Loma Dam increases reservoir storage volume at various volume ranges.

3.8 Water Quality

3.8.1 Existing Conditions

Water quality in Contra Loma Reservoir is heavily influenced by the primary source of its water: the Delta. Water for the reservoir is diverted from the Delta at the Rock Slough and Old River intake sites and is then conveyed by the Contra Costa Canal to Contra Loma, where it is pumped uphill from the canal to the reservoir. The canal also periodically conveys water returned from Contra Loma Reservoir and other CCWD system storage reservoirs during periods when those reservoirs are at full storage capacity.

Potential Sources of Contamination within the Reservoir Watershed

The watershed that drains into the reservoir is about 680 acres. About 350 acres of the reservoir's watershed are within the Regional Park, and most of the remaining area is located in EBRPD's Black Diamond Mines Regional Preserve, which is located adjacent to the southern boundary of Contra Loma. The Community Park does not drain to the reservoir and, therefore, does not contribute contaminants to the reservoir. Several land uses, activities, and natural sources within the reservoir's watershed have the potential to affect the quality of the reservoir water.

Recreational activity in the Regional Park has the potential to affect reservoir water quality, although EBRPD and CCWD manage recreation in a manner that protects water quality. As described previously, body contact with the reservoir is highly restricted to protect the reservoir's domestic water supply from human-borne pathogens and viruses. The swim lagoon is hydrologically separated from the reservoir, thereby ensuring that lagoon water does not enter the reservoir; however, overflow of the swim lagoon could temporarily compromise water quality within the reservoir if its treatment system fails, although the likelihood of failure and resulting contamination is remote.

To further minimize body contact with the reservoir, windsurfers must shower before entering the water and wear wet suits. Kayaks and canoes are allowed on the reservoir, but paddlers using self-bailing kayaks must shower before launching and wear wet suits while boating. No gasoline-powered engines are allowed on the reservoir to prevent contamination from petroleum products and exhaust byproducts. All boats are inspected by trained staff prior to launching in order to protect the reservoir against infestation by non-native quagga mussels (*Dreissena rostriformis bugensis*) and zebra mussels (*Dreissena polymorpha*), collectively referred to as dreissenids. No wet boats or gear are allowed on the reservoir.

Equestrian activities and dog walking have the potential to introduce animal waste into the reservoir through surface runoff; however, plastic waste bags are provided in various locations and dog owners are encouraged to dispose of dog waste in garbage cans. In addition, hiking, biking, and equestrian activities can cause small amounts of localized erosion, and the resulting sediment can be transported to the reservoir by surface runoff.

Cattle grazing is allowed on 454 acres of grasslands surrounding the reservoir in accordance with the grazing license issued by EBRPD for the purpose of fire suppression (Figure 1-2). Most of the grazing in the recreation area is within the reservoir's watershed. Grazing within the watershed also occurs in the Black Diamond Mines Regional Preserve, which is located upstream from Contra Loma. Cattle grazing can impair water quality not only through transport

of feces from surface runoff, but also through the process of cattle-induced erosion and subsequent transport of sediment. Within Contra Loma, grazing is rotated between multiple enclosures, and cattle are not allowed near the reservoir itself to protect water quality; however, one small ephemeral stream flows through the southern part of the grazed area into the reservoir. This ephemeral stream could transport fecal matter and sediment directly into the reservoir.

The restrooms and showers at the park office near the swim lagoon are connected to the City's sewer service. Chemical toilets are also located in various parts of the Regional Park to supplement the permanent facilities. All restroom facilities are inspected and maintained at regular intervals by EBRPD staff or contractors. Restrooms and portable toilets that are properly used and maintained represent a very limited potential source of biological contamination to the reservoir. However, improper use, plumbing system failure, or accidental spills or overflow of portable toilets could cause contamination.

The fish cleaning facility located adjacent to the boat launch area of the marina often contaminates the reservoir due to improper disposal of fish cleaning waste. EBRPD has proposed relocating the fish cleaning facility away from the reservoir to prevent this from occurring. Reclamation is currently preparing separate environmental documentation for this project.

Other potential sources of contamination include chemical and sediment runoff from roads and parking lots, animal waste from local and transient wildlife, litter, potential spills or runoff from portable chemical toilets, human waste deposited outside of a designated restroom, and natural erosion and sedimentation processes.

