Letter 82: Arc Ecology (1/12/10)

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Letter 82

Arc Ecology

Environment, Economy, Society, & Peace

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12 January 2010

Mr. Stanley Muraoka
Environmental Review Officer
San Francisco Redevelopment Agency
One South Van Ness Avenue, Fifth Floor
San Francisco, California 94103

RE: Public Comment on Candlestick Point-Hunters Point Shipyard Phase II Development Plan Project *(formerly the "Bayview Waterfront Project")* Draft EIR [DEIR]

Dear Sirs:

Arc Ecology is submitting the enclosed pages as our formal commentary on Candlestick Point-Hunters Point Shipyard Phase II Development Plan Project *(formerly the "Bayview Waterfront Project")* Draft EIR [DEIR]. 82-1

Sincerely,

Saul Bloom
Executive Director
Arc Ecology

Enclosures: bound pages of Arc Ecology Comment, multiple documents

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Comments made by Arc Ecology

Preliminary comments on selected impacts and mitigation measures listed in Table ES-2. Michael F. McGowan, Ph.D. Staff Scientist, Arc Ecology. 12/8/2009

Impact AQ-4 Operation of the Project would violate BAAQMD CEQA significance thresholds for mass criteria pollutant emissions from mobile and area sources and contribute substantially to an existing or projected air quality violation at full build-out in the year 2029.

82-2

1. This significant and unmitigated impact exacerbates local environmental injustice with respect to public health and constitutes a cumulative negative impact on the quality of the environment for the city of San Francisco and the Bay Area. The project should be modified such that project air quality emissions would neither worsen existing air quality, nor contribute substantially to projected air quality violations.

Impact HZ-1 Construction activities associated with the Project would not expose construction workers, the
Public, or the environment to unacceptable levels of hazardous materials as a result of the disturbance of soil and/or groundwater with known contaminants from historic uses.
Impacts HZ-2 to HZ-14

82-3

2. The mitigation measures proposed for these potentially significant impacts are not spelled out in adequate detail to judge whether they would be effective in mitigating the impacts to less than significant. Stating that a plan will be made later to mitigate any hazardous release from construction impacts is not a mitigation measure but a promise of the intent to have a mitigation measure. There is no certainty that any mitigation measures will be possible, therefore these impacts should be considered potentially significant and unmitigable, not less than significant and mitigable.
3. This comment applies especially to **HZ-10b** and its mitigation measure. The installation of pilings through a landfill cap that will be used to contain likely, but unspecified contaminants including radiological materials is extremely problematic. This impact should be considered potentially significant and unmitigable. An unmitigable radiological release is not acceptable, therefore the plan needs to be revised to provide a clear alternative to any option for placing pilings through the cap or cover into contaminated fill.

82-4

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Comments made by Arc Ecology

Impact HZ-15 Construction and grading activities associated with the Project would not disturb soil or rock that could be a source of naturally occurring asbestos in a manner that would present a human health hazard.

MM HZ-15 Asbestos Dust Mitigation Plans and Dust Control Plans.

82-5

4. The asbestos air monitoring should be required, not at the option of BAAQMD, because the "no visible dust" standard does not protect against asbestos dust which is not visible to the naked eye.
5. The threshold of asbestos concentration requiring shut-down and implementation of dust control measures should be specified based on accepted cancer risk assessment guidelines and Hunters Point current standards, i.e., fewer than 1 in 10,000 excess cancers.

82-6

6. Mitigation should include hiring an independent third party to validate the positioning of the asbestos dust monitors and to review and report the monitoring data to the public.

82-7

Impact BI-10a and BI-10b and BI-10c Construction of the Candlestick Point would require the removal of hard substrates (riprap) used by native oysters, but would not have a substantial adverse effect, either directly or through habitat modifications, on this species.

82-8

7. This impact statement is incorrect because the hard substrate used by native oysters is the limiting habitat for the species, therefore removing it would be a significant impact. Acceptable mitigation would be replacement of the square footage of hard substrate with a similar amount of hard substrate preferably made from oyster shells. The mitigation habitat could be placed at or below the tide level of the hard substrate removed by the project. The mitigation should be monitored by a competent biologist to demonstrate successful mitigation.

Impact BI-11c Construction of the Yosemite Slough bridge would not have a substantial adverse effect on designated
critical habitat for green sturgeon and Central California Coast steelhead through permanent and temporary impacts to aquatic
and mudflat foraging habitat.

82-9

8. The mitigation measures for this impact are not complete. A Section 7 consultation with the National Marine Fisheries Service is required to determine potential impacts to green sturgeon and their critical habitat in San Francisco Bay. Depending on the outcome of this consultation, the impact may not be mitigable, in which case the bridge would not be allowed. This should be spelled out clearly in the project description.

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Comments made by Arc Ecology

Impact BI-19a Implementation of the Project at Candlestick Point would not result in impacts to aquatic organisms through the
re-suspension of contaminated sediments.

82-10

9. Re-suspension of sediments potentially impact eelgrass, macroalgae, and phytoplankton by blocking sunlight. The potential impacts of re-suspended sediments, whether contaminated or not, on such organisms should be evaluated, or there should be a full explanation why not.

Impact BI-19b and Mitigation Measure MM BI-19b.1 Work Windows to Reduce Maintenance Dredging Impacts to Fish during Operation of the Marina.

82-11

10. The LTMS (2001) standard is no longer the only regulation that must be considered to protect fish and fish habitat from impacts of dredging. There are no work windows for green sturgeon (federal) or longfin smelt (state) so Section 7 consultations and/or California Department of Fish and Game biological opinions will need to be prepared to mitigate for potential dredging impacts. In addition, if any eelgrass beds are nearby, then light monitoring in compliance with National Marine Fisheries Service protocols will need to be done as a condition of the dredging permits.

Impact BI-20a and MM BI-20a Lighting Measures to Reduce Impacts to Birds.

82-12

11. The proposed mitigation measure in MM BI-20a, "Use strobe or flashing lights in place of continuously burning lights for obstruction lighting. Use flashing white lights rather than continuous light, red light, or rotating beams." May not be permissible near water because the U.S. Coast Guard restricts flashing (strobe) white lights to emergency beacons. Please confirm that the use of white strobe lights to deter birds is allowed under these circumstances or propose a different mitigation measure.

MM BI-18b.1 Maintenance Dredging and Turbidity Minimization Measures for the Operation of the Marina. Maintenance dredging for the marina could remove or generate sediment plumes that could impact special status species, their habitats, and Essential Fish Habitat (EFH). To minimize this effect, the following measures shall be implemented by the Project Applicant:
1. Conduct a detailed survey for native oysters in all suitable substrates within the marina, (and the following under this Mitigation Measure).

82-13

12. This mitigation measure is ill-conceived to address habitat impacts of turbidity plumes from dredging in the new Hunters Point marina. First, native oysters have no special status under federal or state law except catch limits under the Fish and Game Code.

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Comments made by Arc Ecology

Second, substrate within a marina is not the natural habitat of this species so possible effects of dredge sediment plumes are not relevant to protecting native oyster habitat within the marina. Third, dredge sediment plumes should be measured during the first dredging episode to assess potential impact, if any, outside the marina. If no impact is found then the monitoring should not be needed in subsequent dredging episodes. Fourth, a detailed hydrodynamic plume model requires extensive data on bathymetry, tidal currents, and other factors, including actual verification and validation of the model by collecting field data. With good field data on the sediment plume there is no need for the model and its input data. Fifth, native oysters are widely distributed in San Francisco Bay but their settlement and survival in any one area is highly variable and good cause and effect relationships with, e.g., suspended sediment, are lacking. While monitoring and restoration of native oysters and their habitat in San Francisco Bay is a worthy endeavor, making it a costly requirement of maintenance dredging in a new marina is not justified.

82-13 cont'd.

MM BI-19b.1 in part "The spawning season for the Pacific herring is March 1 to November 30. Therefore, the window that shall be applied to minimize impacts to sensitive fish species (during which dredging activities cannot occur) is March 1 to November 30."

82-14

13. My comment. This statement about the spawning season is incorrect. In San Francisco Bay the spawning season for Pacific herring is October to April (California Department of Fish and Game website). Therefore an arbitrary dredging window would be May-September. In practice, regulation of dredging impacts on herring is done on an ad hoc basis using real time observations of herring spawning so as not to unneccessarily constrain dredging projects when there are no herring spawning in the bay. The LTMS 2001 Management Strategy Appendix F that was cited in the mitigation measure actually says that dredging will be restricted in historic herring spawning areas, when they are present, during December 1-February 28. Please change the wording in the mitigation measure to reflect the correct spawning season and the correct wording of the regulation with regard to Pacific herring.

Hazardous Materials

In MM HZ-1a: change the word "comparable" in the second paragraph to "equivalent" because the investigation and treatment should be at the same level of protectiveness in the CPSRA areas as in the land subject to San Francisco Health Department Article 22a.

82-15

The proposed mitigation measures seem appropriate if they are properly implemented. There should be a mechanism for peer review of the plans, independent verification of the performance of the mitigation, and community outreach to reassure and confirm the success of the mitigation as implemented.

82-16

Hydrology and Water Quality

82-17

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Comments made by Arc Ecology

The mitigation measures should specify that revegetation will be done with native, non-invasive species. 82-17 cont'd.

The mitigation measures should specify that shoreline improvements will incorporate the principles of natural, living shorelines, wherever feasible. 82-18

The allowance of three feet for future sea level rise may not be adequate. Other California authorities are using a 55 inches by year 2100 estimate. It would be prudent to allow for more sea level rise because it will be much easier to build out farther if sea level doesn't rise more than expected than it will be to protect existing structures from more than three feet of sea level rise if it does occur.. 82-19

The proposed mitigation measures seem appropriate if they are properly implemented. There should be a mechanism for peer review of the plans, independent verification of the performance of the mitigation, and community outreach to reassure and confirm the success of the mitigation as implemented. 82-20

Shoreline Improvements 82-21

The frequent mention of the potential use of natural shorelines is to be commended. Arc Ecology endorses the use of living shorelines for erosion protection, public access and education, and habitat preservation and enhancement. The relative amounts of sandy beach and natural shoreline in the plan are small compared to their potential development. Please consider living shorelines for erosion protection where there is now deteriorating riprap, e.g., at much of the Candlestick Point shoreline where rubble riprap is ineffective, unattractive, and hazardous. Moreover, some areas suitable for natural shorelines were stated to be planned for riprap by the Navy. Please plan for natural shoreline areas at these locations and encourage the Navy to implement them as part of the remedy for contamination so they do not have to be redone later. Examples of these areas are Parcel B IR 7, Parcel B Drydocks 5 to 7, Parcel D Berths 16 to 20, Parcel E Berths 37-42, Parcel E-2 entire shoreline.

When considering the suitability of the natural, living shoreline, approach to shoreline protection and enhancement be sure to include the construction of deep intertidal and shallow subtidal eelgrass meadows and native oyster beds and reefs. These habitat enhancements also attenuate wave action and thus reinforce the effectiveness of marsh and wetlands plants in stabilizing soil along the shore. 82-22

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December 21, 2009

Saul Bloom
Arc Ecology
4634 Third Street
San Francisco, CA 94124

Subject: Candlestick Point-Hunters Point Shipyard Phase II Development Plan Draft EIR Review

Dear Saul:

As you are aware, the Draft Environmental Impact Report (EIR) for the Candlestick Point-Hunters Point Phase II Development Plan analyzes the proposed project (which includes the Yosemite Slough Bridge) and Alternative 2 (the proposed project without the Yosemite Slough Bridge). LSA Associates, Inc. (LSA) prepared a preliminary review of the Draft EIR focused on the traffic-related analyses of the proposed project and Alternative 2 to determine whether the bridge is an essential component of the redevelopment plan. 82-23

No figure is presented to illustrate the design of the bridge's transportation elements. Page 38 of Section 2, Project Description, provides a written description that is later repeated in other sections. The 81-foot bridge would provide two 11-foot bus rapid transit (BRT) lanes, a 12-foot Class 1 bicycle and pedestrian path, and four game-day lanes. After the BRT lanes and bicycle path have been accounted for, 47 feet remain for the game-day lanes and the separation between lanes. 82-24

Pages 33–35 of Section 6, Alternatives, state that the construction, intersection, freeway, transit, bicycle, pedestrian, and parking impacts of Alternative 2 are the same as or similar to those of the project. The Transportation Study, located in Appendix D of the Draft EIR, similarly states that the impacts of Alternative 2 are the same as those of the project for intersections (page 235), freeway mainline and weaving segments (page 212), freeway ramp junctions (page 216), transit capacity (page 288), bicycle circulation (page 295), and pedestrian circulation (page 300). In fact, Appendix D, Chapter 7, Mitigation Measures, reveals that no additional mitigation measures are considered necessary for Alternative 2. Even Table VI-12, the summary table comparing the significant unavoidable impacts of the project to those of each of the alternatives, states that the traffic impacts of Alternative 2 are all equal to those of the project. 82-25

Despite the statements of equal impacts contained in the analysis portions of the Draft EIR, some statements in the summary paragraphs imply that Alternative 2 would result in increased traffic-related impacts. The following statement from Section 6, page 160, is an example: 82-26

> "Alternative 2 (CP-HPS Phase II Development Project, HPS Phase II Stadium, State Parks Agreement, and without the Yosemite Slough Bridge) would avoid Project impacts related to biological resources, water quality, and hazardous materials because the Yosemite Slough [bridge] would not be constructed. However, because the Yosemite Slough bridge would not be constructed, Alternative 2 would result in increased traffic-related impacts, particularly on game days."

Statements such as these in summary paragraphs are troublesome because they imply to anyone who does not read the document in depth that the bridge alleviates traffic impacts. In reality, the analysis text of the Draft EIR limits discussion of the bridge's benefits to the BRT and game-day traffic. These two topics are discussed in more detail below.

82-26 cont'd.

BRT

In lieu of the project BRT route over the bridge, Alternative 2 proposes that the BRT continue west on Carroll Avenue until reaching the abandoned Navy rail right-of-way. The BRT would then travel along the rail right-of-way adjacent to Hawes Street, adjacent to Armstrong Avenue, and east of Ingalls Street; then cross Hawes Street to reach Shafter Avenue; and then continue adjacent to Shafter Avenue to rejoin the proposed project BRT alignment. This alternative BRT route would travel in dedicated right-of-way.

82-27

Despite this clear description in the text, Figure VI-1 illustrates a confusing line along Ingalls Street labeled, "Alternative 2 Proposed BRT Route." Additionally, the summary paragraph describing the transit impacts of Alternative 2 on page 34 of Section 6 fails to indicate that the alternative BRT route would travel entirely on dedicated right-of-way.

Section III.D, Transportation and Circulation, mentions that the project BRT route would be "rail ready" and would not preclude conversion to light rail at some point in the future. The Draft EIR does not make this statement about the Alternative 2 BRT route. However, it is illogical to state that the Navy rail right-of-way could not accommodate a light-rail line at some time in the future.

82-28

Table VI-4, Attainment of Project Objectives, states that Alternative 2 meets Objectives 1 and 2 to a lesser extent than the project because of a lack of direct transit connection without the bridge. This could be a continuation of the misleading statements in other summary paragraphs overlooking the dedicated right-of-way utilized by the alternative BRT route, or it could also be the result of an error in the Transportation Study being carried forward into the Draft EIR.

82-29

Page 288 of Appendix D (Transportation Study) states that Alternative 2 would increase BRT travel time by "approximately five minutes" and would decrease BRT ridership by "approximately 15 percent." No technical analysis is presented in the Draft EIR justifying the claimed travel time savings.

The travel time increase in the Draft EIR is similar to statements made in the Bayview Transportation Improvements Project (BTIP) Transportation Study dated August 15, 2008, which identified 4 minutes and 37 seconds in travel time savings with the bridge. However, LSA believes that the BTIP erred in its determination of the differences in travel time by adding 1 minute to the travel time of the no-bridge alternative west of the bridge and failing to add travel time across the bridge to the with-bridge alternative. It should be noted that the BTIP no-bridge alternative assumed the BRT would travel on Ingalls Street in mixed-flow lanes. Alternative 2 of the Draft EIR includes the use of dedicated lanes within abandoned Navy rail right-of-way. The project BRT route and Alternative 2 BRT route would both utilize dedicated lanes for the entire trip. Because the BRT would not travel in mixed-flow lanes in Alternative 2, the travel time savings of the bridge identified in the Draft EIR should be even less than the corrected BTIP travel time savings.

82-30

A simple analysis identified that the stated 5-minute increase in travel time with Alternative 2 is greatly exaggerated. Between Carroll Avenue and Shafter Avenue, the bridge route would travel approximately 2,245 feet. The route around Yosemite Slough for Alternative 2 is approximately 5,450 feet. Stating that the trip around Yosemite Slough in dedicated lanes requires 5 additional minutes is equivalent to stating that the BRT has an average speed of 7.3 miles per hour.

Based on other BRT lines operating in dedicated lanes, the expected average speed should be between 20 and 25 miles per hour. This would equate to a travel time savings for the Yosemite Slough Bridge of between 1 minute and 27 seconds and 1 minute and 49 seconds, which is far less than stated in the Draft EIR.

The inaccuracies in the travel time estimate most likely led to an error in calculating a 15 percent decrease in BRT ridership without the bridge. The inaccuracy in calculating Alternative 2 BRT travel time may have also led to an error in determining that Alternative 2 impacts a transit route that the project does not (Appendix D, page 290). It should be noted that the impact to Route 28L is not mentioned in the body of the Draft EIR; the reference to it only appears in Appendix D.

82-30 cont'd.

Route 28L travels north-south between the Presidio and Daly City, on the opposite side of the peninsula from the project. It is not immediately clear how the Transportation Study concludes that the project would impact this route, that 16 additional vehicles would be necessary in both the a.m. and p.m. peak hours to maintain headways as a result of the project, and that elimination of the Yosemite Slough Bridge would require an additional 7 vehicles in the a.m. peak hour and 12 vehicles in the p.m. peak hour to maintain headways on Route 28L.

82-31

Game Day

Table VI-4, Attainment of Project Objectives, states that Alternative 2 meets all project objectives except for Objective 5. Objective 5 is to encourage the 49ers to remain in San Francisco by providing a world-class site for a new waterfront stadium and necessary infrastructure. The reason given for stating the objective is not met is that Alternative 2 "would not facilitate the efficient handling of game-day traffic to as great an extent as the Project."

The Draft EIR does not provide a technical analysis of post-game traffic flow comparing with and without bridge scenarios. It is therefore inappropriate for the Draft EIR to make a conclusion that the bridge is necessary infrastructure or that Alternative 2 would not facilitate the efficient handling of game-day traffic.

Game-day traffic is a condition that would occur 10 times per year (or up to 12 times per year if the 49ers are participating in the playoffs). When discussing game-day traffic, the Draft EIR states that "vehicle arrival is spread over about six hours" (Section III.D, page 22) and that because the arrival occurs over a long period of time, traffic facilities are not substantially impacted (Section III.D, page 23). It is the departure of vehicles from the parking lot over a short period of time that constitutes the majority of game-day traffic impacts.

The number of vehicles exiting any stadium parking lot exceeds the capacity of the surrounding roadway network. Congestion will occur on either the regional transportation routes, the local streets, or in the parking lot itself. Ideally, exiting traffic would be metered to match the ability of the regional and local road networks to absorb the additional vehicles and excess demand would be

82-32

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contained on the event site. Appendix D (Transportation Study), page 325 acknowledges that "the existing egress system [from Candlestick Park] effectively meters the traffic that can merge onto U.S. 101 and other routes so as to minimize mainline congestion."

82-32 cont'd.

The Draft EIR assumes that the three additional lanes provided by the bridge for vehicles exiting the parking lot are beneficial. However, the project (with Yosemite Slough Bridge) would not provide more capacity on regional transportation routes than Alternative 2, nor would the project provide more capacity on local streets than Alternative 2. It is possible that a greater number of lanes exiting the parking lot will overwhelm the local street system and that metering the flow of vehicles exiting the parking lot, by not providing a bridge, would result in more efficient handling of vehicles and reduce the level of queuing and congestion on local streets.

The Draft EIR describes the project's shortfall of 3,059 parking spaces for the stadium (a 15 percent shortfall) as a social inconvenience and hypothesizes that the inconvenience could encourage some patrons to take transit instead (Section III.D, page 138). Any inconvenience associated with waiting to exit the parking lot resulting from eliminating the bridge could similarly encourage some patrons to take transit instead.

82-33

Conclusion

The Draft EIR compared traffic-related impacts for redevelopment of Candlestick Point and Hunters Point Shipyard with or without a bridge. The text of the analysis stated that impacts without the bridge would be similar to or the same as impacts with the bridge. Summary statements in the Draft EIR indicate that Alternative 2 (without the bridge) does not meet the project objectives as well as the project (with the bridge) seemingly because of the bridge's perceived benefits to the BRT and game-day traffic.

However, benefits to the BRT are exaggerated because the travel time savings of the bridge are 1 minute and 27 seconds to 1 minute and 49 seconds. Benefits to game-day traffic cannot be substantiated because the Draft EIR provides no analysis to determine whether or not the bridge would provide a benefit to game-day traffic. It is possible that providing the bridge for game-day traffic would increase congestion on local streets. Because of the similar impacts associated with redevelopment of Candlestick Point and Hunters Point Shipyard with or without a bridge, it does not appear that the bridge is a necessary component of the transportation system.

82-34

LSA hopes that the discussion of traffic-related issues informs your analysis of the Candlestick Point-Hunters Point Shipyard Phase II Development Plan Project Draft EIR. If you have further questions, please feel free to contact us.

Sincerely,

LSA ASSOCIATES, INC.

Meghan Macias

Meghan Macias
Principal

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Comments made by Arc Ecology

COMMENTS ON THE CANDLESTICK POINT-HUNTERS POINT SHIPYARD PHASE II DEVELOPMENT PLAN PROJECT DRAFT EIR DATED NOVEMBER 12, 2009

Section 6, Page 30

Comment 1: "Under Alternative 2, motorized and non-motorized traffic would be required to circumnavigate Yosemite Slough because no bridge would be constructed." 82-35

This statement misleads the reader by implying that additional automobiles would be added to the street network without the bridge when in fact, automobiles would not be allowed on the bridge. The section should correctly inform readers that neither the Project or Alternative 2 would provide bridge access for automobiles.

Comment 2: "The primary roadway connection for automobiles and other vehicular traffic between Candlestick Point and HPS Phase II…" 82-36

This statement is similarly misleading. A more accurate statement would inform the reader that the circulation system proposed for automobiles is the same for the Project and Alternative 2.

Figure VI-1

Comment 3: Although the text clearly indicates that the abandoned rail route would provide dedicated right-of-way for the BRT, the figure displays an "Alternative 2 Proposed BRT Route" along Ingalls Street. This could confuse readers who view the figure without reading the text in depth. Figure VI-1 should be corrected to show the BRT route along the RR ROW, as described in the text. 82-37

Comment 4: At the same time, the line along Innes Avenue should be discussed in the text or removed from Figure VI-1 if Figure VI-1 is in error. 82-38

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Comments made by Arc Ecology

Section 6, Page 32

Comment 5: The first paragraph should indicate that, similar to the project, the alternative BRT route would be "rail ready" (not to preclude possible conversion to light-rail). It is illogical to state that the rail right-of-way, to be utilized by the BRT to circumnavigate Yosemite Slough, would not be capable of accommodating rail. 82-39

Section 6, Page 33 – Transportation and Circulation 82-40

Comment 6: "The main roadway connection between Candlestick Point and HPS Phase II would be via Ingalls Street."

This statement misleads the reader by implying that additional automobiles would be added to the street network without the bridge when in fact, automobiles would not be allowed on the bridge. A more accurate statement would inform the reader that the circulation system proposed for automobiles is the same for the Project and Alternative 2.

Section 6, Page 34 – Intersection Conditions 82-41

Comment 7: "In general, intersection conditions would be significant and unavoidable effect of Alternative 2." This sentence misleads the reader into believing that Alternative 2 has significant impacts that the Project avoids, when in fact Alternative 2 and the Project have identical impacts to intersections. This section should inform readers that impacts of Alternative 2 are the same as the Project.

Comment 8: "During game days at the football stadium, with no Yosemite Slough Bridge, the entrance and exiting capacity for vehicles would be reduced about 40 percent compared to the Project; four out of a total 11 exit lanes would be available without the bridge." 82-42

This statement is in error. Section III.D, page 45 indicates that one out of the bridge's four lanes would remain open to off-peak direction traffic for local traffic and emergency vehicles. In addition, Alternative 2 would provide the same number of lanes accessing regional transportation facilities and the same number of lanes in the local street system. Only the number of lanes leaving the parking lot is reduced from ten to seven.

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Comments made by Arc Ecology

Comment 9: "A mitigation measure to implement a Travel Demand Management Plan for the stadium events would reduce but not avoid traffic impacts, which would be significant and unavoidable." 82-43

This statement misleads the reader by implying that impacts associated with Alternative 2 cannot be mitigated whereas similar Project impacts could be mitigated. The statement should inform the reader that the Project's Travel Demand Management Plan would also reduce but not avoid stadium traffic impacts which would also be significant and unavoidable.

Section 6, Page 34 – Transit Impacts 82-44

Comment 10: The second paragraph misleads the reader into believing that the Alternative 2 route does not provide dedicated right-of-way when in fact the alternative BRT route around Yosemite Slough would still operate in dedicated right-of-way and is technically feasible.

Comment 11: Pursuant to State CEQA Guidelines Section 15151, the EIR should provide a sufficient degree of analysis to provide decision makers with information which enables them to make a decision which takes into account the environmental consequences of the project. While an EIR must contain facts and analysis, not just an agency's conclusions or opinions (Citizens of Goleta Valley v. Board of Supervisors, 1990), no technical analysis is presented in the Draft EIR justifying the claimed travel time savings. Based on the additional distance around Yosemite Slough (3,205 feet) and average BRT travel speeds (20 to 25 miles per hour), the alternate BRT route should require between 1 minute 27 seconds and 1 minute 49 seconds of additional travel time. 82-45

Comment 12: Identical misleading statements regarding dedicated right-of-way and travel time are made in Appendix D (Transportation Study) and should be removed because these statements are not supported by facts or analysis presented in the Draft EIR. 82-46

Comment 13: The reference to VRT on this page is a typographical error. 82-47

Section 6, Page 58 – Attainment of Project Objectives 82-48

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Comments made by Arc Ecology

Comment 14: The statement that Alternative 2 would meet transportation-related objectives to a lesser extent than the Project is inconsistent with the remainder of the section and should be removed from the Final EIR. Earlier in Section 6 the Draft EIR states that construction, intersection, freeway, transit, bicycle, pedestrian, and parking impacts of Alternative 2 are the same as or similar to the Project (Section 6, Pages 33-35). Additionally, Appendix D (Transportation Study) makes the same conclusions:

- "Therefore, the traffic impacts associated with Alternative 2 would be the same as the Project." (Page 235)
- Impacts at Mainline and Weaving Segments are the same (Page 212) and Impacts at Ramp Junctions are the same (Page 216)
- "As with the Project, Alternative 2 impacts on transit capacity would be less than significant." (Page 288)
- "As with the Project, Alternative 2 impacts on bicycle circulation would be less than significant." (Page 295)
- "As with the Project, Alternative 2 impacts on pedestrian circulation would be less than significant." (Page 300)

82-48 cont'd.

Comment 15: Stating that Alternative 2 meets most of the Project objectives is incorrect. Like the Project, Alternative 2 provides for BRT connection between Candlestick Point and Hunters Point along dedicated right-of-way. Alternative 2 and the Project have identical traffic-related impacts. Additionally, the Draft EIR does not provide analysis demonstrating the necessity of the bridge to accommodate game day traffic (a scenario occurring only 10 or 12 times a year). Based on the analysis provided in the Draft EIR, Alternative 2 meets all the Project objectives while reducing impacts to Hazards and Hazardous Material (Section 6, Page 42), Geology and Soils (Section 6, Page 44), and Biological Resources (Section 6, Page 47).

82-49

Table VI-4 – Attainment of Project Objectives Alternative 2

Objective 1

Comment 16: The statement that removing the bridge eliminates direct transit connection is false; Alternative 2 provides a BRT connection in dedicated right-of-way.

82-50

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Comments made by Arc Ecology

Comment 17: The statement that removing the bridge eliminates continuous shoreline and open space access contradicts the previous sentence which correctly states that Alternative 2 provides "the same shoreline improvements and open space network" as the Project. 82-51

Comment 18: Alternative 2 meets this objective to the same extent as the Project because a grade-separated connection is not necessary to produce tangible community benefits. 82-52

Objective 2

Comment 19: The statement that removing the bridge eliminates a direct connection between Candlestick Point and Hunters Point Shipyard is false; Alternative 2 provides a BRT connection in dedicated right-of-way. 82-53

Comment 20: Alternative 2 meets this objective to the same extent as the Project because direct connection is provided by transit in dedicated lanes and the opening of Crisp Avenue. 82-54

Objective 5

Comment 21: Alternative 2 includes the same stadium as the Project, the same number of lanes on local streets as the Project, the same connection to U.S. 101 as the Project, and meets Objective 5 as well as the Project. The technical analysis in the Draft EIR does not support the statement that a bridge over Yosemite Slough is necessary infrastructure. An EIR must contain facts, not just an agency's conclusions or opinions (Citizens of Goleta Valley v. Board of Supervisors, 1990). Because the conclusion that the bridge is "necessary infrastructure" is not supported by fact, such statements should be removed from the Final EIR. 82-55

Comment 22: The Draft EIR does not provide an analysis of post-game traffic flow with and without the bridge. The Draft EIR only assumes that a greater number of lanes exiting the parking lot is beneficial. It is possible that a greater number of lanes exiting the parking lot will overwhelm the local street system without speeding the delivery of vehicles onto U.S. 101. 82-56

Comment 23: Because the Draft EIR does not provide an analysis of post-game traffic flow with and without the bridge, it is improper to make a conclusion that the bridge is necessary infrastructure. Such statements should be removed from the Final EIR. 82-57

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Comments made by Arc Ecology

Section 6, Page 160 – Environmentally Superior Alternative

82-58

Comment 24: "Alternative 2… would avoid Project impacts related to biological resources, water quality, and hazardous materials because the Yosemite Slough [bridge] would not be constructed. However, because the Yosemite Slough bridge would not be constructed, Alternative 2 would result in increased traffic-related impacts, particularly on game days."

This statement is inconsistent with the analysis contained within the section. Earlier in Section 6 the Draft EIR states that construction, intersection, freeway, transit, bicycle, pedestrian, and parking impacts are the same as or similar to the Project (Section 6, Pages 33-35). Additionally, Appendix D (Transportation Study) makes the same conclusions:

- "Therefore, the traffic impacts associated with Alternative 2 would be the same as the Project." (Page 235)
- Impacts at Mainline and Weaving Segments are the same (Page 212) and Impacts at Ramp Junctions are the same (Page 216)
- "As with the Project, Alternative 2 impacts on transit capacity would be less than significant." (Page 288)
- "As with the Project, Alternative 2 impacts on bicycle circulation would be less than significant." (Page 295)
- "As with the Project, Alternative 2 impacts on pedestrian circulation would be less than significant." (Page 300)

Comment 25: Please explain how this paragraph can state Alternative 2 would result in increased traffic-related impacts when that statement is in direct conflict with Table VI-12: Comparison of the Significant and Unavoidable Impacts of the Project to Each of the Alternatives, which found Alternative 2 to be equal to the Project.

82-59

Comment 26: The Draft EIR assumes that a greater number of lanes exiting the stadium parking lot is beneficial, but provides no analysis demonstrating that the number of vehicles delivered by Ingalls Street and the bridge (three outbound lanes each) will not exceed the capacity of the Harney Way and 3rd Street ramps and U.S. 101. It is possible that metering the flow of vehicles exiting the parking lot, by not providing a bridge, would result in more efficient handling of vehicles and reduce the level of queuing and congestion on local streets.

82-60

Appendix D, Chapter 6, Page 288

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Comments made by Arc Ecology

Comment 27: The second paragraph of Alternative 2-No Bridge misleads the reader into believing that the Alternative 2 route does not provide dedicated right-of-way when in fact the alternative BRT route around Yosemite Slough would still operate in dedicated right-of-way and is technically feasible.

82-61 cont'd.

Comment 28: Pursuant to State CEQA Guidelines Section 15151, the EIR should provide a sufficient degree of analysis to provide decision makers with information which enables them to make a decision which takes into account the environmental consequences of the project. While an EIR must contain facts and analysis, not just an agency's conclusions or opinions (Citizens of Goleta Valley v. Board of Supervisors, 1990), no technical analysis is presented in the Draft EIR justifying the claimed travel time savings. Based on the additional distance around Yosemite Slough (3,205 feet) and average BRT travel speeds (20 to 25 miles per hour), the alternate BRT route should require between 1 minute 27 seconds and 1 minute 49 seconds of additional travel time.

82-62

Comment 29: The third paragraph of Alternative 2-No Bridge asserts that the alternative BRT route would increase travel time by 5 minutes and decreases ridership by 15 percent. These statements are not supported by analysis presented anywhere in the Draft EIR and should be removed from the Final EIR.

82-63

Comment 30: The travel time increase in the Draft EIR is similar to statements made in the Bayview Transportation Improvements Project (BTIP) Transportation Study dated August 15, 2008 which identified 4 minutes 37 seconds in travel time savings with the bridge. The BTIP, however, erred when determining the differences in travel time by adding 1 minute to the travel time of the no-bridge alternative west of the bridge and failing to add travel time across the bridge to the with-bridge alternative. It should be noted that the BTIP no-bridge alternative assumed the BRT would travel on Ingalls Street in mixed-flow lanes. Alternative 2 of the Draft EIR includes use of dedicated lanes within abandoned Navy rail right-of-way. The Project BRT route and Alternative 2 BRT route would both utilize dedicated lanes for the entire trip. Because the BRT would not travel in mixed-flow lanes in Alternative 2, the travel time savings of the bridge identified in the Draft EIR would be less than the corrected BTIP travel time savings.

82-64

Comment 31: The stated 5 minute increase in travel time with Alternative 2 is greatly exaggerated. Between Carroll Avenue and Shafter Avenue the bridge route would travel

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Comments made by Arc Ecology

approximately 2,245 feet. The route around Yosemite Slough for Alternative 2 is approximately 5,450 feet. Stating that the trip around Yosemite Slough, in dedicated lanes, requires 5 additional minutes is equivalent to stating that the BRT has an average speed of 7.3 miles per hour.

82-65 cont'd.

Comment 32: Based on other BRT lines operating in dedicated lanes, the expected average speed should be between 20 and 25 miles per hour. This would equate to a travel time savings for the Yosemite Slough Bridge of between 1 minute 27 seconds and 1 minute 49 seconds.

82-66

Comment 33: Errors in calculating the travel time savings of the bridge were undoubtedly carried forward into estimations of BRT ridership to and from the Hunters Point Shipyard and impacts to route 28L-19th Avenue/Geneva BRT route. All analyses that utilized the incorrectly calculated travel time savings should be corrected and reported so that the actual costs and benefits of the bridge can be considered.

82-67

Appendix D, Chapter 6, Page 290

Comment 34: Please explain how development in Bayview (and specifically whether or not a bridge providing approximately 1.5 minutes of travel time savings is built) affects a bus line travelling between Daly City and the Presidio.

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FarWest
RESTORATION
ENGINEERING

July 31, 2006

Ms. Eve Bach
Arc Ecology
4634 Third Street
San Francisco, CA 94124

Subject: Transmittal of Preliminary Design Proposal for Hunters Point Shipyard Parcel E Stormwater Treatment Wetlands, San Francisco, California

Dear Eve:

I am pleased to submit this preliminary design report for a system of stormwater treatment wetlands at the Parcel E landfill of the former Navy base in San Francisco, California. In addition to improving water quality, the proposed wetlands will also provide excellent wildlife habitat and public access and educational opportunities to the local community. 82-69

I appreciate the opportunity to provide these services to Arc Ecology. Please do not hesitate to call me at (510) 522-7200 with any questions or comments.

Sincerely,

Roger Leventhal, P.E.
Principal Engineer

538 Santa Clara Avenue
Alameda, CA 94501
Phone (510) 865-2840

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Preliminary Design Report for Hunters Point Shipyard Parcel E Stormwater Treatment Wetlands

San Francisco, California

82-69 cont'd.

July 31, 2006

Prepared by

FarWest Restoration Engineering
538 Santa Clara Avenue
Alameda, California 94501

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HUNTERS POINT SHIPYARD PARCEL E STORMWATER TREATMENT WETLANDS

PRELIMINARY DESIGN REPORT

Executive Summary

This report presents a preliminary design for stormwater treatment wetlands at the industrial landfill on Parcel E of the former naval shipyard at Hunters Point, including design calculations, grading plans, and a cost estimate. The proposed design is a perennial wetland system that consists of a forebay pond flowing into a pair of permanent wet ponds, which in turn flow into two freshwater marshes that ultimately discharge into San Francisco Bay. Preliminary calculations indicate that the proposed system can treat the proposed 40 acre Hunters Pt site development and potentially an additional 200 acres of upland urbanized watershed.

In addition to stormwater treatment, the design also provides for a functioning wetland system with valuable habitat for a variety of birds and other wetland species. Furthermore, the proposed wetlands will provide significant public access and community education opportunities for an important and historically underserved part of San Francisco.

82-69 cont'd.

FarWest Restoration Engineering 1

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1.0 Introduction

This report presents a preliminary design for stormwater treatment wetlands at the industrial landfill on Parcel E of the former naval shipyard at Hunters Point in San Francisco (Figure 1). It contains an evaluation of the effectiveness of the proposed wetland system to treat pollutants in stormwater, preliminary grading plans and concept renderings, and an estimate of final design and construction costs.

1.1 DESIGN OBJECTIVES

In a 2004 feasibility study for the Golden Gate Audubon Society (Brown and Caldwell 2004), three primary objectives were identified for the creation of wetlands at the site: (1) improve the quality of stormwater effluent before it is discharged to San Francisco Bay; (2) create marsh habitat for desirable birds and aquatic species; (3) provide opportunities for public education, access and recreation. The study identified a permanent freshwater wetland system as the preferred alternative for meeting those objectives.

With funding provided by the Coastal Conservancy, Arc Ecology, a community based environmental group, retained FarWest Restoration Engineering to prepare this preliminary design on the basis of the conceptual design included in the 2004 feasibility study. In addition to advancing the conceptual design with design calculations, preliminary grading plans, and a cost estimate, this preliminary design incorporates modifications to improve and enhance operation of the stormwater treatment potential of the wetland complex, which the conceptual design did not address, and to enhance public safety.

82-69 cont'd.

1.2 SUMMARY OF PROPOSED DESIGN

The proposed wetland design is potentially an important element of the Hunters Point community revitalization process that is now underway. It would provide opportunities to treat stormwater and improve water quality before stormwater is discharged to San Francisco Bay; create wildlife habitat; and offer educational and recreational facilities.

The proposed design is a perennial wetland system that consists of a "forebay" flowing into a pair of ponds, which in turn flow into two freshwater marshes that ultimately discharge into San Francisco Bay (Figure 2). Brown and Caldwell's 2004 feasibility study identified the preferred stormwater treatment method as extended stormwater detention and biofiltration through a pond and marsh system. The design provides for a functioning wetland system with valuable habitat for a variety of birds and other wetland species. The wetlands will also provide significant public access and community education opportunities for this important and historically underserved part of San Francisco.

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1.3 DESCRIPTION OF EXISTING SITE

Parcel E consists of 167 acres in the southwestern portion of the Hunters Point Shipyard; the project site (see Figure 2) is located in the western portion of Parcel E. The industrial landfill at the site encompasses approximately 20 acres with fill ranging in depth from 2 to 32 feet. A landfill cap covers approximately 15 acres of the landfill. The waste consists of a wide range of materials. The landfill reportedly has no bottom liner or leachate capture system, and bottom waste is in direct contact with groundwater.

The Parcel E site's proximity to the bay and to existing wetlands at Hunters Point makes it the ideal location for a treatment wetland. Current master planning efforts identify a portion of Parcel E as open space, including the landfill location, which is not slated for commercial development; thus the treatment wetland will have no negative impact on proposed development plans. (The wetlands' benefits in the proposed development plan will be discussed in *From Pollution to Parkland: Alternatives for a Waterfront Park at Hunters Point Shipyard* (Arc Ecology 2006). Furthermore, we have identified no other site at Hunters Point that is suitable for construction of a stormwater treatment wetland.

82-69 cont'd.

1.4 PREVIOUS STUDY AND CONCEPTUAL DESIGN

The feasibility study on which this design report is based was performed by by the consulting firm Brown and Caldwell, in association with Professor Rhea Williamson of San Jose State University, in 2004 for the community-based group Arc Ecology (Brown and Caldwell 2004). The study investigated various wetland treatment alternatives, and the report included a conceptual design for the alternative that the Brown and Caldwell study identified as preferred (a forebay flowing into a pair of ponds and wetland marshes, as described above). The key assumption supporting the feasibility of the design was that recycled water would be available to supplement surface-water runoff during the summer months. The study focused primarily on the wetlands' benefits to wildlife habitat and less on the design basis for stormwater treatment.

The feasibility study report contained detailed information on the site's history, characteristics of the Parcel E landfill, and pollutants found there, as well as general background information. It should be read in conjunction with this preliminary design report.

1.5 SCOPE OF WORK

1.5.1 Scope of Preliminary Design

The scope of work for this preliminary design includes the following elements.

- Develop the design calculations that provide the basis for stormwater treatment of the proposed wetland system and its effectiveness for pollutant removal

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- Prepare a preliminary grading plan
- Further develop the conceptual design to evaluate implementation and constructability
- Prepare preliminary cost estimates for construction, operation, and maintenance of the system
- Participate in a community meeting and presentation of the system's design

1.5.2 Assumptions and Limitations

This report is based on the following assumptions and limitations.

- The topographic base map of Parcel E was provided by Hargreaves Associates using a scan of a map from a report prepared by Tetra Tech Inc. for the Navy (Tetra Tech 2003). No project datum or date of the survey was provided. We have therefore assumed a datum for this survey of feet NGVD (National Geodetic Vertical Datum, mean sea level 1929).
- We assumed that the area of the watershed draining into the wetlands — 38 acres — was correct as cited in the Brown and Caldwell feasibility report, since Navy regulations prevented us from visiting the site and we were unable to obtain current topographic maps.
- The footprint of the system will be equivalent to the footprint of the existing landfill, an area of approximately 20 acres.
- Final development plans for the Parcel E watershed are not yet available; however, we understand that the watershed area is intended for high-density residential housing. We have made a conservative assumption that the surface of the watershed draining into the wetlands is 80 percent impervious. A more pervious watershed area would result in less runoff and leave additional treatment capacity in the wetland.
- The proposed wetland system is designed only for stormwater treatment and not for reduction of flooding. We have assumed that flow equalization, if required, will occur upstream of the wetlands or is not required because the flow will be discharged into the bay. Some equalization of flood flows may occur in the wetlands, but designing expressly for flood equalization would require information about the proposed upstream development that is unavailable to us at this time, and it is therefore not included in the scope of this report.
- Since the details of the watershed development are unknown, we have assumed that stormwater will enter the forebay at the inlet location shown on the grading plans either by gravity or from pumping. The design of the inlet structure into the wetland system should be coordinated with the watershed development site drainage plans during final design activities for the system.
- This report is based on the assumption that the Navy or others will remove pollutants and debris from the landfill to allow for construction of the project. While not necessary for the successful construction of wetlands on

82-69 cont'd.

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Parcel E, the removal of the industrial landfill has been the Bayview–Hunters Point community's preferred strategy since the 2000 fire at the landfill, and we have therefore based this report on that scenario.

- We have developed two cost alternatives (detailed in Section 5.0). The first assumes the Navy will remove all contaminated soils and leave the site at an elevation of –10 feet NGVD. The second assumes a combination of hot-spot removal and in situ cleanup along with importation of clean soils so that after the Navy completes its cleanup activities the site's elevation will be at 0 feet NGVD. Notice that construction of the wetland will not necessarily depend on the Navy's cleanup decisions, since there are a range of possible remediation scenarios, each with its own associated cost However, the cleanup remedy implemented will strongly influence the quality of surrounding bay water habitat and compliance with community values and will be the subject of negotiations with the community and regulatory agencies.
- We have assumed that residual groundwater contamination will remain after cleanup, which will require a liner system between the wetland marshes and ponds and the groundwater.
- If significant groundwater contamination remains after cleanup, a groundwater extraction and treatment system may be required. However, the costs of such a system are not included in this proposal.

82-69 cont'd.

1.5.3 Modifications to Conceptual Design

This preliminary design addresses stormwater treatment and public safety by incorporating the following modifications to the 2004 feasibility study (Brown and Caldwell 2004).

- Adds a 5-foot-wide safety bench around the edge of each pond and the forebay to reduce the possibility of accidental drowning of anyone who may enter those areas. The benches consist of earthfill and wetland vegetation at an elevation approximately 1 foot below the design water level.
- Adds a small channel at a slope of approximately 0.5 percent graded into the bottom of each wetland marsh cell to allow for drainage if required.
- Increases the size of the forebay to contain enough volume to treat stormwater, as described in Section 4.
- Removes the large predator trench (described in the conceptual design as 8 feet deep and 20 feet wide) from the Dragonfly Pond. The proposed design maintains water in this pond with no drawdown, and therefore a deep trench provides no additional protection against predators. However, in the Wading Bird Pond, which is intended to draw down over a three- to four-week period, we kept a predator trench reduced in size to approximately 3 to 4 feet deep to inhibit predator access to the loafing island. The size of this trench has been reduced to save costs.

