3.0 AFFECTED ENVIRONMENT

This chapter presents the existing environmental conditions within the project study area and, if appropriate, beyond the study area boundaries, identified in Figure 1-1. The information relates to both landside and waterside conditions along the Berkeley/Albany waterfront that could be affected by project implementation. The information presented is based on technical memoranda prepared for each of the environmental topics identified below. Information included in this chapter is excerpted from the technical memoranda, which are kept on file at the WETA office at Pier 9 in San Francisco.

3.1 TRANSPORTATION AND CIRCULATION

This section describes existing transit service within an expanded study area ("transit service study area") bounded by El Cerrito Plaza BART station (Fairmount Avenue) to the north, the shoreline of the San Francisco Bay on the west, Ashby Avenue on the south and Sacramento Street on the east, extending northward generally from the intersection of Sacramento and Hopkins Streets to Santa Fe and Solano Avenues, then following Santa Fe Avenue north to Fairmount Avenue. Local and regional transit providers serve the transit service study area. AC Transit provides local and transbay bus service while BART and Amtrak provide regional rail transit service to this study area. In addition, the WBS provides shuttle service between the Ashby BART station and the West Berkeley employment centers.

Existing traffic and parking conditions within the study area, particularly access roads and potential parking areas adjacent to the alternative ferry terminal sites, are also described. Existing traffic volumes and Level of Service (LOS) at key intersections within the study area are provided.

3.1.1 Transit Service

Direct transit service or the stop location nearest to each ferry terminal location is identified in Table 3-1. None of the proposed sites are currently directly served by transit (service within 200 feet).

A map illustrating existing local transit service within the transit service area is shown in Figure 3-1.

3.1.2 AC Transit Services

AC Transit Routes in the Transit Service Study Area. AC Transit is the main provider of local and transbay bus services within the project study area and the transit service study area. AC Transit provides service to 13 cities and adjacent unincorporated areas in Alameda and Contra Costa counties. The transit service study area includes 15 confirmed bus routes. Local bus lines that serve the transit service study area include: 9, 18, 19, 51, 52, 52L, 72, 72M, 72R, and 88. The 802 Owl also provides all-night service, including service to the Berkeley Amtrak

Table 3-1
Transit Service Stop Locations Nearest to Proposed Ferry Terminal Site Alternatives

Ferry Terminal Site Alternatives	Stop Locations Nearest to the Project Site				
	AC Transit			BART	West Berkeley Shuttle
	Direct Service	Nearest Bus Lines	Other Bus Lines in Vicinity		
A – Berkeley Marina	none	9	19, 51, G, Z	North Berkeley	6th and Dwight
B – Berkeley Fishing Pier	none	9	19, 51, G, Z	North Berkeley	6th and Dwight
C – Gilman Street	none	9, H, Z	52, 52L	El Cerrito Plaza	--
D – Buchanan Street	none	18, Z	52, 52L	El Cerrito Plaza	--

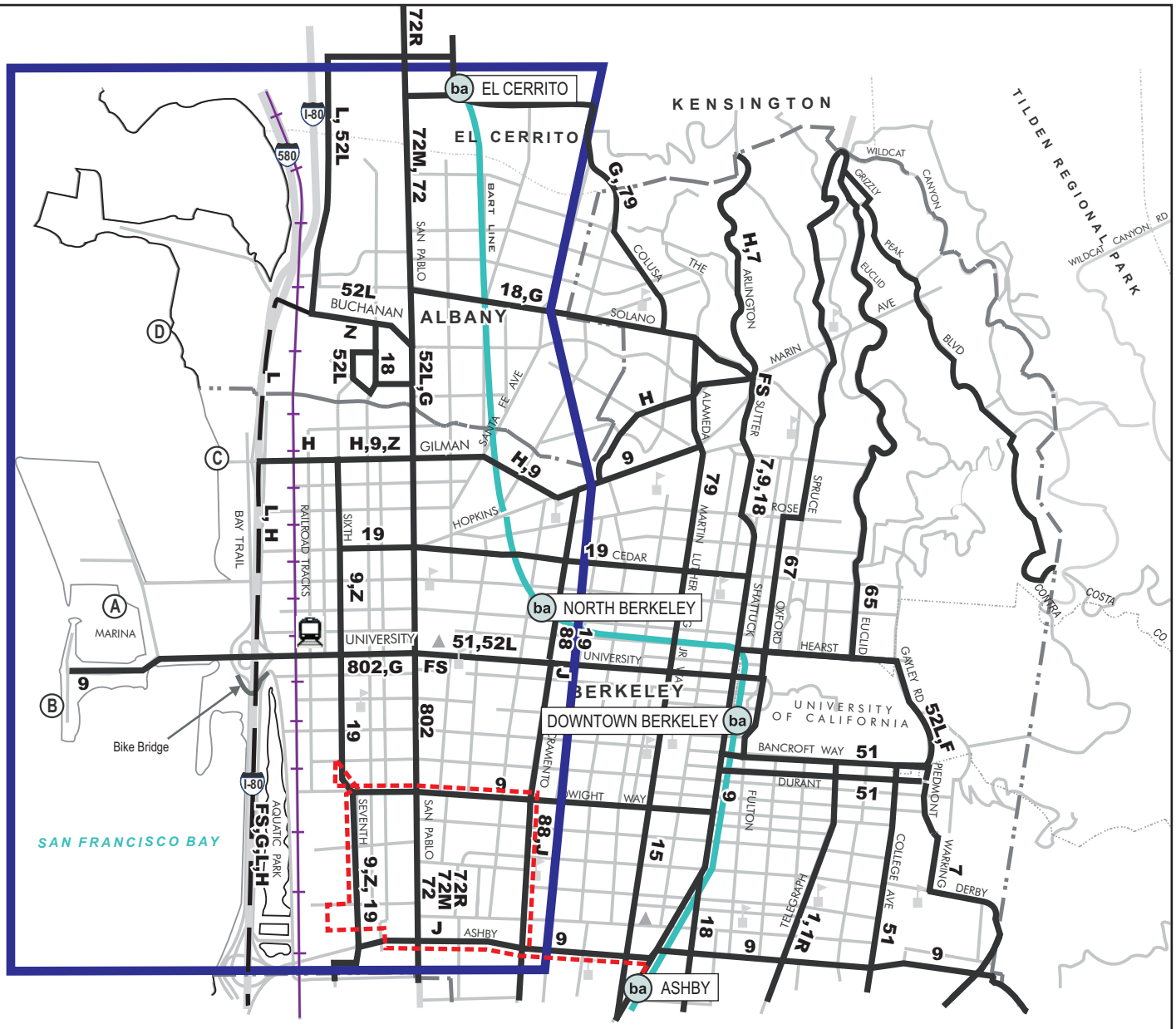
Note:
Based on existing route information obtained from AC Transit from March – June 2007.

Station, located at University Avenue and 3rd Street from 1 a.m. to 5 a.m. During the weekday commute hours, AC Transit offers regional transbay bus service between the San Francisco Transbay Terminal and the transit service study area. Four transbay lines that serve the area include the G, H, J, and Z. AC Transit changed several bus routes within the study area on June 3, 2007.

Provision and Usage of Transit Service. Table 3-2 presents the route structure, span of service, headways, schedule adherence, and vehicle type and capacity for the 15 AC Transit lines in the transit service study area.

AC Transit Service Standards. AC Transit maintains a set of service standards known as "Policy 550" to establish guidelines for route and service design. The standards establish district policy for headways, travel times, load factors, service span (hours of service), and network design. AC Transit's routes are assessed based on these measures, which are then used for decision making as to schedule adjustments, route changes, equipment assignments, and running time adjustments.

For this project, the load factor standards will be important in assessing any future impact from transferring ferry riders. AC Transit establishes maximum acceptable load factors for different types of routes, usually 25 percent over seated capacity. None of the transit routes within the transit service study area currently carry loads on a daily basis that exceed, or even approach AC Transit's maximum standard.



LEGEND

- AC Transit Bus Route
- AC Transit Route on Freeway (No Stops)
- West Berkeley Shuttle
- 9,Z — Letter or Number Denotes AC Transit Route
- Regional Rail
- BART Station
- Amtrak Railroad Station
- Library
- Public School
- Transit Service Study Area

- (A) Berkeley Marina Alternative
- (B) Berkeley Fishing Pier Alternative
- (C) Gilman Street Alternative
- (D) Buchanan Street Alternative

Source:
City of Berkeley, Geographic Information Systems.

LOCAL TRANSIT NETWORK AS OF JUNE 3, 2007

Berkeley/Albany Ferry Terminal Study

October 2008
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FIGURE 3-1

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Table 3-2
AC Transit Service by Route

			Span of Service			Headways			Schedule Adherence* (%) Weekday			Saturday			Sunday			Vehicle		
Line	**Direction**	**Endpoint**	**Weekday**	**Weekend**	**Weekday Peak**	**Midday**	**Evening**	**Saturday**	**Sunday**	**Early****	**On-time**	**Late**	**Early****	**On-time**	**Late**	**Early****	**On-time**	**Late**	**Type**	**Capacity**
9	EB	Ashby Avenue (Ashby Ave and Claremont Ave)	6:27 a.m. – 9:20 p.m.	7:00 a.m. – 8:51 p.m.	20-30	20-30	30	30	30	11.5	69.4	19.1	3.2	67.7	29	11	60.3	28.6	30 foot	39
9	WB	Berkeley Marina (Seawall Dr and University Ave)	6:20 p.m. – 9:05 p.m.	7:00 a.m. – 8:51 p.m.	20-30	20-30	30	30	30	11.5	69.4	19.1	3.2	67.7	29	11	60.3	28.6	30 foot	39
19	EB	Fruitvale BART	6:06 a.m. – 10:21 p.m.	6:06 a.m. – 10:21 p.m.	30	30	30	30	30	3.5	72.6	23.9	8.5	65.5	26	5.7	78.6	15.6	30 foot	39
19	WB	North Berkeley BART	6:38 a.m. – 10:15 p.m.	6:38 a.m. – 10:15 p.m.	30	30	30	30	30	3.5	72.6	23.9	8.5	65.5	26	5.7	78.6	15.6	30 foot	39
43	NB	El Cerrito (San Pablo Ave and Marin Ave)	5:17 a.m. – 12:24 a.m.	5:40 a.m. – 12:20 a.m.	15	15	20-30	20-30	20-30	7.3	71.2	21.6	2.7	72.2	25.2	5.9	84.1	9.9	40 foot – urban coach	48
43	SB	Eastmont Transit Center (Foothill Blvd and Eastmont)	5:01 a.m. – 11:56 p.m.	5:43 p.m. – 11:57 p.m.	15	15	20-30	20-30	20-30	7.3	71.2	21.6	2.7	72.2	25.2	5.9	84.1	9.9	40 foot – urban coach	48
51	NB	Berkeley (University Ave and 3rd St)	4:54 a.m. – 12:41 a.m.	4:58 a.m. – 12:41 a.m.	8	10	15-20	15-60	20-60	5	67.3	27.7	4.5	60.8	34.6	8.4	74	17.6	40 foot – urban coach	48
51	SB	Alameda (Blanding Ave and Broadway)	4:59 a.m. – 12:28 a.m.	4:59 a.m. – 12:28 a.m.	8	10	15-20	15-60	20-60	5	67.3	27.7	4.5	60.8	34.6	8.4	74	17.6	40 foot – urban coach	48
52	NB	UC Village (956 Ohlone Drive)	8:57 a.m. – 6:22 p.m.	—	30	—	—	—	—	14.5	66	19.6	—	—	—	—	—	—	Discontinued, 40 foot?	48
52	SB	UC Campus (Bancroft Way and Telegraph Ave)	8:24 a.m. – 5:49 p.m.	—	30	—	—	—	—	14.5	66	19.6	—	—	—	—	—	—	Discontinued, 40 foot?	48
52L	NB	UC Village (956 Ohlone Drive)	7:49 a.m. – 12:17 a.m.	8:34 a.m. – 12:02 a.m.	15	30	30	30	30	14.5	66	19.6	9.6	74.7	15.6	13.5	71.3	15.2	40 foot	48
52L	SB	UC Campus (Bancroft Way and Telegraph Ave)	7:02 a.m. – 11:48 p.m.	8:02 a.m. – 12:03 a.m.	15	30	30	30	30	14.5	66	19.6	9.6	74.7	15.6	13.5	71.3	15.2	40 foot	48
72	NB	Richmond (Hilltop Mall and Hilltop Dr)	4:59 a.m. – 12:57 a.m.	5:00 a.m. – 12:50 a.m.	30	30	36	30-36	30-36	37.8	43.4	18.8	33.4	38	28.5	30.2	51.7	18.1	60 foot – articulated	60
72	SB	Oakland Amtrak (2nd St and Alice St)	3:40 a.m. – 12:39 a.m.	3:40 a.m. – 12:55 a.m.	30	30	36	30-36	30-36	37.8	43.4	18.8	33.4	38	28.5	30.2	51.7	18.1	60 foot – articulated	60
72M	NB	Richmond (Tewksbury Ave and Castro St)	6:03 a.m. – 12:28 a.m.	6:20 a.m. – 12:16 a.m.	30	30	30-60	30-60	30-60	37.8	43.4	18.8	33.4	38	28.5	30.2	51.7	18.1	60 foot – articulated	60
72M	SB	Oakland Amtrak (2nd St and Alice St)	4:45 a.m. – 12:19 a.m.	5:01 a.m. – 12:30 a.m.	30	30	30-60	30-60	30-60	37.8	43.4	18.8	33.4	38	28.5	30.2	51.7	18.1	60 foot – articulated	60
72R	NB	Contra Costa College	6:00 a.m. – 8:12 p.m.	—	12	12	—	—	—	25.5	45.1	29.3	—	—	—	—	—	—	40 foot – urban coach	48

AC Transit Fleet Information		
Vehicle Type	**Capacity**	**Capacity Breakdown**
30 foot	39	29 seated, 10 standees
40 foot – Local Service /urban coach	48	32 seated, 16 standees
40 foot – Transbay Service /urban coach	32	32 seated, no standees
45 foot – MCI	57	57 seated, no standees
60 foot – articulated	60	40 seated, 20 standees

Source: Bruzzone, 2007. AC Transit; AC Transit website (www.actransit.org)

Table 3-2 (Continued)
AC Transit Service by Route

			Span of Service			Headways			Schedule Adherence* (%) Weekday			Saturday			Sunday			Vehicle		
Line	Direction	Endpoint	Weekday	Weekend	Weekday Peak	Midday	Evening	Saturday	Sunday	Early**	On-time	Late	Early**	On-time	Late	Early**	On-time	Late	Type	Capacity
72R	SB	Jack London Square (2nd St and Clay St)	6:00 a.m. – 8:12 p.m.	—	12	12	—	—	—	25.5	45.1	29.3	—	—	—	—	—	—	40 foot – urban coach	48
88	NB	North Berkeley BART	5:29 a.m. – 12:24 a.m.	5:29 a.m. – 12:22 a.m.	20	20	20	20	20	5.4	72.1	22.5	3.6	84	12.3	5.7	80.9	13.5	30 foot	39
88	SB	Lake Merritt BART (Oak St and 8th St)	5:30 a.m. – 12:08 a.m.	5:30 a.m. – 12:23 a.m.	20	20	20	20	20	5.4	72.1	22.5	3.6	84	12.3	5.7	80.9	13.5	30 foot	39
802	NB	Berkeley (University Ave and 3rd St)	12:35 a.m. – 4:58 a.m.	12:35 a.m. – 4:58 a.m.	—	—	60	60	60	12.2	75.8	12	6.6	73.7	19.7	11	77.7	11.3	40 foot	48
802	SB	12th Street BART (Broadway and 14th St)	12:07 a.m. – 5:28 a.m.	12:07 a.m. – 5:28 a.m.	—	—	60	60	60	12.2	75.8	12	6.6	73.7	19.7	11	77.7	11.3	40 foot	48
G **	EB	El Cerrito (Potrero Ave and Richmond St)	3:40 p.m. – 8:00 p.m.	—	30-60	—	—	—	—	41.2	39.9	18.9	—	—	—	—	—	—	45 foot – MCI	57
G **	WB	San Francisco Transbay Terminal	5:31 a.m. – 8:55 a.m.	—	30-60	—	—	—	—	41.2	39.9	18.9	—	—	—	—	—	—	45 foot – MCI	57
H **	EB	El Cerrito (Barrett Ave and San Pablo Ave)	4:10 p.m. – 9:00 p.m.	—	20-30	—	—	—	—	50.3	37.3	12.4	—	—	—	—	—	—	45 foot – MCI	57
H **	WB	San Francisco Transbay Terminal	5:55 a.m. – 9:00 a.m.	—	20-30	—	—	—	—	50.3	37.3	12.4	—	—	—	—	—	—	45 foot – MCI	57
J **	EB	North Berkeley BART (Sacramento St and University Ave)	4:00 p.m. – 8:41 p.m.	—	20-30	—	—	—	—	48.4	44.6	7	—	—	—	—	—	—	40 foot	32
J **	WB	San Francisco Transbay Terminal	6:02 a.m. – 9:15 a.m.	—	20-30	—	—	—	—	48.4	44.6	7	—	—	—	—	—	—	40 foot	32
Z **	EB	Albany (Buchanan St and Pierce St)	6:55 a.m. – 9:08 a.m.	—	20	—	—	—	—	45	36.4	18.6	—	—	—	—	—	—	45 foot – MCI	57
Z **	WB	San Francisco Transbay Terminal	4:30 p.m. – 6:52 p.m.	—	20	—	—	—	—	45	36.4	18.6	—	—	—	—	—	—	45 foot – MCI	57

Based on existing route information obtained from March – April 2007.

* Schedule adherence data was collected by AC Transit from June 2006 to March 2007. The data presented may not represent a 100% sample of all scheduled trips.

Instead, the information presented reflects only information that was available for collection during the collection period.

** AC Transit policy for transbay services permits peak direction trips to arrive early at peak direction timepoints.

Future Service Changes

AC Transit is scheduled to undergo a service change on June 3, 2007. Proposed service changes include:

– A variant of Line 19 to Downtown Berkeley (which will replace Line 52)

– The elimination of Line 52

– The extension of Line 52L to El Cerrito Del Norte BART

– The elimination of Line 43 (with replacement by Line 18)

3.1.3 West Berkeley Shuttle

The WBS is the only shuttle service that operates in close proximity to the proposed ferry terminal sites. The WBS is a service of the Berkeley TMA and connects the West Berkeley employment centers with the Ashby BART station. The shuttle runs from 5:40 to 9:06 a.m. and 3:00 to 6:17 p.m. The nearest shuttle stop is located at 6th Street and Dwight Way, at the southeastern border of the transit service study area, approximately one and one-quarter or one and one-half miles from the ferry terminal site alternatives (Berkeley Gateway TMA, 2007a). The WBS is free to employees and affiliates of the shuttle sponsors and costs $0.50 per ride for non-affiliates (Berkeley Gateway TMA, 2007b). Approximately 99.9 percent of riders are employees or affiliates of the shuttle sponsors, which include Wareham Properties, Bayer, and the City of Berkeley. The shuttle serves approximately 100 riders a day and adheres to its schedule 99 percent of the time (Atkinson, 2007).

Many shuttle riders have expressed the need for expanded hours of operation. The Berkeley TMA is looking into the possibility of expanding service in the next few years and may consider the option of running the shuttle service all day. In addition, several new construction projects are underway in the West Berkeley neighborhood, including the development of new condominiums and also a new West Berkeley Bowl Marketplace at 9th Street and Heinz Avenue. The Berkeley TMA anticipates these projects will likely increase the demand for the shuttle (Atkinson, 2007).

3.1.4 Emery Go Round

The Emery Go Round is a free shuttle service that connects Emeryville's corporate centers, retail, schools, residential, and hotels to the MacArthur BART and Emeryville Amtrak stations. The shuttle operates outside of the transit service study area, with the closest weekday stop located on 67th Street between Hollis Street and San Pablo Avenue and the closest weekend stop located along 65th Street at Shellmound St, both located in Emeryville. The shuttle operates daily, with service every 10 to 12 minutes during the weekday commute hours, every 15 to 20 minutes during off-peak hours and synchronizes to BART every 40 minutes after 8 p.m. (Emeryville TMA, 2007).

3.1.5 BART

Two BART stations are located within the transit service study area, the El Cerrito Plaza and North Berkeley stations. Two additional stations, Downtown Berkeley and Ashby, are connected to the transit service study area by transit lines or shuttle lines serving the study area. These four stations are served by the Richmond-Fremont and the Richmond-Daly City lines. BART operates 4 a.m. to midnight, Monday through Friday; 6 a.m. to midnight on Saturdays; and 8 a.m. to midnight on Sundays and Holidays.

3.1.6 Traffic

This section discusses the existing transportation system in the vicinity of the proposed Berkeley Ferry Terminal Project, including the local and regional access in the study area. Service level calculations were also performed for the study intersections, and the project team also assessed pedestrian, bicycle, and parking facilities.

Defining Existing Conditions

Intersection Level of Service. LOS is a measure used to rate roadway facilities, based on their traffic conditions. It is a qualitative description of traffic flow based on factors including speed, travel time, delay, and freedom to maneuver. Six levels of service are defined for each facility type, varying from LOS A, which indicates that traffic flows freely, with little or no delay, to LOS F, which indicates that traffic demand exceeds the capacity, generally resulting in long queues and delays. The criteria for signalized and unsignalized intersections are presented in Tables 3-3 and 3-4, respectively. The intersection LOS descriptions are based on vehicular delay in seconds per vehicle, which generally dictate traffic conditions on arterial and collector streets. Signalized intersections LOS and delay analyses were performed using methodologies approved by Caltrans, based on the *2000 Highway Capacity Manual* (HCM), Chapter 16.

Table 3-3
Signalized Intersection LOS Definitions

Level of Service	Descriptions of Operations	Average Control Delay (sec/veh)
A	Insignificant Delays: No approach phase is fully utilized and no vehicle waits longer than one red indication.	< 10
B	Minimal Delays: An occasional approach phase is fully utilized. Drivers begin to feel restricted.	> 10 to 20
C	Acceptable Delays: Major approach phase may become fully utilized. Most drivers feel somewhat restricted.	>20 to 35
D	Tolerate Delays: Drivers may wait through no more than one red indication. Queues may develop but dissipate rapidly, without excessive Delays.	>35 to 55
E	Significant Delays: Volumes approaching capacity. Vehicles may wait through several signal cycles and long queues from upstream.	>55 to 80
F	Excessive Delays: Represents conditions at capacity with extremely long delays. Queues may block upstream intersections.	>80

Source: *HCM*, Transportation Research Board, 2000.

Table 3-4
Unsignalized Intersection LOS Definitions

Level of Service	Descriptions of Operations	Average Control Delay (sec/veh)
A	No delay for stop-controlled approaches.	0 to 10
B	Operations with minor delays.	> 10 to 15
C	Operations with moderate delays.	> 15 to 25
D	Operations with some delays.	> 25 to 35
E	Operations with high delays, and long queues.	> 35 to 50
F	Operations with extreme congestion, with very high delays and long queues unacceptable to most drivers.	>50

Source: *HCM*, Transportation Research Board, 2000.

Data collection and intersection analysis under the existing traffic and geometric conditions has been performed for the study intersections for the weekday a.m. peak period (7:00 to 9:00 a.m.) and for the weekday p.m. peak period (4:00 to 6:00 p.m.). The selected intersections were identified in consultation with staff from the Cities of Berkeley and Albany. All traffic counts have been collected by Wilbur Smith Associates field personnel in April 2007. A total of 17 study intersections were evaluated within and surrounding the project study area, including:

1. Solano Avenue at Pierce Street;
2. San Pablo Avenue at Solano Avenue;
3. Buchanan Street at I-80 westbound (WB) Ramps;
4. Buchanan Street at I-80 eastbound (EB) Ramps;
5. Buchanan Street at Cleveland Avenue/Pierce Street;
6. San Pablo Avenue at Marin Avenue;
7. Gilman Street at W. Frontage Road;
8. Gilman Street at I-80 WB Ramps;
9. Gilman Street at I-80 EB Ramps;
10. Gilman Street at Eastshore Highway;
11. Gilman Street at 6th Street;
12. Gilman Street at San Pablo Avenue;
13. University Avenue at Marina Boulevard;
14. University Avenue at W. Frontage Road;
15. University Avenue at I-80 WB Ramps;
16. University Avenue at 6th Street; and
17. University Avenue at San Pablo Avenue.

Eight of the study intersections are currently signalized (intersections 2, 3, 4, 6, 11, 12, 16, and 17). Five of these signalized intersections (intersections 2, 3, 4, 6, and 11) are under Caltrans jurisdictions, while the rest of the signalized intersections are maintained by the City of Berkeley.

Streets and Roadways in the Study Area

University Avenue. University Avenue is a four-lane major street running in the east-west direction. Serving as a connector to I-80, this roadway may be the primary source of local access for the project traffic (for Berkeley Fishing Pier and Berkeley Marina Sites). East of I-80, this arterial provides primary access to downtown Berkeley and the University of California at Berkeley campus. East University Avenue is a busy roadway with on-street parking on both sides. The roadway is divided and has left turn pockets at major intersections. Left turns from University Avenue onto cross-streets generally are not served by a separate left turn signal phase. West University Avenue, which is less busy than East University Avenue, provides motorist access to the Berkeley Marina area, primarily for recreational purposes. Additionally, many vehicles turn on to University Avenue to travel slightly west and then take West Frontage Road to Powell Avenue, avoiding traffic south on I-80.

Gilman Street. Gilman Street is a two-lane major street in the east-west direction, just north of University Avenue. Gilman Street connects I-80 with San Pablo Avenue and Northern Berkeley, which is mostly used for light industrial/commercial purposes. Both lanes on Gilman Street are wider, to better accommodate truck traffic, and on-street parking is allowed on both sides of the street. Most of the intersections along Gilman are unsignalized. The Southern Pacific railroad track crosses Gilman Street at Third Street, where flashing lights and safety gates on both sides of the at-grade railroad crossing are provided. Gilman Street west of the interchange provides access to the existing Golden Gate Fields and would also be the connection to ferry terminal at the Gilman Site, if selected.

Buchanan Street. Buchanan Street is a four-lane major street in the east-west direction, north of Gilman Street. West of I-80, this street currently provides local street access to the Golden Gate Fields, and may also provide local access to the proposed ferry terminal (Buchanan Site), if selected. East of the interchange, Buchanan Street provides one of the main accesses to the City of Albany and the residential neighborhoods along this street. The intersections are mostly unsignalized with left turn pockets into the cross streets. Near San Pablo Avenue to the east, Buchanan Street becomes Marin Avenue.

San Pablo Avenue (State Route 123). San Pablo Avenue is a four-lane major street in the north-south direction, east of I-80. This arterial connects the Cities of Oakland, Emeryville, Berkeley, Albany, and beyond to the Richmond/Pinole area. San Pablo Avenue's significance to the western Alameda and Contra Costa Counties cannot be underestimated. Within the vicinity of the study area, San Pablo Avenue intersects with University Avenue, Gilman Street, and Buchanan Street, and some of the project trips will likely use San Pablo Avenue to access any of the ferry terminal sites. San Pablo Avenue is a state highway with left-turn pockets at major intersections.

Sixth Street. Sixth Street is a two-lane collector running north-south, located between I-80 and San Pablo Avenue. It traverses between residential and light industrial/commercial neighborhoods in Berkeley, and intersects with both University Avenue and Gilman Street.

Solano Avenue and Pierce Street. Solano Avenue and Pierce Street are two-lane collector streets located east of I-80 and north of Buchanan Avenue. Solano Avenue runs parallel of Buchanan Street, running east-west, while Pierce Street runs north-south, with the southern terminus of Pierce Street intersecting with Buchanan Street. The neighborhoods served by the two streets are mostly residential with some commercial uses.

Regional Access

Interstate 580. Interstate 580 (I-580) is another major corridor running east-west in the San Francisco Bay Area. As a commercial corridor, I-580 is designated a priority truck route and connects Marin County, the East Bay, and the Tri-Valley area, with the rest of California. Within the vicinity of the ferry terminal sites, I-580 combines with I-80 between the I-80/Interstate 880/I-580 interchange (often referred to as "The Maze") in Oakland and the I-80/Buchanan Street interchange, before splitting off westward to Richmond and the Marin County.

Interstate 80. I-80 is a ten-lane freeway providing the primary regional access to the project traffic. I-80 originates just southwest of the study area, at the San Francisco end of the Bay Bridge, and extends to Oakland, Berkeley, Sacramento, and beyond. I-80 is a major east-west corridor connecting the Bay Area and California with the rest of the country, serving dense residential and commercial neighborhoods in the East Bay region. In the vicinity of the ferry terminal sites, I-80 runs north-south, although the designation remains east-west, respectively.

I-80 has both EB and WB ramps from **University Avenue**. Access to I-80 EB from University Avenue is provided via an on-ramp, accessible only by University WB traffic. University EB traffic would have to continue along University Avenue and turn back, or use local streets to travel north. Likewise, the I-80 EB offramp at University Avenue only permits University EB travel; motorists intending to travel WB on University must first exit the freeway and perform a U-turn at the first opportunity (University Avenue at San Pablo Avenue). The I- 80 WB off/on-ramps use a half-cloverleaf design, with the WB on-ramp looping on the northwest quadrant of the interchange, and the WB off-ramp looping at the southwest quadrant. Unlike the EB ramps, WB ramps allow vehicle access from both the EB and WB directions. All ramps have only one lane, and none are signalized. West Frontage Road, which parallels I-80 on the west, crosses University Avenue at the intersection of University Avenue and the WB ramps.

The interchange at I-80 and **Gilman Street** uses a standard diamond pattern. The I-80 EB offramp terminates at the STOP-controlled Gilman Street, allowing motorists to travel both EB and WB on Gilman Street. The I-80 EB on-ramp is located directly opposite from the off-ramp. Both ramps have two lanes. Similarly, the I-80 WB off-ramp and I-80 WB on-ramp have two lanes, directly opposite from each other. The I-80 WB off-ramp terminates at Gilman Street, and is STOP-controlled. Due to its proximity to the Gilman Street/West Frontage Road intersection,

a 50-foot turning bay is provided at the terminus of the I-80 WB off-ramp, allowing direct access to West Frontage Road from the off-ramp.

The **Buchanan Street** interchange also employs a standard diamond pattern, although two different Interstates are connected to this roadway, depending on the ramp. On the eastern quadrant of the interchange, the off- and on-ramps are connected to I-80 EB. On the western quadrant of the interchange, however, the off-ramp is an exit of I-580 WB, while the on-ramp connects to I-80 WB. All of the ramps have two lanes, with the exception of I-80 EB off-ramp (three lanes). The intersections at this interchange are signalized.

Roadway Access to the Ferry Terminal Site Alternatives

The following roads provide access to each site:

- **Berkeley Marina Site:** University Avenue and Marina Boulevard.
- **Berkeley Fishing Pier Site:** University Avenue and Seawall Drive.
- **Gilman Site:** Gilman Street.
- **Buchanan Site: Gilman Street and** Buchanan Street.

The current condition and operation of these access roads is described below by site alternative.

Alternative A (Berkeley Marina Site) and Alternative B (Berkeley Fishing Pier Site). The primary means of access to these ferry terminal locations would be University Avenue. University Avenue is heavily used and sometimes congested. The I-80/University Avenue interchange does not provide direct access for EB I-80 traffic. Eastbound traffic must use the Gilman Street interchange. It takes about 2 to 3 minutes to reach the ferry terminal sites from the I-80 interchange. The roadway conditions between I-80 and Marina Boulevard are very poor along University Avenue.

The City has identified the Sixth Street intersection with University Avenue as a congestion point. It is reported to operate at LOS F during peak traffic hours. Improvement plans have been developed that might improve operations to LOS C during the morning peak and LOS D during the afternoon peak traffic period. Current traffic on University Avenue east of Sixth Street is relatively balanced during the a.m. peak hour (about 1,000 vehicles per hour per direction). In the p.m. traffic peak hour volumes are comparable. The peak ferry traffic could be in the WB direction in the morning and EB direction in the evening. Thus, the most substantial ferry traffic would not increase the critical WB afternoon traffic flow. Some ferry patrons would use West Frontage Road to access I-80 at Gilman Street and undoubtedly some of the ferry patrons would be existing I-80 freeway commuters and would not add to University Avenue traffic volumes. On the other hand, the ferry traffic might increase traffic conflicts and delays at the University Avenue/West Frontage Road intersection, which is currently unsignalized.

Alternative C (Gilman Site). The I-80/Gilman Street interchange (including the intersection of Gilman Street/Eastshore Highway) is congested during peak periods. The I-80 WB at Gilman Street intersection operates at unacceptable levels of service during both peak periods. Both EB and WB ramps end at STOP-controlled intersections with two more STOP-controlled intersections

located within 400 feet along Gilman Street (at Eastshore Highway and W. Frontage Road).There are plans to convert the interchange into a twin roundabout design. This change is intended to increase capacity and safety. With the twin roundabout design, the interchange is projected to operate satisfactorily in 2025, with the exception of some movements. In summary, the Gilman Street interchange currently operates poorly, but with planned improvements will operate better although not totally satisfactory. Insatiable demand for I-80 access and congestion on I-80 will disrupt access to the proposed Gilman Street ferry terminal. The Gilman Street ferry terminal site is the closest to I-80 of all the alternative locations (700 feet). This proximity is good for visibility and patron attraction, but its proximity also means that the ferry arrival traffic pulse will likely be more concentrated when it arrives at critical I-80 interchange intersections. With the location and amount of ferry parking for this site undefined, the traffic access needs and impacts are impossible to accurately describe. Future development of Golden Gate Fields could also substantially change traffic patterns at the Gilman Street interchange.

Alternative D (Buchanan Site). The Buchanan Street access will likely change if development of Golden Gate Fields proceeds. The current I-80 interchange at Buchanan Street provides all access turning movements to and from the south on I-80. The interchange also provides EB access to both I-80 and I-580, as well as WB access from I-580. Traffic arriving WB on I-80 must exit onto Cleveland Avenue and travel on local streets to reach Buchanan Street. The proposed ferry terminal would be located about 4,000 feet from the I-80 interchange. While this distance would help disperse the ferry arrival/exit traffic pulse, its weak visibility and distance from the alluring I-80 freeway would not benefit ferry patronage. From a patronage capture perspective, the ferry terminal should be as close to I-80 as possible and also be visible. Commuters bound for work will see the proximity of the terminal and be reminded by seeing the boat at the dock of the ferry option. If the terminal is not visible and is distant from the I-80 commute decision point, the capture of commuters by ferry service will be lower. The downside of being close to I-80 is that the pulse of traffic leaving the parking area after arrival of boats will be more pronounced and therefore will more impact the I-80 critical intersections.

Existing Traffic Circulation in the Study Area

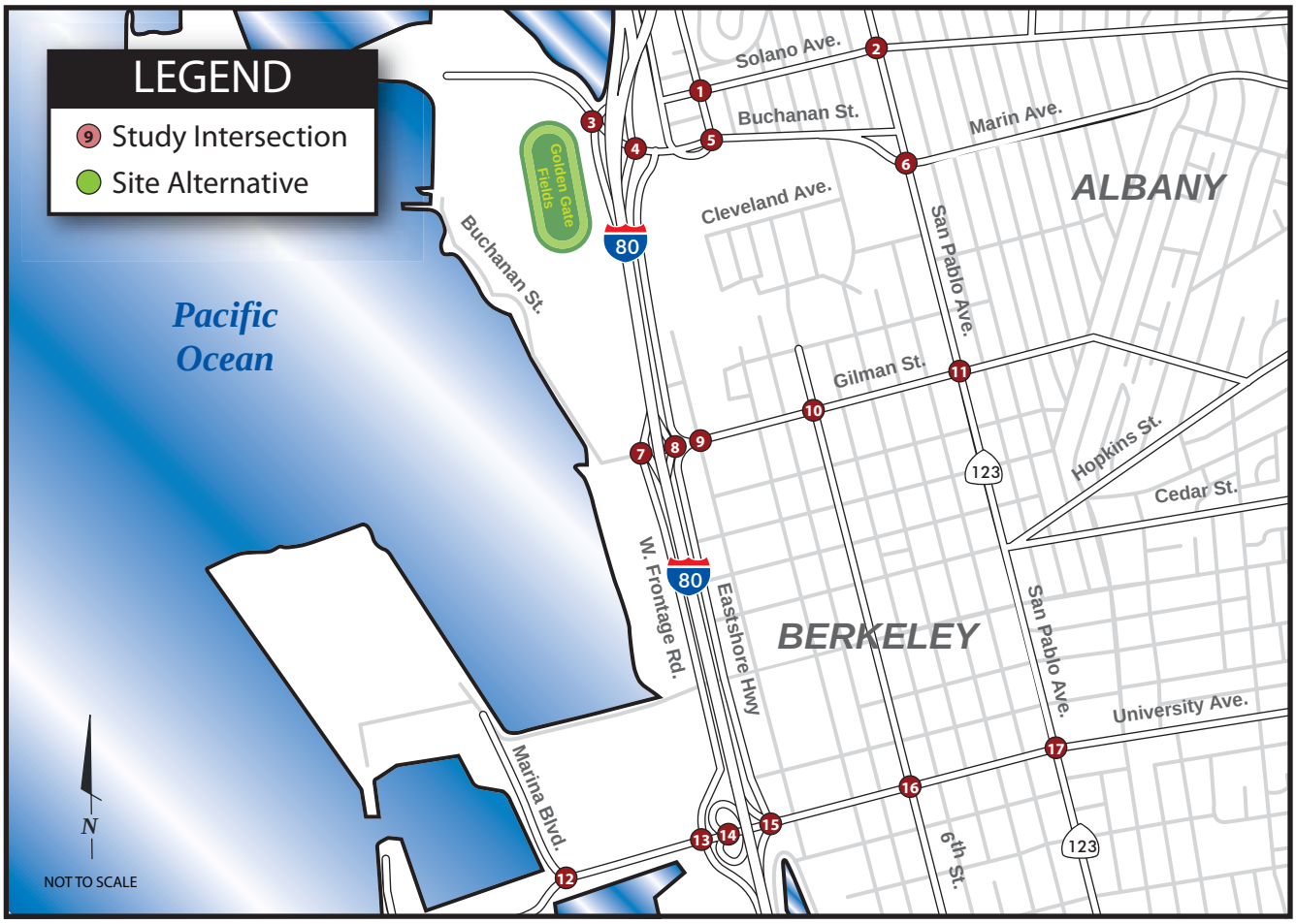
Figures 3-2 and 3-3 exhibit the existing weekday a.m. and p.m. peak hour traffic volumes at the study intersections.

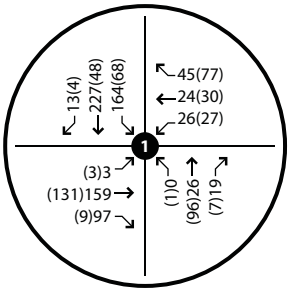
Table 3-5 presents the a.m. and p.m. peak hour service levels for the study intersections, while the detailed calculations can be found in the Transportation Technical Report. As shown, only seven out of 17 study intersections currently operate at acceptable levels during the a.m. and p.m. peak hours (1, 3, 4, 7, 11, 12, and 13). Intersections 2, 9, 14, 15, and 17 are operating at acceptable service levels during the a.m. peak hour, but not the p.m. peak hour. The San Pablo Avenue/Solano Avenue intersection (#2) is controlled by Caltrans, and operates at LOS D (average delay of 42 seconds per vehicle) during the p.m. peak hour. This falls below the Caltrans LOS acceptable standard between LOS C and D (average delays between 30 and 40 seconds per vehicle). The Gilman Street/I-80 EB study intersection (#9) and University

Table 3-5
A.M. and P.M. Peak Hour Intersection LOS – Existing Conditions

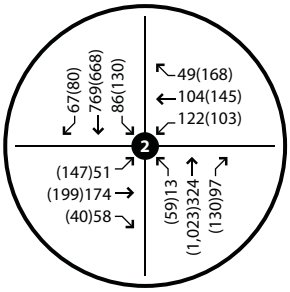
Study Intersection	Intersection Control	A.M. Peak		P.M. Peak	
		LOS	Delay (sec.)	LOS	Delay (sec.)
1. Solano Avenue at Pierce Street	AWSC	C	20.1	A	9.3
2. San Pablo Avenue at Solano Avenue*	S	C	30.7	D	41.8
3. Buchanan Street at I-80 WB Ramps *	S	B	19.4	B	16.6
4. Buchanan Street at I-80 EB Ramps*	S	B	10.2	B	10.5
5. Buchanan St at Cleveland Ave/Pierce St**	TWSC	F	>50 (SB)	C	20.3 (SB)
6. San Pablo Avenue at Marin Avenue*	S	E	64.3	E	73.0
7. Gilman St at W. Frontage Rd	TWSC	B	14.5 (NB)	C	15.3 (NB)
8. Gilman St at I-80 WB Ramps	TWSC	F	>50 (SB)	F	>50 (SB)
9. Gilman Street at I-80 EB Ramps	TWSC	C	23.5 (NB)	F	>50 (NB)
10. Gilman Street at Eastshore Highway	TWSC	F	>50 (SB)	F	>50 (SB)
11. Gilman Street at 6th Street*	S	B	15.0	C	31.3
12. Gilman Street at San Pablo Avenue	S	C	31.0	D	51.3
13. University Avenue at Marina Boulevard	TWSC	A	9.8 (WB)	C	15.0 (WB)
14. University Avenue at W. Frontage Road**	AWSC	C	23.7	F	>50
15. University Avenue at I-80 WB Ramps	TWSC	D	28.5 (NB)	F	>50 (NB)
16. University Avenue at 6th Street	S	F	>80	F	>80
17. University Avenue at San Pablo Avenue	S	D	40.2	E	79.1

Source: Wilbur Smith Associates, 2006.
Notes:
* Indicates signalized intersections under Caltrans jurisdictions.
** Indicates that changes were made to intersection geometry so as to enable analysis using the *HCM 2000* methodology.
S – Signalized, TWSC – Two-Way STOP-Controlled, AWSC – All-Way STOP-Controlled.
LOS – Level of Service.
Delay indicates Average Vehicle Delay in seconds per vehicle.
Values in **RED** indicate LOS exceeds acceptable threshold.

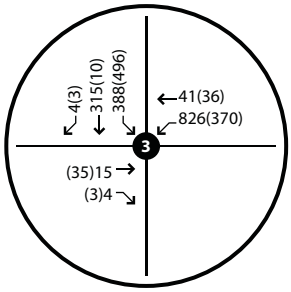




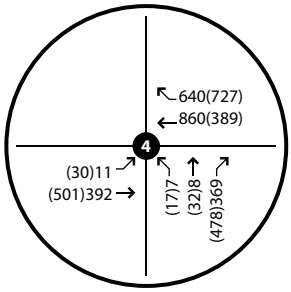
Solano Ave./
Pierce St.



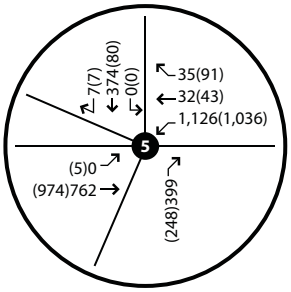
San Pablo Ave./
Solano Ave.



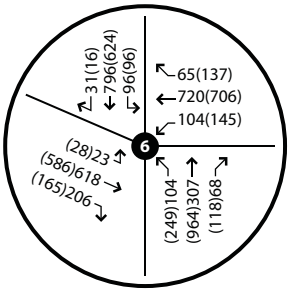
Buchanan St./
I-80 WB Ramps



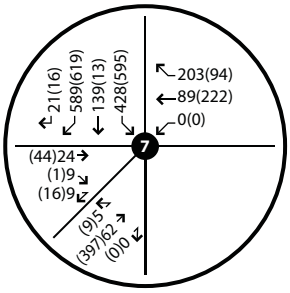
Buchanan St./
I-80 EB Ramps



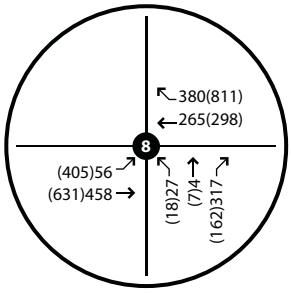
Buchanan St./
Cleveland Ave./Pierce St.



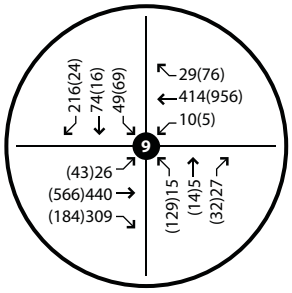
San Pablo Ave./
Marin Ave.



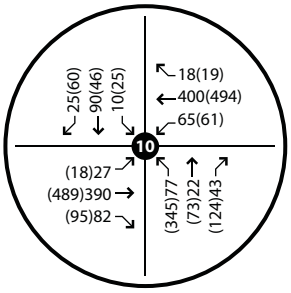
Gilman St./
I-80 WB Ramps/ W. Frontage Rd.



Gilman St./
I-80 EB Ramps



Gilman St./
Eastshore Highway



Gilman St./
6th St.