Water Quality Protection

Section 303 of the Federal Clean Water Act requires states to adopt water quality standards that designate uses of navigable waters and associated water quality standards. The California Water Code (Section 13240) requires preparation and adoption of water quality control plans (i.e., basin plans). Basin plans are implemented by each Regional Water Quality Control Board (RWQCB). Basin plans consist of a designation or establishment of beneficial uses to be protected for the waters within a specified area, water quality objectives to protect those uses, and an implementation program needed for achieving the objectives. Basin plans identify both numeric and narrative water quality objectives that apply to all surface waters in the basin. Delta waters and the Contra Loma Reservoir are covered in the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins prepared by the Central Valley RWQCB (Central Valley Regional Water Quality Control Board 2009). This basin plan covers all of the Sacramento and San Joaquin River basins. Beneficial uses of the Contra Loma Reservoir include municipal and domestic drinking water supply, recreation, warm freshwater habitat, and wildlife habitat.

Drinking water quality is regulated at the Federal, state, and local levels. The Safe Drinking Water Act (SDWA) is the main Federal law that ensures the quality of drinking water in the U.S. The SDWA authorizes the Environmental Protection Agency (EPA) to set national health-based standards for drinking water to protect against both naturally occurring and man-made contaminants that may be found in drinking water. The EPA also oversees the states, localities, and water suppliers who implement these standards. States are given primary enforcement responsibility for public water systems in their state if they meet certain requirements.

In California, Title 22 of the California Code of Regulations (CCR) sets numeric primary and secondary drinking water standards to protect public health. California's standards meet or exceed the standards set forth in the Federal SDWA. The CDPH oversees water quality regulations for public water systems through its Drinking Water Program. In addition to Title 22 drinking water standards, Section 115825(b) of the California Health and Safety Code prohibits recreational body contact with reservoirs that store water for domestic use. Much of CCWD's water quality monitoring at the Contra Loma Reservoir is performed to ensure compliance with Title 22 provisions.

Title 22 provides primary drinking water standards, called maximum contaminant levels (MCLs), for 92 contaminants. Numerical MCLs are provided for 90 of these contaminants, and treatment techniques are provided for the two contaminants for which MCLs are not feasible. These primary contaminants include inorganic chemicals such as aluminum, antimony, and arsenic; radionuclides such as uranium and radium; volatile organic chemicals such as benzene and carbon tetrachloride; non-volatile synthetic organic chemicals such as chlordane; and disinfection byproducts such as bromate. Title 22 also includes secondary MCLs for 16 contaminants such as copper and iron as well as physical attributes such as color and odor.

The EPA developed the Long Term 2 Enhanced Surface Water Treatment Rule to provide additional protection for drinking water from disease-causing microorganisms sometimes found in surface water sources. These microorganisms include water-borne pathogens such as *Cryptosporidium* and *Giardia* that can cause diarrhea, vomiting, or stomach cramps as well as other health risks. *Cryptosporidium* is a significant concern in drinking water because it may contaminate surface waters used as drinking water sources, it is resistant to chlorine and other disinfectants, and it has caused waterborne disease outbreaks in other public water systems. Consuming water with *Cryptosporidium* can cause gastrointestinal illness that may be severe in people with weakened immune systems such as infants and the elderly and may be fatal in people with severely compromised immune systems such as cancer and Acquired Immune Deficiency Syndrome patients. Other pathogens of concern regulated by EPA and CDPH include *Escherichia coli* (E. coli) and other coliform bacteria.

Dreissenids represent another type of hazard to public drinking water systems. Once established, these non-native mussels can clog water intake and delivery pipes and other infrastructure, requiring costly maintenance and repairs to drinking water systems. These mussels also adhere to boats and pilings, foul recreational beaches, compete with native mussels, disrupt natural food webs, and bioaccumulate toxins. Quagga and zebra mussels were first detected in the Great Lakes in the late 1980s and have since spread unchecked throughout much of the eastern U.S. In January 2007, the first population of dreissenid mussels in the western U.S. was discovered in Lake Mead, and they have recently been found in several California reservoirs.

The Contra Loma Reservoir supports populations of Asiatic clam (*Corbicula fluminea*), a freshwater species native to Asia. Asiatic clams live in many reservoirs, lakes, rivers, and canals in California, including the Delta. The clam is also found throughout much of the U.S. (Geological Survey 2011). These clams burrow in reservoir sediments. Certain short-term water quality conditions can occasionally cause large clam die-offs, causing the clam shells to release the dead clam bodies, which float to the surface. These die-offs can affect water quality and create unpleasant odors (Contra Costa Water District 2010a). Asiatic clams have been known to

clog water intake and delivery pipes and other infrastructure in reservoirs, thereby increasing operating costs (Geological Survey 2011).

Water Quality Monitoring Programs

CCWD has instituted several water quality monitoring programs in support of regulatory compliance and for operations and maintenance of its water system infrastructure (Contra Costa Water District 2010b). CCWD monitors water quality in the reservoir for Title 22 primary and secondary drinking water standards and to meet the requirements of Compliance Order No. 02-04-97CO-007 (as amended) pertaining to microbiological (e.g., *Cryptosporidium*, *E. coli, Giardia*) water quality in the reservoir after completion of the swim lagoon. This order was issued to CCWD by the DOHS (predecessor to CDPH).