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- Modifies public access routes to reduce the impact of walking trails on use of the site by birds, while still maintaining generous public access. Also, the preliminary design reduces the extent of boardwalks over wetland cells to minimize human impact on the wetlands and reduce construction costs.

2.0 Stormwater Treatment Concepts

This section presents the major concepts and related considerations in stormwater treatment as proposed in this preliminary design.

2.1 HOW LAND DEVELOPMENT AFFECTS STORMWATER RUNOFF

Every site has its own natural hydrology, or patterns of water flow — through the air, across its surface, and under the ground. Constructing buildings and roads typically changes both the volume and pattern of the flow of water at a site and the kinds and quantities of pollutants and debris carried in the water.

When rainwater flows over the surface of a site, it is called runoff. Under natural conditions — that is, on land where no buildings, sidewalks, roads, or parking lots have been built — most of the rain that falls typically soaks into the soil, and runoff occurs only when the ground is saturated, for example during a heavy rainstorm.

82-69 cont'd.

Areas covered by buildings, sidewalks, roads, and parking lots, on the other hand, are impervious to runoff — they cannot absorb it. The denser a development is, the more impervious its surfaces, and the more runoff it generates. The surfaces of commercial and industrial areas typically are highly impervious to runoff. In general, the more impervious the surface of a watershed, the more pollutants its runoff contains (Center for Watershed Protection 2003).

Furthermore, land development typically leads not only to more but faster runoff, which can increase erosion and widen and deepen creek and river channels. Development also alters the timing and pattern of the flow of water. For example, relatively small flows that typically occurred once every one to two years before a site has been developed may occur several times a year after it is developed. These kinds of changes to a site's hydrology have detrimental effects on ecosystems and waterways downstream.

Finally, land development changes the nature of the pollutants carried by runoff. The type and proportion of pollutants in runoff generally correspond to the use of the land over which the water flows. When properly designed, stormwater treatment systems can lessen the impact of development on a site's hydrology and improve the quality of the water.

2.2 POTENTIAL POLLUTANTS IN STORMWATER RUNOFF

Stormwater treatment wetlands are most successful when they are designed with known pollutants in mind. The pollutants typically of concern in urban stormwater runoff include the following.

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- Mineral and organic matter (frequently reported as total suspended solids or TSS)
- Excessive plant "nutrients" (primarily nitrogen and phosphorus in plant fertilizers), which can cause excessive algal growth and depletion of oxygen)
- Hydrocarbons (such as oil, grease, and gasoline)
- Other "organic" chemicals such as pesticides
- Trace metals
- Pathogens

The actual pollutants in stormwater depend on the specific conditions at a site and its watershed. Some information on the Hunters Point site is available from the Navy's past stormwater monitoring, but redevelopment of the watershed will undoubtedly alter runoff characteristics significantly.

Land use strongly influences the types of constituents that may be found in runoff. Residential areas typically contain more turf, and the runoff that flows from them typically contains elevated levels of fertilizers and pesticides. Runoff from commercial and industrial areas may contain fewer of those chemicals but more metals associated with mechanical and industrial processes. The level of automobile traffic in an area is correlated with levels of hydrocarbons in runoff.

82-69 cont'd.

The preliminary design for the Hunters Point Shipyard project is based on the assumption that pollutants in stormwater runoff from the redeveloped watershed area will be comparable to runoff from other high-density residential developments. The extent to which previous land use will continue to influence pollutants in the runoff is unknown.

Table 1 summarizes data from stormwater monitoring the Navy performed at the Hunters Point Shipyard in 2004–2005, which involved two rounds of collection and analysis of stormwater samples at three locations. To assess the potential effectiveness of wetlands in treating stormwater at the site, we also examined several data sets of national and regional average conditions (Center for Watershed Protection 2003; Kadlec and Knight 1996). Table 2 compares the Hunters Point monitoring data with data for selected residential areas a set of national data; a set of data averaged from four areas with low rainfall (Phoenix, Arizona; San Diego, California; Boise, Idaho; and Denver, Colorado); and data for the San Francisco Bay Area. The data show what chemical constituents are typical in residential areas, in order-of-magnitude concentrations. These data are useful only for planning purposes, to provide a very rough estimate of the types and amounts of pollutants that would likely be found in the influent of the proposed wetlands once residential development has been completed upland from the wetlands site.

Some studies have shown that urban stormwater runoff in arid areas may have higher chemical constituent concentrations than runoff in areas with more rainfall (Center for Watershed Protection 2003). As Table 2 shows, both the existing data on the site and the regional data for the Bay Area show constituent concentrations comparable to the averaged concentrations in the four low-rainfall areas. The Hunters Point data show comparatively elevated levels of some metals, as might be

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expected given the history of land use at the site. We anticipate that regulations will require the proposed wetland design to treat runoff typical of high-density residential development, and possibly also elevated levels of metals, depending on the extent to which redevelopment and cleanup remove the sources of pollutants.

2.3 STORMWATER TREATMENT PROCESSES

Pollutant removal in stormwater treatment systems — including ponds and wetlands — involves a range of physical, chemical, and biological processes. The main treatment mechanisms are water detention [storage of water to allow for physical settling of particles] and biofiltration (adsorption of particles to wetlands vegetation).

2.3.1 Physical and Chemical Processes: Sedimentation and Adsorption

The primary physical and chemical processes involved in stormwater treatment in general (and the proposed design in particular) are adsorption and sedimentation. These processes both remove pollutants suspended in the water. Adsorption is a physical process by which particles adhere to another surface or medium (such as soil or vegetation). Sedimentation happens when particles suspended in water fall to the bottom and are removed from the water stream.

The proposed design does not include any elements specifically based on chemical precipitation, which is a less important removal mechanism for most stormwater treatment wetlands. There are exceptions under certain conditions for specific pollutants; for example, under high-pH conditions, chemical precipitation may be used to remove phosphorus.

82-69 cont'd.

In addition to the pollutants listed in Section 2.2, stormwater runoff typically carries a high proportion of solid materials. The materials vary but may include soil particles from eroding surfaces, incompletely decomposed organic matter such as grass clippings, wood fragments, and small particles from asphalt, tires, and so forth. These types of pollutants would typically be removed in the forebay of the proposed project, which is designed to settle large particles and debris.

A large percentage of the pollutants typically carried in stormwater may be adsorbed onto particles of these solid materials. The particles can then settle out in a detention basin or wet pond. This process removes pollutants from the flow of water where they can be removed at a later date or are safely contained at the site. Furthermore, once they have settled, the sediments at the bottom of the basin or pond can continue to adsorb more pollutants.

Organic matter produced within a pond or wetland — the remains of plants, animals, and microorganisms — also settles to the bottom. The sedimentation of this decomposing matter "sequesters" them, keeping chemical nutrients from producing excessive vegetation growth of algae which reduce oxygen levels. Chemical nutrients in bottom sediments can be released into the water under anoxic (oxygenless) conditions. Therefore it is important that pond waters be maintained in a well-oxygenated condition.

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2.3.2 Enhancing Sedimentation and Adsorption

The primary physical design parameters for enhancing sedimentation and adsorption are (1) residence time and (2) the ratio of surface area to volume of water. Residence time is defined as the time water spends in a pool while flowing from inlet to outlet. A longer residence time allows for more adsorption, sedimentation, and biological processing.

A suspended particle has both a forward velocity resulting from the flow through the pond and a vertical settling velocity. For a particle to settle out before it is discharged from the pond, its residence time, or time spent in the pool, must be equal to or greater than its settling time. The average residence time is defined as follows:

$tr = Qp/q$ (Qp = volume of pool or pond; q = inflow)

Settling time is defined as follows:

$ts = Dp/Vs$ (Dp = pool depth; Vs = settling velocity)

The settling velocity and settling time depend on the size and specific gravity of the particle to be settled. Table 3 shows typical particle settling velocities and times.

Other things being equal, shallow ponds and wetlands are preferable to deeper. Particles settling in deeper pools take longer to reach the bottom than in shallower pools. (Notice that pool depth is the second term in the settling time calculation shown above.) Once particles reach the bottom, additional energy is required to re-suspend them. In addition, the sediment-water interface is where most adsorption occurs, and therefore the more surface area available in relation to the volume of influent the better.

82-69 cont'd.

Consider a 1-acre pond with vertical sides 2 feet deep, and a 2-acre pond 1 foot deep. The latter has almost twice the surface area of the former for the same volume, and therefore twice the potential area for physical processes to operate. (The 2-foot-deep pond has a relatively minor increase in the surface area of its sides compared to the 1-foot-deep pond.) In wetlands, both nitrogen and phosphorus removal are related to the area of wetland vegetation (Kadlec and Knight 1996). However, effective treatment system design requires balancing the desirability of a high surface area for treatment against other considerations. Usually available treatment area is limited by economics or land availability. Water at least 3 feet deep is required to inhibit the growth of wetland vegetation and maintain open water areas. Deeper water also helps maintain cooler water temperatures, which can be important to some species.

2.3.3 Biological Processes

Biological processes involved in stormwater treatment include both direct use and transformation of pollutants by organisms (such as bacteria and plants) and the modification of physical and chemical conditions that in turn support or influence other processes. The interactions between biological and physical processes that contribute to reducing pollutants and improving water quality are complex. The specific pollutant determines which processes are important. This section summarizes biological processes related to treating chemical nutrients, trace metals, and pathogens in wetland treatment systems.

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2.3.3.1 Plant Nutrients

Wetland treatment systems have been shown consistently to reduce total nitrogen concentrations in many situations (Kadlec and Knight 1996). Their ability to remove phosphorus over the long term is more variable. Nitrogen removal involves a diverse set of biological and chemical processes. Excess nitrogen in stormwater runoff can be removed in a wetland by being released to the atmosphere as a gas (in a process called nitrification). The complex series of transformations required to achieve this removal (ammonia to nitrite to nitrate to nitrogen) are mediated by different species of bacteria, some species preferring anaerobic and others aerobic conditions. Shallowly flooded soils in wetlands help create anaerobic conditions in soil sediments. Bacteria live in association with the stems and roots of wetland and aquatic species of plants, as well as in the soil. Plant roots and rhizomes provide surfaces for bacterial growth. Plants translocate oxygen from shoots to roots. The root zone therefore offers an oxidized microenvironment in an otherwise anaerobic substrate. This microenvironment stimulates both the decomposition of organic matter and the growth of nitrifying bacteria.

Algae and bacteria use plant shoots and leaves as substrates for growth. Plants, algae, and other microorganisms all make direct use of nutrients as well. However, the nutrients taken up directly by organisms are recycled to the system when they die. Only a fraction of the nutrients are removed from the system by being deposited in sediments as incompletely decomposed biomass.

82-69 cont'd.

Wetlands can work well to remove nitrogen because they contain a combination of aerobic and anaerobic conditions favorable to the nitrification-denitrification process. Plants help create these physical conditions.

Phosphorus, which lacks a gaseous phase like nitrogen, is only removed on a long-term basis by being sequestered in sediments. The potential long-term phosphorus removal rate by wetlands is therefore generally lower than for nitrogen. Phosphorus binds chemically to soil particles. New wetlands often have a large capacity to adsorb phosphorus, and therefore removal rates in the first few years after construction are often high. Eventually, however, sediments reach their capacity to adsorb phosphorus and removal rates decline, and long-term sustainable removal rates are much lower.

2.3.3.2 Metals

Wetlands interact strongly with trace metals in a number of ways and thus are potentially capable of retaining significant amounts of trace metals. There are three major retention mechanisms for metals:

- Binding to soils, sediments, particulates, and soluble organics
- Precipitation as insoluble salts, principally sulfides
- Uptake by bacteria, algae, and plants

Metals taken up by bacteria, algae, or higher plants may be either incorporated into tissues or transformed into less-toxic compounds, but the primary long-term repository for trace metals is wetland sediments. Sulfide precipitation, a source of odors, is controlled by bacteria within sediments in a wetlands system. High levels

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of many metals can be toxic to wildlife, plants, and humans, and must therefore be monitored closely. In situations where a waste stream is very high in specific metals, phytoremediation (remediation using plants) systems may employ specific plant species with known affinities for those specific metals; but at the lower concentrations typical of urban stormwater, it is generally assumed that the varied plant and microbial complexes of wetlands can do the job.

Under high loads of pollutants, the capacity of wetland soils to bind metals can eventually be exceeded, which stops them from fully functioning as part of a treatment system. Under such conditions it is important to monitor pollutant levels in the sediments; this monitoring is included in the proposed design. The design allows for draining the ponds and wetlands, removing the affected soils and replacing the soils with clean substrate, which will allow the treatment system to begin functioning again. The need to follow this procedure is anticipated to be very infrequent, because the land use in the wetlands drainage area is anticipated to be high-density residential and thus would not be expected to produce large amounts of trace metals.

2.3.3.3 Pathogens

The intense microbial activity in wetlands provides many opportunities for predation and degradation of human pathogens such as bacteria. A suite of factors make wetlands a relatively hostile environment for pathogens: unfavorable temperatures, exposure to ultraviolet light, and biological interactions.

82-69 cont'd.

2.4 TREATMENT COMPONENTS OF THE PROPOSED DESIGN

Various options exist for treating stormwater, each employing these processes to varying degrees. The effectiveness of a given stormwater treatment system will vary based on factors including the type and load of pollutants. Combining different treatment components into a "train" can increase a system's overall effectiveness in treating a range of pollutants.

The proposed design combines three components that move the runoff in the following sequence: a forebay flowing into a pair of permanent wet ponds, with the ponds then flowing into two wetland marshes (Figure 3). The single forebay receives all incoming waters from the watershed. The flow out of the forebay is split into two ponds, and the outflow from each pond passes through the marshes before exiting into San Francisco Bay.

2.4.1 Forebay

In the proposed design, larger particles in the stormwater influent are intended to be settled in the forebay. The accumulation of the bulk of larger sediments in the forebay means that regular maintenance must be planned to remove the accumulated materials. The design of the forebay must account for the extra depth required for storage of settled materials.

2.4.2 Wet Ponds

Wet ponds are designed to use gravitational forces and biological activities to remove urban stormwater pollutants before discharging the treated runoff into a

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waterway. They are typically designed as flow-through systems that can also meet the onsite stormwater detention requirement for streambank erosion protection and flood mitigation.

Wet ponds in general are designed to have three stages with three corresponding volumes that are intended to meet water quality and detention requirements. The first two stages, permanent pool and extended detention, are required for all ponds and function primarily as a water quality control. The second stage may also provide some flow equalization. The third, optional stage, flood control detention, provides flood control. This third stage is not currently included in the proposed design and is not discussed further below.

The permanent pool and extended detention volume are designed to treat the entire drainage area, thus contributing to the control of pollutants that are not already addressed by water quality controls of the watershed development. As described in Section 4, the proposed design provides excess treatment capacity to accommodate treatment of runoff from additional watershed area.

- **Permanent Pool.** A wet pond has a permanent pool that is in place before a storm begins and is the lowest stage of the pond. This pool provides wildlife habitat as described in Section 3; it also has important water quality benefits. A permanent pool lengthens residence time, especially during the initial first flush of pollutants into the system, and it continues settling and biodegradation after the storm has passed. The permanent pool should remain nearly full at all times to provide a source of water for wetland plants, which are used for biological uptake and to minimize turbulence within the pond during storm events which may result in re-suspension of sediment. During storm events the pond is designed to flush out the treated water and replace it with "new" runoff.

- **Extended Detention Volume.** The extended detention treatment pool sits at a higher elevation than the permanent pool. This volume holds stormwater above the permanent pool elevation and is intended to fill up during storm events and provide 48 to 72 hours of stormwater treatment prior to emptying into the wetland cells for additional treatment. The extended detention portion of the pond minimizes turbulence in the pond by decreasing the pond flow-through rate and increasing the time in which treatment can occur during the storm through dynamic settling. The extended detention volume does not include the volume provided in the permanent pool because the permanent pool is designed to be full at the start of the rainfall event.

The removal efficiency of wet ponds is directly related to the time the runoff is held in the pond. The longer the runoff is held in the pond, the more settling and biological uptake that can occur. Given national and local monitoring data, we estimate that a hydraulic residence time of two weeks would provide an equivalent level of water quality treatment as sedimentation/filtration. Design guidelines (Caltrans 2002; California Stormwater Quality Association 2003) recommend that the permanent pool volume be at least two to three times the required water quality treatment volume for optimum treatment without short-circuiting through the system.

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The flow path of the pool needs to be as long as possible without creating "dead zones" within the pools where water stagnates and is not moved through the system. As described below, the proposed pond system has an island built into each pond to increase the flow path and improve the treatment effectiveness of the ponds.

As shown in Table 3, the time required to settle silt and larger particles is within the range of most pond systems. However, the settling rate of very fine clays and colloids is longer than would be practical for the proposed system. Sedimentation rates in the ponds will be much lower than in the forebay and will require much less frequent maintenance.

In the proposed design, we have assumed that supplemental water will be available to maintain the design pond level. As a rule of thumb for optimum water quality functioning, Ferguson (1998) recommends the permanent pool be equal in volume to the largest average monthly runoff. A larger volume may be desirable for habitat purposes. However, a wetland treatment design should also maintain a high surface-area-to-volume ratio to provide sufficient surface area for treatment.

2.4.3 Freshwater Marsh Cells

The constructed wetland cells in the concept plan are designed to support "emergent" (wetland) marsh vegetation. Wetland plants such as tule and bulrush (*Scirpus* spp.), rush (*Juncus* spp.), and cattail (*Typha* spp.) are called emergent because their roots and lower shoots grow under water, but most of the plant shoots and leaves emerge into the air above the water surface. These species grow best in shallow water (6 to 18 inches).

82-69 cont'd.

The wetland cells provide additional opportunities for particle sedimentation and sequestration, associated not only with additional residence time but with biological processes that flocculate smaller particles into larger and allow them to settle or be incorporated into biological materials. The presence of plants and their roots helps reduce sediment re-suspension. Densely rooted plants slow down stormwater and distribute flow uniformly. Dense stems and leaves provide surface area where biologically active algae and microorganisms live and process pollutants from the stormwater.

Treatment capabilities are related primarily to the surface area of the wetland, in relationship to the loading rate and residence time. For vegetation success, the primary design consideration for emergent marsh is to provide the appropriate shallow water level. Stormwater wetlands subjected to typical flash flows of urban hydrology are frequently less ecologically diverse than their natural counterparts. The forebay and pools above the wetlands in the proposed design should help to attenuate the effects of the developed watershed hydrology and improve the ecological value of these wetlands. Supplemental water in the dry season should also help dampen the oscillations typical of stormwater wetlands.

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3.0 Wildlife Habitat Design Concepts

The proposed design is intended to integrate wildlife habitat with stormwater improvement. Habitat design components were well developed in the feasibility study (Brown and Caldwell 2004). Below we have summarized and expanded on key design concepts.

Through a wetland complex of freshwater ponds and emergent marsh, the proposed design focuses on providing habitat for a diversity of resident and migratory bird species. The wetland will be located on the Pacific flyway, next to San Francisco Bay and to existing, though degraded, tidal wetlands. A 2003–04 wildlife census (LSA Associates 2004) at Candlestick Point State Recreation Area, immediately next to the project site, identified 118 bird species, in addition to another 36 bird species identified over several previous years of observation by other Audubon naturalists. The creation of 20 acres of new wetlands at Hunters Point will provide important support to many of these local and migratory wildlife species.

3.1 STRUCTURAL COMPLEXITY

Structural complexity is one of the most important components in developing a wetland that will support a wide range of wildlife species. Structural complexity can be achieved both through the physical design of the wetland system and through the plant communities and aquatic ecosystems established there.

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The availability of water, through capture of stormwater runoff and through the reuse of reclaimed water, provides an opportunity to establish a range of plant communities and aquatic ecosystems that support different suites of bird species, as well as other associated wildlife.

- **Deep water** areas will provide habitat for open water feeders, including grebes, scaups (diving ducks), mergansers, and other species that dive for food, and for species that forage over open water, such as terns.

  To support this suite of species, water should be deep enough to preclude the growth of emergent vegetation, four to six feet, or deeper. Some open water areas should be of adequate length, approximately 200 feet or longer, to accommodate birds that need a running start to take flight from the water surface.

- **Shallow water** areas will provide habitat for dabbling ducks and other species that feed by skimming food off the water surface or tipping forward to feed in the shallows, such as mallard, pintail, teals, coots, and gulls. Shallow water areas are also important for wading birds such as the great blue heron and the great egret, which typically feed while wading or standing at the water's edge.

  Shallow water areas should range from 1 to 3 feet deep. These areas will support algae and aquatic vegetation.

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- **Pond edge and mudflat** areas will provide habitat for shorebirds that feed while wading in shallow water or probing in mud at the water's edge, such as avocets, plovers, and sandpipers.

  Mudflats are characterized by moist substrate, absence of vegetation, and the presence of soil-dwelling invertebrates and other species. Typically mudflats are present where the water inundation cycle prevents emergent vegetation from growing and temporarily exposes a moist substrate. Mudflats can be created along pond edges by periodic draw down of water levels.

- **Freshwater marsh** will provide habitat for species associated with emergent vegetation, such as the green heron, rail, marsh wren, red-winged blackbird, and salt-marsh yellowthroat. Tall wading birds will also use the marsh.

  The two large wetland treatment cells will be managed to create emergent marsh conditions.

- **Grassland** areas will provide habitat for species that prefer open habitats, such as meadowlarks and American goldfinch.

  The berms between the wetland cells and the perimeter edges of the wetland complex can be planted and managed as grassland habitat.

- **Generalists.** All the plant communities developed at the wetlands will provide habitat for generalist bird species that are tolerant of human presence or attracted to landscaped areas, such as doves, hummingbirds, jays, mockingbirds, and robins.

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The overall structural complexity of the wetland will be enhanced by the use of several cells. The forebay, two ponds, and two wetland cells included in the design will each be designed and managed slightly differently to enhance the diversity of habitat in the wetland.

The physical diversity of a site can also be enhanced through the design of islands and loafing strips. Islands provide waterfowl with resting habitat that is protected from predators. They also provide the birds using them with clear lines of sight. Loafing strips — long, thin areas of very shallow water — can be connected to islands and provide birds with excellent resting, nesting, and foraging habitat. The proposed design includes two islands.

3.2 PLANT SPECIES

The primary drivers of wetland ecological success are site hydrology in relation to topography and soils. Wetlands are areas inundated by water for at least a portion of the growing season. This water regime produces hydric (frequently water-saturated) soils, and only plant species adapted to these conditions can survive there. The depth and length of time an area is flooded, and the pattern of flooding and drying over time, are the primary drivers of what specific types of vegetation will prevail in any given location.

Emergent plants, such as various species of bulrush and tule (*Scirpus* spp.), rush (*Juncus* spp.), reed (*Phragmites communis*), or cattail (*Typha* spp.) grow up and out

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of shallow water. Though they are capable of surviving and thriving in permanently flooded shallow water, they are generally tolerant of occasional drying out, as long as it does not persist too long. All require drier moist soil rather than flooded condition to establish from seed, but once established they can continue to expand through vegetative reproduction.

Submerged and floating aquatic plant species typically grow completely within the water column, though some may raise their flowers above the water. Submerged aquatic species grow with their roots in the soil, while floating aquatic species grow on the water surface with their roots in the water column. Typical submerged aquatics include pondweeds (*Potamogeton* spp.), milfoils (*Myriophylum* spp. — includes native as well as nonnative invasive species), and *Ruppia* spp. Native aquatics include duckweed (*Lemna* spp.) and water fern (*Azolla* spp.).

The best results in establishing a diverse suite of native plant species in a wetland complex are achieved through the design of varied site topography, the provision of adequate water and the management of that water, and through the introduction and planting of a diverse suite of native plants grown from locally collected ecotypes. The exact locations where different species may thrive is difficult to predict, given the complexities of interactions between water level patterns, water and soil fertility, and other factors. Over time, after the introduction of a diverse set of plant species to the site, those best adapted to the various niches created will begin to occupy those niches wherever they occur.

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4.0 Preliminary Stormwater Wetland Design

This section describes the preliminary design and presents the design basis for the wetland system. Figure 3 shows a grading plan for the proposed wetland system as well as the major public access and trail routes. Figures 4 and 5 are illustrative views of the wetland. Figure 6 shows cross-sections through the system.

4.1 SYSTEM LAYOUT AND CONFIGURATION

This section describes the grading and configuration of the various parts of the proposed system. The layout and grade slopes are subject to change during final design, especially after the project geotechnical engineer makes recommendations on allowable levee and pond grading slopes and levee construction details.

Table 4 summarizes the volume capabilities and other design characteristics of the proposed system.

4.1.1 General

The site is surrounded by a 12-foot-wide roadway that provides access to all parts of the site ponds and wetland cells. Maintenance roadways also run between the various ponds and cells. Roadways are maintained at elevation +12.5 feet NGVD along the forebay, grading down to elevation 12 feet NGVD for the levee around the Dragonfly Pond, and to elevation +11 feet NGVD for the levee around the Wading Bird Pond, finally grading down to elevation +6 feet NGVD for the levees around the wetland cells. The maintenance road also functions to provide trail access through the site at designated locations (see Figure 3).

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4.1.2 Forebay

The forebay is approximately 1.5 acres in area. The bottom elevation of the forebay is set at +2.5 feet NGVD and the normal operating pool level within the forebay is +8.5 feet NGVD, giving a depth under normal day-to-day conditions of approximately 6 feet. The forebay sides are graded on a 3:1 slope from the perimeter access road at elevation +12.5 feet NGVD down to a 5-foot-wide safety bench at elevation +7.5 feet NGVD. At a normal water level, the safety bench will be submerged approximately 1 foot, allowing for the growth of fringe wetland vegetation around the perimeter of the forebay. An access road is also graded into the forebay to facilitate removal of accumulated sediments. The forebay is designed to allow for approximately 2 feet of sediment accumulation in the bottom areas, that is, accumulation to an elevation of approximately +4.5 feet before maintenance is required.

The forebay includes an inlet pipe where stormwater from the watershed area enters the site. Since details of the upstream development are not known at this time, the details of this connection will need to be developed during final design. The forebay inlet structure should also be designed to divert very high flows (above the system design capacity) away from the forebay to the existing seasonal wetlands south of the proposed treatment wetland. This will limit the potential for re-suspension of sediments in the forebay due to high turbulence, and the possible transport of contaminated sediments out of the forebay and into the pond/wetland system.

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4.1.3 Wet Ponds

On leaving the forebay, the stormwater flow splits approximately half and half into two extended detention ponds: the Dragonfly Pond to the east and the Wading Bird Pond to the south. Each pond will be just under 3 acres in surface area at the permanent pond elevation, which is +7 in the Wading Bird Pond (provides for a permanent pool depth of 5 feet at maximum depth) and at elevation +8 feet NGVD in the Dragonfly Pond (provides a permanent pool depth of 6 feet). Each pond contains an island with a loafing strip that provides nesting, refuge, and foraging habitat for birds. The islands also act as berms, splitting the pond into two effective treatment cells, thereby inhibiting short circuiting and promoting water treatment.

The water elevation in the Dragonfly Pond will be held constant at a depth of 6 feet to provide habitat for appropriate bird species. The water level in the Wading Bird Pond will be designed to draw down slowly and refill every four to six weeks during the spring though fall. The bottom elevation of the Wading Bird Pond slopes gradually to the island to allow for emergence of mudflats at different elevations as the water level is periodically lowered. This will expose benthic animals living in the sediment, thereby facilitating foraging by mudflat loving bird species. The Wading Bird Pond also includes a predator trench, roughly 3 to 4 feet deep, around the circumference of the pond to prevent land predators from getting to the islands at low water levels.

Both ponds are graded at a 3:1 slope from the access road to a 5-foot-wide safety bench at an elevation just below the permanent pool depth. This safety area is located one foot below the permanent pool depth within the ponds. It is intended to reduce the possibility of accidental drowning by persons falling into the ponds. A

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safety fencing system should be developed during final design to further discourage people from entering the ponds.

4.1.4 Wetland Cells

Each pond will discharge into a separate wetland cell. Each wetland cell is approximately five acres in surface area at the normal pool level of +3 feet NGVD. The bottom elevation in each cell grades from approximately 2.5 feet near the inlet to 0 feet at the outlet. The water depth in the wetland cells will therefore vary from 6 inches at the inlet end to 3 feet at the outlet pipe into San Francisco Bay. Water depth over most of each cell will range from 6 to 18 inches, which is optimum for growth of emergent vegetation and water quality improvement. A shallow drainage swale has been graded into the bottom of each wetland cell to allow for drainage of the cells and to minimize stagnant water areas and help reduce mosquito production. (See Section 4.7.2 for further discussion of mosquito control techniques.)

A deeper permanent ponded area that will not drain by gravity has been graded into each cell to provide deep-water refuge for fish. These areas are excavated down to an elevation of –2 feet, approximately 6 feet deeper than the surrounding surface. A shallower pond, approximately 3 feet deep when water is at normal pool level, is contained within each cell at the outlet end. Depths of 3 feet should prevent colonization of the ponds by emergent vegetation.

Note that the outlet pipe elevation of 0 feet NGVD means that the wetland cells will not be able to gravity drain except at lower tide elevations. The outlet pipe will require a flap gate to prevent saltwater intrusion from the bay into the wetland cells. Should the outlet pipe check valve fail in the open position, salty bay water will enter the wetland cell potentially up to elevation +3.5 feet NGVD and would likely affect freshwater vegetation in the wetland cell.

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4.2 STORMWATER TREATMENT EFFECTIVENESS

This section summarizes the preliminary design's potential effectiveness in stormwater treatment. We will consider water quality treatment volume first; then we will discuss potential pollutant removal rates.

4.2.1 Water Quality Treatment Volume

This section presents the results of analysis of stormwater treatment effectiveness for the proposed pond and wetland treatment system for the anticipated water quality treatment volume. In addition, we have estimated the additional area of watershed that could potentially be treated within the proposed system. Estimates of additional area that could be treated are approximate, since estimates of treatment effectiveness depend on many factors that are currently unknown.

The proposed pond and wetland system is a type of volume-based treatment system. The design goal is to contain the calculated water quality treatment volume within the system for a specified period, typically 48 to 72 hours, to allow for natural processes such as settling and biological uptake to remove pollutants. Volume-based stormwater treatment systems require determination of the water quality treatment volume, which is defined as the 85th percentile of all storms

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within the period of record of the site-specific rain gauge data (Camp, Dresser & McKee 2003).

The nearest full-time rain gauge with a significant period of record is the Mission Dolores Station, which has daily measurements from 1914 through 2005. FarWest Restoration Engineering purchased the data set and prepared a cumulative histogram of storm events for the entire period of record (Figure 7). From that information, we calculated the 85th-percentile storm event at approximately 1.5 inches of rainfall per day.

Assuming that the entire 38-acre watershed area is 80 percent impervious (see Section 1.5.2), we calculate the water quality treatment volume at approximately 1.2 million gallons of stormwater. We used this volume as the basis for the preliminary design.

- Figure 8 shows stage-storage curves (that is, the volume of water storage in each pond at different elevations) for the forebay and treatment ponds.
- The permanent water level elevation is the water level that is assumed to be continuously maintained by supplemental water as required to meet habitat and wildlife goals. The permanent pool volume is also essential for treating the first flush of stormwater.
- The extended treatment water level elevation is the capacity of the ponds and cells to store and treat water by physical settling and biological processes immediately following storm events.
- The remaining elevation from the top of the extended detention water level to the top of the levees is considered freeboard elevation and has been designed for a minimum of 2 feet.

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A discussion of anticipated water control structures is included within each treatment unit. The discussion of water control structures is preliminary and will be refined during final design of the project. The final selection and sizing of water control structures will depend on the final hydraulic analysis of runoff into the treatment wetlands, which requires an understanding of the upstream development in the watershed.

4.2.2 Evaluation of Treatment Effectiveness

As described above, hydraulic residence time is the single best indicator of stormwater treatment effectiveness in a well-designed pond and wetland system. Final residence time calculations require knowledge of the watershed development and calculation of stormwater flows, which are then modeled with specialty hydraulics software to determine the treatment system flow characteristics such as residence time, detention storage, and outfall hydraulics. This level of hydraulic analysis was beyond the scope of the preliminary design but should be performed during final design activities in coordination with the proposed site development. A first-cut assessment was provided for the forebay.

As a substitute for detailed hydraulic analysis and calculation of residence time, we have used a conservative assumption that the combined extended detention storage volume of the forebay, ponds, and wetlands equals the effective treatment

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capability of the system. This approach is in accordance with Regional Water Quality Control Board guidance documents and essentially equates the treatment capacity with the effective storage capacity of a wetland system.

4.2.3 Forebay

4.2.3.1 Treatment Capacity

As shown in Table 4, the forebay has a permanent pool volume of 2.59 million gallons and an extended storage volume of 1.075 million gallons. The goal for the forebay is to maintain a minimum residence time of 60 minutes. That goal is based on an assumed inflow, which will require analysis of the proposed watershed development; as discussed above, that information will be obtained during final design activities. As a first-cut estimate of residence time we have assumed an average inflow of 0.6 cubic feet per second (cfs) (equivalent to 270 gallons per minute from a one-year Type IA storm; see Section 4.3.1 and Figure 9), which gives an average residence time of 1,075,000 gallons/270 gallons per minute, or approximately 66 hours of total residence time — more than enough to settle large particles, according to Table 3. The forebay thus has excess capacity for particle settling before water treatment in the wetland ponds and cells. The water control structures in the forebay will be designed to allow for a maximum residence time of 24 hours.

The final determination of residence time requires knowledge of the inflow into the forebay system. The time of concentration and detention storage characteristics of the upstream development — currently unknown — will also affect the flow into the system.

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4.2.3.2 Water Control Structures

The forebay will require three types of water control structures.

- **Inlet Structure.** The inlet structure must allow for piping of the water quality treatment flows into the forebay while shunting higher stormflows away from the treatment wetlands and directly into the existing wetlands to the west. The outlet pipe into the existing wetlands should be designed with energy dissipation to avoid erosion.

  The exact configuration of the inlet pipe and diversions will need to be determined during final design activities in coordination with the upstream development and grading.

- **Flood Flow Overflow Structure.** The forebay should be graded with a lowered spillway section at elevation +11.5 to +12 feet NGVD to allow for overflow of high flows directly into the adjacent existing wetlands to avoid overtopping of the levees.

- **Pond Flow Structure.** There are a variety of pond overflow structures that can be used to move water from the forebay into the detention ponds. We anticipate that the forebay will contain two overflow structures that flow into each detention pond. The outlet flow structure (used to drain the forebay for maintenance purposes) will consist of an outlet riser pipe with an 8-inch discharge pipe to drain the forebay.

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4.2.4 Wet Ponds

4.2.4.1 Treatment Capacity

The calculated treatment storage capacity; of the Dragonfly Pond is approximately 1.907 million gallons; the capacity of the Wading Bird Pond is approximately 1.655 million gallons (Table 4). Together the two ponds provide three times the capacity of the water quality treatment volume. Given the large capacity of the ponds, the water control structures can be designed to allow for draw down of the detention ponds over whatever residence time is required. Typically, for detention ponds a 48- to 72-hour draw down time is designed to avoid excessive ponding and mosquito production. The extended detention capacity of the ponds will be drawn down within 72 hours.

Additional residence time is provided within the permanent pool volume. Removal of nutrients could require up to one week of residence time. With a capacity of twice the design treatment volume, the permanent pools should provide an average of two weeks' residence time even in the wettest months.

4.2.4.2 Vegetation

The only vegetation in the detention ponds occurs in the 5-foot-wide safety bench that surrounds the ponds. In this bench, emergent vegetation such as tules will be planted and will provide some biological treatment as well as diversify wildlife habitat within the ponds.

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4.2.4.3 Water Control Structures

The water control structures within each pond will vary because the operating regime within each pond is different.

Wading Bird Pond. Within the Wading Bird Pond, the operating regime is intended to draw the pond down slowly over a three- to four-week period. We anticipate using an inlet control vertical or riser type orifice with a perforated standpipe to allow for the gradual lowering of the water level.

Dragonfly Pond. We anticipate that this pond will have a standard riser and horizontal orifice inlet since the pond level is not designed to change continuously. All water control structures will be placed off the bank for both ponds to allow for easy access and maintenance.

4.2.5 Wetland Cells

4.2.5.1 Treatment Capacity

The wetland cells treat water primarily through biological treatment within the wetland vegetation. Residence time is also a key indicator of treatment effectiveness. The operating water level within the cells is approximately +3 feet NGVD. However, the emergent vegetation within the wetland cells treats stormwater as it flows through by a combination of physical and biological treatment.

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4.2.5.2 Vegetation

In the wetland cells, we anticipate that the plantings will consist primarily of tules and rushes. Some cattails may establish themselves but won't be planted.

4.2.5.3 Water Control Structures

The water control structure proposed for both wetland cells 1 and 2 will consist of overflow weirs with a gravity drainage pipe at the bottom set at elevation 0 feet NGVD. Given that the ponds and cells are designed to allow for gravity drainage to San Francisco Bay at low tides, the outfall pipe will require a tide gate check valve to prevent inflow of bay waters into the project wetlands.

4.2.6 Overall System Treatment Capacity

The combined extended storage volume for the proposed pond and wetland system is approximately 7,660,000 gallons. This volume is approximately 6.4 times the required water quality treatment volume (as described in Section 4.2.1). At the assumed watershed development impervious percentage of 80 percent, the proposed wetlands system could treat an additional development area of approximately 200 acres over the current proposed development size.

4.2.7 Effectiveness in Removing Pollutants

We reviewed the U.S. Environmental Protection Agency (EPA) technology fact sheet for wet ponds as a guide to the treatment effectiveness of the proposed pond and wetland system (U.S. EPA 1999).

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Table 5 shows expected treatment effectiveness for wet ponds.

Treatment effectiveness is improved by longer hydraulic residence times. Notice that these removal values are just for the wet ponds. The proposed system includes constructed wetlands that will further improve water quality prior to entering the bay. A review of the International Stormwater Best Management Practices database (U.S. EPA/ASCE 2006) also shows that the proposed pond and wetland system should be highly effective for the treatment of constituents commonly associated with stormwater from urban developments.

4.3 OTHER HYDROLOGY AND FLOW CONSIDERATIONS

4.3.1 Estimation of Flood Flows

This report evaluates the effectiveness of the proposed wetlands for stormwater treatment. Wetlands of this type are commonly used for flood flow equalization of stormwater flows after development. However, given that the discharge will flow into San Francisco Bay, it is not clear whether post-development hydrograph modification is required; if it is required, we have assumed that the developer will implement it upstream of the proposed wetlands.

As a first-cut estimate of stormwater flows, we have run the TR-55 program on the basis of a very impervious curve number of 95 (corresponding to an almost completely impervious watershed) to estimate potential flood flows into the system, which is a conservative assumption. We have also assumed a time of concentration

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(Tc) of 0.25 hour (15 minutes); calculation of Tc requires knowledge of the flow characteristics of the developed watershed area to which we currently do not have access.

On the basis of a first-cut analysis of flood flows using TR-55, we estimate that for a Type IA storm (typical for this area) the peak stormflows for the 10- and 100-year rainfall events would be as follows:

10-year event: 9.6 cfs

100-year event: 33 cfs

The spillway leading into the forebay should be designed to handle the 100-year event by bypassing the proposed pond and wetland system and discharging directly into the existing wetland. Note that the hydraulic analysis above is very preliminary and is intended solely as an approximation of potential storm flows for this preliminary design report. A more detailed hydrologic analysis of flood flows should be performed as part of final design efforts for the project following analysis of the entire watershed and the proposed development.

4.3.2 Supplemental Water Volumes

The Brown and Caldwell feasibility study included an estimate of the supplemental water volumes required to provide the wetland and pond system with water on a year-round basis. Table 6 shows the required supplemental water volumes by month.

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Notice that the Brown and Caldwell study was based on the assumption that 39 percent of rainfall will infiltrate the ground and will not run off as stormwater. Depending on the final upstream development plans, the actual percentage of infiltration may be lower and the amount of annual runoff greater. However, the estimated supplemental water volume is probably accurate for the critical summer months.

We have assumed that the source of the supplemental water will be a recycled-water plant at Hunters Point. Designs for this facility are reportedly on hold pending site development plans. Section 4.8 discusses alternative sources of water in case the recycled-water plant is not built.

4.4 HABITAT DESIGN

4.4.1 Forebay

The forebay and wet ponds are designed to preclude the establishment of emergent and rooted aquatic vegetation over most of their areas. On the shallow perimeter safety benches, emergent vegetation will be established. Tules (*Scirpus acutus*) along with other bulrush species such as common three-square (*S. americanus*) and California bulrush (*S. californicus*) will be the dominant species. Plants for transplanting should be propagated from locally collected ecotypes. It is likely that cattails (*Typha* spp.) may also establish themselves in these areas, but cattails are not proposed for planting. In wetlands subject to regular disturbance such as stormwater wetlands, cattails can sometimes spread aggressively. The spread of cattails would diminish the area of open water necessary for effective functioning of

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the system. Cattail establishment should be monitored and management undertaken if necessary to keep this plant in check.

At the permanent pool's edge and up the slope of the berms other rushes, sedges, and grasses can be established. Baltic rush (*Juncus balticus*) grows at the upland edge of many marshes in the area and can be planted here. Other potential rush species include softstem rush (*J. effuses*), dagger-leaf rush (*J. ensifolius*), and gray rush (*J. patens*). Creeping wildrye (*Leymus triticoides*), Barbara's sedge (*Carex barbarae*), and clustered field sedge (*Carex praegracilis*) can be established in moist areas above the permanent pool elevation. Saltgrass (*Distichlis spicata*) is another candidate for establishment in this area. Other native grass species suited to drier conditions can be established on the upper portions of the slope. Patches of shallow rooted shrubs can be planted on the berms to further diversify the habitat. Wild rose (*Rosa californica*), mugwort (*Artemesia douglasiana*), blackberry (*Rubus ursinus*) are among the species that could be included.

While the permanent pool levels have been established to preclude the establishment of rooted aquatic plants over most of the pond area, some areas appropriate for establishment of these species will occur in the transition zones from deep water to the safety benches, and perhaps in areas along the safety benches as well. The most common freshwater aquatic species in the Bay area are pondweeds (*Polygonum* spp.), of which numerous species could be planted.

The forebay will provide habitat for migratory birds and dabbling or diving ducks. Species likely to be found in this pond would include diving ducks such as bufflehead, greater and lesser scaup, and ruddy ducks. Dabbling ducks such as mallards and American wigeon and other diving waterbirds such as horned grebes may also make use of this pond.

82-69 cont'd.

4.4.2 Wet Ponds

The vegetation of the two wet ponds will be similar to that of the forebay, though perhaps somewhat more diverse since the forebay will help to buffer the ponds against the "flashier" flows of urban stormwater runoff (more water flowing more quickly over impervious, paved areas) that would hamper the growth of vegetation. As with the forebay, a shallow safety bench will be built around the pond perimeter. A suite of species similar to those described for the forebay will be planted and allowed to find their niche within the ponds and on the upland slopes above the pond. The differences in management of the two ponds will likely result in a different suite of species becoming dominant in each. The grass, sedge, and rush species planted on the pond slopes can also be planted on the islands.

Dragonfly Pond. The Dragonfly Pond consists of a pool with a constant depth of 6 feet. This pool will be used primarily by diving waterbirds as resting and feeding areas. Such birds include buffleheads, ruddy ducks, greater and lesser scaups, and occasional ring-necked ducks, surf scoters and canvasbacks. Pied-billed and horned grebes may use the pond, as may coots. The island in the pond will attract shorebirds such as killdeer (which may also nest on the island), western and least sandpipers and willets. If fish are introduced to the pond system, terns and cormorants are likely to feed on them.

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Wading Bird Pond. The water level in the Wading Bird Pond is intended to fluctuate up and down over a three- to four-week cycle. At greater water depths the pond should provide habitat for diving ducks (see above) and dabbling ducks. The latter prefer to feed in 12–18 inches of water, feeding not by diving but by simply putting their heads under water and their tails in the air. Dabbling ducks such as American wigeons, mallards, cinnamon and green-winged teals, northern shovelers and pintail ducks are likely residents. Wading birds such as great and snowy egrets are likely to be found at the pond edges as will the great-blue heron (especially if fish or mice and voles are present). Coots and grebes will also be found in this pond.

When the pond water level is lowered the bottom elevation will be exposed. At this depth, the pond should provide habitat for shorebirds and other birds that feed on the invertebrates such as worms and crustaceans found on or in the exposed mud. These birds include western and least sandpipers, spotted sandpipers, killdeer, willets, marbled godwits, yellowlegs, avocets, and many others. All of these species will also use the island as a roosting site.

4.4.3 Wetland Cells

The wetland cells will be planted with the same tule and bulrush species (*Scirpus acutus, S. americanus*, and *S. californicus*) as will be planted on the safety berms of the forebay and ponds. The berm slopes at and above the permanent pool elevation will be planted with a similar mix of native grasses, sedges, and rushes as discussed above for the forebay and ponds.

82-69 cont'd.

The wetland cells should provide habitat for more secretive waterbird species such as rails. These birds, including the Virginia rail and the sora, hide and breed in dense wetland vegetation and feed in the open channels on invertebrates and small mammals. The combined presence of large wetland areas next to the large open water areas of the ponds will provide a suite of diverse habitats in close proximity, supporting a diverse wildlife community.