BERKELEY/ALBANY FERRY TERMINAL
STUDY INTERSECTIONS (1 THROUGH 10)

Berkeley/Albany
Ferry Terminal Study

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FIGURE 3-2

Source:
Wilbur Smith Associates, 2007

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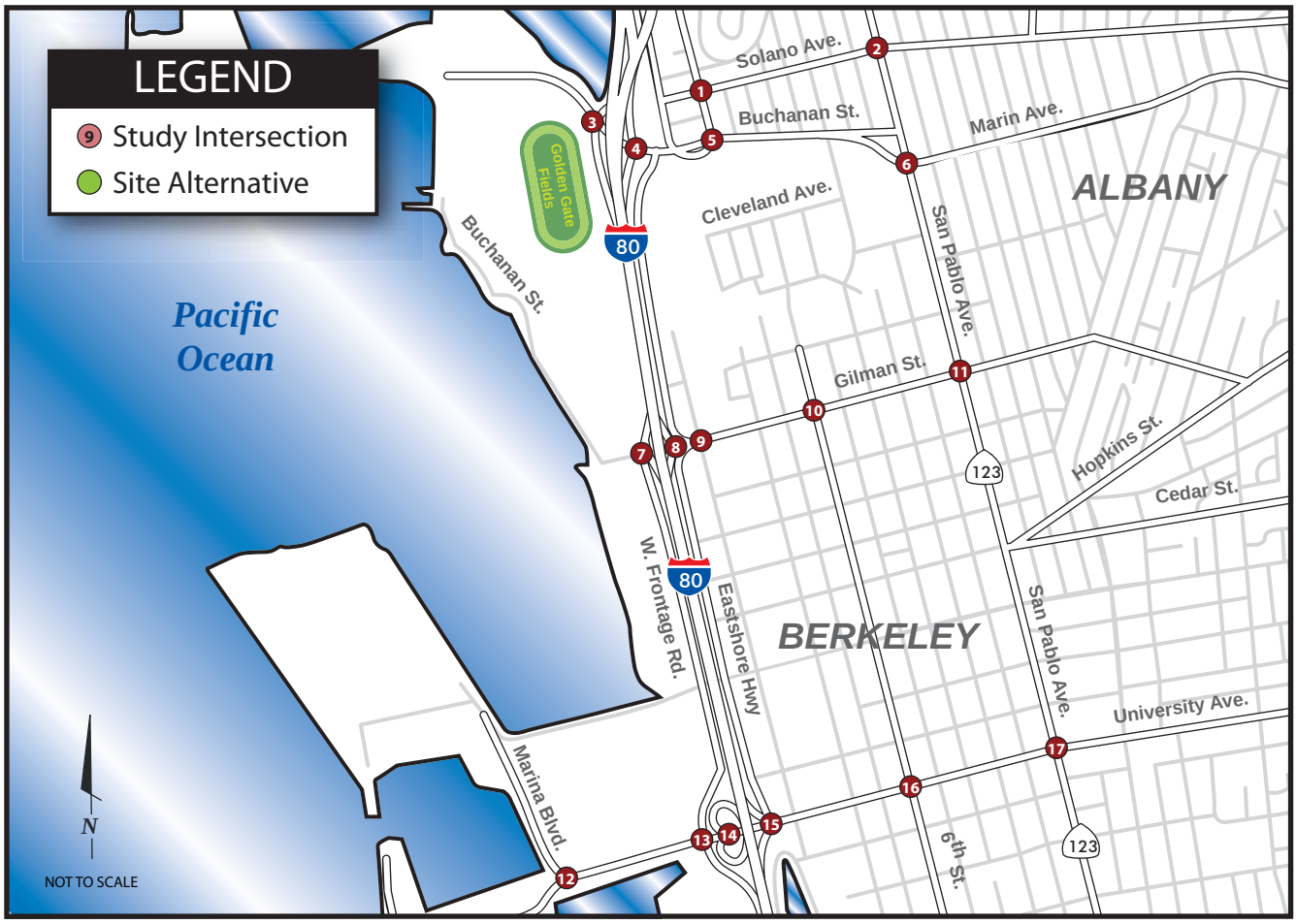
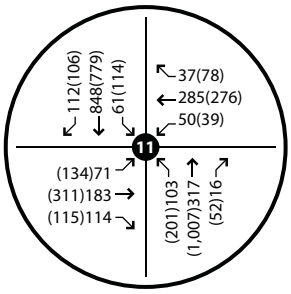
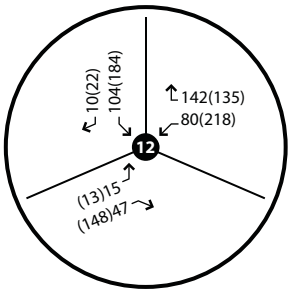
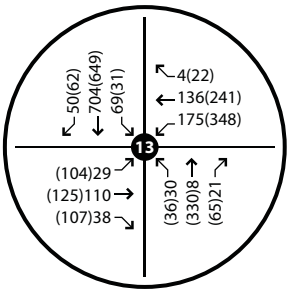




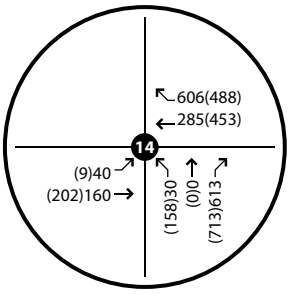
Gilman St./
Gilman St./San Pablo Ave.



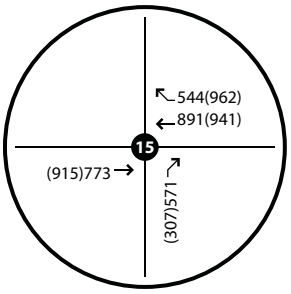
University Ave./
Marina Blvd.



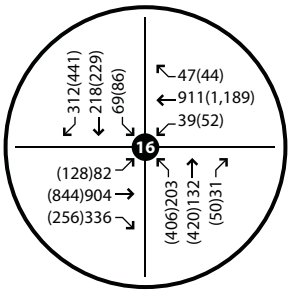
University Ave./
W. Frontage Rd.



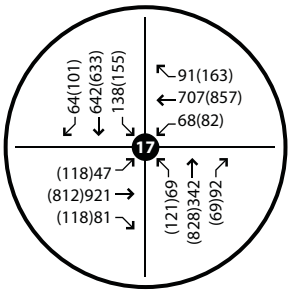
University Ave./
I-80 WB Ramps



University Ave./
I-80 EB Ramps



University Ave./
6th St.



University Ave./
San Pablo Ave.

BERKELEY/ALBANY FERRY TERMINAL
STUDY INTERSECTIONS (11 THROUGH 17)

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FIGURE 3-3

Source:
Wilbur Smith Associates, 2007

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Avenue/I-80 WB intersection (#15) operate at LOS F during the p.m. peak hour. In both cases, the northbound STOP-controlled direction failed, causing average delays of more than 150 seconds per vehicle. The University Avenue/San Pablo Avenue study intersection (#17) is one of the busiest intersections in Berkeley, and operates at LOS E in the p.m. peak hour, with a volume to capacity ratio (v/c ratio) of 0.97 (very close to full capacity).

Intersections 6, 8, 10, and 16 currently operate at unacceptable service levels during both the a.m. and p.m. peak hours. Marin Avenue/San Pablo Avenue (#6) and University Avenue/6th Street (#16) are busy signalized intersections that operate near or over their capacities during the peak hours. Gilman Street/Eastshore Highway (#10) operates at LOS F, with heavy demand at the STOP-controlled northbound and southbound movements. Lastly, the Gilman Street/I-80 WB (#8) study intersection that consists of a stop-controlled I-80 WB off-ramp operates at unacceptable service levels during both peak periods along this approach. Finally, two unsignalized study intersections (#5 and 14) were analyzed with a few changes to the lane geometry. This was necessitated to analyze these intersections using the *2000 HCM* methodology which does not allow for the analysis of stop controlled intersections with more than two lanes per leg or intersections with more than four legs: Buchanan Street/Cleveland Avenue/Pierce Street (#5): This unsignalized study intersections consists of more than four legs and hence the leg leading to Cleveland Avenue has been incorporated as a third receiving lane for vehicles traveling WB. University Avenue/West Frontage Road (#14): This is an all-way STOP-controlled intersection with more than two lanes per leg and hence the shared right turn and through lane along the WB approach has been eliminated under the premise that the volume of traffic traveling through and making right turns would not be critical contributing factors to the delay at this intersection.

3.1.7 Parking

The proposed Berkeley/Albany Ferry Terminal needs to provide 388 parking spaces to accommodate ferry patrons (Programmatic EIR Alternative 17). Additional area for passenger pick up/drop off is also required. For weekends, the patronage numbers are expected to be substantially lower, and the proportion of East Bay residents using the service is balanced with San Francisco residents heading to the East Bay. Only about 100 parking spaces would be needed on weekends. The following discussion indicates the current parking availability at each alternative site.

Alternative A (Berkeley Marina Site)

A parking occupancy survey was performed in March 2006 for parking resources near the Berkeley Marina and Doubletree Hotel complex. Surveys were conducted on two typical weekdays and also on a weekend. The parking resources near the Alternative A ferry dock site were defined into sub-areas, as indicated in Figure 3-4. It should be noted that Berkeley Marina parking often has use restrictions that allow only boaters to park in the spaces.

The maximum potential for ferry patron parking for this ferry site appears to be about 520 spaces in Lots 1A through 8A. Table 3-6 indicates the number of spaces available in each surrounding lot and percent occupancy observed during field surveys in 2006.

Table 3-6
Berkeley Marina/Doubletree Hotel Area Parking Usage – Existing Conditions

Lot	Dist.	Spaces	Wednesday*			Thursday			Sunday		
			Occ.	Avail.	%Occ.	Occ.	Avail.	%Occ.	Occ	Avail.	%Occ.
1A	N/A	180	2	178	1%	2	178	1%	7	173	4%
2A	N/A	125	40	85	32%	125	43	82%	48	77	38%
3A	N/A	118	66	52	56%	116	2	98%	63	55	53%
4A	N/A	155	62	93	40%	146	9	94%	45	110	29%
5A	N/A	245	24	221	10%	91	154	37%	14	231	6%
6A	N/A	180	36	144	20%	29	151	16%	53	127	29%
7A	N/A	68	2	66	3%	2	66	3%	27	41	40%
8A	N/A	25	1	24	4%	3	22	12%	8	17	32%
Total	**N/A**	**1096**	**233**	**863**	**21%**	**432**	**625**	**39%**	**265**	**831**	**24%**

Source: Wilbur Smith Associates independent surveys conducted in March of 2006
Note:
*The observed Wednesday was during a Rotary Club lunch event when parking demands were increased in certain lots.

Alternative B (Berkeley Fishing Pier Site)

Alternative B would incorporate nearby parking that is currently used by Hs Lordships restaurant, Skates restaurant, recreation and Berkeley Marina users. The parking areas will be redesigned to accommodate the Bay Trail Plan, which will involve relocation of Seawall Drive.

Figure 3-4 indicates the locations of the parking areas in the vicinity of the Berkeley Fishing Pier site. Table 3-7 presents the number of spaces occupied, space open and the percent occupancy. Occupancy was observed during the lunch hour on all 3 days. Thursday conditions represent normal demand conditions. Wednesdays were Rotary Club lunch days, to represent special event parking conditions, and Sunday observations were taken during spring weekend conditions. Not all the parking resources were found to be fully used. As expected, parking lots near the restaurants (3B and 5B) tended to be most used at lunch times.

Alternative C (Gilman Street Site)

Development plans for the Eastshore Park and for Golden Gate Fields indicated that assessment of current parking demands near the Gilman Street ferry terminal site would not provide useful information. The Gilman Street Playing Fields Plan proposes 82 parking spaces at its south end (about 2,000 feet from the proposed terminal site) and another 83 spaces at the north end near the proposed terminal site. It is unlikely that these recreation spaces could be shared for ferry use. Shared use of the Golden Gate Fields parking area is unknown at this time.

PARKING RESOURCES
BERKELEY MARINA SITES

Berkeley/Albany
Ferry Terminal Study

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FIGURE 3-4

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Table 3-7
Berkeley Pier Area Parking Usage – Existing Conditions

Lot	Spaces	Wednesday*			Thursday			Sunday		
		Occ.	Avail.	%Occ.	Occ.	Avail.	%Occ.	Occ.	Avail.	%Occ.
2B**	140	65	75	46%	37	103	26%	58	82	41%
3B	156	74	82	47%	47	109	30%	119	37	76%
4B	92	26	66	28%	24	68	26%	67	25	73%
5B	318	141	177	44%	195	123	61%	236	82	74%
Total	**706**	**306**	**400**	**43%**	**303**	**403**	**43%**	**480**	**226**	**68%**

Source: Wilbur Smith Associates independent surveys conducted in March of 2006
Notes:
*The observed Wednesday was during a Rotary Club lunch event when parking demands were increased in certain lots.
**Lot 1B is more remote and is used by boaters in Berths J-K. It contains 102 spaces; more than 75 percent are typically available.

Alternative D (Buchanan Street Site)

An area approximately 180 feet by 730 feet of paved surface is located near the proposed Buchanan Street ferry dock location. It is separated from Golden Gate Fields parking by wooden bollards. More than 400 surface parking spaces could be accommodated on this paved surface. On the three days that were surveyed, fewer than six vehicles were observed to be parked in this large area. Usage during Golden Gate Fields events was not observed. Shared use of the Golden Gate Fields parking area is unknown at this time.

3.1.8 Bicycle Circulation and Pedestrian Access

The Bicycle Master Plans for the City of Berkeley and City of Albany are described below.

Berkeley Bicycle Plan (1998, updated 2005)

The goal of the City of Berkeley's Bicycle Plan is to make bicycling safer and more convenient for bicyclists of all ages and skill levels. Furthermore, the Bicycle Plan would allow the City to access a significant grant funding source, The Bicycle Lane Account (BLA) which is a source of State funds created to support development of bicycle transportation systems. Competitive grants are distributed to local agencies by Caltrans on an annual basis. BLA funded $360,000 toward projects throughout the state in 1996; by 2004 that amount grew to $5 million per year (City of Berkeley, 2005). BLA funds are only available to jurisdictions with an adopted Bicycle Plan, which contains the following required elements:

- Estimated current and future bicycle commuters, including increase resulting from plan implementation

- Description of safety/education conducted within the area and effort by law enforcement to enforce vehicle code relating to bike operations and resulting impacts on collisions

- Description of citizen involvement and letters of support

- Coordination and consistency with other plans, air quality, and energy conservation plans

- Prioritized list of projects

- Financial: description of previous expenditures and future financial need

The City of Albany Bicycle Master Plan (2006)

The goal of the City of Albany's Master Bicycle Plan is to make bicycling safer and more convenient for bicyclists of all ages and skill levels within the City of Albany. What follows is a list of specific goals from the Master Bicycle Plan (City of Albany, 2006):

- Goal 1: Support bicycling and the development of a comprehensive bicycle transportation system as a viable alternative to the automobile.

- Goal 2: Use available state and federal funding for bicycle improvements in Albany.

- Goal 3: Improve upon existing bikeway facilities and programs in Albany.

- Goal 4: Develop a bicycle system that meets the needs of commuter and recreation users, helps reduce vehicle trips, and links residential neighborhoods with regional destinations.

- Goal 5: Maximize multi-modal connections to the bicycle system.

- Goal 6: Improve bicycle safety in Albany.

- Goal 7: Develop detailed bicycle facility improvement proposals.

- Goal 8: Encourage public participation and creation of an ongoing Advisory Committee.

- Goal 9: Develop a coordinated strategy to encourage bicycling in Albany.

Furthermore, the Bicycle Plan would allow the City to access a significant grant funding source, The BLA which is a source of State funds created to support development of bicycle transportation systems. Competitive grants are distributed to local agencies by Caltrans on an annual basis. BLA funded $360,000 toward projects throughout the state in 1996; by 2004 that

amount grew to $5 million per year (City of Berkeley, 2005). BLA funds are only available to jurisdictions with an adopted Bicycle Plan, which contains the following required elements:

- Estimated current and future bicycle commuters, including increase resulting from plan
- Implementation
- Description of safety/education conducted within the area and effort by law enforcement to enforce vehicle code relating to bike operations and resulting impacts on collisions
- Description of citizen involvement and letters of support
- Coordination and consistency with other plans, air quality, and energy conservation plans
- Prioritized list of projects
- Financial: description of previous expenditures and future financial need

The study area is directly accessible for bicyclists and pedestrians from existing and future segments of the Bay Trail (Figure 3-5); this proximity to the Bay Trail offers a good connection not only from Berkeley and Albany but also from more distant communities such as Richmond, El Cerrito and Emeryville. The Berkeley and Albany network of bicycle and pedestrian facilities is shown on Figure 3-6.

Current Bicycle and Pedestrian Circulation at Each Alternative Terminal Site

For all the alternative terminal sites, access for bicycles and pedestrians is limited by the barriers of I-80/I-580 and the railroad tracks. Gilman and Buchanan have facilities to accommodate bicyclists and pedestrians. To cross the freeway at University, bicyclists and pedestrians must use a separate pathway accessible by stairs from the east approach or via the sidewalk on the overpass from the west approach. Bicyclists are not allowed on the roadway. To improve bicycle and pedestrian access to Berkeley Marina, a bicycle/pedestrian bridge was opened in 2002. The bridge is located just south of University Avenue and can be reached from Aquatic Park, 2nd Street or Addison St. This section describes the existing bicycle and pedestrian access to each terminal site in greater detail.

Alternative A and Alternative B (Berkeley Marina and Berkeley Fishing Pier Sites). The western section of University Avenue is designated for future bicycle lanes. Bicyclists can now share the road although the pavement is in very poor condition suffering from extensive settlement over the years. Pavement conditions improve west of Marina Boulevard. Pedestrian facilities on University Avenue between the Bay Trail and Marina Boulevard are limited. There are some sections of paved pathway on the north side of University but this pathway does not

extend along the whole length of this segment. Pedestrians must, at times, walk along the unpaved shoulder. This pathway is also too narrow to be recommended for shared use by pedestrians and bicyclists. The intersection of University Avenue and Marina Boulevard is atypical; the combination of medians, free right turns and traffic controls make it confusing and difficult to traverse both for pedestrians and bicyclists. There are no marked crosswalks or other indications of the best place for pedestrians to cross.

Alternative C (Gilman Street Site). This site is readily accessible to pedestrians and bicyclists from either the Berkeley Marina via the Bay Trail or from Gilman Street. Gilman Street is a signed bike route and has sidewalks on both sides of the street. The I-80/Gilman intersection is difficult to traverse because of the necessity to cross the many on/off-ramps and frontage roads. The hazardous condition of this intersection has been somewhat mitigated by multi-use paths on either side of Gilman under the freeway

Alternative D (Buchanan Site). This site can be reached from the north via the Bay Trail from Richmond. A connection to/from Albany is also available via Buchanan Street. Although bicycles are allowed on the roadway, there is a multi-use pathway on the north side of overpass for bicycle and pedestrian use. An additional pathway on the south side of the overpass is planned for the future. At the west end of the overpass, there are two multi-use path connections for access to the Bay Trail at the base of the Albany Bulb. There is an existing gap in the Bay Trail from the Albany Bulb south to Berkeley Marina. A future Bay Trail connection is planned to fill the existing gap. However, it is currently possible to make this connection by using the Golden Gate Fields access road and parking lot.

3.2 LAND USE, PLANS, AND POLICIES

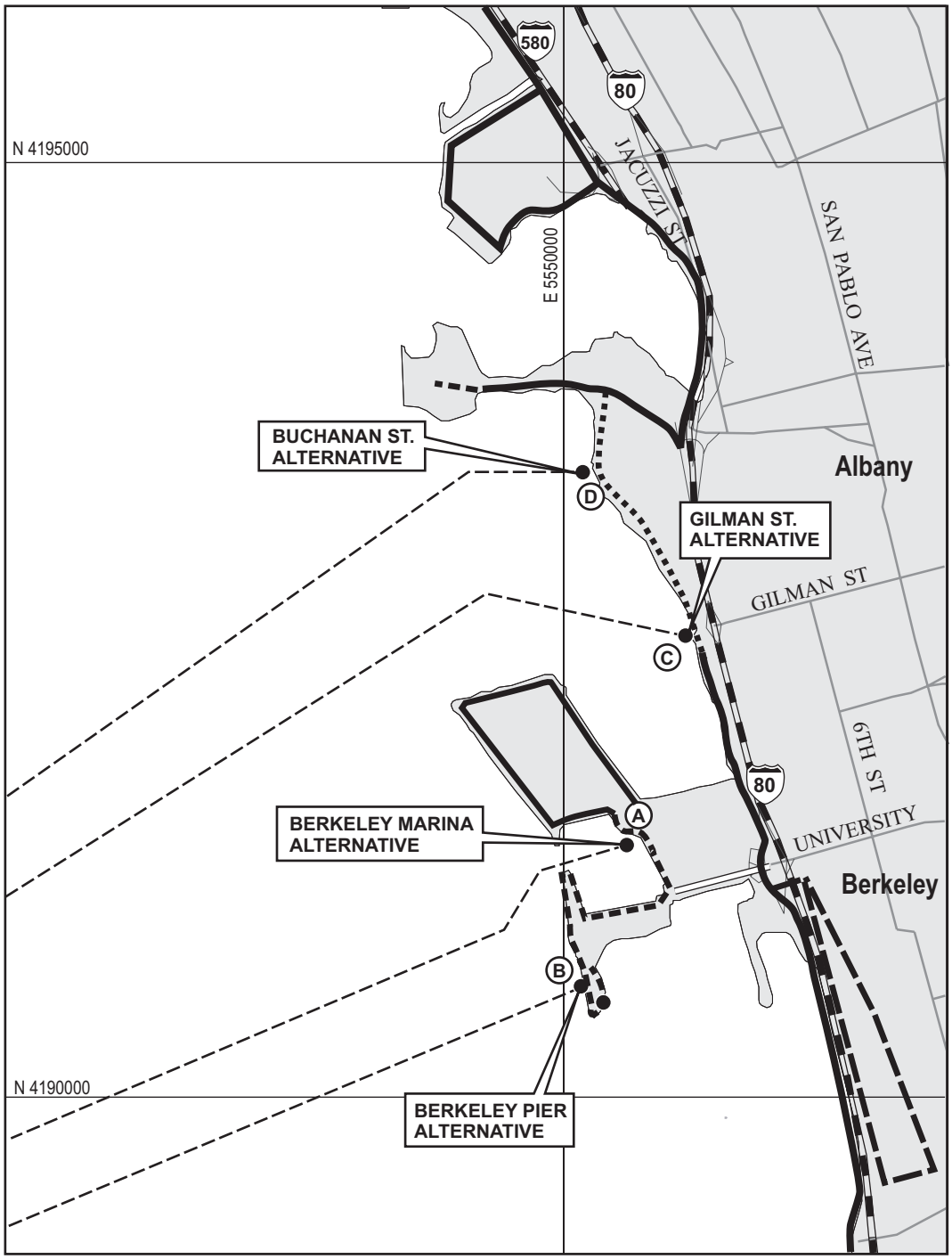
3.2.1 Regulatory Framework

The following local regulations govern the review and analysis of land use in the study area.

City of Berkeley General Plan (2001) – Land Use Element

The Land Use Element provides general direction and guidance for the physical development of Berkeley. The following policies apply to the proposed sites located within the City of Berkeley.

- Policy LU-44 – Prepare and adopt a plan for the maintenance and improvement of the Berkeley Marina.
- Policy LU-43 – Implement the Waterfront Master Plan and take actions to achieve the five goals of the Plan:



LEGEND

- Bay Trail (off street)
- Unimproved Bay Trail (off street)
- Unimproved Bay trail (on street)
- Planned Bay Trail
- Other Trail
- Potential Terminal Location
- Potential Ferry Route

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BAY TRAIL

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FIGURE 3-5

Source:
San Francisco Bay Trail - East Bay; ABAG 2003

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EXISTING AND PROPOSED BICYCLE AND PEDESTRIAN FACILITIES

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FIGURE 3-6

Source:
Wilbur Smith Associates, 2007

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Bay Trail Plan

The Bay Trail Plan proposes development of a regional hiking and bicycling trail around the perimeter of San Francisco and San Pablo Bays. The Plan was adopted by the Association of Bay Area Governments (ABAG) in July 1989 and includes a proposed alignment for a multi-use trail; a set of policies to guide the future selection, design, and implementation of routes; and strategies for implementation and financing. The Plan was prepared by ABAG pursuant to Senate Bill 100 that was passed into law in 1987 and mandated that the Bay Trail: provide connections to existing park and recreation facilities; create links to existing and proposed transportation facilities; and be planned in such a way as to avoid adverse effects on environmentally sensitive areas. Since the Bay Trail Plan was adopted, the majority of the jurisdictions along the Bay Trail alignment have passed resolutions in support of the Bay Trail and have incorporated it into their general plans.

The Bay Trail Plan is envisioned to be a continuous 500-mile public corridor along the Bay Area's shoreline containing recreational, environmental education, and non-motorized transportation opportunities, 290 miles of which are complete. When complete, it would cross all the counties in the Bay Area and all the major toll bridges in the Bay Area.

The Bay Trail Plan contains five categories of policies to guide selections of the trail route and implementation of the trail system: trail alignment, trail design, environmental protection, transportation access, and implementation policies. Bay Trail policies and design guidelines are intended to complement, rather than supplant the adopted regulations and guidelines of local management agencies. Policies relevant to the proposed project include:

Trail Alignment Policies

1. Ensure a feasible, continuous trail around the Bay.

3. Locate trail, where feasible, close to the shoreline.

6. In selecting a route for the trail, incorporate local agency alignments where shoreline trail routes have been approved. Incorporate San Francisco Bay Conservation and Development Commission public access trails where they have been required.

10. To minimize the use of existing staging areas along the shoreline and reduce the need for additional staging areas, the choice of trail alignment should take full advantage of available transit, including rail service (e.g., Caltrain, BART), ferries, and bus service.

Trail Design Policies

12. Provide access wherever feasible to the greatest range of trail users on each segment.

13. Wherever possible, new trails should be physically separated from streets and roadways to ensure the safety of trail users.

14. Create a trail that is as wide as necessary to accommodate safely the intended use, with separate alignments, where feasible, to provide alternative experiences.

16. Incorporate necessary support facilities, using existing parks, parking lots, and other staging areas wherever possible.

17. Design new segments of trail to meet the highest practical standards and regulations, depending on the nature and intensity of anticipate use, terrain, existing regulations, and standards on existing portions of the trail.

19. Design and route the trail to discourage use of undesignated trails.

20. A consistent signing program should be established throughout the trail system, using a Bay Trail logo which will identify trails within the Bay Trail system as distinct from other connecting trails. The choice of materials used should be the concern of the individual implementing jurisdictions and agencies.

21. The Bay Trail signing program may include necessary cautionary and regulatory signing, including warnings of seasonal trail closings and other restrictions on trail use. Interpretive signing may be provided to help educate trail users about the surrounding environment and the importance of observing trail use restrictions and staying on designated trails.

Environmental Protection Policies

25. The Bay Trail should not be defined as a continuous asphalt loop at the Bay's edge, but as a system of interconnecting trails, the nature of which will vary according to the locale and the nature of the terrain and resources in the vicinity of each particular trail segment.

26. The path will not always follow the Bay shoreline; inland reaches may be more appropriate, especially for bicycle travel, in some parts of the San Francisco Bay region.

27. The path should be designed to accommodate different modes of travel (such as bicycling and hiking) and differing intensities of use, possibly requiring different trail alignments for each mode of travel, in order to avoid overly intensive use of sensitive areas.

Transportation Access Policies

30. Bridges and roads will be important connections in the Bay Trail system, providing not only commute routes, but enhancing the recreational use of the

Trail by creating trail loops which will allow a greater number of people to enjoy the Trail.

34. Access to the trail by all forms of public transit should be strongly encouraged. Opportunities for reaching the trail by public transit should be highlighted on trail maps and promotional materials.

City of Berkeley Waterfront Master Plan (1986) – Waterfront Land Use Policies

The purpose of the Waterfront Master Plan is to establish the waterfront as an area primarily for recreational, open space, and environmental uses, with preservation and enhancement of beaches, marshes, and other natural habitats. The following polices, which are integrated into the City's General Plan are geared toward the preservation and enhancement of the Berkeley Waterfront:

- Policy W-1: Preserve and protect the open space, views, wetlands, mudflats, seasonal ponds, creeks, meadows, and beaches of the Berkeley waterfront.
- Policy W-2: Restore and improve the features of the natural environment so that the waterfront approximates the character of the original shoreline wherever feasible.
- Policy W-3: Create a social environment where Berkeley, East Bay residents, and visitors can mingle in harmony and mutually enjoy their natural heritage.
- Policy W-4: Express the primary recreational, open space and environmentally significant character of the waterfront.
- Policy W-5: Create an environment, which enhances the unique qualities of Berkeley's waterfront and its special meaning to the city and region.
- Policy W-6: Enhance the strength and diversity of the Berkeley economy.
- Policy W-7: Generate jobs, which meet the needs of Berkeley's unemployed and underemployed population and provide opportunities for job mobility.
- Policy W-8: Generate revenues, which exceed cover municipal service costs over the long term, to make possible other city objectives.
- Policy W-9: Create water-related job and business opportunities, which relate to the sites unique location, which cannot be easily, create elsewhere in the city or region.

- Policy W-10: Create business and employment opportunities for Berkeley residents, which are compatible with and will not adversely affect those found in other economic centers within Berkeley.

- Policy W-11: Create conditions which will help offset pressures for housing gentrification in West Berkeley and elsewhere in the city through requirements for developer exactions to assist housing programs.

- Policy W-12: Create opportunities for advancement of Berkeley's affirmative action policies.

- Policy W-13: Provide for goods and services that complement or reinforce other land uses in the waterfront area.

- Policy W-14: Do not compete with development elsewhere in the city (such as downtown) that is desirable in those locations but incompatible with the character of the waterfront.

- Policy W-15: Provide opportunities for small businesses that are locally owned and controlled.

- Policy W-16: Provide transition of Berkeley's waterfront to the waterfront development in Albany and Emeryville.

- Policy W-17: Cluster development where it is most accessible, least subject to seismic hazards, where utilities and services are most readily available, and where environmental impacts are minimal.

- Policy W-18: Phase development in accordance with the timing of traffic improvements that will make necessary additions to capacity.

- Policy W-19: These are priority uses for the Waterfront. They should encompass a range of recreational and environmental uses

City of Albany General Plan (1990-2010)

The following goals and polices are intended to preserve and enhance the waterfront area of Albany. Albany's General Plan does not include any provisions related to ferry service (Bond, 2007).

- Work with all appropriate landowners, agencies, and citizen groups to implement the Bay Trail Plan along the Albany Shoreline.

- Ensure adequate protection of wildlife and vegetation resources when developing the Bay Trail alignment.

- Require that public access to the shoreline and Albany Point (Bulb) be part of any future waterfront development plans, and that multi-modal access be coordinated with state and Regional Park and open space plans.

- Continue to work with the state, cities, and other appropriate agencies to develop the former Albany landfill site into a state waterfront park.

- Work closely with the state, cities, and other appropriate agencies to complete the acquisition, planning and development of the project site.

- Assure that the planning for the project site is consistent with the City's conceptual plan for that portion in the city of Albany.

3.2.2 Existing Conditions

All four proposed sites are located within Alameda County along the waterfront of the San Francisco Bay. The proposed sites are all located within the jurisdictional city boundaries of Berkeley and Albany. The Berkeley Marina, Berkeley Fishing Pier, and Gilman Street sites are subject to the City of Berkeley land use plans and policies and zoning controls. Similarly, the Buchanan Street site, within the City of Albany, is governed by that city's land use and zoning policies. A description of the land use and zoning at each of the four sites is provided below. Land use maps are presented for Berkeley and Albany in Figures 3-7 and 3-8.

Alternative A (Berkeley Marina Site)

The Berkeley Marina site's current zoning is "Unclassified," which is the overall zoning for the waterfront district. This zoning designation acts a placeholder designation until the area is classified into another type of land use. A use permit is required for development in this district, which is subject to review and approval by the Planning Commission and the City Council (City of Berkeley, Zoning Code, Chapter 23E.92). Current land uses are the Berkeley Marina, with the adjacent Hornblower restaurant and the nearby Doubletree Hotel.

Alternative B (Berkeley Fishing Pier Site)

This site is governed by the City of Berkeley's Waterfront Master Plan. The City's General Plan designates this site as Open Space and Waterfront/Marina, and it is zoned as "Unclassified." Current land uses are primarily recreational and include fishing at the nearby municipal pier.

Alternative C (Gilman Street Site)

Most of this site is currently underused. The area near the water consists of primarily of embankment against the water and riprap. An empty lot sits very close to the site and serves as storage for horse trailers and overflow parking for patrons of the nearby Golden Gate Fields racetrack.

This site is zoned as a "Specific Plan" district, which allows an adopted Specific Plan to govern its development. The City of Berkeley developed a Waterfront Specific Plan in 1986, which envisions the waterfront as an area primarily for recreational, open space, and environmental uses, with preservation and enhancement of beaches, marshes, and other natural habitats.

Alternative D (Buchanan Street Site)

This site straddles land that currently is used as parklands to the north and a racetrack to the south. The City of Albany has zoned this site as "Waterfront," which allows for the following uses: Berkeley Marina and boat launching ramp; parking for non-residential uses; commercial, recreation, restaurants; and waterfront-related commercial sales and service. The site's land use designation is "park and recreation." The City does not have a Master or Specific Plan for its waterfront area. Golden Gate Fields, east of the site, has been operating at its current location since 1941. Currently, there are no plans for future development in this area by Magna Entertainment, who is the owner of Golden Gate Fields and some of its adjacent properties.

3.3 SOCIOECONOMICS

Socioeconomic issues relevant to the evaluation of environmental impacts include employment, population, housing, environmental justice, ethnicity of population, and poverty status. This section describes existing economic and demographic conditions at varying geographic levels. Alternative D (Buchanan Site) is located within Census Tract 4204 and Alternatives C (Gilman Street Site), B (Berkeley Fishing Pier Site), and A (Berkeley Marina Site) are all located within Census Tract 4220. These Census Tracts are depicted in Figure 3-9.

3.3.1 Regulatory Framework

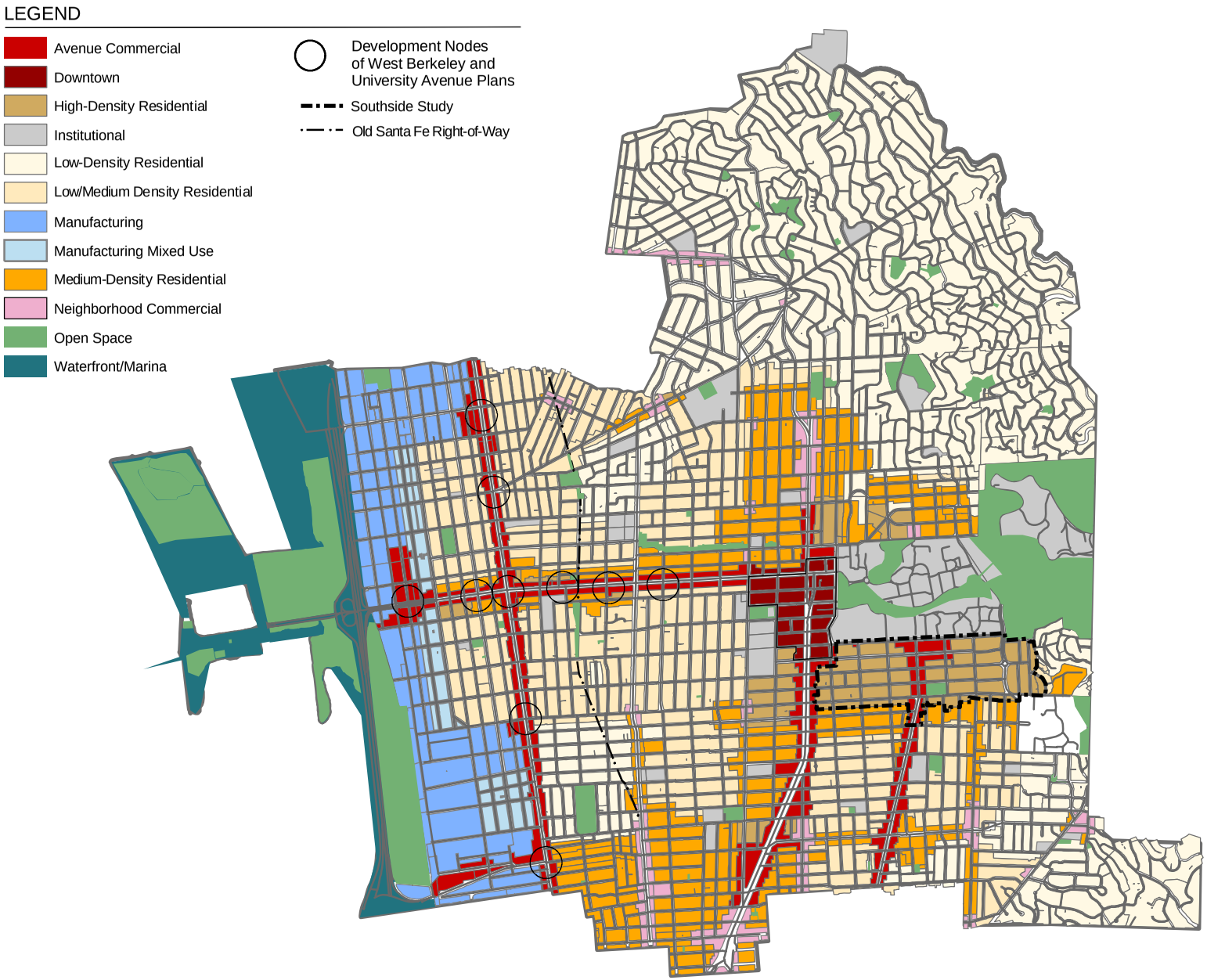
Cities of Berkeley and Albany

The *City of Berkeley's General Plan* (adopted April 23, 2003) includes citywide objectives, policies, and actions that relate to the city's population, housing, and employment. The following *Housing Element* policy specifically deals with socioeconomics issues (City of Berkeley, 2003):

- **Policy H-16 – Transit-Oriented New Construction.** Encourage construction of new medium and high density housing on major transit corridors and in the Downtown consistent with zoning and compatible with the scale and character of these areas.

The *City of Albany's General Plan* (adopted December 7, 1992) includes citywide goals, policies, and programs to enhance the city's population, housing, and employment. The following *Circulation Element* policy specifically deals with socioeconomics issues (City of Albany, 1992):

- **Policy CIRC 4.1.** Monitor existing and proposed transit service for responsiveness to residents' and employers' needs.



CITY OF BERKELEY
LAND USE PLAN

Berkeley/Albany
Ferry Terminal Study

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FIGURE 3-7

Source: City of Berkeley General Plan, 2001

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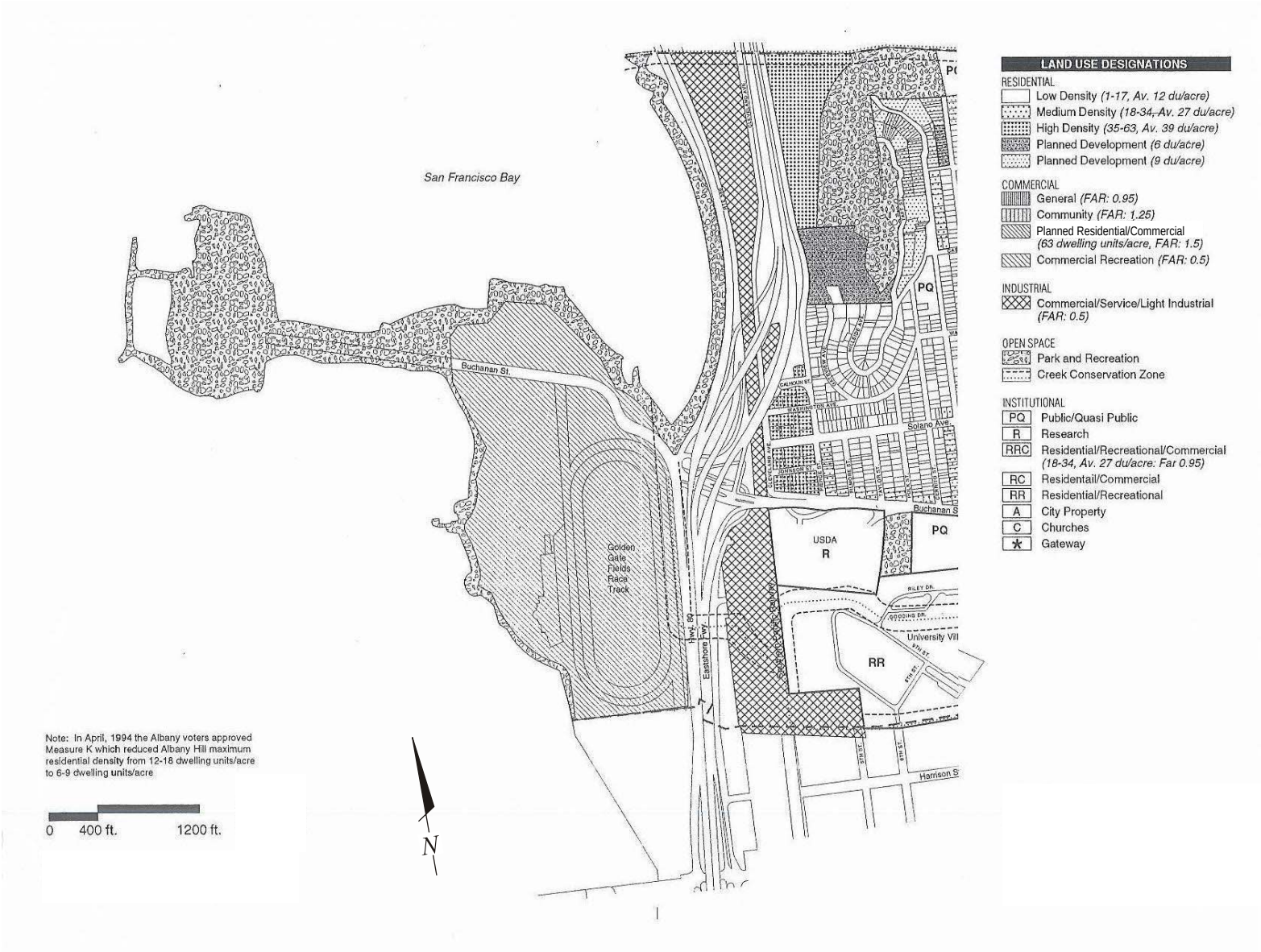

CITY OF ALBANY LAND USE PLAN

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FIGURE 3-8

Source: City of Albany General Plan 1990-2010

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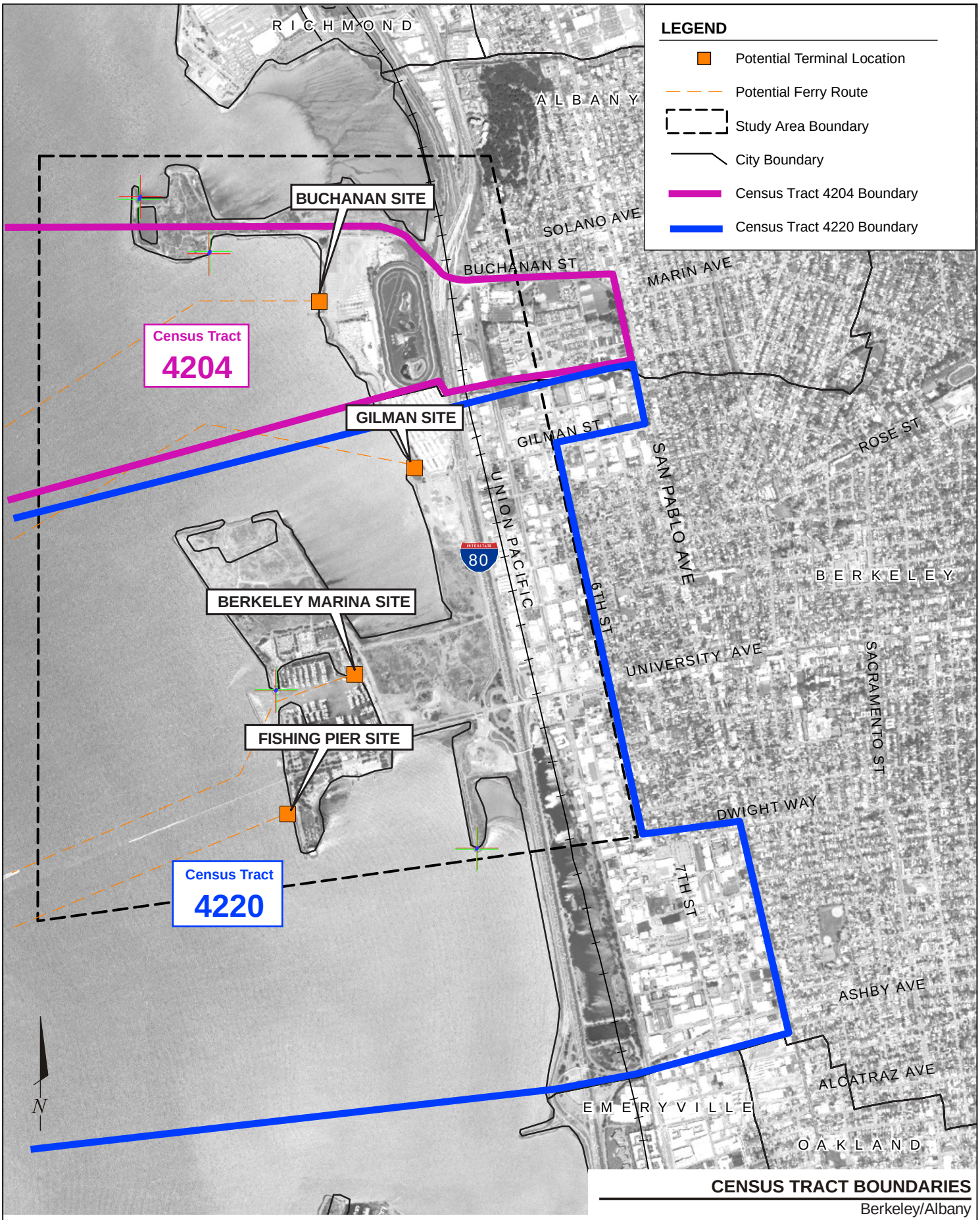

Source:
Aerial Imagery, USDA FSA Aerial Photography Field Office, 2005.