Physical analysis and water quality testing for inorganic pollutants and synthetic and volatile organic chemicals occurs annually in October. Testing for asbestos is performed every 9 years, with the next sampling event scheduled for 2017. Radiochemistry testing is performed every 3 years, usually during the first week of January. Microbiology testing is performed monthly. CCWD also tests the reservoir water for physical parameters such as temperature, pH, and dissolved oxygen; phytoplankton; quagga and zebra mussels; non-native aquatic plant species; and stratification.

CCWD's water quality testing indicates that chemical and biological contamination of the reservoir rarely occurs. Between 2006 and 2010, CCWD sampled and tested for 194 different water quality analytes, including microbes. Only two of the non-microbial analytes had at least one sample that was equal to or exceeded its MCL (Contra Costa Water District 2010c). These analytes are color and iron, and both are derived from natural sources within the reservoir watershed as shown in Table 3-3.

Table 3-3. Analytes in Contra Loma Reservoir with at Least One Sampling Result Equal to or Greater Than the Designated MCL (2006–2010)

Analyte *(source)*	Reporting Unit	MCL Level	Maximum	Minimum	Median	Total Samples	Samples ≥MCL (as %)
Secondary Standards							
Color (naturally occurring organic materials)	Color Unit	15	20	15	20	5	5 (100%)
Iron (natural deposits)	µg/L	300	1100	100	205	58	17 (29%)

Source: Contra Costa Water District 2010c
Notes: µg = microgram, L = liter

Every month, CCWD tests for biological pathogens by sampling reservoir water in two locations: near the dam and near the swim lagoon in the vicinity of the former swimming beach. This testing helps monitor the effectiveness of the swim lagoon at controlling human introduction of microbial pathogens into the reservoir. CCWD tests for *E. coli*, fecal coliform bacteria, nonsheen bacteria, and total coliform at the former beach. *E. coli* is an indicator of possible fecal contamination. Fecal coliform are specific to warm-blooded animals, and serve as

indicators of human waste contamination. Total coliform includes bacteria found not only in mammal waste, but also in soils. CCWD tests for these pathogens as well as *Cryptosporidium* and *Giardia* at the dam.

CCWD testing data show that pathogens in the reservoir are generally well below standards most of the time. However, total coliform levels have often exceeded standards and *E. coli* and fecal coliform have occasionally exceeded standards (Contra Costa Water District 2010c). As shown in Table 3-4, *E. coli* and fecal coliform exceeded standards in at least one sample each from both the dam and the former beach sites; however, median count values for *E. coli* and fecal coliform remained low, indicating that microbial levels for these pathogens remain low most of the time. It is also important to note that the median and maximum levels for these pathogens at the dam were equal to or higher than those at the former beach, suggesting that Delta water, which enters the reservoir at the dam, is the primary source of these pathogens.

Table 3-4. Microbiological Water Quality Results for Contra Loma Reservoir (2006-2010)

Analyte	Reporting Location	Reporting Unit	Standard	Median	Maximum	Total Samples	Samples ≥Standard (as %)
Giardia lamblia	Dam	cysts/L	1	<0.1	<0.1	60	0 (0%)
Cryptosporidium	Dam	oocysts/L	1	<0.1	<0.1	60	0 (0%)
Total coliform	Dam	cfu/100 ml	1000	785	39,000	90	53 (59%)
Total coliform	Former beach			505	33,000	60	23 (38%)
E. coli	Dam	cfu/100 ml	200	6.5	920	70	2 (3%)
E. coli	Former beach			3	920	40	5 (12%)
Fecal coliform	Dam	200 cfu/100ml (5 samples for 30 day period)	200	7.5	270	24	1 (4%)
Fecal coliform	Former beach			5.5	220	24	1 (4%)

Source: Source: Contra Costa Water District 2010c
Notes: cfu = colony forming units, ml = milliliter, L = liter

Approximately 38 percent of the samples collected at the former beach and 59 percent of the samples collected at the dam contained total coliform levels above the standard. Importantly, the median and maximum levels for total coliform were higher at the dam than the former beach, again suggesting that Delta water is the primary source of these bacteria. Although total coliform levels are not a direct indicator of microbial contamination, increased counts may indicate fecal sources of contamination. *Giardia* and *Cryptosporidium* counts were well below standards at the dam and do not appear to cause water quality problems for the reservoir.

CCWD monitoring has not identified any adult quagga or zebra mussels or veligers (the free-floating larval form of dreissenids) in Contra Loma reservoir (Contra Costa Water District 2010c).