4.4.4 Other Wildlife Species and Opportunities

The grassland areas that border the ponds will likely be inhabited by mice and voles as well as lizards and harmless snakes such as the garter snake. Amphibians such as the Pacific tree frog may also be found in the ponds and adjacent uplands, as well as numerous invertebrates including dragonflies and damselflies. All these creatures will provide food for raptors such as the red-tailed hawk and for other predators such as the great blue heron and black-crowned night heron. Peregrine falcons will feed on ducks or grebes. Red-winged blackbirds will nest in the tules and the shoreline vegetation, as will species such as the marsh wren and the salt-marsh yellowthroat. Song and savannah sparrows, yellow-rumped warblers, and other passerines will make use of marsh and adjacent upland vegetation. Burrowing owls or even golden eagles may occasionally be seen.

An island has been designed into each pond to provide refuge and potential nesting habitat. Such protected habitat could be diversified and expanded through the installation of floating islands. These are small rafts designed to provide habitat for particular bird species. They can be designed to support wetland vegetation or not depending upon the species to be encouraged.

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Given the presence of contaminated groundwater at the site, a clay liner has been included in the wetland design to separate the wetland waters from groundwater. No trees have been included in the planting design because their deep roots have the potential to penetrate and compromise the liner. If the groundwater contamination were remediated, the inclusion of small areas of willows within the overall wetland complex design would be very beneficial in diversifying the wildlife habitat value of the site. A natural habitat complex of willow woodlands, ponds, and wetlands was a common occurrence before the urbanization and land disturbance of the last 150 years.

The preliminary design focuses on providing stormwater treatment for the proposed residential development above it. Maximum use is made of the landfill site for that purpose. Educational and interpretive use of the site could be expanded if adjacent areas were also planted with appropriate native species, further diversifying the habitats. Additional patches could be developed to support butterflies, hummingbirds, and other high-visibility species.

4.5 PUBLIC ACCESS

Public access and education are important goals of the project. Figure 3 shows elements of the public access plan including location of trails, boardwalks, and an educational kiosk. The public access facilities shown need to be coordinated with conceptual planning efforts by Hargreaves Associates, the landscape architects for the Shipyard Waterfront Park Project. The public would access the wetland via a single entrance point located on the levee between the Dragonfly Pond and Wetland Cell 2. A number of observation decks with informational kiosks could also be included along the boardwalks. The observation decks would provide unobtrusive vantage points for observing the wetlands and wildlife. A wetland center near the public entrance or located as shown next to the forebay could be used to educate the public about the importance of wetland ecosystems. Office space could also be provided for volunteers to monitor and quantify bird use of the wetland, an important parameter in evaluating the success of the wetland system. In addition, a blind (a viewing area camouflaged from birds and wildlife) could be attached to the wetland side of the wetland center to allow for supervised, all-weather viewing of wetland plants and animals.

82-69 cont'd.

4.6 CONSTRUCTABILITY

In this section, we have identified specific construction requirements — elements of the project that might require a specialized contractor or coordination with other parties such as the upstream land developers.

As previously described, we are assuming that after landfill remediation and before wetland construction, the site will have a bottom elevation of 0 feet NGVD, sloping up 2:1 to match the existing ground elevation at the project boundary.

4.6.1 Levees

Levee construction will be an important part of the wetland system construction. The levees will be constructed on a soft foundation, only a few feet above the bay mud substrate. Most of the levees will have to be constructed with clean fill

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material. We have assumed that clean fill will be available from other excavation on site or from other construction projects nearby in San Francisco. Most of the levees have been assumed to have 2:1 or 3:1 side slopes for stability. More detailed geotechnical analysis will be done during the final design phase of the project.

At the project site, the soils are underlain by a deep foundation of bay mud and therefore construction of levees will require extra care and higher cost to achieve stability. The levees should have a wide base and may need to be raised frequently to compensate for long-term subsidence caused by compression of the underlying soils. The levee side slopes will be graded to promote vegetation growth while still retaining water. The percentage grade used for a given levee will depend on topographical features of the site, soil composition, vegetation selection, and the intended purpose of the constructed wetland. The exposed surfaces of the levee need to be protected from rain, wind, and wave erosion, as well as from burrowing animals. Rock riprap may be used to protect the levee, especially at outfall locations. If rodent burrowing and wind and rain erosion are not a serious problem, then the exposed surfaces of the levee may be covered with vegetation.

4.6.2 Impermeable Liner

Although it is assumed that most, if not all, of the existing waste and debris will be removed from the landfill area before the wetland is constructed, residual groundwater contamination is still likely. Therefore, an impermeable liner will likely be required to prevent infiltration of contaminated groundwater into the wetland ponds. Since the groundwater elevations are approximately +3 feet NGVD, an important design consideration for the project will be to secure the liner so that it does not float on top of the groundwater. This condition will be especially acute under conditions where the ponds are drained and there is no water weight in the ponds.

82-69 cont'd.

Pending more detailed analysis during final design, we have assumed that the pond liner will be installed at elevation –3 feet NGVD, which will prevent uplifting by allowing for 3 feet of soil fill above the liner to the pond bottom elevation of 0 feet NGVD. If additional fill depth is required, the pond liner may have to be installed at a lower depth; that analysis will be conducted during final design.

4.6.3 Permitting

The project likely will require permits from several agencies. Below is the full discussion of permitting from the feasibility report (Brown and Caldwell 2004).

The U.S. Army Corps of Engineers and the U.S. EPA will decide on a case-by-case basis whether or not particular bodies of water are considered waters of the United States. Although wetlands intentionally created from non-wetland sites for the purpose of wastewater or stormwater treatment are not normally considered waters of the United States, discharges from constructed wetlands to waters of the United States must meet applicable National Pollutant Discharge Elimination System (NPDES) permit effluent limits and state water quality standards (Hammer 1991). Since the existing seasonal wetlands on Parcel E may be considered waters of the U.S. and discharge from a constructed wetland at Parcel E could enter San Francisco Bay, the construction of a wetland in Parcel E could fall under the

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jurisdiction of the Clean Water Act (CWA), and the project will require fulfillment of CWA Sections 401, 402, and 404:

- **Section 401.** This section addresses water quality certification. It requires compliance with state or tribal water quality standards. Section 401 verification is necessary when projects result in discharges to waters of the United States and require Section 402 or 404 permits (Interagency Workgroup 2000). The San Francisco Bay Regional Water Quality Control Board implements Section 401 certification permitting in the Bay Area.
- **Section 402.** Section 402, which includes the NPDES stormwater program, is designed to regulate the discharge of a pollutant from a point source into waters of the United States. The state of California is authorized by the U.S. EPA to issue Section 402 NPDES permits. The construction of a treatment wetland at Parcel E would require a Section 402 NPDES permit if stormwater captured by the proposed wetland is released to the San Francisco Bay (Interagency Workgroup 2000; Hammer 1991).
- **Section 404.** This section regulates discharge of dredged or fill materials into waters of the United States. A Section 404 permit would be required if the constructed wetland at Parcel E was built in the vicinity of a pre-existing wetland or riparian corridor. As stated above, the U.S. Army Corps of Engineers and the U.S. EPA decide on a case-by-case basis whether or not particular bodies of water are considered waters of the United States. The U.S. Army Corps of Engineers administers Section 404 permits, with advisement from the U.S. Fish and Wildlife Service and the National Marine Fisheries Service (Interagency Workgroup 2000).
- **Other Permits.** In San Francisco Bay, an additional permit is required from the San Francisco Bay Conservation and Development Commission (BCDC), which has jurisdiction over the 100-foot shoreline band around the bay as well as the bay itself.

82-69 cont'd.

Typically, government approval and/or construction of a wetland requires preparation of a California Environmental Quality Act (CEQA) Initial Study followed by a period of public review (Silverman 1984). Additional studies or permits that could possibly be required to construct engineered wetlands include sediment and erosion control plans, dam safety permits, a Department of Fish and Game Streambed Alteration permit, local grading permits, and land use approvals or encroachment permits (U.S. EPA 1999). Given the environmental considerations associated with the landfill cleanup, it is likely that California Department of Toxic Substances Control will be involved in ongoing monitoring of pollution at the site.

4.7 OPERATION, MAINTENANCE, AND MONITORING

This section describes the operation and maintenance requirements for the system. Although this type of wetlands system may require less operation and maintenance than some other types of systems, some maintenance will be required. Monitoring will also be essential to maintain treatment effectiveness, as well as to determine the degree to which the facility is achieving other objectives such as provision of wildlife habitat and educational and interpretive opportunities. Adaptive

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management can be defined as management that is informed by monitoring and research, facilitating the modification of management actions based on objective feedback. The creation of ecological systems requires adaptive management because the complexity of biological systems rarely allows for detailed predictions of all possible variables.

4.7.1 General Maintenance and Monitoring

A long-term management plan for the wetlands should be developed that addresses each of the three primary objectives — stormwater quality improvement, provision of wildlife habitat, and provision of educational and interpretive opportunities. A regular schedule for maintenance activities should be established and the parties responsible for maintenance and monitoring activities should be identified.

In general, the wetland system will need to be maintained for the following parameters:

- Regular trash removal
- Inspection for clogging of outlet structures and cleaning and maintenance as necessary of water control structures
- Inspection and repair of eroded levee areas or burrowing by small mammals
- Regular observation of how users are interacting with the site and a general safety inspection of the site. Are design features functioning as intended? Are repairs or additional actions required?
- Observation of level of sediment accumulation

Other monitoring activities should include:

- Regular sampling and analysis of water quality parameters
- Qualitative and quantitative monitoring of vegetation health and identification of potential problems including areas needing replanting or invasive species removal
- Regular wildlife surveys to record use
- Monitoring of mosquitoes at the site and the health and effectiveness of control activities including fish and predatory invertebrate populations

4.7.2 Mosquito Control

By their nature as permanently wet places, constructed ponds and wetlands have the potential to provide habitat for mosquitoes. The shallow water and emergent vegetation of treatment wetlands are essential for optimizing water quality polishing, yet these characteristics also promote mosquito breeding unless the wetland is properly maintained. Proper design and management of stormwater treatment ponds and wetland cells can minimize and control mosquito production but cannot completely eliminate it. Areas of both fresh water and tidal wetlands currently exist in the project vicinity (Brown and Caldwell 2004). These wetlands undoubtedly already provide suitable habitat for mosquitoes. In general, well-

82-69 cont'd.

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designed and well-managed treatment wetlands do not pose a greater mosquito threat than existing natural wetlands (Knight et al. 2003). It is necessary to balance water quality improvement, increase in wildlife habitat, and educational objectives for the project against the controllable risk of mosquito production.

Mosquitoes lay their eggs on or near the water and the mosquito larvae live on the water surface, breathing air and feeding primarily on algae and organic debris (Borror 1976; Metcalf and Luckman 1975). Common mosquito control strategies include minimizing stagnant ponded areas, disturbing or adjusting water levels to drown larvae, minimizing anaerobic zones, and creating access for natural mosquito predators. The project design includes the following mosquito control features:

1. Prevent establishment of stagnant water areas
2. Raise and lower the pond water levels
3. Reduce areas of emergent vegetation, where feasible
4. Create ecologically diverse conditions that support mosquito predators (fish and invertebrates including dragonflies)
5. Provide ready access to ponds and wetlands for any necessary monitoring and treatment

In addition, long-term management of the wetland should include the following:

6. Monitor mosquito levels and treat as required

82-69 cont'd.

Two groups of mosquito species are of interest given their breeding habits: (1) pool-breeding and (2) floodwater species. Maintaining a permanent pool in the ponds and wetland cells provides potentially suitable habitat for pool breeding species but limited habitat for floodwater species. On the other hand, temporary detention of stormwater runoff above the permanent pool provides potentially suitable habitat for floodwater species, but is disruptive to pool-breeding species.

The proposed design calls for regular input of water from a supplemental water source during the warm season to maintain the permanent pool level. Regular input of water will maintain water circulation into and out of the pond and this circulation will prevent water stagnation and help to reduce the potential for the pond to support mosquitoes. The depths of the forebay and ponds have been specifically designed to sustain primarily open water at the permanent pool elevation and preclude the establishment of emergent vegetation. Within the ponds, only limited shallow areas (approximately 5 feet wide) around the perimeter will support emergent vegetation. These shallow perimeter benches are necessary for human safety and secondarily they provide wildlife habitat benefits. Access roads surround each pond and provide ready drivable access to all areas of fringing wetland vegetation to allow for mosquito control. In addition, boat access to the ponds is provided.

The temporary detention volume in the proposed design is designed to drain within two days following a storm. This design will disrupt the ability of floodwater species to complete their reproductive cycle.

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While the growth of emergent vegetation in the ponds can be minimized, it is essential to the function of wetland cells for both water quality and wildlife habitat. However, other design features such as water circulation and diverse habitat structure will help minimize potential mosquito production.

As in the ponds, opportunities for water to stagnate in the wetland cells have been minimized. The wetland cells have been constructed to allow for complete drawdown if necessary, with the exception of two deeper pools. Two deep-water zones in each cell will provide habitat and refuge for fish and other aquatic mosquito predators. The design of the wetland cells includes a slight slope and a central swale to facilitate flow-through and drainage. As with the ponds, the wetland cells will benefit from supplemental flow during the dry season. This supplemental flow will provide continuous circulation and reduce stagnant water. Precise grading techniques such as laser leveling during construction can also be used to provide consistent elevations and minimize the production of isolated non-draining areas.

Fish are commonly introduced to ponds and wetlands as a natural method of controlling mosquito populations. The mosquito fish (*Gambusia affinis*) is the most widely used biological control agent and is harvested for mass inoculation into wetland systems. Sunfish (*Lepomis* spp.) and stickleback (*Gasterosteus* spp.) are two other fish species that can enhance mosquito control efforts. Recycled water from domestic wastewater treatment plants is generally of adequate quality to support fish in a wetland. Moyle (2002) recommends more attention be given to the potential for native fish species in mosquito control. Several species of fish can be stocked at the proposed wetland and their relative success monitored.

82-69 cont'd.

As with the ponds, access roads surround each wetland cell and provide ready drivable access to the entire perimeter. Note that the City and County of San Francisco has no dedicated mosquito abatement district responsible for the control and monitoring of mosquitoes. Therefore, mosquito monitoring and maintenance should be an element of the long-term operation and maintenance plan for the wetlands.

4.7.3 Sediment Removal

The forebay has been designed to allow for accumulation of 2 feet of sediment at the bottom. The degree to which sediment accumulates in the forebay is a function of the sediment runoff from the proposed site development. Urban developments like those proposed for Hunters Point, largely covered by concrete and asphalt, typically do not have a high sediment load. We anticipate that this sediment will be periodically dredged and disposed of or reused at the site.

Given the site's environmental history, the sediment would require characterization before disposal.

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4.8 DESIGN CONTINGENCIES

This section describes and addresses some of the major contingencies of the project and identifies alternatives for dealing with each contingency.

4.8.1 No On-Site Recycled Water Available

Like the feasibility study, the proposed design is based on the assumption that a source of fresh water will be available to provide a perennial wetland system. The required volumes of water are described in the feasibility study report (Brown and Caldwell 2004). To illustrate the types of freshwater sources needed for a perennial wetland system, we are assuming recycled wastewater from a proposed wastewater treatment plant to be constructed at Hunters Point will be used as freshwater input. However, this proposed plant has not yet been designed or approved. In addition, the water from the recycling plant should not be too high in plant nutrients that would affect the growth of vegetation.

To allow for the possibility that the wastewater treatment plant is not built, we have developed two design alternatives. Alternative sources of water for the wetlands system do exist, and an effective treatment system can be designed whether or not the treatment plant is built.

82-69 cont'd.

4.8.1.1 Pump Water from San Francisco Bay

It would be possible to design an intake from San Francisco Bay to pump bay water directly into the wetland system. In that event, the wetland would no longer be a freshwater treatment system, but instead a brackish water system. This change will alter the potential vegetation makeup of the wetlands. However, there is great deal of overlap between freshwater and brackish marsh vegetation such that effective stormwater runoff treatment would still be possible.

Some *Scirpus* species as well as *Typha* can tolerate moderate salinity levels. In the San Francisco Bay–Delta salinity levels in brackish marshes fluctuate seasonally, decreasing in the winter as rains increase freshwater input and increasing through the summer and into the fall as freshwater input declines. Salinity levels also follow a gradient from the seaward end of the estuary inland, with saltwater influence toward the east. The geographic extent of seawater influence likewise fluctuates seasonally, extending further east during the dry season. As a consequence, plant species typical of salt water and fresh water intermix continuously along this gradient, with species composition varying depending on the local pattern of fluctuation.

California bulrush is found all along this gradient, though it apparently can tolerate greater submergence with fresher water conditions (Josselyn 1983). Under "middle marsh" conditions, *S. americanus* is common, along with alkali bulrush (*S. robustus*) and *Typha* species.

Some care would be required in monitoring salinity levels, both in the wetlands and in the bay water intended for supplemental input, especially as the dry season progresses, but the creation of a brackish marsh system should be possible.

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Periodic maintenance would also be required to remove debris and trash and occasionally clean out sediments and vegetation.

4.8.1.2 Bring Water from the Southeast Treatment Plant

Another approach would be to bring water in from the southeast treatment plant operated by the City of San Francisco. This approach would require piping water to the site over a distance of just over a mile. We anticipate that a 2-inch pipeline would be sufficient to bring enough makeup water to the site during months where supplemental water is needed. This solution is technically feasible, although it may be costly to bring a pipe through a mile of highly urbanized area, but it also appears likely that the site developer (Lennar) may install a pipe connection to the southeast treatment plant as part of the site development. In that event, it would be easy and a relatively small additional cost to add the supplemental water pipe within the construction trench to bring the recycled water to the project wetlands. These options will be explored during final design activities. The routing and costs for this alternative were beyond the scope of this report.

4.8.2 Seepage of Contaminated Groundwater into Wetlands

The proposed design accounts for the possibility of residual groundwater contamination after the landfill waste and debris are removed by including an impermeable liner to separate groundwater from the wetlands system. We have assumed that the Navy will be required to implement a monitoring system around Parcel E to assess the effectiveness of its remedial activities around the landfill. In the event of measured groundwater seepage into the wetlands, we have assumed that the Navy will implement a groundwater pumping and remediation program separate from the wetlands system to pump the groundwater for treatment.

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5.0 Cost Estimates

Tables 7 and 8 each contains a preliminary cost estimate based on professional judgment and experience. The costs are intended to provide an order-of-magnitude estimate of costs for construction of the proposed system. Actual costs may vary owing to inflation, fuel costs, specific San Francisco construction and contracting requirements, and unforeseen field conditions.

The cost estimates reflect the following assumptions:

- No hazardous waste or environmental issues are involved in the wetlands project construction; Two alternatives were developed for cost estimates. Alternative 1 assumes the Navy or others will treat or remove pollutants and debris from the landfill site and leave the site at an elevation of –10 feet NGVD. Again, alternative 2 assumes that the Navy or others will treat or remove pollutants and debris from the landfill site but in this case will leave the site at an elevation of 0 feet NGVD. Earthwork volume calculations have been developed using each of these starting elevations.

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- The Navy will use the existing 5-foot clay cap and native soil backfill (thickness assumed to be 3 feet) as on-site backfill materials.
- Import soils are available on site or near the site. Our estimate includes minimal costs for transport of clean fill soils to the site.

Furthermore, we have included no costs for acquisition of land or preparation of extensive permitting studies such as an environmental assessment, environmental impact report, or environmental impact statement.

The largest single cost in the estimate is earthwork and fine grading of the proposed pond systems. Regardless of which cleanup scenario the Navy selects, that is, complete removal and disposal of contaminated materials or a combination of hot-spot removal and in situ cleanup to below hazardous levels, the proposed design can be implemented as designed and presented in this report.

6.0 Recommended Next Steps

Since this design is preliminary, additional design work will be needed during the final design phase of the project, including the following:

- Development of an accurate and current base map for the project site and adjustment of the proposed layout to meet project limits
- Coordination with the upstream property developer to integrate the proposed wetlands with site development plans and to determine treatment and flood flows more accurately
- Performance of a more detailed hydraulic analysis to determine the input hydrograph and loadings into the system and to design water control structures
- Coordination with the Navy for the cleanup and removal of pollutants from the landfill site to allow for construction of the wetlands
- Finalization of construction and operating cost estimates
- Cooperation with the appropriate regulatory agencies to obtain permits for the project

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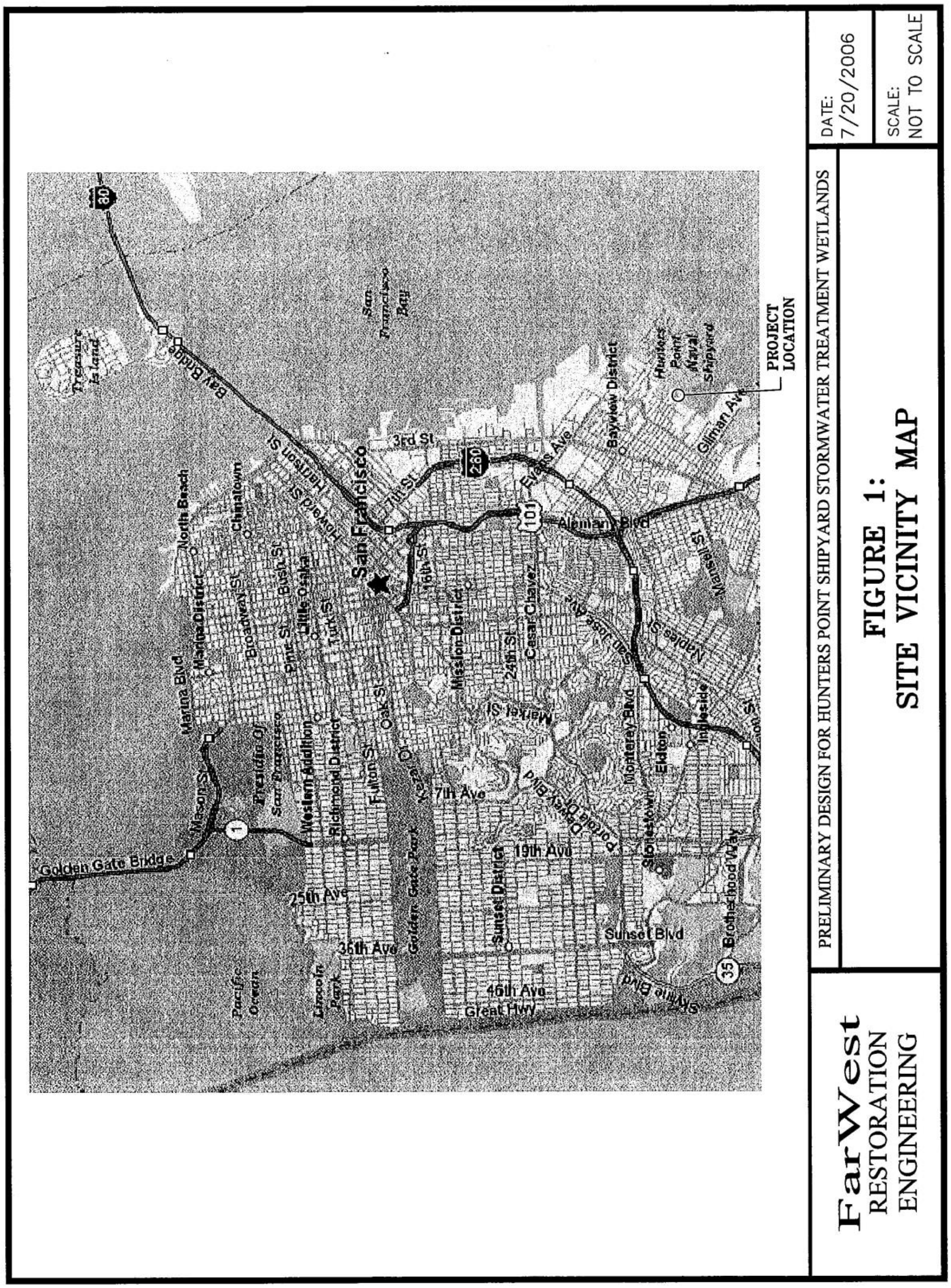
PRELIMINARY DESIGN FOR HUNTERS POINT SHIPYARD STORMWATER TREATMENT WETLANDS
DATE:
7/20/2006
SCALE:
NOT TO SCALE
FIGURE 1:
SITE VICINITY MAP
FarWest
RESTORATION
ENGINEERING
PROJECT
LOCATION
Hunters Point Naval Shipyard
San Francisco Bay
Treasure Island
Bay Bridge
San Francisco
Golden Gate Bridge
Pacific Ocean
Bayview District
Mission District
Sunset District
Golden Gate Park
Presidio of San Francisco
Gilman Ave
Alemany Blvd
Evans Ave
3rd St
7th St
16th St
24th St
Cesar Chavez
Market St
Oak St
Fulton St
Marina Blvd
North Beach
Chinatown
Broadway St
Pine St
Bush St
Turk St
Western Addition
Richmond District
Lincoln Park
7th Ave
19th Ave
25th Ave
36th Ave
46th Ave
Great Hwy
Sunset Blvd
Skyline Blvd
Monterey Blvd
Stonestown
Ingleside
Mansell St
Brotherhood Way

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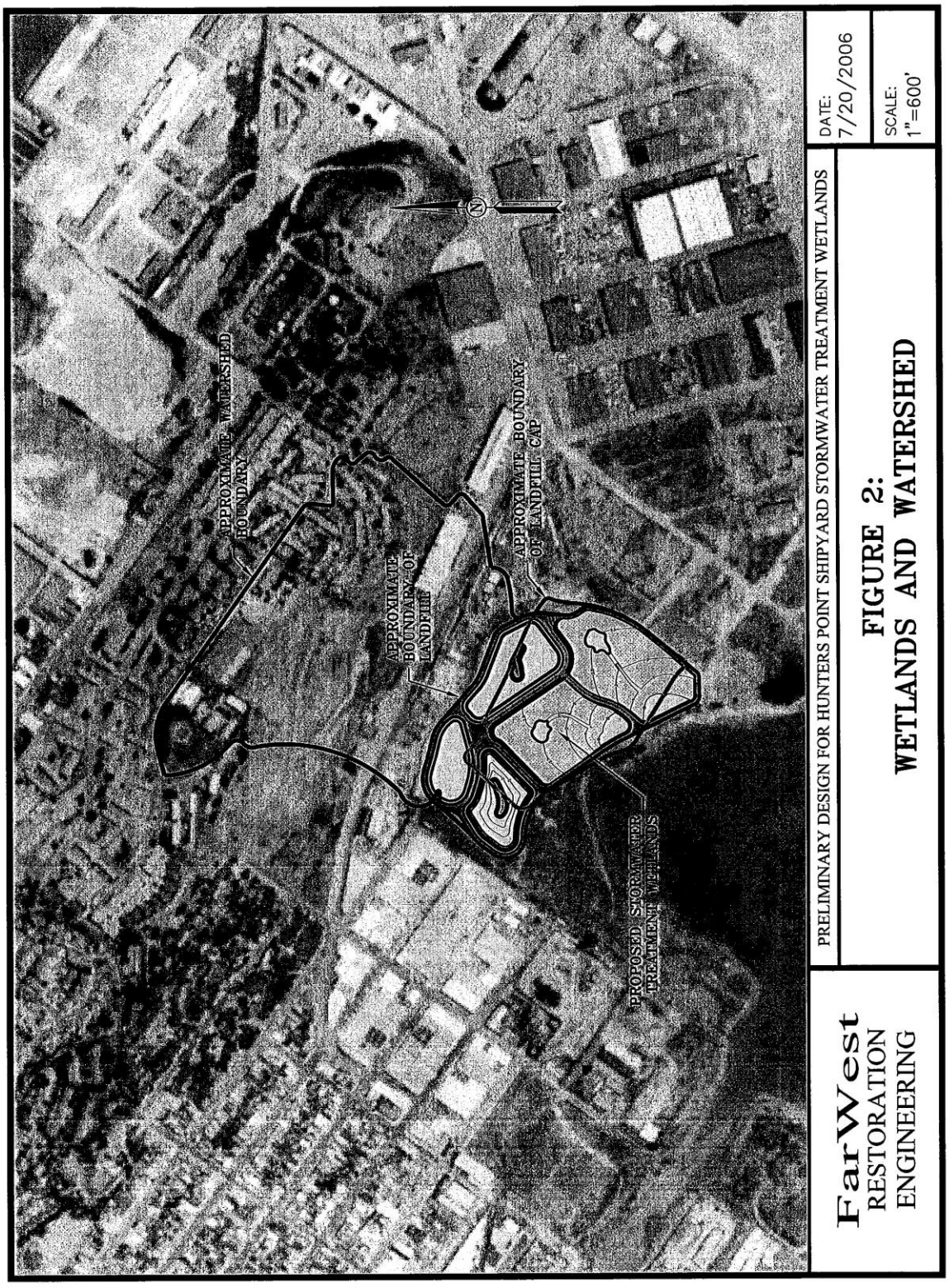
APPROXIMATE WATERSHED BOUNDARY
APPROXIMATE BOUNDARY OF LANDFILL
APPROXIMATE BOUNDARY OF LANDFILL CAP
PROPOSED STORMWATER TREATMENT WETLANDS
N
FarWest
RESTORATION
ENGINEERING
PRELIMINARY DESIGN FOR HUNTERS POINT SHIPYARD STORMWATER TREATMENT WETLANDS
FIGURE 2:
WETLANDS AND WATERSHED
DATE:
7/20/2006
SCALE:
1"=600'

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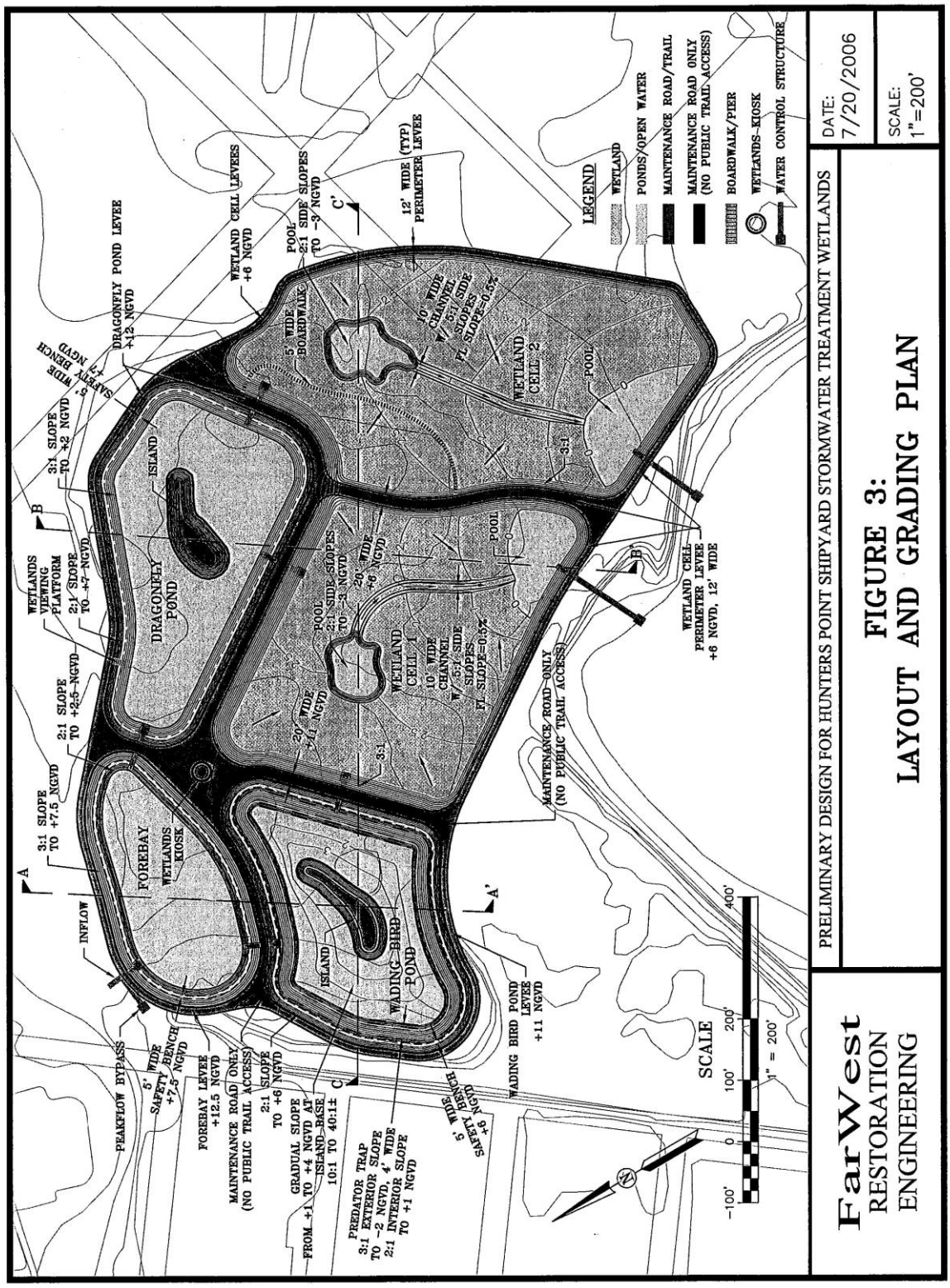
FIGURE 3:
LAYOUT AND GRADING PLAN
PRELIMINARY DESIGN FOR HUNTERS POINT SHIPYARD STORMWATER TREATMENT WETLANDS
FarWest
RESTORATION
ENGINEERING
DATE: 7/20/2006
SCALE: 1"=200'
LEGEND
WETLAND
PONDS/OPEN WATER
MAINTENANCE ROAD/TRAIL
MAINTENANCE ROAD ONLY (NO PUBLIC TRAIL ACCESS)
BOARDWALK/PIER
WETLANDS-KIOSK
WATER CONTROL STRUCTURE
SCALE
1" = 200'
DRAGONFLY POND
FOREBAY
WETLANDS KIOSK
WADING BIRD POND
WETLAND CELL 1
WETLAND CELL 2
ISLAND
INFLOW
PEAKFLOW BYPASS
FOREBAY LEVEE +12.5 NGVD
DRAGONFLY POND LEVEE +12 NGVD
WETLAND CELL LEVEES +6 NGVD
12' WIDE (TYP) PERIMETER LEVEE
WETLAND CELL PERIMETER LEVEE +6 NGVD, 12' WIDE
WADING BIRD POND LEVEE +11 NGVD
MAINTENANCE ROAD (NO PUBLIC TRAIL ACCESS)
WETLANDS VIEWING PLATFORM
5' WIDE BOARDWALK
10' WIDE CHANNEL W/ 5:1 SIDE SLOPES FL SLOPE=0.5%
POOL 2:1 SIDE SLOPES TO -3 NGVD
20' WIDE +6 NGVD
20' WIDE +11 NGVD
3:1 SLOPE TO +7.5 NGVD
2:1 SLOPE TO +2.5 NGVD
2:1 SLOPE TO +7 NGVD
3:1 SLOPE TO +2 NGVD
5' WIDE SAFETY BENCH +7 NGVD
5' WIDE SAFETY BENCH +7.5 NGVD
5' WIDE SAFETY BENCH +6 NGVD
2:1 SLOPE TO +6 NGVD
GRADUAL SLOPE FROM +1 TO +4 NGVD AT ISLAND BASE 10:1 TO 40:1±
PREDATOR TRAP 3:1 EXTERIOR SLOPE TO -2 NGVD, 4' WIDE 2:1 INTERIOR SLOPE TO +1 NGVD
A
A'
B
B'
C
C'

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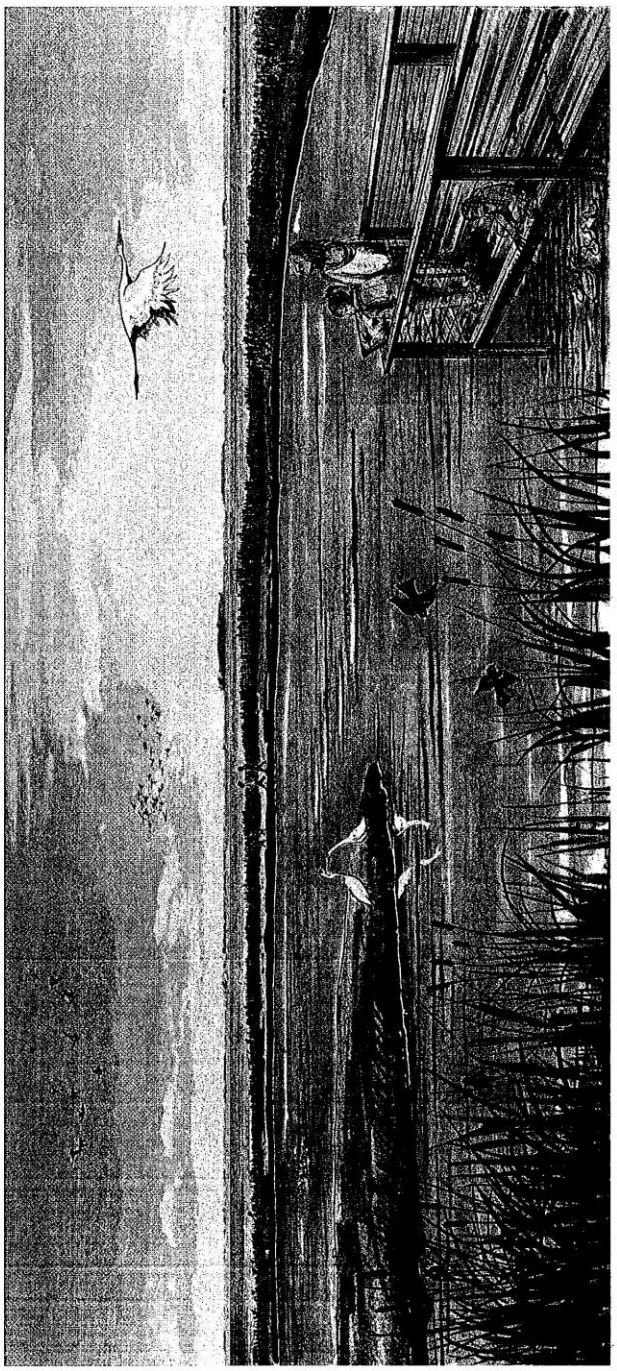

Figure 4: Illustrative Drawing of Dragonfly Pond
Preliminary Design for Hunters Point Shipyard Stormwater Treatment Wetlands

INSIDEOUT

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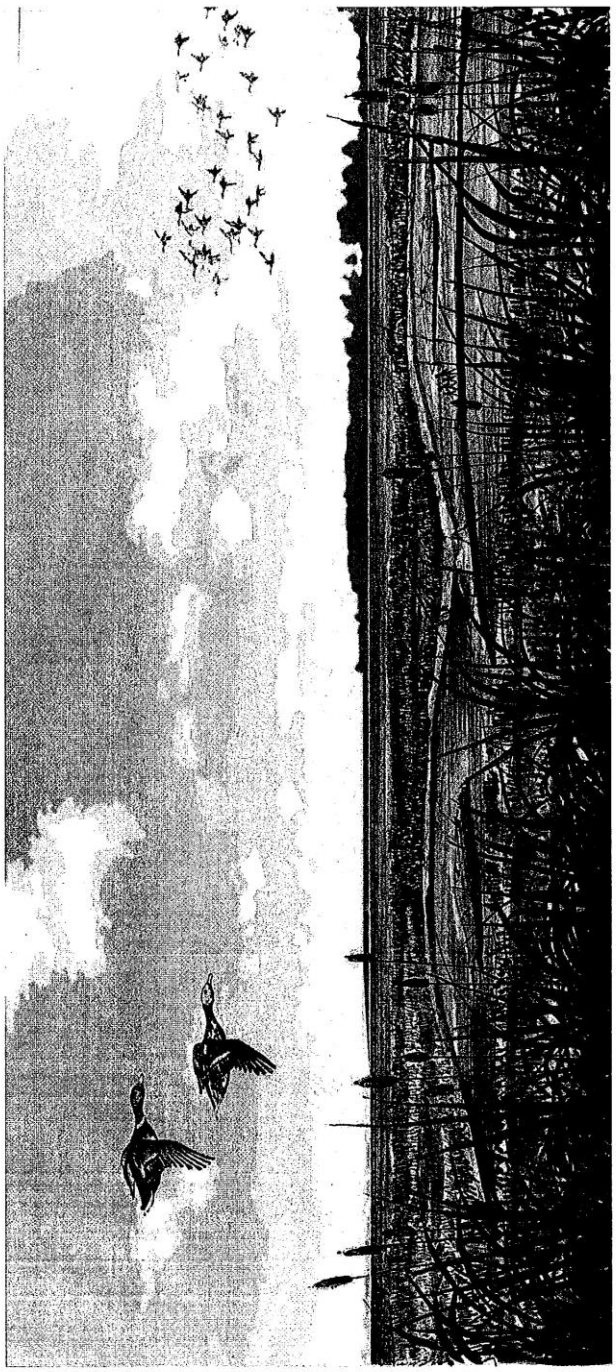

Figure 5: Illustrative Drawing of Wetland Cells
Preliminary Design for Hunters Point Shipyard Stormwater Treatment Wetlands

INSIDEOUT

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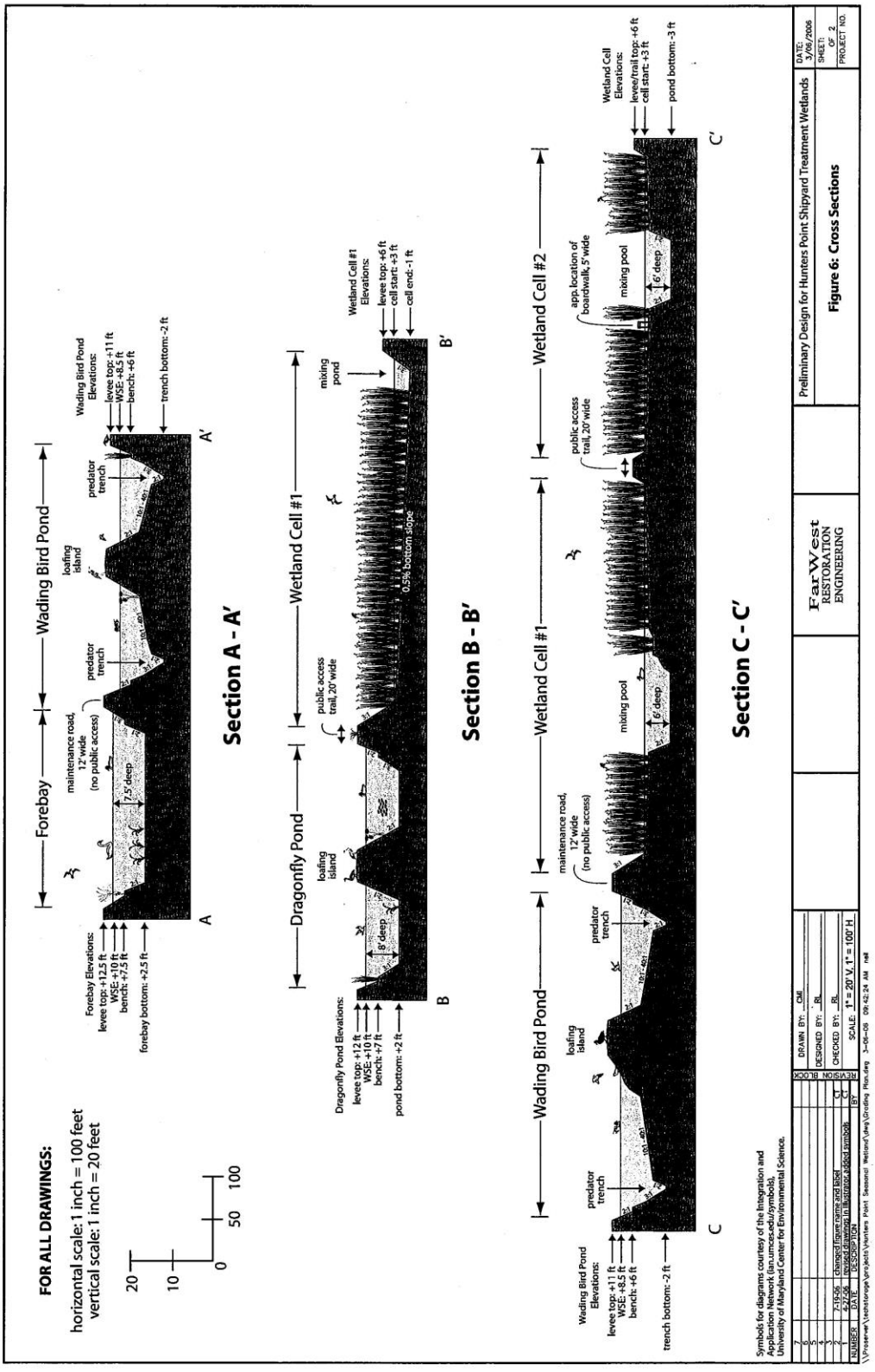
FOR ALL DRAWINGS:
horizontal scale: 1 inch = 100 feet
vertical scale: 1 inch = 20 feet
20
10
0
50
100
Forebay
Wading Bird Pond
maintenance road, 12' wide (no public access)
predator trench
loafing island
Wading Bird Pond Elevations: levee top: +11 ft WSE: +8.5 ft bench: +6 ft
trench bottom: -2 ft
Forebay Elevations: levee top: +12.5 ft WSE: +10 ft bench: +7.5 ft
forebay bottom: +2.5 ft
7.5' deep
A
A'
Section A - A'
Dragonfly Pond
Wetland Cell #1
public access trail, 20' wide
mixing pond
Wetland Cell #1 Elevations: levee top: +6 ft cell start: +3 ft cell end: -1 ft
0.5% bottom slope
Dragonfly Pond Elevations: levee top: +12 ft WSE: +10 ft bench: +7 ft
pond bottom: +2 ft
6' deep
B
B'
Section B - B'
Wetland Cell #2
appx. location of boardwalk, 5' wide
Wetland Cell Elevations: levee/trail top: +6 ft cell start: +3 ft
pond bottom: -3 ft
C
C'
Section C - C'
Symbols for diagrams courtesy of the Integration and Application Network (ian.umces.edu/symbols), University of Maryland Center for Environmental Science.
FarWest RESTORATION ENGINEERING
Preliminary Design for Hunters Point Shipyard Treatment Wetlands
Figure 6: Cross Sections
DATE: 3/06/2006
SHEET: OF 2
PROJECT NO.
DRAWN BY: CMI
DESIGNED BY: RL
CHECKED BY: RL
SCALE: 1" = 20' V, 1" = 100' H
NUMBER DATE DESCRIPTION BY
1 2-15-06 changed foam name and label CL
2 6-7-06 revised drawing in illustrator added symbols CL
\\Preserve\Restoration\Projects\Hunters Point Seasonal Wetland\Dwg\Grading Plan.dwg 3-06-06 09:42:24 AM rwl