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CENSUS TRACT BOUNDARIES

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FIGURE 3-9

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Federal Environmental Justice Executive Order

Executive Order (EO) 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, requires Federal agencies like the FTA to consider environmental justice issues in their policies, activities, and procedures. A Presidential Memorandum directed to the heads of all departments and agencies accompanied EO 12898. The memorandum states "each Federal agency shall analyze the environmental effects, including human health, economic, and social effects, of Federal actions, including effects on minority communities and low-income communities, when such analysis is required" by NEPA. The memorandum particularly emphasizes the importance of NEPA's public participation process, directing that "each Federal agency shall provide opportunities for community input in the NEPA process." Agencies are further directed to "identify potential effects and mitigation measures in consultation with affected communities, and improve the accessibility of meetings, crucial documents, and notices." Potential environmental justice areas are identified in the alternatives screening process to ensure that these communities have access to concise and clear information sufficient to effectively participate in the public involvement process. This helps to ensure that these communities are not disproportionately affected by a project. Environmental justice in transportation projects is about striving to ensure that minority and low-income populations get an equal share of the transportation benefits without carrying the brunt of the burden.

EO 12898 was designed to supplement Title VI of the Civil Rights Act of 1964, and the resulting regulations for the U.S. Department of Transportation (U.S. DOT) implementing this Act. Title VI prohibits discriminatory practices in programs receiving federal funding (U.S. DOT, 1994). In addition, EO 12898 is supplemented by more than 30 federal statutes, regulations, executive orders, and directives regarding nondiscrimination.

3.3.2 Employment, Housing, and Population

Employment

Historic labor force and unemployment rates are illustrated in Table 3-8. The civilian labor force remained relatively stable in the City of Berkeley, while the Alameda County a small growth of 6 percent and the City of Albany experienced a large growth of 97 percent in the civilian labor force between 1990 and 2000. Census Tracts 4204 and 4220 both experienced a large decline in the civilian labor force of approximately 43 and 32 percent respectively between 1990 and 2000. In Alameda County, City of Berkeley, City of Albany, and Census Tract 4204 unemployment rates have remained stable from 1990 to 2000. Between 1990 and 2000 the unemployment rate in Census Tract 4220 dropped by 8.4 percent.

The existing and projected jobs for the Study Area are illustrated in Table 3-9. Jobs are projected to grow in the City of Albany, City of Berkeley, and Alameda County by 21 percent, 16 percent, and 51 percent, respectively, from 2005 to 2035.

Table 3-8
Historic Labor Force and Employment

Area	Year	Civilian Labor Force	Civilian Employment	Civilian Unemployment Rate
Alameda County	1990	689,517	635,840	7.8%
	2000	733,194	692,833	5.5%
City of Berkeley	1990	59,323	55,990	5.6%
	2000	59,097	55,832	5.5%
City of Albany	1990	4,479	4,401	1.7%
	2000	8,859	8,674	2.1%
Census Tract 4204 (Alternative 2)	1990	1,105	1,071	3.1%
	2000	625	600	4.0%
Census Tract 4220 (Alternatives 3, 4, and 5)	1990	1,103	917	16.9%
	2000	749	693	7.5%

Source: U.S. Census 2000 and 1990.

Table 3-9
Existing and Projected Jobs

	2005	2015	2025	2035	Projected Growth 2005-2035
City of Albany	4,840	5,540	5,740	5,880	21%
City of Berkeley	75,430	80,740	83,660	87,150	16%
Alameda County	730,270	840,660	968,590	1,099,550	51%

Source: Association of Bay Area Governments, 2006.

The City of Berkeley Parks Recreation and Waterfront Department operates the Berkeley Marina. Approximately 21 workers support the operation of Berkeley Marina. These employees include: 1 Marina Director, 3 Clerical Support Assistants, 1 Landscape Supervisor, 3 Landscape Gardeners, 1 Maintenance Supervisor, 3 Mechanics, 1 Electrician, 1 Groundskeeper Supervisor, 1 Groundskeeper, 1 Recreation Director, 1 Harbor Master and 4 Operations Assistants (Shelley, 2007). Additional employment is generated by a variety of nearby businesses, including Seabreeze Market, Marina Deli, Berkeley Marina Sports Fishing Center, Hana Japan Restaurant, Cal Adventures, Cal Sailing Club, Adventure Park, a 378 room Doubletree Hotel and conference center, Hornblower Cruises, Hs Lordships Restaurant, Skates on the Bay Restaurant, and the Berkeley Yacht Club.

Golden Gate Fields Racetrack is located at 1100 Eastshore Highway in Berkeley. Golden Gate Fields, which is owned and operated by Magna Entertainment Corporation on 225 acres, includes a racetrack, stable areas, first aid station, food services, and a gift shop. Golden Gate Fields employs approximately 400 employees that are disbursed among the following groups: operations, catering, marketing, sales department, parimutuels, laborers, janitors, and administrative (Lagreve, 2007).

Housing

The historical housing distribution for the study area is shown in Table 3-10. Between 1990 and 2000 the housing units in the City of Berkeley, City of Albany, and Census Tract 4220 remained relatively stable. Between 1990 and 2000, Alameda County experienced a growth of approximately 36,000 housing units, while Census Tract 4204 experienced a decrease in housing units by 250. The percentage of vacant homes has remained relatively constant in Alameda County, the City of Berkeley, and the City of Albany between 1990 and 2000. The percentage of vacant housing grew in Census Tracts 4204 and 4220 by approximately 10 and 3.5 percent between 1990 and 2000.

Table 3-10
Historical Housing Distribution

Area	Year	Housing Distribution			
		Housing Units	Occupied Housing	Vacant Housing	% Vacant
Alameda County	1990	504,109	479,518	24,591	4.90%
	2000	540,183	523,366	16,817	3.10%
City of Berkeley	1990	45,735	43,453	2,282	5.00%
	2000	46,875	44,955	1,920	4.10%
City of Albany	1990	7,468	7,192	276	3.70%
	2000	7,248	7,011	237	3.30%
Census Tract 4204 (Alternative 2)	1990	929	924	5	0.50%
	2000	679	608	71	10.50%
Census Tract 4220 (Alternatives 3, 4, and 5)	1990	655	622	33	5.00%
	2000	634	580	54	8.50%

Source: U.S. Census 2000 and 1990.

Existing and projected households within the Study Area are shown in Table 3-11. Housing is projected to grow in the City of Albany, City of Berkeley, and Alameda County by 14 percent, 12 percent and 29 percent respectively from 2005 to 2035. The percentage of vacant housing units remained relatively stable in Alameda County, the City of Berkeley, and the City of Albany between 1990 and 2000. However, Census Tract 4204 and 4220 experienced a growth of 9.5 percent and 3.5 percent respectively, in vacant housing units.

Table 3-11
Existing and Projected Households

Area	2005	2015	2025	2035	Projected Growth 2005-2035
City of Albany	7,130	7,490	7,790	8,110	14%
City of Berkeley	45,530	47,050	48,960	50,980	12%
Alameda County	543,790	589,780	643,030	700,090	29%

Source: Association of Bay Area Governments, 2006.

Population

The historical population of the study area is located in Table 3-12. Between 1990 and 2000, the Cities of Berkeley and Albany grew by less than 1 percent, while Alameda County grew by over 12 percent. Census Tracts 4204 and 4220 decreased in population by approximately 34 and 29 percent respectively from 1990 to 2000.

Table 3-12
Historical Population

Year	Alameda County	City of Berkeley	City of Albany	Census Tract 4204 (Alternative D)	Census Tract 4220 (Alternatives A, B, and C)
1990	1,279,182	102,724	16,327	2,598	1,872
2000	1,443,741	102,743	16,444	1,721	1,333
Growth from 1990 to 2000	12.86%	0.02%	0.72%	-33.76%	-28.79%

Source: U.S. Census 2000 and 1990.

Table 3-13 illustrates the existing and projected population of the study area. The populations of the City of Albany, City of Berkeley, and Alameda County are each projected to grow by 14 percent, 14 percent, and 29 percent respectively from 2005 to 2035.

Table 3-13
Existing and Projected Population

Area	2005	2015	2025	2035	Projected Growth 2005-2035
City of Albany	16,800	17,600	18,300	19,200	14%
City of Berkeley	104,400	109,000	113,900	119,400	14%
Alameda County	1,505,300	1,635,700	1,776,900	1,938,600	29%

Source: Association of Bay Area Governments, 2006

The Berkeley Marina currently has 100 live aboard vessels, with an average of two residents per vessel. Therefore, the Berkeley Marina population is estimated at 200 people. Currently, the Berkeley Marina is allowed to have 10 percent of the total berths as liveaboards. The Berkeley Marina has a total of 1,100 berths; therefore the Berkeley Marina liveaboard population may expand to a maximum of 220 people (Shelley, 2007).

3.3.3 Ethnicity

According to U.S. Census Bureau data, the Latino populations are not an official ethnic category due to reporting inaccuracies. Often, Latinos self-report themselves as being a part of another ethnic category, mostly white. While the census data cannot provide an exact number of Latinos in a census year, those that marked Latino were separated into their own category for analysis purposes. As shown in Table 3-14, the majority of the population of Census Tracts 4204 and 4220 are considered White or Asian.

The racial and ethnic population is more than 50 percent of the population of Census Tracts 4204 and 4220, which typically constitutes an environmental justice community. However, the racial and ethnic population distribution can be attributed to the University Village, which is a University of California at Berkeley family student housing facility located at 1125 Jackson Street in Albany, and the proximity of the census tracts to the University of California at Berkeley. Approximately 65 percent of the students at UC Berkeley in the fall of 2006 were considered to be racial minorities (UC Berkeley, 2007). The proposed project will increase mobility by providing an additional mode of public transportation for the residents and increase the area's economic prosperity.

3.3.4 Low-Income and Poverty Status

Table 3-15 illustrates the poverty status for the study area. Residents of Census Tract 4220 are not considered a low income environmental justice community since the total tract population has less the 50 percent of persons living in poverty and is less than 2 percentage points higher than the percentage of population below the poverty level in Alameda County and the City of Berkeley.

Census Tract 4204 consists of University Village, which is a University of California at Berkeley owned family student housing facility located in Albany. This housing is available to students who are married, single-parent, and domestic partner student families. University Village encompasses 58 acres and has 760 one, two, and three bedroom apartments and two bedroom townhouses (UC Housing, 2007). Residents of Census Tract 4220 have a percentage of the population below the poverty level that is more than 2 percentage points higher than the percentage of population below the poverty level in Alameda County and the City of Albany, attributable to predominance of student population within the Census Tract.

Table 3-14
Ethnicity Data for 2000

Ethnicity	Alameda County		City of Berkeley		City of Albany		Census Tract 4204 (Alternative D)		Census Tract 4220 (Alternatives A, B, and C)	
	Population	%	Population	%	Population	%	Population	%	Population	%
White	704,334	48.8	60,797	59.2	10,078	61.3	470	27.3	624	46.8
Black or African American	215,598	14.9	14,007	13.6	675	4.1	119	6.9	358	26.9
American Indian and Alaska Native	9,146	0.6	467	0.5	64	0.4	16	0.9	19	1.4
Asian	295,218	20.4	16,837	16.4	4,126	25.1	823	47.8	163	12.2
Native Hawaiian and Other Pacific Islander	9,142	0.6	146	0.1	22	0.1	7	0.4	3	0.2
Some Other Race	129,079	8.9	4,764	4.6	521	3.2	129	7.5	85	6.4
Two or More Races	81,224	5.6	5,725	5.6	958	5.8	157	9.1	81	6.1
Total	1,443,741	100	102,743	100	16,444	100	1,721	100	1333	100
Hispanic or Latino (of Any Race)	273,910	19	10,001	9.7	1,312	8	239	13.9	180	13.5

Source: U.S. Census, 2000.

Table 3-15
Poverty Level Status in 2000

	Alameda County	City of Berkeley	City of Albany	Census Tract 4204 (Alternative D)	Census Tract 4220 (Alternatives A, B, and C)
Population	1,433,741	102,743	16,444	1,721	1,333
Persons Below Poverty Level	156,804	19,495	1,304	358	164
Percentage of Population Below Poverty Level	10.9	19.0	7.9	20.8	12.3

Source: U.S. Census 2000.

3.4 PARKLANDS AND RECREATIONAL FACILITIES

3.4.1 Regulatory Framework

United States Department of Transportation Act of 1966- Section 4(f)

Section 4(f) provides protection to certain publicly used lands and historic sites. Under Section 4(f), the FTA shall not approve a program or project which requires the use of any publicly owned public park, recreation area or wildlife or waterfowl refuge, or land from an historic site officially designated by a federal, state, or local agency and the officials of these governmental entities, having jurisdiction over the land, as a major purpose or function of the land unless there is no feasible and prudent alternative to the use, and all possible planning to minimize harm resulting from such use is included. Incidental, secondary occasional or dispersed park, recreational, or refuge activities do not constitute a major purpose. Officials having jurisdiction are the officials of the agency owning or administering the land. If the authority has been delegated or relinquished to another agency, that agency must be contacted to determine the major purpose(s) of the land. Management plans that address or officially designate the major purpose of the property are reviewed as part of this determination. After consultation, and in the absence of an official designation of purpose and function by the officials having jurisdiction, FTA bases its decision on its own examination of the actual functions that exist. The final decision on applicability of Section 4(f) to a particular property of type of land is made by FTA. In reaching this decision, FTA relies on the official having jurisdiction over the resource to determine that the kinds of activities and functions that take place constitute a major purpose. Documentation of the determination of non-applicability is included in the environmental document or project record.

United States Department of Interior Section 6(f) Lands

The Department of Interior Land and Water Conservation Fund Act (LWCFA) of 1965 as amended, U.S. Code: 16 U.S.C Sections 4601-4 et seq., commonly known as Section 6(f), allows the Secretary of Interior, acting through the Director of the National Park Service, to establish a land and water conservation fund. The fund provides money to federal agencies, states, or state's designee for purchasing land and developing outdoor recreational facilities for the public. The Act requires that all lands acquired or developed with Land and Water Conservation Fund Act assistance be maintained in public outdoor recreation use, or suitably replaced. If the selected alternative (LPA) directly or indirectly affects parklands, consultation with the Department of Interior, the LWCFA liaison, and the state and regional park departments will occur in conjunction with the preparation of the chapter describing Section 4(f) and Section 6(f) evaluation and mitigation, as required.

San Francisco Bay Plan (2003)

BCDC is a state agency with the authority to issue or deny permit applications for placing fill, extracting minerals, or changing the use of any land, water, or structure within the San Francisco Bay. The San Francisco Bay Plan, adopted in 1968 by BCDC and last amended in 2006, includes policies to guide future uses of the Bay and shoreline and includes a set of maps which

show where the policies should apply to the present Bay and shoreline. Transportation Policy 5 in the Plan states that ferry terminals should be sited at locations that are near navigable channels, would not rapidly fill with sediment, and would not significantly impact tidal marshes, tidal flats or other valuable wildlife habitat (BCDC, 2002).

Eastshore State Park General Plan (2002)

A General Plan, prepared in partnership with East Bay Regional Parks District (EBRPD) was completed for Eastshore State Park and approved by the State Park and Recreation Commission in December 2002. The General Plan provides for the conservation of unique natural resources while providing outstanding recreational opportunities and protecting spectacular views of San Francisco Bay (CDPR, 2002).

City of Berkeley General Plan (2001) – Open Space Element

The Open Space and Recreation Element establishes a policy framework and action program for the maintenance, improvement, and expansion of Berkeley's open space and recreational facilities. The Element addresses open spaces, including parks, playgrounds, recreation centers, swim centers, public gardens, the Berkeley Marina, public paths and stairways, landscaped medians, and sidewalks. The following policy applies to the proposed sites located within the City of Berkeley:

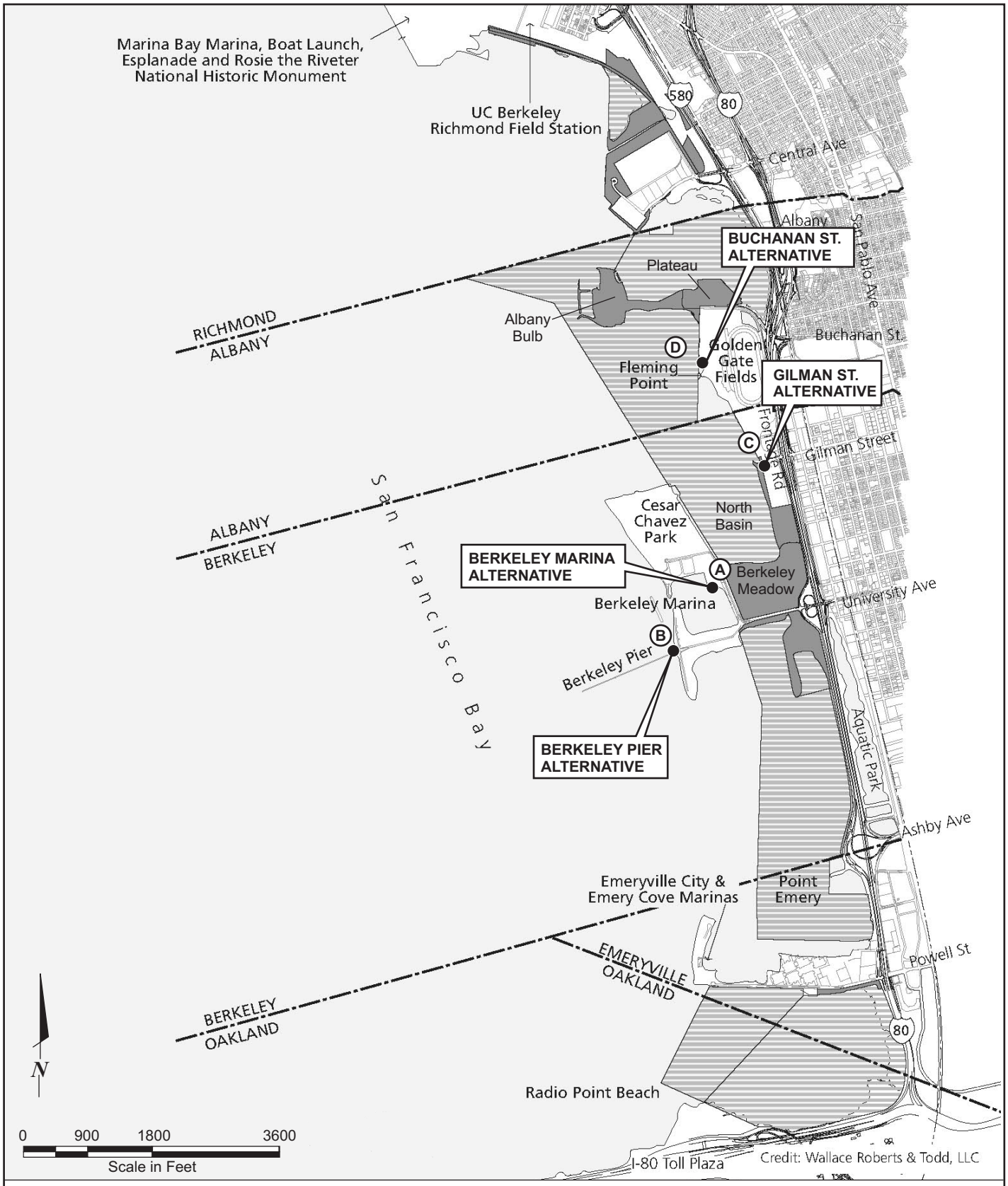
- **Policy OS-13.** Implement the 1986 Waterfront Plan policies to establish the waterfront as an area primarily for recreational, open space, and environmental uses, with preservation and enhancement of beaches, marshes, and other natural habitats. (Also see Land Use Policies LU-43 and LU-44.)

3.4.2 Existing Parklands and Recreational Areas

The parklands and recreational areas located within the study area are described below. The Eastshore State Park boundaries are illustrated in Figure 3-10 and the parks owned and operated by the Cities of Berkeley and Albany are indicated in Figure 3-11.

Eastshore State Park

The Eastshore State Park extends approximately 8.5 miles along the eastern shoreline of San Francisco Bay from the Oakland Bay Bridge north to the Marina Bay neighborhood in the City of Richmond. The park project includes approximately 2,262 acres of uplands and tidelands along the waterfronts of the cities of Oakland, Emeryville, Berkeley, Albany, and Richmond (CDPR, 2002). Current plans for the Eastshore State Park indicate that the "Meadow" area of the Berkeley waterfront will be part of the park's uplands. The Meadow abuts the Berkeley Marina and is an area of the waterfront that resulted from the placement of fill over mudflats and open water. In addition, an open-space area north and west of the Buchanan Street site serves as a passive recreational area, with few facilities. This land provides access for users to Albany Beach and other parkland areas. Albany and Berkley Meadow are conservation areas. The North Basin and Plateau are recreational areas as well which will eventually be connected to the Bay Trail.



LEGEND

- Upland Parklands
- City Boundaries
- Aquatic Parklands
- Potential Terminal Location

Source:
Modified from CDPR, 2002.

EASTSHORE STATE PARK

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FIGURE 3-10

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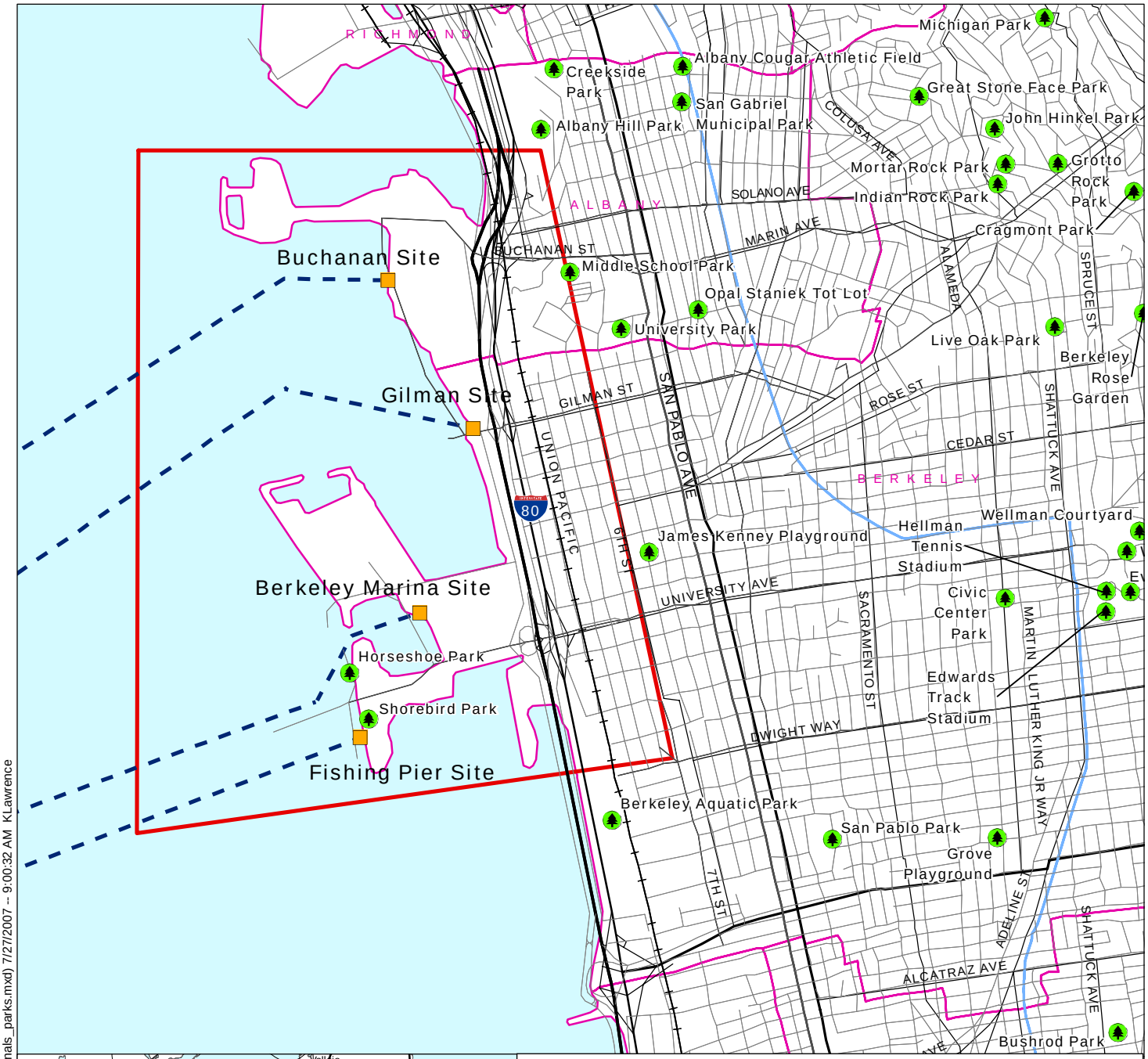

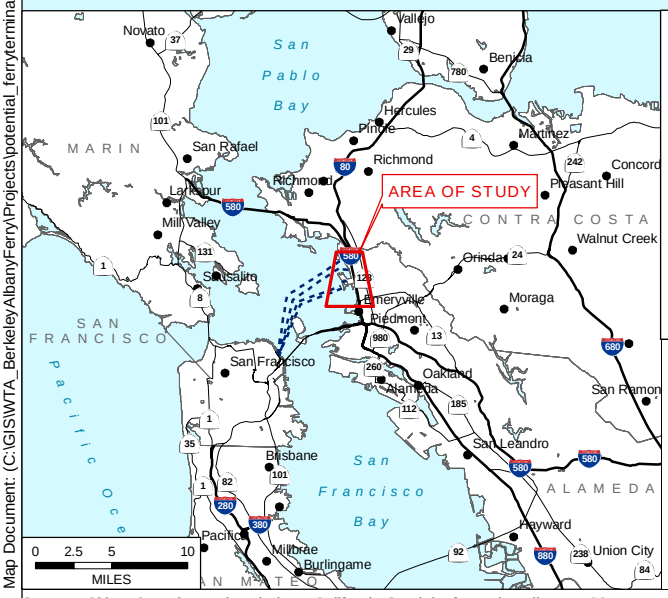

LEGEND

- Potential Terminal Location
- Park
- Potential Ferry Route
- BART
- Study Area Boundary
- City Boundary

N

0 1500 3000
Scale in Feet

PARKS IN VICINITY OF BERKELEY/ ALBANY FERRY TERMINAL SITE LOCATION ALTERNATIVES

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FIGURE 3-11

Source: Cities, Counties and Hydrology, California Spatial Information Library, 1997; Potential Ferry Terminals and Routes, URS, 2007; Rail Lines and Roads, US Census Bureau Tiger Data, 2000; BART Line, MTC, 2004; Aerial Imagery, USDA FSA Aerial Photography Field Office, 2005; Parks, Geographic Names Information System, USGS, January 2007.

Map Document: (C:\GIS\WTA_BerkeleyAlbanyFerry\Projects\potential_ferryterminals_parks.mxd) 7/27/2007 -- 9:00:32 AM KLawrence

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The Bay Trail

The Bay Trail is a collaborative project by Bay Area cities, park agencies (California Department of Parks and Recreation [CDPR] and EBRPD), Bay agencies (ABAG and BCDC), and transportation agencies (Caltrans and MTC) to create a multi-use trail around the Bay. When complete, the Bay Trail will be a continuous 400-mile recreational corridor that will encircle the entire Bay Area, connecting communities to each other and to the Bay. It will link the shorelines of all nine counties in the Bay Area and 47 of its cities. The Bay Trail represents an important element in linking the noncontiguous parts of the Eastshore Park Project to each other and to adjacent municipal recreational facilities (CDPR, 2002). To date, 240 miles of the Bay Trail, or more than half its ultimate length, have been developed (ABAG, 2007).

Aquatic Park

Aquatic Park is a City of Berkeley Park located east of I-80 between Ashby and University Avenues. The park is a remnant of the Bay's historic east shore. When the Bay was filled to create the freeway, a section of it was isolated east of the roadway, creating what is now Aquatic Park. The recent completion of the pedestrian/bicycle bridge over I-80 links Aquatic Park with the Brickyard area of the Eastshore Park Project (CDPR, 2002).

Berkeley Marina

The Berkeley Marina contains 52 acres of water and 975 berths. A breakwater protects the Berkeley Marina against surge and rough waters of the Bay. Berths have storage lockers, water, electrical outlets, night lighting, parking, restrooms and showers, and locked gates. Approximately 90 percent of berthed vessels are sailboats; the remainder are motorized watercraft (Hardinger, 2006).

Berkeley Fishing Pier

Recreational fishermen use the pier to cast their fishing lines and pedestrians use the pier for strolling or observation.

Cesar Chavez Park

Cesar Chavez Park is a 90-acre municipal park located north of the Berkeley Marina. Built on a former municipal landfill, Cesar Chavez Park consists of rolling turf, an off-leash dog area, and 1.5 miles of paved trails. The park hosts several large seasonal events and festivals (CDPR, 2002). There are no improvements planned for this park.

Gilman Street Playing Fields

The area at the foot of Gilman Street south of the Gilman site is being developed by the City of Berkeley for recreational playing fields and a future Bay Trail route. On March 27, 2007, the Berkeley City Council decided to proceed with the construction of the playing fields, which also requires a lease agreement with the EBRPD. The site, which is approximately 15.76 acres in size, will include one baseball diamond, two softball fields, two full size soccer fields and a parking lot for approximately 50 automobiles.

Horseshoe Park

Horseshoe Park is located at 101 Seawall Drive, at the Berkeley Marina. The park is 3.39 acres in size (147,670 square feet) and features a multi-purpose turf with landscaping, vista with marina view and a shoreline access area. Horseshoe Park offers protection from the west winds and a wonderful view across the harbor to the East Bay Hills (City of Berkeley, 2007a).

Shorebird Park

Shorebird Park is located on the southern edge of the Berkeley Marina area along the shores of the South Sailing Basin. The park includes the Shorebird Nature Center (an educational and interpretive center dedicated to teaching children about the Bay ecology), a boat launch area, and an adventure playground for young children (CDPR, 2002). Shorebird Park is less than 300 feet from the site. Park facilities here include the Shorebird Nature Center, picnic sites, children's play areas, a multi-purpose turf, and other facilities.

3.5 AESTHETICS AND VISUAL RESOURCES

This section describes the visual quality of the area around each proposed terminal site, including views and viewpoints, depth of perspective, and color and texture of the visual setting. It also denotes if there are controlling local or regional regulations that restrict or guide the design of new infrastructure, in terms of height and bulk, materials, or visual setbacks. This information is used to compare the existing environment with potential modifications resulting from project implementation.

3.5.1 Regulatory Framework

Cities of Berkeley and Albany

The City of Berkeley has no specific height and bulk restrictions for land uses designated as Unclassified or a Specific Plan review of projects in these areas such as along the waterfront is on a case by case basis (City Berkeley Planning Department, August 3, 2007). In the City of Albany, areas such as the Buchannan site located in waterfront and public facilities districts, where site regulations not otherwise specified are determined by the Planning and Zoning Commission on a use permit basis (City of Albany Zoning Code, Table 2.B).

Bay Area Conservation and Development Commission

BCDC maintains public access design guidelines for the San Francisco Bay called "Shoreline Spaces," that provides direction for the design of gathering and seating areas site furnishings and signage along the Bay shorelines projects are examined on a case by case basis (McCrae, 2007.)

3.5.2 Visual Setting

Alternative A (Berkeley Marina Site)

As indicated in Figures 3-12 and 3-13, the foreground and middle ground setting at the Berkeley Marina site is punctuated by the masts of the sailboats that are docked in close quarters at the Berkeley Marina. The white hulls of the sailboats are contrasted by the colorful sail coves and the dark tones of the water and access planks. The view to the distant horizon is interspersed with a multitude of masts and the vertical presence of the Hornblower vessel, also docked in the Berkeley Marina. The boats hug the shoreline allowing an unobstructed view across the middle of the Berkeley Marina to the breakwater, whose linear presence articulates the horizon line at the mouth of the Berkeley Marina. Except for a scattering of evergreens and low lying vegetation as well as cars parked across the nearby parking areas, the foreground and middle ground views looking inland are unobstructed as well, looking out over the shoreline toward the low-lying industrial buildings and the distant hills. The roofline of structures associated with the Berkeley Marina and Doubletree are barely visible through the evergreens, which appear to have been planted to obstruct the view of the hotel from the Berkeley Marina.

Alternative B (Berkeley Fishing Pier Site)

The shoreline at the Berkeley Fishing Pier is demarcated by a straight line of dark boulders accentuated by the parallel line that separates the roadway from the pedestrian path (Figure 3-14). The light grey tones of the water contrast with browns of the riprap and strengthen the linear perspective of the view along the shoreline. This perspective is broken by the intrusion of evergreens, slender utility poles, and a low structure that obscure the distant horizon. Extending out from this billowing mass of vegetation is the Berkeley Fishing Pier, which articulates the horizon from this vantage point. The pier adds another linear dimension to the perspective, this time perpendicular to the shoreline. It frames on the north the unobstructed view across the Bay to the City and the Golden Gate Bridge. The perspective looking inland is interrupted in the foreground by trees and utility poles that punctuate the parking area. The hills are visible between these foreground elements.

Alternative C (Gilman Street Site)

The flat area in the foreground is interrupted in the middle ground by a rise in elevation which partially obstructs the view to Albany Bulb, which extends into the Bay along the horizon (Figures 3-15 and 3-16). The rise in elevation is mirrored by vegetation that climbs the slopes from the shoreline. At the crest of the rise are a line of palm trees that demarcate the sleek line of the racetrack grandstand from the undeveloped slope. A roadway leading to the grandstand mimics the linearity of the shoreline before leading the viewer's perspective to the top of the rise in a sweeping curve. The view of the road is highlighted by a green fence bordering the road interspersed with the slender verticality of light standards and the contrasting white rooflines of horse trailers located off to the right. The horse trailers partially obstruct the inland view to the hills in contrast to the view across the Bay, which is an open expanse to the hills of Marin.

Alternative D (Buchanan Street Site)

The Buchanan Street site has unobstructed views in all directions with the exception of the southerly view which is interrupted by the protruding lines of the racetrack grandstand. Because the area is surrounded by a vast parking area and low-lying shoreline defined by riprap, the foreground views blend with the expansive sight lines across the Bay and draw the viewer's attention to the more dramatic long views west to Marin. The long view is punctuated by slender points of land extending into the Bay on the north and the west that frame the views to the western horizon (Figures 3-17 and 3-18). Also leading the view across the Bay are the remnants of broken down piers that angle into the water from the shoreline. Inland views are also unobstructed, with the linear features of the freeway overpass underlining the textured relief of scattered houses climbing Albany Hill in the background.

3.6 CULTURAL RESOURCES

3.6.1 Regulatory Framework

Federal Mandates

Federal laws, procedures, and policies affecting the treatment of cultural resources include the Antiquities Act of 1906, Public Law 59-209, EO 11593, Section 106 of the National Historic Preservation Act (NHPA) of 1966 (Public Law 89-665), as amended, Public Law 93-291, the NEPA of 1969 (Public Law 91-190), the Federal Land Policy Management Act (Public Law 94-94-579), regulations 36 Code of Federal Regulations (CFR) 60 and 36 CFR 800.

For management purposes, a cultural resource must be recommended as either eligible or not eligible to the National Register of Historic Places (NRHP) to determine effect and the need for mitigation of effect. If the property (cultural resource) is determined eligible, then a determination of effect, as per 36 CFR 800, must be provided. If the property is identified as not eligible, then no determination of effect or mitigation measures is necessary. Recommendations are reviewed and approved by the State Historic Preservation Officer (SHPO) and the Advisory Council on Historic Preservation (ACHP).

The NHPA requires all federal agencies to assess the effects of any agency-sponsored undertaking on cultural resources. The federal agency is responsible for project compliance with Section 106 of the NHPA and its implementing regulations, set forth by the ACHP at 36 CFR 800.

Four evaluation criteria to determine a resource's eligibility to the NRHP, in accordance with the regulations outlined in 36 CFR 800, are identified at 36 CFR 60.4. To determine site significance through application of National Register criteria, several levels of potential significance that reflect different (although not necessarily mutually exclusive) values must be considered. As provided in 36 CFR 60.4:

VIEW OF BERKELEY MARINA LOOKING WEST

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FIGURE 3-12

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VIEW OF BERKELEY MARINA LOOKING NORTH TO THE DOUBLETREE HOTEL

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FIGURE 3-13

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VIEW OF BERKELEY FISHING PIER LOOKING NORTH

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FIGURE 3-14

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VIEW OF GOLDEN GATE FIELDS GRANDSTAND LOOKING NORTH

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FIGURE 3-15

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VIEW OF STRUCTURES AT SOUTH END OF GOLDEN GATE FIELDS

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FIGURE 3-16

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VIEW OF SHORELINE LOOKING SOUTH FROM GOLDEN GATE FIELDS

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FIGURE 3-17

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VIEW OF SHORELINE LOOKING WEST FROM GOLDEN GATE FIELDS PARKING AREA

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FIGURE 3-18

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The quality of significance in American history, architecture, archaeology, and culture is present in districts, sites, buildings, structures, and objects of state and local importance that possess integrity of location, design, setting, materials, workmanship, feeling, and association and:

1. That are associated with events that have made a significant contribution to the broad patterns of our history,

2. That are associated with the lives of persons significant in our past,

3. That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction, or

4. That have yielded, or may be likely to yield, information important in prehistory or history.

These evaluation criteria are used to help determine what properties should be considered for protection from destruction or impairment resulting from project-related activities (36 CFR 60.2).

The American Indian Religious Freedom Act, 42 United States Code (USC) 1996, has been established to protect religious practices, ethnic heritage sites, and land uses of federally recognized Native Americans. The Native American Graves Protection and Repatriation Act applies to human remains found on federal lands.

In addition, the historic resources inventory comply with applicable sections of the NHPA and the implementing regulations of the ACHP, as well as the Section 106 PA, as these pertain to federally funded undertakings and their impacts on historic properties. The properties have also been evaluated in accordance with Section 15064.5(a)(1)-(4) of the CEQA Guidelines using the criteria outlined in Section 5024.1 of the California Public Resources Code (PRC). The Secretary of the Interior guidelines for evaluation of National Register eligibility is for buildings, structures, or features 50 years of age or older. This technical report includes resources 45 years or older (constructed in 1962 or earlier) to account for lead time between preparation of environmental documentation and actual project construction.

In initiating the Section 106 process, FTA determines whether it has an undertaking that is a type of activity that could affect historic properties, which are included in the NRHP or that meet the criteria for the National Register. If so, FTA initiates consultation with the SHPO and the Tribal Historic Preservation Officer (refer to FTA letter to SHPO in Appendix C). In this case, FTA provides SHPO and Tribal Historic Preservation Officer with documentation and, barring any objection in 30 days, proceeds with the undertaking. If FTA finds that historic properties are present, it proceeds to assess possible adverse effects. If FTA determines that the undertaking is a type of activity that has no potential to affect historic properties, the agency has no further Section 106 obligations.

State Mandates

The basic goal of CEQA is to develop and maintain a high-quality environment now and in the future. The CEQA Guidelines provide a framework for the analysis of impacts to archaeological resources.

In considering impact significance under CEQA, the significance of the resource itself must first be determined. At the state level, consideration of significance as an "important archaeological resource" is measured by cultural resource provisions considered under CEQA Sections 15064.5 and 15126.4, and the criteria regarding resource eligibility to the California Register of Historic Resources (CRHR).

The criteria for eligibility to the CRHR are very similar to those that qualify a property for the NRHP, which is the significance assessment tool used under the NHPA. Essentially, a property that is eligible for the NRHP is also eligible to the CRHR.

Generally under CEQA, a historical resource (these include built-environment, historic, and prehistoric archaeological resources) is considered significant if it meets the criteria for listing on the CRHR. These criteria are set forth in CEQA Section 15064.5 and defined as any resource that:

1. Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage,

2. Is associated with lives of persons important in our past,

3. Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic value, or

4. Has yielded, or may be likely to yield, information important in prehistory or history.

Section 15064.5 of CEQA also assigns special importance to human remains and specifies procedures to be used when Native American remains are discovered. These procedures are detailed under PRC 21083.2. A "unique archaeological resource" implies an archaeological artifact, object, or site about which it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is high probability that it meets one of the following criteria:

1. The archaeological artifact, object, or site contains information needed to answer important scientific questions, and there is a demonstrable public interest in that information,

2. The archaeological artifact, object, or site has a special and particular quality, such as being the oldest of its type or the best available example of its type, or

3. The archaeological artifact, object, or site is directly associated with a scientifically recognized important prehistoric or historic event or person.

A non-unique archaeological resource indicates an archaeological artifact, object, or site that does not meet the above criteria. Impacts to non-unique archaeological resources and resources which do not qualify for listing on the CRHR receive no further consideration under CEQA.

Under CEQA Section 15064.5, a project would potentially have significant impacts if it would cause substantial adverse change in the significance of one of the following:

1. A historical resource (i.e., a cultural resource eligible for the CRHR)

2. An archaeological resource (defined as a unique archaeological resource which does not meet CRHR criteria),

3. A unique paleontological resource or unique geologic feature (i.e., where the project would directly or indirectly destroy a site or resources), or

4. Human remains (i.e., where the project would disturb or destroy human burials).

A non-unique archaeological or paleontological resource is given no further consideration other than the simple recording of its existence by the CEQA lead agency.

Potential impacts to identified cultural resources need only be considered if the resource is an "important" or "unique archaeological resource" under the provisions of CEQA Sections 15064.5 and 15126.4 and the eligibility criteria. If a resource cannot be avoided, then the resource must be examined vis-à-vis the provisions of CEQA Sections 15064.5 and 15126.4 and of the eligibility criteria as an "important" or "unique archaeological resource." In many cases, determination of a resource's eligibility can only be made through extensive research and archaeological testing. No mitigation measures are required unless previously undiscovered cultural resources are detected. Mitigation under CEQA must address impacts to values for which a cultural resource is considered important. To mitigate adequately, it must therefore be determined what elements make a site eligible for the CRHR. The first line of mitigation is complete avoidance, when feasible, of all cultural resources.

3.6.2 Area of Potential Effects

Archaeological APE

The FTA has determined that the undertaking's horizontal (on the surface) Area of Potential Effects (APE) would consist of the proposed ferry terminal locations, areas that would be used for parking lots and portions of navigation channels where dredging will occur. The approximate total area for each site, including dredge channel, is as follows: Berkeley Pier, 103 acres, Berkeley Marina Site, 118 acres, Gilman site, 128 acres, and Buchanan site, 124 acres. The portions of the navigational channels that fall within the APE are 150 feet wide and range in length from 10,000 to 12,000 feet. The APE for the proposed navigation channels includes a 50-foot buffer to allow for temporary

anchorages and other potential disturbances related to dredging activities. Elements of this undertaking include, but are not limited to, dredging of navigation channels, grading and paving of parking lots, installation of utility distribution systems, and construction of fixed piers, gangways and floats. Figure 3-19 depicts the horizontal APE for this undertaking.

The (below the surface) vertical APE has been determined to range in depth, due to various types of construction activities. Some of the construction activity associated with this undertaking will have negligible vertical disturbance, e.g., re-striping of existing surface parking lots. Activities associated with this undertaking that have been determined to have vertical disturbance include dredging, construction of fixed piers and trenching of utility corridors. It is estimated that the maximum vertical disturbance of these activities will be up to 8 feet within the navigation channels and up to 5 feet for utility trenches.