3.9 Vegetation

3.9.1 Existing Conditions

Contra Loma Recreation Area is designated by the EBRPD as an open space area with developed recreation occurring in limited areas. As a result, vegetation at Contra Loma has been retained in or restored to its natural state to the extent feasible for an area that has been cultivated, grazed, or inhabited by Euro-Americans since the mid-1800s.

Vegetation Communities Assessment

The vegetation communities described in this section are classified based on the habitat descriptions provided in *A Guide to Wildlife Habitats of California* (Mayer and Laudenslayer Jr. 1988), which is a component of the California Wildlife Habitat Relationship (CWHR) System (California Department of Fish and Game 2011) used by CDFW. The CWHR habitat types present within Contra Loma include annual grassland, blue oak woodland, valley foothill riparian, fresh emergent wetland, riverine, lacustrine, urban, and barren. Field reconnaissance surveys of the study area were conducted by Reclamation's consultant North State Resources, Inc. (NSR) on October 20 and 22, 2010 by walking meandering transects that covered all habitats. Observations were made at each distinct habitat unit and the dominant plant species were recorded. Any areas that appeared suitable for special-status species were noted. Potentially significant features were also documented with photographs (Appendix F.1). On March 30, 2011, NSR conducted a focused botanical survey for stinkbells (*Fritillaria agrestis*), a plant classified by the California Native Plant Society (CNPS) as California Rare Plant Rank (RPR) 4.2, uncommon in California. The locations of stinkbells occurrences were mapped using a Trimble Pathfinder Pro XH GPS capable of sub-foot accuracy.

The descriptions and locations of aquatic, wetland, and riparian habitats are based on the reconnaissance-level surveys performed in October 2010, which did not include a formal delineation of these features or a determination of their Corps jurisdictional status. The habitat assessment is intended to provide a general description of the types of wetland and aquatic features at Contra Loma, including intermittent streams, seasonal wetlands, fresh emergent wetlands, riparian habitat, and open water. The jurisdictional boundaries and wetland classifications of the aquatic features at Contra Loma are subject to refinement if or when a formal delineation is performed.

Each of the habitats at Contra Loma is described below; Figure 3-11 illustrates the location and areal extent of these habitats and Table 3-5 provides acreages and percentages for all habitats at Contra Loma.

Upland Habitats

There are five upland habitats present at Contra Loma: annual grassland, valley foothill riparian, blue oak woodland, urban, and barren.

Annual Grassland Annual grassland is the dominant habitat at Contra Loma, covering 73 percent of the study area. The annual grassland at Contra Loma has historically been grazed and is composed primarily of non-native grasses and forbs. Dominant grasses and forbs include smooth brome (*Bromus hordeaceus*), slender wild oats (*Avena barbata*), Italian rye grass

(*Lolium multiflorum*), yellow star thistle (*Centaurea solstitialis*), white-stem filaree (*Erodium moschatum*), and mouse-ear chickweed (*Cerastium glomeratum*).

Table 3-5. Habitat Composition at Contra Loma Reservoir and Recreation Area

Habitat	Acreage in Study Area (acres)	Percentage of Study Area (percent)
Upland		
Annual grassland	541	73.0
Valley foothill riparian	8	1.1
Urban	48	6.5
Barren	37	5.0
Upland Total	**634**	**85.6**
Blue Oak Woodland	**13**	**1.8**
Wetland and Aquatic		
Riverine	4	0.5
Fresh emergent wetland	8	1.1
Lacustrine	68	9.2
Wetland and Aquatic Total	**80**	**10.9**
Restoration Area	**14**	**1.9**
TOTAL – ALL HABITATS	**741**	**100**

Five very large valley oak trees (*Quercus lobata*) are present within the annual grassland habitat near the northeast corner of Contra Loma. These trees are very old (estimated between 50 and 150 years of age) and are important for their habitat value and acorn production. They may also be historically, culturally, and visually important to the community. The locations of these trees are shown in Figure 3-11.

Valley Foothill Riparian The valley foothill riparian habitat covers a little more than 1 percent of Contra Loma, and is primarily present along the intermittent stream corridors downslope from the Contra Loma and Antioch Municipal reservoirs near the northern boundary of the recreation area. Narrow fringes of valley foothill riparian habitat also occur along portions of the Contra Loma Reservoir shoreline. These areas are prone to periodic saturation or inundation from precipitation, high reservoir levels, irrigation runoff from the sports fields and landscaped areas, or possibly from seepage from Antioch Municipal Reservoir.

The valley foothill riparian habitat is composed mostly of large valley oaks, cottonwoods (*Populus fremontii*), and red willows (*Salix laevigata*), with an understory of Himalayan blackberry (*Rubus discolor*), poison oak (*Toxicodendron diversilobum*), and mulefat (*Baccharis salicifolia*). The narrow band of riparian habitat along the Contra Loma Reservoir is primarily composed of willows (*Salix* spp.) and mulefat.