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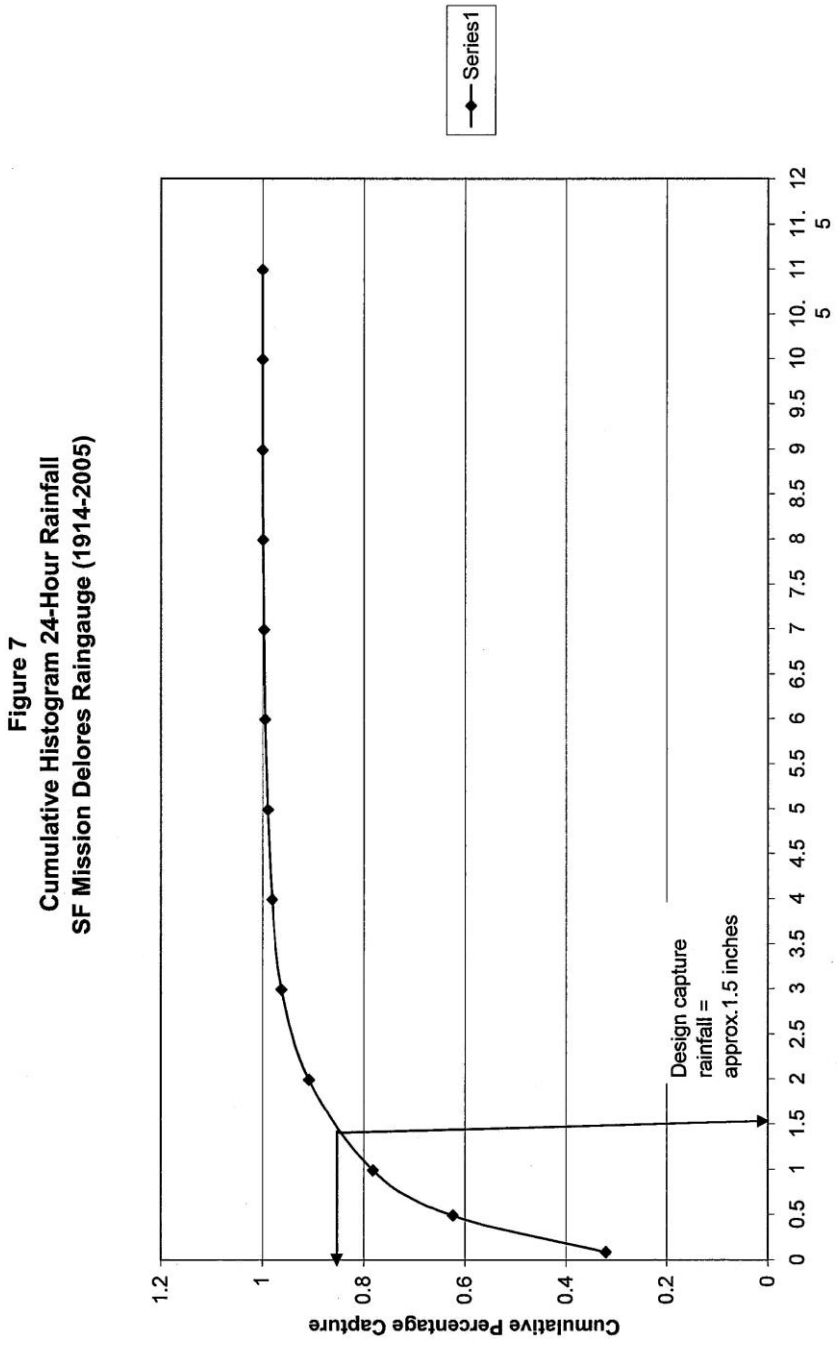
Figure 7
Cumulative Histogram 24-Hour Rainfall
SF Mission Delores Raingauge (1914-2005)
Series1
Cumulative Percentage Capture
Rainfall Depth (in)
Design capture
rainfall =
approx.1.5 inches
FarWest Restoration Engineeering

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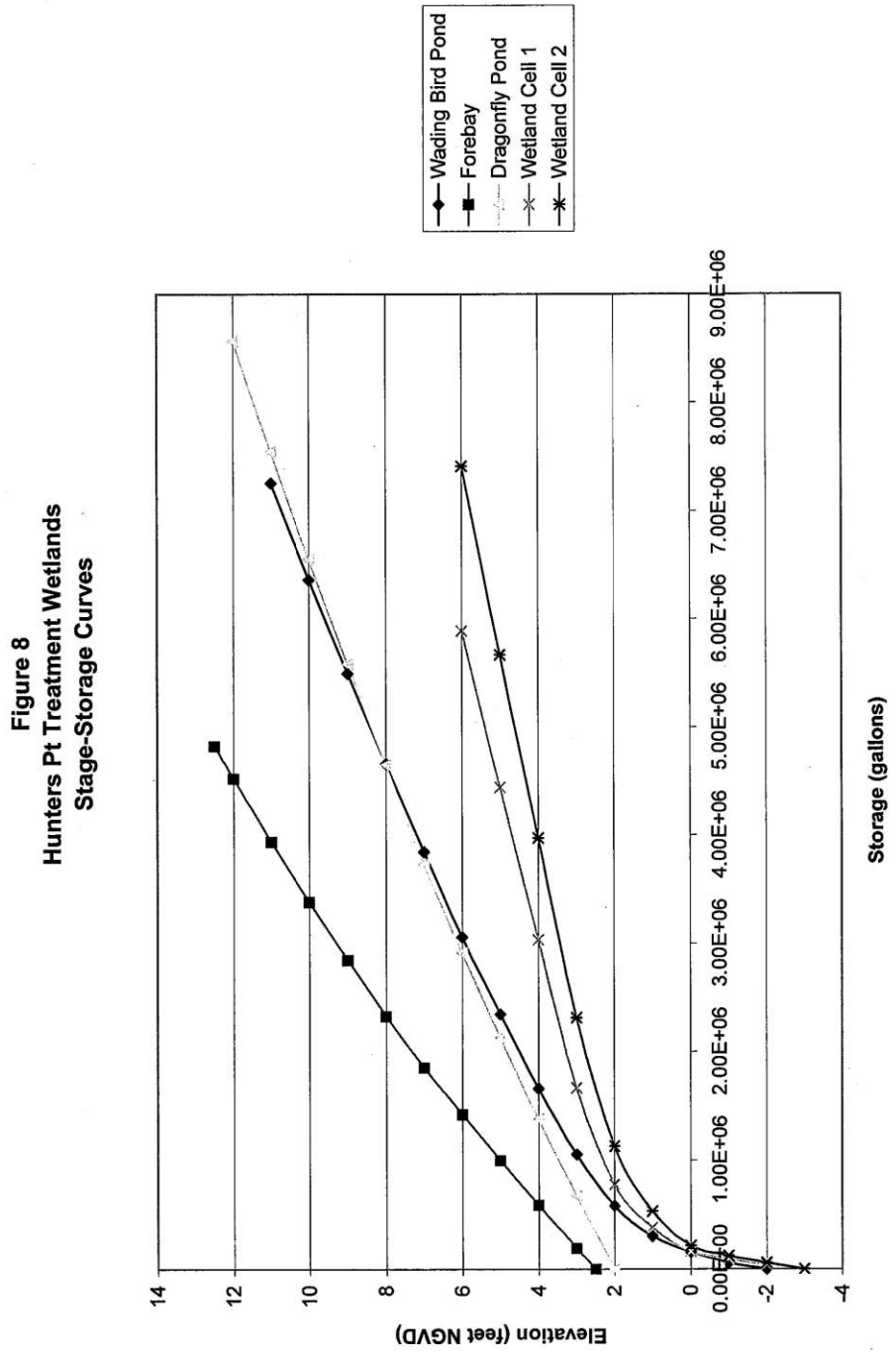

Figure 8
Hunters Pt Treatment Wetlands
Stage-Storage Curves

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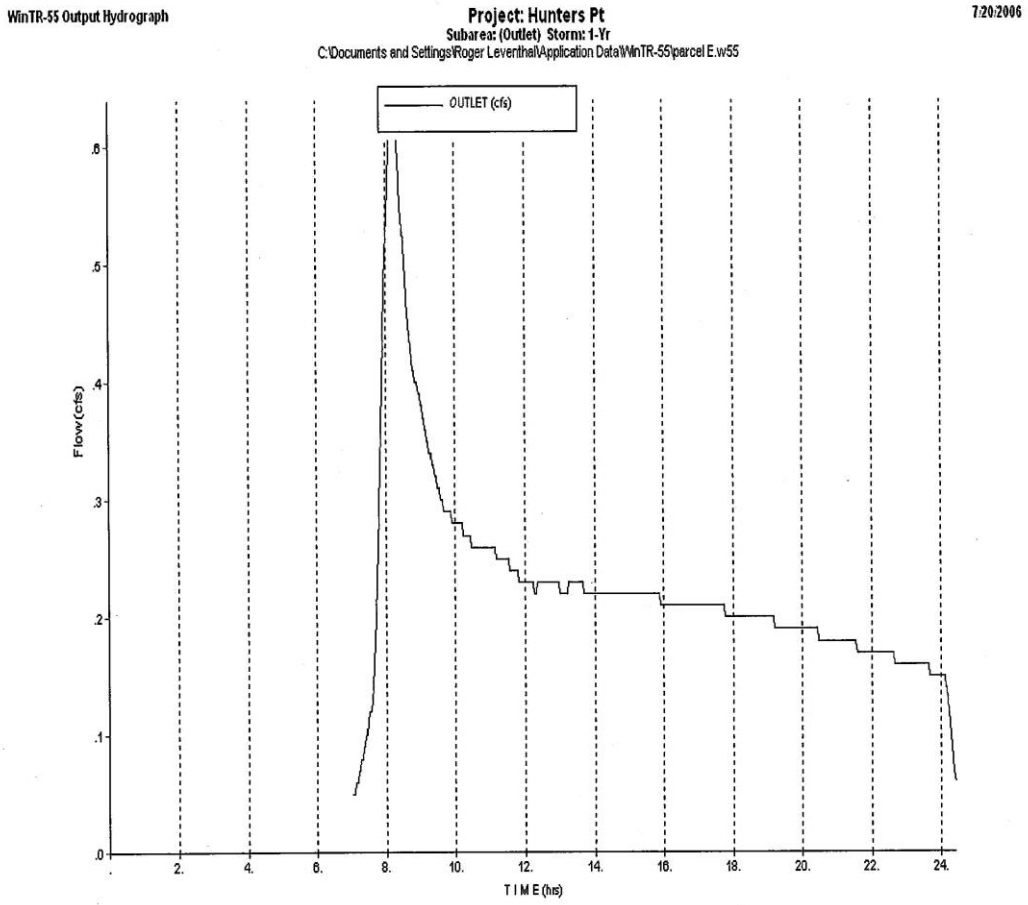

Figure 9: One-Year Storm Hydrograph from TR-55 Model

Preliminary Design for Hunters Point Shipyard Stormwater Treatment Wetlands

Table 1
Hunters Point Shipyard Stormwater Monitoring Data, 2004–2005
Preliminary Design for Hunters Point Shipyard Stormwater Treatment Wetlands

	Outfall 001 Concentration (mg/l)		DP1 Concentration (mg/l)		DP2 Concentration (mg/l)	
	2/14/05 Sampling Event	*Sampling Event*	*Sampling Event*	*Sampling Event*	*Sampling Event*	*Sampling Event*
Total suspended solids	7	7	450	40	460	12
pH	7.8	7.7	8.2	7	8.1	6.8
Oil and grease	ND (<4.72)	ND (<4.72)	ND (<4.72)	ND (<4.72)	ND (<4.72)	ND (<4.72)
Aluminum	1.7	0.12	19	1	14	0.29
Arsenic	ND (<0.05)	ND (<0.005)	0.013	0.005	0.0098	0.005
Barium	0.12	0.084	0.21	0.032	0.23	0.025
Copper	0.18	0.11	0.51	0.13	0.68	0.14
Chromium	0.011	ND <0.01	0.13	0.01	0.1	ND (<0.01)
Iron	3.4	0.4	32	1.3	23	0.37
Lead	0.012	0.003	0.16	0.026	0.19	0.014
Magnesium	95	76	26	2.2	20	2
Manganese	0.45	0.28	0.77	0.07	0.75	0.048
Mercury	ND (<.0002)	ND (<.0002)	0.0023	ND (<.0002)	0.0033	0.0002
Nickel	0.023	0.02	0.23	0.02	0.19	0.02
Vanadium	ND (<0.01)	ND (<0.01)	0.055	0.001	0.055	ND (<0.01)
Zinc	0.064	0.02	0.82	0.3	0.99	0.28

Outfall 001: Entrance to existing wetlands
DP1: Pipe inlet to UCSF compound
DP2: Catch basin leading to base-wide sewer system
mg/l: milligrams per liter

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Table 2
Potential Types and Concentrations of Chemical Constituents in Site Watershed Runoff
Preliminary Design for Hunters Point Shipyard Stormwater Treatment Wetlands

	Data for			Data Collected by the Navy at Hunters Point Shipyard 2004–2005					
				Outfall 001 (mg/l)		*DP1 (mg/l)*		*DP2 (mg/l)*	
	National[1] (mg/l)	Mean of Four Low Rainfall Areas[1] (mg/l)	Bay Area[2] (mg/l)	*2/14/05 Sampling Event*	*3/18/05 Sampling Event*	*2/14/05 Sampling Event*	*3/18/05 Sampling Event*	*2/14/05 Sampling Event*	*3/18/05 Sampling Event*
Total suspended solids	78.4	228.75		7	7	450	40	460	12
Total nitrogen	2.39	4		NA	NA	NA	NA	NA	NA
Total phosphorus	0.32	0.63		NA	NA	NA	NA	NA	NA
Oil and grease	3			ND (<4.72)	ND (<4.72)	ND (<4.72)	ND (<4.72)	ND (<4.72l)	ND (<4.72)
Cadmium	0.0007		0.00221	ND (<0.005)	ND (<0.005)	20	8.1	ND (<0.005)	ND (<0.005)
Copper	0.0134	0.0415	0.0466	0.18	0.011	0.51	0.13	0.68	0.14
Chromium	0.004		0.02345	0.011	ND (<0.01)	0.13	0.01	0.1	ND
Lead	0.0675	0.103	0.1146	0.012	ND (<0.003)	0.16	0.026	0.19	0.014
Mercury				ND (<.0002)	ND (<.0002)	0.0023	ND (<.0002)	0.0033	0.0002
Nickel			0.0469	0.023	0.02	0.23	0.02	0.19	0.02
Zinc	0.162	0.269	0.3128	0.064	0.02	0.82	0.3	0.99	0.28

Outfall 001: Entrance to existing wetlands
DP1: Pipe inlet to UCSF compound
DP2: Catch basin leading to base-wide sewer system
ND: Not detected
NA: Not analyzed
mg/l: milligrams per liter

1. Center for Watershed Protection 2003.
2. Bay Area Stormwater Management Agencies Association 1996

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TABLE 3
Typical Settling Velocities and Times for Mineral Particles in Still Water
Preliminary Design for
Hunters Point Shipyard Stormwater Treatment Wetlands

Particle Size	Settling Velocity (feet/day)	Time to Settle 1 Foot
Gravel	283,000	0.3 second
Coarse sand	28,300	3.0 seconds
Fine sand	2,260	38.0 seconds
Silt	43.6	33.0 minutes
Clay	0.00436	230 days
Colloids	0.0000436	63 years

Source: Ferguson 1998

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TABLE 4
Characteristics of Proposed Treatment Wetlands
Preliminary Design for
Hunters Point Shipyard Stormwater Treatment Wetlands

	Forebay	Dragonfly Pond	Wading Bird Pond	Wetland Cell #1	Wetland Cell #2
Area at Normal Pool Level (acres)	1.5	2.7	2.6	5	5
Bottom Elevation (feet NGVD)	+2.5	+2	+2[1]	0 to 2.5[2]	0 to 2.5[2]
Normal Water Level (feet NGVD)	+8.5	+8	+7	+3	+3
Volume of Permanent Pool at Normal Water Level (gallons)	2,590,000	4,650,000	3,850,000	1,670,000	2,320,000
Elevation of Extended Detention Storage (feet NGVD)	+10.5	+10	+9	+4	+4
Volume of Extended Detention Storage (gallons)	1,075,000	1,905,000	1,655,000	1,370,000	1,655,000
Elevation of Top of Levee (feet NGVD)	+12.5	+12	+11	+6	+6

1. Excludes predator trench.
2. Excludes nondraining pool area.

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TABLE 5
Expected Treatment Effectiveness for Wet Ponds
Preliminary Design for
Hunters Point Shipyard Stormwater Treatment Wetlands

Parameter	Percentage Removal Schueler 1992	Percentage Removal Hatigan 1998
TSS	50–90	80–90
Total Phosphorus	30–90	
Soluble Nutrients	40–80	50–70
Lead	70–80	
Zinc	40–50	
BOD/COD	20–40	

Source: U.S. Environmental Protection Agency (EPA) 1999

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TABLE 6
Required Supplemental Water Volumes
Preliminary Design for
Hunters Point Shipyard Stormwater Treatment Wetlands

Month	Supplemental Water Required (acre-feet)
January	0
February	0
March	0
April	2.1
May	7.1
June	9
July	8.9
August	8.6
September	7.2
October	2.5
November	0
December	0

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Table 7
Preliminary Cost Estimate, Alternative 1
Preliminary Design for Hunters Point Shipyard Stormwater Treatment Wetlands

CONSTRUCTION COSTS					
Description of Item	**Quantity**	**Units**	**Unit Cost ($)**	**Total Cost ($)**	**Comments**
Site survey	1	ls	$10,000	$10,000	
Equipment mobilization/demobilization	1	ls	$20,000	$20,000	
Clearing and grubbing	20	acres	$2,000	$40,000	
Earthwork[1]					
Total fill landfill cap reuse	113000	cy	$3	$339,000	Assumes Navy has stockpiled existing cap materials; assumes existing cap consists of 2-foot clay layer with 1.5-foot soil layer
Total clean import fill	295000	cy	$10	$2,950,000	Assumes Navy has removed all landfill materials; assumes site elevation at start of construction is at elevation –10 feet NGVD; assumes nearby source of clean fill
Pond and cell fine grading	20	acres	$7,000	$140,000	Fine grading and contouring of ponds
Levee road	21780	sf	$7	$152,460	Assumes 4 inches aggregate base with 3 inches of asphalt
Decomposed granite trails	91476	sf	$4	$365,904	Assumes decomposed granite pathway with aggregate base
Liner placement	69000	sy	$5	$310,500	Assumes liner placed to contour elevation +3 feet NGVD in ponds and cells
Water control structures	7	each	$20,000	$140,000	
Boardwalk in Dragonfly Pond	500	lf	$200	$100,000	
Wildlife viewing platform	1	ls	$20,000	$20,000	
Signs					
Educational signs	3	each	$250	$750	
Warning signs	8	each	$100	$800	
Wetland planting	270,000	plugs	$0.85	$229,500	
Landscaping					
Topsoil for plantings	500	cy	$12	$6,000	Soil for upland planting
Soil amendments, mulch					
Native grass hydroseeding	9	acre	$3,000	$27,000	
Native shrubs	500	each	$15	$7,500	Assumes 1-gallon shrubs
Subtotal:				$4,849,414	
10% contingency:		10	%	$484,941	
Total construction:				$5,334,355	

MAINTENANCE AND MONITORING COSTS					
Description of Item	**Quantity**	**Units**	**Unit Cost ($)**	**Total Cost ($)**	**Comments**
Landscape maintenance	1	ls	$3,000	$3,000	Assumes limited plant replacement and repair of irrigation system
Biological monitoring					
Bird surveys	1	ls	$2,400	$2,400	
Quantitative vegetation transects	1	ls	$2,500	$1,500	
Qualitative monitoring	1		$2,000		Observations, recommendations for remedial action; photo monitoring
Cleaning of pipes	1	ls	$2,000	$2,000	
Mosquito control	1	ls	$2,500	$2,500	
Weed control (hand weeding)	1	ls	$2,000	$2,000	
Litter control	1	ls	$2,000	$2,000	
Annual monitoring report	1	ls	$6,000	$6,000	
Annual subtotal:				$18,400	
Total 5-year maintenance and monitoring:				$92,000	No inflation adjustment
TOTAL COST:				$5,426,355	

cy: cubic yards
ls: lump sum
sf: square feet
sy: square yards
NGVD: National Geodetic Vertical Datum, mean sea level 1929

1. Total cut quantity calculated using Land Desktop Version 3

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Table 8
Preliminary Cost Estimate, Alternative 2
Preliminary Design for Hunters Point Shipyard Stormwater Treatment Wetlands

CONSTRUCTION COSTS					
Description of Item	**Quantity**	**Units**	**Unit Cost ($**	**Total Cost ($)**	**Comments**
Site survey	1	ls	$10,000	$10,000	
Equipment mobilization/demobilization	1	ls	$20,000	$20,000	
Clearing and grubbing	20	acres	$2,000	$40,000	
Earthwork[1]					
Total fill landfill cap reuse	113000	cy	$3	$339,000	Assumes Navy has stockpiled existing cap materials; assumes existing cap consists of 2-foot clay layer with 1.5-foo soil layer
Total clean import fill	2000	cy	$10	$20,000	Assumes Navy has removed and/or treated all hazardous landfill materials; assumes site elevation at start of construction is at elevation 0 feet NGVD; assumes existing landfill cap materials are reused; assumes nearby source of clean fill
Pond and cell fine grading	20	acres	$7,000	$140,000	Fine grading and contouring of ponds
Levee road	21780	sf	$7	$152,460	Assumes 6 inches aggregate base with 3 inches of asphalt
Decomposed granite trails	91476	sf	$4	$365,904	Assumes decomposed granite pathway
Liner placement	69000	sy	$5	$310,500	Assumes liner placed to contour elevation +3 feet NGVD in ponds and cells
Water control structures	7	each	$20,000	$140,000	
Boardwalk in Dragonfly Pond	500	lf	$200	$100,000	
Wildlife viewing platform	1	ls	$20,000	$20,000	
Signs					
Educational signs	3	each	$250	$750	
Warning signs	8	each	$100	$800	
Wetland planting	270,000	plugs	$0.85	$229,500	
Landscaping					
Topsoil for plantings	500	cy	$12	$6,000	Soil for upland planting
Soil amendments, mulch					
Native grass hydroseeding	9	acre	$3,000	$27,000	
Native shrubs	500	each	$15	$7,500	Assumes 1-gallon shrubs
Subtotal:				$1,919,414	
10% contingency:		10	%	$191,941	
Total construction:				$2,111,355	

MAINTENANCE AND MONITORING COSTS					
Description of Item	**Quantity**	**Units**	**Unit Cost ($**	**Total Cost ($)**	**Comments**
Landscape maintenance	1	ls	$3,000	$3,000	Assumes limited plant replacement and repair of irrigation system
Biological monitoring					
Bird surveys	1	ls	$2,400	$2,400	
Quantitative vegetation transects	1	ls	$2,500	$1,500	
Qualitative monitoring	1		$2,000		Observations, recommendations for remedial action; photo monitoring
Cleaning of pipes	1	ls	$2,000	$2,000	
Mosquito control	1	ls	$2,500	$2,500	
Weed control (hand weeding)	1	ls	$2,000	$2,000	
Litter control	1	ls	$2,000	$2,000	
Annual monitoring report	1	ls	$6,000	$6,000	
Annual subtotal:				$18,400	
tal 5-year maintenance and monitoring:				$92,000	No inflation adjustment
TOTAL COST:				**$2,203,355**	

cy: cubic yards
ls: lump sum
sf: square feet
sy: square yards
NGVD: National Geodetic Vertical Datum, mean sea level 1929

1. Total cut quantity calculated using Land Desktop Version 3

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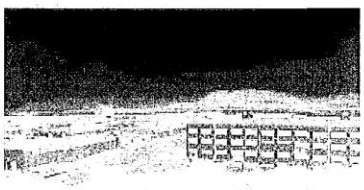
Hunters Point Constructed Storm Water Wetland Feasibility Study

Prepared for the
Golden Gate Audubon Society

Final Report - July 2004



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Hunters Point Constructed Storm Water Wetland Feasibility Study

Prepared for the Golden Gate Audubon Society

July 2004

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ACKNOWLEDGEMENTS

This publication and our work as a member of the Yosemite Slough Watershed Restoration Project has been funded through a contract with Arc Ecology, with the generous support of CALFED, which is sponsoring our investigation of the Yosemite Slough Environmental Justice Watershed. The Yosemite Slough Watershed Restoration Project is a collaborative of the Alliance for a Clean Waterfront, the Bayview Hunters Point Advocates, Clean Water Fund, Golden Gate Audubon Society, Literacy for Environmental Justice, and the University of San Francisco, administered and managed by Arc Ecology. To find out more about our project or how you can get involved in the recently formed Yosemite Watershed Council please contact Arc Ecology at the address below or Golden Gate Audubon Society at our address below.

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APPENDIX

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LIST OF FIGURES

EXECUTIVE SUMMARY

In 2003, the Golden Gate Audubon Society (GGAS) received funding from CALFED to: 1) determine the feasibility of the construction of a wetland to receive storm water runoff from the Hunters Point Shipyard sub-basin, and 2) provide a conceptual design for the wetland such that subsequent natural treatment of the storm water occurs within the wetland. In addition, as part of this project the GGAS has strived to provide the community with an alternative vision for the use of the area in Parcel E currently occupied by a landfill. The Project Team, including staff and students from San Jose State University, backed by staff from Brown and Caldwell, was hired to develop the conceptual design. The team made two key assumptions concerning the wetland:

- We assumed that the wetland would be located on the site of the current industrial landfill in Parcel E of the shipyard, and that the landfill would be removed.
- We assumed that there would be a water source capable of meeting the needs of the wetland alternative developed in this report.

The project goals outlined above align with those of The Hunters Point Shipyard Citizen's Advisory Committee (CAC), which convened in 1993 and was mandated to provide community oversight of the redevelopment process for the shipyard. The CAC goals include rejuvenation of the project area by returning the southeast waterfront to its natural ecology, and integrating open space with affordable housing, transportation, and industry. They proposed to use the toxic cleanup process to develop training, employment and business opportunities for community members. The CAC developed several guidelines which were integrated into a redevelopment plan (http://sfwater.org/detail.cfm):

- Create jobs for economic vitality
- Support existing businesses and an artist's community
- Create an appropriate mix of new businesses
- Balance development and environmental conservation
- Facilitate appropriate immediate access
- Integrate land use
- Acknowledge history

The development of new wetlands in Parcel E will comply with several of the guidelines set forth in the Hunters Point Shipyard CAC redevelopment plan, including provision of a balance in development and environmental conservation (by providing wildlife habitat), integration of land uses (by providing open space), and accessibility (by providing public access). The Executive Summary that follows provides a brief summary of the report.

1. Site Description

Site Location. Hunters Point shipyard is located in the southeastern part of San Francisco, California, between the Financial District of San Francisco and San Francisco International Airport. The shipyard area is approximately 936 acres, of which 493 acres are land and 443 acres are submerged under water in the San Francisco Bay.

Site History. Hunters Point shipyard was operated as a commercial dry dock from 1869 through 1939 (U.S. Navy, 2000; TetraTech, 2003a), and was in operation as a Navy facility from 1941 through 1974. In 1989, the site was placed on the National Priority List following the detection of extensive pollution. The Department of Defense listed the shipyard for closure in 1991 (U.S. Navy, 2000); in 1992, Hunters Point shipyard was divided into six parcels labeled A through F in order to expedite the investigation and cleanup.

Parcel E Characteristics. Parcel E consists of 167 acres located in the southwestern portion of Hunters Point Shipyard. This investigation is primarily concerned with the western portion of Parcel E that contains an industrial landfill. The landfill encompasses an area of approximately 20 acres and ranges in depth from 2 to 32 feet in depth. Approximately 15 acres of the landfill are under a landfill cap. The waste consists of a wide range of materials. The landfill has no bottom liner or leachate capture system, and bottom waste is in direct contact with groundwater.

2. Review of Existing Data

Existing Wetlands. According to the U.S. Navy and its consultants, the existing wetlands at Parcel E do not currently have recreational value since public access to this area is restricted. In addition, the wetlands are not considered to be unique or to have any cultural value since they are manmade and situated on artificial fill known to be contaminated with hazardous waste.

Surface Water Sources. The watershed area of the existing industrial landfill, excluding the landfill, is roughly 38 acres in total area and consists of approximately 24 acres of pervious area and 14 acres of impervious area (buildings and paved areas). In an effort to reduce the amount of volume of runoff available to potentially infiltrate and flow through the waste area of the industrial landfill located on Parcel E, an extensive storm water collection and diversion system has been installed.

Potential Contaminants. Surface water data indicate elevated concentrations of contaminants known to be present in the landfill, including arsenic, cadmium, chromium, cobalt, copper, lead, mercury, nickel, and zinc (Shirley, 2000). Ground water contamination as a result of the landfill has been confirmed based on the presence of various types of metals and chemicals in the ground water. Soil data collected by the U.S. Navy are consistent with the type of contamination known to exist in the landfill area.

3. Wetland Site Conditions and Constraints

Wetland Water Needs. At Hunters Point shipyard, annual precipitation ranges from approximately 10 to 30 inches and averages 20 inches. Annual evaporation is approximately 44 inches. Based on the water balance, storm water and direct precipitation are adequate to keep the wetland full from

November through March. Make-up water is needed from April through October when evaporation is high and inflow is low. Make-up water flow rates are around 2 acre-feet per month or 0.02 million gallons per day (mgd) in April and October, and around 9 acre-feet per month or 0.1 mgd from May through September. The total amount of recycled water required over the year is 46 acre-feet or 15 million gallons (Table ES-1). There is adequate recycled water supply within the shipyard to meet the modest needs of the wetland proposed in this report, presuming that a decentralized wastewater treatment plant is implemented.

Table ES-1. Water Balance for Average Water Year for Hunters Point Wetland

Month	Precipitation (in/mo)	Evaporation (in/mo)	Inflow		Outflow	Net Inflow (acre-feet)	Required Make-up Water (acre-feet)
			Direct Precipitation (acre-feet)	Runoff (acre-feet)	Evaporation (acre-feet)		
January	4.50	1.36	7.5	8.7	-2.3	13.9	0.0
February	3.58	1.92	6.0	6.9	-3.2	9.7	0.0
March	2.85	3.04	4.8	5.5	-5.1	5.2	0.0
April	1.37	4.24	2.3	2.6	-7.1	-2.1	2.1
May	0.39	5.12	0.7	0.8	-8.5	-7.1	7.1
June	0.12	5.68	0.2	0.2	-9.5	-9.0	9.0
July	0.02	5.36	0.0	0.0	-8.9	-8.9	8.9
August	0.05	5.28	0.1	0.1	-8.8	-8.6	8.6
September	0.19	4.72	0.3	0.4	-7.9	-7.2	7.2
October	0.94	3.52	1.6	1.8	-5.9	-2.5	2.5
November	2.42	1.92	4.0	4.7	-3.2	5.5	0.0
December	3.57	1.36	6.0	6.9	-2.3	10.6	0.0
Total	20.00	43.52	33.3	38.6	-72.5	-0.6	45.5

Landfill Issues. Several issues exist related to the ability of the industrial landfill to contain waste and not function as a source of continued contamination to the San Francisco Bay and adjacent parcels at Hunters Point.

- Contaminant source. Surface runoff, ground water, and soils in Parcel E contain elevated concentrations of numerous contaminants. Of concern is the potential for infiltration through the landfill cover and ground water flows through the landfill waste to transport contaminants either within Parcel E, to adjacent parcels, or to San Francisco Bay.

- Extent of landfill. The location of contaminants deposited in the landfill remains somewhat unclear. It is known that the fill area extends outside of the area currently designated as industrial landfill, and that as a result, efforts to prevent infiltration, percolation, and contaminant transport may not be effective.

- Liquefaction potential. The potential for liquefaction in the vicinity of the landfill during earthquake activity is a serious concern. Lateral movement resulting in settlement could exert

pressure on the landfill waste that could transfer contaminants outside existing boundaries, and potentially into areas being developed for public housing and open space.

- Landfill cap. The multilayer landfill cap does not cover the entire landfill area. The landfill cap was designed as an interim measure.

4. Environmental Justice Issues.

Remediation of the site should take into consideration the concerns and needs of the community living in and around the shipyard. Two issues are paramount:

- Residents of the adjacent areas around Hunters Point have expressed considerable concern about the health effects associated with the location of an industrial landfill in their community.

- At numerous former military installations in San Francisco, following base closure, the sites were remediated at great expense and redeveloped to include public access. Given the general lack of parks and recreational outlets in the Hunters Point area, remediation and restoration of the shipyard, and specifically the replacement of the Parcel E industrial landfill with a publicly accessible wetland, provides an exciting opportunity to afford local residence with equivalent access to natural open-space.

5. Wetland Alternative Selection and Conceptual Design

The three main objectives for wetland creation at Hunters Point were

- Provide opportunities for public education, access, and recreation.

- Create marsh habitat for desirable birds and aquatic biota.

- Improve the quality of storm water and wastewater effluent prior to discharge to San Francisco Bay.

Based on a review of project objectives, the permanent freshwater wetland system was determined to be the preferred alternative for Parcel E at Hunters Point because it is the only alternative that meets all the project objectives. Figure ES-1 shows the conceptual design developed by the project team for a permanent freshwater wetland in Parcel E of Hunters Point. The wetland includes a forebay/pond/wetland treatment train which provides a wide range of treatment capabilities and wildlife habitats. Total construction costs are estimated at $1 million and O&M cost are estimated at $40,000 per year. Final design/permitting fee should be around $100,000.

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6. Conclusions and Recommendations

Based on this study we make the following twelve conclusions and recommendations which are discussed in more detail in Section 7:

- The development of new wetlands in Parcel E will comply with several of the guidelines set forth in the Hunters Point shipyard Citizen's Advisory Committee redevelopment plan.
- Remediation of the site should take into consideration the concerns and needs of the community living in and around the shipyard, with a focus on potential health effects.
- A properly constructed and operated wetland could result in an improvement in water quality in the San Francisco Bay by capturing and treating pollutants and sediment in storm water before they reach the Bay.
- Several issues exist related to the ability of the industrial landfill to contain waste and not function as a source of continued contamination to the area. Many of the issues and uncertainties would be ameliorated if the landfill was removed and replaced with a wetland.
- A permanent freshwater wetland system is the preferred alternative for Parcel E at Hunters Point. This alternative meets the multiple objectives of the project including year-round recreational opportunities, year-round habitat for wildlife, and storm water treatment.
- 46 acre-feet of make-up water are needed for the proposed wetland from April through October. The most suitable source of make-up water is recycled water from a satellite wastewater treatment plant proposed for the Hunters Point shipyard.
- A liner system should be installed between the wetland bottom and the existing soils on the site in order to isolate the wetland from contaminated ground water and soils.
- Any wetland design should include a forebay with easy drainage and access capabilities to capture, trap and remove contaminated sediment from storm water and keep it out of the wetland.
- To save money and ease construction, clean soils already on site should be used to fill in the excavated landfill after removal of the waste and to construct a liner to protect the wetland from underlying groundwater and soils.
- Wetlands can be designed and maintained to keep mosquito populations to a minimum by eliminating hydraulically static areas, controlling water level, disturbing water surface, minimizing anaerobic zones, and creating access for natural mosquito predators.
- Total construction costs are estimated at $1 million and annual O&M cost is estimated at $40,000. This estimated O&M cost is far below the current costs associated with management of the industrial landfill, which likely exceed $400,000 per year.

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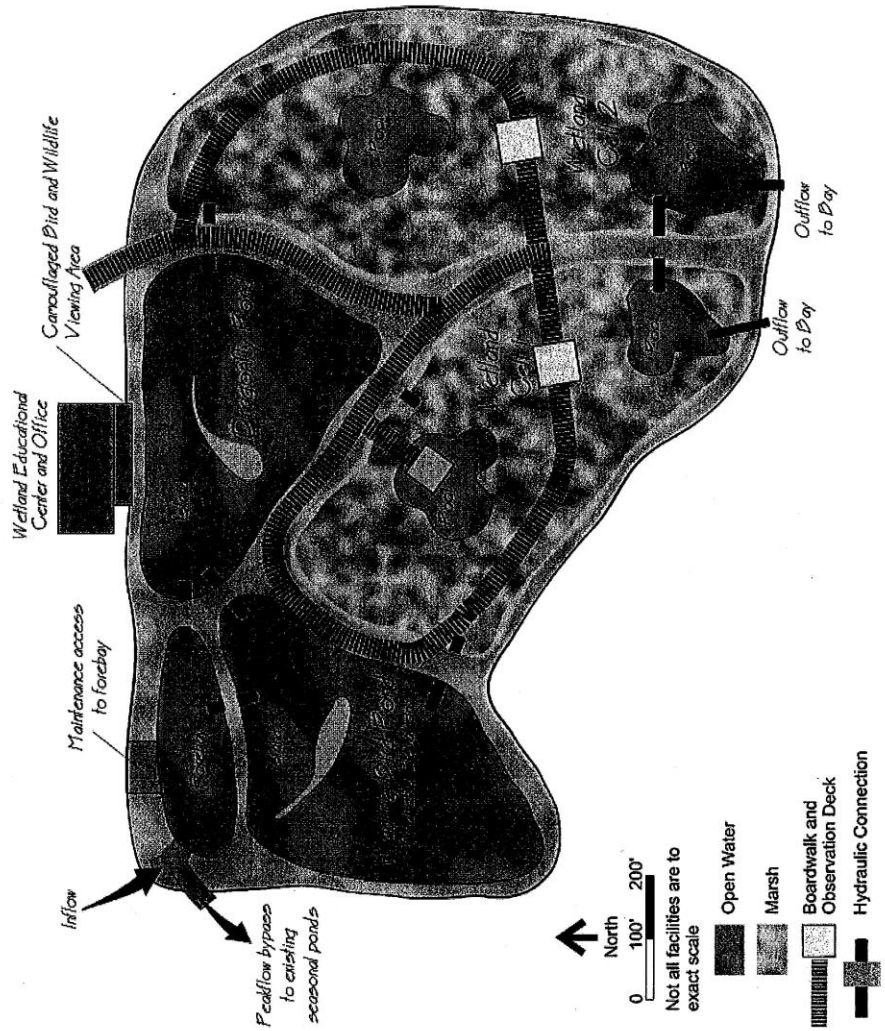

Figure ES-1. Conceptual Design of Permanent Freshwater Wetland at Hunters Point

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1.0 INTRODUCTION

This section describes the project and the project goals. It also identifies project team members and their specific project responsibilities, as well as stakeholders to whom the report will be provided for review and comment. An overview of the format of the report is also provided.

1.1 Project Description and Goals

The Golden Gate Audubon Society (GGAS) received funding from CALFED to: 1) determine the feasibility of the construction of a wetland to receive storm water runoff from the Hunters Point shipyard sub-basin, and 2) provide a conceptual design for the wetland such that subsequent natural treatment of the storm water occurs within the wetland. The intent of the project is to provide a mechanism for segregation and treatment of storm water from municipal wastewater. In addition, this project provides the community with an alternative vision for the use of the area in Parcel E currently occupied by a landfill.

The project team was hired to perform a wetland feasibility study. Under the direction of the GGAS, the team made two key assumptions concerning the wetland. First, we assumed that the wetland would be located on the site of the current industrial landfill in Parcel E of the shipyard. We have assumed that the landfill will be removed, and its removal would provide an exciting opportunity to develop a wetland to provide multiple potential benefits including treatment of storm water, polishing of wastewater effluent, creation of wildlife habitat and development of recreational and educational opportunities for the surrounding community. Second, we assumed that there would be a water source capable of meeting the needs of the wetland alternative developed in this report.

The team performed an extensive review of pertinent data available on the Hunters Point shipyard site. Information and data were accessed through the Environmental Protection Agency's (EPA) database, the State of California Storage and Retrieval (STORET) system, and collected from documents on file with the United States Navy, the Department of Health Services (DHS), the United States Geological Survey (USGS), the Regional Water Quality Control Board (RWQCB), available consultants reports, the wastewater treatment plants, and other sources as identified during the review process. The data were evaluated and summarized in this report. Analysis of the data with respect to project feasibility, including watershed area, runoff discharges, water quality, soil quality, and potential for wetland use were included.

Using the collected data and information, the project team identified three conceptual wetland design alternatives which included provision for fresh and salt water wetland cells, and the potential for seasonal and/or permanent wetland cells. These alternatives were evaluated, taking into account the multiple objectives of the project, and a preferred alternative was selected. We then developed a conceptual design for the preferred alternative. The results of this project were presented to the GGAS and stakeholders at a community forum on June 24, 2004. Appendix A contains a summary of community comments and concerns.

1.2 Project Team and Stakeholders

This report was completed by a team of professionals and students under the supervision of the principal investigator, Dr. Rhea L. Williamson, and the San Jose State University Foundation (SJSUF). Dr. Marc Beutel of Brown and Caldwell was identified as a SJSUF subcontractor. Dr. Williamson was responsible for keeping the GGAS Contract Manager informed about the project status via bi-weekly project status meetings (via email, telephone or in-person) and written monthly progress reports. A listing of key project personnel and responsibilities is provided in Table 1-1. Stakeholders include the GGAS, the Hunters Point Community, the Hunters Point Shipyard Citizen's Advisory Committee, and others.

Table 1-1. Project Personnel and Associated Responsibilities Specific to the GGAS Hunters Point Project

Duty	Responsible Team Member
Initiate and Administer the Project	Rhea Williamson
Review Existing Data	Rhea Williamson, Rashmi Kashyap, Divya Ramachandra
Identify Water Quality and Potential Contaminants and Sources	Rhea Williamson, Rashmi Kashyap, Wendy Jo Kroll
Develop Conceptual Design Scenarios	Rhea Williamson, Marc Beutel, Wendy Jo Kroll
Present Conceptual Design Scenarios to GGAS and the Community	Rhea Williamson and Marc Beutel, with students
Write and Submit Draft Final Report	Rhea Williamson and Marc Beutel, with students
Write and Submit Final Report	Rhea Williamson and Marc Beutel, with students

1.3 Report Overview

Section 1 provides a brief description of the project, the project goals, and the project team and stakeholders. Section 2 provides a description of the site, including site location, site history, and characteristics of Parcel E. Section 3 presents existing data pertinent to wetland design including watershed characteristics, site hydrology, and water and soil quality. Section 4 reviews site characteristics and constraints relative to wetland implementation, including wetland objectives, alternative wetland types, water sources, groundwater issues, and regulatory constraints. In Section 5, we discuss wetland design features. Finally, in Section 6 we perform a wetland alternatives analysis and select a preferred wetland system. We then present a conceptual design for the preferred alternative. Section 7 presents a brief summary of conclusions and recommendations, and Section 8 includes references. The following Appendix section contains several appendices, including a summary of project meetings (Appendix B), documents reviewed (Appendix C), and persons contacted during the course of this project (Appendix D).

2.0 SITE DESCRIPTION

In this section, we discuss the location and history of the Hunters Point shipyard. The report focuses on Parcel E, the parcel where the proposed wetland would be sited. A description of existing wetland resources in Parcel E is also provided.

2.1 Site Location

Hunters Point shipyard is located in the southeastern part of San Francisco, California, between the Financial District of San Francisco and San Francisco International Airport (Figure 2-1). The shipyard area is approximately 936 acres, of which 493 acres are land and 443 acres are submerged under water in the San Francisco Bay (http://www.dtsc.ca.gov/database/ Calsites/CALP001). To the southwest of Hunters Point are 3Com Park and Candlestick Point. The port of San Francisco and the Mission Bay Project are to the north of Hunters Point. The site is on a relatively flat peninsula with views of the San Francisco Bay from Hunters Point Hill (Tetra Tech, 2003a). Hunter's Point is adjacent to San Francisco Bay to the south, and is bordered by the University of California, San Francisco compound to the north.