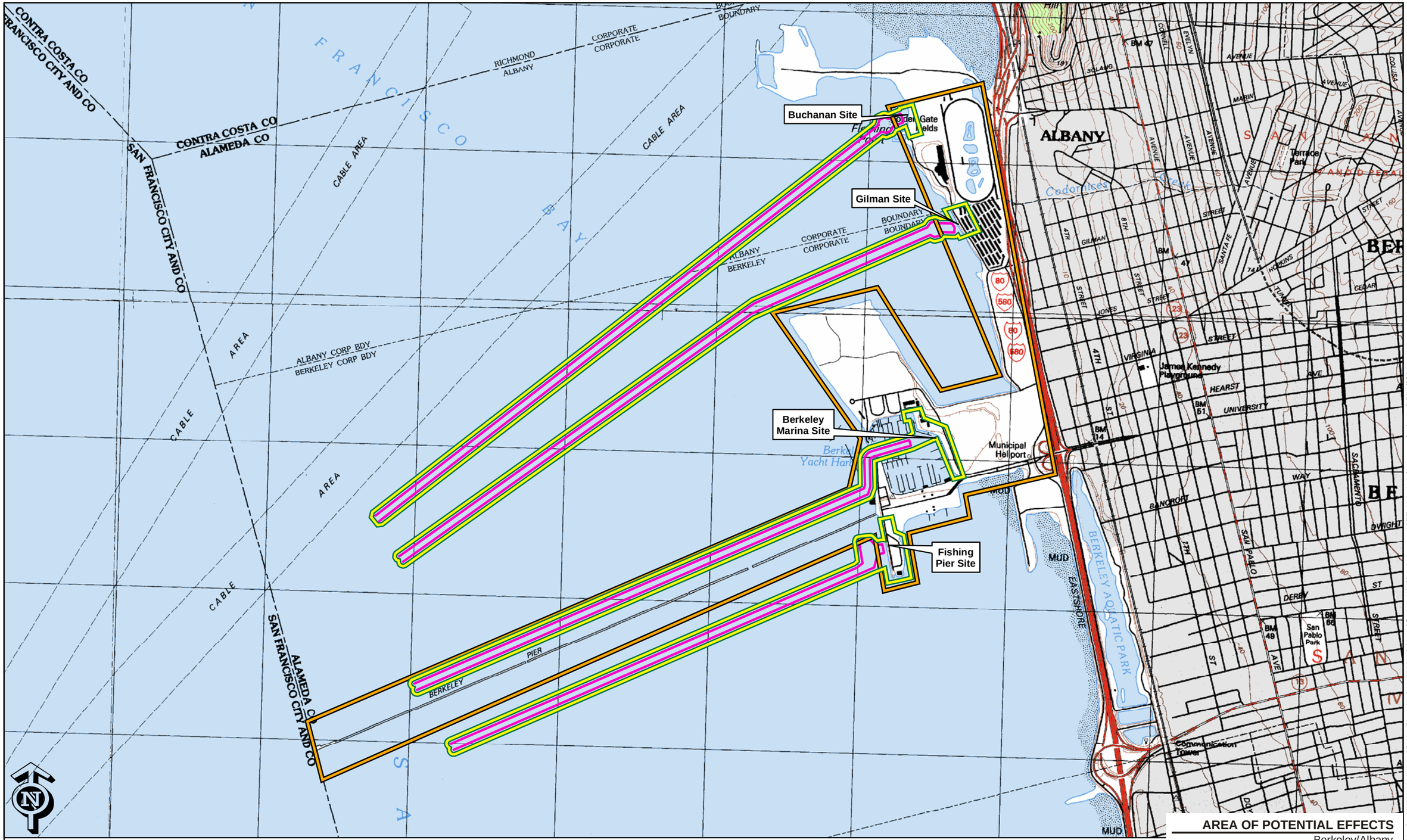
Architectural APE

The historic architectural APE for this project covers an area along the eastern shoreline of San Francisco Bay in northern Alameda County, from the City of Albany south to University Avenue and the Berkeley Marina. This area encompasses municipal land and privately-owned legal parcels. The properties surveyed are related to general historical patterns of waterfront and recreational development in this area, and influenced by changes to and expansion of those facilities. The waterfront landscape changed dramatically during the post World War II period, as landfill activities and freeway improvements changed and expanded the shoreline. The resource complexes largely date to the mid twentieth century, from 1940 and later, but also include a few components that were built as early as the 1920s.

3.6.3 Results of Records Search

California Historical Resources Information System (CHRIS) records search (# 06-1344) was conducted by Ms. Lisa Hagel at the Northwest Information Center, at California State University, Sonoma on March 26, 2007. The CHRIS records search included a review of all recorded archaeological sites, historic structures, and other known cultural resources within the Archaeological APE and a half-mile radius around it, as well as a review of reports for all known cultural resources studies conducted within a half-mile search radius. The records search was initially conducted based upon a larger project study area, and was later refined to capture only those studies and resources within the project areas and ½ mile radius. A copy of the complete records search is included in the Cultural Resources Technical Report.

There were 38 additional archaeological studies and surveys conducted within a ½-mile radius of the Archaeological APE. No previously recorded sites fall within the archaeological APE for this project. Three previously recorded sites lie within a ½-mile of the APE. Additionally, a search of the California State Lands Commission Shipwrecks Database was conducted on May 31, 2007. No known shipwrecks are listed within the archaeological APE or within ½ mile radius of the APE.



AREA OF POTENTIAL EFFECTS

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FIGURE 3-19

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For the historic property survey inventory, pre-field research included review of the previous survey work in the area and project mapping, as well as the current NRHP listings, CRHR, California Historical Landmarks, Points of Historic Interest publications and updates, and the Office of Historic Preservation "Directory of Properties in the Historic Property Data File for Alameda County," as of December 2004. This search effort established that none of the properties in the supplemental survey population had been previously listed or determined eligible for the NRHP or CRHR.

Reconnaissance surveys of the area were conducted in June and July 2007, to account in the field for all the buildings, structures, and objects found within the APE. This field reconnaissance helped to determine which buildings appeared to have been built in 1962 or earlier and would therefore be studied for this project. While the Secretary of Interior sets a guideline for review of potential National Register eligible buildings, structures, or features at 50 years of age or older, this age limit was extended to include resources constructed in 1962 or before to account for lead time between preparation of environmental documentation and actual project construction. Buildings, structures and features built after 1962 are not included in the survey.

Additional pre-field background research was done through First American Real Estate Solutions commercial database, Alameda County records online, review of historic and current U.S. Geological Survey (USGS) topographic maps, nautical charts, historic aerial photography, and other documents to confirm dates of construction. The property-specific and historical context research included review of archival and published records, and of government records. Research for the project was conducted at the following locations: California State Library; the map collection and special collections of the University of California, Berkeley; and Shields Library at University of California Davis. A complete listing of materials consulted is provided in the Cultural Resources Technical Report.

3.6.4 Natural Setting

Paleoenvironment

Because the early Native Americans were dependent entirely on natural resources, their lifeways can be understood fully only with reference to the land and climate (Moratto, 1984). During the prehistoric period, the Bay Area featured a mosaic of plant communities ranging from salt marsh to redwood forest to grassland to mixed-evergreen woodland (Moratto, 1984). The East Bay plain was predominately grass covered, with patches of brush and coast live oak groves (Wallace and Lathrap, 1975; Chavez, 1989). Vegetation was most dense along the freshwater drainages, which supported yellow willow, California laurel, California buckeye and coast live oaks (Wallace and Lathrap, 1975; Chavez, 1989).

San Francisco Bay, as we now know it, was formed during a period of relatively rapid sea-level rise (average rate of 2 centimeters per year) between 9,000 and 6,000 B.C. (Stright, 1990). After 4,000 B.C., when the sea-level rise slowed to a rate of 0.1 to 0.2 centimeters/year, marshes began to develop around the bay. During this post 4,000 B.C. period, numerous shell middens were

created as a result of human activity within the Bay Area (Stright, 1990). Because of rising sea levels, many early sites may have been destroyed or may currently be submerged. The changing environment would have also played a role in shifts in subsistence through time (Bickel, 1978; Moratto, 1984).

A marked slow down in the rate of sea level rise occurred approximately 6,000 B.C. (Bickel, 1978; Josselyn, 1983). Eventually, sedimentation rates exceeded the sea level rise and extensive intertidal mudflats developed (Bickel, 1978; Josselyn, 1983). Many of the marshlands surrounding the Bay were established no more than 3,000 years ago (Moratto, 1984).

The growth of the marshes is of archaeological interest, because most of the San Francisco Bay shell middens were located in close proximity to marshes (Nelson, 1909; Bickel, 1978). Marshes are particularly productive ecosystems. The area's prehistoric populations took advantage of this productivity by harvesting fish, shellfish, birds, and land mammals which live or feed in or near the marsh, as well as the marsh plants themselves (Bickel, 1978).

The present day tidal wetlands have been greatly impacted by anthropogenic influences and we can now only infer how prehistoric marshes may have appeared (Josselyn, 1983). The most dramatic changes occurred during the period of hydraulic mining for gold in the Sierra Nevada (1855-1884). Sediments resulting from the removal of overburden flowed into streams and fine sediments reached Suisun and San Pablo bays causing widespread shoaling (Josselyn, 1983). The urbanization of the Bay Area in the post World War II era has also encroached substantially on the remaining tidal wetlands.

Ethnohistory

Based on linguistic and archaeological evidence, it is believe that Penutian-speaking peoples entered the Bay Area from the Sacramento River Delta region, displacing or replacing speakers of Hokan stock languages of the Bay Area, such as Esselen (Kroeber, 1925; Moratto, 1984). The proto-Costanoan homeland was probably located in the East Bay area, possibly in the Carquinez Straits vicinity (Moratto, 1984).

By around 1500 B.C., Costanoans occupied most of the east shore of the San Francisco Bay, presumably displacing or assimilating older Esselen language speakers as they advanced (Moratto, 1984); Moratto, 1984 indicates that the Berkeley Pattern, including the components previously assigned to the Middle Horizon, is attributable to the emergence of the Costanoan peoples.

The project area is situated within the *Chochenyo* territory of the Costanoan Indians. Costanoan is not a native term, but rather is derived from the Spanish word *Costanos* meaning coast people (Kroeber, 1925). The term Ohlone is preferred by modern Native Americans in the area.

The basic unit of the Ohlone political organization was the tribelet, consisting of one or more socially linked villages and smaller settlements within a recognized territory (Moratto, 1984). Principal villages were established at ecotones, that is, junctures of two or more biotic communities (e.g., oak woodland and bayshore marsh) (Moratto, 1984).

Subsistence activities emphasized: gathering berries, greens, and bulbs; harvesting seeds and nuts, of which acorn was the most important; hunting for elk, deer, pronghorn, and smaller animals; collecting shellfish; and taking varied fishes in stream, bay, lagoon, and open coastal waters (Moratto, 1984).

The population and traditional lifeways of the Ohlone were severely affected by the influences of the Spanish colonists and the Mission system. As the result of enforced missionization, disease and direct assault, by 1800, few if any Ohlone remained on the land or subsisted in native lifeways; in fact, native population had declined in some area by as much as ninety percent.

Prehistory

The first regional chronology for the Bay Area was established by R.K. Beardsley in 1948 (Beardsley, 1948, 1954a, 1954b). This scheme was originally devised for chronologically organizing sites from Central California, the Sacramento Delta, and the northern San Joaquin Valley (Lillard, Heizer, and Fenenga, 1939). Beardsley (1954a) refined this scheme, which became known as the Central California Taxonomic System (Moratto, 1984). The system relies on identifying certain characteristics such as burial patterns (whether the body is flexed or extended), shell bead types, stone tools, and even where the sites tend to occur. These traits and characteristics are used to place a site in a specific time period. The system is still widely used by archaeologists. It organizes the archaeology of the region as follows:

- Paleoindian: earlier than 8,000 year ago
- Early Horizon: 8,000 to 2,500 years ago
- Middle Horizon: 2,500 to 1,100 years ago
- Late Horizon: 1,100 to 200 years ago
- Historic: 200 years ago to modern times

Scholars have debated whether the Early Horizon inhabitants of the Central Valley were culturally related to inhabitants of the San Francisco Bay, or if they developed independently (Bickel, 1981; Gerow and Force, 1968). The exact dynamics of cultural change and interchange between these two groups is still unclear.

It has been suggested that the Early Middle Horizon (4,500 to 2,500 years ago), now referred to as the Windmiller Pattern, is associated with an influx of peoples from outside of California who brought with them an adaptation to river-wetland environments (Moratto, 1984). Typical Windmiller sites are often situated in riverine, marshland, and valley floors, settings that offer a variety of plant and animal resources. These sites often contain burials that are extended ventrally and oriented to the west. Burial artifacts include a variety of fishing paraphernalia (net weights, spear points, and bone hooks) and large projectile points, as well as large and small mammal remains.

The subsequent Middle Horizon or Berkeley Pattern covers a period from 2,500 to 1,500 years ago in Northern California. This pattern overlaps somewhat with the Windmiller attributes at the beginning and with the late Prehistoric artifacts at the end. Berkeley Pattern sites are much more

common and well documented; therefore, they are better understood than the Windmiller sites. The sites are distributed in more diverse environmental settings, although a riverine focus is common. As described by Allan et al. (1997:9), sites from this period include deeply stratified midden deposits containing large assemblages of milling and grinding stones for the processing of vegetal resources as well as smaller, lighter projectile points. Further distinguishing traits from earlier patterns include artifacts such as slate pendants, steatite beads, stone tubes, and ear ornaments. A shift in burial patterning is also evident with variable directional orientation, flexed body positioning, and a general reduction in mortuary goods (Fredrickson, 1973; Moratto, 1984).

Fredrickson (1973) has defined the later prehistoric period, which ranges from 1,500 to 150 years ago, as the Augustine Pattern. The pattern is characterized by intensive hunting, fishing, and gathering, a focus on acorn processing, large population increases, intensified trade and exchange networks, more complex ceremonial and social attributes, and the practice of cremation in addition to flexed burials. As pointed out by Allan et al. (1997), certain artifacts also typify the pattern: bone awls for use in basketry manufacture, small notched and serrated projectile points, the introduction of the bow and arrow, occasional pottery, clay effigies, bone whistles, and stone pipes.

History

Pursuant to the revised implementing regulations of the NHPA, found at Title 36 CFR Part 800.4(a) (4), URS Corporation, on behalf of FTA, contacted the California Native American Heritage Commission (NAHC) on May 30, 2007, to request a review of its Sacred Lands File and to receive a list of the individuals and groups that the NAHC believes should be contacted regarding information or concerns related to the project areas. The NAHC responded on May 31, 2007, with negative results for its search of the Sacred Lands File. On June 8, 2007, URS transmitted an informational letter to the eight potentially interested parties identified by the NAHC. Follow-up calls were made on July 19, 2007 and again on July 24, 2007. Two requests for additional information were received from Jakki Kehl, Ohlone/Costanoan, and Ann Marie Sayers, Chairperson, Indian Canyon Mutsun Band of Costanoan. Additional information was provided to these individuals. No other responses were received.

Information concerning consultation with Native American groups and individuals, including copies of the informational letter sent on behalf of the FTA on June 8, 2007, is included in Appendix D of this report.

Based upon the results of the Class I record search data and a review of the location of proposed alternatives sites, no archaeological pedestrian survey was conducted as a part of this baseline study. The proposed project areas are located primarily on imported fill, and preliminary project engineering information indicates construction would not penetrate below the fill zone. Two of the proposed project areas, the Buchanan site and the Gilman site, are located on what may be a natural land surface or earlier fill. Both of these areas were previously surveyed in 2006 with negative results. However, upon selection of a preferred alternative, more detailed studies including an archeological survey would be conducted if warranted.

Historic Property Survey

A detailed historic context for the project, along with historic themes appropriate for the project area, has been developed in the architectural analysis for this project (JRP, 2007). The reader is referred to the historic technical report for a detailed discussion of the project area history. A summary of information from the technical report for these two historic resources is provided below. The DPR 523 forms documenting these buildings and structures are presented in the Cultural Resources Technical Report.

The survey population consists of two large, multi-component complexes comprised of both buildings and structures: the Golden Gate Fields horse racing track, and the Berkeley Marina and adjacent Cesar Chavez Park. Components of these two facilities date to the historic era, or 1962 and before, and were therefore subject to survey.

Berkeley Marina Description. The Berkeley Marina is on of the largest small craft harbors on the West Coast, with 52 acres of water and about 1,000 berths that can accommodate crafts from 16 feet to 110 feet (Photo 1). The harbor entrance is protected from surge and rough water by an entrance breakwater. Berth rentals include the use of storage lockers, water and electrical hookup, parking, restrooms, and showers. The north side of the harbor includes a paved launching ramp, vehicle and boat parking, fuel dock, and a small boat repair and hoist facility. The Berkeley Marina administrative offices and several sailing/boating organizations and charter operators (such as the Berkeley Yacht Club) have offices in buildings on either side of the harbor. Two full service restaurants and a boat chandlery are located at the west end of the Berkeley Marina, and a large hotel conference is located at the east side of the harbor. The Berkeley Marina jetties and the breakwater are earth, rock riprap, and poured concrete construction. Ramps and parking areas are paved asphalt. The Berkeley Fishing Pier is a combination of concrete and timber construction, while the berths, docks, and wharf areas are generally timber construction. Buildings are largely wood frame, one to two stories in height, in the Contemporary Style with exposed framing and round timber posts. Siding is either wood panel or wood shingles set with metal frame fixed or sliding windows.

Cesar Chavez Park Description. Cesar Chavez Park is a 90-acre former landfill that extends northward from the north side of the Berkeley Marina. The park does not include permanent buildings. Park structures include a paved perimeter walking trail, interior hiking trails, multi-purpose turf areas, off-leash dog park, and picnic areas.

Golden Gate Fields Description. Golden Gate Fields is located on multiple legal parcels comprising about 225 acres straddling the corporate boundaries of the City of Albany and the City of Berkeley in northern Alameda County. The complex of buildings and structures includes a racetrack, grandstand, parking areas, shops, stables, and other miscellaneous facilities. The site is west of I-80 and bounded on the north by Buchanan Street, on the south by Gilman Street, and on the west by San Francisco Bay. The grandstand building is built into a hillside, with two stories facing west toward the bay and three tiers of open-air grandstand seating facing the track to the east. The steel frame building has a shallow gable roof with a parapet at the roof-wall

junction and flat, metal panel siding. The main grandstand portion of the building was originally about 800 feet long and 130 feet wide, and although largely rectangular in plan, the building curved slightly at the south end to angle the viewing from that part of the stands toward the starting gates and finish line. Grandstand capacity is 14,750, with both escalators and elevators serving the various tiers. The offices, betting windows, and "Turf & Paddock Club" were located in a 400-foot by 50-foot bay attached south of center on the west side of the main grandstand. A semi-circular main entrance foyer or lobby area was centered on this bay. Original windows were combinations of awning-style steel frame sashes and tall, narrow fixed frame windows to capture the views of the shoreline and San Francisco Bay.

The grandstand portion of the plant houses various functions and facilities, including restaurants, bars, customer service and administration offices, gift shop, and a first aid station. Several additions have expanded the plant since its completion in 1940. The entrance area and west side have undergone the most change, although the owners have made alterations throughout the plant. Modern construction that appears to date to the 1980s and 1990s, with stucco walls and modern metal frame glass doors, surrounds the original semi-circular foyer on the west side of the grandstand. Additions also extend north and south from the original foyer: a two-story wedge-shaped stairwell and restaurant addition at the north, and a single story, flat-roofed addition to the south. Another new element—a single story, concrete masonry unit bay—was added to the west side of the grand stand, extending from the foyer area north to the end of the building. Fenestration in the modern construction is anodized aluminum fixed frame windows. The seating in the grandstands has been replaced and a new section of seating added in the former "standing room" terrace, and transparent plastic panels have been added to the north and south ends of the originally open-sided second and third tier stands. Most of the original awning style steel sashes have been replaced throughout the west side of the building with aluminum frame sliding windows. The main track is a 1-mile oval that is 78 feet wide in the stretch, 75 feet wide in the backstretch, and has a minimum width of 50 feet with moveable rail. The track surface was dirt from its time of construction until July 2007, when the field began a project to install a synthetic "tapeta" racing surface in response to California Horse Racing Board requirements. The track includes a three-sixteenths mile chute and 14-stall Puett Automatic Starting Gate.

Within the main track is the Lakeside Turf Course, which is a nine-tenths mile oval, 65 feet wide throughout. The tote board is located near the west side of the infield, facing the grandstand. The paddock and oval walking ring are located in front of the grandstand near the finish line. Saddling stalls for fourteen thoroughbreds in the paddock are covered in transparent plastic panels. Golden Gate Fields uses Automatic Totalisator pari-mutuel equipment, including screen activated machines and more than 300 monitors located throughout the plant to display race odds, probable payoffs, results, and the previous day's races. The track uses O'Brien Photographic Company photo finish equipment and modern race timing equipment. The stables are located in more than thirty buildings south of the track, with a capacity of 1,420 horses. The circular Receiving Barn, located near the southwest curve of the track, was originally a stand-alone building that has since been attached to the stable building to its south. The wood frame stables are arranged in rows, with exercise yards between. The buildings have shallow side gable roofs and are basically rectangular in plan. The stables have undergone several changes over the years, including filling in the clipped corners that

each building had as originally constructed, and installation of modern vertical groove wood panel siding. Two-story living quarters have been added to the north or south ends of at least thirteen of the stables, and these additions feature similar wood frame construction, shallow pitch gable roofs, wood panel siding, and aluminum frame sliding windows. The covered pedestrian walkways that once lined the west side of the stables area have been removed.

The technical report concludes that neither of the surveyed properties is listed in the NRHP or CRHR, and neither resource appears to meet the criteria for listing in either register. Neither of the surveyed resources is considered a historical resource for the purposes of CEQA. The Berkeley Marina and adjacent Cesar Chavez Park do not appear to meet the significance criteria for listing in the NRHP or the CRHR. These resources do not embody direct significant associations with important trends, individuals, or developments in our history at the local, state, or national level, nor are they important for their type, period, or method of construction. Neither resource has the potential to provide important information about history (Criteria 1, 2, 3, and 4 of the California Register, and Criteria A, B, C, and D of the National Register).

3.7 AIR QUALITY

This section gives an overview of the local environmental setting as well as the regulatory setting and attainment status of the region. Meteorological data, including temperature and precipitation are discussed, and ambient concentrations for the appropriate criteria pollutants are summarized. Pollutants considered are oxides of nitrogen (NO_x), CO, sulfur dioxide (SO_2), precursor organic compounds, PM_{10}, particulate matter less than 2.5 micrometers (µm) in diameter ($PM_{2.5}$), and diesel particulate matter (DPM), a toxic air contaminant (TAC).

3.7.1 Regulatory Framework

Applicable federal, state, and local air quality regulations are described below:

Air Quality Regulations

The U.S. EPA established National Ambient Air Quality Standards (NAAQS) in 40 CFR 50 in response to the federal Clean Air Act of 1970. The federal NAAQS include both primary and secondary standards for six "criteria" pollutants. These criteria pollutants are O_3, CO, nitrogen dioxide (NO_2), SO_2, PM_{10}, and lead. Primary standards were established to protect human health, and secondary standards were designed to protect property and natural ecosystems from the effects of air pollution.

The 1990 Clean Air Act Amendments (CAAA) established attainment deadlines for all designated areas that were not in attainment with the NAAQS. In addition to the NAAQS described above, a new federal standard for $PM_{2.5}$ and a revised O_3 standard were promulgated in July 1997. Under an interim policy, the PM_{10} and 1-hour O_3 standards will continue to be implemented for the next several years while the new standards are being phased in. In 1988, as part of the California Clean Air Act (CCAA), the State of California adopted the California

Ambient Air Quality Standards (CAAQS), which are in some cases more stringent than the NAAQS. The state and federal ambient air quality standards are summarized in Table 3-16.

Table 3-16
Relevant Federal and California Ambient Air Quality Standards

Pollutant	Averaging Time	CAAQS [1,3]	NAAQS [2,3]	
			Primary	Secondary
Ozone (O_3)	8-hour [4]	0.07 ppm (137 μg/m^3)	0.08 ppm (157 μg/m^3)	Same as primary standard
	1-hour	0.09 ppm (180 μg/m^3)	See footnote [4]	
Carbon Monoxide (CO)	8-hour	9 ppm (10 mg/m^3)	9 ppm (10 mg/m^3)	-
	1-hour	20 ppm (23 mg/m^3)	35 ppm (40 mg/m^3)	-
Nitrogen Dioxide (NO_2) [5]	Annual (Arithmetic Mean)	-	0.053 ppm (100 μg/m^3)	Same as primary standard
	1-hour	0.25 ppm (470 μg/m^3)	-	
Sulfur Dioxide (SO_2)	Annual (Arithmetic Mean)	-	0.03 ppm (80 μg/m^3)	-
	24-hour	0.04 ppm (105 μg/m^3)	0.14 ppm (365 μg/m^3)	-
	3-hour	-	-	0.05 ppm (1,300 μg/m^3)
	1-hour	0.25 ppm (655 μg/m^3)	-	-
Respirable Particulate Matter (PM_{10}) [6]	Annual (Arithmetic Mean)	20 μg/m^3	50 μg/m^3	Same as primary standard
	24-hour	50 μg/m^3	150 μg/m^3	
Fine Particulate Matter ($PM_{2.5}$) [6, 7]	Annual (Arithmetic Mean)	12 μg/m^3	15 μg/m^3	Same as primary standard
	24-hour	-	35 μg/m^3	
Sulfates	24-hour	25 μg/m^3	-	-
Visibility Reducing Particles	1 observation	See footnote [8]	No federal standard	No federal standard

Notes:
1 Title 17, California Code of Regulations, CAAQS for ozone (as volatile organic compounds), carbon monoxide, sulfur dioxide (1-hour), nitrogen dioxide, and particulate matter (PM_{10}), are values that are not to be exceeded. The visibility standard is not to be equaled or exceeded.
2 40 CFR 50. NAAQS, other than those for ozone and based on annual averages, are not to be exceeded more than once a year. The 80-hr ozone standard is based on a three-year average of the fourth-highest daily maximum.
3 Concentrations are expressed first in units in which they were promulgated. Equivalent units are given in parentheses and based on a reference temperature of 25°C and a reference pressure of 760 millimeters (mm) of mercury. All measurements of air quality area to be corrected to a reference temperature of 25°C and a reference pressure of 760 mm of mercury (1,013.2 millibar); ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.
4 New federal 8-hour ozone and fine particulate matter ($PM_{2.5}$) standards were promulgated by U.S. EPA on July 18, 1997. The federal 1-hour ozone standard was revoked by U.S. EPA on June 15, 2005.
5 Nitrogen dioxide (NO_2) is the compound regulated as a criteria pollutant; however, emissions are usually based on the sum of all oxides of nitrogen (NO_x).
6 California Air Resources Board established new standards for PM_{10} and $PM_{2.5}$ in June 2002.
7 Annual federal standard is 3-year average. The 24-hour federal standard is 3-year average of 98th percentile.
8 In sufficient amount to reduce the prevailing visibility to less than 10 miles when the relative humidity is less than 70 percent. "Prevailing visibility" is defined as the greatest visibility which is attained or surpassed around at least half of the horizon circle, but not necessarily in continuous sectors.
CAAQS = California Ambient Air Quality Standard
mg/m^3 = milligrams per cubic meter
μg/m^3 = micrograms per cubic meter
NAAQS = National Ambient Air Quality Standard
ppm = parts per million

The U.S. EPA, the California Air Resources Board (CARB), and the local air pollution control districts determine the air quality attainment status of designated areas by comparing local ambient air quality measurements from the state or local ambient air monitoring stations with the federal and CAAQS. Those areas that meet ambient air quality standards are classified as "attainment" areas; areas that do not meet the standards are classified as "nonattainment" areas. Areas that have insufficient air quality data may be identified as unclassifiable areas. These attainment designations are determined on a pollutant-by-pollutant basis. The Bay Area has been designated as a federal nonattainment area for O_3 and as a state nonattainment area for O_3 and PM_{10}. The attainment status for all other criteria pollutants is considered attainment. Table 3-17 presents the attainment status (both federal and state) for the Bay Area.

Table 3-17
Federal and State Attainment Status for the Bay Area

Pollutant	Federal Attainment Status	State Attainment Status
Ozone	Nonattainment	Nonattainment
CO	Attainment	Attainment
NO_2	Attainment	Attainment
SO_2	Attainment	Attainment
PM_{10}	Attainment	Nonattainment
$PM_{2.5}$	Attainment	Unclassified
Lead	Attainment	Attainment

Agency Responsibilities

The U.S. EPA has ultimate responsibility for ensuring, pursuant to the CAAA, that all areas of the United States meet, or are making progress toward meeting, the NAAQS. U.S. EPA requires that all states submit State Implementation Plans (SIPs) for nonattainment areas that describe how the NAAQS will be achieved and maintained. The U.S. EPA has delegated this attainment responsibility to CARB, which, in turn, has delegated attainment responsibility to regional or local air quality management districts (or air districts), such as the BAAQMD. CARB is responsible for attainment of the CAAQS, implementation of nearly all phases of California's motor vehicle emissions program, and oversight of the operations and programs of the regional air districts.

Each air district is responsible for establishing and implementing rules and control measures to achieve air quality attainment within its district boundaries. The air district prepares an air quality management plan that is submitted to CARB, which then compiles air quality management plans from all air districts within the state into the SIP. The responsibility of the air districts is to maintain an effective permitting system for existing, new, and modified stationary sources, to monitor local air

quality trends, and to adopt and enforce such rules and regulations as may be necessary to achieve the ambient air quality standards.

The applicable regulations related to the potential air quality impacts from the alternatives are primarily administered (either independently or cooperatively) by the BAAQMD. The BAAQMD has been delegated responsibility for implementing the federal, state, and local regulations on air quality in the nine-county region that includes the study area. The alternatives are subject to BAAQMD regulations that apply to new sources of emissions, to the prohibitory regulations that specify emissions standards, and to the requirements for evaluation of air pollutant impacts for both criteria and toxic air pollutants.

3.7.2 Climatology

The climate of the San Francisco Bay region, along with much of coastal California, is controlled by a semi-permanent high-pressure system that is centered over the northeastern Pacific Ocean. In the summer, the relatively northern location of this strong high-pressure system results in clear skies inland and frequent coastal fog. Very little precipitation occurs during the summer months because storm systems are blocked by the high-pressure system. Beginning in the fall and continuing through the winter, the high-pressure system weakens and moves south, allowing storm systems originating from the Alaska Gulf and the Pacific Ocean into the area. Temperature, winds, and rainfall are more variable during these months.

The predominant regional surface winds during the winter are northerly and southerly. During the spring, summer, and fall, the winds are stronger and westerly. These strong westerly winds are caused by the combination of high pressure offshore and a thermal low pressure resulting from higher temperatures inland.

Atmospheric stability and mixing heights are important parameters in the determination of pollutant dispersion. Atmospheric stability reflects the amount of atmospheric turbulence and mixing. In general, the less stable an atmosphere, the greater the turbulence, resulting in more mixing and better dispersion. The mixing height, measured from the ground upward, is the height of the atmospheric layer in which convection and mechanical turbulence promote mixing. Good ventilation results from a high mixing height and at least moderate wind speeds within the mixing layer. In general, the frequent occurrence of temperature inversions over the San Francisco Bay Area limits this mixing height and consequently limits the availability of air for dilution.

3.7.3 Existing Air Quality Conditions

The entire study area is within the BAAQMD jurisdiction. The majority of the potential impacts to air quality would be on a local level within or adjacent to the study area. Existing air quality at all four ferry terminal sites is similar, and representative measurements are presented below. It is reasonable to assume that the existing air quality on the Bay within the study area is similar to the existing air quality at the four terminal sites.

Air quality measurements for O_3, CO, SO_2, and NO_2 from the air monitoring station on Rumrill Boulevard in San Pablo are presented in Tables 3-18 through 3-21. Measurements for PM_{10} and $PM_{2.5}$ are not available at this site, so the BAAQMD-maintained Arkansas Street, San Francisco monitoring station is substituted and data presented in Tables 3-22 and 3-23. The Rumrill Boulevard monitoring station is located about 5 miles from the Buchanan site and 6.5 miles from the Berkeley Fishing Pier site. This location was chosen as the primary monitoring site due to its proximity to the study area. The Arkansas Street station is roughly 9 miles from the four ferry terminal sites and was chosen as the nearest site with PM_{10} and $PM_{2.5}$ measurements. For the analysis, the maximum criteria pollutant concentration from the three most recent years of reported air quality data (2001 to 2004) was used. This value is highlighted in bold.

Table 3-18
Ambient Nitrogen Dioxide Levels at Rumrill Boulevard Station, San Pablo, California (2002–2006 [ppm])

Measurement	2002	2003	2004	2005	2006
Maximum 1-Hour Average [1]	0.054	0.070	0.055	0.054	**0.055**
Annual Average [2]	*	0.013	0.013	0.012	**0.013**

Source: CARB, 2007.
Notes:
Maximum average values occurring during the most recent three years are indicated in bold.
ppm = parts per million.
[1] All 1-hr concentrations are below the California NO_2 ambient air quality standard of 0.25 ppm.
[2] All annual average concentrations are below the federal NO_2 ambient air quality standard of 0.053 ppm.
* Insufficient data available to determine the value.

Table 3-19
Ambient Ozone Levels at Rumrill Boulevard Station, San Pablo, California (1995–2004 [ppm])[1]

Measurement	2002	2003	2004	2005	2006
Maximum 1-Hour Average [1]	0.069	0.091	**0.105**	0.066	0.061
Maximum 8-Hour Average [2]	0.047	0.068	**0.069**	0.057	0.050

Source: CARB, 2007.
Notes:
Maximum average values occurring during the most recent three years are indicated in bold.
ppm + parts per million.
[1] The 1-hr concentrations for 2003 and 2004 were above the California O_3 ambient air quality standard of 0.09 ppm. All other 1-hr concentrations were below the California O_3 ambient air quality standard.
[2] All 8-hr concentrations are below the federal O_3 air quality standard of 0.08 ppm, 8-hour average. Regulatory standard is to maintain 0.08 ppm as a 3-year average of the 4th-highest daily maximum. Therefore, number of days exceeding standard concentration is not necessarily the number of violations of the standard for the year.

Table 3-20
Ambient Sulfur Dioxide Levels at Rumrill Boulevard Station, San Pablo, California (2002–2006 [ppm])

Measurement	2002	2003	2004	2005	2006
Maximum 1-Hour Average [1]	0.012	0.019	0.019	**0.025**	0.017
Maximum 3-Hour Average [2]	0.009	0.013	0.010	**0.013**	0.012
Maximum 24-Hour Average [3]	0.005	0.006	0.005	**0.006**	0.006
Annual Average [4]	0.002	0.002	0.002	**0.002**	0.002

Source: CARB, 2007; U.S. EPA AirData, 2007.
Notes:
Maximum average values occurring during the most recent three years are indicated in bold.
ppm = parts per million.
$\mu g/m^3$ = micrograms per cubic meter.
[1] The 1-hr concentration for 2005 was equal to the California SO_2 ambient air quality standard of 0.25 ppm. All other 1-hour average concentrations are below the California SO_2 ambient air quality standard.
[2] All 3-hour average concentrations are below the federal SO_2 ambient air quality standard of 0.5 ppm (1,300 $\mu g/m^3$).
[3] All 24-hr concentrations are below the California SO_2 ambient air quality standard of 0.04 ppm (105 $\mu g/m^3$) and the federal ambient air quality standard of 0.14 ppm (365 $\mu g/m^3$).
[4] All annual average concentrations are below the federal SO_2 ambient air quality standard of 0.03 ppm (80 $\mu g/m^3$).

Table 3-21
Ambient Carbon Monoxide Levels at Rumrill Boulevard Station, San Pablo, California (2002–2006 [ppm])

Measurement	2002	2003	2004	2005	2006
Maximum 1-Hour Average [1]	3.7	3.1	**3.2**	2.8	2.5
Maximum 8-Hour Average [2]	2.00	1.78	**1.83**	1.33	1.40

Source: CARB, 2007; U.S. EPA AirData, 2007.

Notes:
Maximum average values occurring during the most recent three years are indicated in bold.
ppm = parts per million.
[1] All 1-hr concentrations are below the California CO ambient air quality standard of 20 ppm and the federal CO ambient air quality standard of 35 ppm.
[2] All 8-hr concentrations are below the California and federal CO ambient air quality standards of 9.0 ppm.

Table 3-22
Ambient Particulate Levels (<10 µm) at Arkansas Street Station, San Francisco, California (2002–2006 [µg/m^3])

Measurement	2002	2003	2004	2005	2006
Maximum 24-Hour Average	74	51	49	45	**58**
Estimated Number of Days Exceeding California Standard [1] (50 µg/m^3; 24-hour avg.)	24	6	6	0	**17**
Annual Arithmetic Mean [2] Federal	25	22	22	19	**22**
Annual Geometric Mean [3] State	26.0	22.7	22.5	20.1	**22.9**

Source: CARB, 2007; U.S. EPA AirData, 2007.

Maximum average values occurring during the most recent three years are indicated in bold.

[1] Measurements are typically collected about every 6 days. Values reported are estimated number of days that a measurement would have been greater than the level of the standard had measurements been collected every day. The number of days above the standard is not necessarily the number of violations of the standard for the year. All daily average concentrations are below the federal PM_{10} ambient air quality standard of 150 µg/m^3.

[2] All annual arithmetic mean concentrations are below the federal PM_{10} ambient air quality standard of 50 µg/m^3.

[3] The state PM_{10} ambient air quality standard was lowered from 30 µg/m^3 to 20 µg/m^3. State and federal arithmetic means may differ due to being based on different statistical criteria.

µg/m^3 = micrograms per cubic meter.

µm = micrometer.

Table 3-23
Ambient Particulate Levels (<2.5 µm) at Arkansas Street Station, San Francisco, California (2002–2006 [µg/m^3])

	2002	2003	2004	2005	2006
Maximum 24-Hour Average	70	42	46	44	**54**
Number of Days Exceeding Federal Standard (65 µg/m^3; 24-hour avg.)	0	0	0	0	0
98th Percentile	58	33	32	**33**	28
3-year average, 98th Percentile [1]	--	47	**41**	33	--
Annual Arithmetic Mean	13.1	10.2	**10.0**	9.5	9.7
3-year average, Annual Arithmetic Mean [2]	12	12	**11**	10	10

Source: CARB, 2007; U.S. EPA AirData, 2007.

Maximum average values occurring during the most recent three years are indicated in bold.

[1] The number of days above the standard is not necessarily the number of violations of the standard for the year. The federal standard is 65 µg/m^3 based on the 3-year average of the 98th percentiles.

[2] The federal annual $PM_{2.5}$ ambient air quality standard is 15 µg/m^3 based on the 3-year average. The state annual $PM_{2.5}$ ambient air quality standard is 12 µg/m^3.

-- = Data not available.

µg/m^3 = micrograms per cubic meter.

µm = micrometer.

3.8 NOISE AND VIBRATION

3.8.1 Regulatory Framework

Federal, state, and local settings are discussed in the following subsections.

Federal

The Noise Control Act of 1972. The Noise Control Act (42 USC Chapter 4901, et seq.) directs the U.S. EPA to develop noise level guidelines, which would protect the population from the adverse effects of environmental noise. The U.S. EPA published a guideline (U.S. EPA, 1974) recommending a 55 A-weighted decibel (dBA) Day-Night Average Sound Level (L_{dn}) for outdoors and 45 dBA L_{dn} for indoors for acceptable noise level limits affecting residential land use. The agency is careful to stress that these recommendations contain a factor of safety and do not consider technical or economic feasibility issues, and therefore should not be construed as standards or regulations.

Noise Emission Standards for Transportation Equipment. Federal regulations establish noise limits for medium and heavy trucks (more than 4.5 tons, gross vehicle weight rating) under 40 CFR Part 205, Subpart B. The federal truck pass-by noise standard is 80 dBA at 15 meters (approximately 50 feet) from the vehicle pathway centerline (Crocker, 1997). Vehicle noise limits are implemented through regulatory controls on vehicle manufacturers. The federal regulations for railroad noise are contained in 40 CFR, Part 201, and 49 CFR, Part 210. Noise limits for locomotives manufactured during or after 1980 are as follows: stationary (idle throttle setting)—70 dBA at 15 meters from the track pathway centerline; stationary (all other throttle settings)—87 dBA at 15 meters; and moving—90 dBA at 15 meters (Crocker, 1997). These noise limits are implemented through regulatory controls on vehicle manufacturers.

Department of Housing and Urban Development Standards. Department of Housing and Urban Development standards define L_{dn} below 65 dBA as acceptable for residential use. Levels up to 75 dBA L_{dn} can be made acceptable through the use of insulation in buildings.

FTA Guidelines. The FTA has no specific guidelines for ferries. However, it has published a guidance manual for assessment of rail and bus mass transit projects. As ferries are another mode of mass transit, and in lieu of any specific guidance, it would be expected that the FTA would apply its "transit project" impact criteria described below.

The three "sensitive" land use categories used by the FTA to evaluate the compatibility of predicted noise levels are:

- Category 1 includes land where quiet is an essential element such as outdoor amphitheaters;
- Category 2 includes residences where people sleep; and
- Category 3 includes institutional buildings where quiet is important such as schools, libraries and churches.

Note that Categories 1 and 3 use the Hourly Equivalent Sound Level, whereas Category 2 uses L_{dn}. Such criteria recognize the heightened community annoyance caused by late-night or early-morning train operations, and respond to the varying sensitivities of communities to projects under

different ambient noise conditions. The noise criteria are to be applied *outside of building locations* for residential land use and at the *property line* for parks and other significant outdoor use (FTA, 1995).

U.S. Fish and Wildlife Service. Regarding impacts to birds, the U.S. Fish and Wildlife Service (USFWS) has determined a significance criterion of 60 dBA Community Noise Equivalent Level (CNEL) at the line of habitat as an impact.

Marine Mammal Protection Act. See Section 3.5, Biological Resources, for a brief description. With regard to noise, the National Marine Fisheries Service (NMFS) currently considers, as a guideline, received underwater sound pressure levels at or above 160 decibel (dB) (referenced to 1 micro-Pascal [μPa]) as constituting harassment of marine mammals. NMFS has suggested that underwater sound pressure levels above 180 dB (referenced to 1 μPa) could cause Temporary Threshold Shift in marine mammals.

Shipboard Noise. The regulation of shipboard noise is not very clear. The USCG regulates all affairs regarding licensed commercial vessels. The applicable USCG document is Navigation and Vessel Inspection Circular (NVIC) No. 12-82, dated June 2, 1982. However, NVIC No. 12-82 only provides guidelines and recommendations for vessel noise, not shipboard noise. Away from seaways, California Department of Industrial Relations, Division of Occupational Safety and Health (Cal-OSHA) actively regulates noise in industrial environments under the Department of Labor (Bahtiarian, 2002). The Cal-OSHA regulations are similar to the USCG requirements. The governing regulations for "Occupational Noise Exposure" are found in 29 CFR 1910.15. Cal-OSHA (8 California Code of Regulations [CCR], General Industry Safety Orders, Article 105, Control of Noise Exposure, Section 5095) requires that the time-averaged noise level of any work environment during an 8-hour period be limited to 90 dBA. In many cases, shipboard and exterior noise limits for all types of ships including ferries are specified prior to ship construction. For example, Table 3.11.3 contains the noise limits imposed by Alaska for their Fast Vehicle Ferry. For this vessel, shipboard levels are limited to 55 dBA due to heating, ventilation, and air conditioning noise up to 120 dBA in the engine room. Fast Vehicle Ferry exterior noise is limited to 60 dBA at 1,000 feet with engines developing their maximum fast ferry power rating (Springer, 2002).

State

Noise Insulation Standards. Relevant state regulations are contained in CCR. Part 2 of Title 24 establishes the limit for interior community noise level for multifamily dwellings, hotels, motels, dormitories and long-term care facilities of 45 dBA L_{dn}. The state's regulation may be extended by local legislative action to include single-family dwellings.

California Governor's Office of Planning and Research (OPR) Guidelines. Section 65302(f) of the CCR establishes the requirement that local land use planning jurisdictions prepare a General Plan. In 1998, the OPR published its most recent edition of their *General Plan Guidelines*. The *General Plan Guidelines* advise local jurisdictions in preparing their comprehensive long-term general plans. The Noise Element is a mandatory component of the General Plan and includes general community noise guidelines and specific planning guidelines for noise/land use compatibility developed by the local jurisdiction. Selected relevant levels are:

- CNEL below 60 dBA—acceptable for low-density residential use.
- CNEL below 65 dBA—normally acceptable for high-density residential use.
- CNEL of 60 to 70 dBA—conditionally acceptable for churches, educational and medical facilities.
- CNEL below 70 dBA—normally acceptable for playgrounds and neighborhood parks.

Other. The State of California also establishes noise limits for vehicles licensed to operate on public roads. For heavy trucks, the state pass-by noise standard is consistent with the federal limit of 80 dBA. The state pass-by noise standard for light trucks and passenger cars (less than 4.5 tons, gross vehicle weight rating) is also 80 dBA at 15 meters from the centerline (California Vehicle Code, Sections 23130, 23130.5, 27150 et seq., 27204, and 27206). Vehicle noise limits are implemented through regulatory controls on vehicle manufacturers and by legal sanction of vehicle operators enforced by state and local peace officers. Other state standards exist, such as Caltrans and FHWA's criteria for noise assessment and abatement, but these are focused on situations unique to their authority, such as control of freeway noise, and are not necessarily applicable to WETA's actions.