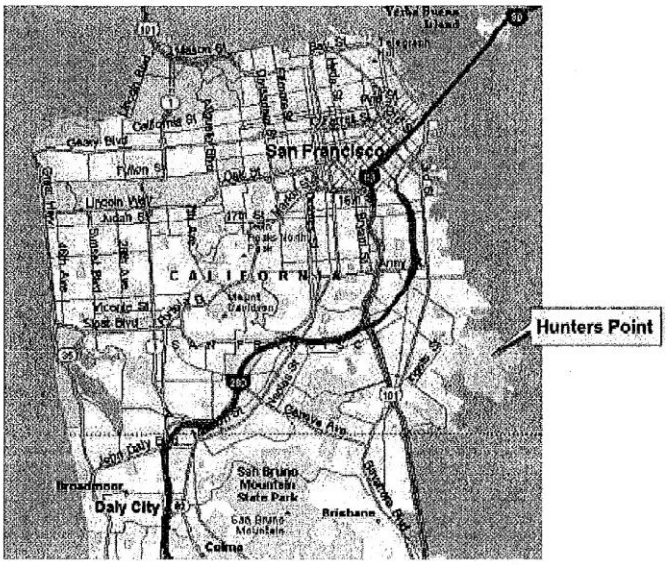

Figure 2-1. Site Location Map

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2.2 Site History

Hunters Point shipyard was operated as a commercial dry dock from 1869 through 1939 (U.S. Navy, 2000; TetraTech, 2003a). The shipyard was in operation as a Navy facility from 1941 through 1974. During this period, the Navy increased its ship building operations. In addition to ship building, the repair and maintenance of ships and submarines were also carried out at the site (Figure 2-2 and 2-3). The Naval Radiological Defense Laboratory (NRDL) was formed in 1946 to decontaminate and dispose of ships that returned from nuclear weapons test activities. The NRDL was active at Hunters Point from 1946 to 1969. During this period, several of the buildings at Hunters Point were used for radioactive laboratory operations, cyclotron operations, animal research studies, material storage, and/or processing (U.S. Navy, 2000)

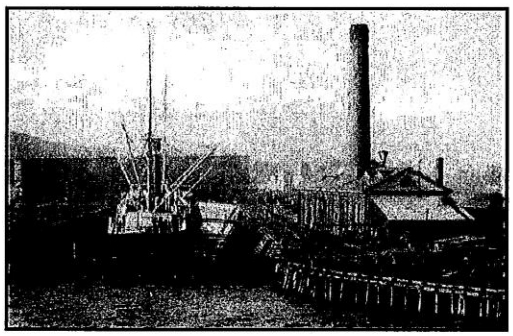

Figure 2-2. Commercial Dry Dock in Use
(http://www.dtsc.ca.gov/database/Calsites)

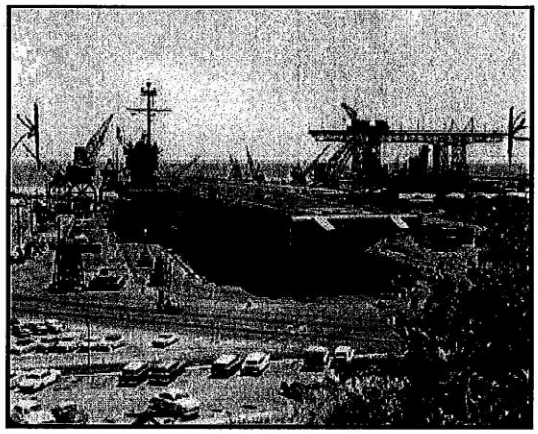

Figure 2-3. Commercial Dry Dock in Use
(http://www.dtsc.ca.gov/database/Calsites)

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In 1976, a large section of Hunters Point shipyard was leased to Triple A Machine Shop (Triple A), a ship repair and maintenance facility (TetraTech, 2003a). Triple A continued its operations until 1986, when the company was charged by the District Attorney of San Francisco with improper disposal practices of hazardous wastes at nineteen locations throughout the Hunters Point shipyard, including the landfill in Parcel E (TetraTech, 2003b).

Hunters Point shipyard was placed on the National Priority List in 1989 following the findings of polychlorinated bi-phenyls, trichloroethylene, pesticides, petroleum hydrocarbons, metals and solvents at several site locations. The listing was made in part because of the proximity of the site to a drinking water source (http://www.dtsc.ca.gov/database/ Calsites/CALP001). The Department of Defense listed the shipyard for closure in 1991 (U.S. Navy, 2000). To better coordinate the environmental investigation and cleanup, the U.S. Environmental Protection Agency signed a Federal Facilities Agreement in January of 1992 with the U.S. Navy and the State of California. As a part of this agreement, Hunters Point shipyard was divided into six parcels labeled A through F, as shown on Figure 2-4, to expedite the investigation and cleanup.

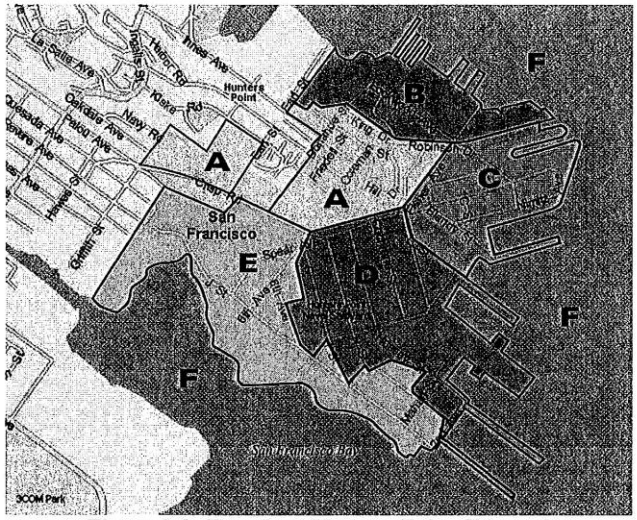

Figure 2-4. Parcels at Hunters Point Shipyard

In 1997, the San Francisco Board of Supervisors adopted the Hunters Point Naval Shipyard Redevelopment Plan after extensive multi-year community planning activities (http://sfwater.org/detail.cfm). The City Planning and Redevelopment Agency approved a companion document to the Redevelopment Plan called the Design for Development. These two documents identify the project goals and objectives, land use designations, development standards, community services and benefits, affordable housing and business relocation requirements, development approval process, and redevelopment financing opportunities for the shipyard. The aim was to rejuvenate the project area to return the southeast waterfront to its natural ecology, and to integrate open space with

affordable housing, transportation, and industry. The plan proposed to use the toxic cleanup process to develop training, employment and business opportunities for community members.

A group of community residents and business owners, selected by the mayor of San Francisco, formed a committee known as The Hunters Point Shipyard Citizen's Advisory Committee (CAC). The CAC, which convened in 1993, was mandated to provide community oversight of the redevelopment process. The CAC developed several guidelines which were integrated into the redevelopment plan (http://sfwater.org/detail.cfm):

- Create jobs for economic vitality
- Support existing businesses and an artist's community
- Create an appropriate mix of new businesses
- Balance development and environmental conservation
- Facilitate appropriate immediate access
- Integrate land use
- Acknowledge history

The CAC holds monthly public meetings at the Southeast Community Facility in the Bay View District. In addition, a community-based website has been developed that provides an update of community actions and site information (www.communitywindowontheshipyard.org).

2.3 Parcel E Site Characteristics

Parcel E consists of 167 acres located in the southwestern portion of Hunters Point shipyard. Parcel E is bordered to the south by approximately 8,142 linear feet of baylands, and to the north by the University of California, San Francisco compound (Tetra Tech, 2003a) (Figure 2-5). This investigation is primarily concerned with the portion of Parcel E referred to as Installation Restoration (IR) -01/21, located in the northwest corner of Parcel E. This is the location of the proposed wetlands. IR-01/21 encompasses approximately 35 acres and includes roughly 20 acres of industrial landfill. Approximately 15 acres of the 20 acre industrial landfill are under a landfill cap. IR-01/21 is unpaved, has no buildings and is the home to 1.3 acres of seasonal freshwater wetlands (TetraTech, 2003a). The subsections below discuss the landfill and existing wetland resources in more detail.

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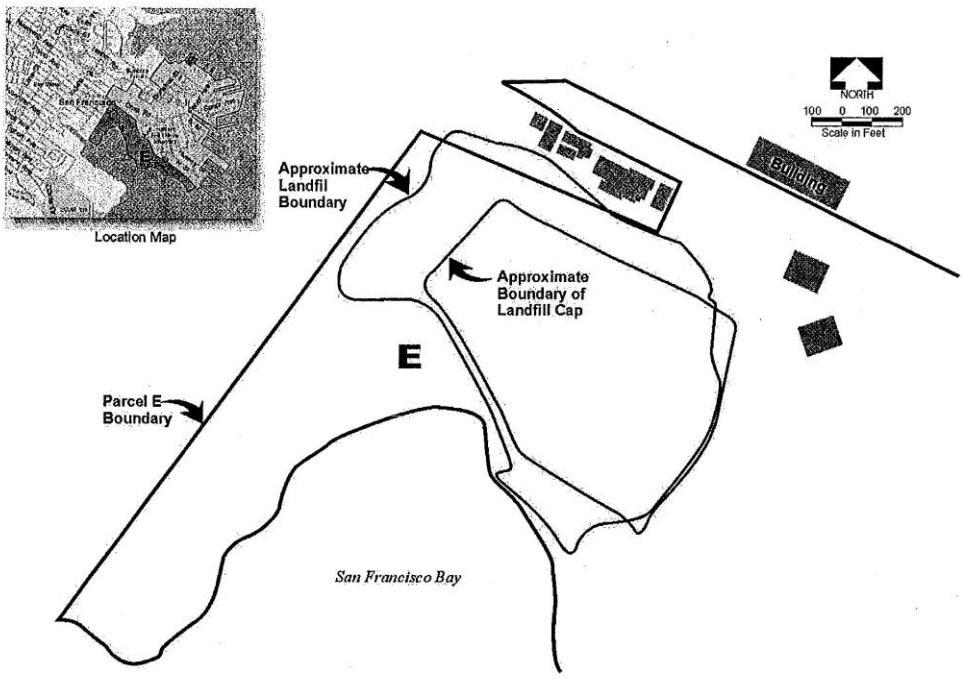

Figure 2-5. Location of Landfill in Parcel E

Landfill Characteristics. The Parcel E Landfill Background Booklet (www.communitywindowontheshipyard.org) provides an excellent overview of the history and current condition of the landfill. Since the late 1950s, the southern corner of Hunters Point shipyard has been used as a waste dump for byproducts of the industrial operations at the shipyard. Today, the landfill encompasses an area of approximately 20 acres and ranges vertically from 2 to 32 feet in depth. The landfill contains an estimated one-million cubic yards of waste. The waste consist of a wide range of materials including domestic refuse, sand-blast waste, construction waste (sawdust, wood, concrete, brick, asphalt), low-level radioactive debris, paint sludges, solvents and waste oils. Since the landfill was started before environmental regulations were developed for landfills, it has no bottom liner or leachate capture system, and bottom waste is in direct contact with groundwater. Soils, groundwater, and gasses within and emanating from the landfill are contaminated with a wide range of pollutants. Four major management activities have been implemented over the past decade at landfill.

- **Sand-Blast Waste Removal.** An estimated 4,000 cubic yards of sand-blast waste which was piled on the top of the landfill and caused a dust nuisance was removed from the site.

- **Sheet Pile Wall.** A 600-foot-long sheet pile wall was installed in the ground between the Bay and the landfill to intercept and pump out PCB contaminated groundwater from the site. The system cost $1,000,000 to build and $250,000 each year to operate. However, the

system is ineffective since the groundwater being removed is not significantly contaminated by PCBs. Regardless, the system must remain in operation for regulatory reasons and to prevent water from building up behind the wall (Brownell, Personal Communications).

- **Landfill Cap.** A soil cap, approximately 15 acres in area, was put on the landfill to smother a fire within the landfill. The cap cost an estimated $10,000,000 to construct. It consists of a few feet of well-compacted soil covered by a specially designed fabric/clay liner that inhibits the flow of water down into the landfill. The liner is covered with a few feet of clean soil that supports vegetation. On-going maintenance includes watering and mowing of the plant cover.

- **Gas Collection System.** An extensive landfill gas collection system was installed along the northeast boundary of the landfill to collect and treat gasses escaping the landfill. Prior to the landfill cap, the gases seeped upwards and out the top of the landfill, but the cap forced the gas out the sides of the landfill. The system includes a 1,500-foot-long barrier wall in the ground, passive vents that filter then discharge the gas 15 feet above the ground, and extraction wells where gas can be vacuumed out of the landfill at high rates. Construction costs and operating costs of the system are unknown, but they are likely substantial.

Existing Wetland Resources. The majority of Parcel E was developed from extensive cut and fill operations performed by the U.S. Navy from 1940 to 1945 (US Navy, 2000). One result of this practice was the development of a heterogeneous construction-type fill material that has few, if any, inherent soil properties or characteristics. Due to the differential settlement of this heterogeneous fill and the construction of an earthen breakwater levee built along the shoreline with San Francisco Bay, numerous ponds and channels that seasonally retain water and do not readily drain were created. A culvert was constructed through the levee to allow drainage of water that accumulated during storm events in the low areas of IR-01/21. The culvert also functioned to ensure the stability of the levee. The elevation of the culvert controls the level of water accumulated behind the levee. The tide gate was originally meant to prevent salt water input during high tide however the culvert is open to tidal influx as a result of rust damage.

As a result of the low areas and drainage ditches that traverse Installation Restoration (IR) -01/21, approximately one acre of seasonal freshwater wetlands have developed, which are bordered by the Parcel E landfill to the northeast, the Bay view/Hunters Point district of San Francisco to the west and northwest, and a levee to the south (Tetra Tech, 2003c). The main source of water to these seasonal freshwater wetlands is surface water runoff, although tidal influx also occurs through the rust damaged tidal gate installed in the culvert. Due in part to tidal influx, the wetlands are vegetated with both freshwater and salt tolerant plant species (Tetra Tech, 2003c).

In addition to the freshwater wetlands in IR-01/21, the shoreline is punctuated with five discontinuous salt marsh areas totaling three acres. These bayside wetlands are bounded by a discontinuous erosion control riprap wall and the South Basin, which is contiguous with the San Francisco Bay (Tetra Tech, 2003c). In total, Navy consultants identified 22 potential jurisdictional wetland areas: 9 intertidal salt marshes, 8 emergent wetlands, and 5 freshwater wetlands (Tetra Tech, 2003c). The existing wetlands at the Parcel E do not currently have recreational value since public access to this area is restricted. Furthermore, the wetlands are not considered by the U.S. Navy and its consultants to be unique or to

have any cultural value since they are manmade and situated on artificial fill known to be contaminated with hazardous waste.

The most significant features of Parcel E wetlands are the presence of known contaminants, existing vegetative cover, and its location along the Pacific Flyway. Due to the moderate mudflats adjacent to emergent vegetation, the wetlands support a diverse population of migrating and wintering birds. Few bird species have been identified by Navy consultants that breed in the area, presumably because of the small size and discontinuous nature of the wetlands, and limited vegetation diversity. Only red-winged blackbirds have been identified by Tetra Tech to nest in the freshwater wetland (Tetra Tech, 2003c).

However, a 2003-2004 wildlife survey for Yosemite Slough identified over 160 bird species on land and water in habitat adjacent to Parcel E (Lacy, 2004). In addition, over 3,000 birds were individually counted during a single monitoring event. Table 2-1 lists potential bird species that could benefit from a constructed wetland at Hunters Point.

Table 2-1. Bird Species Potentially Inhabiting Hunters Point Shipyard
(U.S. Navy, 2000)

Common Name	Scientific Name	Federal Status[1]	State Status[2]
Western snowy plover	*Charadrius alexandrinus nivosus*	T	CSC
Peregrine falcon	*Falco peregrinus anatum*	E	E
California black rail	*Laterallus jamaicensis*	SC	T
California brown pelican	*Pelecanus occidentalis californicus*	E	E
California clapper rail	*Rallus longirostrus obsoletus*	E	E
California least tern	*Sterna antillarum browni*	E	E
Swainson's hawk	*Buteo swainasoni*	--	T
Clark's grebe	*Aechmophorus clarkii*	--	CSC
western grebe	*Aechmophorus occidentalis*	--	CSC
tri-colored blackbird	*Agelius tricolor*	SC	CSC
burrowing owls	*Athene cunicularia*	SC	CSC
Barrow's goldeneye	*Bucephala islandica*	--	CSC
common loon	*Gavia immer*	--	CSC
sharp-shinned hawk	*Accipiter striatus*	--	CSC
loggerhead shrike	*Lanius ludovicianus*	--	CSC
California gull	*Larus californicus*	--	CSC
Alameda song sparrow	*Melospiza melodia pusillula*	SC	CSC
long-billed curlew	*Numenius americanus*	--	CSC
double-crested cormorant	*Phalacrocorax auritus*	--	CSC

[1]T = Threatened; E = Endangered; SC = Species of Concern.

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[2]CSC = California Species of Special Concern; E = Endangered; T = Threatened.

3.0 REVIEW OF EXISTING DATA

Information and data on the Hunters Point shipyard site were collected from documents on file with the United States Navy, DHS, USGS, RWQCB, available consultant reports, the wastewater treatment plants and other sources as identified during the review process. This section presents data pertaining to watershed characteristics, and water and soil quality in Parcel E. Documents collected for review are described in Appendix C. Agencies and individuals contacted for information are listed in Appendix D.

3.1 Watershed Characteristics

Hunters Point Naval Shipyard. The shipyard lies in a lowland area bounded by hills to the northwest. The general topography of the shipyard area is coastal range and lowlands. Figure 3-1 shows a schematic of shipyard topography and surface runoff patterns, as well as the location of the landfill located in the western corner of the shipyard. From a peak elevation of 130 ft, the land slopes toward the San Francisco Bay, with most of the watershed located in coastal lowlands at an average elevation of 25 feet above mean sea level.

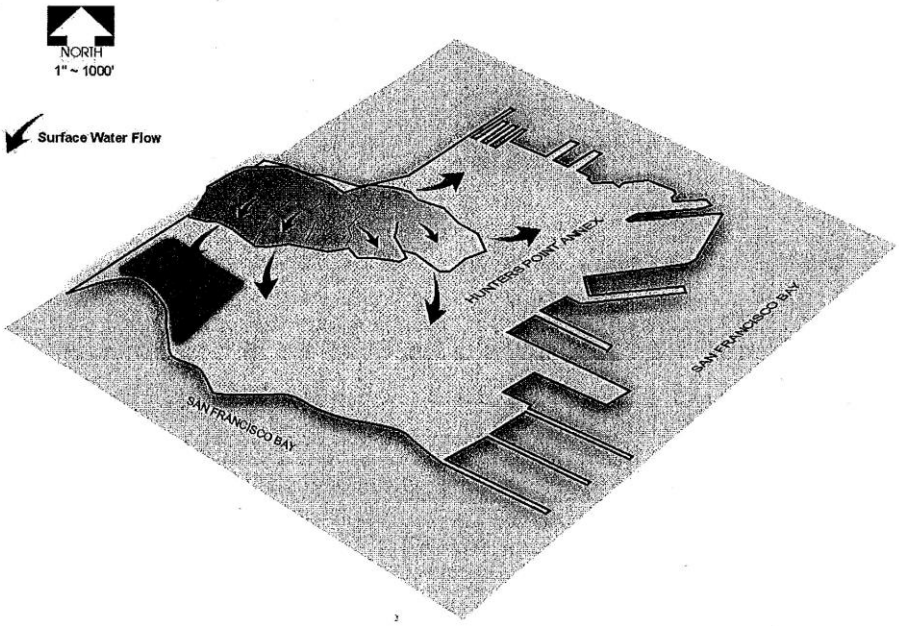

Figure 3-1. Schematic of Surface Water Flow at Hunters Point Shipyard

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Parcel E. Parcel E is located in the southern section of the shipyard and consists of 167 acres of shoreline and lowland coast (US Navy, 2000). The majority of the land use classifications within Parcel E are industrial, urban, and open space. The developed portion occupies approximately 65 percent of Parcel E and the remaining 35 percent is undeveloped (Tetra Tech, 2003c). The proposed wetland location is entirely within the coastal wetland region, on the southwest bayside boundary of Parcel E in a portion currently designated as industrial landfill. Figure 3-2 is a view to the north from the eastern border of the landfill on Parcel E.

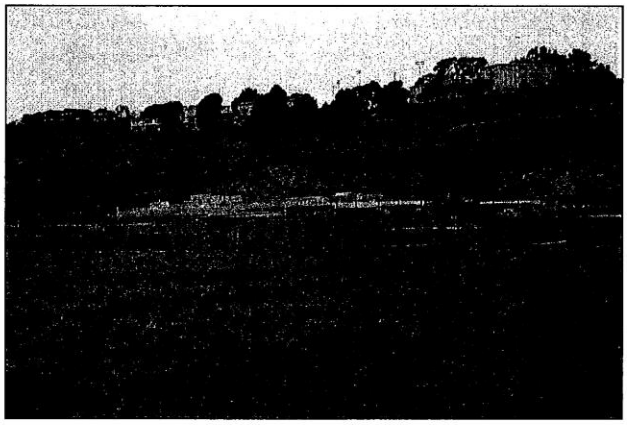

Figure 3-2. View North from Eastern Border of the Landfill

In an effort to reduce the amount of volume of runoff available to potentially infiltrate and flow through the waste area of the industrial landfill located on Parcel E, an extensive storm water collection and diversion system has been installed. Storm water runoff from the surrounding hills located to the northwest of Parcel E is collected in drainage channels on Parcel E and then indirectly discharged into San Francisco Bay through existing fresh water wetlands. Storm water from the southeastern portion of the site flows directly into San Francisco Bay (Tetra Tech, 2003a). In the northeastern portion of the site, storm water runoff drains into an existing storm water sewer system and discharges into San Francisco Bay through Outfall No. 33 (Tetra Tech, 2003a). Outfall No. 33 also receives runoff from the University of California at San Francisco (UCSF) parking lot. The only potential source of non-storm water on Parcel E is the landscape water used to maintain a vegetative cover on the landfill cap (Tetra Tech, 2003a).

Landfill/Wetland. Figure 3-3 shows the approximate boundary of the watershed for the existing landfill in Parcel E which is the location of the proposed wetland. The watershed, excluding the landfill, is roughly 38 acres in total area and consists of approximately 24 acres of pervious area and 14 acres of impervious area (buildings and paved areas). The watershed is bounded on to the northeast by the hill that protrudes into the shipyard and which slopes towards the landfill area, refer to Figure 3-1. Hydrologic calculations that estimate runoff from the watershed area to the proposed wetland are presented below in Section 4.

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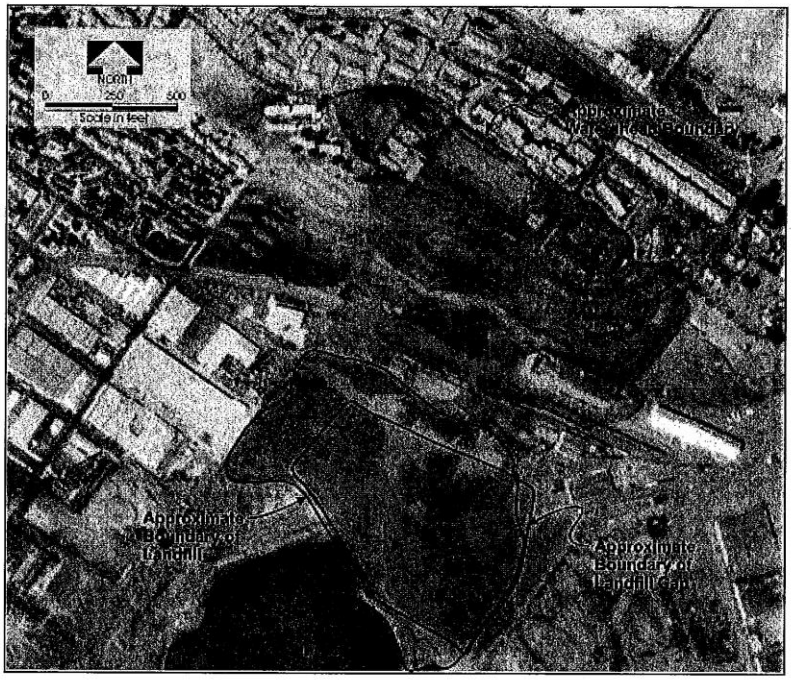

Figure 3-3. Landfill/Wetland Watershed

3.2 Site Hydrology

In this section, hydrological parameters at Hunters Point shipyard are discussed with a focus on the determination of the quantity of storm water runoff that would be available to support a permanent wetland in Parcel E. Parameters summarized include precipitation, wind speed, temperature, evaporation, and others. Weather conditions at San Francisco International Airport, located six miles to the south of Hunters Point, were used to approximate conditions at Hunters Point due to the lack of a local weather station.

Precipitation. Monthly average precipitation at San Francisco International Airport is shown in Figure 3-4. Annual average precipitation at Hunters Point is typically less than 20 inches. Precipitation is minimal during the summer months. Maximum rainfall typically occurs during the winter months of December and January at a rate of 2.5 to 4.5 inches per month respectively. Based on a fifty year precipitation database for the San Francisco International Airport collected between 1948 and 2003, the minimum and maximum annual rainfall was 9.8 and 39.8 inches (http://www.wrcc.dri.edu/summary/climsmsfo.html).

Evaporation. Also included in Figure 3-4 is evaporation for the San Francisco International Airport reported by the Western Regional Climate Center. Evaporation nearly equals or exceeds precipitation in all months excluding December, January and February. Evaporation rates are highest in summer months (4 to 6 inches per month) as a result of high air temperatures and wind speeds (see below). Annual evaporation totals 43.5 inches, and is over twice the average annual precipitation.

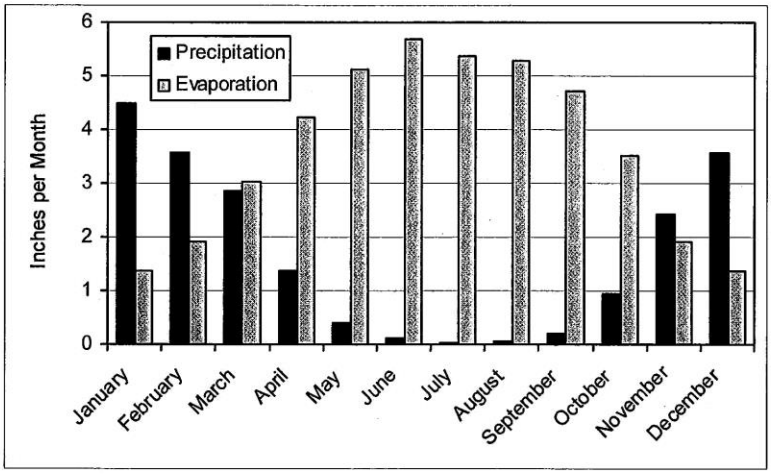

Figure 3-4. Average Monthly Precipitation and Evaporation at San Francisco International Airport
(http://www.wrcc.dri.edu/summary/climsmsfo.html)

Temperature. Temperature variations at San Francisco International Airport are summarized in Table 3-1. Monthly average temperatures at San Francisco International Airport range between highs of 56 to 74 °F and lows of 42 to 55 °F. Average temperatures peak in the summer and fall months from June through October.

Table 3-1. Monthly Average Temperature at San Francisco International Airport
(http://www.wrcc.dri.edu/htmlfiles/westwind.html)

	Monthly Average Temperature (°F)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Max	55.8	59.1	61.1	63.8	66.7	70.0	71.8	72.4	73.3	70.1	60.4	55.9
Min	41.8	44.5	45.8	47.2	49.6	52.3	53.8	54.8	54.6	51.8	45.6	42.3

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Wind Speed. Monthly average wind speeds based on hourly observations from 1992 to 2002 are summarized in Table 3-2. Monthly average wind speeds range from 7 to 14 miles per hour (mph) and tend to peak in spring and summer months from April through August.

Table 3-2. Monthly Average Wind Speeds at San Francisco International Airport
(http://www.wrcc.dri.edu/summary/climsmsfo.html)

Monthly average wind speed (mph)											
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
7.6	8.3	10.0	12.9	13.6	14.3	13.1	12.9	11.1	9.2	7.8	7.7

3.3 Potential Contaminants and Sources

Contaminants of concern that may enter the proposed wetland site via surface water, ground water, or runoff from the watershed are described in this section.

Surface Water Quality. An assessment of storm runoff water quality is essential to storm water wetland design. Such an assessment allows for the identification of potential contaminants of concern that may enter the proposed wetland site from the watershed. Surface water sampling results provided to Arc Ecology by the U.S. Navy indicate elevated concentrations of contaminants known to be present in the landfill, including arsenic, cadmium, chromium, cobalt, copper, lead, mercury, nickel, and zinc (Shirley, 2000).

Table 3-3 summarizes water quality in surface water collected on Parcel E reported by Shirley (2000). The table also includes groundwater quality objectives developed for Parcel B, as established by the Parcel B Record of Decision for the site. These objectives are water quality limits that are not to be exceeded in water discharged from Parcel B. The limits cannot be applied directly to Parcel E, but are provided for comparison purposes until Parcel E water quality objectives are developed. The surface water data indicate that runoff from Parcel E is high in contaminants and may result in deleterious impacts to water quality in San Francisco Bay. Storm water entering a wetland sited on Parcel E could potentially receive contaminated storm water, and this should be considered in the design and operation of any wetland at the site which will be used by wildlife. This data also points out that a properly constructed and operated wetland could result in an improvement in water quality in the Bay by capturing and treating pollutants in stormwater before they reach the Bay.

Table 3-3. Surface Water Quality in Runoff from Parcel E
(Shirley, 2000)

Contaminant	Sampling Event 1 (µg/l)	Sampling Event 2 (µg/l)	Groundwater Trigger Level (µg/l)
Arsenic	155	210	36
Cadmium	10.5	19.5	9
Chromium	132	268	16
Cobalt	27.7	41.7	20
Copper	340	530	28
Lead	3,980	8,840	14
Mercury	1.6	2.3	0.6
Nickel	153	206	97
Petroleum	18	7.4	1.4

Groundwater Quality. Two aquifers, A-aquifer and B-aquifer, are present under Parcel E. The A-aquifer is shallow and lies above the B-aquifer (Tetra Tech, 2003d). Depth to groundwater is around 15 to 20 feet and groundwater flows in a northwesterly direction. According to the RWQCB, the groundwater in A-aquifer is not suitable for either municipal or domestic use because of the contamination caused by the landfill. Neither natural formations such as an aquitard, nor geotechnical measures (for example, liners) separate waste deposited in the landfill from the A-aquifer. The B-aquifer is located at some distance below the A-aquifer, and groundwater flows in the deeper aquifer to the southeast. Although B-aquifer is considered suitable for potential municipal and domestic use, well construction is prohibited in most parts of the shipyard. Aquifers A and B are interconnected in the northern portion of the landfill.

Ground water contamination as a result of the landfill has been confirmed based on the presence of various types of metals and chemicals in the ground water. Metals, including copper, nickel, and zinc, volatile organic compounds (VOCs), pesticides, and polychlorobiphenyls (PCBs), exceed the evaluation criteria in groundwater samples collected in 2001 from the landfill area. In combination with site history, the presence of these contaminants indicates that ground water contamination exists (Tetra Tech, 2003d). Ground water data collected from throughout Parcel E indicate that the contamination is present not only in the industrial landfill area, but also in other Installation Restoration areas. Although the industrial landfill is situated mostly within IR-01/21, groundwater contamination extends into adjacent Installation Restoration areas, including IR-02, IR-12, and IR-56.

Soil Quality. According to a Soil Conservation Service soil survey, most of Parcel E is included in a general soil mapping unit called 'Unit 134-Urban land-Orthents, reclaimed complex, 0 to 2 percent slopes' (Tetra Tech, 2003c). The soil unit consists of areas covered by asphalt and concrete and also includes undeveloped areas. Areas that were once part of the San Francisco Bay and tidal flats are included in the survey and designated as recently man-made land areas consisting of a mixture of soil material, gravel, broken concrete, Bay mud, and solid waste materials. Two wetland-type clay soils are

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found in this mapping unit for Parcel E: Reyes clay and Novato clay. Both are hydric soils due to frequently high groundwater elevations. The soils have variable textures because of the presence of asphalt, concrete, or buildings, gravel, broken cement and asphalt.

Soil data collected by the U.S. Navy are consistent with the type of contamination known to exist in the landfill area (http://www.atsdr.cdc.gov/HAC/PHA.html). Unexpected are high concentrations of lead, copper, and other heavy metals very near the surface of the landfill (Shirley, 2000). Levels of antimony, arsenic, copper, lead, and zinc were detected above the interim ambient levels that were developed by the Navy, and agreed upon by the regulatory agencies (Table 3-4). These interim ambient levels are used as field screening criteria to identify "hot spots" or high levels of chemical constituents. Soil data for IR-01/21 and the interim ambient levels are much higher than background concentrations of trace and major elements in California soils (Bradford *et al.*, 1996). Based on this data, there is potential for the transport of contaminated soil in runoff during storm events to San Francisco Bay.

Table 3-4. Maximum Contaminant Concentrations in IR-01/21 Soil
(Harding Lawson Associates, 1994)

Contaminant	Maximum Concentration (ppm)	95% Upper Confidence Limit of the Arithmetic Mean (ppm)	Interim Ambient Level (ppm)
Aroclor-1242	32,000	3,981.5	NA
Antimony	1,930	316	20
Arsenic	315	54.2	16
Beryllium	12	1.96	1.3
Cadmium	983	53.3	11
Copper	175,000	30,968	110
Lead	19,200	3,144	14
Manganese	5,150	1,352	2,980
Molybdenum	641	97.9	5.4
Nickel	8,440	1,716.5	3,400
Vanadium	24,900	3,065.9	110

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4.0 WETLAND SITE CONDITIONS AND CONSTRAINTS

4.1 Introduction

The design and construction of a wetland at Hunters Point shipyard requires consideration of site conditions that may affect the creation of wetland habitat and the ability to attract wildlife or promote human recreational activities at the site. This section provides summary information regarding the following topics:

- Water Needs
- Water Availability
- Landfill Issues
  - Contaminant source
  - Landfill lateral and vertical Extent
  - Liquefaction potential
  - Interim landfill cap
- Environmental Justice Issues
- Regulatory Constraints

4.2 Water Needs

Table 4-1 summarizes precipitation and evaporation data for the area. Annual precipitation ranges from approximately 10 to 30 inches and averages 20 inches. Annual evaporation is approximately 44 inches. Since evaporation exceeds precipitation, any permanent wetland in the area will need an additional source of water other than direct precipitation. Minimal water needs of a wetland in the area can be estimated based on the difference between evaporation and precipitation and the surface area of the wetland.

Table 4-1. Monthly Precipitation and Evaporation Rates Near Hunters Point Shipyard

Month	Average Precipitation (in/mo)	Dry Year Precipitation[1] (in/mo)	Wet Year Precipitation[2] (in/mo)	Evaporation[3] (in/mo)
January	4.50	2.36	6.49	1.36
February	3.58	1.88	5.16	1.92
March	2.85	1.49	4.11	3.04
April	1.37	0.72	1.97	4.24
May	0.39	0.20	0.56	5.12
June	0.12	0.06	0.17	5.68
July	0.02	0.01	0.03	5.36
August	0.05	0.03	0.07	5.28
September	0.19	0.10	0.27	4.72
October	0.94	0.49	1.36	3.52
November	2.42	1.27	3.49	1.92
December	3.57	1.87	5.15	1.36
Total	20.00	10.48	28.83	43.52

Notes
All data based on precipitation for SFO from 1948-2003; www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?casfoa+sfo.
[1]Dry year values based on 10th percentile of annual precipitation data set. This total is spread over the year based on the relative monthly precipitation for the average year (e.g., January has 22.5% of annual precipitation; February has 19.25% of annual precipitation, etc.).
[2]Wet year values based on 90th percentile of annual precipitation data set. This total is spread over the year based on the relative monthly precipitation for the average year.
[3]Values based on 80 percent of pan evaporation data for SFO estimated from meteorological data using the Penman equation; www.wrcc.dri.edu/htmlfiles/westevap.final.html.

To estimate the amount of alternative water supply needed for the wetland, we developed a monthly water balance for the site. The water balance for an average year is presented in Table 4-2. The first two columns show precipitation and evaporation. The next two columns estimate water inputs to the wetland. Direct precipitation onto the wetland is estimated as the monthly precipitation times the area of wetland (20 acres). Stormwater runoff is estimated as the area of the watershed (38 acres) multiplied by monthly precipitation and an estimated runoff coefficient of 0.61 (Appendix E). The runoff coefficient is based on land use and landscape slopes in the watershed. A value of 0.61 means that 61 percent of the precipitation that falls on the watershed runs off as overland flow. The remaining 39 percent infiltrates into the ground. Outflow is estimated as monthly evaporation times the surface area of the wetland. Net inflow is a summation of the inflows and outflow. Required make-up water is the amount of water need to offset negative monthly flows when there is a potential water deficit for the wetland.

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Table 4-2. Water Balance for Average Water Year for Hunters Point Wetland

Month	Precipitation (in/mo)	Evaporation (in/mo)	Inflow		Outflow	Net Inflow (acre-feet)	Required Make-up Water (acre-feet)
			Direct Precipitation (acre-feet)	Runoff (acre-feet)	Evaporation (acre-feet)		
January	4.50	1.36	7.5	8.7	-2.3	13.9	0.0
February	3.58	1.92	6.0	6.9	-3.2	9.7	0.0
March	2.85	3.04	4.8	5.5	-5.1	5.2	0.0
April	1.37	4.24	2.3	2.6	-7.1	-2.1	2.1
May	0.39	5.12	0.7	0.8	-8.5	-7.1	7.1
June	0.12	5.68	0.2	0.2	-9.5	-9.0	9.0
July	0.02	5.36	0.0	0.0	-8.9	-8.9	8.9
August	0.05	5.28	0.1	0.1	-8.8	-8.6	8.6
September	0.19	4.72	0.3	0.4	-7.9	-7.2	7.2
October	0.94	3.52	1.6	1.8	-5.9	-2.5	2.5
November	2.42	1.92	4.0	4.7	-3.2	5.5	0.0
December	3.57	1.36	6.0	6.9	-2.3	10.6	0.0
Total	20.00	43.52	33.3	38.6	-72.5	-0.6	45.5

Based on the water balance presented above, storm water and direct precipitation are adequate to keep the wetland full from November through March. Make-up water is needed from April through October when evaporation is high and inflow is low. Make-up water flow rates are around 2 acre-feet per month or 0.02 million gallons per day (mgd) in April and October, and around 9 acre-feet per month or 0.1 mgd from May through September. The total amount of make-up water required over the year is 46 acre-feet or 15 million gallons. An acre-foot is the volume of water equivalent to covering one acre of surface area one foot deep. It is roughly the amount of water that a typical family uses in one year.

Table 4-3 summarizes make-up water needs for a dry, average and wet year. Details are provided in Appendix F. In all years, 40 to 50 acre-feet of make-up water is required in the summer and fall to make up for evaporation losses. The average rate of usage of make-up water is around 0.07 mgd, and peak summer delivery rate is around 0.1 mgd. It is important to note that the volumes and flow rates reported here are minimal water needs for a permanently flooded wetland. Higher volumes and flow rates could be discharged to the wetland if water was available, and if recycled water was used, a significant improvement in water quality, particularly in nutrient levels, could be achieved. Conversely, water needs could be decreased simply by making the wetland smaller in area, or by allowing the wetland to dry out during the summer and fall.

Table 4-3. Estimated Make-Up Water Needs of 20 Acre Wetland at Hunters Point Shipyard

Year	Total water needs, April through October		Average delivery rate, million gallons per day
	Acre-feet	Million gallons	
Dry	51	17	0.08
Average	46	15	0.07
Wet[1]	41	13	0.07

[1]In wet year, water is only needed from May through October.

4.3 Water Availability

Alternative sources of make-up water for the wetlands include potable water or recycled water from local wastewater treatment plants and/or satellite plants. Potable water is not recommended due to the cost of purchasing the water. The most suitable source of make-up water is recycled water, treated effluent from a wastewater treatment plant. A recent draft report entitled the Hunters Point Shipyard Decentralized Wastewater Treatment Study (February 2004) recommends implementation of a decentralized wastewater treatment plant at the shipyard. The plant would treat wastewater produced at the shipyard and reuse the treated effluent for in-building dual plumbing demands, landscape irrigation, and environmental enhancement such as wetlands.

Estimated future wastewater flows produced within the shipyard range from 2 to 5 mgd. The draft study examined the cost and feasibility of treatment plants ranging in size from 0.5 to 4.0 mgd. Based on this study, there is adequate recycled water supply within the shipyard to meet the modest needs of the wetland proposed in this report, presuming that a decentralized wastewater treatment plant is implemented. The minimum size of such a plant would be on the order of 0.5 mgd. This compares with a wetland peak water demand of around 0.1 mgd between April and October. In addition, the recommended site of the decentralized wastewater treatment plant was in the light-industrial area of Parcel E or near an existing pump station facility in Parcel A. Both of these proposed areas are relatively close to the proposed wetland in Parcel E, thus delivering the water to the wetland would not be too complicated or expensive.

4.4 Landfill Issues

Several issues exist related to the ability of the industrial landfill to contain waste and not function as a source of continued contamination to the San Francisco Bay and adjacent parcels at Hunters Point. These issues, discussed below, include the lateral and vertical extent of the landfill, the potential for liquefaction, and the construction and/or extent of the landfill cap. Many of the issues and uncertainties would be ameliorated if the landfill was removed and replaced with a wetland.

Contaminant Source. Surface runoff, ground water, and soils in Parcel E contain elevated concentrations of numerous contaminants. Of concern is the potential for infiltration through the landfill cover and ground water flows through the landfill waste to transport contaminants either within

Parcel E, to adjacent parcels, or to San Francisco Bay. As discussed earlier, a slurry wall barrier and a ground water extraction system were constructed to limit the migration of ground water contaminated from the landfill into San Francisco Bay (Tetra Tech, 2003b). A drainage system along the northern perimeter of the landfill was constructed to intercept runoff from the watershed and divert it around the landfill. In addition, a landfill gas collection system was installed along the northern boarder of the landfill to intercept, treat and dilute landfill gasses into the atmosphere. In order to prevent the landfill from acting as a contaminant source, these engineered solutions must be maintained and monitored continuously. Operation of the ground water extraction system alone costs an estimated $250,000 per year to operate (communitywindowontheshipyard.org).

Extent of Landfill. The location of contaminants deposited in the landfill remains somewhat unclear. It is known that the fill area extends outside of the area currently designated as industrial landfill, and that as a result, efforts to prevent infiltration, percolation, and contaminant transport may not be effective. Results of a recent study to define the extent of the landfill are discussed below.

Between March and September of 2002, an investigation was conducted to determine the extent of waste fill at the Hunters Point industrial landfill (Tetra Tech, 2003b). Test pits were dug around the border of the landfill to estimate the lateral extent of the landfill. Along the northern perimeter of Parcel E landfill waste extends from under the landfill cap to a few feet from the fence that separates the UCSF compound from the landfill. Landfill waste was also found in borings along the eastern extent of the northern perimeter. Test pit data indicated that the eastern perimeter of the landfill is beneath the interim cap. Test pit data along the western perimeter of the landfill, which is adjacent to a warehouse/industrial area, also contained landfill waste. Data obtained along the northern border has reportedly been used to design a barrier wall to divert ground water around the landfill, and a vent system to contain the landfill gas within the footprint of the landfill.

The vertical extent of landfill waste was assessed by a series of test borings. Boring data collected along the perimeter of the landfill confirmed that the bottom of the waste was usually deeper than the bottom of the test pits excavated to determine the lateral extent of the landfill. Landfill waste was generally located between 20 feet above mean sea level and 14 feet below mean sea level. The thickness of the waste was found to vary from 10 to 25 feet. In most test borings drilled deeper than 15 feet below grade, the water table was encountered before the bottom of the waste. The only exception to this was at the northwest corner of the landfill, where the water table was located deeper than the bottom of the waste. The waste was deposited directly on top of Bay mud in the southern and eastern portions of the landfill, and on top of the sands of the B-aquifer in the northwestern portion of the landfill.

Figure 4-1 shows a cutaway side-view of the landfill presented by Tetra Tech in the Landfill Lateral Extent report (2003b). The figure shows a transect of the landfill running across the shorter width of the landfill from the northeast (on the right) to southwest (on the left). The waste is colored gray. Surrounding soils and clays are colored in browns, yellows, greens and blues. The landfill cap is colored in red. The surface of the ground water is shown in light blue and Bay water is colored purple. The waste generally lies in a region from -10 to +10 feet above mean sea level and ranges in thickness from 10 to 20 feet. Note that the ground water elevation is around 4 feet above mean sea level and waste below this elevation is in direct contact with ground water. Also note that the interim cap does not cover the edges of the landfill.

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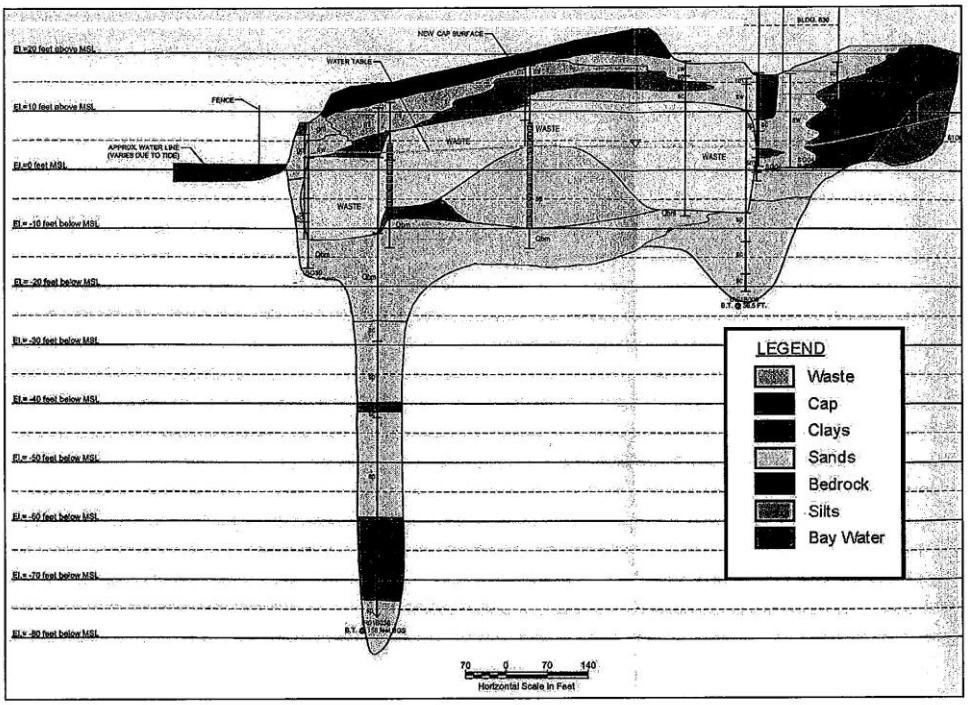

Figure 4-1. Cutaway View of Landfill in Parcel E
Source: Tetra Tech (2003b)

Liquefaction Potential. A field investigation was recently conducted to evaluate the potential for liquefaction in subsurface soil in areas surrounding Parcel E (Tetra Tech, 2003b). The study determined the type of soil layer, as well as its thickness, density, and ability to transmit lateral motion through the soil column above bed rock. Standard geotechnical test were performed on multiple soil samples. Results indicate that lateral soil movement of 1.5 to 5 ft could occur during an earthquake, with non-uniform soil liquefaction across Parcel E due to varying soil type and depth. In addition, settlement due to liquefaction on the order of 5 to 10 inches could be expected. This data suggests that the potential for liquefaction in the vicinity of the landfill during earthquake activity is a serious concern. Lateral movement resulting in settlement could exert pressure on the landfill waste that could transfer contaminants outside existing boundaries, and potentially into areas being developed for public housing and open space (Parcel A). In addition, wastes in the landfill could be redistributed causing chemical reactions resulting in contaminant releases in the form of gases, fires, or leachate.

Landfill Cap. In 2000, a multilayer landfill cap was installed to smother a fire within the landfill and to prevent percolation of the surface runoff through the landfill. The cap consists of a few feet of well-compacted soil covered by a specially designed fabric/clay liner covered with a few feet of clean soil that supports vegetation. The landfill cap is offset from the landfill to the north and does not cover the

entire landfill area. The cap cost an estimated $10,000,000 to construct and ongoing maintenance is required to promote and control the growth of suitable plants on top of the cap.

4.5 Environmental Justice Issues

Residents of the adjacent areas around Hunters Point have expressed considerable concern about the health effects associated with the location of an industrial landfill in their community (http://www.atsdr.cdc.gov/HAC/PHA.html). Of great concern is the fact that according to the Redevelopment Plan for Parcel A, which is adjacent to Parcel E to the northwest, low income housing will be constructed. Existing concerns about children climbing fences into Parcel E, children playing in contaminated soils, increased incidences of asthma, exposure to volatile compounds, the potential for fire and/or explosions and other hazards associated with the industrial landfill, have been well documented.

Another issue of concern is that at numerous former military installations in San Francisco, following base closure, the sites were remediated at great expense and redeveloped to include public access. Examples include the Presidio, Fort Funston, Fort Mason, and Crissy Field. The location of these sites and other significant parks in the City is included in Figure 4-2. Note that the majority of large open-space and parks are in the north and west of the City. Given the general lack of parks and recreational outlets in the Hunters Point area, remediation and restoration of the shipyard, and specifically the replacement of the Parcel E industrial landfill with a publicly accessible wetland, provides an exciting opportunity to afford local residence with equivalent access to natural open-space. In addition, a storm water wetland at Hunters Point would enhance the connectivity of parklands along the shore line. A long-term recreational goal in the area is to develop parklands that wrap around the entire South Basin shoreline.

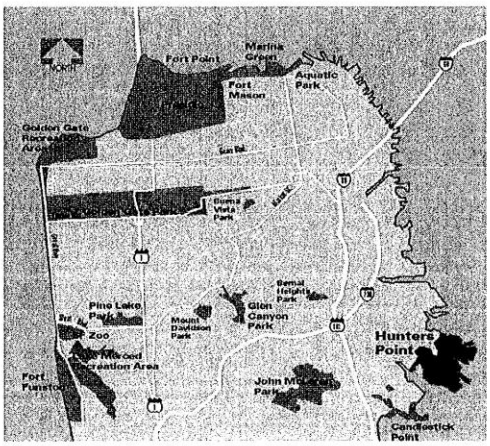

Figure 4-2. Parks and Open Space in San Francisco

4.6 Regulatory Constraints

The United States Clean Water Act (CWA) is the primary regulatory tool for the protection of natural wetlands and wetlands created for mitigation and water purification purposes (Hammer, 1991). Prior to construction of the conceptual wetland design, the proper selection and sequence of pertinent local, state and federal permit requirements must be determined.

The U.S. Army Corps of Engineers (COE) and the U.S. Environmental Protection Agency (U.S. EPA) decide on a case-by-case basis whether or not particular bodies of water are considered waters of the United States (Interagency Workgroup, 1999). Although wetlands intentionally created from non-wetland sites for the purpose of wastewater or storm water treatment are not normally considered waters of the U.S., discharges from constructed wetlands to waters of the U.S. must meet applicable NPDES permit effluent limits and state water quality standards (Hammer, 1991). Since the existing seasonal wetlands on Parcel E may be considered waters of the U.S. and discharge from a constructed wetland at Parcel E could enter San Francisco Bay, the construction of a wetland in Parcel E could fall under the jurisdiction of the CWA and the project will require fulfillment of CWA Sections 401, 402 and 404:

- **Section 401.** This section addresses Water Quality Certification. It verifies compliance with State or Tribal water quality standards. Section 401 verification is necessary when projects result in discharges to waters of the United States and require Section 402 or 404 permits (Interagency Workgroup, 1999).

- **Section 402.** Section 402, which includes the Storm Water NPDES program, is designed to regulate the discharge of a pollutant from a point source into waters of the United States. The state of California is authorized by the EPA to issue Section 402 NPDES permits. The construction of a treatment wetland at Parcel E would require a Section 402 NPDES permit if storm water captured by the proposed wetland is released to the San Francisco Bay (Interagency Workgroup, 1999; Hammer, 1991).

- **Section 404.** This section regulates discharge of dredged or fill materials into waters of the United States. A Section 404 permit would be required if the constructed wetland at Parcel E was built in the vicinity of a pre-existing wetland or riparian corridor. As stated above, the COE and the EPA decide on a case-by-case basis whether or not particular bodies of water are considered waters of the U.S. The COE administers section 404 permits, with advisement from the U.S. Fish and Wildlife Service and the National Marine Fisheries Service (Interagency Workgroup, 1999).

Typically, wetland construction requires preparation of a California Environmental Quality Assurance (CEQA) Initial Study followed by a period of public review (Silverman, 1984). Additional permits that could possibly be required to construct engineered wetlands include: sediment and erosion control plans, dam safety permits, a Department of Fish and Game Stream Alteration permit, local grading permits, and land use approvals or encroachment permits (U.S. EPA, 1999).

In addition to the COE and EPA, other regulatory agencies typically involved in permitting for wetland construction in California include: US Fish and Wildlife Service; National Marine Fishery Service; California Department of Fish and Game; Regional Water Quality Control Board; and local Mosquito

Abatement and Flood Control Districts (Silverman, 1984). The Coyote Hills Demonstration Urban Stormwater Treatment (DUST) wetland in Fremont, California provides an example of the agencies and permits required for the construction of a storm water wetland in the San Francisco Bay area (Table 4-4).

Table 4-4. Permits for the DUST Wetland in Fremont, California (Silverman, 1984)

Agency/Permit	Permit Requirement
State Determination of Environmental Significance	CEQA initial study, adopted negative declaration (conditional) on environmental impacts
Army Corps of Engineers Section 404 Permit	Conceptual Plan. Approved CEQA initial study and negative declaration. No net loss of wetlands.
Department of Fish and Game Stream Alteration Permit	Minimize disturbance and environmental degradation. Protect water quality. Limited construction period to protect fish and wildlife.
City of Fremont Grading Permit	Exempt due to lack of fill or export to the site.
Alameda County Flood Control and Water Conservation District Encroachment Permit	No reduction in storage capacity or obstruction to flow.

Any constructed wetland in Parcel E at Hunters Point shipyard would need to comply with a similar list of agencies and permits outlined in Table 4-4. Of greater concern is the need to address existing contamination at the site, the presence of the industrial landfill, and potential for future releases from the landfill. Replacement of the landfill with a wetland could greatly reduce the potential for future contaminant releases while providing recreational opportunity for the Hunters Point community, improve storm water released to the bay, polish wastewater effluent, and create habitat for wildlife.

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5.0 WETLAND DESIGN FEATURES

5.1 Introduction to Wetlands

Wetlands are land areas inundated by fresh, ground, and/or salt water for at least a portion of the growing season. These saturated conditions produce a unique ecosystem characterized by specific types of soils, vegetation, hydrology and wildlife. Wetlands contain saturated or hydric soils characterized by anoxic conditions, which produce soil of a distinctive gray color and fine texture. Hydrophilic plants are adapted with specialized structures that enable them to transport oxygen to their roots and thus thrive in the oxygen-deficient soils typical of wetlands (Hammer, 1989).

Wetlands are among the most biologically productive natural ecosystems in the world and provide a variety of life enhancing benefits. Wetlands cleanse waters of nutrients and toxins, prevent flooding by providing storage of floodwaters, provide open space for aesthetics, education and recreation, and provide essential habitat for many species of plants and animals, including rare and endangered species and migratory birds (U.S. EPA, 2002).

Wetlands are characterized as permanent or seasonal, and as fresh, saline or brackish. Permanent wetlands are continuously flooded with water and provide year-round habitat for migratory and permanent wildlife species. Seasonal wetlands are periodically flooded with surface water early in the growing season and generally dry out each spring or summer. Seasonal wetlands provide benefits of both flooded and mudflat habitats throughout the year. As spring dewatering occurs, mudflat conditions tend to prevail attracting migrant shorebirds and ducks. Freshwater wetlands receive water from surface runoff and/or freshwater groundwater discharge. In contrast, tidal wetlands are regularly exposed to the ebb and flow of the tides and can be either salt water or brackish. Plants that live in saline wetlands have special adaptations to withstand tidal action and high salinity.

5.2 Design Features to Enhance Bird Habitat

An established wetland system will provide food and habitat for a diverse population of plants, birds, fish, small mammals, and invertebrates. Some of the animals attracted to a constructed wetland will become permanent residents while others will be seasonal and migratory visitors (Dawson, 1989). Constructed wetlands can be especially beneficial for waterfowl. For example, the constructed freshwater wetland at Mount View Sanitation District, California, is populated with more than 123 species of birds (U.S. EPA, 1993 and 2002). Given Hunters Point's location on the Pacific Flyway, it is especially important that any wetland design create habitat to support both resident and migratory birds. A number of design attributes that can improve waterfowl habitat in a constructed wetland are discussed briefly below.

Structural Complexity. Structural complexity is one of the most important design features to enhance wildlife habitat in a constructed wetland. A successful constructed wetland will have a combination of open water areas with depths greater than 4 to 6 feet, and shallow marsh areas less than 2 feet in depth where emergent vegetation will grow. Several small cells rather than one large marsh tend to promote wildlife use of a wetland, as well as providing for better water treatment since short circuiting is

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inhibited. Shorelines should be irregular in shape and islands within ponds can provide ideal bird habitat.

Vegetation. Vegetation has a major influence on bird habitat, and a variety of vegetation is needed to support diverse wildlife and bird populations (Fredrickson and Reid, 1987). Aquatic plants within the wetland are classified as emergent, floating and submerged (Dawson, 1989). Emergent plants grow up and out of shallow water. They transfer oxygen to the root zone and provide habitat and food for birds and other animals. Emergent plants frequently found in constructed wetlands include cattails, reeds, rushes, bulrushes, and sedges. Floating plants have leaves that are on the water surface while their roots extend into the water column. Floating plants can reduce sunlight penetration and limit the growth of noxious filamentous algae in the water column. Examples of floating aquatic vegetation include water hyacinth, duckweed and pennywort. Submerged aquatic plants grow underwater and common species include milfoil and watercress. The practical use of submerged aquatics in constructed wetlands is limited since they tend to be shaded out by floating plants and algae and/or inhibited by anaerobic conditions common in wetlands (U.S. EPA, 1988).

Wetland design should also incorporate terrestrial plants, including trees and shrubs, located near the shores of the wetland system. Terrestrial plants provide food, nesting habitat, shade cover, windbreaks and habitat (Dawson, 1989). Dense uniform terrestrial cover crops can be used for erosion prevention on overland flow slopes and levees (Metcalf and Eddy, 1991). Open grassy areas should be limited since they tend to attract unwanted species such as geese.

Water Depth. The availability of appropriate water depths is an important element of effective waterfowl management. In keeping with the concept of structural complexity, a range of water depths should be incorporated into a constructed wetland. Shallow water, less than a foot deep, is essential for wading birds to foraging. Loafing strips, long and thin areas of very shallow water, provide ideal resting and foraging habitat for birds. Foraging can be further enhanced by slowly drawing down water level in ponds. This exposes benthic biota which facilitates feeding by shore birds. Ducks and diving birds are adapted to deeper bodies of open water where visibility is good and vegetation is sparse.

Islands. Islands provide waterfowl with ideal resting habitat that is protected from predators and provides the birds with clear line of site. Loafing strips, long and thin areas of very shallow water, can be connected to islands and provide birds with excellent resting, nesting and foraging habitat.

5.3 Physical Design Factors

An artificial wetland can be constructed with many different physical features. These features depend on the geographical location, seasonal weather conditions, and the purpose for which the wetland is designed. However, all wetlands must contain structures which will conduct water into and out of the system, control water flow, physically contain the water, and provide the means to fulfill specific process requirements. Such structures include, but are not limited to, single and multiple port entry devises, baffling structures, pond configurations, berms, dikes, and vegetation. Under some conditions, as at Hunters Point, a liner may be required. All of these features serve a combination of purposes which interact to produce a complex and viable artificial wetland capable of treating wastewater streams and urban runoff while providing food and habitat for wildlife. A brief discussion highlighting some of these design features is included below.

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Wetland Configuration. Three different configurations are generally used in constructed wetlands: series, parallel, and a combination of parallel and series. The series configuration utilizes wetland cells in series while the parallel configuration splits inflow into a number of cells in parallel. In general, the more cells that water passes through, the better the removal of pollutants. All constructed wetlands should have at least two parallel cells so that one can operate while the other is shut down for maintenance. Two important features in wetland construction are to avoid "blind spots" in corners where water will stagnate, and to maintain good bottom uniformity to minimize channel formation and prevent short circuiting. Gravity is the favored method for transporting water through a wetland system, and where possible, the system should be designed to follow natural topography that facilitates gravity flow.

Many designers recommended a forebay/pond/wetland system for treatment of urban runoff (Walesh, 1989; U.S. EPA, 1999). The first component of this system, the sedimentation forebay, consists of a small area into which the influent flows. Debris and large particulates settle out of the water by gravity and collect at the bottom of the basin. The forebay acts to decrease the velocity of water entering the wetland and to decrease the sediment loading to the subsequent pond/wetland system. Many pollutants in urban runoff are attached to particulate matter, thus the forebay captures these particle-related pollutants before they reach the wetland. Adequate access to the forebay is needed so that equipment can enter and remove any polluted sediment that accumulates in the forebay. The forebay is followed by a pond/wetland system which provides a wide range of water treatment capabilities and aquatic habitats for wildlife.

Flow Control Structures. Once the influent has been brought to the wetland site, it must be introduced to the wetland and transferred between wetland cells in a controlled manner. Piping is normally used as an influent conductor when the influent is already contained, as from a wastewater treatment facility. Additional inlet/outlet structures include single port entry structures like weirs, and gates, as well as multiple port entry structures such as perforated piping. Multiple port entry structures are preferred over single port entry structures because they provide more even flow rates and influent distribution. One of the simplest multiple port structures is perforated piping. Influent conducted to the perforated pipe flows out into the wetland system through openings in the pipe which run the width of the system.

Weirs and gates are single port entry structures used to measure and control flow where the water surface can remain free (Grant, 1989). Weirs can be constructed in many different configurations including U-shaped, V-notched, parabolic, trapezoidal and truncated triangular. The shape and size of the opening determines the flow rate of the effluent. A gate structure may be a manually operated structure as simple as a sheet of plywood which can be lifted or lowered to release of retain effluent flow, or a sophisticated automated devise. The primary difference between weirs and gates is that gate structures have the ability to block the flow of water while weirs can only measure or direct the flow rate. Gates tend to be used as flood control and drainage/draw-down devises, while weirs generally serve as entry/outlet ports into and between pond cells.

The removal of pollutants can generally be increased by increasing the detention time. This is accomplished by forcing the influent to take a more meandering course through the wetland. This may be accomplished by installing baffles (U.S. EPA, 1983). Baffles are structures that cause the direction and velocity of the flow to change. A baffle can be a small earthen "island" placed in the path of

influent flow which diverts the fluid to either side, or it can be a submerged fence. Easy installation and low cost have made the latter method popular. The same effect caused by baffling can be achieved by the configuration of the wetland system. Wetland cells can consist of several shallow canals rather than large, wide ponds. The channels will have the same effect on the flow pattern of the influent as baffling.

Levees. One of the largest components of constructed wetlands is the levees that surround and contain the water. Associated apparatuses are also designed to limit damage to wetlands such as rodent burrowing, seepage, or erosion that could damage the levee. The basic component of constructed wetland levees is soil. Soil is mounded and compacted to a specified height and width. In wetlands where the soil is high in clay and rests upon a deep foundation of mud, extra care and maintenance must be taken to construct the levees. At these sites, levees should have a wide base and may need to be continually raised to compensate long-term subsidence caused by the compression of the underlying soils (U.S. EPA, 1983).

The sides of the levee are carefully graded to promote vegetation growth while still retaining water. The percent grade used for a given levee will depend upon topographical features of the site, soil composition, vegetation selection, and the intended purpose of the constructed wetland. The exposed surfaces of the levee need to be protected from rain, wind, and wave erosion, as well as from burrowing animals. Rip rap is commonly used for these purposes. Rip rap are pieces of rock or broken concrete which are carefully laid across the exposed surface of the levee. If rodent burrowing and wind and rain erosion are not a serious problem, then the exposed surfaces of the levee may be covered with grass.

Vegetation. Vegetation and microbial organisms purify water in several ways. Plants will take up many pollutants through their roots and store them as biomass. Plants, both dead and alive, also provide surface area and carbon for microbial growth and the physical filtration of suspended particles. Two different categories of microbes generally exist in wetlands: aerobic organisms that thrive in high oxygen conditions and anaerobic bacteria that live under no-oxygen conditions. An example of these two types of microbes working together in wetlands is the nitrification/denitrification process which converts ammonia to nitrate (aerobic microbes) and nitrate to nitrogen gas (anaerobic microbes). This process removes nitrogen in the form of ammonia and/or nitrate from the aquatic ecosystem and transfers it as nitrogen gas to the atmosphere, thereby purifying the water traveling through the wetland.

When constructing a wetland, suitable provisions must be made to optimize growing conditions for these functioning flora. Structural considerations to promote vegetative and/or microbial growth include providing both shallow areas with gradual bank slopes for emergent vegetation such as cattails and bulrushes, and deep areas of water to promote anaerobic bacterial growth. In addition, large surface areas of water can provide adequate air to water oxygen transfer for fish and aerobic bacteria.

5.4 Wetland Liner and Reuse of Landfill Cap

Seepage into or out of a constructed wetland is not a desirable occurrence. Seepage results in fluctuations in the water depth and can cause pollution of groundwater (U.S. EPA, 1983). It is common practice in treatment pond design to assume that natural sealing will occur at the bottom of the wetland. Sealing can occur by a combination of mechanisms including physical clogging of soil

pores by settled solids, chemical clogging of soil pores by ionic exchange, and organic clogging caused by microbial growth at the pond bottom.

In the case of Hunters Point, a liner system should be considered due to the presence of contaminated ground water and soils at the site. The conventional solution to seepage problems in treatment ponds and lagoons is the use of synthetic liners. While this method provides very good isolation between a wetland and underlying soils and groundwater, it can be expensive. Well-compacted clay soils can also provide adequate isolation between surface and ground waters at much lower costs. The section below discusses the potential for the reuse of soils already on site to fill in the excavated landfill after removal of the waste, and to construct a liner to protect the wetland from potential contamination from underlying groundwater and soils.

The recently installed landfill cap provides a source of clean fill that can be used during wetland construction, and this will preclude the need for the importation of large amounts of clean soil onto the site to construct the proposed wetland. Figure 5-1 shows a schematic of the wetland construction process. Generally speaking, the current landfill sits atop bay mud and is covered with a layer of native sand/clay and a landfill cap (Tetra Tech, 2003b). Ground water flows through the waste area. During excavation and construction, clean soils from the landfill cap and underlying sand/clay should be segregated and stockpiled on site for later use. Once the landfill waste is removed, the native sand/clay, presuming it meets soil quality objectives, can be placed in the excavation area. The clean soil from the landfill cap would then be used as the base for a wetland.

As described in Section 4.4 (Landfill Issues) the landfill waste covers approximately 20 acres and has an average thickness of around 15 feet. Removal of the landfill waste would result in an excavated area roughly 20 acres in surface area with a base elevation of 5 to 10 feet below mean sea level. Native clay/sand currently on top of the landfill could be placed in the excavated area and bring the base elevation up to approximately sea level. If the permeability of the native clay/sand is not low enough to isolate the wetland from the ground water, a clay liner could be installed on the clay/sand. The clean soil from the landfill cap would then be placed on top of the native clay/sand, thereby raising the elevation by roughly an additional 5 feet. Additional clean fill may be needed for the construction of the levees around the wetland.

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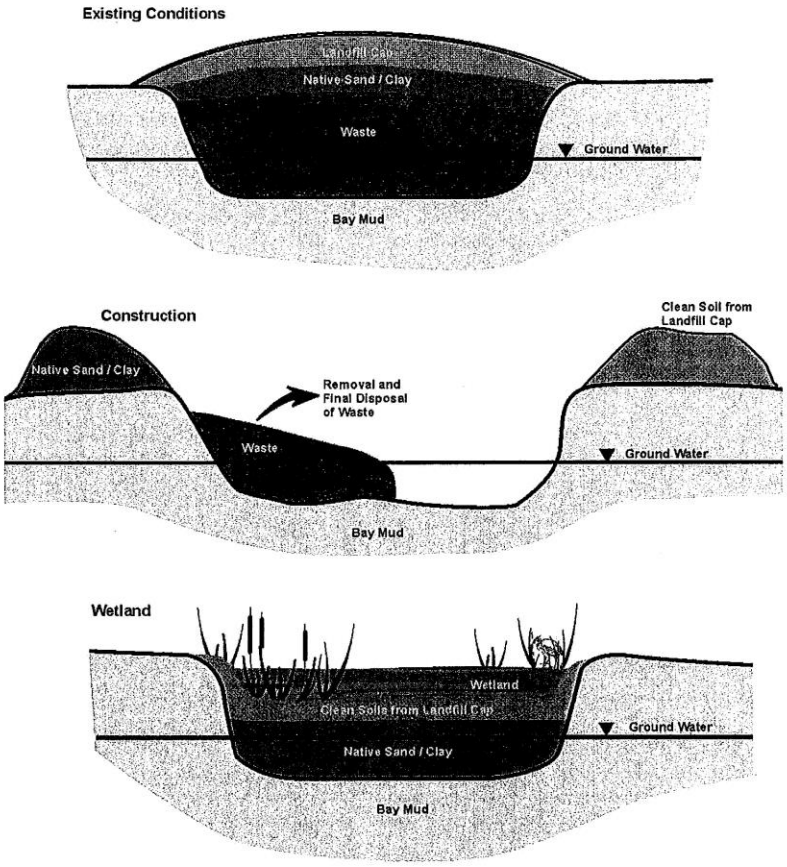

Figure 5-1. Schematic of Reuse of Landfill Cap

5.5 Mosquito Abatement

Although there is public concern about mosquito outbreaks resulting from constructed wetland projects, wetlands can be designed and maintained to keep mosquito populations to a minimum. Mosquitoes lay their eggs on or near the water and the mosquito larvae live on the water surface, breathing air and feeding primarily on algae and organic debris (Borror, 1976; Metcalf and Luckman, 1975). Minimizing hydraulically static areas, controlling water level, disturbing water surface to drown larvae, minimizing anaerobic zones, and creating access for natural mosquito predators are common mosquito control strategies. Some of these strategies are discussed in further detail below.

Water level manipulation and topography control are two commonly used control mechanisms. The periodic drawdown of the water surface in a wetland can eliminate habitat for most mosquito species

and can be timed for key periods in the insect's life cycle (Collins and Resh, 1989). Wetland topography should be constructed to avoid ponding of water in isolated areas during drawdown. In addition, deep pools should be provided to ensure sufficient habitat for fish during the dry season when wetland water elevation may be minimal (Silverman, 1984).

Wetland vegetation, although beneficial in other ways, can provide larvae with refuge from water surface disturbances and predators, and can decrease developmental time by increasing habitat temperature and enhancing food resources. Vegetation selection plays a key role in mosquito management. Dense patches of free-floating vegetation (i.e., duckweed and water fern) which totally cover the water surface inhibit mosquito egg laying. In contrast, water hyacinths, pickleweed and pondweed appear to support large populations of mosquito larvae (Collins and Resh, 1989). Appendix G includes a copy of an assessment of wetland plant of the San Francisco Bay Area in relation to the ecological control of mosquitoes from by Collins and Resh (1989).

The addition of fish to a wetland is commonly used as a natural method to control mosquito populations. The mosquito fish (*Gambusia afffinis*) is the most widely used biological control agent and is harvested for mass inoculation into wetland systems. Sunfish (*Lepomis spp.*) and stickleback (*Gasterosteus spp.*) are two additional species that can enhancing mosquito control efforts. The three different fish species will inhabit different niches within a wetland/pond system, thereby providing comprehensive protection against mosquitoes (Collins and Resh, 1989). Adequate dissolved oxygen concentrations and low ammonia levels should be maintained in the wetland to make the aquatic environment hospitable to fish (Tchobanoglous, 1987; Horne, Personal Communications). Oxygen is required for the fish to breathe, while ammonia can be toxic to fish. Oxygen levels can be maintained mainly by limiting organic loading to the wetland. Recycled water from domestic wastewater treatment plants is generally of adequate quality to support fish in a wetland.

Neither the City nor County of San Francisco have a dedicated mosquito abatement district that is responsible for the control and monitoring of mosquitoes. Mosquito abatement in the City is handled by the San Francisco Department of Public Health. The nearby San Mateo County Mosquito Abatement District (SMCMAD) controls and monitors harmful pests, including mosquitoes, in San Mateo County. A representative from the SMCMAD is available for a preliminary site visit and to review the wetland design plans to ensure a mosquito source is not created at Hunters Point (Peavey, Personal Communications).

6.0 WETLAND ALTERNATIVE SELECTION AND CONCEPTUAL DESIGN

6.1 Objectives of Wetland at Hunters Point Shipyard

Based on dialog with the staff at the GGAS, we identified three main objectives for wetland creation at Hunters Point:

- Provide opportunities for public education, access, and recreation.
- Create marsh habitat for desirable birds and aquatic biota.
- Improve the quality of storm water and wastewater effluent prior to discharge to San Francisco Bay

An overarching goal of the project was also to provide an alternative vision for the use of the area in Parcel E now containing an industrial landfill. The proposed location of the wetland described in this study is the area currently occupied by the landfill, and this conceptual design assumes the prior removal and final off-site disposal of landfill waste.

6.2 Wetland Alternatives Analysis

Constructed treatment wetlands generally fall into one of two conceptual types: the free water surface wetland, and the subsurface flow wetland (Reed *et al.*, 1995). In a free water surface wetland, the water surface is in contact with the atmosphere in basins that can be variable in depth. In a subsurface flow wetland, the water surface is maintained below the surface of a porous media that is contained in an excavated basin or trench. Table 6-1 compares these two wetland types with respect to ability to meet the project objectives stated above. For obvious reasons, a free water surface wetland is the preferred option available at Hunters Point.

Table 6-1. Comparison of Free Water Surface and Subsurface Flow Wetlands

Characteristics	Free Water Surface Wetland	Subsurface Flow Wetland
Public recreation	Available as open space	Minimal
Wildlife habitat	Refuge and nesting areas, and food sources available for fish and birds	Minimal
Vegetation types	Emergent, submerged, floating aquatic vegetation habitat available	Minimal

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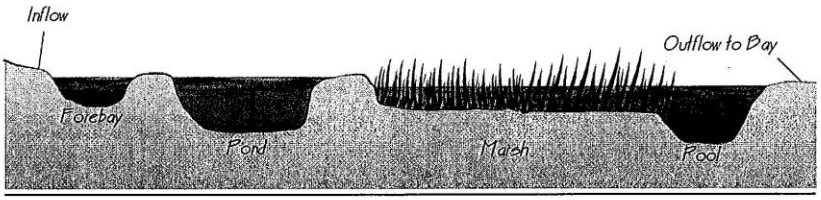
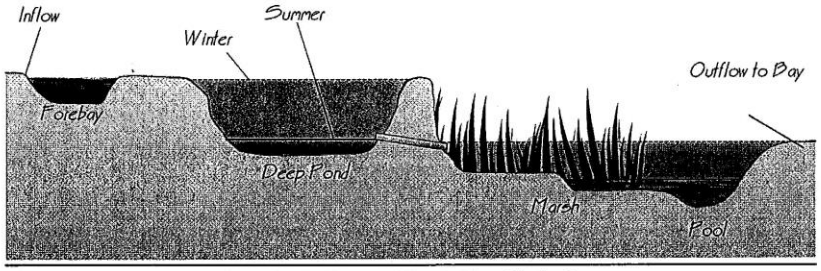
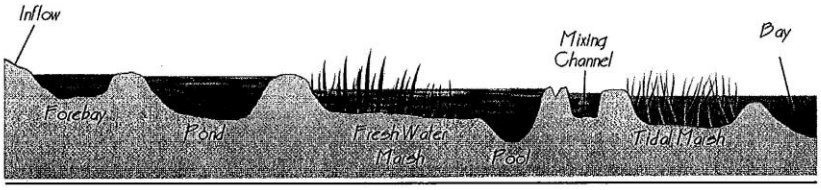
Additional considerations in the conceptual design of a wetland include whether the wetland will be a seasonal or permanent wetland, and whether the wetland will include freshwater, brackish water, and/or saltwater wetland cells. For this alternative analysis we evaluated three alternatives: a permanent freshwater wetland (Alternative 1), a seasonal freshwater wetland (Alternative 2), and a permanent freshwater/tidal wetland (Alternative 3). Figure 6-1 shows a schematic of these three alternatives.



Alternative: Permanent Fresh Water Wetland



Alternative 2: Seasonal Fresh Water Wetland



Alternative 3: Permanent Fresh Water / Tidal Wetland

Figure 6-1. Hunters Point Wetland Alternatives

Each of the three alternatives has several features in common. Inflow first discharges into a forebay. The forebay acts as a basin for settling of suspended solids. An added benefit of the forebay is that it can be dredged if the sediment load is excessive. After the forebay is a pond. Ponds provide open-water zones that are accessible to birds and wildlife. Ponds also enhance treatment benefits by increasing retention time in the wetland. Marsh areas follow the ponds. Marsh areas enable the growth

of emergent vegetation that can be utilized by wildlife as a food resource, and for nesting and resting space. In addition, emergent vegetation is an attachment substrate for bacteria that are active in the removal of pollutants present in the inflow. Pool areas in the marsh provide a refuge for fish during low flow periods. They are of particular importance when water level manipulation is needed or, in seasonal wetlands during months when water surface levels are reduced. The feasibility of each alternative is assessed below.

Alternative 1 – Permanent Freshwater Wetland. In the permanent freshwater wetland alternative, storm water and recycled water flow into the forebay, and are gravity fed to the pond, which flows into the marsh/pool cells. The marsh overflows to San Francisco Bay. In Alternative 1, water levels will be maintained in all wetland components throughout the year through the use of recycled water. Hydraulic structures to allow drawdown of the water level to optimize operations will be provided.

Based on a review of project objectives, the permanent freshwater wetland system is the preferred alternative for Parcel E at Hunters Point. It is the only alternative that meets the multiple project objectives: providing high-quality year-round recreational opportunities to the community; providing optimal year-round habitat for a range of resident and migratory populations of fish, birds and other wildlife; and providing a year-round mechanism for improving storm water prior to discharge to the Bay. Additionally, with a permit from the National Pollutant Discharge Elimination System NPDES, these wetlands could also receive recycled water.

Alternative 2 – Seasonal Freshwater Wetland. In this alternative, stormwater flows into the forebay and then is gravity fed to the pond/marsh system. Since input to the wetland will depend on precipitation and runoff in the watershed, the pond water level will fluctuate from summer to winter months. This requires construction of a larger and deeper pond to store storm water. Storm water from the pond will discharge into the marsh and pool over the spring and summer, followed by discharge into San Francisco Bay. The water level in the pond is expected to drop considerably, resulting in the need for a hydraulic structure to convey water from the deep pond to the marsh.

While this alternative is feasible, it does not fully meet the objectives for the project. Since the pond and marsh would be dry in the summer, it would not provide for a year-round aesthetically pleasant recreational resource for surrounding inhabitants. In addition, this alternative does not utilize the treatment capacity of the wetland to improve the quality of recycled water before it is discharged to the Bay.

Alternative 3 – Permanent Freshwater/Tidal Wetland. In the permanent freshwater/tidal wetland alternative, inflowing storm water and recycled water follows the same path as described for Alternative 1, with the exception that outflow from the marsh/pool will flow into a mixing channel where it will combine with incoming saltwater from San Francisco Bay during periods of high tide. The use of flap gates or unidirectional valve structures will direct the mixed water into the tidal marsh cell, which is hydraulically connected to San Francisco Bay.

This alternative is not recommended at Hunters Point due to contaminated sediments, including PCBs, in Parcel F, the submerged area of the Bay just offshore of Parcel E. We are concerned that contaminants could be resuspended and transported into the tidal marsh area. This could potentially lead to the contamination of biota if the pollutants biomagnified up the food chain within the wetland. In addition, this alternative would need to have relatively complex water control structures and operational procedures which make it less attractive.

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6.3 Conceptual Design of Preferred Alternative

Figure 6-2 shows the conceptual design developed by the project team for a permanent freshwater wetland in Parcel E of Hunters Point. Note that not all facilities in Figure 6-2 are to exact scale. The design includes a series/parallel configuration in which water passes through two parallel systems that consist of multiple cells in series. The wetland includes a forebay/pond/wetland treatment train which provides a wide range of treatment capabilities and wildlife habitats. Water first flows into the Forebay. From the Forebay, water is distributed to the Wading Bird Pond to the south and to the Dragonfly Pond to the east. Water then flows from the Wading Bird Pond to Wetland Cell 1 and from the Dragonfly Pond to Wetland Cell 2. Both wetland cells discharge to the San Francisco Bay. Components of the proposed permanent freshwater wetland are discussed in greater detail below.

Forebay. Inflow, consisting of storm water during the winter and recycled water during the spring, summer and fall, would first enter a forebay roughly one-half acre in surface area. The forebay acts to capture particulates which commonly have pollutants attached to their surfaces. Since sediments and storm water from Parcel E have been shown to be contaminated, containment of particles in the forebay is an important water treatment goal. The forebay would have fairly steep edges and a deep bottom to inhibit plant growth and the use of the area by wildlife. The forebay would include an access ramp to facilitate removal of sediments as needed. The forebay would also act to slow inflowing storm water and to distribute water to the two treatment trains, one to the east of the forebay and the other to the south of the forebay.

The forebay inlet structure should be designed to divert extreme flows events away from the forebay to the existing seasonal wetlands south of the proposed wetland. This would limit the potential for resuspension of sediments in the forebay due to high turbulence, and the possible transport of contaminated sediments out of the forebay and into the pond/wetland system. The inlet structure could also be used to discharge the more polluted "first flush" of the storm water to the forebay, and into the pond/wetland system for additional treatment. Subsequent storm water could be discharged to the seasonal wetlands to enhance water quality and habitat in these wetlands.

Ponds. After the forebay, water flows into two ponds: the Dragonfly pond to the east and the Wading Bird Pond to the south. Each pond would be around three acres in surface area and six feet in depth. The water elevation in the east pond would be held constant. This would permit the growth of aquatic plants and the development of a pond food web which would support insects, thus the name "Dragonfly" Pond. The insects would support various types of insect-eating birds. Water elevation in the Wading Bird Pond would be slowly drawn down then refilled every four to six weeks during the spring though fall. This would expose benthic animals growing in the sediment, thereby facilitating foraging by wading birds.

Both ponds would contain an island with a loafing strip that would provide nesting, refuge and foraging habitat for birds. The islands would also act as berms, splitting the pond into two effective treatment cells, thereby inhibiting short circuiting and promoting water treatment. The ponds would also include a predator trench, roughly 8 feet deep and 20 feet wide, around the submerged circumference of the ponds to prevent land predators from getting into the ponds and onto the islands.

Wetland. Both ponds discharge to a separate wetland cell, each roughly seven acres in surface area. The wetlands would be fairly shallow to allow for the growth of emergent vegetation such as cattail and bulrush. The depth of the wetland would increase near its center to exclude emergent vegetation, and

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this would result in the creation of pools. By incorporating a complex topography into the wetland, various depth zones will be created, thereby maximizing plant diversity, wildlife habitat, and pollutant removal capacity. Berms made of earth or of wood could be installed under or as part of the structure of the boardwalks that cross each of the wetland cells. This would split the wetlands into two effective treatment cells, thereby inhibiting short circuiting and promoting water treatment.

The wetland should include native aquatic plant selections that will provide a wide range of habitat and food resources for wildlife. Plant selection can also be based on desired effluent qualities if the wetland is a treatment wetland. In addition, local climate (Dawson, 1989) and hydroperiod (Zimmerman, 1988) should be considered during plant selection. Appendix G includes a list of native plant species available for inclusion in a detailed wetland design.

Hydraulic Connections. Hydraulic connections will be installed between treatment cells, and under typical operation water will flow from the forebay to the two ponds, then from each of the ponds to the subsequent wetland cell. In addition to these standard connections, there are additional connections that would be closed under standard operating conditions, but would provide wetland managers with operational flexibility in moving water around the system during times of emergency or maintenance. For example, there are proposed hydraulic connections between the two ponds, between the Dragonfly Pond and Wetland Cell 1, and between the two wetland cells near the outlet to the Bay.

Public Access. Public recreation and utilization of the wetland is a primary goal of the project, thus public access is an important component of wetland design. Figure 6-2 includes a number of public access features. The public would access the wetland via a single entrance point located on the levee between the Dragonfly Pond and Wetland Cell 2. Boardwalks would be included along most of the levees between the ponds and wetland cells, and would also extend into the wetlands themselves. A number of observations decks with informational kiosks could also be included along the boardwalks. The boardwalks and observation desks would provide an ideal vantage point from which to unobtrusively observe wetland plants and wildlife.

A wetland center near the public entrance to the wetland could be used to educate the public concerning the importance of wetland ecosystems. Office space should also be provided for volunteers to monitor and quantify bird use of the wetland, an important parameter in evaluating the success of the wetland system. In addition, a blind, a viewing area camouflaged to birds and wildlife, could be attached to the wetland side of the wetland center to allow for supervised, all-weather viewing of wetland biota.

6.4 Construction and Operation and Maintenance Costs

Unit costs for wetland construction range from $40,000 per acre for a wetland of moderate complexity, to $75,000 per acre for a wetland of higher complexity (*e.g.,* bottom liner, planting of specified species) (Kadlec and Knight, 1996). At Hunters Point, there should be savings associated with earth moving, since it is assumed that the landfill would be removed. It is expected, however, that a liner composed of synthetic material (Appendix H) or of low permeability soils, perhaps reused from the current landfill cap, would be needed to isolate the wetland from potentially contaminated groundwater. Based on these assumptions, an estimated unit cost for the Hunters Point Wetland is around $50,000. Assuming a 20 acre wetland, total construction costs are estimated at $1 million. In comparison, the 38 acre Arcata, California, wastewater treatment wetland

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cost around $1 million to construct ($24,500 per acre), while the 24 acre Gustine, California, wastewater treatment wetland cost $1.6 million to construct ($66,700 per acre). All costs noted here are in 2003 dollars.

The construction costs cited above include clearing brush, erosion control, excavation, staking and grading, and planting. After the development of a conceptual wetland design and buy-in from local stakeholders, design and permitting costs are typically around 10% of construction costs; a final design/permitting fee should be around $100,000.

Various sources cite operation and maintenance (O&M) costs of $600 per acre for a "median" wetland, 2% of construction costs, or $5,000 to $50,000 (Kadlec and Knight 1996; U.S. EPA, 1999). O&M costs include pumping energy, basic compliance monitoring, dike maintenance, equipment replacement/repair, boardwalk and signage maintenance, and nuisance control (e.g., mosquitoes, gophers, bottom fish). The $600 per acre factor would yield $12,000 per year, while the 2% factor would yield $20,000. Note that more sophisticated compliance monitoring or study costs could add up rapidly. Due to the contaminated nature of the stormwater and the wetland site, water and sediment monitoring costs could result in much higher annual costs. It is recommended that cost estimates assume a $20,000 per year value, plus an additional $20,000 for water and sediment monitoring. This yields a net annual O&M cost of $40,000 per year as a rough O&M estimate.

Note that the estimated O&M costs for the wetland, around $40,000 per year, are far below the current O&M costs associated with management of the industrial landfill. Current O&M activities include pumping and maintenance associated with the sheet pile groundwater extraction system on the southeast border of the landfill, pumping and maintenance associated with the gas extraction and treatment system on the north border of the landfill, and watering and mowing of 16 acre landfill cap. While we have not seen precise cost estimates for these ongoing activities, they likely exceed $400,000 per year. Additional construction and O&M costs will be incurred if a subsequent vertical barrier is installed along the northern edge of the landfill. If the landfill was removed and a wetland was constructed in its place, total annual operating costs would decrease substantially, while recreational options, wildlife habitat, and water quality of waters discharged to the Bay would increase.

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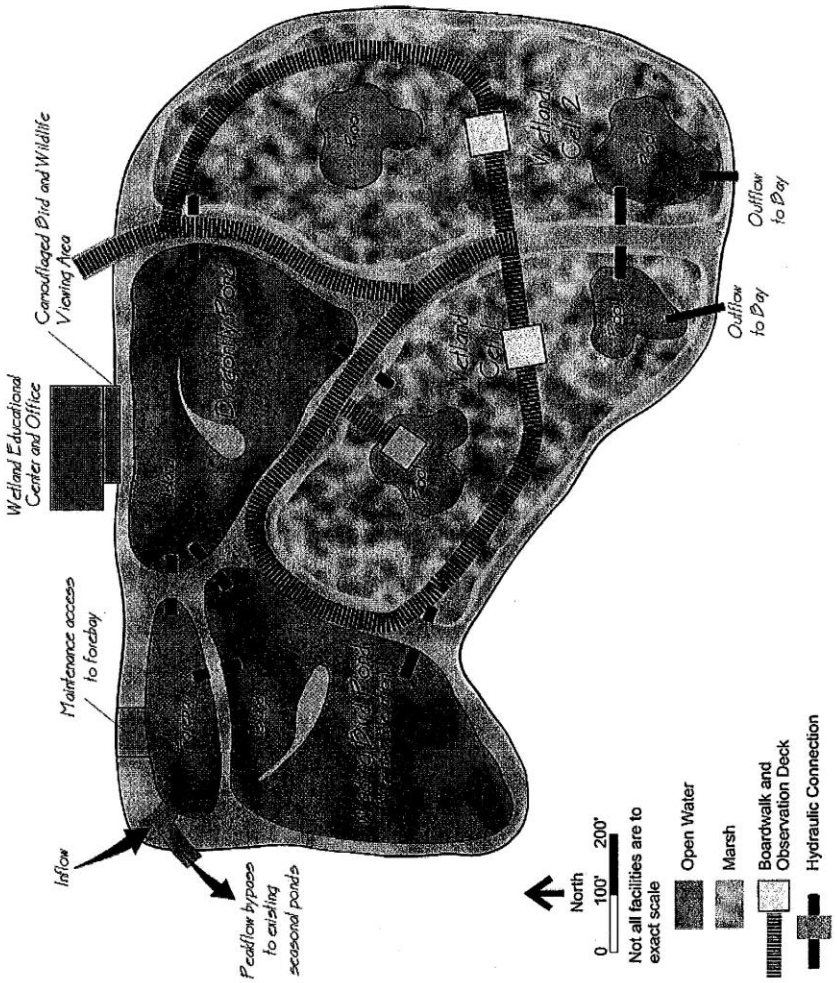

Figure 6-2. Conceptual Design of Permanent Freshwater Wetland at Hunters Point

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7.0 CONCLUSIONS AND RECOMMENDATIONS

This section provides a number of conclusions based on this study, and some specific recommendations regarding implementation of a storm water wetland in Parcel E of the Hunters Point shipyard.