Local

Regulatory noise standards employed by local jurisdictions generally fall into two categories: noise control ordinances and noise/land use compatibility planning guidelines. Noise produced by non–transportation-related noise sources may be regulated by some jurisdictions by using ordinances that limit the amount of noise such sources may produce, as measured at the nearest sensitive receptor or at property lines. Standards in local noise ordinances may be in the form of quantitative noise performance levels, or they may simply be in the form of a qualitative prohibition against creating a nuisance. Many ordinances employ both approaches.

Because local jurisdictions are preempted from regulating noise emissions from transportation noise sources such as cars, trucks, trains, airplanes and ferries, such jurisdictions typically implement noise controls through adoption and implementation of noise/land use compatibility guidelines. Noise/land use compatibility guidelines identify the range of noise levels with which various land uses are deemed compatible. This permits local jurisdictions to achieve noise/land use compatibility for the land uses exposed to noise, even if the noise sources themselves cannot be regulated.

Berkeley and Albany have published Noise Elements of their General Plans. These Noise Elements are mandatory components of General Plans and typically contain general guidelines for noise and land use planning, although some Noise Elements do also contain more detailed objective noise control standards. Specific objective requirements are usually provided in the local noise ordinances.

Tables 3-24 and 3-25 present and identify exterior operational noise standards according to adopted noise ordinances in the two cities affected by the project: Berkeley (Chapter 13.40 of the Municipal Code) and Albany (Ordinance #91-08-1.4). As evidenced by these tables, ordinances in Berkeley and Albany specify daytime and nighttime limits of statistical noise levels[1] for various land use or zoning. Nighttime standards are lower than daytime standards accounting for the sometimes lower ambient noise levels and typically more favorable propagation of sound at night, and people's increased sensitivity to or annoyance with nighttime noise events.

[1] Please refer to the noise terms glossary for a definition of statistical noise level descriptors

Table 3-24
City of Berkeley
Operational Noise Standards at Receiving Property Line

Receiving Land Use	Cumulative Number of Minutes in a 1-Hour Period[1]	Maximum Allowable Noise Level (dBA)[2]	
		Daytime 7 a.m. to 10 p.m.	Nighttime 10 p.m. to 7 a.m.
R-1, R-2 Single Family Residential, Restricted two-family residential	30 (L_{50})	55	45
	15 (L_{25})	60	50
	5 ($L_{8.3}$)	65	55
	1 ($L_{1.7}$)	70	60
	0 (L_{max})	75	65
R-3 and above Multiple-family residential, Multi-family residential, high density residential	30 (L_{50})	60	55
	15 (L_{25})	65	60
	5 ($L_{8.3}$)	70	65
	1 ($L_{1.7}$)	75	70
	0 (L_{max})	80	75
Commercial	30 (L_{50})	65	60
	15 (L_{25})	70	65
	5 ($L_{8.3}$)	75	70
	1 ($L_{1.7}$)	80	75
	0 (L_{max})	85	80
Industrial	30 (L_{50})	70	70
	15 (L_{25})	75	75
	5 ($L_{8.3}$)	80	80
	1 ($L_{1.7}$)	85	85
	0 (L_{max})	90	90

Notes:
1 Lx is the noise level exceeded x percent of a given period. Lmax is the maximum instantaneous noise level.
2 These standards are reduced 5 dBA for simple tone noise, noise consisting primarily of speech or music, or recurring impact noise. If the ambient level exceeds these standards, the standard shall be adjusted to equal the ambient noise level.

Table 3-25
City of Albany
Operational Noise Standards at Receiving Property Line

Receiving Land Use	Cumulative Number of Minutes in a 1-Hour Period[1]	Maximum Allowable Noise Level (dBA)[2]	
		Daytime 8 a.m. to 10 p.m.	Nighttime 10 p.m. to 8 a.m.
R-1, R-2, R-3, R-4, HD [3]	30 (L_{50})	55	50
	15 (L_{25})	60	55
	5 ($L_{8.3}$)	65	60
	1 ($L_{1.7}$)	70	65
	0 (L_{max})	75	70
C-1, C-2, C/S/L1 [4]	30 (L_{50})	65	60
	15 (L_{25})	70	65
	5 ($L_{8.3}$)	75	70
	1 ($L_{1.7}$)	80	75
	0 (L_{max})	85	80
WF [5]	30 (L_{50})	65	50
	15 (L_{25})	70	55
	5 ($L_{8.3}$)	75	60
	1 ($L_{1.7}$)	80	65
	0 (L_{max})	85	70

Notes:

1 Lx is the noise level exceeded x percent of a given period. Lmax is the maximum instantaneous noise level.

2 In the event the measured ambient noise level exceeds the applicable standards, the thirty (30) minute noise standards shown above shall be adjusted so as to equal said ambient noise level plus 10 dBA, with the fifteen (15), five (5),one (1) and zero (0) minute standards adjusted upwards in 5 dBA increments, based on the ambient noise level. In no case shall the ambient level standard exceed 100 dBA for the zero (0) minute standard.

3 R-1 (Residential Low Density Single Family), R-2 (Residential Moderate Density), R-3 (Residential High Density), R-4 (Residential Towers), and HD (Hillside District). Includes Public Facilities Zones.

4 C-1 (General Commercial), C-2 (Highway Commercial), and C/S/L (Commercial, Service, Light Industry)

5 WF (Waterfront Zoned)

Note that there are differences in defining the daytime and nighttime periods between the two cities. Berkeley defines daytime as the period from 7 a.m. to 10 p.m. and nighttime as the period from 10 p.m. to 7 a.m. This is in keeping with the daytime and nighttime definitions used in federal guidelines. Albany defines daytime as the period from 8 a.m. to 10 p.m. and nighttime as the period from 10 p.m. to 8 a.m.

3.8.2 Noise Measurement Survey Methods

On-site noise measurements were conducted to assess the existing noise environment at the four proposed ferry terminal site locations. The purpose of these measurements was to quantify the ambient noise environment, evaluate current environmental noise sources, and to assess the potential for project noise impacts in the surrounding environs. These measurements were conducted May 23 and 24, 2007.

The measurements consisted of automated long-term (LT) (24 hours duration with contiguous 15 minute intervals) and a series of attended short-term (ST) (10-minute) measurements. The long-term measurements provide a 24-hour time history of the ambient noise environment and are valuable for assessing hourly changes. The short-term measurements are conducted to document noise levels associated with noise sources common to specific locations. The LT and ST measurements were co-located at each proposed ferry terminal site.

LT-1/ST-1 was located at the Buchanan Site at the far western side of the Golden State Park parking lot. LT-2/ST-2 was located at the Gilman Site on the eastern side of Gilman Street. adjacent to Golden State Park in the vicinity of the horse stables. LT-3/ST-3 was located at the Berkeley Marina Site located on the northeasterly side of Berkeley Marina in the vicinity of the existing tour boat dock, adjacent to the Doubletree Hotel. LT-4/ST-4 was located at the Berkeley Fishing Pier Site on the western side of Seawall Drive, adjacent to the public parking area provided for the Berkeley Fishing Pier. Each of these measurement locations is in the immediate vicinity of the respective proposed ferry terminal sites. Two of the proposed sites are located adjacent to noise-sensitive receptor locations. LT-1/ST-1 is located approximately 700 feet southerly of Eastshore State Park and LT-3/ST-3 is located adjacent to the Doubletree Berkeley Marina Inn. The noise measurement locations are shown in Figure 3-20.

The LT measurements were obtained with three Larson David Model 820 Type 1 “Precision” grade Community Noise Analyzer (CNA) and one Larson Davis Model 720 Type 2 “Engineering” grade CNA. LT data is stored within the instrument for subsequent download and analysis. The ST measurements were made with a Brüel and Kjær 2231 Type 1 “Precision” grade Sound Level Meter. The ST data was noted on a preprinted Field Measurement Data Sheet (FMDS) at the time of the measurement. A minimum of two and a maximum of four ST measurements were conducted at each location.

Each of the sound measurement instruments satisfies the requirements of the American National Standards Institute (ANSI) Standard S1.4-1983 and the International Electrotechnical Commission Publications 804 and 651. The sound measuring instruments used for the survey were set on Slow

time response using the dBA scale. A-weighting is used so that the instrument's response is similar to human hearing which is less sensitive to low and very high-pitched sounds. In all cases, the microphone height was 5 feet above the ground and the microphone was equipped with a windscreen. The Sound Level Meter used for the short-term measurements was tripod mounted. Each sound measuring instrument was programmed to record Equivalent sound levels (L_{eq}), Maximum and Minimum sound levels (L_{max}, L_{min}), and percentile distributions of sound level (L_{10}, L_{50}, and L_{90}) for each measurement period.

To ensure accuracy and to verify laboratory calibration, each instrument's calibration was verified in the field before and after each measurement period with a Larson Davis Model CAL200 acoustic calibrator or a Brüel and Kjær acoustic calibrator as appropriate. The accuracy of the acoustical calibrators is maintained through a program established by the manufacturers and is traceable to the National Institute of Standards and Technology. All field procedures were consistent with professional practice and ANSI Standards for measuring environmental noise.

Meteorological conditions were noted on the FMDS using visual observations, a digital thermo-hygrometer, and an anemometer. Weather conditions were favorable for conducting accurate noise measurements during the entire 24-hour measurement period. Air temperatures ranged from the low 60s degrees Fahrenheit (°F) during nighttime hours to the low 80s °F during the daytime. Relative humidity ranged from 15 percent to 62 percent. Winds were predominantly from a southwesterly direction at 7 miles per hour (mph) with occasional gusts to 11 mph. FMDS documenting the LT and ST measurements including precise measurement locations, start and stop times, field calibration checks, and meteorological conditions were maintained for each measurement site. Copies of the FMDS are provided in the Noise and Vibration Technical Report, along with the sound measurement instrument's laboratory calibration records and other relevant technical data.

3.8.3 Noise Measurement Results

The L_{eq}, L_{max}, L_{min}, L_{90}, L_{50}, and L_{10} were digitally recorded. The stored hourly data from the CNA located at the LT sites was downloaded to a personal computer for subsequent analysis. The overall noise environment in L_{dn} was calculated for the LT locations from the hourly L_{eq} dBA values. The 10-dB nighttime penalty integral to the L_{dn} noise descriptor was added to the hourly data for the hours between 10 p.m. and 7 a.m.

Alternative A (Berkeley Marina Site)

Alternative A is located at the Berkeley Marina adjacent to the Doubletree Berkeley Marina Inn. The Berkeley Marina Inn plus any "live-aboard" use on the boats docked at the Berkeley Marina are considered noise-sensitive land use (residential). Noise sources at this site are associated with boating activity, hotel operations, and other commercial activities. These include boat horns, boat maintenance and supply, parking lot traffic associated with hotel and hotel and restaurant/concession activities.

NOISE MEASUREMENT SITE LOCATIONS

Berkeley/Albany
Ferry Terminal Study

October 2008
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URS

FIGURE 3-20

Source:
GlobeXplorer, WTA

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The L_{dn} at this site (LT-3) is 62 dBA. This environmental noise level is compatible with existing land uses in the area. The maximum acceptable noise level at locations where people normally sleep is an L_{dn} of 65 dBA. The hourly noise levels at this site ranged from a minimum of 58 dBA in the evening to a maximum of 66 dBA in the afternoon.

Alternative B (Berkeley Fishing Pier Site)

Alternative B is located south of the Berkeley Fishing Pier. Primary noise sources in the vicinity of this site include vehicular traffic and noise associated with public parking and pedestrian activity (vehicle audio systems, conversation, car door slams). Secondary noise sources are distant aircraft.

The L_{dn} at this site (LT-4) is 66 dBA. This environmental noise level is compatible with existing land uses in the area. The hourly noise levels at this site ranged from a minimum of 50 dBA in the late morning to a maximum of 59 dBA in the afternoon.

Alternative C (Gilman Street Site)

Alternative C is located along Gilman Street adjacent to Golden Gate Fields in the vicinity of the horse stables. No noise-sensitive areas are currently located in the vicinity of this site. Primary noise sources at this site include vehicular noise along Gilman Street, bicycle and pedestrian pass-bys, and the public address system associated with Golden Gate Fields horse stable operations. Additional noise sources are rustling leaves, birds, distant aircraft, distant industrial noise and vehicular traffic on I-80.

The L_{dn} at this site is 65 dBA. This environmental noise level is compatible with existing land uses in the area. The hourly noise levels at this site (LT-2) ranged from a minimum of 55 dBA in the early morning to a maximum of 67 dBA in the late morning and early afternoon with variation resulting from traffic activity of patrons arriving and departing Golden Gate Fields.

Alternative D (Buchanan Street Site)

Alternative D is located in the City of Albany at the western side of the parking lot for Golden Gate Fields which is a private facility used for horse racing. This alternative site is approximately 700 feet southerly of Eastshore State Park which is considered a noise-sensitive area. Noise sources in the vicinity of the Buchanan Site consist of Golden Gate Fields operations noise including that from patrons and maintenance activities, Additional noise sources include shoreline bicycle and pedestrian traffic, ocean waves, and activity at Eastshore State Park. Distant vehicular traffic along I-80 can also be heard.

The L_{dn} at this site is 61 dBA. This environmental noise level is compatible with existing land uses in the area. The hourly noise levels at this site (LT-1) ranged from a minimum of 54 dBA in the evening to a maximum of 61 dBA during the afternoon.

3.9 BIOLOGICAL RESOURCES

This section provides an overview description of the biological resources that may be affected by implementation of the Berkeley/Albany ferry terminal alternatives. The project could potentially affect a variety of habitat types, supporting a diverse assemblage of species. This section describes the general nearshore and tidal habitat types found within the study area, and provides general locations of these habitat types and the species commonly found in them.

3.9.1 Regulatory Framework

Federal

Federal Endangered Species Act (16 USC 1531-1544). The Federal Endangered Species Act (FESA) provides protection for endangered and threatened species and requires conservation of such species' critical habitats in the ecosystem. An "endangered" species is a species in danger of extinction throughout all or a significant portion of its range. A "threatened" species is one that is likely to become "endangered" in the foreseeable future without further protection. Other special-status species include "proposed" and "candidate" species, and "species of concern." Proposed species are those that have been officially proposed (in the Federal Register) for listing as threatened or endangered. Candidate species are those for which enough information is on file to propose listing as endangered or threatened. "Species of concern" are species for which not enough information is on file to support a listing proposal, but still may be appropriate for listing in the future after further study. A "delisted" species is one whose population has reached its recovery goal and is no longer in jeopardy.

FESA is administered by the USFWS and the NMFS. In general, NMFS is responsible for protection of FESA-listed marine species and anadromous fishes, while other species are under USFWS jurisdiction.

FESA Section 9 prohibits the "take" of listed species, while Section 7 of this act provides a means of authorizing the "take" of listed species. Taking is defined by FESA [Section 3(19)] to mean "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct." Section 7 requires formal consultation with USFWS or NMFS for projects that may affect those species that are either listed as or proposed for listing as endangered or threatened, to ensure that the proposed action will not jeopardize listed species or destroy or adversely modify designated critical habitat.

A proposed project may address federally listed species in one of two ways: (1) a nonfederal government entity may resolve potential adverse impacts to protected species; or (2) a federal lead agency may regulate a proposed project and develop mitigation for any significant impacts to federally listed species. Both cases require consultation with the USFWS and/or NMFS, which ultimately issues a final opinion determining whether the federally listed species will be adversely impacted by a proposed project.

Fish and Wildlife Coordination Act (16 USC 661-667e). The original act of March 10, 1934, authorized the Secretaries of Agriculture and Commerce to assist and cooperate with federal and state agencies to protect, rear, stock, and increase the supply of game and fur-bearing animals, as well as to study the effects of domestic sewage, trade wastes, and other polluting substances on wildlife.

The amendments to this act, enacted in 1946, require consultation with the USFWS, NMFS, and state agencies responsible for fish and wildlife resources for all proposed federal undertakings and nonfederal actions needing a federal permit or license that would impound, divert, deepen, or otherwise control or modify a stream or waterbody, and to make mitigation and enhancement recommendations to the involved federal agency.

Additionally, the act requires that wildlife conservation be coordinated with other features of water resource development programs. Determination under this authority for specific projects located in estuarine areas constitute compliance with the provisions of the Estuary Protection Act, as discussed below.

Estuary Protection Act (16 USC 1221–1226). This act highlights the value of estuaries and the need for conservation of their valuable natural resources. It authorizes the Secretary of the Interior, in cooperation with other federal agencies and the states, to study and inventory estuaries of the United States and to determine whether any areas should be acquired by the federal government for future protection.

Under this act, the Secretary of the Interior is required to review all project plans and reports for land and water resource development affecting estuaries and make an assessment of likely impacts and related recommendations for conservation, protection, and enhancement of estuaries.

Magnuson-Stevens Fisheries Act (16 USC 1801-1882). The original act was passed in 1976, and its primary purposes were conservation and management of U.S. fishery resources, development of U.S. domestic fisheries, and phasing out foreign fishing activities within federal waters, the 200-mile limit extending from the edge of state waters. This area become known as the Exclusive Economic Zone and the Magnuson Act achieved its goal of eliminating foreign fisheries and enhancing domestic fisheries in the Exclusive Economic Zone.

The Amended Magnuson-Stevens Fishery Conservation and Management Act of 1996, also known as the Sustainable Fisheries Act (Public Law 104-297), requires all federal agencies to consult with the Secretary of Commerce on proposed projects authorized, funded, or undertaken by that agency that may adversely affect Essential Fish Habitat. The main purpose of the Essential Fish Habitat provisions of the Sustainable Fisheries Act is to avoid loss of fisheries due to disturbance and degradation of the fisheries habitat.

Migratory Bird Treaty Act (16 USC 703-712). This act established special protection for migratory birds by regulating hunting or trade in migratory birds. Furthermore, this act prohibits anyone to take, possess, buy, sell, purchase, or barter any migratory bird listed in 50 CFR 10,

including feathers or other parts, nests, eggs, or products, except as allowed by implementing regulations (50 CFR 21). Definition of "take" includes any disturbance that causes nest abandonment and/or loss of reproductive effort (e.g., killing or abandonment of eggs or young), and such activity is potentially punishable by fines and/or imprisonment.

Marine Mammal Protection Act (16 USC 1361-1421h). The Marine Mammal Protection Act, adopted in 1972, makes it unlawful to take or import any marine mammals and/or their products. Under Section 101(a)(5)(D) of this act, an incidental harassment permit may be issued for activities other than commercial fishing that may impact small numbers of marine mammals. An incidental harassment permit covers activities that extend for periods of not more than 1 year and that will have a negligible impact on the impacted species. Amendments to this act in 1994 statutorily defined two levels of harassment. Level A harassment is defined as any act of pursuit, torment, or annoyance that has the potential to injure a marine mammal in the wild. Level B harassment is defined as harassment having potential to disturb marine mammals by causing disruption of behavioral patterns including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering.

Executive Order 13112: Invasive Species. The purpose of this order is to prevent the introduction of invasive species and to provide control for the spread of any invasive species that have already been introduced. This law prohibits the federal government to "authorize, fund, or carry out actions that it believes are likely to cause or promote the introduction or spread of invasive species in the United States or elsewhere unless, pursuant to guidelines that it has prescribed, the agency has determined and made public its determination that the benefits of such actions clearly outweigh the potential harm caused by invasive species; and that all feasible and prudent measures to minimize risk of harm will be taken in conjunction with the actions."

Additionally, this order requires federal agencies to consult with the Invasive Species Council, consistent with the Invasive Species Management Plan.

Section 404/10 Jurisdiction (33 USC 1251-1376). Under Section 404 of the Clean Water Act (CWA), the U.S. Army Corps of Engineers (USACE) regulates the disposal of dredged and fill materials into "waters of the United States," which include intrastate lakes, rivers, streams (including intermittent streams), bayflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, and wetlands adjacent to any water of the U.S. [33 CFR 328]. In areas subject to tidal influence, Section 404 jurisdiction extends to the high tide line or boundary of any adjacent wetlands.

The USACE also regulates navigable waters under Section 10 of the Rivers and Harbors Act. Navigable waters are defined as "those waters of the United States that are subject to the ebb and flow of the tide shoreward to the mean high water (MHW) mark and/or are presently used, or have been used in the past, or may be susceptible to use to transport interstate or foreign commerce" [33 CFR 322.2].

In San Francisco Bay, waters of the U.S. include open waters of the Bay, seasonal and tidal wetlands, and intertidal habitats. Any dredge or fill activities required as a part of ferry implementation and/or operation require a permit from the USACE.

State

California Endangered Species Act (California Fish and Game Code 2050-2116). Similar to FESA, the California Endangered Species Act (CESA), along with the Native Plant Protection Act, authorizes the California Fish and Game Commission to designate, protect, and regulate the taking of special-status species in the state of California. CESA defines "endangered" species as those whose continued existence in California is jeopardized. State-listed "threatened" species are those not presently threatened with extinction, but which may become endangered if their environments change or deteriorate. Any proposed projects that may adversely impact state-listed threatened or endangered species must formally consult with the California Department of Fish and Game (CDFG).

Section 2080 of the California Fish and Game Code prohibits the taking of state-listed plants and animals. The CDFG also designates "fully protected" or "protected" species as those which may not be taken or possessed without a permit from the Fish and Game Commission and/or the CDFG. Species designated as fully protected or protected may or may not be listed as endangered or threatened.

In addition to listed species, the CDFG also maintains a list of "Species of Special Concern," most of which are species whose breeding populations in California may face extirpation. To avoid the future need to list these species as endangered or threatened, the CDFG recommends consideration of these species, which do not as yet have any legal status, during analysis of the impacts of proposed projects.

3.9.2 Habitat Restoration in the Study Area

Several ecosystems enhancement and restoration efforts are ongoing within or near the study area. These include restoration of native oyster beds (Latta, 2007), restoration of native eelgrass, and the Berkeley Meadows Habitat Restoration.

Native Oyster Bed Restoration

The native Olympia oyster, *Ostrea conchaphila*, once a dominant fishery resource in San Francisco Bay, and abundant along the west coast of America, had been reduced to a few scattered populations. The loss of oyster beds has removed a major filter feeder from the bay, resulting in serious implications for Bay food webs, nutrient transfer and water clarity. The National Oceanic and Atmospheric Administration (NOAA), Save the Bay, and other groups are collaborating on native oyster monitoring and restoration in several sites throughout the bay. Although detailed maps of oyster beds are not available, large populations of oysters are known to exist at the Albany bulb, along Albany Beach south of the racetrack, and oysters have been observed for many years within the Berkeley Marina (Latta, 2007; Grosholz, 2007).

Eelgrass Restoration

Eelgrass beds have been afforded special management considerations by CDFG, USFWS, NMFS, and the Golden Gate Audubon Society. Once abundant in the Bay, native beds have dwindled significantly due to dredging and activities. Two eelgrass bed restoration projects are ongoing or planned in and adjacent to the study area. The first, conducted by Merkel & Associates for Caltrans as a mitigation project for construction of the East Span of the Bay Bridge, is located in the North Basin (Boyer, 2007). The second, by Dr. Katharyn Boyer of San Francisco State University, will begin in the summer of 2007 north of the Albany bulb (Boyer, 2007).

Seasonal Wetland Restoration

Habitat in the 72-acre Berkeley Meadow consisted of non-native weeds, small patches of native vegetation, and several seasonal wetlands that had developed atop subsiding landfill. A three-phase restoration plan is now being implemented. During Phase I, approximately 16.5 acres was cleared of non native vegetation, leaving intact will and a diverse assemblage of native vegetation was planted, with enhancement to existing wetlands and construction of new wetlands, coastal scrub, and upland habitat. Phases II and III will similarly restore 15.2 and 35.6 acres, respectively. Habitat and nesting areas for white-tailed kite, northern harriers, and burrowing owls are encompassed within the restoration project (Gandesbery, 2007).

3.9.3 Habitat Types

Habitats within the study area include nearshore upland habitats such as seasonal wetlands and coastal scrub, intertidal areas such as sandy beach, rocky shoreline, piers and pilings, tidal marsh, and intertidal bayflats; subtidal bayflats and open Bay. The habitats types within the study area may blend with one another in transition zones called ecotones. Species found in these areas often overlap habitat types.

The descriptions of habitats provided below combine similar habitat types, such as muted tidal marsh and tidal marsh, because the majority of species occur in both habitats. The habitats and common species associated with those habitat types discussed below have the potential to occur within the project boundaries. Habitat types as used in this report include the broad categories described below.

Upland

Seasonal Wetland. Seasonal wetland vegetation occurs in areas where soils remain ponded and/or saturated for a prolonged period of time during the winter season. Two types of non-tidal wetlands are located in the study area: seasonal wetlands and seeps. Seasonal wetlands are present in several areas in the Berkeley Meadow, the North Basin Strip, and the Brickyard. Species previously described in the Berkeley Meadow include rabbit's-foot grass (*Polypogon monspeliensis*), Italian wildrye (*Lolium multiflorum*), Mediterranean barley (*Hordeum marinum* ssp. *gussoneanum*), native nutsedge (*Cyperus eragrostis*), native fathen (*Atriplex triangularis*), cut-leaf plantain (*Plantago coronopus*), and bristly oxtongue (*Picris echioides*) (CDPR, 2001). Most of these plants are non-native species that have invaded wetlands in disturbed areas in

California. As described above, removal of non native plants and restoration of seasonal wetlands using native plants is ongoing within Berkeley Meadows.

A small wetland present near the upland edge of the Albany Beach includes plants such as nutsedge, curly dock (*Rumex crispus*), and cocklebur (*Xanthium strumarium*).

Northern Foredune. Northern foredune vegetation is typically dominated by salt tolerant plants adapted to moving sands, including perennial grasses and low, perennial herbs and succulents. Typical northern foredune vegetation is absent from the study area. However Albany Beach shows some dune formation and supports two foredune indicator species: a relatively dense cover of bursage (*Ambrosia chmissonis*) interspersed with non-native sea-rocket (*Cakile maritime*). Invasive, non-native species including ripgut brome (*Bromus diandrus*), iceplant (*Carpobrotus edulis*), Kikuyu grass (*Pennisetum clandestinum*), and a European daisy (*Argyranthemum foeniculaceum*) are present on the dunes (CDPR, 2001).

Coastal and Ruderal Scrub. True Coastal Scrub, with a characteristic native plant community, has been typically absent from the site but is currently being restored in the Berkeley Meadows. Ruderal scrub consists of vegetation which colonizes disturbed areas, and includes shrubs, broadleaved species, and grasses, is present scattered through the upland portions of the site. Coyote-brush (*Baccharis pilularis*) dominates large portions of the scrub area, including the Berkeley Meadow and Albany Bulb. Coyote-brush forms covers from 25 percent to 75 percent of the scrub areas; non-native French broom (*Genista monspessulana*) and cotoneaster (*Cotoneaster* spp.) intersperse with the coyote-brush in some areas.

Australian tea tree (*Leptospermum laevigatum*), is a dominant species at Fleming Point along with French broom and the native poison oak (*Toxicodendron diversilobum*) on the steep bluffs. The native subshrub seaside woolly sunflower (*Eriophyllum staechadifolium*) is also present in small stands on the bluffs (CDPR, 2001).

Trees. Stands of willow (*Salix lasiolepis*) are present, and are being preserved, within Berkeley Meadow. Other native willows and some native glue elderberry trees (*Sambucus Mexicana*) also occur on steep slopes within the site. Non native eucalyptus, acacia, pine, cypress and fruit trees occur throughout the site, especially at the Brickyard and along trails and roads (CDPR, 2001).

Developed Areas

Developed areas are areas that are paved and have landscaped or ruderal vegetation. They typically support wildlife species associated with disturbed or urban areas, such as red-winged blackbird (*Agelaius phoeniceus*), mourning dove (*Zenaida macroura*), American crow (*Corvus brachyrhynchos*), European starling (*Sturnus vulgaris*), rock dove (*Columba livia*), house cat (*Cattus domesticus*), and black rat (*Rattus rattus*). However, development within this study area includes shoreline armoring and Berkeley Marina facilities. These types of development provide intertidal habitat for pier and piling communities, including algae, invertebrate fauna such as barnacles, mussels, tunicates, and crab, and, where riprap, cobbles, and other hard debris occur, a manmade rocky shoreline which provides foraging and resting areas for shorebirds.

Developed areas within the study site include the Berkeley Marina, constructed on artificial fill approximately 40 years ago. The Berkeley Marina currently occupies approximately 100 acres of land and 52 acres of water. The Berkeley Marina has 1,000 wet berths ranging in length from 20 to 84 feet in fifteen sets of docks and is protected by detached and enclosing breakwaters. Existing Berkeley Marina facilities include a fuel dock, bait and tackle shop, commercial sport fishing boats, sailing club concessions, the Berkeley Yacht Club, two restaurants (Skates on the Bay and Hs Lordships), the Doubletree Hotel, the Radisson Hotel, Cesar Chavez Park, and the Shorebird Nature Center.

Also present is the Berkeley Pier, built in 1929, and extended 3 miles into the Bay to allow for large transbay ferries. Ferry service stopped in 1936 with the opening of the Bay Bridge; shortly after, the pier was given to the City of Berkeley. The first 200 feet of the pier were refinished in 1955, and the next 1,000 feet were refinished in 1962. Currently, 3,000 feet of the pier are maintained and open to the public for fishing and sightseeing (Jones, 2005). The remainder of the pier lies in various states of ruin.

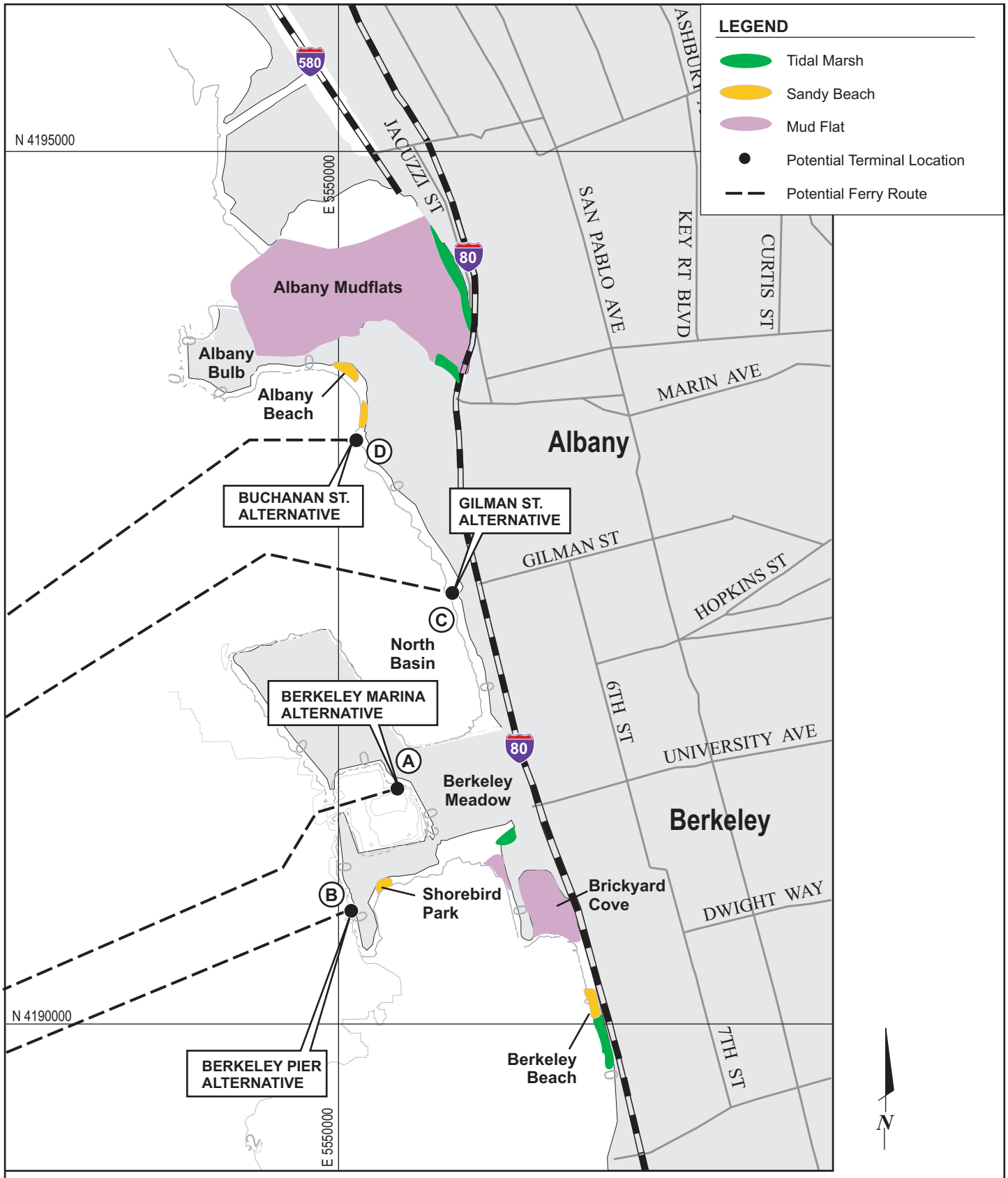
Large sections of shoreline in the study site are protected by rock or brick riprap, poured concrete armoring, and other debris.

Intertidal

Tidal Marsh. Two classifications of tidal marsh occur within the study area: salt marsh and brackish marsh. In areas with a predominantly marine influence, tidal salt marsh is present. In areas with significant freshwater influence, the water is less saline and the marshes are more brackish (Goals Project, 1999). The vegetation in these marsh types differs due to the variation in salinity, and is described in more detail below. Vegetation zones and the distance from the shore characterize the gradations in tidal salt marsh and tidal brackish marsh. Low tidal marsh occurs between the lowest margin of marsh and MHW. Middle tidal marsh occurs between MHW and mean higher high water (MHHW).

High tidal marsh occurs between MHHW and the highest margin of the marsh. Tidal marshes can be referred to as young or old. Younger marshes are more recently established, often due to shoreline fill development, which can cause sediments to accumulate in surrounding areas where marsh vegetation eventually grows. These marshes tend to be dominated by low-diversity plant composition, whereas older marshes tend to have a more complex plant composition (Goals Project, 2000). As the marsh and upland areas of this study area are predominantly manmade fill material, marshes in the project area are predominantly young marsh (CDPR, 2001).

Salt Marsh. Salt marsh occurs throughout the entire San Francisco Bay, primarily in the North and South bays. Within the study area, smaller salt marshes exist along the entire shoreline of the Albany mudflat, the east shore of the Albany Bulb, and at the mouth of Cordornices Creek (Figure 3-21). Typically, salt marshes grade into meadow or scrub communities; these marshes tend to end at riprapped shorelines or other manmade structures. Pacific cordgrass (*Spartina*



Source:
Modified from Merkel & Associates, 2004a

SENSITIVE SHORELINES

Berkeley/Albany
Ferry Terminal Study

October 2008
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FIGURE 3-21

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foliosa) and pickleweed (*Salicornia virginica*) dominate salt marshes in the Bay and in the study site marshes. The low salt marsh zone consists mainly of these species, although it is rapidly being colonized by the invasive smooth cordgrass (*Spartina alterniflora*), which has invaded the study area in the last decade (CDPR, 2001). Pacific cordgrass and smooth cordgrass frequently hybridize and are slowly outcompeting the native Pacific cordgrass. The middle salt marsh zone, or the salt marsh plains in the Bay, tend to be dominated by pickleweed, but are also characterized to a lesser extent by saltgrass (*Distichilis spicata*), dodder (*Cuscuta salina*), fleshy jaumea (*Jaumea carnosa*), and alkali heath *(Frankenia salina*). Species such as marsh gumplant (*Grindelia stricta* var. *angustifolia*), saltgrass, pickleweed, dodder, and alkali heath characterize the high salt marsh zone (Goals Project, 2000). Special-status plant species include soft bird's beak (*Cordylanthus mollis* ssp. *mollis*), Point Reyes bird's beak (*Cordylanthus maritimus* ssp. *palustris*), California seablite (*Suaeda californica*), and Suisun thistle (*Cirsium hydrophilum* var. *hydrophilum*). These species are discussed in more detail in Protected Species and Habitats.

Common fish and insects in salt marshes include: California killifish (*Lucania parva),* bay goby (*Lepidogobius lepidus*), striped bass (*Morone saxatilis*), topsmelt (*Atherinops affinis*), starry flounder (*Platichthys stellatus),* water boatman (*Trichocorixa reticulata*), and wandering skipper (*Panoquina errans*). Common wildlife species in salt marshes include Belding's savannah sparrow (*Passerculus sandwichensis beldingi*), white-crowned sparrow (*Zonotrichia leucophrys*), sora (*Porzana carolina*), marsh wren (*Cistothorus palustris*), northern harrier (*Circus cyaneus*), and deer mouse (*Peromyscus maniculatus*).

Special-status animal species found in salt marsh habitat include salt marsh harvest mouse (*Reithrodontomys raviventris*), clapper rail (*Rallus longirostris obsoletus*), black rail (*Laterallus jamaicensis*), salt marsh wandering shrew (*Sorex vagrans halicoetes*), and salt marsh common yellowthroat (*Geothlypis trichas sinuosa*).

Brackish Marsh. Typical brackish marsh species in San Francisco Bay include alkali-bulrush, tules (*Scirpus californicus* and *S. acutus*), and cattails (*Typha angustifolia* and *T. latifolia*) in areas that have more freshwater. The middle brackish zone is frequently dominated by saltgrass, although pickleweed, fleshy jaumea, and fathen are also present. The high brackish marsh zone is characterized by perennial peppergrass (*Lepidium latifolium*), fennel (*Foeniculum vulgare*), and exotic grasses (Goals Project, 2000). Brackish marsh has formed in a roadside ditch or basin between the eastern portion of the Brickyard and the frontage road to the east and is dominated by cattail and bulrush, with Arroyo willow at the edge. Curly dock and prickly ox-tongue are also reported (CDPR, 2001). A small brackish marsh also exists at the northwestern corner of the Albany Bulb (Figure 3-21).

American bittern (*Botaurus lentiginosus*) and wildlife species commonly found in salt marshes also often occur in brackish marshes.

Special-status species in freshwater marshes include all of the species found in salt marshes listed above except Suisun thistle, San Pablo vole, and salt marsh wandering shrew. These species are discussed in more detail in Protected Species and Habitats.

Bayflats. Bay tidal flats are usually sparsely vegetated intertidal areas which occur from approximately MLLW to mean tide level. Vegetation within study area flats includes scattered green macro-algae (*Ulva* spp. and *Enteromorpha intestinalis*), and microscopic algae including diatoms, golden brown and blue-green phytoplankton. Bayflats provide habitat for many species of invertebrates, including polychaetes, oligochaetes, amphipods, isopods, and crustaceans. They provide protection to banks and upland shoreline from wave energy and sediment.

During low tide, bayflats provide crucial foraging and roosting areas for almost one million shorebirds that use the Bay during the spring migration. Shorebirds frequently found on bayflats in the Bay include western sandpiper (*Calidris mauri*), least sandpiper (*Calidris minutilla*), dunlin (*Calidris alpina*), long- and short-billed dowitcher (*Limnodromus griseus,* and *L. scolopaceus,* respectively), long-billed curlew (*Numenius americanus*), whimbrel (*Numenius phaeopus*), and American avocet (*Recurvirostra americana*).

During high tide, bayflats provide foraging habitat for fish, including longfin smelt (*Spirinchus thaleichthys)*, staghorn sculpin (*Leptocottus armatus*), starry flounder, and leopard shark *(Triakis semifasciata).* One of the few mammals that are occasionally present on bayflats is the Pacific harbor seal (*Phoca vitulina*).

Sandy Beaches. Sandy beaches in and near the study area are critical for the recovery of California seablite (*Suaeda californica*), a federally endangered species. A large sandy beach with some dune formation is located at Albany Beach, and a large sandy beach without dunes is located at the south shore of the Brickyard, and supports both upland and wetland vegetation (CDPR, 2001). Sandy beaches which do not support much, if any, dune or beach vegetation include those along the Berkeley shoreline, at the outfalls of Strawberry Creek and Schoolhouse Creek (Figure 3-21).

Beach fauna include crustaceans such as sand crabs, amphipods and isopods (beach hoppers and sow bugs), polychaete worms, and flying insects. Sandy beaches are important foraging areas for shorebirds.

Rocky Intertidal

Rocky intertidal habitat within the study area is primarily composed of riprap along the shoreline. Seaweeds or macroalgae form the predominant plant communities here: green algae (Division Chlorophyta), red algae (Division Rhodophyta), and brown algae (Division Phaeophyta) are all present. Species include the green *Ulva lactuca* and *Enteromorpha intestinalis*, red *Endocladia muricata*, *Mastocarpus* spp., and *Bangia fusco-purpurea* and brown Rockweed (*Fucus Distichus)* (CDPR, 2001).

The riprap and miscellaneous debris along these shorelines provides habitat for both sessile and mobile invertebrates species. Sessile organisms, including mussels (*Mytilus edulis-galloprovincialis*) and barnacles (*Chthamalus dalli* and *Balanus glandula*), have been observed throughout the rocky zone. Mobile organisms, mainly amphipods, isopods, and shorecrabs (*Hemigrapsis oregonsis*) are also present. These invertebrates are preyed upon by birds at low

tide and nearshore fishes at high tide. Black oystercatchers (*Haematopus bachmani*), ruddy turnstones (*Arenaria interpres*), and black turnstones (*Arenaria melanocephala*), are known to forage in the rocky intertidal habitat at the site.

Fleming point provides an exceptional rocky intertidal habitat, as naturally occurring rocky shoreline is present. This stretch of shoreline is one of the few remaining natural features along the East Bay (CDPR, 2001). Because of its age, this stretch of shoreline supports a diversity of rocky intertidal organisms described as among the highest in the region. Both macro algae, such as *Rhodoglossum affine, Ceramium* sp., *Ralfsia* sp., and *Gracilaria* spp and marine invertebrates such as littorine snails (*Littorina* spp.), bryozoans, polychaete worms, encrusting sponges, and splash zone isopods (*Ligia occidentalis*) were observed at Fleming Point and nowhere else within the study area.

Subtidal

Subtidal Flats. The subtidal flats within the study area are permanently submerged shallow soft bottomed areas seaward of the intertidal bayflats, primarily composed of sand or mud. Macroflora on subtidal flats tends to be limited to red algae (*Gracilaria* spp.) and eelgrass. No kelp beds are present in the Bay. However, these areas are rich in fauna: benthic invertebrates include a diverse array of tube-worms, clams, oysters, snails, and crustaceans such as crab, shrimp, and marine isopods. A variety of bony fish, sharks and rays have been reported or have the potential to occur, and the habitat provides critical foraging and resting areas for diving ducks, gulls, terns, California Brown Pelican (*Pelecanus occidentalis)*, loons, grebes, and others described in more detail in Protected Species and Habitats. Flocks of diving ducks wintering within the area often number in the thousands: particularly in the South Sailing Basin just south of Brickyard Cove, the North Basin, and directly adjacent to the study area to both the north and south, north of the Albany bulb and south in the Emeryville Crescent. Rafting areas for water birds are shown in Figure 3-22.

Open Bay. The Goals Report (Goals Project, 1999) subdivides the open Bay into two habitat sub-units: deep bay/channel and shallow bay. Deep bay/channel habitat is defined as those portions of the Bay deeper than 18 feet below MLLW, including the deepest portions of the Bay and the largest tidal channels. Shallow bay is defined as that portion of the Bay between 18 feet below MLLW and MLLW. The shallow bay habitat accounts for two-thirds of the Bay's area (Goals Project, 1999). This study site includes only shallow bay, with maximum depths of approximately 6 feet.

The shallow bay habitat is a feeding area for Pacific herring (*Clupea harengus*), northern anchovy (*Engraulis mordax*), bat ray (*Myliobatis californica*), and jacksmelt (*Catherinops californiensis*), as well as at least 40 other species of fish, crabs, and shrimp. The shallow bay is also a nursery area for juvenile halibut and sanddab (*Citharichthys stigmaeus*), leopard shark, shiner perch (*Cymatogaster aggregata*), herring, and other fishes. Anadromous fish use the shallow bay area as migratory pathways to and from upstream spawning areas. This habitat is within the depth range of many diving birds and, therefore, provides important avian foraging habitat. Marine mammals such as harbor seals also forage in this habitat type.

Eelgrass Beds. Eelgrass (*Zostera marina*), San Francisco Bay's only rooted seagrass beds, forms beds common in healthy, shallow bays and estuaries, which serve as an indicator community for the overall health of an estuary. Eelgrass beds perform multiple functions within an estuarine ecosystem. The eelgrass stabilizes shorelines by dampening wave energy, collecting sediments transported to the shore, and preventing erosion. Beds improve water quality by collecting and filtering organic matter and sediments, and are easily affected by changes in water quality and turbidity, as the depth at which this species grows is a function of light penetration.

Eelgrass beds provide habitat for epiphytic algae, invertebrates, and crustaceans, a nursery area for many species of fish, including Pacific halibut (*Hippoglossus stenolepis*), and English sole (*Parophrys vetulus*). Eelgrass is particularly important to fish such as Pacific herring, which spawn in the blades of this plant, and wintering birds such as the endangered least tern (*Sterna antillarum browni*), which forages on small, or the American widgeon (*Anas americana*) that feed on fish roe and invertebrates within the beds. As substrate for the epiphytic algae, invertebrates, and crustaceans on which these species feed, eelgrass beds also contribute to the ecosystem at multiple trophic levels.

Eelgrass beds and potential habitat within the study area are shown on Figure 3-23. In addition to the ongoing eelgrass bed restoration taking place within the study area, as discussed in Section 3.9.2, eelgrass naturally occurs along the shoreline at Albany Beach, north of Gilman Street, in the vicinity of Shorebird Park, and south of Brickyard Cove extending to Ashby. Off-shore eelgrass lie 1,000 meters south of Hs Lordships.

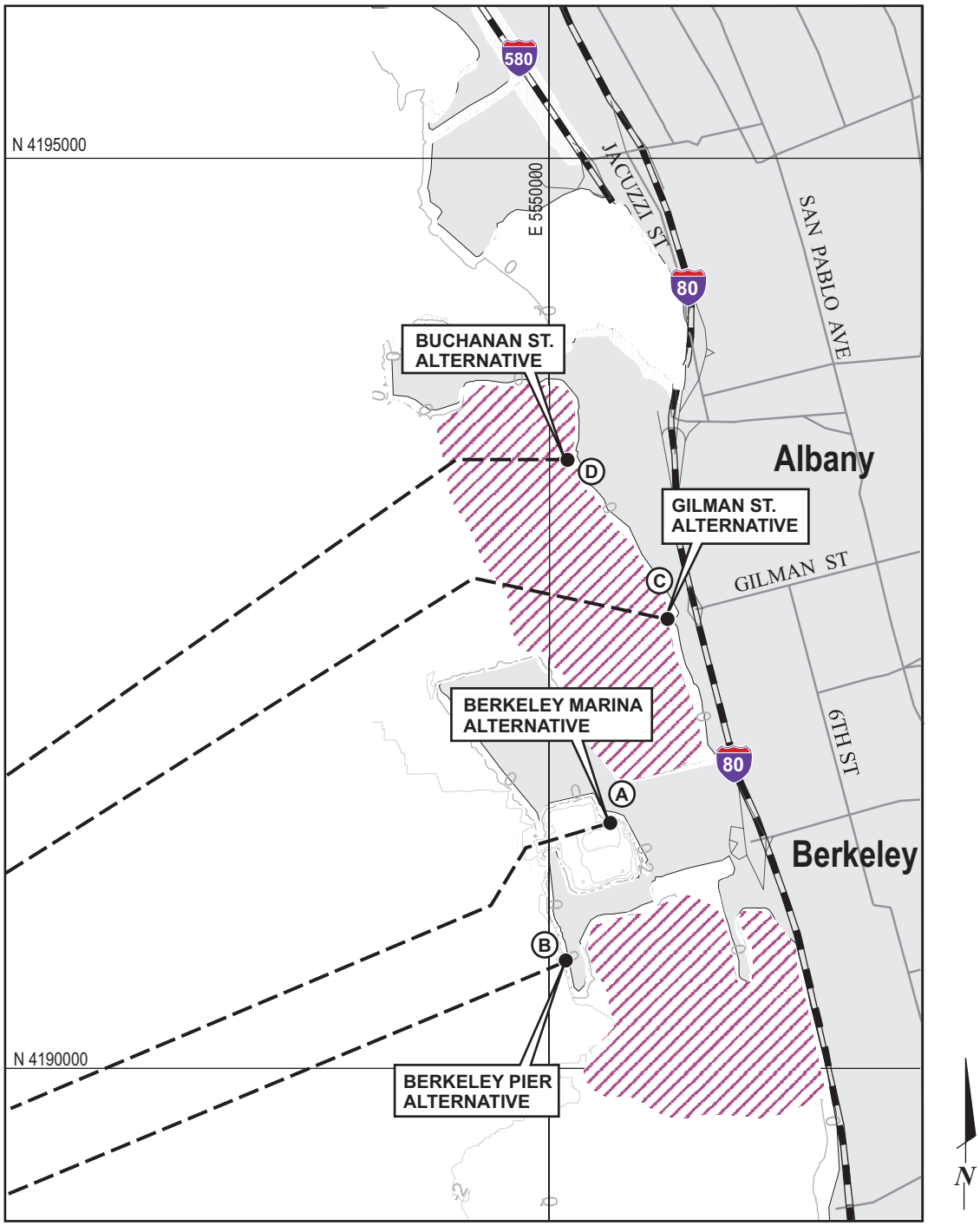
3.9.4 Site Fauna

Plankton

Plankton are found in all waters within study area. The three major components of plankton are phytoplankton, zooplankton, and ichthyoplankton (fish larvae and eggs), all of which free-float in open water. Representing the lower levels of the food chain, plankton are important to many marine community members, including benthic organisms, fish, and mammals.

Phytoplankton are small, floating, simple plants that represent the base of the marine food web. Consisting of single cells or chains of cells, phytoplankton are usually microscopic in size and reproduce asexually through cellular division. Much of San Francisco Bay's productivity of other organisms, including clams, worms, mussels, and zooplankton, depends on the growth of phytoplankton (SFEP, 1992). Major phytoplankton groups in the Bay include diatoms, dinoflagellates, and cryptomonads (Herbold et al., 1992).

In the Central Bay where habitats are mostly open and deep water, the high degree of tidal water exchange and mixing generally keep phytoplankton levels very low (SFEP, 1992). Therefore, the shallow subtidal flats within this study area may be important for phytoplankton growth and primary productivity within the Central Bay.



LEGEND

- ● Potential Terminal Location
- — — Potential Ferry Route
- Rafting Birds Areas

AREAS USED BY RAFTING BIRDS

Berkeley/Albany
Ferry Terminal Study

October 2008
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FIGURE 3-22

Source:
GGAS, 2005; 2006b.

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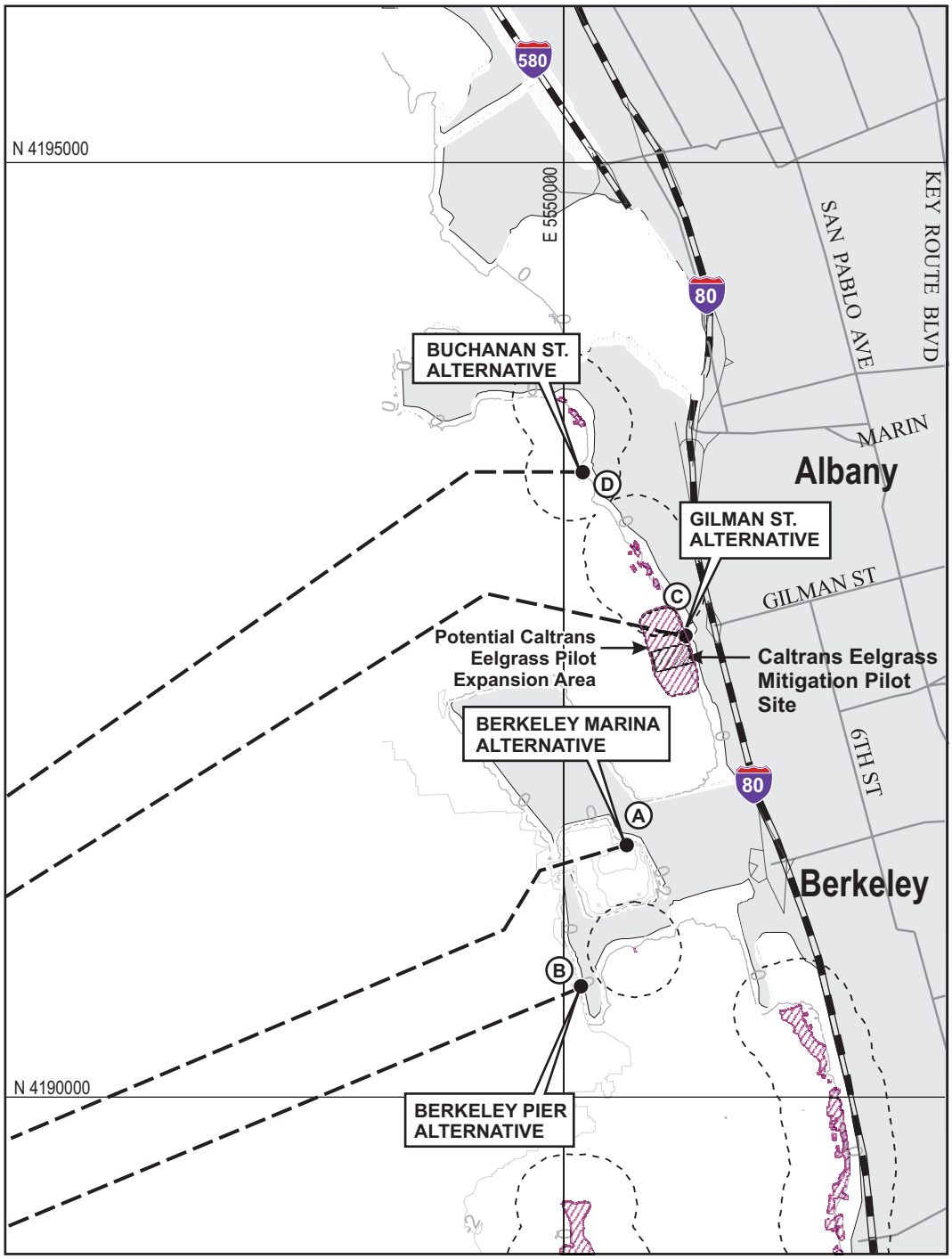

LEGEND

- Eelgrass
- 250m Buffer of Maximum Documented Eelgrass Extents
- Potential Terminal Location
- Potential Ferry Route

N

500 0 500

Scale in Meters

EELGRASS LOCATIONS

Berkeley/Albany
Ferry Terminal Study

October 2008
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FIGURE 3-23

Source:
Modified from Merkel & Associates, 2004a

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Zooplankton consist of microscopic and macroscopic animals that either free-float or feebly swim in open water. Zooplankton provide an ecologically important food source for many types of fish such as anchovies, smelt, and striped bass. Common zooplankton found in the Bay include species of copepods, tintinnids, larval forms of gastropods, bivalves, barnacles, polychaetes, and crustaceans such as the Dungeness crab (*Cancer magister*) (Ambler et al., 1985).

Ichthyoplankton are the eggs and larval forms of marine fishes, such as Pacific herring, northern anchovy, goby (family *Gobiidae*), white seabass (*Cynoscion nobilis*), staghorn sculpin, and diamond turbot (*Hypsopsetta guttulata*). Seasonal abundance and distribution of individual ichthyoplankton species are dependent on the reproductive cycles of the adult fish species and their circulation within the Bay. In return, the dynamics of the adult fish populations are closely related to annual recruitment success rates of individuals from the larval stage. Generally, fish larvae are in the plankton community coinciding with peaks of phytoplankton and zooplankton abundance in the winter and spring (Ambler et al., 1985).

Benthos

Benthos are bottom-dwelling organisms that generally live nonmobile lifestyles, though some mobile species such as crabs do exist. Epibenthos is the collection of benthic organisms that live on the substrate surfaces, such as crabs, while infauna are those that live within the sediment, such as native oysters and tube-dwelling worms. Because many infauna species live a year or more in the same bottom area, they serve as one of the best biological indicators of impacts from human disturbances, as well as general indicators of ecosystem health in aquatic environments. The benthos also provide an important food source for many species of fish, birds, and mammals in the marine environment.

In the Bay Area, many benthic invertebrates live within sedimentary or soft-bottom habitats, usually within the top 2 to 3 centimeters of the soft sediment. Some benthic invertebrates also live on hard substrates, which are much less common in the Bay compared to sedimentary habitats.

The Central bay and study area harbor predominantly marine benthos, although brackish communities may be present in brackish marsh and at the mouths of creeks within the area. Community characteristics such as species composition and abundance are affected by many physical factors, including salinity and sediment grain size, or by biological factors such as competition and predation (Thompson et al., 2000). Changes in these factors can influence individual benthic species differently.

Many of the more common benthic species in San Francisco Bay today are accidentally or intentionally introduced species (SFEP, 1992). Most of these nonnative species were transported here in ballast water of ships or on the oyster shells brought from the east coast for commercial farming purposes in the late 19th century (Carlton, 1979). Some of these nonindigenous species serve ecological functions similar to those of the native species that they have displaced. Examples of these include the eastern oyster (*Crassostrea virginica*), the Japanese littleneck

clam (*Tapes philippinarum)*, and the soft-shelled clam (*Mya arenaria*), all of which have supported commercial or sport fisheries. However, other species, such as *Potamocorbula amurensis*, have a negative effect on phytoplankton and zooplankton populations and organisms that depend on them. Though *Potamocorbula* may serve as a food source for diving ducks and sturgeon, their high feeding rates can remove much of the phytoplankton from the water column and may have an adverse effect on zooplankton and other organisms in the food chain that feed on them (SFEP, 1992).

Benthic species common to the Central Bay consist of clams (including *Potamocorbula*), amphipods such as *Monocorophium* and *Ampelisca*, polychaete worms, and Bay mussels (SFEP, 1992). The native oyster (*Ostrea conchaphila*), a cornerstone species critical to benthic and pelagic foodwebs, is found in sediments within the study site (Grosholz, 2007). No systematic sampling of the benthos has been conducted within the study area (CDPR, 2001).The non-native Atlantic soft-shelled clam (*Mya arenaria*) and Japanese littleneck clam (*Tresus japonicus*); both commonly occur in the East Bay (CDPR, 2001) and may also be present.

Shrimp and Crabs

The Bay is home to many species of shrimp and crab that are important for their recreational fishery and ecological values. The Bay shrimp (*Crangon* spp.) is the most common shrimp reported by the CDFG in the Bay (Baxter et al., 1999). Shrimp species are an important food source for virtually all species of fish, marine mammals, and water birds.

While distributed widely throughout the Bay, the various species of shrimp found in the Bay do have differing centers of distribution. For example, *C. franciscorum* are more commonly collected in the northern reach of the Bay (San Pablo to the west Delta) than in the Central or South bays, while *C. nigromaculata* are usually found in the Central and South bays (Baxter et al., 1999).

Crabs are both recreationally and ecologically important in the Bay. The most common species in the Bay is the Dungeness crab, which supports an important commercial fishery. Other commonly found species in the Bay include *C. productus*, *C. antennarius*, and *C. gracilis*. These species are typically abundant in the more marine waters of the Central Bay but are also found in the South Bay and San Pablo Bay (Baxter et al., 1999).

Fish

Habitats used by fish within the study area include bay flat open waters, eelgrass beds, piers and pilings, and in tidal marshlands and rocky intertidal zones during high tide.

More than 100 species of fish inhabit the San Francisco Bay system. The majority of species are native, but there are also many introduced species. Many complete all stages of life within the Bay; a smaller portion, anadromous fish, migrate from ocean waters, through the Bay-Delta Estuary (the Estuary), and into a series of freshwater streams where they spawn. As adults or young-of-the-year, they migrate through the Estuary back to the ocean. A small portion of these

remain in the Bay year-round. Whether spawned offshore and carried into the Bay by currents or spawned directly in the Bay, most of the anadromous species spend 4 to 8 months in the Bay before entering the ocean. Common fish species found in the Bay include northern anchovy (*Engraulis mordax*), topsmelt (*Atherinops affinis)*, jacksmelt (*Atherinopsis californiensis)*, striped bass (*Morone saxatilis)*, white croaker (*Genyonemus lineatus*), Pacific herring, and English sole.

Fish reported to be, or to have potential to be in the study area include American shad (*Alosa sapidissima*), bat ray, brown rockfish (*Sebastes auriculatus)*, Chinook salmon (*Oncorhynchus tshawytscha*)(see Rare, Endangered species section below), leopard shark, striped bass, and white croaker Smelt, northern anchovy, shiner perch, starry flounder, and speckled sanddab have also been reported in the nearshore environment in the central Bay (CDPR, 2001) as have green sturgeon (*Acipencer medirostris*) and Pacific herring (SFEP, 1992); these species are likely present within the study area. The tidewater goby (*Eucyclogobius newberryi*), a federally endangered species, historically existed within the study area, but has not been reported since 1950.

Because of the large number of fish species that could be present, not all are discussed in detail here. The more ecologically, commercially, and/or recreationally important species are discussed below. A discussion of fish species with either federal or state protection status is included in Protected Species and Habitats.

Birds

Bay waters and shorelines provide diverse habitat for many species of waterfowl, shorebirds, and tidal marsh birds. In fact, birds use all of the habitats reported within the study area.

The Bay serves as an important staging and wintering ground on the Pacific Flyway for numerous species of waterbirds, both common and uncommon. The Pacific Flyway is a bird migration corridor along the Pacific Coast that stretches as far north as northern Canada and Alaska, and as far south as the southern tip of South America (SFEP, 1992). In the Bay, the greatest waterbird abundance and species diversity is seen in winter, as birds migrate along the flyway. Each year, nearly one million waterfowl and more than one million shorebirds pass through this area. San Francisco Bay supports the largest population of canvasback along the Pacific coast, 46 percent of the midwinter population in the Pacific Flyway (Goals Project, 2000). Additionally, San Francisco Bay provides crucial wintering habitat for surf scoter (Goals Project, 2000). It is the most important inshore habitat in the eastern Pacific, south of the Straits of Georgia and Puget Sound (Small, 1994), for this species. Scoters (primarily surf scoters [*Melanitta perspicillata*], but also white-winged scoters [*Melanitta fusca*]) are the second most abundant waterfowl in the Bay, and between 1998 and 2000 accounted for 25 percent (South Bay) to 29 percent (Central Bay) of total wintering waterfowl numbers counted during annual surveys (USFWS, unpublished data).

Roughly 120 waterbird species from 16 avian families occur in the Bay. Of these birds, approximately two-thirds are represented by three families: *Anatidae* (waterfowl), *Laridae* (gulls and terns), and *Scolopacidae* (sandpipers and phalaropes). Individual waterbird species may reach their peak abundance during different periods throughout the fall and spring migration.

San Francisco Bay is also recognized as a site of hemispheric importance for shorebirds by the Western Hemisphere Shorebird Reserve Network. A site has been designated of hemispheric importance if it is used by at least 500,000 shorebirds annually. Between 1988 and 1995, the Bay supported 41.4 to 96.5 percent of the key species of shorebirds surveyed along the Pacific Flyway in the fall, 37.8 to 90.1 percent in the winter, and 24 to 85.6 percent in the spring. No other site within the Pacific Flyway supported more than 16.1 percent of these species in the fall, 32.9 percent in the winter, and 27.5 percent in the spring (Page et al., 1999). Tidal bayflats in particular offer important habitat and a migratory staging area for shorebirds.

Tidal marshes in the Bay also provide foraging, nesting, and roosting habitat for many tidal marsh species endemic to the area. Many of these species are listed as threatened or endangered by the state or federal governments or are recognized as species of special concern. A discussion of the distribution of these species is included in the species accounts in Protected Species and Habitats, along with a discussion of all of the bird species with either federal or state protection status.

A recently concluded 3-year bird survey of the North Basin, just north of Berkeley Meadows, was undertaken by Avocet Research Associates (ARA) for the CDPR. Although the results are not yet published, at least 122 species of birds were observed.

Waterbirds

Each year, typically in January, the USFWS conducts a mid-winter survey of the distribution and number of waterfowl present in the San Francisco Bay. Accurso (1992) analyzed the species and distribution of waterfowl in the Bay from 1988 to 1990. These data, while 10 years old, still provide the most detailed information available concerning the distribution of waterfowl species in the Bay as a whole. When available, the ARA 3-year survey should provide up to date and similarly detailed information for the study area. All of the birds discussed below in relation to their bay abundance were observed within the study area by the ARA study.

Forty-eight and 68 percent of all waterfowl in San Francisco Bay used the open Bay in 1988-1989 and 1989-1990, respectively (not including Suisun Bay) (Accurso, 1992).

The most predominant birds in the open Bay are diving ducks. Dabbling ducks such as mallard (*Anas platyrhynchos*), northern pintail (*Anas acuta*), and American widgeon (*Anas americana*) are also present in the open Bay, but in smaller numbers, as they tend to prefer seasonal wetlands, salt ponds, and managed marshes surrounding the Bay. Ruddy ducks (*Oxyura jamaicensis*) and bufflehead (*Bucephala albeola*), also diving ducks, are found predominately in the North and South Bay salt ponds (Goals Project, 2000).

Tidal Marsh Birds

Tidal flats are a primary foraging habitat for shorebirds within the Bay. As the amount of wetlands in other parts of the state declines, Tidal marsh and coastal wetlands in the Bay become increasingly more valuable to many waterfowl species. The shorebird species abundance and diversity is greatest in the spring, when these birds stop en route to northern breeding grounds in Canada and Alaska, and in the fall upon their return to South America. Wading birds such as great blue heron (*Ardea Herodias*), great egret (*Ardea alba*), and snowy egret (*Egretta thula*) forage on fish, invertebrates, and small mammals within the marshes. At low tide, shorebirds such as include western sandpiper, dunlin, marbled godwit (*Limosa fedoa)*, willet (*Catoptrophorus semipalmatus*), American avocet, and snowy plover (*Charadrius alexandrinus nivosus*) forage in exposed banks channels. At high tides, Caspian tern (*Sterna caspia*), eared grebe (*Podiceps nigricollis*) and Forster's tern (*Sterna forsteri*), American widgeon, mallard, American coot ((*Fulica americana*), bufflehead, and pied-billed grebe (*Podilymbus podiceps*) make use of the submerged channels. Secretive bird species hiding within marsh vegetation include California clapper rail, and probably sora and Virginia rail (*Rallus limicola*). Alameda song sparrows (*Melospiza melodia pusillula)*, saltmarsh common yellowthroats (*Geothylpis trichas sinuosa)*, and marsh wrens (*Cistothorus palustris*) may nest in the marsh vegetation at higher tidal elevations. Black phoebes (*Sayornis nigricans*) and swallows feed on the aerial insects above the marsh vegetation.

Rocky Shoreline Birds

Some of the few remaining rocky shore habitats in the Bay occur in the Central Bay, and species that use natural rocky shorelines also use the riprap within the study area, either for foraging, or as vital pullout areas for shorebirds species including brown pelicans, cormorants, and gulls (SFEP, 1992) at high tide. Rocky intertidal invertebrates are preyed upon by various birds at low tide. Black oystercatchers, ruddy turnstones, and black turnstones, American crow and western gull (*Larus occidentalis*) have all been observed in the study area foraging amongst the cobbles and pebbles, feeding on mussels and crabs (CDPR, 2001).

Birds of Prey

The study area is also vital habitat for birds of prey. The bare ground and shorter vegetation of beaches and meadow provides good habitat for predatory birds, including American kestrel (*Falco sparverius*), red-tailed hawk *(Buteo jamaicensis*), northern harrier (*Circus cyaneus*), white-tailed kite (*Elanus leucurus*), and burrowing owl (*Athene cunicularia*). Scrub and grassland habitat, particularly within Berkeley Meadow, provides suitable habitat for nesting burrowing owls (CDPR, 2001). White-tailed kite and northern harrier are also known to nest within the study area (Olson, 2007). Piscivorous or fish-eating birds including osprey (*Pandion haliaetus)* and belted kingfisher (*Megaceryle alcyon*) are known to forage in the North Basin.

Terrestrial Birds

The upland habitats within the study area, including grasslands and Coastal scrub, include white-crowned sparrow (*Zonotrichia leucophrys*), song sparrow (*Melospiza melodia)*, California towhee (*Pipilo crissalis)*, and mourning dove (*Zenaida macroura*). Savannah sparrow (*Passerculus sandwichensis*) and western meadowlark (*Sturnella neglecta*), Northern mockingbird (*Mimus polyglottos)*, Brewer's blackbird (*Euphagus cyanocephalus*), red-winged blackbird (*Agelaius phoeniceus)*, Anna's hummingbird (*Calypte anna*), loggerhead shrike (*Lanius ludovicianus*) and lesser goldfinch (*Carduelis psaltria*) all of which may nest in such habitats.

Terrestrial and Marine Mammals

Terrestrial mammals occupy all but the open water habitats of the study area. In tidal marshes, house mouse and Norway rats are present, and bats forage on flying insects. Several species of mice, black-tailed hare (*Lepus californicus*), and raccoon (*Procyon lotor*) may use the sandy beaches and foredunes. Ruderal grasslands and shrub areas host small rodents which include or likely include Meadow vole (*Microtus pennsylvanicus*), house mouse, western harvest mouse (*Reithrodontomys megalotis*), California ground squirrel (*Spermophilus beecheyi)*, and Botta's pocket gopher (*Thomomys bottae*). Black tailed hare and Virginia opossum (*Didelphis virginiana*) also use these areas (CDPR, 2001). Rats and raccoons may also use rocky (and riprap) shorelines and mudflats for foraging activities during low tide. Salt harvest mouse (*Reithrodontomys raviventris*), a state and federally listed endangered species, was found in or near the study area as recently as 1982.

San Francisco Bay supports several common marine mammal species that include the Pacific harbor seal, California sea lion, and occasionally, the gray whale (*Eschrichtius robustus*). No seal or sea lion haul outs or pupping areas occur in the study area (Goals Project, 2000), although both use shallow subtidal areas for foraging. Harbor seals have been observed in the waters of the study area.

The federally listed southern sea otter has been reported at least once within the study area: it was seen swimming and diving offshore of the southwestern end of the Albany bulb in January of 2002 (CDPR, 2001).

All marine mammals are protected by the Marine Mammal Protection Act of 1972, with additional laws protecting species with very low population levels (e.g., sea otter). Other marine mammal species that have been seen occasionally in the Bay include the humpback whale (*Megaptera noveangliae*), harbor porpoise (*Phocoena phocoena*), northern elephant seal (*Mirounga angustirostris*), Steller sea lion (*Eumetopius jubatus*), northern fur seal (*Callorhinus ursinus*), and less frequently, the southern sea otter (*Enhydra lutris*). Due to their protected status, individual marine mammal species are discussed in greater detail in Protected Species and Habitats.

3.9.5 Protected Species and Habitats

Special-status species that occur, or have the potential to occur, in the project vicinity were identified from several sources, including the following: the California Natural Diversity Data Base (CNDDB) (CDFG, 2007), the California Native Plant Society's (CNPS) online Inventory of Rare and Endangered Vascular Plants of California (CNPS, 2007), the USFWS Sacramento Office's Endangered and Threatened Species list (2007), and the CDFG Habitat Conservation Planning Branch (CDFG and Game Habitat Conservation Planning Branch, 2005). CNDDB records from the Oakland West, Richmond, San Quentin, San Leandro, and Mare Island USGS 7.5-minute quadrangle maps were reviewed. The USFWS online species database, which is a predictive database for special-status species, was queried using the Oakland West 7.5 minute quadrangle.

The resulting species list gathered from these sources has been formatted into a table showing the common and scientific names, federal and state status, and a general description of suitable habitat for each species (Appendix F). Species with a strong potential to occur in the study area are discussed in more detail in the text.

3.9.6 Threatened and Endangered Species

Plants

California Sea Blite (*Suaeda californica*). This FESA listed endangered species occupies coastal saltwater marshes and the upper margins of salt flats. Today, this species is known primarily to inhabit the relatively well-drained marshy beach ridges along Morro Bay. The last known specimen collected in San Francisco Bay was in 1943 (Goals Project, 2000). Sand and shell beaches are the principal recovery habitat for California seablite. The only beaches in San Francisco Bay that are considered suitable for restoring this species are located between the Emeryville Crescent (near the Bay Bridge toll plaza) and Albany, at Crissy Field (San Francisco), and at Point Pinole (CDPR, 2001). California seablite is not likely to occur in the study area at present.

Soft Bird's Beak (*Cordylanthus mollis* ssp. *mollis*). Soft bird's beak is an annual herb listed as endangered under FESA and state-listed as rare. This plant occurs in the high brackish marsh zone, typically in the lower end of a well-drained high marsh gradient, on slight topographic relief above the marsh plain. It is often found in association with high marsh vegetation such as pickleweed (*Salicornia virginica*), saltgrass (*Distichlis spicata*), fleshy jaumea (*Jaumea carnosa*), and alkali seaheath (*Frankenia salina*). Soft bird's beak is hemiparasitic, and its numbers fluctuate from year to year. The plant may disappear for a year or more and then regenerate from dormant seed banks. Threats to the species include erosion and marsh drainage. Soft bird's beak is currently found in tidal brackish marshes around the Napa River, Carquinez Strait tidal marsh, and Suisun Marsh area (Goals Project, 2000). The species is recorded as having been observed by M. Roberts at "the tip of the peninsula" at the Brickyard (Robinson, *in* Sloan, 1982). No record of the observation is included in the CNDDB. This species is unlikely to occur in the study area but could be present in relatively undisturbed salt marsh.

Fish

Central California Steelhead (*Oncorhynchus mykiss*). Central California steelhead is federally listed as threatened and is a CDFG species of concern. Steelhead historically ranged throughout the north Pacific Ocean from Baja California to Kamchatka Peninsula. Currently, their range extends from Malibu Creek in southern California to Kamchatka Peninsula (Busby et al., 1996). The Bay and its tributary streams support migrating steelhead populations. Trout can be either anadromous (migrating from freshwater to the ocean and returning to spawn in freshwater) or can complete their entire life cycle in freshwater. Those fish that remain in fresh water are referred to as rainbow trout. Steelhead, the anadromous form of *O. mykiss*, can spend several years in freshwater prior to smoltification and can spawn more than once before dying, unlike most other salmonids (Busby et al., 1996). Spawning runs in the Bay occur from December through May.

Chinook Salmon (*Oncorhynchus tshawytscha*). The species historically ranged from the Ventura River in California to Point Hope, Alaska, on the eastern edge of the Pacific and in the western portion of the Pacific Ocean from Hokkaido, Japan, to the Anadyr River in Russia (Healey, 1991). Chinook salmon consists of four distinct breeding populations or evolutionarily significant units (ESUs) that are endemic to the Sacramento-San Joaquin River system. Factors used in determining ESUs include spatial, temporal, and genetic isolation, maturation rates, and other life history traits. Chinook salmon have been categorized into fall/late fall, winter, and spring ESUs. Each ESU is considered a distinct race and has been given its own management status. Winter-run Chinook salmon has been state and federally listed as endangered, the fall/late fall-run salmon has been state and federally listed as threatened and is federally proposed as endangered, and spring-run salmon is federally proposed as threatened and is a CDFG species of concern.

Three Chinook salmon ESUs migrate through the Bay: Sacramento River winter-run, Central Valley spring-run, and Central Valley fall/late fall-run. The winter-run, a state and federally listed endangered species, spawns in the upper Sacramento River below Keswick Dam. The fall/late fall-run, a state and federally listed threatened species and federally proposed endangered species, spawns in the Sacramento and San Joaquin River basins (Myers et al., 1998). Spring-run Chinook salmon, federally proposed as threatened and a CDFG species of concern, spawn in the Sacramento River Basin. All three runs are most commonly found migrating through the northern and central portions of the Bay (CDFG, 1987).

Coho Salmon (*Oncorhynchus kisutch*). Coho salmon are listed as threatened under FESA and endangered under CESA. This species ranges from Baja California, Mexico, north to Alaska, and southwest to Japan (McGinnis, 1994). This species exhibits a simple 3-year anadromous life cycle (Federal Register, 1999), rearing in freshwater for up to 15 months before migrating to the ocean. Coho salmon typically spend two growing seasons in the ocean before returning to their natal streams to spawn (Federal Register, 1996). The Central California Coast Coho Salmon ESU occurs from Punta Gorda in Northern California south to, and including, the San Lorenzo River in central California, including tributaries to the Bay, but excluding the Sacramento-San

Joaquin River system (Weitkamp et al., 1995). Coho generally return to their natal streams between November and December. Coho no longer spawn in Bay tributaries and are not expected to occur within the Bay.

Birds

California Black Rail (*Latterallus jamaicensis coturniculus*). State listed as threatened, the California black rails reside in larger tidally influenced marshes of the Bay region. They require high-elevation emergent tidal marsh for nesting and breeding. Most, if not all, nesting occurs in the northern portions of the Estuary; however, they have been recorded in the South Bay during the breeding season (Evens et al., 1991). Black rails occur in the Central and South bays in the nonbreeding season, with known populations at Dumbarton Marsh and Palo Alto Baylands (Evens et al., 1991). They were reported in 1999 at the Emeryville Crescent, just south of the study area. Suitable habitat is present in tidal marsh within the study area.

California Brown Pelican (*Pelecanus occidentalis californicus*). The California brown pelican is a state and federally listed endangered species. This species breeds on the California Channel Islands between March and August (Zeiner et al., 1990) and is present in Northern California from June to November. In the Bay, pelicans forage over deep-water habitats and roost on structures such as breakwaters, pilings, and to a lesser extent, salt-pond dikes (USFWS, 1992). Brown pelicans feed almost exclusively on fish in either shallow or deep waters. Brown pelicans are fairly common throughout waters of the Central Bay and San Pablo Bay, and are known to forage subtidally within the study area. They may roost but does not nest on piers and breakwaters within the study area (CDPR, 2001).

California Clapper Rail (*Rallus longistostris obsoletus*). The California clapper rail is a listed as endangered under FESA and CESA and is a state fully protected species. Clapper rails are yearlong residents of emergent salt and tidal marshlands of the Bay (Goals Project, 2000; Zeiner et al., 1990). Loss and degradation of wetland habitat, predation by nonnative red foxes (*Vulpes vulpes*), and sewage effluent in the South Bay have contributed to the population decline of this species (Steinhart, 1990). In the Bay, clapper rails are most abundant in marshes south of San Mateo Bridge and in San Pablo Bay. They probably nested in tidal marshes just north of the study area in 2000, and are known to occur at Emeryville Crescent (CDPR, 2001).

California Least Tern (*Sterna antillarum browni*). The California least tern is a state and federally listed endangered species. It is migratory, breeds in California from April to August, and ranges from southern Baja California and Mexico north to San Francisco Bay. Breeding colonies are generally located in abandoned salt ponds and along estuarine shorelines that are free of predators. California least terns are ground-nesters and nest in colonies on sandy beaches and fine gravel with sparse vegetation (Goals Project, 2000). Due to degradation of more natural nesting habitat, they occasionally nest on dredge-spoil islands, open areas adjacent to airport runways, and industrial ports. Known San Francisco Bay nesting locations of this species include areas in the city of Alameda, Pittsburg Power Plant, and Oakland Airport (Goals Project,

2000). In 2000, Least terns nested on a new shell-covered island just south of Central Avenue. They forage in mudflats and marshes within the study area.

Western Snowy Plover (*Charadrius alexandrinus nivosus*). The western snowy plover is listed by the federal government as a threatened species and by the State of California as a species of special concern. This small shorebird typically occupies sandy beaches and intertidal areas of marine and estuarine habitats, but is known to occur in some inland areas. In San Francisco Bay, it is commonly found on salt pond levees. Western snowy plovers are known to winter in the San Francisco Bay Area. Approximately 250 individuals have been recorded in the Bay during the breeding season (Port of Oakland, 1998). They have been found nesting primarily in the salt ponds south of San Mateo Bridge in the South Bay, although they have also been observed in San Pablo Bay at the Napa-Sonoma salt ponds, and in the Central Bay at Alameda Naval Air Station. It may occur within the study area but was not seen during the most recent survey (Shafer, 2007).

Double-Crested Cormorant (*Phalacrocorax auritus).* The double crested cormorant is a state species of special concern. It is the only cormorant to exist in large numbers both coastally and inland across the continent of North America It is a piscivorous diver which nests in colonies of up to 3,000 birds, either in trees or on the ground. Numbers have been increasing since the 1970s (Hatch and Weseloh, 1999). It is often present in the shallow nearshore and offshore portions of the study area, and no nesting colony is present.

Northern Harrier (*Circus cyaneus)*. The northern harrier is a state species of special concern. It is a raptor which feed primarily on small mammals and birds. Populations declined throughout the 20th century, primarily due to the loss in wetland habitat (MacWhirter and Bildstein, 1996). It occurs throughout the state except for the Sierra Nevada and the Cascade Ranges. Breeding usually occurs in shrubby vegetation within marshes, although nesting may also occur in grasslands or other dry habitats away from water. Harriers forage primarily on small mammals that inhabit a variety of wet and dry habitats. It is known to nest near the northwest corner of the Berkeley Meadow, and suitable foraging and nesting habitat is present throughout the site particularly at Albany Bulb, Neck, and Plateau; Berkeley Meadow and North Basin; and the Brickyard.

White-Tailed Kite (*Elanus leucurus).* The white-tailed kite, a California Fully Protected Species, was considered nearly extinct in California in the 1930s. Little is known about this species, but its habitat preference includes marsh and grasslands, and its numbers are increasing within California. Suitable foraging and nesting habitat is present within plant communities in the study area and it is known to forage in the North Basin.

American Peregrine Falcon (*Falco peregrinus anatum*). A state endangered and fully protected species, the peregrine falcon is known to feed in the Albany mudflat with the study area and in the Emeryville Crescent south of the study area. Famous for its amazing speed, this falcon can stoop at up to 200 mph when chasing the small birds which are its prey. Peregrine numbers crashed to near extinction between 1950 and 1970 due to dichloro-diphenyl-

trichloroethane (DDT) poisoning, and populations are now recovering (White et al., 2002.). The historic range of the American peregrine falcon extends throughout North America from the boreal forests south into Mexico (USFWS, 1992). Peregrines generally nest on protected ledges of high cliffs in woodland, forest, and coastal habitats; however, pairs are also known to nest on human-made structures such as bridges and buildings. Although no nest sites are known within the study area, it does nest nearby on the Bay Bridge.

Osprey *(Pandion haliaetus)*. Like the peregrine falcon, osprey numbers declined rapidly with the advent of DDT in the 1950s. Now listed as a state species of special concern, the exclusively fish eating raptor is making a strong comeback (Poole et al., 2002). It has been seen foraging in the North Basin.

Burrowing Owl *(Athene cunicularia hypugea)*. The burrowing owl, a state species of special concern, typically inhabits open, dry grassland habitat but can also be found in areas with low-growing vegetation such as along levees and berms, and in urban settings such as golf courses, airports, and undeveloped lots. Burrowing owls use burrows for botshelter, and nests, and often use the burrows of California ground squirrels and other burrowing mammals. They will also make use of manmade structures such as pipes, and culverts.

Many individuals are year-round residents in California, while others are seasonal visitors. They feed primarily on insects but will also catch and eat small mammals, reptiles, and birds. They will often collect dung to their burrows, to attract insect prey. A major source of mortality for the owls is collision with cars (Haug et al., 1993; Levy et al., 2004). Burrowing owls have been reported in the study area in ruderal grassland and ruderal scrub habitats, although it is unknown whether the owls use these areas year-round or if breeding occurs. Individuals have been observed in recent years at the Albany Bulb (around piles of concrete), the North Basin Strip, the south shoreline of the North Basin (in riprap), and south of University Avenue (west of the Strawberry Creek outfall). Suitable habitat and nesting sites are a component of the Berkeley Meadows restoration.

Saltmarsh Common Yellowthroat *(Geothlypis trichas sinuosa)*. Destruction of wetlands was a major factor for the population decreases in this small warbler, a California species of special concern, which experienced an 80 percent decline from the early 20th Century to 1976 due to loss of suitable habitat, with this diminution most exacerbated in the South Bay (Goals Project, 2000). It is mostly a resident in the fresh and brackish marsh habitat surrounding the Bay, moving into saline tidal marshes in winter. An insectivore, it usually picks insect prey from surfaces, though it will also chase prey on the wing. It occurs at Emeryville Crescent and along the Albany shoreline. Suitable nesting habitat is present within tidal marsh and scrub habitats in the study area.

Alameda Song Sparrow *(Melospiza melodia pusillula)*. Endemic to the San Francisco Bay, the Alameda song sparrow is one of three song sparrow subspecies endemic to saltwater marshes. It is also the most genetically distinct of the three, which also include Samuels and Suisan song sparrows, also endemic to this region. It is a year round resident that faces intense pressure from

habitat fragmentation and loss. It is found in only 10 percent of the remaining tidal marsh habitat within the South and Central Bay, including the Emeryville Crescent, just south of the study area. Suitable nesting habitat is present within tidal marsh, non-tidal salt marsh, and adjacent upland habitats within the study area, (Elliott, 2002).

Mammals

Salt Marsh Harvest Mouse (*Reithrodonyomys raviventris*). The salt marsh harvest mouse is listed as endangered under both FESA and CESA and is a state fully protected species. Salt marsh harvest mice are endemic to tidal and brackish marsh habitats of the Bay, where they occur in areas of dense cover, preferably where pickleweed constitutes 60 percent or more of the vegetation (Shellhammer, 1984). These mice are most commonly associated with large tidal marshes of the both the North and South bays that have extensive high marsh zones. Smaller marshes do not usually provide adequate cover for mice during periods of high tide. Vegetated levees and other grassy upland habitats adjacent to pickleweed marshes are also critical as they provide shelter from predators during high tides and flooding. Salt marsh harvest mice build nests on the ground amongst the marsh vegetation or use old nests from groundnesting birds. They breed from May to November with peak activity occurring in summer and fall. Salt-marsh harvest mice were found in the Emeryville Crescent in 1982. However, there are no other records of occurrence in the tidal marshes within the study area.

Southern Sea Otter (*Enhydra lutris*). The southern sea otter is considered a threatened population under FESA and is protected by the Marine Mammal Protection Act of 1972. Approximately 16,000 to 18,000 sea otters were formerly distributed along the California coastline. After extensive harvesting in the 18th and 19th centuries, fewer than a hundred sea otters remained off the isolated coastline of Big Sur, California. After years of protection, the population increased to 500 to 600 individuals by 1950 and, thereafter, increased by approximately 5 percent annually until 1976, when the increase slowed (Estes, 1990). Currently, about 2,200 individuals exist in the southern sea otter range, and they have expanded their range to north of Santa Cruz (about Half Moon Bay), and are only occasionally seen in the Bay.

Within the study area, a sea otter was seen swimming and diving offshore of the southwestern end of the Albany bulb in January of 2002 (RI). This and other recent observations of sea otters within the Bay confirm that sea otters may be taking up residence in the Bay.

3.9.7 Other Special-Status Species

Plants

Point Reyes Bird's-Beak (*Cordylanthus maritimus* ssp. *palustris*). Point Reyes bird's-beak is listed as a CNPS 1B species. It is a hemiparasitic annual herb that occurs in high sandy salt marshes (Goals Project, 2000). Associated plants include marsh gumplant (Grindelia stricta var. *stricta),* seaside lavender *(Limonium californicum),* and sandspurry *(Spergularia sp.).* The known range of Point Reyes bird's-beak extends from northern Oregon to Marin and Sonoma counties in the North Bay with small remnant populations known both from Petaluma Marsh and

near Gallinas Creek in Marin County. Historically, this species was also known to occur as far south as Santa Clara and San Mateo counties (Skinner and Pavlik, 1994). Threats to the species include development, competition from invasive species, and cattle grazing. It is not thought to be currently present within the study area, but is considered extirpated as of 1996 (RI).

Fish

Green Sturgeon (*Acipencer medirostris*). Green sturgeon are a federally threatened species. Green sturgeon are not abundant in any estuaries along the Pacific Coast but are known to exist in the Estuary (Pycha, 1956; Skinner, 1962; Moyle, 1976). Green sturgeon are anadromous fish that spend most of their lives in saltwater and return to spawn in freshwater. Green sturgeon rely on streams, rivers, and estuarine habitat as well as marine waters during their lifecycle. They spawn in the lower reaches of large rivers with swift currents and large cobble. Juveniles remain in the estuaries for a short time and migrate to the ocean as they grow larger. Green sturgeon are found throughout the Bay and are native to the Sacramento-San Joaquin River system. Spawning occurs in the lower reaches of the Sacramento-San Joaquin River system; however, feeding occurs throughout the Bay. Sturgeon often feed on invertebrates and small fish and are common in areas where herring spawn.

Birds

Caspian Tern (*Sterna caspia*). Nesting colonies of Caspian tern are of concern; however, this species is listed as "demonstrably secure; commonly found throughout its historic range" (CDFG, 2008). Active South Bay and Central Bay colonies are located at Coyote Hills (west levee), Alviso Pond A7, Hayward Shoreline, Ravenswood Slough, Brooks Island, and Naval Air Station Alameda (Goals Project, 1999). It is known to forage within the study area in the North Basin (Shafer, 2007).

Common Loon (*Gavia immer*). The common loon is listed by the CDFG as a California Special Concern species with a "demonstrably secure" population. The common loon is observed in the Bay, but their nesting sites, which do not occur in the Bay region, are of primary concern (Zeiner et al., 1990). It is known to forage within the study area in the North Basin (Shafer, 2007).

Elegant Tern (*Sterna elegans*). The elegant tern is a CDFG species of special concern, and its nesting colonies are protected. Elegant terns are post-nesting visitors to coastal California north of San Diego, generally between June and October (Zeiner et al., 1990). In the Bay, this species is most often observed foraging or roosting near breakwaters and marinas in the Central Bay. It is known to forage within the study area in the North Basin (Shafer, 2007).

Long-Billed Curlew (*Numenius americanus*). Long-billed curlew is a federal and CDFG species of special concern. Long-billed curlews commonly winter in the Central Valley, where they occupy seasonal wetland habitats. Smaller numbers of curlews also winter in San Francisco Bay. This species breeds within the northeastern portion of the state in grassland or wet meadow habitats that are usually adjacent to lakes or marshes. Conversion of these breeding grounds to

agricultural areas is believed to be the primary cause for the decline of this species in the state (Zeiner et al., 1990). It is known to forage within the study area in the North Basin (Shafer, 2007).