Conclusions

- The development of new wetlands in Parcel E will comply with several of the guidelines set forth in the Hunters Point Shipyard Citizen's Advisory Committee redevelopment plan, including: a balance between development and environmental conservation by providing wildlife habitat, integration of land uses by expanding open space, and improved public access by promoting recreational opportunities at a natural wetland area.

- Surface water and sediment data indicate that runoff and soils from Parcel E are high in contaminants and may result in deleterious impacts to water quality in San Francisco Bay. A properly constructed and operated wetland could result in an improvement in water quality in the San Francisco Bay by capturing and treating pollutants and sediment in storm water before they reach the Bay.

- Several issues exist related to the ability of the industrial landfill to contain waste and not function as a source of continued contamination to the San Francisco Bay and adjacent parcels at Hunters Point. These issues include the lateral and vertical extent of the landfill, the potential for liquefaction, and the construction and/or extent of the landfill cap. Many of the issues and uncertainties would be ameliorated if the landfill was removed and replaced with a wetland.

- A permanent freshwater wetland system was determined to be the preferred alternative for Parcel E at Hunters Point because it is the only alternative that meets the multiple project objectives: providing high-quality year-round recreational opportunities to the community; providing optimal year-round habitat for a range of resident and migratory populations of birds and other wildlife; and providing a year-round mechanism for improving storm water prior to discharge to the Bay.

- The conceptual design presented in this report includes a series/parallel configuration in which water passes through two parallel systems that consist of multiple cells in series. The wetland includes a forebay/pond/wetland treatment train which provides a wide range of treatment capabilities and wildlife habitats.

- Wetlands can be designed and maintained to keep mosquito populations to a minimum by eliminating hydraulically static areas, controlling water level, disturbing water surface to drown larvae, minimizing anaerobic zones, and creating access for natural mosquito predators.

- Assuming construction of a 20 acre wetland, total construction costs are estimated at $1 million in 2003 dollars. The net annual O&M cost is estimated at $40,000 per year. This estimated O&M cost is far below the current O&M costs associated with management of the industrial landfill, which likely exceed $400,000 per year.

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Recommendations

- Remediation of the site should take into consideration the concerns and needs of the community living in and around the shipyard, with a focus on potential health effects associated with the location of an industrial landfill in their community, and return of the site to full use and accessibility by the public. Community input at all phases of the design and construction of a wetland should be solicited.

- Storm water and direct precipitation are adequate to keep the proposed wetland full from November through March. Make-up water is needed from April through October when evaporation is high and inflow is low. The total amount of make-up water required over the year is 46 acre-feet or 15 million gallons. The most suitable source of make-up water is recycled water from a satellite wastewater treatment plant proposed for the Hunters Point shipyard.

- A liner system should be installed between the wetland bottom and the existing soils on the site in order to isolate the wetland from contaminated ground water and soils. This liner may be constructed of clay or may utilize more sophisticated manufacture liners.

- A wetland sited on Parcel E could potentially receive contaminated storm water. This point should be considered in the design and operation of any wetland at the site since the wetland will be heavily used by wildlife, and the risk of contamination of wildlife must be minimized. Since many contaminants are attached to particles, a forebay with easy drainage and access capabilities should be included in any wetland design to capture, trap and remove sediment, and keep the sediment from entering the wetland.

- To save money and ease construction, clean soils already on site, including the landfill cover, should be used to fill in the excavated landfill after removal of the waste and to construct a liner to protect the wetland from underlying groundwater and soils.

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APPENDIX A

SUMMARY OF PUBLIC COMMENTS AND ISSUES RESULTING FROM THE JUNE 24, 2004 PUBLIC MEETING

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Summary of Public Comment and Issues Resulting from June 24, 2004 Public Meeting

Following a presentation on the conceptual design for a constructed wetland on the site of the existing industrial landfill at Parcel E of the Hunters Point shipyard, the floor was opened for comments by the members of the public and the community. Following are comments, concerns and requests made at that time by three community members.

Olin Webb. Olin is a member of the Bay View Community Advocates group. He described his participation in a 2-week long class on watersheds, which he took so he could understand what was happening at the shipyard. He expressed his concern about the loss of fishing and shrimping along the shores of the shipyard, recalling earlier times when he and members of his community had access to the shoreline and fishing was a part of the community. He is also concerned about the capping of the landfill, and of the lack of protection for the people and the watershed.

Oscar James. Oscar spoke quite eloquently about what is and is not happening at Hunters Point. He wants to see all toxics removed from the area. He wants the shrimp and crabs to return to the waters adjacent to the site. He wants money provided to help send community kids to college so they can come back to the neighborhood and help clean it up. He approved of the involvement of high school students in the water quality work at Yosemite Slough, and would like to see more activities of the type. Oscar spoke of all the money spent so far at Hunters Point, and of how he sees no benefit to the community as of yet. He says all that money spent has not helped anyone in the community, and he wants it to.

Tyrone Honory. Tyrone recalled fishing at the shipyard when he was 12 years old, and he is now in his 50s. He wants to be able to fish again. He wants all the polluting that is going on to stop now.

APPENDIX B

SUMMARY OF MEETINGS FOR THE HUNTERS POINT STORM WATER WETLAND PROJECT

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Summary of meetings for Hunters Point Storm Water Wetland Project

Date of meeting: March 11, 2003	Individuals Present: Arthur Feinstein, Marc Beutel, Rhea Williamson
Meeting Summary: Review of project goals and tasks. Discussion of data needs; identification of individual responsibilities: Copies of documents on constructed wetlands were distributed. Information was discussed on additional work (60 to 90% design), reports on Hunters Point were reviewed.	
Date of meeting: March 18, 2003	Individuals Present: Rashmi Kashyap, Divya Ramachandra, Nohemy Revilla, and Rhea L. Williamson
Meeting Summary: Task assignments and paperwork for initiating the project were discussed. An initial web-based search was initiated to begin identifying sites to collect data from. Data sheets were discussed related to project documentation; these include phone log forms, work completion forms, and a data identification spreadsheet.	
Date of meeting: April 10, 2003	Individuals Present: Arthur Feinstein, Saul Bloom, Steven Krefting, Jeff Marmer, Marc Beutel and Rhea L. Williamson
Meeting Summary: Saul Bloom provided a detailed overview of the Hunters Point project, with discussion of the involvement of the numerous players, including the Public Utilities Commission (PUC), Lenare Developers, the Technical Review Committee (comprised of Gearhart, Josslyn, Tchobanoglous, Jenkins, and Allen) and others. The Redevelopment Plan of 1997 was summarized, as was involvement by the City of San Francisco, the SF airport, the Navy and others. The expected cleanup levels were discussed (practical and per level of use) as were the need for community based cleanup levels. The landfill was discussed with respect to the fire, the RCRA compliant cap, and potential problems with the landfill.	
Date of meeting: April 24, 2003	Individuals Present: Rhea L. Williamson, Wendy Jo Kroll, Wilfreddo Hoffer, Rashmi Kashyap, Nohemy Revilla, and Divya Ramachandra
Meeting Summary: 1) determine lead individuals on various tasks and subtasks (see below), 2) go over data collected to date, and 3) set some deadlines with respect to the schedule (not finalized).	
Date of meeting: May 12, 2003	Individuals Present: Rhea L. Williamson, Wendy Jo Kroll, Wilfreddo Hoffer, Rashmi Kashyap, Nohemy Revilla, and Divya Ramachandra
Meeting Summary: 1) verify leads individuals on the various tasks and subtasks, 2) go over data collected to date, and 3) set some deadlines with respect to the schedule.	
Date of meeting: June 18, 2003	Individuals Present: Rhea L. Williamson, Wendy Jo Kroll, Rashmi Kashyap, Nohemy Revilla, Divya Ramachandra and Marc Beutel.
Meeting Summary: 1) acquaint Marc and student workers, 2) go over data collected to date, 3) strategize on specific aspects of data collection and 4) set schedule deadlines.	
Date of meeting: July 16, 2003	Individuals Present: Rhea L. Williamson, Wendy Jo Kroll, Rashmi Kashyap, Divya Ramachandra and Marc Beutel.
Meeting Summary: 1) Discussion of data needs (prepare precipitation plots, determine watershed area, schedule site visit, review Title 27 of CCR, determine runoff as a function of land use in the watershed), 2) identification of individual responsibilities, 3) copies of several documents were distributed including tables of Hunters Point water quality data, the final storm water discharge management plan, Parcel E wetlands delineation and function and values assessment document, SJSU draft report on HP, and 17 case studies on constructed wetlands, 4) set deadlines for the annotated outline and the compilation of data and information collected to date.	

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Summary of meetings for Hunters Point Storm Water Wetland Project (continued)

Date of meeting: August 05, 2003	Individuals Present: Rhea L. Williamson, Wendy Jo Kroll, Rashmi Kashyap, and Divya Ramachandra
Meeting Summary: 1) discussion of landfill area (14.8 acres of the total landfill area (20 acres?) is capped with an interim design, 2) brainstorm of reasons for landfill removal (source of contaminants to SF Bay, cap does not cover entire landfill, cap is not RCRA approved, problems with spontaneous combustion, aesthetics, and etc., 3) Rhea will contact Kevin Bricknell or Mike Wanta of Tetra Tech in San Diego at 619-525-7188.	
Date of meeting: August 13, 2003	Individuals Present: Rhea L. Williamson, Wendy Jo Kroll, Rashmi Kashyap, Divya Ramachandra and Marc Beutel.
Meeting Summary: 1) discussion of data needs (preliminary outline of document, background cleanup levels, info on Parcel E and F), 2) distribution of several documents, 3) review of initial annotated outline, and 4) summary of the compilation of data and information collected to date.	
Date of meeting: August 27, 2003	Individuals Present: Rhea L. Williamson, Wendy Jo Kroll, Rashmi Kashyap, Divya Ramachandra and Marc Beutel.
Meeting Summary: 1) discussion of data collected to date, 2) distribution of several documents, 3) review of preliminary document outline, and 4) summary of the compilation of data and information collected to date. Deadlines were set for several sections of the report. After Marc left, discussion followed on presentation in the SJSU Graduate Studies and Research Showcase of Excellence forum and on presenting at the CWEA Annual Conference.	
Date of meetings: September 10, 17, and 23 of 2003	Individuals Present: Rhea L. Williamson, Wendy Jo Kroll, Rashmi Kashyap, and Divya Ramachandra
Meeting Summary: 1) discussion of data needs, 2) summary of the compilation of data and information collected to date, and 3) answer questions.	
Date of meeting: September 25, 2003	Individuals Present: Rhea L. Williamson, Wendy Jo Kroll, Rashmi Kashyap, and Divya Ramachandra from San Jose State University, Marc Beutel from Brown and Caldwell, Amy Brownell from the City of San Francisco Department of Public Health, Lucinda Rose of Tetra Tech, Wayne Akiyama of Shaw Environmental, and Patrick Brooks, who represented the US Navy
Meeting Summary: 1) site visit of the Hunters Point shipyard, Parcel E. Areas visited include the wetland areas, landfill, and drainage areas. Following the site visit, the project team (SJSU members and Marc Beutel) met to 1) discuss data collected to date, 2) review the deadlines previously set, and 3) go over the draft report that is in progress.	
Date of meeting: September 30, 2003	Individuals Present: Rhea L. Williamson, Wendy Jo Kroll, Rashmi Kashyap, and Divya Ramachandra
Meeting Summary: 1) met to discuss presentation of the Hunters Point Project at the San Jose State University Showcase of Excellence in Research. Poster tasks and assignments were made.	

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Summary of meetings for Hunters Point Storm Water Wetland Project (continued)

Dates of meetings: October 8, 22, 27, and 8 of 2003	Individuals Present: Rhea L. Williamson, Wendy Jo Kroll, Rashmi Kashyap, and Divya Ramachandra
Meeting Summary: 1) discussion of report progress, 2) data needs, 3) poster preparation for the Showcase, 4) draft submittal reviews, 5) schedule of future tasks, and 6) other project related issues	
Date of meeting: October 29, 2003	Individuals Present: Rhea L. Williamson and Marc Beutel
Meeting Summary: 1) The draft report was evaluated for completed sections, sections in need of additional information and areas of focus. The wetland design section was discussed with respect to the water balance (inflows and losses), wetland site characteristics, need for a forebay, potential reuse of cap materials for the wetland base, and design goals. In the latter, the importance considering wildlife habitat options that select for preferred species (*i.e.*, minimize geese/unwanted vegetation types), vector minimization, operational flexibility, community support, public access options, and stormwater transport of sediments and/or contaminants were discussed.	
Date of meeting: November 4, 18, and 25 of 2003	Individuals Present: Rhea L. Williamson, Wendy Jo Kroll, Rashmi Kashyap, and Divya Ramachandra
Meeting Summary: 1) discussion of report progress, 2) data needs, 3) poster preparation for the Showcase, 4) draft submittal reviews, and 5) schedule of future tasks.	
Date of meeting: December 18, and 22 of 2003	Individuals Present: Rhea L. Williamson, Wendy Jo Kroll, Rashmi Kashyap, and/or Divya Ramachandra. Meetings were with individuals due to schedule changes and conflicts related to the end of the semester.
Meeting Summary: 1) discussion of report progress, 2) data needs, 3) draft submittal reviews, 5) schedule of future tasks, and 5) other project related issues	
Date of meeting: January 14, 2004	Individuals Present: Rhea L. Williamson and Wendy Jo Kroll.
Meeting Summary: 1) discussion of wetland objectives and design criteria, 2) review of data sources available.	
Date of meeting: January 19, 2004	Individuals Present: Rhea L. Williamson and Divya Ramachandra.
Meeting Summary: 1) discussion of report progress with a focus on water quality needs.	
Date of meeting: January 20, 2004	Individuals Present: Rhea L. Williamson and Marc Beutel.
Meeting Summary: 1) discussion of report progress with a focus on wetland design criteria.	

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Summary of meetings for Hunters Point Storm Water Wetland Project (continued)

Date of meeting: January 20, 2004	Individuals Present: Rhea L. Williamson, Marc Beutel, Arthur Feinstein, Jeff Marmer, Jack Lendvay.
Meeting Summary: 1) discussion of project progress with an overview of site characteristics, water quality, the water balance, need for an alternative water supply, and wetland design criteria. Wetland design focused on the concepts of a forebay, landfill cap soil reuse, need for a liner, and vector issues. 2) discussion of where we need to go focused on community involvement, wetland scenario schematics, and confirmation of the availability of an alternate water supply.	
Date of meeting: January 26 of 2004	Individuals Present: Rhea L. Williamson, Wendy Jo Kroll, and Divya Ramachandra.
Meeting Summary: 1) discussion of report progress, 2) sorting of reference materials related to wetlands into categories of design, performance, criteria, problem solving and others.	
Date of meeting: February 9 of 2004	Individuals Present: Rhea L. Williamson and Wendy Jo Kroll.
Meeting Summary: 1) writing of summary information related to conceptual wetland design.	
Date of meeting: February 16 of 2004	Individuals Present: Rhea L. Williamson, Wendy Jo Kroll, Rashmi Kashyap, and Divya Ramachandra.
Meeting Summary: 1) discussion of report progress, 2) delegation of tasks on liner, and liquefaction issues, and 3) writing of summary information on conceptual wetland design.	
Date of meeting: February 24 of 2004	Individuals Present: Rhea L. Williamson and Wendy Jo Kroll.
Meeting Summary: 1) writing of summary information related to conceptual wetland design.	
Date of meeting: March 8 of 2004	Individuals Present: Rhea L. Williamson and Wendy Jo Kroll.
Meeting Summary: 1) writing of summary information related to conceptual wetland design.	
Date of meeting: March 20 of 2004	Individuals Present: Rhea L. Williamson and Rashmi Kashyap.
Meeting Summary: 1) writing/editing of conceptual wetland design section.	
Date of meeting: March 22 of 2004	Individuals Present: Rhea L. Williamson and Wendy Jo Kroll.
Meeting Summary: 1) writing of summary information related to conceptual wetland design.	
Date of meeting: March 31 of 2004	Individuals Present: Rhea L. Williamson and Wendy Jo Kroll.
Meeting Summary: 1) writing/editing of conceptual wetland design section.	
Date of meeting: April 12 of 2004	Individuals Present: Rhea L. Williamson and Marc Beutel.
Meeting Summary: 1) discussion of conceptual wetland design, draft report.	

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Summary of meetings for Hunters Point Storm Water Wetland Project (continued)

Date of meeting: April 13 of 2004	Individuals Present: Rhea L. Williamson and Wendy Jo Kroll.
Meeting Summary: 1) writing of summary information related to conceptual wetland design.	
Date of meeting: April 15 of 2004	Individuals Present: Rhea L. Williamson and Marc Beutel.
Meeting Summary: 1) discussion of conceptual wetland design, review of draft figures, overview of draft report.	
Date of meeting: April 17 of 2004	Individuals Present: Rhea L. Williamson, Wendy Jo Kroll, Rashmi Kashyap, and Divya Ramachandra.
Meeting Summary: 1) preparation of PowerPoint presentation on Hunters Point for CWEA conference and for community public forum.	
Date of meeting: April 21 of 2004	Individuals Present: Rhea L. Williamson, Wendy Jo Kroll, Rashmi Kashyap, and Divya Ramachandra..
Meeting Summary: 1) preparation of PowerPoint presentation on Hunters Point for CWEA conference and for community public forum.	
Date of meeting: April 28 of 2004	Individuals Present: Rhea L. Williamson, Wendy Jo Kroll, Rashmi Kashyap, and Divya Ramachandra..
Meeting Summary: 1) PowerPoint presentation on Hunters Point at CWEA conference.	
Date of meeting: June 9 of 2004	Individuals Present: Rhea L. Williamson and Wendy Jo Kroll.
Meeting Summary: 1) Review of community outreach information.	
Date of meeting: June 15 of 2004	Individuals Present: Rhea L. Williamson and Wendy Jo Kroll.
Meeting Summary: 1) review of community outreach information; preparation of presentation materials and poster for the public meeting.	
Date of meeting: June 15 of 2004	Individuals Present: Rhea L. Williamson, Wendy Jo Kroll, Rashmi Kashyap, and Divya Ramachandra..
Meeting Summary: 1) review of final report needs, reference citations, information for the public forum.	

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APPENDIX C

DOCUMENTS AND DATA REVIEWED FOR THE HUNTERS POINT STORM WATER WETLAND PROJECT

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Documents and data reviewed for the Hunters Point Storm Water Wetland Project

DATE	DESCRIPTION OF DOCUMENT/DATA
03/18/03	USEPA/ Region 9/ Superfund/ web-based document on the Hunters Point Naval shipyard including a site description, history, threats and contaminants, cleanup approach, environmental progress, responsible parties, documents and reports, repositories, contacts and other pertinent information.
04/09/03	http://www.efdsw.navfac.navy.mil/06/indexHP.htm. links to several other documents.
04/10/03	USEPA. 1999. Storm Water Technology Fact Sheet. Storm Water Wetlands. EPA 832-F-99-025. Office of Water. Washington D.C.
04/17/03	http://www.sfgov.org/site/sfra_page.asp?id=5588. Report from SF Redevelopment Agency.
04/17/03	http://www.hunterspointshipyard.com.
04/28/03	http://www.swrcb.ca.gov/rwqcb2/download/watershedmiipc.doc San Francisco Bay Regional Water Quality Control Board: Watershed Management Initiative Integrated Plan chapter
04/28/03	http://www.efdsw.navfac.navy.mil/06/HPS_E/Landfill_Gas/index.htm#weekly_activities Parcel E: Landfill Gas Removal Action. Extraction Monitoring Meteorological data
04/28/03	Historical Radiological Assessment Volume 2: Use of general radiological materials (634 pages) March 2002 http://www.efdsw.navfac.navy.mil/Environmental/pdf/HP/Draft_HRA.pdf
04/28/03	Historical Radiological Assessment Appendix B http://www.efdsw.navfac.navy.mil/Environmental/Pages/hpHRA_appendixB.htm
04/28/03	http://www.efdsw.navfac.navy.mil/Environmental/HuntersPoint.htm. main page for several good links. Includes the Hunters Point Shipyard Environmental Cleanup Newsletter. Oct-Dec. 2001. Provides a chronological description of site activities.
05/23/03	Site Cleanup - Site Mitigation and Brownfields Reuse Program Database. http://www.dtsc.ca.gov/database/Calsites/CALP001.CFM?IDNUM=38440005 . Retrieved on 5/24/03
05/23/03	http://sfwater.org/detail.cfm/MSC_ID/73/MTO_ID/111/MC_ID/7/C_ID/1416/holdSession/1 ---Photos and history of land use
05/23/03	Hunters Point Shipyard Decentralized Wastewater Treatment Study & Meetings 04- 07-2003. http://sfwater.org/detail.cfm/MSC_ID/73/MTO_ID/111/MC_ID/7/C_ID/1416/holdSession/1 retrieved on 5/24/03
05/23/03	http://www.fas.org/man/company/shipyard/hunters_point.htm Military analysis network – has good figures of exact location on a map and also figures of each parcel along with the site numbers.
05/23/03	http://storm-water.com/Newsletters/1996/May96.PDF --- storm water news letter (page 4)
05/24/03	http://www.dtsc.ca.gov/database/Calsites/Cortese_List.cfm?county=38 --- has good links which gives info about the list of actions taken in each parcel.
05/24/03	http://www.dtsc.ca.gov/database/Calsites/CALP001.CFM?IDNUM=38440005 -- detailed information on the actions taken on parcel E.
05/26/03	http://www.atsdr.cdc.gov/HAC/PHA/treasure/tre_toc.html Gives very good information about the public health assessment with exposure dose and contaminants and lot more.
06/09/03	http://www.electmarie.freeservers.com/fire.html Lot of information about the contaminants in the soil, air. Links to several other related sites. Excellent recent photos of parcel E.
06/09/03	http://www.ujamaa.freeservers.com/MAP.HTM Earthquake amplification map
06/09/03	http://www.electmarie.freeservers.com/Arc_Ecology.htm Results of water, soil, and air samples
06/12/03	http://www.epa.gov/superfund/new/white.pdf Modeling to Evaluate Fate and Transport of Sediment-Bound Contaminants at Hunters Point shipyard

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Documents and data reviewed for the Hunters Point Storm Water Wetland Project (continued)

DATE	DESCRIPTION OF DOCUMENT/DATA
06/16/03	http://www.swrcb.ca.gov/bptcp/docs/conplnv2.doc look at the ref (pg 119)
06/18/03	Reed, S., Crites, R. & Middlebrooks, E. (1995) Natural Systems for Waste Management and Treatment (2nd ed.). New York:McGraw-Hill.
06/18/03	Hammer, D. (1992). Creating Freshwater Wetlands. Michigan: Lewis Publishers.
06/18/03	Wetlands Engineering & River Restoration. (2001). ASCE Conference Proceedings. Software.
06/18/03	East Bay Regional Park District. (1983). Final Hayward Marsh Expansion Management Plan. Management Plan for second phase development of wetland adjacent to San Francisco Bay.
06/23/03	www.terraserver.microsoft.com topographical map access
06/23/03	http://quake.wr.usgs.gov/research/seismology/wg02/summary earthquake probability map for SF Bay area.
06/23/03	http://www.wrh.noaa.gov/Monterey/climate.html rainfall data (7 yrs for SF airport)
06/23/03	http://www.wrcc.dri.edu/summary/climsmsfo.html very good link for climate summary at various station points in SF Bay area.
06/23/03	http://www.wrcc.dri.edu/htmlfiles/westevap.final.html. good link for evaporation rate at various station points in SF Bay area.
07/16/03	http://www.atsdr.cdc.gov/HAC/PHA/treasure/tre_p2.html. lists stormwater contaminants of concern.
07/16/03	http://efdsw.navfac.navy.mil/06HPS-E/investigation/PDF/draft_landfill_gas_report.final V2.pdf. provides information on landfill gas, recommended clay liner (?).
09/22/03	U.S. Department of Navy responses to agency comments on the Draft Storm Water Discharge Management Plan IR-01/21, Industrial Landfill, Parcel E, Hunters Point Shipyard, San Francisco, California of January 07, 2003. AECRU Contract No. N68711-00-D-0005. Prepared for the U.S. Department of Navy. Prepared by Tetra Tech EM Inc.
09/22/03	Final Storm Water Discharge Management Plan IR-01/21, Industrial Landfill, Parcel E, Hunters Point Shipyard, San Francisco, California. June 12, 2003. AECRU Contract No. N68711-00-D-0005. Prepared for the U.S. Department of Navy. Prepared by Tetra Tech EM Inc.
09/22/03	Draft Parcel E Nonstandard Data Gaps Investigation: Wetlands Delineation and Functions and Values Assessment: Parcels B and E, Hunters Point Shipyard, San Francisco, California. June 12, 2003. AECRU Contract No. N68711-00-D-0005. Prepared for the U.S. Department of Navy. Prepared by Tetra Tech EM Inc.
09/22/03	U.S. EPA Constructed Wetlands for Wastewater Treatment and Wildlife Habitat: 17 Case Studies. EPA832-R-93-005. September, 1993.
09/22/03	Draft Parcel E Nonstandard Data Gaps Investigation: Landfill Lateral Extent Evaluation. Hunters Point Shipyard, San Francisco, California. June 12, 2003. AECRU Contract No. N68711-00-D-0005. Prepared for the U.S. Department of Navy. Prepared by Tetra Tech EM Inc.
01/19/04	Draft Community Relations Plan. Hunters Point Shipyard, San Francisco, California. June 6, 2003. Prepared for the U.S. Department of Navy. Prepared by Innovative Technical Solutions, Inc.
01/19/04	Final First Five Year Review of Remedial Actions Implemented at Hunters Point Shipyard, San Francisco, California. December 10, 2003. Prepared by the Department of Navy.
02/15/04	Draft Hunters Point Shipyard Parcel F Validation Study. April 25, 2002. Prepared by the Department of Navy.
02/15/04	Draft Sampling and Analysis Plan (Field Sampling Plan and Quality Assurance Project Plan). Basewide Groundwater Monitoring Program. Hunters Point Shipyard, San Francisco, California. December 18, 2003. Prepared for the U.S. Department of Navy. Prepared by Tetra Tech EM, Inc.

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APPENDIX D

LIST OF AGENCY CONTACTS MADE FOR THE HUNTERS POINT CONSTRUCTION STROM WATER WETLAND PROMECT

List of agency contacts made for the Hunters Point Constructed Storm Water Wetland Project

Name/Agency	Phone/Email	Date/ (Initials)	Contact Summary
Tom Mumley /RWQCB-SFB	510-622-2395	09/16/03 (WJK)	Referred to Andre Breaux at 510-622-2324. Left her a message.
Julie Menack /SWQCB		07/30/03 (RK)	Spoke to her about the HPS. Some important points noted were: 1) RI/FS for parcel E has not been done yet. Only the preliminary report is available, 2) Interim capping done on the landfill has not yet been approved, and 3) A complete study on soil quality has not been done yet. A report on soil quality is expected by the end of summer.
James Collins/ OEHHA	510-622-3146 jcollins@oehha.ca.gov	06/17/03 (RK)	Provided us with all the contact information we needed; sent mails to agencies to help us.
Kathy Camarda /USEPA		07/30/03 (RK)	Spoke to her about the availability of most recent files on HPS. Got a list of files about parcel E. A request for some of those files has been placed. No reply has been received yet.
Jackie Lane /USEPA	Lane.Jackie@epa.gov	07/30/03 (RK)	Requested information about the community around HPS. Received some contact information and came to know more about the agencies involved with HPS. Received some useful web sites with very good information on HPS.
Keith Forman/ U.S. Navy	(619)532-0913 formanks@efdsw.nav fac.navy.mil	07/30/03 (RK)	Discussed some points about HPS; Has been in contact through e-mail and phone; Got information about a few files available at San Francisco repository; He has offered to come down and meet with us if necessary at the final stages of the project.
Chien Kao/DTSC	(510)540-822 CKao@dtsc.ca.gov	07/30/03 (RK)	Has been in contact through e-mail and phone. Helped in understanding some points about HPS.
Jim Polisini/DTSC	Jpolisin@dtsc.ca.gov	07/30/03 (RK)	Has been in contact through e-mail; asked us to get a copy of the Parcel F Validation study; draw your own conclusions regarding the isopleths of PCBs in sediment off the landfill in the South Basin; also said that there is a clear trend of decreasing PCB sediment concentration with increasing distance from the landfill.

List of agency contacts made for the Hunters Point Constructed Storm Water Wetland Project (continued)

Name/Agency	Phone/Email	Date/(Initials)	Contact Summary
Michael Work/ USEPA	(415)972-3024 work.michael@epa.gov	07/30/03 (RK)	Has been in contact through e-mail and phone. Gave some pointers about looking for files; Offered to help in whatever way he can.
Kathy Camarda/ USEPA (Superfund Records Center)	(415) 536-2000 camarda.kathy@epa.gov	07/30/03 (RK)	Spoke to her about the availability of most recent files on HPS. Got a list of files about parcel E. A request for some of those files has been placed. Copies of requested files were provided to us.
Julie Menack /SWQCB	(510)622-2401 jsm@rb2.swrcb.ca.gov	07/15/03 10/17/03 11/03 (RK)	Requested an update about the background levels of COCs in soils at Hunters Point. RI/FS for parcel E has not been done yet. Only preliminary report is available; Interim capping done on the landfill has not yet been approved; No complete study on soil quality has been done yet. A report on soil quality is expected by the end of summer. The only soil data available is for the shoreline characteristics; No report yet on soil quality. The one that was due by the end of summer has been delayed; Should look forward to the Technical Memorandum of soil quality which might be available by the end of October; RI report on HPS (1993) may contain some background characteristics; No soil test has been done after the RI report.
Karen Taberski /RWQCB	kmt@rb2.swrcb.ca.gov	01/19/04 (RLW)	Requested for pointers, to find the storm water runoff quality for San Francisco region.
Tom Gallivan / Stevens Geomembrane	800-621-2281	01/ 29/04 (DR)	Requested geomembrane samples.
Misty/ Water Saver	303-289-1818	01/30/04 (DR)	Requested liner samples
Andre Breaux/ RWQCB-Oakland		(WJK)	Sending information on wetland regulatory issues
Ginger Mitcham/ Gundle Lining Sys.	800-435-2008	01/30/04 (DR)	Requested liner samples

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APPENDIX E

VALUES OF RUNOFF COEFFICIENT (C) FOR RATIONAL FORMULA

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Values of Runoff Coefficient (C) for Rational Formula
http://water.me.vccs.edu/courses/CIV246/table2.htm

Land Use	C	Land Use	C
Business:		Lawns:	
Downtown areas	0.70 - 0.95	Sandy soil, flat, 2%	0.05 - 0.10
Neighborhood areas	0.50 - 0.70	Sandy soil, avg., 2-7%	0.10 - 0.15
		Sandy soil, steep, 7%	0.15 - 0.20
		Heavy soil, flat, 2%	0.13 - 0.17
		Heavy soil, avg., 2-7%	0.18 - 0.22
		Heavy soil, steep, 7%	0.25 - 0.35
Residential:		Agricultural land:	
Single-family areas	0.30 - 0.50	Bare packed soil	0.30 - 0.60
Multi units, detached	0.40 - 0.60	*Smooth	0.20 - 0.50
Multi units, attached	0.60 - 0.75	*Rough	0.30 - 0.60
Suburban	0.25 - 0.40	Cultivated rows	0.20 - 0.50
		*Heavy soil, no crop	0.20 - 0.40
		*Heavy soil, with crop	0.10 - 0.25
		*Sandy soil, no crop	0.15 - 0.45
		*Sandy soil, with crop	0.05 - 0.25
		Pasture	0.05 - 0.25
		*Heavy soil	
		*Sandy soil	
		Woodlands	
Industrial:		Streets:	
Light areas	0.50 - 0.80	Asphalt	0.70 - 0.95
Heavy areas	0.60 - 0.90	Concrete	0.80 - 0.95
		Brick	0.70 - 0.85
Parks, cemeteries	0.10 - 0.25	Unimproved areas	0.10 - 0.30
Playgrounds	0.20 - 0.35	Drives and walks	0.75 - 0.85
Railroad yard areas	0.20 - 0.40	Roofs	0.75 - 0.95

***Note:** The designer must use judgment to select the appropriate "C" value within the range. Generally, larger areas with permeable soils, flat slopes and dense vegetation should have the lowest "C" values. Smaller areas with dense soils, moderate to steep slopes, and sparse vegetation should assigned the highest "C" values.

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APPENDIX F

WATER NEEDS FOR THE HUNTERS POINT STORM WATER WETLAND PROJECT

Water Needs for the Hunters Point Storm Water Wetland Project - Average Year

			Inflow		Outflow		
Month	Precipitation[1] (in/mo)	Evaporation[2] (in/mo)	Direct Precipitation[3] (acre-feet)	Runoff[4] (acre-feet)	Evaporation[3] (acre-feet)	Net Inflow (acre-feet)	Required Make-up Water (acre-feet)
January	4.50	1.36	7.5	8.7	-2.3	13.9	0.0
February	3.58	1.92	6.0	6.9	-3.2	9.7	0.0
March	2.85	3.04	4.8	5.5	-5.1	5.2	0.0
April	1.37	4.24	2.3	2.6	-7.1	-2.1	2.1
May	0.39	5.12	0.7	0.8	-8.5	-7.1	7.1
June	0.12	5.68	0.2	0.2	-9.5	-9.0	9.0
July	0.02	5.36	0.0	0.0	-8.9	-8.9	8.9
August	0.05	5.28	0.1	0.1	-8.8	-8.6	8.6
September	0.19	4.72	0.3	0.4	-7.9	-7.2	7.2
October	0.94	3.52	1.6	1.8	-5.9	-2.5	2.5
November	2.42	1.92	4.0	4.7	-3.2	5.5	0.0
December	3.57	1.36	6.0	6.9	-2.3	10.6	0.0
Total	**20.00**	**43.52**	**33.3**	**38.6**	**-72.5**	**-0.6**	**45.5**

Notes

[1]Values based on average of precipitation data for SFO from 1948-2003.
Website: http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?casfoa+sfo

[2]Values based on 80 percent of pan evaporation data for SFO estimated from meteorological data using the Penman equation.
Website: http://www.wrcc.dri.edu/htmlfiles/westevap.final.html

[3]Assumes 20 acres of wetland area.

[4]Assumes 38 acres of watershed area (excluding wetlands) with a composite runoff coefficient of 0.61.

Water Needs for the Hunters Point Storm Water Wetland Project - Dry Year

Month	Precipitation[1] (in/mo)	Evaporation[2] (in/mo)	Inflow		Outflow	Net Inflow (acre-feet)	Required Make-up Water (acre-feet)
			Direct Precipitation[3] (acre-feet)	Runoff[4] (acre-feet)	Evaporation[3] (acre-feet)		
January	2.36	1.36	3.9	4.6	-2.3	6.2	0.0
February	1.88	1.92	3.1	3.6	-3.2	3.6	0.0
March	1.49	3.04	2.5	2.9	-5.1	0.3	0.0
April	0.72	4.24	1.2	1.4	-7.1	-4.5	4.5
May	0.20	5.12	0.3	0.4	-8.5	-7.8	7.8
June	0.06	5.68	0.1	0.1	-9.5	-9.3	9.3
July	0.01	5.36	0.0	0.0	-8.9	-8.9	8.9
August	0.03	5.28	0.1	0.1	-8.8	-8.7	8.7
September	0.10	4.72	0.2	0.2	-7.9	-7.5	7.5
October	0.49	3.52	0.8	0.9	-5.9	-4.1	4.1
November	1.27	1.92	2.1	2.5	-3.2	1.4	0.0
December	1.87	1.36	3.1	3.6	-2.3	4.5	0.0
Total	**10.48**	**43.52**	**17.5**	**20.2**	**-72.5**	**-34.8**	**50.7**

Notes

[1]10th percentile of annual precipitation data set. This total is spread over the year based on the relative monthly precipitation for the average year (e.g., January has 22.5% of annual precipitation; February has 19.25% of annual precipitation, etc.).
Website: http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?casfoa+sfo

[2]Values based on 80 percent of pan evaporation data for SFO estimated from meteorological data using the Penman equation.
Website: http://www.wrcc.dri.edu/htmlfiles/westevap.final.html

[3]Assumes 20 acres of wetland area.

[4]Assumes 38 acres of watershed area (excluding wetlands) with a composite runoff coefficient of 0.61.

Water Needs for the Hunters Point Storm Water Wetland Project - Wet Year

Month	Precipitation[1] (in/mo)	Evaporation[2] (in/mo)	Inflow: Direct Precipitation[3] (acre-feet)	Inflow: Runoff[4] (acre-feet)	Outflow: Evaporation[3] (acre-feet)	Net Inflow (acre-feet)	Required Make-up Water (acre-feet)
January	6.49	1.36	10.8	12.5	-2.3	21.1	0.0
February	5.16	1.92	8.6	10.0	-3.2	15.4	0.0
March	4.11	3.04	6.9	7.9	-5.1	9.7	0.0
April	1.97	4.24	3.3	3.8	-7.1	0.0	0.0
May	0.56	5.12	0.9	1.1	-8.5	-6.5	6.5
June	0.17	5.68	0.3	0.3	-9.5	-8.9	8.9
July	0.03	5.36	0.1	0.1	-8.9	-8.8	8.8
August	0.07	5.28	0.1	0.1	-8.8	-8.5	8.5
September	0.27	4.72	0.5	0.5	-7.9	-6.9	6.9
October	1.36	3.52	2.3	2.6	-5.9	-1.0	1.0
November	3.49	1.92	5.8	6.7	-3.2	9.4	0.0
December	5.15	1.36	8.6	9.9	-2.3	16.3	0.0
Total	**28.83**	**43.52**	**48.1**	**55.7**	**-72.5**	**31.2**	**40.6**

Notes

[1] 90th percentile of annual precipitation data set. This total is spread over the year based on the relative monthly precipitation for the average year (e.g., January has 22.5% of annual precipitation; February has 19.25% of annual precipitation, etc.).
Website: http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?casfoa+sfo

[2] Values based on 80 percent of pan evaporation data for SFO estimated from meteorological data using the Penman equation.
Website: http://www.wrcc.dri.edu/htmlfiles/westevap.final.html

[3] Assumes 20 acres of wetland area.

[4] Assumes 38 acres of watershed area (excluding wetlands) with a composite runoff coefficient of 0.61.

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APPENDIX G

ASSESSMENT OF WETLAND PLANTS OF THE SAN FRANCISCO BAY AREA IN RELATION TO ECOLOGICAL MOSQUITOE CONTROL

From Appendix I of Collins and Resh (1989)

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A practical assessment of common plants of palustrine wetlands of the San Francisco Bay Area in relation to ecological mosquito control.

Plant species in this appendix are classified by growth form, according to the scheme of the Tennessee Valley Authority (see list of information sources, p. 85). Each plant species is quantitatively evaluated on a scale of 1 to 5 with regard to each of the following four ecological parameters.

(1) Intersection Line Value (ILV). This value is high for plants with complex architecture that provide abundant positive menisci during most of the plant growth cycle; moderate for plants that usually provide intermediate amounts of positive menisci or that provide abundant menisci for a short portion of the plant growth cycle; low for plants that provide negative menisci or that have simple architecture that provides scarce positive menisci.

(2) Crayfish Food Value (CFV). This value is low for plants that are usually accessible and preferable as food for mature crayfish; moderate for plants that are seasonally not accessible or that are not preferred as food; high for plants that are not palatable or that are usually not accessible.

(3) Waterfowl Food Value (WFV). This value is low for plants that are entirely palatable and that are preferred as food by dabbling ducks and geese; moderate for plants that are palatable in part or that are not preferred as food; high for plants that are either not palatable or that do not usually occur where waterfowl are abundant.

(4) Fish Obstruction Value (FOV). This value is high for plants that provide abundant positive menisci and that restrict dispersal and predation by insectivorous fish at the water surface; moderate for plants that provide abundant menisci but that do not restrict fish dispersal; low for plants that neither provide abundant positive menisci nor restrict fish dispersal.

A plant complements ecological mosquito control with regard to any parameter for which the plant has a low score. The sum of scores for all four parameters for any plant is its total score. A low total score for a plant indicates that it complements ecological mosquito control in general. The following scale is a guideline to identify potentially beneficial or detrimental plants that are listed in the Appendix.

Plant Assessment	Recommended Management Practice
Total Score < 9	maintain natural patch size.
9 < Total Score < 13	maintain small patch size.
Total Score > 14	minimize patch size.

This practical assessment is based upon information from a variety of sources, including correspondence with personnel of the California Department of Fish and Game and the United States Fish and Wildlife Service (San Pablo Bay and San Francisco Bay National Wildlife Refuges).

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PLANT FORM	TAXA	ILV	CFV	WFV	FOV	Total
Erect-Naked						
	Chenopodiaceae (pickleweeds)					
	Salicornia virginica	2	5	5	1	13
	Asteraceae (brass-button)					
	Cotula coronopifolia	2	5	1	2	10
	Juncaginaceae (arrowgrass)					
	Triglochin maritima	1	5	4	1	11
	Juncaceae (rushes)					
	Juncus effusus	1	3	4	2	10
	J. patens	1	3	4	2	10
	J. balticus	1	3	4	2	10
	J. lesueurii	1	3	3	2	9
	J. acutus	1	3	5	4	13
	J. bufonius	1	3	3	2	9
	J. sphaerocarpus	1	3	4	2	10
	J. bolanderi	1	3	4	2	10
	J. rugulosus	1	3	4	2	10
	J. torreyi	1	3	4	2	10
	J. xiphioides	1	3	4	2	10
	Cyperaceae (bullrushes, spikerushes, sedges)					
	Scirpus fluviatilis	1	4	5	3	13
	S. robustus	1	4	2	2	9
	S. americanus	1	4	2	3	10
	S. olneyi	1	4	4	3	12
	S. acutus	1	5	5	4	15
	S. koilolepsis	1	3	2	3	9
	S. californicus	1	5	5	4	15
	Cyperus niger	1	4	4	3	12
	C. aristatus	1	3	2	3	9
	C. difformis	1	4	4	2	11
	C. esculentus	2	4	4	3	13
	Eleocharis palustris	1	3	4	2	10
	Carex stipata	2	4	4	3	13
	C. bolanderi	2	4	4	3	13
	C. obnupta	2	4	3	2	11
	C. rostrata	2	4	5	3	14
	Sparganiaceae (burreeds)					
	Sparganium eurycarpum	2	4	4	3	13
	Typhaceae (cattails)					
	Typha latifolia	2	5	5	5	17
	T. angustifolia	2	5	5	4	16
	T. glauca	2	5	5	4	16

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PLANT FORM	TAXA	ILV	CFV	WFV	FOV	Total
Erect-Leafy						
	Equisetaceae (horsetails)					
	Equisetum arvense	2	5	5	2	14
	Pteridaceae (ferns)					
	Pteridium aquilinum	2	5	5	1	13
	Plantaginaceae (plantains)					
	Plantago hirtella	2	3	3	1	9
	P. major	2	3	3	1	9
	Alismataceae (water-plantains, arrowheads)					
	Alisma triviale	2	2	2	1	7
	A. geyeri	2	2	2	1	7
	Sagittaria latifolia	2	2	2	1	7
	S. montevidensis	2	3	2	1	8
	S. longiloba	2	2	2	1	7
	S. sanfordii	2	2	2	1	7
	Echinodorus berteroi	2	4	2	2	10
	Onagraceae (primroses)					
	Ludwigia spp.	2	2	4	1	9
	Jussiaea repens	4	3	4	5	16
	Lythraceae (loosestrifes)					
	Lythrum californicum	2	4	4	3	13
Flexus						
	Frankeniaceae (alkali heath)					
	Frankenia grandifolia	2	5	5	2	14
	Poaceae (grasses)					
	Phragmites communis	3	5	5	4	17
	Distichlis spicata	4	5	5	4	18
	Deschampsia danthonoides	3	5	2	1	11
	D. beringensis	3	5	2	1	11
	D. holciformis	3	5	2	1	11
	Alopecurus howellii	2	4	2	1	9
	Polypogon elongatus	2	4	4	1	11
	Echinochloa crusgalli	3	4	1	3	11
	Glyceria leptostachya	2	4	3	3	12
	G. occidentalis	2	4	3	3	12
	Zizania aquatica	3	2	4	4	13
	Leersia oryzoides	3	2	3	3	11
	Oryza sativa	2	2	2	3	9
	Phalaris arundinacea	3	4	4	3	14
	Beckmannia syzigachne	2	4	3	3	12
	Heleochloa schoenoides	2	4	1	3	10
	Leptochloa fascicularis	2	4	1	3	10

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PLANT FORM	TAXA	ILV	CFV	WFV	FOV	Total
Flexus (continued)						
	Polygonaceae (smartweeds)					
	Polygonum punctatum	3	4	2	3	12
	P. coccineum	3	4	2	3	12
	P. hydropiperoides	3	4	2	3	12
	P. lapathifolium	3	4	2	3	12
	P. paronychia	3	4	2	3	12
	P. patulum	3	4	2	3	12
	P. amphibium	4	4	1	5	14
	P. pennsylvanicum	3	4	2	3	12
	Rosaceae (cinquefoils)					
	Potentilla rivalis	3	3	2	3	11
	P. palustris	3	3	2	3	11
	Asteraceae (cockleburs)					
	Xanthium strumarium	2	4	5	3	14
Pleuston						
	Lemnaceae (duckweeds)					
	Spirodela polyrhiza	1	5	2	1	9
	Lemna minima	1	5	2	1	9
	L. perpusilla	1	5	2	1	9
	L. gibba	1	5	2	1	9
	L. valdiviana	1	5	2	1	9
	Wolffiella lingulata	1	5	2	1	9
	Salviniaceae (water ferns)					
	Azolla filiculoides	1	4	4	1	10
Floating Mat						
	Apiaceae (marsh pennyworts)					
	Hydrocotyle ranunculoides	4	4	2	5	15
	H. umbellata	4	4	2	5	15
	Ranunculaceae (crowfoots)					
	Caltha howellii	4	4	3	4	15
	Ranunculus flammula	4	4	3	4	15
	R. pusillus	4	4	3	4	15
	R. flabellaris	4	4	3	4	15
	R. aquatilis	4	4	3	5	16
	Brassicaceae (water-cress)					
	Nasturtium officinale	4	4	2	5	15
	Scrophulariaceae (figworts)					
	Bacopa nobsiana	3	4	3	3	13

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PLANT FORM	TAXA	ILV	CFV	WFV	FOV	Total
Floating Leaf						
	Nymphaeaceae (cow-lily, water-shield)					
	Nuphar polysepalum	3	2	4	2	11
	Brasenia schreberi	1	4	5	2	12
	Araceae (water-lettuce)					
	Pistia stratiotes	4	5	5	4	18
	Pontederiaceae (water-hyacinth)					
	Eichhornia crassipes	4	5	5	4	18
	Potamogetonaceae (pondweeds)					
	Potamogeton crispus	2	2	2	2	8
	P. diversifolius	2	2	2	2	8
	P. nodosus	2	2	2	2	8
Submergent						
	Haloragaceae (water-milfoils)					
	Myriophyllum brasiliense	5	3	4	5	17
	M. spicatum	4	2	4	4	14
	Callitrichaceae (water-starwort)					
	Callitriche longipedunculata	2	2	4	3	11
	Zannichelliaceae (horned pondweeds)					
	Zannichellia palustris	2	2	4	2	10
	Najadaceae (water-nymphs)					
	Najas flexilis	3	2	4	2	11
	N. graminea	3	2	4	2	11
	Lentibulariaceae (bladderworts)					
	Utricularia vulgaris	3	3	4	3	13
	U. gibba	3	3	4	2	12
	Ceratophyllaceae (hornworts)					
	Ceratophyllum demersum	3	4	4	4	15
	Hydrocharitaceae (frogbits)					
	Elodea densa	3	2	4	2	11
	E. canadensis	1	2	4	1	8
	Ruppiaceae (wigeon grass)					
	Ruppia spiralis	3	3	2	3	11
	Potamogetonaceae (pondweeds)					
	Potamogeton filiformis	4	2	3	4	13
	P. pectinatus	5	2	1	5	13
	P. foliosus	4	2	3	4	13

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APPENDIX H

LINER TYPES, PROPERTIES, APPLICATIONS, AND MANUFACTURERS AVAILABLE FOR HUNTERS POINT STORM WATER WETLAND

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Liner Types, Properties, Application, and Manufacturers Available for Hunters Point Storm Water Wetland

USEPA guidelines on "Liners and Leak Detection Systems for Hazardous Waste Land Disposal Units" are available at http://tis.eh.doe.gov/oepa/guidance/rcra/leak.pdf.