Song Sparrow (*Melospiza melodia*). Three subspecies of song sparrow reside year-round in marshlands of San Francisco Bay: Alameda song sparrow (*Melospiza melodia pusillula*), discussed above, San Pablo song sparrow (*M. m. samuelis*), and Suisun song sparrow (*M. m. maxillaris*). All three subspecies are federal species of concern and CDFG species of special concern. The Alameda and San Pablo song sparrows are found predominantly in tidal salt marsh, which provides optimum habitat for all life needs as long as the marsh contains numerous small channels and complex vegetation structure. Tidal brackish marsh dominated by tall hardstem bulrush (*Scirpus acutus)*, salt marsh bulrush (*S. robustus)*, and concentrated areas of pickleweed and gumplant provides habitat for the Suisun song sparrow. The birds generally forage along the banks of sinuous tidal channels and use gumplant bushes for nest sites and song perches. The San Pablo song sparrow ranges from San Pablo Bay and northern San Francisco Bay (south to Sausalito and north Richmond), with the most suitable habitat in Petaluma Marsh. The Alameda song sparrow is found in the San Francisco Bay shores, breeding from San Francisco and southeast Richmond south to Alviso. Their highest-quality habitat is located in Dumbarton Marsh, Greco Island, and Outer Bair Island. The Suisun song sparrow is found within the Suisun Bay marsh complex and west to include Southhampton Bay (Goals Project, 2000).

Densities of all of the song sparrow species (Alameda song sparrow, San Pablo song sparrow, and Suisun song sparrow) are lower in the Central/South Bay, with a median of 3.7 birds/hectare for the tidal marshes surveyed, than in San Pablo Bay (18 birds/hectare) and Suisun Bay (26 birds/hectare) (Nur et al., 1997). Densities in San Pablo Bay range from 3.7 to 94 birds/hectare. They range from 7.6 to 46 birds/hectare in Suisun Bay. Highly channeled marshes were directly correlated to higher song sparrow density for this species.

Mammals

California Sea Lion (*Zalophus californianus*). The California sea lion is protected under the Marine Mammal Protection Act. California sea lions breed in Southern California and along the Channel Islands. After the breeding season, males migrate up the Pacific Coast and enter the Bay. In the Bay, sea lions are known to haul out at Pier 39 in the Fisherman's Wharf area of the San Francisco Marina. An estimated 600 animals were observed in January and February 1991 at that haul-out site (USFWS, 1992). In addition to that site, California sea lions have the potential to haul out on buoys and similar structures throughout the Bay. No other repeatedly used haul-out site for California sea lions, other than Pier 39, has been observed in the Bay (Allen, 1999). During anchovy and herring runs, approximately 400 to 500 sea lions (mostly immature males) feed almost exclusively in the North and Central bays (USFWS, 1992). California sea lions are occasionally observed in the offshore portions of the study area (RI).

Gray Whale (*Eschrichtius robustus*). Gray whales are protected by the Marine Mammal Protection Act of 1972 (as are all marine mammals including seals and sea lions), and were recently delisted as an endangered species. Gray whales migrate each year along the west coast of North America, typically passing off the coast of San Francisco heading south from December through February and heading north from mid-February through July. The population has recently reached a level thought to be near carrying capacity (approximately 26,000 animals), which may explain why more gray whales have been observed feeding of the coasts of British Columbia, Washington, Oregon, and California rather than migrating the entire way to Alaska.

Gray whales consume benthic prey (primarily amphipods) in North America (e.g., Bering, Beaufort, and Chuckhi Seas) during summer and migrate south along the west coast of North America to calve and breed off the coast of Mexico. During the migration, gray whales will occasionally enter rivers and bays (such as San Francisco Bay) along the coast either because they are disoriented or to forage. Recently, small numbers of gray whales (presumably juveniles and post-weaning females) have been observed foraging along the nearshore coastline of California, Oregon, Washington, and British Columbia during summer and are remaining there instead of migrating northward as do the bulk of the population (Sumich, 1985).

In the past, gray whales have been seen irregularly in the Bay. These whales are probably individuals that meandered off during the migration. Most of these individuals eventually make their way out of the Bay, although occasionally an individual has died. The number of gray whales sighted in the Bay has increased recently. The Sea Training Institute reported two gray whales in the Bay during 1999 and six in 2000, although some of these may be repeat sightings. The Oceanic Society has observed and recorded reported gray whales in the Bay during Spring 2000.

Pacific Harbor Seal (*Phoca vitulina*). The harbor seal is protected by the Marine Mammal Protection Act. Harbor seals are nonmigratory and can be found along shorelines and in estuaries throughout North America. Pacific harbor seals use the Bay year-round where they engage in limited seasonal movements associated with foraging and breeding activities (Kopec and Harvey, 1995). Harbor seals haul out in groups ranging in size from a few individuals to several hundred seals. Habitats used as haul-out sites include tidal rocks, bayflats, sandbars, and sandy beaches (Zeiner et al., 1990). Haul-out sites are relatively consistent from year to year and are important habitats for harbor seals (Kopec and Harvey, 1995). In the Bay, pupping occurs from March to May, and molting in June and July (Kopec and Harvey, 1995). These activities correspond to the greatest number of harbor seals counted at major haul-out sites in the Bay (Kopec and Harvey, 1995). Haul-out sites that support some of the largest concentrations of seals include Corte Madera Marsh and Castro Rocks in the Central Bay, Mowry Slough south of Dumbarton Bridge, and Yerba Buena Island.

Harbor seals forage in shallow, intertidal waters on a variety of fish, crustaceans, and a few cephalopods (e.g., octopus). They also consume benthic organisms as well as schooling fishes. The most numerous prey items identified in harbor seal fecal samples from haul-out sites in the

Bay include yellowfin goby, northern anchovy, Pacific herring, staghorn sculpin, plainfin midshipman, and white croaker) (Harvey and Torok, 1994).

Harbor seals have been observed in the waters of the study area, in the North Basin, on Brooks Island, and in the surrounding waters, in recent years (CDPR, 2001).

Special Aquatic Sites

Under Section 404 of the CWA, USACE regulates the disposal of dredged and fill materials into "waters of the United States." Waters of the U.S. include intrastate lakes, rivers, streams (including intermittent streams), bayflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, and wetlands adjacent to any water of the U.S. (33 CFR Part 328). In areas subject to tidal influence, Section 404 jurisdiction extends to the high tide line or to the boundary of any adjacent wetlands. Certain waters of the U.S. are considered "special aquatic sites" because they are generally recognized as having unique ecological value. Such sites include sanctuaries and refuges, mudflats, wetlands, vegetated shallows, eelgrass bed, coral reefs, and riffle and pool complexes. Special aquatic sites are defined by the U.S. EPA, and may be afforded additional consideration in the permit process for a project. The following describes eelgrass, wetlands, and tidal marshes.

Eelgrass (*Zostera marina*) is a native marine vascular plant indigenous to the soft-bottom bays and estuaries of the Northern Hemisphere. It has been afforded special management considerations by CDFG, USFWS, NMFS, and the Golden Gate Audubon Society. The species is found from middle Baja California and the Sea of Cortez to northern Alaska along the west coast of North America, and is common in healthy, shallow bays and estuaries. The habitat provided by eelgrass beds is described in Section 3.9.3, Habitat Types. Eelgrass is easily affected by changes in water quality and turbidity. Eelgrass beds are extremely dynamic, expanding and contracting by as much as several hectares per season depending on the quality of the site. Consequently, they serve as an indicator community for the overall health of an estuary. Figure 3-23 shows potential eelgrass habitat within the study area.

3.10 WATER RESOURCES

This section presents a description of the existing water and sediment quality in the Bay waters offshore of the four alternative ferry terminal sites. Sediment quality can influence water quality due to the movement and suspension of sediments under tide and current action.

All alternative ferry terminal sites and approach channels are located in the eastern portion of Central San Francisco Bay. Alternative A is located within the confines of the Berkeley Marina and Alternative B is adjacent to shallow water of the eastern Bay. The proposed terminal site for Alternative C is adjacent to the offshore portion of Eastshore State Park known as the North Basin and the approach channel would pass through the North Basin. Similarly, the proposed terminal site for Alternative D is adjacent to the offshore Fleming Point portion of Eastshore State Park and the approach channel would pass through this portion of the Park.

3.10.1 Regulatory Framework

Water resources are regulated under a variety of federal and state laws. The regulations apply to both preservation of water quality standards and to prevention of water quality degradation from oils spills and other sources including the underlying sediments.

Federal Regulations

Federal Water Pollution Control Act, as Amended by the Clean Water Act of 1977 (33 USC 1251 et seq.)

The objective of the CWA is to restore and maintain the chemical, physical, and biological integrity of the nation's waters. Specific sections of the CWA control the discharge of pollutants and wastes into the marine and aquatic environments. The major sections of the CWA that apply to activities potentially occurring as parts of the proposed project include dredging and disposal activities (Sections 401 and 404) and the National Pollutant Discharge Elimination System (NPDES) (Section 402).

Oil Spill Regulations

At the federal level, two agencies hold key regulatory authority regarding oil spills. The USCG is focused on prevention and response, while NOAA is focused on restoration of oil-damaged resources. The CWA, Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), and Oil Pollution Act (OPA) mandate that parties releasing hazardous materials and oil into the environment are responsible not only for the cost of cleaning up the release, but also for restoring any injury to natural resources that resulted. The National Marine Sanctuaries Act (NMSA) mandates that parties who destroy, cause the loss of, or injure sanctuary resources are responsible for their restoration.

Oil Pollution Act of 1990 (33 USC 2701-2761). This is the principal statute governing oil spills into the nation's waterways. The OPA was passed in the wake of the Exxon Valdez oil spill in March of 1989. The statute establishes liability and limitations on liability for damages resulting from oil pollution, and establishes a fund for the payment of compensation for such damages. In conjunction with CERCLA, OPA mandates a "National Oil and Hazardous Substances Pollution Contingency Plan (NCP)" to provide the organizational structure and procedures for preparing for and responding to discharges of oil and releases of hazardous substances, pollutants, and contaminants. OPA requires preparation of spill prevention and response plans by coastal facilities, vessels, and certain geographic regions. OPA amended the CWA and includes the Oil Terminal and Oil Tanker Environmental Oversight and Monitoring Act of 1990.

Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA or Superfund) (42 USC 9601 et seq.). This is the principal statute governing the cleanup of sites contaminated with hazardous substances, and responses to spills of those substances. The statute establishes liability for site cleanup, prescribes a procedure for identifying and ranking contaminated sites, provides funding for site cleanups, reduces

uncontrolled releases of hazardous substances, establishes cleanup procedures that provide protection for humans and the environment, and restores injured natural resources through provisions administered by the natural resource trustees. In conjunction with OPA, it also mandates an NCP to provide the organizational structure and procedures for preparing for and responding to discharges of oil and releases of hazardous substances, pollutants, and contaminants. The statute was amended by the Superfund Amendment and Reauthorization Act (SARA) in 1986, which adds extensive public "right-to-know" and emergency planning requirements, establishes a fund for leaking underground storage tanks (USTs), and imposes worker safety requirements for hazardous materials.

National Marine Sanctuaries Act (16 USC 1431 et seq.). This statute governs the designation and management of protected marine areas of special significance. The statute requires NOAA to designate National Marine Sanctuaries in accordance with specific guidelines and to develop and review management plans for these sites. It provides for the continuation of existing leases, licenses, and other established rights in sanctuary areas, and for the development of research and education programs. The statute also prohibits destruction, injury, or loss of sanctuary resources, and establishes liability for response costs and natural resource damages for injury to these resources.

The Ports and Waterways Safety Act of 1972 (33 USC 1221 et seq.)

The Ports and Waterways Safety Act of 1972 as amended by the Port and Tanker Safety Act of 1978, provides the strongest authority for the USCG's program to increase vessel safety and protect the marine environment in ports, harbors, waterfront areas, and navigable waters. It authorizes VTS, controls vessel movement, establishes requirements for vessel operation, and other related port safety controls.

In addition, a number of other laws call for USCG enforcement. These include the Federal Water Pollution Control Act, which delegates enforcement authority and responsibility to the USCG in cases where oil and hazardous substances are discharged into U.S. waters in harmful quantities. The Act to Prevent Pollution from Ships (33 USC 1901 et seq.) limits the operational discharges of oil from ships and requires reception facilities to receive waste that cannot be discharged at sea. The Marine Protection, Research and Sanctuaries Act of 1972 (33 USC 1401 et seq.) requires USCG surveillance of ocean dumping activities. The OPA of 1990 (33 USC 2701 et seq.) requires increased USCG involvement with vessel traffic service systems, vessel and facility monitoring, and oil spill prevention and cleanup, in addition to amending the Federal Water Pollution Control Act.

NOAA established the Damage Assessment and Restoration Program (DARP) in 1990 to fulfill natural resource trustee responsibilities assigned in the CWA, CERCLA, OPA, and the NMSA and other federal laws. DARP has the mission to restore coastal and marine resources that have been injured by releases of oil or hazardous substances and to obtain compensation for the public's lost use and enjoyment of these resources.

State

Water Quality Control Act (Porter-Cologne Act) (California Water Code Section 13000 et seq.; CCR Title 23, Chapter 3, Subchapter 15)

The Porter-Cologne Water Quality Control Act is the primary state regulation that addresses water quality. The requirements of the Act are implemented by the State Water Resources Control Board (SWRCB) at the state level, and the Regional Water Quality Control Board (RWQCB) at the regional level. The SWRCB, as authorized by the Act, has promulgated regulations in Subchapter 15 of Title 23 of CCR designed to protect water quality from the effects of waste discharges to land. Under Subchapter 15, wastes that cannot be discharged directly or indirectly to waters of the state (and therefore must be discharged to land for treatment, storage, or disposal) are classified to determine specifically where such wastes may be discharged. This classification requirement would apply to dredged material or fill that would be disposed of in an upland environment.

In addition to the provisions contained in the Lempert-Keene-Seastrand Oil Spill Prevention and Response Act, the California Fish and Game Code provides general law regarding water pollution prohibitions and both criminal and civil penalties on discharges of petroleum and other hazardous materials entering California waters (Sections 5650 et seq.). State Fish and Game wardens enforce these sections.

Further, California Water Code Section 13272 requires any person who knows of any oil or petroleum product discharge into California waters to notify the Office of Emergency Services. Failure to comply is a misdemeanor.

All Oil Spill Prevention and Response regulations are found in Title 14, CCR. Regulations promulgated by the State Lands Commission are found in Title 2, CCR.

California State Lands Commission Marine Facilities Division derive legislative authority from the Lempert-Keene-Seastrand Oil Spill Prevention and Response Act of 1990 Division 7.8 of the Public Resources Code. The Act expanded the California State Lands Commission's pollution prevention responsibilities.

Local

Water Quality Control Plan for San Francisco Bay Basin

The Basin Plan identifies surface waters in the region as consisting of inland surface water (freshwater lakes, rivers, and streams), estuaries, enclosed bays, and ocean waters. Historical and ongoing wasteloads contributed to the surface water bodies in the region come from upstream discharges carried into the region via Delta outflow, direct input in the forms of point and nonpoint sources, and indirect input via groundwater seepage (RWQCB, 2006). The Basin Plan describes the water quality control measures that contribute to the protection of the beneficial uses of the Bay watershed. The Basin Plan identifies beneficial uses for each segment

of the Bay and its tributaries, water quality objectives for the reasonable protection of the uses, and an implementation plan for achieving these objectives.

McAteer-Petris Act (Public Resources Code Section 66600 et seq.)

The BCDC is responsible for implementing the McAteer-Petris Act. The Act directs BCDC to exercise its authority to issue or deny permit applications for placing fill, extracting minerals, or changing the use of any land, water, or structure within the area of its jurisdiction (the Bay waters and a 100-foot-wide shoreline band inland from the high tide line). The BCDC also carries out determinations of consistency with the Federal Coastal Zone Protection Act for federally sponsored projects.

3.10.2 Study Area

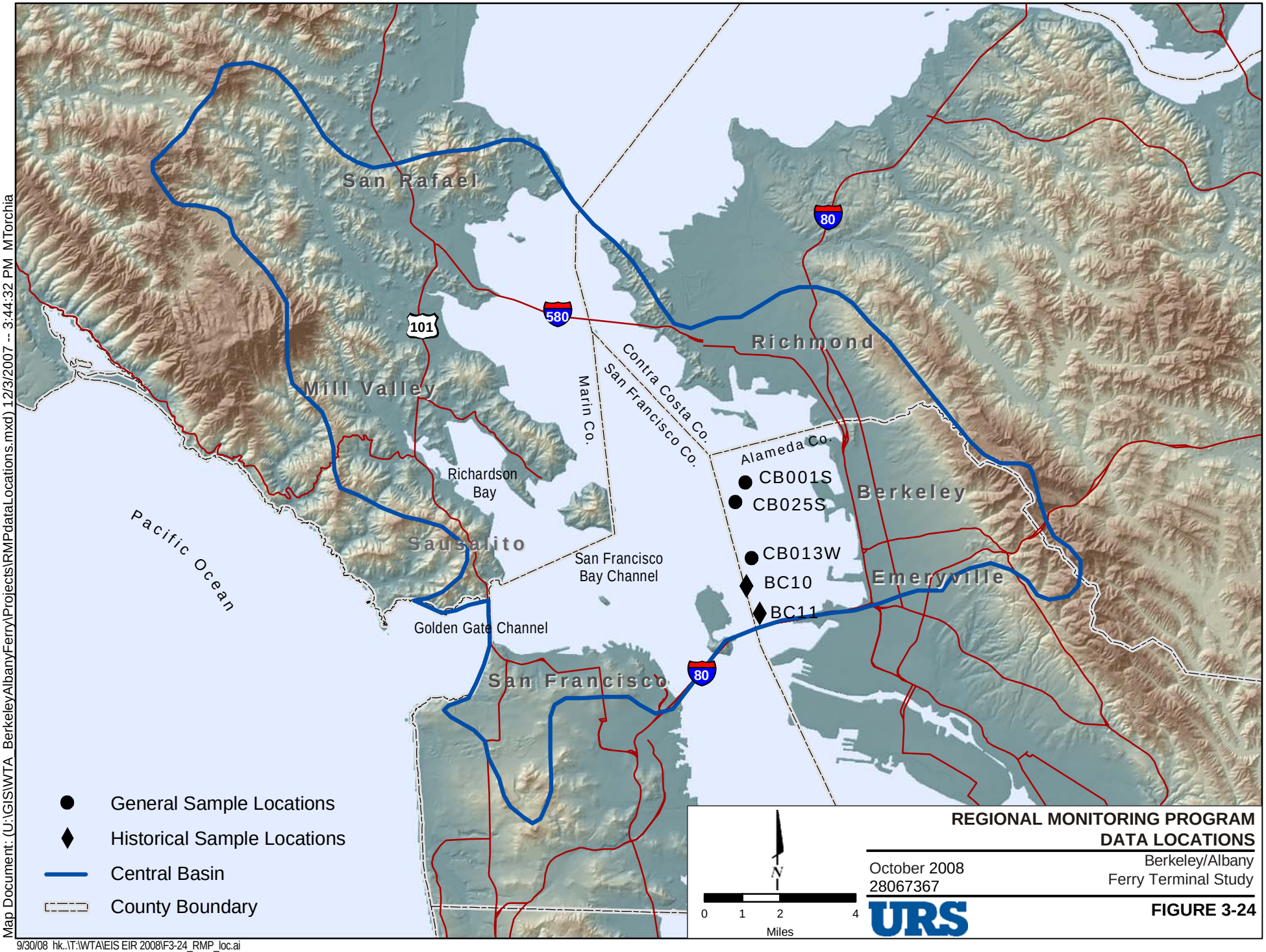
The four alternative terminal sites are located in the eastern portion of Central San Francisco Bay. San Francisco Bay and the San Joaquin-Sacramento River Delta form the West Coast's largest estuary, combining fresh water from the rivers and numerous smaller tributaries flows with the influence of the Pacific Ocean. The San Francisco Bay Estuary (Estuary) currently encompasses roughly 1,600 square miles, drains more than 40 percent of the state, and provides drinking water to approximately two-thirds of California (SFEP, 1999). The Estuary is composed of distinct hydrographic regimes: the South Bay, which extends from the Bay Bridge to the southern terminus of the Bay in San Jose, and the Central Bay which extends from the Bay Bridge north to the Richmond-San Rafael Bridge, and North Bays that connect the Delta and the Pacific Ocean.

Central Bay has a complex bathymetry and contains several islands (Figure 3-24). Water depth is highly variable ranging from approximately 300 feet near the Golden Gate Bridge to a shallow area of extensive intertidal mudflats at the eastern edge of the Central Bay. The project sites are adjacent to the eastern intertidal mudflat area.

Freshwater inflows, tidal flows, and their interactions largely determine variations in the hydrology of the Estuary. Hydrology has profound effects on all species that live in the Estuary because it determines the salinity in different portions of the Estuary, and controls the circulation of water through the channels and bays.

Approximately ninety percent of the freshwater inflow to the Bay comes from the Delta (Cheng et al., 1993) and flows through the northern portion of the Bay, resulting in a partially to well-mixed Estuary (Walters et al., 1985; Uncles and Peterson, 1995). The degree of mixing depends on seasonally varying river inflow. The timing and magnitude of the highly seasonal river inflow modulates permanent estuarine circulation, which is largely maintained by salinity-controlled density differences between river and ocean waters.

Beneficial uses of the Bay include commercial and sport fishing, estuarine habitat, industrial water supply, fish migration, navigation, industrial process water supply, preservation of rare and endangered species, contact and non-contact water recreation, shellfish harvesting, fish spawning, and wildlife habitat (RWQCB, 2006).



REGIONAL MONITORING PROGRAM DATA LOCATIONS

October 2008
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Berkeley/Albany
Ferry Terminal Study

URS

FIGURE 3-24

Map Document: (U:\GIS\WTA_BerkeleyAlbanyFerry\Projects\RMPdataLocations.mxd) 12/3/2007 -- 3:44:32 PM MTorchia

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3.10.3 Water Quality

The water quality goals of the Water Quality Control Plan for San Francisco Bay Basin (Basin Plan) (RWQCB, 2006) are to protect and maintain thriving aquatic ecosystems and the resources those systems provide to society, and to accomplish these goals in an economically and socially sound manner.

The San Francisco Estuary Institute (SFEI) has administered the Regional Monitoring Program (RMP) for the RWQCB since 1993. SFEI conducts water quality and sediment monitoring three times a year at designated sampling location along the central line of the Bay including water quality sampling locations CB13W and BC10, and sediment sampling locations CB001S, CB025S, and BC11 (Figure 3-24). The stations designated "BC" are historical sampling locations at which data was collected before the RMP program was formalized.

The goal of the RMP is to characterize contaminant concentrations in San Francisco Estuary water, sediment, fish, and shellfish to determine how contaminant concentrations in the estuary are changing in response to pollution prevention and reduction measures. The program's key objectives are to; describe patterns and trends in contaminant concentration and distribution, to describe contamination sources and loads, to measure contaminant effects, and to compare monitoring information to water quality objectives; and to present the most complete picture possible of the sources, distribution, fates, and effects of contaminants in the estuary ecosystem. To achieve this objective, the RMP routinely monitors water quality salinity and chemistry, water toxicity, sediment characteristics and chemistry, sediment toxicity, and contaminant bioaccumulation in transplanted shellfish.

The most recent annual RMP data are presented in Annual Report 2004-2005 (SFEI, 2006a) and the *Pulse of the Estuary* 2006 (SFEI, 2006b) which summarize trends and issues. The *Pulse of the Estuary* summarized the status of chemical contamination in the Estuary using RMP results and indicated top known contamination issues being faced in the Bay include:

- High levels of mercury and polychlorinated biphenyls (PCBs) in fish and water;
- Water quality objectives for cyanide, copper and nickel;
- Pyrethroid insecticides from the Delta which are highly toxic to fish; and
- Brominated flame retardants (PBDEs) and fluorinated stain repellants (PFCs) that are appearing in water and sediment.

Regional Monitoring Program Findings

Data from monitoring stations CB13W and BC10 are shown in Table 3-26.

Table 3-26
RMP 2004-2005 Water and Sediment Quality Data

Compound	Water Data		Sediment Data		
	BC10	CB13W	BC11	CB001S	CB025S
Dissolved Organic Carbon	>1,500 µg/L	1,500 µg/L	1.3% total	1.4% total	1% total
Suspended Solids Concentration	>20 mg/L	20 mg/L	NA**	NA**	NA**
Dissolved Arsenic	1.5 µg/L	1.5 µg/L	NA**	NA**	NA**
Dissolved Cadmium	0.05 µg/L	0.05 µg/L	NA**	NA**	NA**
Dissolved Copper	0.5 µg/L	0.5 µg/L	NA**	NA**	NA**
Dissolved Lead	0.05 µg/L	0.05 µg/L	NA**	NA**	NA**
Dissolved Mercury	ND*	ND*	NA**	NA**	NA**
Dissolved Nickel	0.5 µg/L	0.5 µg/L	NA**	NA**	NA**
Dissolved Selenium	0.1 µg/L	0.1 µg/L	NA**	NA**	NA**
Dissolved Silver	0.002 µg/L	0.002 µg/L	NA**	NA**	NA**
Salinity	30 psu	30 psu	NA**	NA**	NA**
Dissolved Zinc	0.4 µg/L	0.4 µg/L	NA**	NA**	NA**
Total Arsenic	1.5 µg/L	1.5 µg/L	6 mg/kg	10 mg/kg	10 mg/kg
Total Cadmium	0.08 µg/L	0.06 µg/L	.2 mg/kg	0.2 mg/kg	0.2 mg/kg
Total Copper	1 µg/L	1 µg/L	40 mg/kg	40 mg/kg	20 mg/kg
Total Lead	0.5 µg/L	0.5 µg/L	10 mg/kg	10 mg/kg	10 mg/kg
Total Mercury	0.005 µg/L	0.005 µg/L	0.3 mg/kg	0.3 mg/kg	0.15 mg/kg
Total Nickel	2 µg/L	2 µg/L	90 mg/kg	90 mg/kg	90 mg/kg
Total Selenium	0.05 µg/L	0.05 µg/L	0.2 mg/kg	0.2 mg/kg	0.2 mg/kg
Total silver	0.05 µg/L	0.01 µg/L	ND*	0.1 mg/kg	0.1 mg/kg
Total Zinc	2 µg/L	2 µg/L	80 mg/kg	80 mg/kg	60 mg/kg
Dissolved Dieldrin	<20 pg/L	20 pg/L	.08 µg/kg	0.08 µg/kg	0.08 µg/kg
Dissolved sum of Chlordanes	<10 pg/L	10 pg/L	.1 µg/kg	0.1 µg/kg	0.1 µg/kg
Dissolved Sum of DDTs	40 pg/L	20 pg/L	2 µg/kg	2 µg/kg	2 µg/kg
Dissolved sum of HCHs	350 pg/L	300 pg/L	NA**	NA**	NA**
Dissolved sum of PAHs	20,000 pg/L	20,000 pg/L	1000 µg/kg	3000 µg/kg	5000 µg/kg
Dissolved Sum of PCBs	100 pg/L	100 pg/L	<5 µg/kg	5 µg/kg	5 µg/kg
Total BDE-47	50 pg/L	50 pg/L	0.8 µg/kg	0.4 µg/kg	0.4 µg/kg
Percent Fines <63 um	NA**	NA**	90%	70%	70%
Methyl Mercury	NA**	NA**	0.8 mg/kg	0.3 mg/kg	0.3 mg/kg

Notes:
***** Compounds that were not detected in the sampling area.
****** Values were not included in compound sampling results.
µg/kg = micrograms per kilogram; mg/kg = milligrams per kilogram; µg/L = micrograms per Liter; mg/L = milligrams per Liter; psu = practical salinity units; pg/L = picograms per Liter; NA = Not Applicable; ND = Not Detected; PAHs = Polyaromatic hydrocarbons; PCBs = polychlorinated biphenyls

3.10.4 Sediment Quality

Sediment quality is closely monitored by the RMP because of the influence of sediment quality on the quality of overlying waters. Sediment can be both a source of and sink for pollutants and trace compounds. Historic waste disposal practices have resulted in the introduction of pollutants into the Bay, some of which have degraded Bay sediments.

Natural resuspension processes, biological processes, other mechanical disturbances, dredging, and sediment disposal can remobilize particulate-bound pollutants. While pollutant loading to the Estuary from point sources has declined dramatically over the past two decades, and surface sediment contamination may be declining from historical highs, Bay sediments are still an according to grain size, organic carbon content, and seasonal changes associated with riverine flow, flushing, sediment dynamics, and anthropogenic inputs. Anthropogenic inputs appear to have the greatest effect on sediment levels of copper, silver, cadmium, and zinc, but may also have elevated concentrations of chromium, nickel, and cobalt above background (RWQCB, 1999).

The condition of sediment quality is assesses using two types of guidelines; biological effects-based concentrations, and, ambient sediment concentrations (ASCs). Using a wide compilation of biological data, Long (Long et al., 1995) developed two screening-level contaminant concentrations below which adverse were *rarely* and *occasionally* seen (effects range-low [ERL] and effects range-median [ERM], respectively). The RWQCB is also developing ASCs using data from the cleanest areas of the Bay to distinguish between ambient or background conditions and contaminated conditions.

The most recent annual RMP data are presented in Annual Report 2004-2005 (SFEI, 2006a). Data from sediment sampling stations CB001S and CB025S nearest the project area (see Figure 3-24), and historical station BC11 east of Yerba Buena Island are shown in Table 3-26.

California 303(d) List and Total Maximum Daily Loads

Section 303(d) of the CWA requires each state to identify waters that are not achieving water quality standards and to establish TMDLs for water bodies that are impaired. The TMDL is a loading-based approach to attaining water quality rather than reliance on sediment concentrations.

The 2006 California 303(d) list was approved by the State Board in October 2006. The project site falls within the San Francisco Bay, Central watershed. The 303(d) list pollutant, source of pollutant, and proposed completion date for the pollutant TMDL for Central San Francisco Bay are as follows:

Pollutant	Source	TMDL Date
Chlordane	Nonpoint source	2008
DDT	Nonpoint source	2008
Dieldrin	Nonpoint source	2008
Dioxin compounds	Atmospheric Deposition	2019
Exotic species	Ballast water	2019
Furan compounds	Atmospheric Deposition	2019
Mercury	Nonpoint source	2006
PCBs	Nonpoint source	2006
Dioxin-like PCBs	Nonpoint source	2019
Selenium	Nonpoint source	2019

Bay Protection and Toxic Cleanup Program

Sediment "toxic hot spots" in San Francisco Bay where sediment is severely and poses a risk to ecological receptors were identified by the Bay Protection and Toxic Cleanup Program. The Bay Protection and Toxic Cleanup section of the California Water Code (Division 7, Sections 13390-13396.5) established a program (no longer funded) to identify and plan remediation of toxic hot spots in bays and estuaries. Under this law, the RWQCB implemented a program to identify potential toxic hot spots, sample and assess biological impacts in areas of unknown condition, confirm the biological impacts in areas that have been previously sampled, and assess the relationship between toxic pollutants and biological effects. In the Bay region, the RWQCB has reviewed existing data and reports; collected and analyzed new water, sediment, and tissue samples; and prepared reports. The *Final Regional Toxic Hot Spot Cleanup Plan* (RWQCB, 1999) summarizes the situation in the Bay, and identifies Sites of Concern and Candidate Toxic Hot Spots.

The Toxic Hotspot closest to the project area is the Sedge Marsh wetland area located in Contra Costa in the northeast corner of Central Bay. This marsh is approximately one mile north of the Albany Bulb.

3.10.5 Floodplain Risk

Some areas of the Bay along the shoreline and drainages leading to the Bay are potential floodplains. Risks associated with building in a floodplain include threats to life and property. The level of risk is determined by the nature of the facility (i.e., parking lots, ticket purchase stations, access roads, or docks), its location, and appropriate mitigation measures specific to each alternative ferry terminal site. Local city or county government agencies regulate floodplain construction, management, and mitigation through land use controls, based on determinations of flood elevations. The Federal Emergency Management Agency (FEMA) maintains maps of 100-year flood areas in the Bay counties. A "100-year flood" refers to a flood level with a 1 percent or greater chance of being equaled or exceeded in any given year.

3.10.6 Groundwater

Groundwater is subsurface water that occurs beneath the water table in soils and geologic formations that are fully saturated. Where groundwater occurs in a saturated geologic unit that contains sufficient permeable thickness to yield significant quantities of water to wells and springs, it can be defined as an aquifer. A groundwater basin is defined as a hydrogeologic unit containing one large aquifer or several connected and interrelated aquifers. Some water-bearing geologic units occur within groundwater basins in the San Francisco Bay region do not meet the definition of an aquifer. For instance, there are shallow, low-permeability zones throughout the region that have extremely low water yields. Groundwater may also occur outside of currently identified basins. Therefore, for basin planning purposes, the term "groundwater" includes all subsurface waters, whether or not these waters meet the classic definition of an aquifer or occur within identified groundwater basins.

The areal extent of groundwater basins in the Bay region has been evaluated by the Department of Water Resources (DWR) (DWR, 1980). The DWR has classified 31 groundwater basins that produce, or potentially could produce, significant amounts of groundwater. The four proposed site alternatives are all located within the East Bay Plain sub-basin of the Santa Clara Valley groundwater basin which extends from Hayward in the south to Richmond and is bounded on the east by the Berkeley Hills (RWQCB, 2006).

The East Bay Plain basins which include the project area have been studied in further detail by the RWQCB and have been divided into proposed groundwater management zones including: (1) significant drinking water resource; (2) limited drinking water resource; and (3) nonpotable water resource. Existing and potential beneficial uses applicable to groundwater in the region include municipal and domestic water supply, industrial water supply, industrial process water supply, agricultural water supply, and freshwater replenishment to surface waters. More detailed information that lists the 31 identified groundwater basins located in the region and their existing and potential beneficial uses can be obtained from the RWQCB Basin Plan. Unless otherwise designated by the RWQCB, all groundwater is considered suitable, or potentially suitable, for municipal or domestic water supply.

3.11 GEOLOGY AND SOILS

The baseline data presented in this section were developed based on the review of USGS and California Division of Mines and Geology (now Geological Survey of California) maps and reports; published and peer-reviewed scientific literature; seismicity catalogs; and other available, non-proprietary geologic and seismologic data.

Most of the Central Bay shoreline in the Berkeley/Albany area is composed of manmade fill covering Bay Mud. Bedrock in the study area is composed of Holocene alluvium.

3.11.1 Regulatory Framework

Regulatory requirements potentially applicable to geology and geologic hazards are summarized below:

2001 California Building Code

The CBC contains the minimum standards for design and construction in California. Local standards other than the CBC may be adopted if those standards are stricter. Some design considerations associated with seismic hazards will have to address the appropriate building codes for each ferry expansion facility location. The CBC involves the standards associated with seismic engineering detailed in the Uniform Building Code of 1997.

California Public Resources Code Section 25523(a); 20 CCR 1752(b) and (c); 1972 Alquist-Priolo Earthquake Fault Zoning Act (amended 1994)

The Alquist-Priolo Earthquake Fault Zoning Act was passed in 1972 to mitigate the hazard of surface faulting to structures for human occupancy. The Alquist-Priolo Earthquake Fault Zoning Act's main purpose is to prevent the construction of buildings used for human occupancy on the surface trace of active faults.

Before a project can be permitted, cities and counties must require a geologic investigation to demonstrate that potential buildings will not be constructed across active faults. An evaluation and written report of a specific site must be prepared by a licensed geologist. If an active fault is found, a structure for human occupancy cannot be placed over the trace of the fault and must be set back from the fault (generally 50 feet).

California Public Resources Code Chapter 7.8, 1990 Seismic Hazards Mapping Act

The Seismic Hazards Mapping Act of 1990 allows the lead agency to withhold permits until geologic investigations are conducted and mitigation measures are incorporated into plans. The Seismic Hazards Mapping Act addresses not only seismically induced hazards but also expansive soils, settlement, and slope stability. The Seismic Hazards Mapping Act will be relevant to soil conditions at some future facility sites.

3.11.2 Regional Geologic Setting

The Berkeley/Albany site alternatives are located within the northern Coast Ranges physiographic province. This province is characterized by a north-northwest–trending series of mountains and intervening valleys that extend from the Oregon border south to the Transverse Ranges of Southern California. The ridge and valley character of the Coast Ranges province is predominantly controlled by the structural grain of the underlying geological units and subsequent erosion.

The San Francisco Bay Area has a structurally controlled topography that consists primarily of north to northwest trending mountain ranges and intervening valleys that are characteristic of the

Coast Range geomorphic province (Figure 3-25). This fabric is subparallel to the San Andreas Fault. The Coast Ranges consist of the Mendocino Range to the north of the San Francisco Bay, the Santa Cruz Mountains west of the Bay, and the Diablo Range to the east of the Bay. The Coast Ranges are composed of a thick sequence of late Mesozoic (200 to 70 million years old) and Cenozoic (less than 70 million years old) sedimentary strata. The northern part of the Coast Range is dominated by the landslide-prone Franciscan Formation.

San Francisco Bay is a topographic trough formed by combination of warping and faulting and is underlain by a down-dropped or tilted block (the Bay Block) (Olson et al., 1994). This gap in the Coast Ranges to allow the San Joaquin and Sacramento Rivers to drain to the ocean. The Bay is about 90 kilometers (km) long and from 5 to 8 km wide. Constrictions divide the Bay into Suisun, San Pablo, and the North and South San Francisco Bays. The Bay is relatively shallow with depths of less than 3 meters except in locations of drowned drainage channels. The deepest point is within the main channel through the Golden Gate, at a depth of approximately 105 meters below sea level.

To the east, the Coast Ranges are bounded by the Great Valley geomorphic province. The Great Valley comprises two elongate northwest to southeast-trending basins, the Sacramento basin to the northwest and the San Joaquin basin to the southeast located between the Coast Ranges to the west and the Sierra Nevada to the east. The province is approximately 700 km long and 70 to 90 km wide. It is characterized by a thick, relatively undeformed sequence of alluvium and volcanic deposits overlying older sediments. The western margin of the Great Valley, the Coast Ranges-Great Valley geomorphic boundary, is underlain by a system of folds and seismically active thrust faults (Wakabayashi and Smith, 1994). This separates the relatively undeformed strata of the Great Valley from the highly deformed rocks of the Coast Ranges.

The geology of the Bay Area is made up primarily of three different geologic provinces: the Salinian block, the Franciscan complex, and the Great Valley sequence. The Salinian block is located west of the San Andreas Fault. It is composed primarily of granitic plutonic rocks, which are similar to those found in the Sierra Nevada and are believed to be rocks of the Sierra Nevada Batholith that have been displaced along the San Andreas Fault. To the east of the San Andreas Fault and bounded on the west by the Hayward Fault is the Mesozoic Franciscan complex. The Franciscan rocks represent pieces of former oceanic crust that have accreted to North America by subduction and collision. These rocks are primarily deep marine sandstone and shale. However, chert and limestone are also found within the assemblage. The rocks of the Franciscan complex are prone to landslides. To the east of the Hayward Fault is the Great Valley sequence. This is composed primarily of Cretaceous and Tertiary marine sedimentary rocks in the Bay Area. These rocks are also prone to landsliding.

Recent Geologic History

San Francisco Bay is California's largest estuarine environment, and its configuration and the surrounding landscape has been shaped by a combination of tectonic activity, recent sea level changes, and human activities since 1850.

Since the formation of the Sacramento-San Joaquin drainage outlet through the Bay approximately 400,000 years ago, the environment of deposition has fluctuated between estuarine (periods of high sea level resulting from a warm global climate) and alluvial (periods of low sea level during periods of cold global climate) (Sloan, 1992).

The present Bay estuary formed less than 10,000 years ago as the global climate warmed and sea levels rose. Marine water re-entered the Bay approximately 10,000 years ago and by about 4,000 years ago had reached its present level. With the establishment of estuarine conditions, sedimentation in the Bay changed from alluvial sands and silts to dark-colored estuarine clays and silts, commonly called Bay Mud. Deposition of sandier sediment was confined to channels.

Since about 1850, human activities have made enormous modifications to the Bay, causing changes in the patterns of circulation and sedimentation. Between 1856 and about 1900, hydraulic mining in the Sierra foothills deposited several feet of sediment throughout the Bay. Starting in the 1800s, the construction of levees and dykes altered the patterns of drainage and annual flooding in the Sacramento River Delta. Also, the placement of fill at numerous localities around the Bay margins has dramatically altered the shoreline profile during historic time (URS, 2003).

3.11.3 Area Geology and Soils

The geologic conditions specific to each alternative ferry terminal site are discussed below. All of the alternative sites are located on Holocene (recent) fill (Figure 3-26).

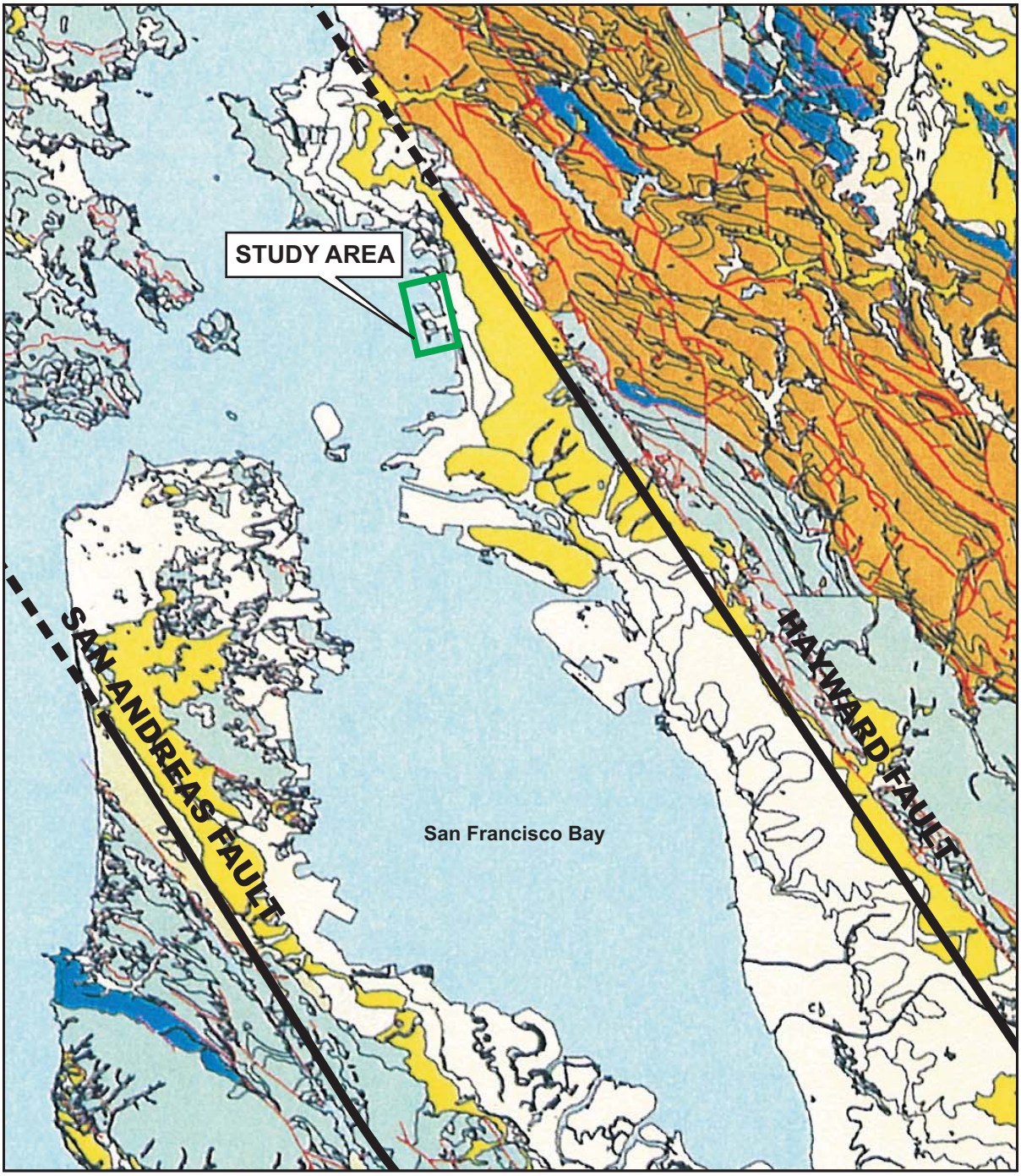
3.11.4 Seismicity

The study area lies within the right-lateral San Andreas Fault system that accommodates the majority of the plate motion between the Pacific and North American plates. Compressional tectonics reflected in the Coast Ranges also result in folds and thrusts sub-parallel to the San Andreas Fault system, and local bends in the fault may also produce secondary zones of deformation. Faults of the San Andreas system form the major structural features in the vicinity of the study area.

Active faults within 20 miles of the study area are shown on Figure 3-26. The San Andreas Fault is located approximately 16 miles to the southwest of the sites and is the major tectonic boundary between the Pacific and North American plates. The Hayward Fault, located approximately 3 miles east of the Berkeley/Albany shoreline and oriented parallel to the shoreline, is another major active tectonic feature in the Bay Area. Both the San Andreas and Hayward Faults have generated major historical earthquakes and are considered to have a moderate probability of producing another major earthquake within the next 30 years.

Significant Faults

The most significant Quaternary faults in the vicinity of the study area, as well as estimates of the maximum earthquake for each fault, shown on Figure 3-26. Maximum earthquake magnitude estimates are based on those reported by the Working Group on Northern California Earthquake Potential (WGNCEP) (WGNCEP, 1996).



LEGEND

- Holocene
- Pleistocene
- Quaternary Undivided
- Pliocene and/or Quaternary
- Study Site
- Upper Tertiary
- Lower Tertiary
- Mesozoic
- Water
- Geologic Contact
- Fault

0 5 10 Miles
0 5 10 Kilometers
Approximate Scale

N

REGIONAL GEOLOGY

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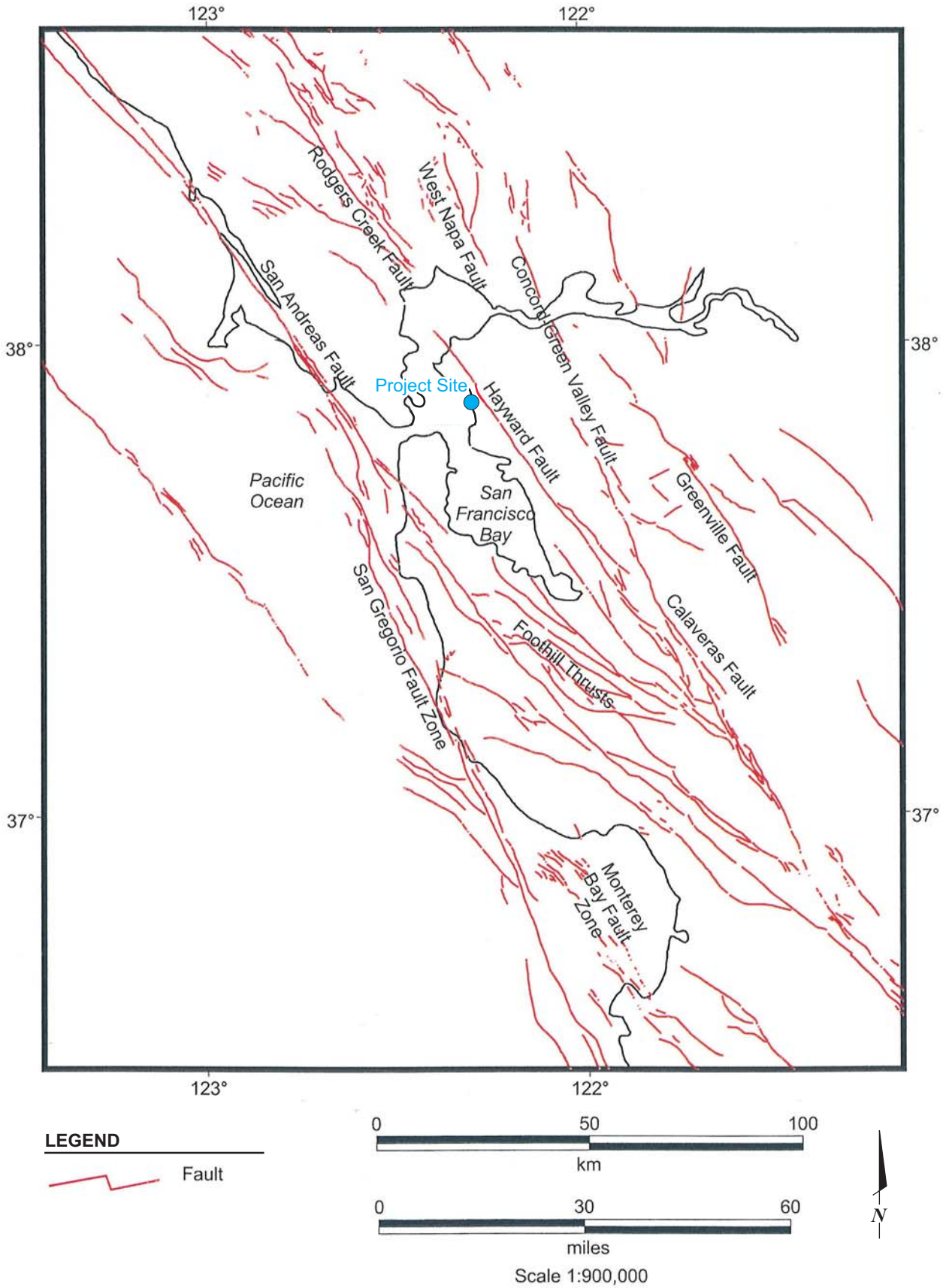
URS

FIGURE 3-25

9/30/08 hk...T:WTA\EIS EIR 2008\F3-25_geo map_CA_2.cdr



MAJOR ACTIVE FAULTS

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URS

FIGURE 3-26

9/26/08 hk...\T:WTA\EIS EIR 2008\F3-26_major active faults.cdr

Fault data were obtained from Bortugno et al. (1991), and the WGNCEP (1996). The following paragraphs briefly describe each of the major faults, from west to east (Figure 3-26).

San Gregorio Fault

The San Gregorio Fault is a major Holocene active fault that lies west of the San Andreas Fault. The fault is approximately 78 miles long, extending from the Big Sur area northward to the area offshore of Bolinas Bay. Most of the fault lies offshore; however, in several areas the fault lies onshore and has been actively investigated (Simpson et al., 1992). The fault has an estimated Quaternary slip rate of 5 millimeters per year (mm/yr). Paleoseismic estimates of earthquake recurrence intervals on the fault range from 350 to 680 years based on offset archeological remains at Seal Cove (Simpson et al., 1992). The San Gregorio Fault is located approximately 35 miles from the site area, and the maximum earthquake magnitude for the fault is estimated to be approximately Moment Magnitude (M_W) 7.3. (M_W is based on the amount of energy released by the earthquake.)

San Andreas Fault

The San Andreas Fault is the largest active fault in California, and extends from the Gulf of California on the south approximately 750 miles to Cape Mendocino on the north. It was the source of the 1906 M_W 7.9 San Francisco earthquake (Wallace, 1990), which ruptured approximately 280 miles of the fault from San Juan Batista to Shelter Cove. The fault is about 16 miles southwest of the site area at its closest approach.

The San Andreas Fault can be divided into a number of segments, based on differences in geomorphology, geometry, paleoseismic chronology, seismicity, and historic displacements. In the Bay Area, these segments include the southern Santa Cruz Mountains, possible source of the 1989 M_W 7.0 Loma Prieta earthquake; the Peninsula segment; and the North Coast segment. These segments have been assigned maximum earthquakes of M_W 7, M_W 7.1, and M_W 7.9, respectively, by the WGNCEP (1996).

Hayward Fault

The Hayward Fault is about 62 miles long and has been divided into two fault segments: a longer southern segment, and a shorter northern segment. The fault demonstrates systematic right-lateral creep offset of cultural features along its entire length (Lienkaemper et al., 1991). This structure is considered to be the most likely source of the next major earthquake in the San Francisco Bay area (WGNCEP, 1996), and is located approximately 3 miles east of the study area.

The Local Magnitude (M_L) 6.8 event in October 1868 was the last major earthquake on the Hayward Fault, and occurred along the southern segment near Fremont. (M_L is based on the measurement of the earthquake from a distance of 100 km from the epicenter.) The WGNCEP (1996) has assigned maximum earthquakes of M_W 6.9 for both the northern and southern segments of the Hayward Fault.

Rodgers Creek Fault

The Rodgers Creek Fault is a 38-mile-long northwest-striking, right-lateral strike-slip fault that extends northward from the projection of the Hayward Fault on the south side of San Pablo Bay. The Rodgers Creek Fault has a long-term geological slip rate similar to the Hayward Fault, and produced a large-magnitude historical earthquake in the late 1800s. Paleoseismic investigations by Schwartz et al. (1992) identified evidence for three earthquakes in the last 925 to 1,000 years, yielding a preferred earthquake recurrence interval of 230 years for an earthquake of M_W 7.0. The fault is about 5 miles to the north of the study area at its closest approach.

Concord-Green Valley Fault Zone

The Concord-Green Valley Fault is a northwest-striking, right-lateral strike-slip fault zone that extends from the Walnut Creek area across Suisun Bay and continues to the north. The Concord Fault extends for approximately 12 miles, from the northern slopes of Mount Diablo to Suisun Bay. North of Suisun Bay, the Green Valley Fault continues to the north for about 28 miles. The Concord Fault is an actively creeping structure that has a long-term creep rate of approximately 5 mm/yr.

It is estimated that rupture of both faults would produce a maximum earthquake of about M_W 6.9, with a recurrence interval of approximately 180 years (WGNCEP, 1996). At its closest point, the Concord Fault is approximately 22 miles from the site.

Greenville-Marsh Creek Fault

The Greenville-Marsh Creek Fault is a northwest-striking strike-slip fault of the San Andreas system in the northern Diablo Range, extending from Bear Valley to the east side of Mt. Diablo. This fault has a lower slip rate than other structures within the San Andreas system, with a long-term rate of approximately 1 to 3 mm/yr. This fault produced a moderate-magnitude earthquake in 1980.

Research is currently being conducted on the fault zone to better constrain its slip rate and its history of past earthquakes. The WGNCEP (1996) assigned a maximum earthquake of M_W 6.9 to the Greenville Fault; the recurrence interval is estimated to be about 550 years. The fault is located approximately 36 miles east of the site.

3.11.5 Fault Rupture

No active or potentially active faults are mapped within the study area. The closest fault zone to the site zoned under the Alquist-Priolo Special Studies Zone Act is the San Andreas Fault. The Act requires the California Division of Mines and Geology to designate faults considered active or potentially active and to establish zones within which studies are required for structures involving human occupancy. Based on the absence of zoned faults, the hazard from ground rupture is considered very low to negligible.

3.11.6 Seismic Shaking

Seismically-induced strong ground shaking is potentially a significant geologic hazard expected in the study area. The study area has experienced strong ground motions in the past and will do so in the future. The highest peak acceleration is expected to occur from a M_W 7.9 maximum credible earthquake event on the San Andreas Fault located at a distance of approximately 16 miles from the study area. Strong ground shaking could either be amplified or dampened depending on the engineering properties of the soils.

As described in Section 3.11.3, the San Andreas Fault is located approximately 16 miles to the southwest of the sites and is the major tectonic boundary between the Pacific and North American plates. The Hayward Fault, located approximately 4 miles to the northeast, is another major active tectonic feature in the Bay Area. Both the San Andreas and Hayward Faults have generated major historical earthquakes and are considered to have a moderate probability of producing another major earthquake within the next 30 years.

3.11.7 Liquefaction and Lateral Spreading

Liquefaction of soils occurs when loose, cohesionless soils become saturated, temporarily losing shear strength during strong ground shaking. Significant factors affect that soil liquefaction potential are grain-size distribution, relative density, degree of saturation, the initial stresses acting on the soils, and the characteristics of the earthquake, such as the intensity and duration of the ground shaking. As indicated on Figure 3-27, all of the study area along the shoreline in the region of the proposed alternatives is potentially prone to liquefaction (State of California, 2003).

In addition to liquefaction, other potential hazards in the study area include compaction consolidation (settlement) and seismically-induced settlement. Dissipation of excess pore pressure generated by ground shaking will produce volume changes within the liquefied soil layers, which would be manifested at the ground surface as settlement.

3.11.8 Subsidence

Subsidence of the land surface can occur from tectonic deformation, consolidation, hydrocompaction, collapse of underground cavities, oxidation of organic-rich soils, rapid sedimentation, and activities of man, such as the withdrawal of groundwater. Around the margins of San Francisco Bay, settlement commonly occurs in areas of manmade fill underlain by young Bay Mud through consolidation of the Bay Mud, and consequent subsidence of the overlying materials.

Areas of the underlain by bedrock and dense fill have a low susceptibility to subsidence. Areas underlain by Bay Mud, estuarine sediments, organic rubbish, or thick organic deposits may be moderately to highly susceptible to subsidence. Settlement is discussed under liquefaction, above.

3.11.9 Expansive Soils

Artificial fill underlies the study area. Therefore, the hazard from expansive soil is considered low.

3.11.10 Geologic Resources

The following section discusses geologic resources in the vicinity of the study area.

Sand and Gravel Aggregate Resources

In 1987, the California Division of Mines and Geology published a comprehensive mineral land classification for aggregate materials in the San Francisco-Monterey Bay Area (Stinson et al., 1987). Lands were classified in the following categories:

- **MRZ-1:** Areas where adequate information indicates that no significant mineral deposits are present, or where it is judged that little likelihood exists for their presence.
- **MRZ-2:** Areas where adequate information indicates that significant mineral deposits are present, or where it is judged that a high likelihood for their presence exists.
- **MRZ-3:** Areas containing mineral deposits the significance of which cannot be evaluated from available data.

According to these definitions, the study area is classified as MRZ-1.

Oil and Gas Resources

No oil and gas reserves have been identified or are under production in the study area.

3.11.11 Tsunami and Seiche

A tsunami (Japanese word meaning "harbor wave") is a water wave or a series of waves generated by an impulsive displacement of the surface of the ocean or other body of water Tsunamis can travel across oceanic basins and cause damage several thousand miles from their sources. Most tsunamis are caused by a rapid vertical movement along a break in the Earth's crust, i.e., a tectonic fault rupture on the bottom of the ocean resulting in displacement of the column of water directly above it. The majority of tsunamis are triggered by earthquake rupture along subduction zones. The 1964 Alaska earthquake generated a tsunami that caused widespread damage along the coastline of northern California. Paleoseismic investigations have also shown that tsunamis resulting from earthquakes on the subduction zone beneath Japan and the Cascadia subduction zone in the Pacific northwest have also inundated the Pacific coast states (Atwater et al., 1999).

Source:
State of California 2003

SCALE 1:24,000

1 .5 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 .5 0 1 KILOMETER

LEGEND

Liquefaction

Areas where historical occurrence of liquefaction, or local geological, geotechnical and ground-water conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required.

Earthquake-Induced Landslides

Areas where previous occurrence of landslide movement, or local topographic, geological, geotechnical and subsurface water conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required.

SEISMIC HAZARD MAP

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FIGURE 3-27

9/26/08 hk...\T:WTA\EIS EIR 2008\F3-27_seismic hazard map.cdr

A seiche is a periodic oscillation or "sloshing" of water in an enclosed basin such as the San Francisco Bay. The period of oscillation can range from minutes to hours. The 1898 "Mare Island" earthquake is reported to have caused a seiche in the northern part of the Bay (Toppozada et al., 1992). There are no reports of damage associated with this event.

Ritter and Dupre (1972) calculated that for a tsunami originating outside San Francisco Bay, the amount of inundation based on tsunami run-up decreases to 50 percent of its maximum at the Golden Gate by the time it passes the Bay Bridge to the south and the Richmond-San Rafael Bridge to the north. Tsunami run-up results in inundation and flooding of low-lying areas, and in locations where the waves have sufficient energy cause significant erosion. The inundation model of Ritter and Dupre (1972) was used to assess hazards related to tsunamis and seiche in the study area (URS, 2003). The ranking of tsunami hazard is based on the exposure of the locality to the open ocean. The study area is sheltered from potential tsunami waves, and therefore tsunami hazard is low.

3.12 HAZARDOUS MATERIALS

3.12.1 Regulatory Framework

The management of hazardous materials and hazardous wastes, including chemicals, radioactive materials, and bio-hazardous materials, is subject to numerous laws and regulations at all levels of government. Summaries of federal and state laws and regulations related to hazardous materials management are presented below. California state law allows for certain hazardous materials regulatory programs, including those pertaining to USTs, hazardous materials storage, and hazardous materials management, to be delegated to local agencies.

Federal Regulations

Primary federal agencies with responsibility for hazardous materials management include the U.S. EPA, Occupational Safety and Health Administration (OSHA), U.S. DOT, and Nuclear Regulatory Commission. Major federal laws and issue areas include the following statutes (and regulations promulgated there under):

- **Resource Conservation and Recovery Act (RCRA):** Hazardous waste management
- **Hazardous and Solid Waste Amendments Act:** Hazardous waste management
- **CERCLA:** Cleanup of contamination
- **SARA:** Cleanup of contamination
- **Emergency Planning and Community Right-to-Know (SARA Title III):** Business inventories and emergency response planning.

State Regulations

Primary state agencies with jurisdiction over hazardous chemical materials management are the Department of Toxic Substances Control (DTSC) and the RWQCB. Other state agencies involved in

hazardous materials management are the Department of Industrial Relations (Cal-OSHA implementation), state Office of Emergency Services (California Accidental Release Prevention implementation), CDFG, CARB, Caltrans, California State Office of Environmental Health Hazard Assessment (Proposition 65 implementation), and the California Integrated Waste Management Board.

Hazardous chemical and bio hazardous materials management laws in California include the following statutes (and regulations promulgated there under):

- **Hazardous Materials Management Act:** Hazardous Materials Business Plan (HMBP) reporting
- **Hazardous Waste Control Act:** Hazardous waste management
- **Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65):** Releases of and exposure to carcinogenic chemicals
- **Hazardous Substances Act:** Cleanup of contamination
- **Hazardous Waste Management Planning and Facility Siting (Tanner Act)**
- **Hazardous Materials Storage and Emergency Response**
- **California Medical Waste Management Act:** Medical and bio-hazardous wastes

State regulations and agencies that are specifically applicable to the project site include the Hazardous Materials Management Act (HMMA) and Cal-OSHA, which are further described below.

Hazardous Materials Management Act. A hazardous material is any substance that possesses qualities or characteristics that could produce physical damage to the environment and/or cause deleterious effects upon human health (Title 22, CCR). The HMMA requires that businesses handling or storing certain amounts of hazardous materials prepare a HMBP, which includes an inventory of hazardous materials stored on site (above specified quantities), an emergency response plan, and an employee training program. Businesses that use, store, or handle 55 gallons of liquid, 500 pounds of a solid, or 200 cubic feet of a compressed gas at standard temperature and pressure require a HMBP. Plans must be prepared prior to facility operation and are reviewed/updated biennially (or within 30 days of a change in storage conditions at the site).

Occupational Health and Safety Administration. Site safety requirements are generally based on the specifications of OSHA. Applicable specifications prepared by OSHA related to earth resources consist of Section 29 CFR Part 1926 (Department of Labor, 1989), which focuses on worker safety during excavation, shoring, and trenching.

Regional Regulations

City of Berkeley Toxics Material Division (COBTMD). The COBTMD is responsible for regulating the operations of businesses and institutions that handle hazardous materials or generate hazardous wastes in the City of Berkeley. As part of the state-mandated Certified Unified Participating Agency program, administered by California EPA, the COBTMD coordinates regulatory and enforcement for the following programs related to hazardous materials and wastes: HMBP/Emergency Response Plan, Hazardous Waste, USTs, Aboveground Storage Tank Spill Prevention Countermeasures and Control only, and the California Accidental Release Program.

3.12.2 Database Searches

The federal, state, and local records review was accomplished through a computer database search of facilities, which appear on a series of government lists. The database search for the Site and surrounding properties was performed by the Environmental Data Registry (EDR). A copy of the regulatory agency databases is included in the Biological Resources Technical Report.

Through the database review, facilities can be identified and located based on information submitted to government environmental agencies. In this way, the potential risk posed to the site by surrounding properties can be assessed. Facilities located beyond the specified search radii are not discussed in this analysis, as they are not considered potential environmental concerns due to their distances.

Multiple "orphan" facilities were identified in the regulatory databases, within a mile of the study area; however, these sites lacked complete or accurate geographical data, and, therefore were left out of this section. A summary of the orphan facilities is contained in the EDR database reports.

The following tables and associated descriptions summarize the information reviewed in the federal, state, and local databases. For purposes of this review, sites A and B (located near each other) have been grouped together and Site C and Site D have individual EDR reports and tables.

Alternatives A and B (Berkeley Marina and Berkeley Fishing Pier Sites)

Table 3-27
University Avenue Alternatives A and B

Federal or State List	Does Site Appear on List?	Surrounding Area Search Radius *	Number of Sites Within Search Radius
Resource Conservation and Recovery Act (RCRA) Corrective Action Plan (CORRACTS)	No	1.0 mile	1
Cal-Sites	No	1.0 mile	2
Hazardous Wastes and Substances Sites List (Cortese)	No	0.5 mile	4
Solid Waste Facilities/Landfill Sites (SW/LF)	No	0.5 mile	1
Leaking Underground Storage Tank (LUST)	No	0.5 mile	4
Registered Aboveground Storage Tanks	No	Site and adjacent properties	1
EnviroStor	No	0.5 mile	10
Response	No	1.0 mile	1

Note:
* indicates the distance measured from the Site that was included in the database record search

The Site was not listed on any of the databases searched. The following subsections provide a discussion of the surrounding facilities that have been identified within the search radius in the various categories listed in the preceding table. However, only sites where there is evidence of a release to the subsurface or known potential subsurface contamination (e.g., a landfill) are discussed in any detail.

Solid Waste Facilities/Landfill Sites. The Solid Waste Facilities/Landfill (SW/LF) sites records typically contain an inventory of solid waste disposal facilities or landfills in a particular state. The data come from the Integrated Waste Management Board's Solid Waste Information System database. The database identified one property, the Berkeley Landfill, located at the foot of Virginia Street. This is the property located to the immediate east of the Berkeley Marina. The owner of the landfill is listed as the City of Berkeley Public Works and the facility activity is listed as solid waste disposal site. No other detailed information regarding this site was available in the database report. Given the proximity of the landfill to the Berkeley Marina, this facility is considered a potential concern for Alternative B.

Leaking Underground Storage Tank. The Leaking Underground Storage Tank (LUST) database contains an inventory of reported leaking underground storage tank incidents. The database identified four (4) properties within a 0.5-mile radius of the site. The first property is the Berkeley Marine Center located at 1 Spinnaker Way, to the north/northwest of the Berkeley Marina. A leaking diesel UST was discovered in May 1998 during a tank closure. The site is listed as groundwater affected. Contaminated soil was excavated and treated. The case was closed by the regulatory agencies in April 1996. Based on the location and regulatory status, this facility is not considered a concern to this assessment. The other three sites are all located on the eastern side of I-80. Based on the distance from the site and the regulatory status, these facilities are not considered a concern to this assessment.

EnviroStor. The DTSC's Site Mitigation and Brownfields Reuse Program's EnviroStor database identifies sites that have known contamination or sites for which there may be reasons to investigate further. The database includes the following site types: Federal Superfund sites (National Priorities List); State Response, including Military Facilities and State Superfund; Voluntary Cleanup; and School sites. EnviroStor provides similar information to the information that was available in CalSites, and provides additional site information, including, but not limited to, identification of formerly-contaminated properties that have been released for reuse, properties where environmental deed restrictions have been recorded to prevent inappropriate land uses, and risk characterization information that is used to assess potential impacts to public health and the environment at contaminated sites. The database identified ten (10) facilities on the EnviroStor database, however all of these sites are located east of I-80. Based on the distance from the site, these facilities are not considered a concern to this assessment.

Alternative C (Gilman Street Site)

The Site was not listed on any of the databases searched. The following subsections provide a discussion of the surrounding facilities that have been identified within the search radius in the various categories listed in the preceding table. However, only sites where there is evidence of a

release to the subsurface or known potential subsurface contamination (e.g., a landfill) are discussed in any detail.

Table 3-28
Gilman Street Alternative – Site C

Federal or State List	Does Site Appear on List?	Surrounding Area Search Radius *	Number of Sites Within Search Radius
CERCLIS No Further Remedial Action Planned (CERC-NFRAP)	No	Site and adjacent properties	1
Resource Conservation and Recovery Act (RCRA) Corrective Action Plan (CORRACTS)	No	1.0 mile	2
Resource Conservation and Recovery Information System – Treatment, Storage or Disposal Facilities (RCRIS-TSD)	No	0.5 mile	1
RCRA Registered Large and Small Quantity Generators of Hazardous Waste (LQG/SQG)	No	Site and adjacent properties	6
Cal-Sites	No	1.0 mile	1
State Recycling Facilities (SWRCY)	No	0.5 mile	1
Statewide Environmental Evaluation and Planning System (SWEEPS UST)	No	Site only	4
Hazardous Wastes and Substances Sites List (Cortese)	No	0.5 mile	27
Proposition 65 Records (Notify 65)	No	1.0 mile	5
Solid Waste Facilities/Landfill Sites (SW/LF)	No	0.5 mile	2
A listing of contaminated sites overseen by the Toxic Release Program of Alameda County (CS)	No	0.5 mile	6
Leaking Storage Tanks (LUST)	No	0.5 mile	25
Registered Underground Storage Tanks (USTs)	No	Site and adjacent properties	2
Facility Inventory Database (CA FID UST)	No	Site and adjacent properties	3
Hazardous Substance Storage Container Database (HIST UST)	No	Site and adjacent properties	3
California Spills, Leaks, Investigation and Cleanup Cost Recovery Listing (CA SLIC)	No	0.5 mile	9
EnviroStor	No	0.5 mile	5
Response	No	1.0 mile	1

Note:
* indicates the distance measured from the Site that was included in the database record search

Solid Waste Facilities/Landfill Sites. The database identified the Santa Fe Berkeley Landfill located between I-80/Marina near the racetrack and the Berkeley Solid Waste Transfer Station located at 1201 Second Street. The owner of the Santa Fe Berkeley Landfill is listed as the EBRPD and the facility activity is listed as solid waste disposal site and the status is closed. No other detailed information regarding this site was available in the database report. It is likely that the Gilman Street Alternative (Site C) is located on or near the edge of the landfill. Given the proximity of the landfill to the Gilman Street Alternative site, this is considered a potential concern to this assessment. The Berkeley Solid Waste Transfer Station is a large volume transfer and processing station located on the eat side of I-80. Based on the nature of the operation, as well as the distance from the site, this facility is not considered a concern to this assessment.

Leaking Underground Storage Tank. The database identified twenty five (25) properties within a 0.5-mile radius of the site. However, all of the sites are located on the east side of I-80. Based on the distance from the site these facilities are not considered a concern to this assessment.

Spills, Leaks, Investigation and Cleanup. The Spills, Leaks, Investigation and Cleanup (SLIC) program is designed to protect and restore water quality from spills, leaks, and similar discharges. The database identified nine (9) facilities within a 0.5-mile radius of the site. However, all of the sites are located on the east side of I-80. Based on the distance from the site these facilities are not considered a concern to this assessment.

Alameda CS. This database contains a listing of contaminated sites overseen by the Toxic Release Program (oil and groundwater contamination from chemical releases and spills) and the LUST Program (soil and ground water contamination from leaking petroleum USTs). The database identified six (6) facilities within a 0.5-mile radius of the site. With the exception of one facility, Pacific Racing Association located at 1100 Eastshore Highway, all of the other facilities are located on the east side of I-80. Based on the distance from the site these facilities are not considered a concern to this assessment. The Pacific Racing Association facility is located approximately 2,500 feet north of the Gilman Street Alternative (Site D) location and given the distance from the site, this facility is not considered a concern to this assessment.

EnviroStor. The database identified five (5) facilities on the EnviroStor database, however all of these sites are located east of I-80. Based on the distance from the site, these facilities are not considered a concern to this assessment.

Alternative D (Buchanan Street Site)

The Site was not listed on any of the databases searched. The following subsections provide a discussion of the surrounding facilities that have been identified within the search radius in the various categories listed in the preceding table. However, only sites where there is evidence of a release to the subsurface or known potential subsurface contamination (e.g., a landfill) are discussed in any detail.

Solid Waste Facilities/Landfill Sites. The database identified the Albany Landfill located at the west end of Buchanan Street, approximately 2,100 feet northeast of the site. The owner of the landfill is listed as the City of Albany and the facility activity is listed as disposal and the status is closed. No other detailed information regarding this site was available in the database report. It is not likely that the Buchanan Street Alternative (Site D) is located in close proximity to the landfill. Given the proximity of the landfill to the Buchanan Street Alternative site, this is not considered a concern to this assessment.

Leaking Underground Storage Tanks. The database identified six (6) properties within a 0.5-mile radius of the site. With the exception of one facility, Pacific Racing Association located at 1100 Eastshore Highway, approximately 1,500 feet east/southeast of the site, all of the other facilities are located on the east side of I-80. Based on the distance from the site these facilities are not considered a concern to this assessment. The LUST cases at Pacific Racing Association are closed. Based on the distance and location of the facility and the status of the LUST cases, this facility is not considered a concern to this assessment.

Table 3-29
Buchanan Street Alternative – Site D

Federal or State List	Does Site Appear on List?	Surrounding Area Search Radius *	Number of Sites Within Search Radius
Resource Conservation and Recovery Act (RCRA) Corrective Action Plan (CORRACTS)	No	1.0 mile	1
Cal-Sites	No	1.0 mile	2
Hazardous Wastes and Substances Sites List (Cortese)	No	0.5 mile	6
Proposition 65 Records (Notify 65)	No	1.0 mile	4
Solid Waste Facilities/Landfill Sites (SW/LF)	No	0.5 mile	1
A listing of contaminated sites overseen by the Toxic Release Program of Alameda County (CS)	No	0.5 mile	5
Leaking Storage Tanks (LUST)	No	0.5 mile	6
California Spills, Leaks, Investigation and Cleanup Cost Recovery Listing (CA SLIC)	No	0.5 mile	1
EnviroStor	No	0.5 mile	5
Response	No	1.0 mile	1

Note:
* indicates the distance measured from the Site that was included in the database record search

Spills, Leaks, Investigation and Cleanup. The database identified one (1) facility within a 0.5-mile radius of the site. Fleming Point Property, located at 1100 Eastshore Highway (also the listed address for Pacific Racing Association), approximately 1,500 feet east/southeast of the site, was listed as an open SLIC case. No additional information was available in the EDR report regarding the status of the case. Based on the distance and direction from the site this facility is not considered a concern to this assessment.

Alameda CS. The database identified five (5) facilities within a 0.5-mile radius of the site. With the exception of one facility, Pacific Racing Association located at 1100 Eastshore Highway, all of the other facilities are located on the east side of I-80. Based on the distance from the site these facilities are not considered a concern to this assessment. The Pacific Racing Association facility is located approximately 1,500 feet east/southeast of the Buchanan Street Alternative (Site E) location and given the distance from the site and the facility's closed status, it is not considered a concern to this assessment.

EnviroStor. The database identified five (5) facilities on the EnviroStor database, however all of these sites are located east of I-80. Based on the distance from the site, these facilities are not considered a concern to this assessment.

3.12.3 Other Potential Hazards/Hazardous Materials

Contaminated Fill: All of the proposed site alternatives are located in areas where the existing land was created from land filling operations. The source of the material(s) used for land filling is unknown. As such, there is the potential that contaminated materials (e.g., soil or rock) may have been used for land filling operations. Fill materials may be contaminated with metals, pesticides, hydrocarbons and asbestos, which may be present in naturally occurring forms as serpentinite rock, if these materials were was used as fill material at any of the alternative sites.

3.13 UTILITIES AND PUBLIC SERVICES

3.13.1 Introduction

The following utilities are provided in the vicinity of the four-alternative ferry terminal sites:

- Domestic Water – East Bay Municipal Utility District (EBMUD)
- Sanitary Sewer – Cities of Berkeley and Albany
- Storm Drainage – Cities of Berkeley and Albany
- Electric – Pacific Gas & Electric (PG&E)
- Gas – PG&E
- Telecommunication – AT&T telephone

The infrastructure for each of these utilities is described below by utility for each terminal site alternative. It should be noted that Alternatives C and D (Gilman and Buchanan) do not have all of the utilities identified above in the immediate vicinity.

3.13.2 Water System

Alternative A (Berkeley Marina Site)

Similar to the Berkeley Fishing Pier Site, the Berkeley Marina Site has an 8-inch-diameter steel, mortar lined, mortar coated domestic water line. This line runs north-south Marina Boulevard, services the Doubletree Inn north of the proposed terminal site, then turns west to serve domestic connections and fire hydrants along the north shore of the Berkeley Yacht Harbor and in Spinnaker Way.

Alternative B (Berkeley Fishing Pier Site)

According to EBMUD records, there is an 8-inch-diameter steel, mortar lined, mortar coated water line in Seawall Drive. This provides domestic and fire water service to Hs Lordships restaurant at the south end of Seawall Drive and also serves as the water source for fire hydrants spaced at approximately 700-foot intervals along Seawall Drive. This line connects to a 12-inch-diameter line along the south shore of the Berkeley Yacht Harbor.

The waterlines were installed between 1965 and 1967, and are assumed to be in good working condition. Fire hydrants are indicated along Seawall Drive and Marina Boulevard. Near buildings, these are shown spaced at approximately 250 feet between hydrants. Between buildings, the typical spacing is in the range of 700 feet between hydrants. Blow-off valves are shown at the end of each main, but are not in the immediate vicinity of the project sites. No air valves are shown on the plans. The locations of appurtenances from curb edge and relative depths are unknown.

3.13.3 Sanitary Sewer

Alternative A (Berkeley Marina Site)

The Berkeley Marina Site is very near City of Berkeley Pumping Station No. 2. The pumping station, which includes an underground vault until Marina Boulevard and an above ground generator and control panel on the west side of Marina Boulevard, is located directly east of the proposed terminal site. There is a 15-inch-diameter polyvinyl chloride (PVC) line in Marina Boulevard adjacent to the project site, flowing from north to south. The line was installed in 1984.

Alternative B (Berkeley Fishing Pier Site)

There is an existing 10-inch-diameter PVC sanitary sewer line Seawall Drive adjacent to the project site. This line serves Hs Lordships restaurant. The line was installed in 1990. The flow in the line runs from south to north, and leads to City of Berkeley Pumping Station No. 4.

Alternative D (Buchanan Site)

There is no sanitary sewer pipe in place to serve the Buchanan site; however, a 24-inch pipe labeled on City of Berkeley Block Map No. 42A as “1928 Bond Sewers Unit No. 6” has an

outfall into San Francisco Bay at point just south of the proposed Buchanan Site. It is not known whether this line is in service at this time.

3.13.4 Storm Drainage

According to record documents obtained from the City of Berkeley and Baird Barton with the City of Albany, there is no storm drainage network in the vicinity of the proposed terminal site locations. A review of the sites found no storm drain system in place near the sites. In most areas, rainwater sheet flows across paved and unpaved areas directly into the Bay or is collected in shallow catch basins that are piped to an outfall into the Bay.

3.13.5 Electrical System

Alternative A (Berkeley Marina Site)

The Berkeley Marina Site also has a nearby electrical line. There is an existing 12-kilovolt (kV) underground line in Marina Boulevard that serves the adjacent Doubletree Hotel. The closest existing transformer is located approximately 400 feet to the south and provides power to Berkeley Marina Piers F and G.

Alternative B (Berkeley Fishing Pier Site)

PG&E supplies electric services in the study area. Service to the Berkeley Fishing Pier Site would be provided by the existing underground line in Seawall Drive. The existing electrical line is a 12-kV line, which would require a new transformer to step down the power to standard building voltage. The closest existing transformer is located at the south end of Seawall Drive and currently serves Hs Lordships restaurant. The electrical services are underground from 24 to 48 inches below street grade. There are existing site/roadway lighting standards and electrical conduits along the east side of Seawall Drive.

3.13.6 Gas System

Alternative A (Berkeley Marina Site)

There is an existing gas main in Marina Boulevard, the size of which is not indicated on record drawings obtained from PG&E. The main appears to terminate north of the Doubletree Hotel.

Alternative B (Berkeley Fishing Pier Site)

PG&E supplies gas services in the project area. There is an existing 2-inch gas main in the Seawall Drive right-of-way, parallel to the existing electric service that provides gas to Hs Lordships Restaurant.

3.13.7 Telecommunications

Alternative A (Berkeley Marina Site)

There is no information currently available regarding telecommunication services in Marina Boulevard. A survey of the area revealed no surface evident telephone features in Marina Boulevard. There is an existing AT&T telephone service pedestal at the entrance to Berkeley Marina Piers F and G, south of the project site. There is also an overhead communications line in the former Virginia Street right-of-way, north of the Berkeley Meadow Park. This appears to be the line providing service to the Doubletree Hotel.

Alternative B (Berkeley Fishing Pier Site)

AT&T provides telecommunication services in the project area. No information is available at this time regarding specific telephone facilities in the area and a review of the site revealed no surface-evident telephone system features south of the Berkeley Fishing Pier; however an underground service line is assumed to be in place in the Seawall Drive right-of-way providing service to Hs Lordships Restaurant.

3.13.8 Public Facilities and Services

This section presents the public services and facilities provided by the Cities of Berkeley and Albany that serve the study area.

City of Berkeley Police Department

The Berkeley Police Department (BPD), which has 185 sworn officers, operates out of its main station at 2100 Martin Luther King Jr. Way, approximately 2.15 miles east of the study area. The department does not have mandated response times, nor do they collect development fees (Chief Hambleton, 2007).

City of Berkeley Fire Department

The Berkeley Fire Department (BFD) serves a densely populated eleven square miles that encompass the City of Berkeley. The 137.5 members (125 sworn) of the department staff 7 fire stations, 7 engines, 2 fire trucks, 3 ambulances, and an assortment of specialized equipment including a hazardous materials vehicle (BFD, 2007). The closest fire station to the proposed Berkeley sites is Station 6, located approximately one mile to the northeast at 999 Cedar Street.

Emergency Transport

The BFD Paramedic Service Plan was developed in 1985; since that time the provision of emergency medical services to citizens has become a key aspect in the Department's services. When an initial call is received, a fire company is dispatched from the closest fire station. The firefighters are trained Emergency Medical Technicians (EMTs) and are able to begin the

evaluation and initial treatment and call for an ambulance. Each ambulance is staffed with 2 paramedics (BFD, 2007).

Berkeley Unified School District

The Berkeley Unified School District (BUSD) provides educational services to Berkeley's residents. There are sixteen schools within the school district. The only BUSD school located in the study area is Rosa Parks Environmental Science Magnet School at 920 Alston Way.

Berkeley Libraries

The Berkeley Public Library is one of the busiest libraries of its size nationwide. Its central branch, located in the heart of downtown, reopened in 2002 after an extensive renovation, nearly doubling in size and quadrupling usage to over 2,500 people daily. The four branches, North, South, West, and Claremont, are situated in the four corners of the city (The Berkeley Public Library, 2007). The West Branch is the library closest to the study area at 1125 University Avenue.

City of Albany Police Department

The Albany Police Department (APD) currently has 26 full time sworn officers, no part time officers, 5 reserve officers, and 11 civilian staff. The APD operates a single main police station located at 1000 San Pablo Avenue, at the corner of San Pablo Avenue and Buchanan Street. Response times for calls to the proposed project site area is generally 2 to 4 minutes for emergency calls, however there is no department-wide mandated response time. The APD does not currently collect fees or benefit from fees collected as a result of new construction projects within their jurisdiction (Adams, 2007).

City of Albany Fire Department

The Albany Fire Department (AFD) currently has 18 full-time fire fighters, which make up two engine companies. Both companies operate out of Albany's only fire station at 1000 San Pablo Avenue, approximately 1 mile east of the proposed Buchanan Street project site. According to the AFD, response time to this area is less than 3 minutes. The AFD also has one standby engine in case the other two engines are in need of assistance (AFD, 2007).

The AFD will collect mitigation fees from developers in the event that construction of a particular project would impact AFD's quality of service. Mitigation fees for the AFD, if any, are decided upon on a project-to-project basis (AFD, 2007).

Emergency Transport

The AFD also provides emergency medical transport to its residents with its single Advanced Life Support ambulance. The ambulance is staffed with two paramedics, twenty-four hours a day. Furthermore, each engine company is staffed with one paramedic at all times. The AFD also has one standby ambulance (AFD, 2007).

Albany Unified School District

The Albany Unified School District (AUSD) provides educational services to Albany's residents. There are six schools, which make up the school district. The only AUSD school located in the study area is Albany Middle School at 1250 Brighton Avenue.

Albany Libraries

Albany operates one library, The Albany Library, which is a branch of the Alameda County Library System. The Albany Library serves the 18,000 residents of Albany, as well as the nearby communities of Berkeley, Oakland and El Cerrito. It is 15,000 square feet with over 50,000 volumes (City of Albany, 2007). The Albany Library is located at 1247 Marin Avenue, approximately 1.25 miles west of the proposed Buchanan Street site.

3.14 ENERGY

This section discusses energy consumption as it pertains to the transportation sector and addresses the issue of potential for wasteful, inefficient, or unnecessary use of energy from implementation of the proposed alternatives.

3.14.1 Regulatory Framework

The following federal, state, and local regulations govern the review and analysis of energy consumption.

Federal Guidelines

Regulations for transportation energy consumption are generally directed toward fuel efficiency of motor vehicles. The federal Energy Policy and Conservation Act of 1992 established fuel economy standards for on-road vehicles in the United States. This law places responsibility to the National Highway Traffic and Safety Administration (a part of the U.S. DOT) for establishing vehicle standards and for revising existing standards. The U.S. EPA administers the Corporate Average Fuel Economy program, which determines vehicle manufacturers' compliance with existing fuel economy standards.

The Energy Policy Act of 2005, signed by President Bush on August 8, 2005, offers consumers and businesses federal tax credits beginning in January 2006 for purchasing fuel-efficient hybrid-electric vehicles and energy-efficient appliances and products. Most of these tax credits remain in effect through 2007 (U.S. Department of Energy, 2007).

There are no federal regulations pertaining to energy efficiency of vessels.

State Guidelines

The "California Greenhouse Bill" (Assembly Bill [AB] 1493) was signed into law in July 2002 by then-governor Gray Davis. This bill requires CARB to adopt regulations, no later than

January 1, 2005, to reduce greenhouse gases (GHGs) from noncommercial passenger motor vehicles and light-duty trucks manufactured no earlier than 2009. Further, it places additional duties on the California Climate Action Registry (the Registry) related to emissions reductions (California Energy Commission, 2007). Appendix F of CEQA requires that a discussion of the potential energy impacts of a proposed project be addressed, with particular emphasis on avoiding or reducing inefficient, wasteful, and unnecessary consumption of energy.

There are no State regulations pertaining to energy efficiency of vessels.

Local Guidelines

There are no local regulations pertaining to the energy efficiency of vessels. The study area for the proposed alternatives includes three different sites within the City of Berkeley and one site within the City of Albany.

3.14.2 Current Energy Consumption by Bay Area Transportation Providers

Energy is a major operational component for transit providers in the Bay Area. In 2004, the Golden Gate Bridge, Highway and Transportation District consumed 3.1 million gallons of diesel fuel; the San Francisco Municipal Railway consumed approximately 6 million gallons of diesel fuel and 94,766.9 kilowatt hours (kwh) of electricity; BART consumed 302,399.1 kwh of electricity; AC Transit consumed 6.5 million gallons of diesel fuel and 132,500 gallons of gasoline; the Central Contra Costa Transit Authority consumed 990,700,000 gallons of diesel; and the San Mateo County Transit District consumed 2.1 million gallons of diesel fuel (APTA, 2004).

San Francisco Bay Ferry Energy Consumption

The operating characteristics and energy consumption for ferries that currently provide service between the East Bay and San Francisco is indicated below (Culnane, 2008).[2]

- *Peralta* (Alameda/Oakland Ferry) – 3,200 HP, 26 knots, 330 passengers, using 0.11 gallon of fuel/passenger-trip[3]
- *Encinal* (Alameda/Oakland Ferry) – 3,600 HP, 24 knots, 400 passengers, using 0.10 gallon of fuel/passenger-trip
- *Bay Breeze* (Alameda Harbor Bay Ferry) – 2,570 HP, 20 knots, 250 passengers, using 0.12 gallon of fuel/passenger-trip

For the proposed Berkeley/Albany ferry service, WETA will use the 2008 model MTU 16V 2000 Catamarans. These new vessels, called Spare Vessels, have a capacity for 149 passengers and travel at a speed of 25 knots (see Section 2.3). Spare Vessels are powered by a 2,820 horse

[2] Assumptions for calculations: 11 minutes at 25 knots, 10 minutes at 10 knots and 6 minutes at 5 knots; power is proportional to the cube of speed; and 6.9 nautical miles for Berkeley route distance.
[3] For the purposes of this analysis, Passenger Trip refers to the distance (6.9 nautical miles) the ferry must travel from the terminal in the East Bay to the terminal in San Francisco

power engine that consumes 721.20 gallons of diesel fuel per day, based on 10 hours of daily operation

Existing Fuel and Electricity Consumption at the Berkeley Marina

In 2006, the Berkeley Marina sold 12,489 gallons of diesel fuel and 13,944 gallons of gasoline. In 2005, the Berkeley Marina sold 9,647 gallons of diesel fuel and 18,786 gallons of gasoline. The Berkeley Marina purchases its fuel on an as-needed basis from All Points Petroleum of Benicia, California (Partridge, 2007).

Each berth at the Berkeley Marina provides access to electricity for both recreational boat users and users with live-aboard situations. According to the Berkeley Marina, a portion of the berths have electrical usage included in their berthing fees while others receive a separate bill from PG&E (Fee Schedule 2006-2007, Berkeley Marina).