There are different types of liners based on the properties of a liner and the application for use (Table H-1). For a wetland with a double liner and a leak detection system, components to consider include:
liner for water impoundment
liner chemically resistant to hazardous material
textile for drainage collection
sealant

Table H-1. Liner Types, Properties, Application, and Manufacturers.

Application	Properties	Product name	Manufacturer
Water impoundments	Low thermal expansion/contracting properties; Tough	8130 XR-5, 8138 XR-5, 8228 XR-3, XR-3 FILM 8130 XR-3 PW	XR Technology
Resistant to Hazardous Waste	Resistant to various strong chemicals, acids, oxidizing agents, oil, some nuclear wastes and others. Resistant to cracking Very low permeability	Polypropylene geomembrane Hyplon geomembrane XR-5 Geomembrane Liner RUFCO 3000B Coolshield Coolthane	Cooley, Stevens Geomembranes Stevens Geomembranes Geomembrane Bristar Containment Industries Inc. Cooley
Component of landfill base seals	Containment of contaminated liquid	Carbofol	Naue Fasertechnik GmbH & Co.
Drainage	Retains soil, allows root growth	Terrafix®	Naue Fasertechnik GmbH & Co.

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Letter 82: Arc Ecology (1/12/10)

Response to Comment 82-1

This comment contains introductory, closing, or general background information and is not a direct comment on environmental issues or the content or adequacy of the Draft EIR. No response is required.

Response to Comment 82-2

As a result of the size of the Project, the mass emissions will be above the BAAQMD mass emission thresholds of significance (Impact AQ-4), resulting in a "significant and unavoidable" determination. However, despite its size, the Project has been designed to minimize these exceedances to the extent possible. The Project's design incorporates a dense, compact development plan that includes a diverse mix of land uses that are well connected with regional mass transit systems, all of which serve to reduce the mass emissions of this Project compared to a similar sized project without these design features, as stated on page III.H-31:

> Table III.H-5 (Operational Criteria Pollutant Emissions [Year 2030]) presents the emission modeling with comparisons to BAAQMD thresholds and the transportation scenario without trip reduction features (referred to as the Business as Usual [BAU] scenario). The estimated daily criteria pollutant emissions associated with the proposed Project and the BAU scenario are shown in Table III.H-5 in comparison with each other and with the BAAQMD CEQA significance criteria. Although the Project would generate substantially fewer emissions than the BAU scenario (i.e., from 14 to 50 percent less than BAU depending on the pollutant), Project emissions of ROG, NO_X, PM_{10}, and $PM_{2.5}$ would exceed the BAAQMD thresholds. No additional feasible mitigation measures have been identified that would further reduce the Project's operational criteria emissions below the BAAQMD thresholds. This would be a significant and unavoidable impact.
>
> However, the Project design is a dense, infill mixed-use project, with a transit-oriented design, which is consistent with Senate Bill 375 as well as the San Francisco's sustainable city initiatives to reduce emissions, on a per-capita basis by its very nature. However, the BAAQMD CEQA guidelines list a total mass of criteria pollutants as its CEQA threshold. Accordingly, a large project, such as this one, regardless of its design and location will always exceed these mass-based thresholds.

While the emissions from the Project may exceed the mass thresholds, as discussed in Impact AQ-9, the Project would conform to the current regional air quality plan, and therefore would not impair the ability of the BAAQMD to maintain air quality within its jurisdiction. Therefore, the Project would neither worsen existing air quality nor contribute substantially to projected air quality violations.

Response to Comment 82-3

The comment incorrectly states that requiring a site mitigation plan, contingency plan, or health and safety plan does not constitute a mitigation measure, but only "a promise of the intent to have a mitigation measure." In fact, the Draft EIR provides legally binding mitigation through formulation of, and compliance with, approved plans meeting certain performance standards and utilizing detailed methods.

As the Draft EIR explains, the Project is legally committed to utilizing the mitigation measures corresponding to Impacts HZ-1 through HZ-14. Prior to obtaining a site permit, building permit or other authorization from the City for development activities in various areas, the Project Applicant must comply with the mitigation measures, which require, for example, preparation of a site mitigation plan under Article

22A of the *San Francisco Health Code* (MM HZ-1a), or approval by the San Francisco Department of Public Heath of an unknown contaminants contingency plan (MM HZ-2a.1). Without such approval and compliance with the mitigation measures, no permit may be issued, and no development may take place.

The mitigation measures do not, and cannot, contain the full specifics of the site mitigation plans, contingency plans, and health and safety plans since those plans must take into account circumstances that exist at the time they are prepared. However, the Draft EIR does provide significant detail about the purposes and required content of the plans and the standards they must be designed to achieve. For example, mitigation measure MM HZ-1a, Draft EIR page III.K-54, requires that, where the site investigation reveals a hazardous materials release:

> The site mitigation plan shall identify, as appropriate, such measures as excavation, containment, or treatment of the hazardous materials, monitoring and follow-up testing, and procedures for safe handling and transportation of the excavated materials, or for protecting the integrity of the cover or for addressing emissions from remedial activities, consistent with the requirements set forth in Article 22A.

The Draft EIR further states that any remedial activities, safety protocols, and control measures required would be similar to the specific measures described in Draft EIR Table III.K-2 (Remedial Actions, Potential Environmental Effects, and Methods to Reduce Effects), pages III.K-74 -76. Similarly, mitigation measure MM HZ-2a.1, in describing contingency plans, states the plans will accomplish appropriate notification and site control utilizing methods including further investigation and remediation in various forms where necessary. Please refer to the mitigation measures corresponding to Impacts HZ-1 through HZ-14 for further detail.

Response to Comment 82-4

Mitigation measure MM HZ-10b provides for the creation of legally binding design documents, approved by all required regulatory agencies (including USEPA, DTSC, RWQCB, and the Navy and CDPH if necessary) for the installation of any pilings through a landfill cap. The Draft EIR outlines specific standards those documents must adhere to; in particular, they must describe how the cap will be evaluated to determine the potential adverse effect of shoreline improvements, and they must describe the method of construction to mitigate environmental risk and restore the cap. Mitigation measure MM HZ-10b ensures that, before any construction activities take place that could potentially affect contaminated sediments, the Agency, its contractors, or the Project Applicant shall comply with all requirements incorporated into the design documents, work plans, health and safety plans, dust control plans, and any other document or plan required under the Administrative Order on Consent. In addition to Impact HZ-10 and mitigation measure MM HZ-10b, refer to Master Response 10 (Pile Driving through Contaminated Soil) for a detailed discussion on these topics.

Response to Comment 82-5

As stated in mitigation measure MM HZ-15, Draft EIR page III.K-99, the Project Applicant must attain approval of an Asbestos Dust Mitigation Plan (ADMP) prior to obtaining any permit from the City that includes soil disturbing activities for areas over one acre, and additionally the Project Applicant must attain approval of a Dust Control Plan (DCP) prior to obtaining any such permit for areas over 0.5 acre. The ADMP and DCP must be approved by BAAQMD and SFDPH, respectively, and must meet certain standards through numerous dust control measures. The DCP addresses all forms of dust and is not

specifically targeted at naturally occurring asbestos, although most of the mitigation measures required by the plan have the effect of controlling emissions of naturally occurring asbestos disturbed during excavation activities. The City and County of San Francisco's "no visible dust" objective is likewise not specifically targeted at naturally occurring asbestos emissions. The ADMP approved by the BAAQMD is specifically targeted at controlling naturally occurring asbestos emissions (whether visible or not), as required by the state regulation promulgated by the California Air Resources Board called the Airborne Toxic Control Measures (ATCM). The state ATCM regulations do not require ambient air monitoring to be included as a part of ADMPs; however, the regulations provide that air districts may require an ADMP to include such monitoring. Consistent with the state ATCM regulations, MM HZ-15 requires the ADMP for the Project to include ambient monitoring to the extent the BAAQMD requires such monitoring. In approving the ADMP for HPS Phase I, the BAAQMD did require ambient air monitoring, and continues to require it. There is no reason to believe the BAAQMD would vary from its position of requiring ambient air monitoring when approving the ADMP for the Project. Refer to mitigation measure MM HZ-15 and Master Response 12 (Naturally Occurring Asbestos) for detail regarding the DCP and ADMP.

Response to Comment 82-6

Comment noted. The shutdown criteria in the BAAQMD-approved ADMP for HPS Phase I was established using the methodology employed by the California Office of Environmental Health Hazard Assessment (OEHHA), and corresponds to a risk level of one increased cancer per 10,000 (at the level suggested by the commenter). As indicated in the Response to Comment 82-5, there is no reason to believe the BAAQMD will require a different monitoring program in the ADMP for the Project than it did for the ADMP for HPS Phase I.

Response to Comment 82-7

The ambient air monitoring conducted by the Project Applicant at HPS Phase I includes four "community" monitoring stations operated by an independent contractor under the supervision of the San Francisco Department of Public Health. Samples from these monitoring stations are analyzed by a different laboratory than the one that analyzes the samples from the monitors operated under the direct supervision of the Project Applicant. Under the ADMP, the results of the community air monitors have the same legal effect as those of the monitors operated under the direct supervision of the Project Applicant; in both cases the Project Applicant is required to shut down project operations if monitoring results are above certain thresholds. If the BAAQMD requires ambient air monitoring to be included in the ADMP for the Project (as described in the Response to Comment 82-5 above), it is likely that similar community monitoring stations will be utilized. With respect to the public provision of monitoring data, monitoring results will be available to the community through Navy and City community participation programs and through regulatory agencies. Further, additional notice requirements will be implemented under mitigation measure MM HZ-15, Draft EIR page III.K-99, as described in Master Response 16 (Notification Regarding Environmental Restrictions and Other Cleanup Issues).

The shutdown criteria in the BAAQMD-approved ADMP for HPS Phase I is if the results from one of the air monitors exceeds 16,000 structures per cubic meter. This level was established using the methodology employed by the California Office of Environmental Health Hazard Assessment (OEHHA), and corresponds to a risk level of one increased cancer per 10,000 (at the level suggested by the commenter). As

indicated in Response to Comment 82-5, there is no reason to believe the BAQMD will require a different monitoring program in the ADMP for the Project than it did for the ADMP for HPS Phase I.

Response to Comment 82-8

The commenter states that removal of riprap at Candlestick Point would have a significant impact on oysters and recommends replacement of hard substrate that is to be removed with new hard substrate. As stated in Impact BI-10a, page III.N-83 in the Draft EIR, the scenario recommended by the commenter is what is anticipated to occur as a result of the Project—hard substrate that is removed will be replaced by similar hard substrate suitable for colonization by oysters. Thus, the Draft EIR correctly concludes that impacts to oysters on Candlestick Point will be less than significant.

Response to Comment 82-9

The commenter states that the mitigation measures for potential Project impacts to green sturgeon are incomplete, as Section 7 consultation with the NMFS will be necessary regarding impacts to this species. The commenter suggests that the NMFS may not approve impacts from the bridge.

The regulatory process, which may include a Section 7 consultation, is a parallel but separate process from the CEQA process, and resolution of permitting issues is not required for assessment of impacts, specification of measures necessary to mitigate impacts to less than significant levels, and project approval under CEQA.

Response to Comment 82-10

In reference to the comment that re-suspension of sediment at Candlestick Point may result in impacts to biological resources, Impact BI-19a referenced in this comment pertains to the operational aspects of the development at Candlestick Point. No activities resulting in the re-suspension of sediments at Candlestick Point will occur after construction is completed.

Response to Comment 82-11

In reference to the comment that consultation with the NMFS and CDFG will be necessary regarding potential maintenance dredging impacts to fish and eelgrass, refer to Response to Comment 82-9 above regarding the distinction between the regulatory permitting process and the CEQA process. The applicant will be required to consult with both agencies regarding regulatory issues, separate from the CEQA process.

Response to Comment 82-12

One comment suggested that flashing lights, rather than continuously burning lights, on tops of buildings may not be permissible by the US Coast Guard. According to David Sulouff, Chief of the Bridge Section for the Eleventh Coast Guard District, the Coast Guard is not expected to have any concerns over lighting on tops of the towers on Candlestick Point and HPS Phase II, as such lights would not pose an impediment to navigation of vessels on San Francisco Bay.[121]

[121] David H. Sulouff, pers. comm. to Steve Rottenborn of H. T. Harvey & Associates, March 10, 2010.

Response to Comment 82-13

The suggestion that measures to protect native oysters from maintenance dredging, including a turbidity plume study, are not necessary, are noted. The commenter may be correct in suggesting that a survey for oysters on substrates within the marina may not detect the species. Nevertheless, in light of concerns regarding the status of this native species inside San Francisco Bay, these measures are being required to ensure against impacts to a substantial and important occurrence of the species (e.g., a large oyster bed), in the unlikely event that such an occurrence be present.

Response to Comment 82-14

In reference to the comment regarding the Pacific herring spawning season and seasonal restrictions pertaining to the spawning season, refer to Response to Comment 37-1.

Response to Comment 82-15

In response to the comment, the text in mitigation measure MM HZ-1a, Draft EIR page III.K-55 (and Table ES-2, page ES-51), has been revised as follows:

MM HZ-1a …

To the extent that Article 22A does not apply to state-owned land at CPSRA, prior to undertaking subsurface disturbance activities at CPSRA, the Agency and the California Department of Parks and Recreation shall enter into an agreement to follow procedures ~~comparable~~ equivalent to those set forth in Article 22A for construction and development activities conducted at Candlestick Point State Recreation Area.

Response to Comment 82-16

Documents prepared for the Project approval hearing process will include a Mitigation Monitoring and Reporting Program, which will describe who is responsible for implementing and monitoring the mitigation measures that are adopted.

Response to Comment 82-17

In response to the comment, mitigation measure MM HY-1a.1, Draft EIR page III.M-59 (and Table ES-2, page ES-77), has been edited to add the following text to the second item under the first bullet:

MM HY-1a.1 […]

> *Erosion Control BMPs—Preserve existing vegetation where feasible, apply mulch or hydroseed areas with native, non-invasive species, until permanent stabilization is established, and use soil binders, geotextiles and mats, earth dikes and drainage swales, velocity dissipation devices, slope drains, or polyacrylamide to protect soil from erosion.*

In response to the comment, the text for mitigation measure MM HY-1a.2, Draft EIR page III.M-62 (and Table ES-2, pages ES-79 and -81), the following sentence has been added to the second item under the first bullet as well as to the first item under the tenth bullet:

MM HY-1a.2 …

- *Erosion and Sedimentation:*

…

> *Stabilize and re-vegetate disturbed areas as soon as possible after construction with planting, seeding, and/or mulch (e.g., straw or hay, erosion control blankets, hydromulch, or other similar material) except in actively cultivated areas. Planting and seeding shall use native, non-invasive species.*

…

- *Post-construction BMPs:*

> *Re-vegetate all temporarily disturbed areas as required after construction activities are completed. Re-vegetation shall use native, non-invasive species.*

…

In addition, Appendix N3 of the Draft EIR includes a Draft Parks, Open Space, and Habitat Concept Plan that describes proposed removal of, monitoring for, and ongoing control of invasive plants and describes proposed revegetation efforts.

Response to Comment 82-18

Natural, living shorelines will be incorporated wherever possible and feasible with input from local agencies and stakeholders. Mitigation measures proposed will also require approvals from a myriad of environmental and other regulatory agencies prior to construction, which will provide independent review of their design and performance.

The design of the Project shoreline improvements must consider structural integrity, functionality, and regulatory requirements. Living shorelines emphasize the use of natural materials including marsh plantings, shrubs and trees, low profile breakwaters, strategically placed organic material, and other techniques that recreate the natural functions of a shoreline ecosystem. Table II-13 (Summary of Shoreline Improvements at the Project Site) of the Draft EIR, starting on page II-57, and Table II-14 (Description of Existing Shoreline Conditions and Proposed Improvement Concepts), starting on page II-59, shows the areas where beaches and tidal wetlands would be constructed. Table II-14 also identifies areas where bulkheads could be replaced with a natural shoreline edge. Figure II-20 (Natural Shoreline Recommended Work Map), on page II-68 of the Draft EIR, illustrates the areas where living shoreline elements are proposed.

In response to the comment, mitigation measure MM HY-12a.2, Draft EIR page III.M-102 (and Table ES-2, page ES-89), has been revised as follows:

MM HY-12a.2 Shoreline Improvements for Future Sea-Level Rise. *Shoreline and public access improvements shall be designed to allow future increases in elevation along the shoreline edge to keep up with higher sea level rise values, should they occur. Design elements shall include providing adequate setbacks to allow for future elevation increases of at least 3 feet ~~along the shoreline~~ from the existing elevation along the shoreline. Before the first Small Lot Final Map is approved, the Project Applicant must petition the appropriate governing body to form (or annex into if appropriate) and administer a special assessment district or other funding mechanism to finance and construct future improvements necessary to ensure that the shoreline, public facilities, and public access improvements will be protected should sea level rise exceed 16 inches at the perimeter of the Project. Prior to the sale of the first residential unit within the Project, the legislative body shall have acted upon the petition to include the property within the district boundary. The newly formed district shall also administer a Monitoring and Adaptive Management Plan to monitor sea level and implement and maintain the protective improvements.*

In response to the comment, the text for mitigation measure MM HY-14 on page III.M-106 (and Table ES-2, pages ES-90 to -91) of the Draft EIR has been revised as follows:

> *MM HY-14* Shoreline Improvements to Reduce Flood Risk. *To reduce the flood impacts of failure of existing shoreline ~~protection~~ structures, the Project Applicant shall implement shoreline improvements for flood control protection, as identified in the Candlestick Point/Hunters Point Development Project Proposed Shoreline Improvements report. Where feasible, elements of living shorelines shall be incorporated into the shoreline protection improvement measures.*

Response to Comment 82-19

Refer to Master Response 8 (Sea Level Rise) and Responses to Comments 36-2, 57-1, and 58-3 for a comprehensive discussion of the sea level rise documents reviewed, the levels of sea level rise taken into account for various Project components, and the plan to provide flood protection if higher levels of sea level rise occur. The Adaptation Strategy includes measures to provide continued flood protection beyond the 16 inches of sea level rise that it is initially built to, thereby ensuring that open-space and public uses continue.

Response to Comment 82-20

Refer to Response to Comment 82-16, which is identical to this comment.

Response to Comment 82-21

Refer to Response to Comment 82-18 for a discussion of the incorporation of natural, living shoreline elements into the project, wherever possible and feasible, with input from local agencies and stakeholders, and to the extent that such measures are compatible with proposed shoreline treatments.

Response to Comment 82-22

The suggestion that the natural shoreline incorporate a variety of habitats, including deep intertidal, eelgrass, and native oyster beds and reefs, is noted. The Project will incorporate habitat diversity into this shoreline to the extent that such measures are compatible with proposed shoreline treatments.

Refer also to Response to Comment 57-3 for a discussion of shoreline protection and improvements.

Response to Comment 82-23

This comment contains introductory, closing, or general background information and is not a direct comment on environmental issues or the content or adequacy of the Draft EIR. No response is required.

Response to Comment 82-24

Figure C&R-17 (Cross-section of the Yosemite Slough Bridge, With Stadium and Without Stadium) presents the proposed cross-section of the Yosemite Slough bridge under conditions with and without a new NFL stadium. As shown, with the stadium, the bridge would be 81 feet wide, including a 40-foot-wide bicycle/pedestrian promenade (which would be converted to four 10-foot-wide travel lanes on game days only), a 2-foot-wide median on either side of the promenade, two 11-foot-wide BRT lanes, a 2-foot-wide median barrier, a 12-foot-wide Class I bicycle/pedestrian facility, and a 1-foot-wide shoulder. Under

conditions without the new stadium, the bridge would be 41 feet wide and would include a 12-foot-wide Class I bicycle/pedestrian facility and two 11-foot-wide BRT lanes.

Response to Comment 82-25

This comment repeats information presented in the Draft EIR regarding traffic impacts of Alternative 2. No additional response is required.

Response to Comment 82-26

The intent of the statement was to note that game-day traffic impacts would be exacerbated under Alternative 2 without the bridge compared to the Project. In response to the comment, the text in Section VI.D (Environmentally Superior Alternative), second paragraph, second and third sentences, page VI-160, has been revised as follows:

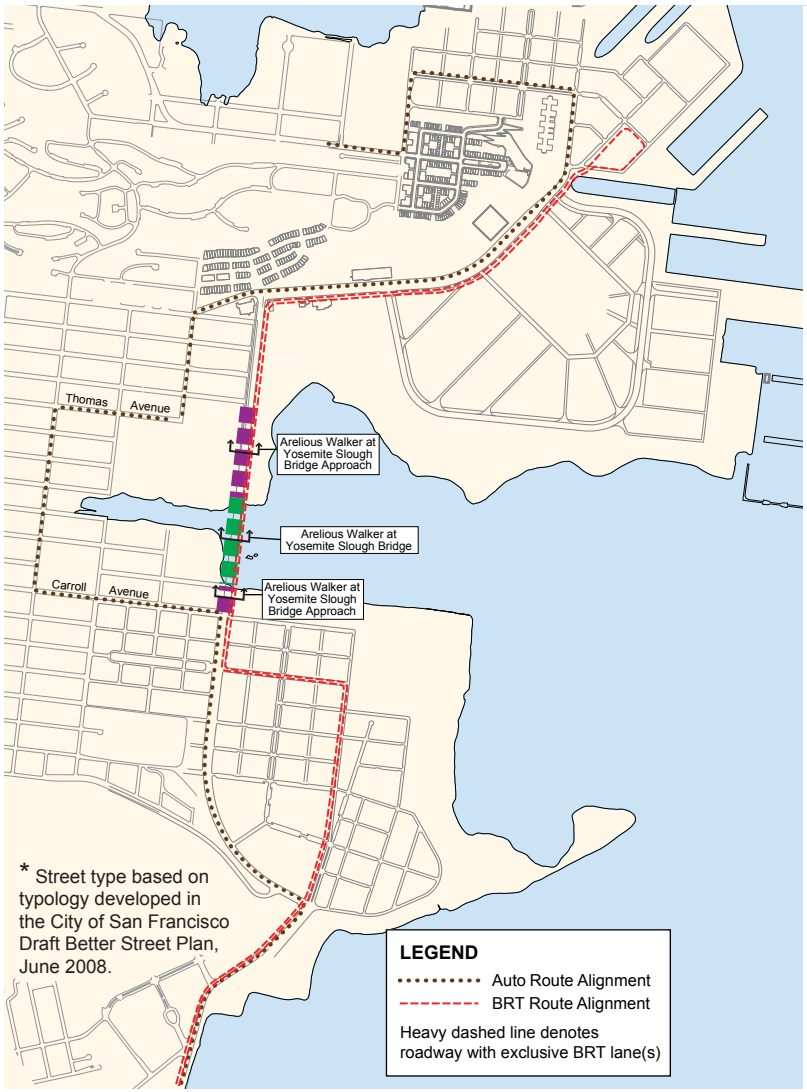
> … Alternative 2 (CP-HPS Phase II Development Project, HPS Phase II Stadium, State Parks Agreement, and without the Yosemite Slough Bridge) would avoid Project impacts related to biological resources, water quality, and hazardous materials because the Yosemite Slough bridge would not be constructed. However, because the Yosemite Slough bridge would not be constructed, Alternative 2 would result in increased traffic-related impacts~~, particularly~~ on game days. …

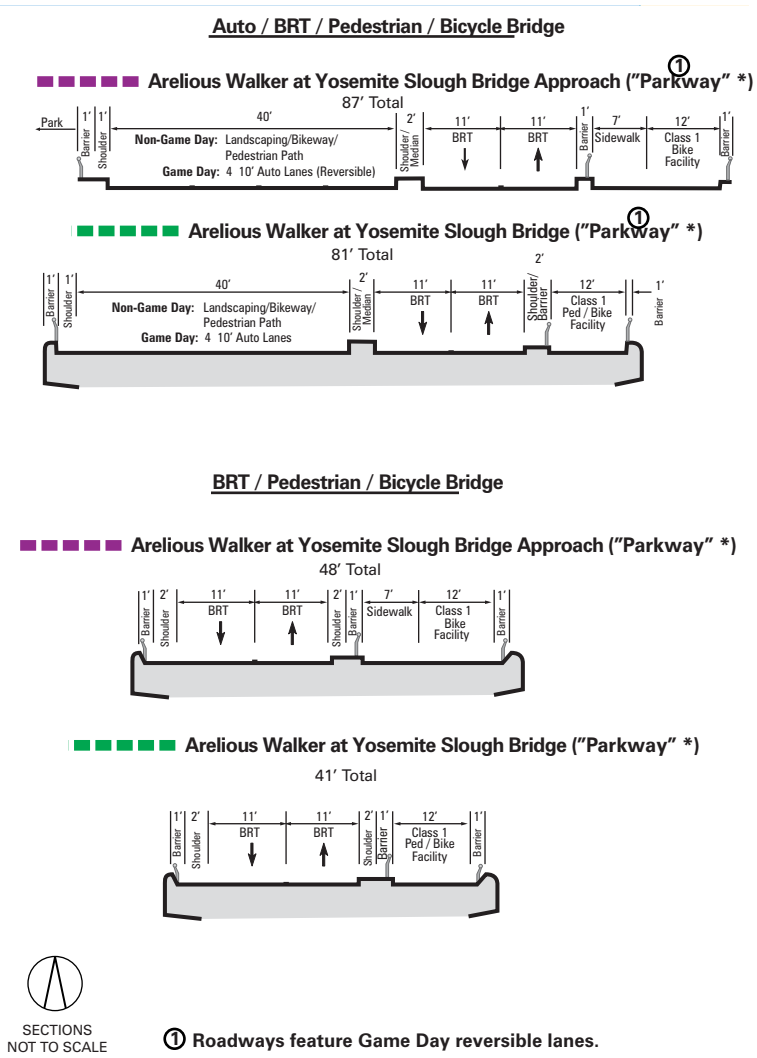
Response to Comment 82-27

In response to the comment, Figure VI-1 (Alternative 2 Circulation Plan Railroad Right-of-Way for Bus Rapid Transit) shows the correct alignment of the proposed BRT route for Alternative 2.

The commenter notes that the BRT route proposed under conditions without the Yosemite Slough bridge would travel in exclusive right-of-way and that the explanatory text does not include this information. In response to the comment, the text in Section VI.C (Analysis of Project Alternatives), under the Transit Impacts heading, page VI-34, the second paragraph under this heading, has been revised as follows:

> Although the alternative BRT route around Yosemite Slough would be technically feasible, it would not be an optimal configuration for a BRT system. BRT service would provide direct, fast, and reliable travel in a dedicated right-of-way, typically with signal priority for ~~V~~BRT vehicles. When these elements are combined, the BRT service takes on a higher quality character than typical local bus service. The Yosemite ~~s~~Slough bridge would provide a dedicated right-of-way and the most direct route between Hunters Point Shipyard and points to the west, including Candlestick ~~p~~Point, the Bayshore Caltrain Station, and Balboa Park BART. Although the route around Yosemite Slough proposed under Alternative 2 would provide exclusive right-of-way, the route would involve a number of right-angle turns and additional signalized intersections and would not ~~accommodate the BRT route~~ provide a comparably direct route as that provided on the bridge proposed ~~with~~ by the Project.





SOURCE: Fehr & Peers; AECOM, 2010.

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FIGURE C&R-17

Candlestick Point — Hunters Point Shipyard Phase II EIR

CROSS-SECTION OF THE YOSEMITE SLOUGH BRIDGE WITH STADIUM AND WITHOUT STADIUM

Existing RR ROW

BRT Path: Using RR ROW for portion of route around Slough

Auto Route Alignment

0 500

Feet

SOURCE: SFMTA, 2010.

PBS&J 04.09.10 02056 | JCS | 10

FIGURE VI-1

Candlestick Point — Hunters Point Shipyard Phase II EIR

ALTERNATIVE 2 CIRCULATION PLAN RAILROAD RIGHT-OF-WAY FOR BUS RAPID TRANSIT

Response to Comment 82-28

Although the portion of the route around Yosemite Slough that travels within the Navy rail right-of-way would be "rail-ready," the primary area of concern with respect to rail-readiness of that route is the multiple right-angle turns and additional signalized intersections that the BRT would have to travel through between Arelious Walker Drive and the Navy rail right-of-way (i.e., along Carroll Avenue, Hawes Street, Armstrong Avenue and Shafter Avenue). Also refer to Master Response 4 (Purpose and Benefits of the Yosemite Slough Bridge).

Response to Comment 82-29

Refer to Master Response 4 (Purpose and Benefits of the Yosemite Slough Bridge), which describes how the route around the Yosemite Slough would be much less direct than the proposed bridge due to multiple right-angle turns and additional signalized intersections.

Response to Comment 82-30

The estimate of travel time around Yosemite Slough was developed based on data regarding average vehicle travel speeds provided by SFMTA's cost estimation model, which was developed as part of the Transit Effectiveness Project. That data notes that local bus service travels an average speed of 7 miles per hour (mph), while BRT service typically travels at 10 mph. Although the route around the slough would provide exclusive right-of-way, due to the large number of right-angle turns through signalized intersections, the analysis assumes that the BRT would operate at speeds more similar to local bus service through this portion (i.e., 7 mph). The route across the bridge would operate more similar to typical BRT speeds (i.e., 10 mph) because it would have no intersections, no turns, and no conflicting bicycle, pedestrian, or traffic streams. Because it would not have to stop on the route across Yosemite Slough bridge, the average travel speed may, in fact, be higher than 10 mph.

The distance across the Yosemite Slough bridge (from Carroll Avenue to Shafter Avenue) is approximately 0.4 mile. The distance on the route around the slough is approximately 1 mile, a difference of 0.6 mile, and includes crossing through 12 to 14 intersections and four additional right turns that the route over the Yosemite Slough bridge would not require. The travel time for the BRT route across this distance (assuming an average 10 to 20 mph travel speed) would be approximately 1.25 to 2.5 minutes. The travel time for the BRT route around the slough (assuming an average 7 mph travel speed) would be 8.7 minutes, an increase of over 6 to 7.5 minutes. Therefore, the assumption of a 5-minute difference in travel time as disclosed in the Draft EIR is a reasonable estimate given the uncertainties in estimating actual transit travel time. As described above, the travel times used in the Draft EIR are from the same start and end points for both routes, so the comparison is valid. Although the route around the slough would provide exclusive right-of-way, its benefits would be limited because of the large number of right-angle turns through signalized intersections.

As noted above, an average travel speed of 7.3 mph is consistent with SFMTA's data regarding typical local bus speeds. Although the average speeds from SFMTA include dwell times at stops, they also are collected on routes traveling along typically straight corridors. The BRT route around Yosemite Slough would not have stops for passenger loading, but it would have more sharp turns through signalized intersections, which are more likely to require stops. Therefore, an average speed of 7 miles per hour is reasonable.

The commenter does not provide evidence supporting the claim that average BRT speeds are between 20 and 25 miles per hour. It is possible that BRT routes achieve maximum speeds of between 20 and 25 miles per hour, but unlikely that they achieve this speed over the length of their route, particularly if they are traveling through industrial areas and making a series of right-angle turns through signalized intersections as would be required by the proposed route around the slough. If anything, the 20-25 mph speed would be more likely to apply to the route across the bridge, since it would be straight and unobstructed and would have adequate distance to achieve its maximum speed.

As described above, the travel time estimates were calculated based on typical average speeds provided by SFMTA and are correct (Fehr & Peers, Memo to Planning Department documenting SFMTA's Transit Operating Speed Assumptions).

The Transportation Study (provided as Appendix D of the Draft EIR) and the text of the Draft EIR itself are consistent. Neither the Transportation Study nor the Draft EIR identified a new significant impact to Route 28L associated with Alternative 2. However, both the Transportation Study and the Draft EIR note that Alternative 2 would not provide the same quality in terms of travel times, reliability, and ridership on the 28L as would be provided by the Project.

Response to Comment 82-31

The 28L-19th Avenue/Geneva Limited would be extended from the Balboa Park BART station east along Geneva Avenue into the Project site. East of Bayshore Boulevard, the 28L-19th Avenue/Geneva Limited would provide the Bus Rapid Transit service extending across Yosemite Slough bridge into the Hunters Point Shipyard. The Project's impacts to this line are due to Project-generated traffic congestion at and just west of the Bayshore Boulevard/Geneva Avenue intersection, when the 28L would operate in mixed-flow travel lanes.

It is not clear to what data the commenter is referring. It is possible that the commenter is referring to Tables 77 and 83 in the Transportation Study in Appendix D of the Draft EIR. Table 77 presents the additional transit vehicles that would be necessary on each route serving the Project study area to maintain headways due to the Project and Variants 1 and 2. Table 83 presents the same information for Project Alternatives. If this is the data to which the commenter is referring, the comment contains a misrepresentation of the data.

Table 83 illustrates that based on long-term growth in traffic congestion in the study area, which would increase transit travel times, if Alternative 1 (No Project) occurred, a total of 16 additional buses would be necessary to maintain proposed transit headways in the study area in both the AM and PM peak hours. This includes only one additional vehicle for the 28L in both peak hours.

Table 77 illustrates that with implementation of the Project (and associated increases in traffic congestion, which would increase transit travel times) using SFMTA's Service Planning model in consultation with SFMTA, a total of 7 additional vehicles would be needed in the AM peak hour and 12 vehicles in the PM peak hour to maintain headways on all transit lines serving the study area. This includes one additional vehicle on the 28L-19th Avenue/Geneva Limited in each peak hour compared to Alternative 1 (No Project).

Table 83 shows that with implementation of Alternative 2, the 28L-19th Avenue/Geneva Limited would require the same number of additional vehicles (one) as required by the Project to maintain proposed

headways, associated with traffic congestion-related delays only. However, the additional travel time around Yosemite Slough under Alternative 2 without the bridge would require an additional 2 vehicles on the 28L BRT, compared to the Project. These additional vehicles are not reflected in Table 83, which is summarizing the effects of traffic congestion related transit delays only.

Response to Comment 82-32

Refer to Master Response 4 (Purpose and Benefits of the Yosemite Slough Bridge) for discussion of stadium traffic egress for Alternative 2. The existing stadium is situated adjacent to a single freeway interchange. A very large portion of post-game traffic is routed to this single interchange, which is typically overwhelmed following games, limiting the capacity of autos to exit the stadium. The new stadium would be situated such that it has two primary routes to regional freeways—the route over Yosemite Slough toward Harney Way and the reconstructed US-101/Harney Way interchange and the route along Innes Avenue/Evans Avenue/Cargo Way which opens up direct connections from the stadium to other regional freeway entrances at Cesar Chavez Street, Indiana Street, and Bayshore Boulevard/Alemany Boulevard (refer to Figure III.D-15 [Stadium Game Day Egress Routes] on Draft EIR page III.D-130).

Response to Comment 82-33

It is possible that providing extremely difficult stadium egress would promote a shift from private auto to transit. However, the shift would not be so great as to reduce stadium clearance times to within standards set by the NFL (i.e., 1 hour for average game). For example, the proposed bridge would accommodate approximately 4,000 vehicles per hour following games. The average auto occupancy for game day attendees is 2.6 persons per auto, according to data provided by the 49ers. In order to maintain the stadium clearance times provided by the Project, which includes the Yosemite Slough bridge, the 10,400 people per hour who would otherwise use the bridge (4,000 vehicles per hour x 2.6 persons per vehicle) would have to switch to transit. When added to the 17,040 persons per hour already forecasted to use transit to access the stadium, the stadium's transit mode share would more than double, increasing from 19 to 40 percent, with 27,440 transit riders.

Refer to Master Response 4 (Purpose and Benefits of the Yosemite Slough Bridge) for discussion of importance of bridge related to new stadium.

Response to Comment 82-34

The comment summarizes Comments 82-23 to 82-33. Refer to Responses to Comments 82-23 to 82-33 as well as Master Response 4 (Purpose and Benefits of the Yosemite Slough Bridge). No further response required.

Response to Comment 82-35

In response to the comment, Section VI.C (Analysis of Project Alternatives), Draft EIR page VI-30, fourth paragraph, has been revised as follows:

> Under Alternative 2, ~~motorized traffic~~ transit and non-motorized traffic would be required to circumnavigate Yosemite Slough because no bridge would be constructed. On game days, motorized and non-motorized traffic, which would travel across Yosemite Slough Bridge under the Project,

would also be required to circumnavigate Yosemite Slough because no bridge would be constructed under Alternative 2. Figure VI-1 (Alternative 2 Circulation Plan Railroad Right-of-Way for Bus Rapid Transit) illustrates the proposed route. The rest of the street network at Candlestick Point and HPS Phase II would be the same as the Project.

Response to Comment 82-36

In response to the comment, the text in Section VI.C (Analysis of Project Alternatives), Draft EIR page VI-30, fifth paragraph, has been revised as follows:

> Similar to the Project, under Alternative 2, ~~T~~the primary roadway connection for automobiles and other vehicular traffic between Candlestick Point and HPS Phase II would be west on Carroll Avenue to Ingalls Street, north along Ingalls Street to Thomas Avenue, and east on Thomas Avenue to Griffith Street. Ingalls Street would remain an industrial mixed-use street with two auto lanes and parking and loading zones on its northern and southern sides. The width of sidewalks on that portion of Ingalls Street from Carroll Avenue to Yosemite Avenue would be decreased from 16 feet to 11 feet to create a uniform street width to accommodate the auto lanes, parking, and loading.

Response to Comment 82-37

Figure VI-1 (Alternative 2 Circulation Plan Railroad Right-of-Way for Bus Rapid Transit) shows an incorrect alignment of the proposed BRT route for Alternative 2. The figure has been revised to illustrate the correct alignment. Refer to Response to Comment 82-27 for the revised figure.

Response to Comment 82-38

The line along Innes Avenue was also in error. Figure VI-1 (Alternative 2 Circulation Plan Railroad Right-of-Way for Bus Rapid Transit) has been revised to illustrate the correct alignment. Refer to Response to Comment 82-27 for the revised figure.

Response to Comment 82-39

Refer to Response to Comment 82-28 for a discussion of "rail-readiness" of the BRT route around Yosemite Slough.

Response to Comment 82-40

In response to the comment, the text in Section VI.C (Analysis of Project Alternatives), the first paragraph, under the Transportation and Circulation heading, page VI-33, has been revised as follows:

> Alternative 2 would be the same as the Project, except it would not include the Yosemite Slough bridge. Because vehicular traffic could not use the bridge on non-game days, ~~T~~the main roadway connection between Candlestick Point and HPS Phase II would be the same as with the Project, via Ingalls Street. The bus rapid transit (BRT) route would be along Carroll Avenue, Hawes Street, Armstrong Avenue, and the abandoned railroad right-of-way to provide access between Candlestick Point and HPS Phase II. Alternative 2 would otherwise have the same transportation improvements as proposed with the Project.

Response to Comment 82-41

The referenced paragraph states that "Alternative 2 would have similar Project and cumulative effects at study intersections." The text is clear and no changes are required.

Response to Comment 82-42

In the case of the Yosemite Slough bridge, the bridge would carry four lanes of traffic inbound before games and four lanes outbound after games. Emergency vehicles would be permitted to use the BRT lanes.

The referenced text is in a paragraph discussing game-day traffic impacts. As described in the Draft EIR, game-day traffic entrance and exiting capacity would be reduced by 40 percent in Alternative 2, compared to the Project. Game-day traffic impacts may, in fact, be more severe under Alternative 2. The commenter is correct in noting that the number of lanes accessing the regional facilities and on the local street system would remain the same. No change to the text is required.

Response to Comment 82-43

In response to the comment, the text in Section VI.C (Analysis of Project Alternatives), under the "Intersection Conditions" heading, page VI-34, has been clarified, as follows:

> During game days at the football stadium, with no Yosemite Slough Bridge, the entrance and exiting capacity for vehicles would be reduced about 40 percent compared to the Project; four out of a total of 11 exit lanes would be available without the bridge. As with the Project, a mitigation measure to implement a Travel Demand Management Plan for stadium events would reduce but not avoid traffic impacts, which would be significant and unavoidable.

Response to Comment 82-44

The text in Section VI.C (Analysis of Project Alternatives), under Transit Impacts heading, page IV-34, has been revised as indicated in Response to Comment 82-27. Refer to Response to Comment 82-27 for revisions to Figure VI-1 and the description of the BRT route.

Response to Comment 82-45

Refer to Master Response 4 (Purpose and Benefits of the Yosemite Slough Bridge) and Responses to Comments 47-4 and 82-30 for an estimate of travel time around Yosemite Slough.

Response to Comment 82-46

Refer to Master Response 4 (Purpose and Benefits of the Yosemite Slough Bridge) and Responses to Comments 47-4 and 82-30 for an estimate of travel time around Yosemite Slough.

Response to Comment 82-47

The text in Section VI.C (Analysis of Project Alternatives), under the "Transit Impacts" heading, page VI-34, the typographical error has been corrected, as follows:

> Although the alternative BRT route around Yosemite Slough would be technically feasible, it would not be an optimal configuration for the BRT system. BRT service would provide direct, fast, and reliable travel in a dedicated right-of-way, typically with signal priority for B~~V~~RT vehicles, …

Response to Comment 82-48

While the transportation impacts of the Project and Alternative 2 would be the same or similar, the Project Objectives would not be met at the same level. Table VI-4, page VI-59, provides a summary of the Project Objectives and indicates whether the Alternative meets those objectives. Two of the objectives of the Project are met to a lesser extent than the Project. Because game day access would be reduced by 40 percent with Alternative 2, and because the BRT would not be an optimal configuration, Alternative 2 does not meet the Project objective 1 and 2 to the same extent as the Project. Refer to Master Response 4 (Purpose and Benefits of the Yosemite Slough Bridge) regarding the need for the bridge.

Response to Comment 82-49

With regard to meeting the Project Objectives, refer to Response to Comment 82-48. Refer to Master Response 4 (Purpose and Benefits of the Yosemite Slough Bridge) regarding the need for the bridge.

Refer to Master Response 4 and Responses to Comments 47-4 and 82-30 about the difference between the Alternative 2 BRT and the Project transit travel time. With regard to impacts related to hazards and hazardous materials, geology and soils, and biological resources, Alternative 2 reduces the number of less-than-significant impacts (impacts which can be addressed by mitigation) that would occur with the Project. Alternative 2 has the same or similar significant unavoidable impacts as the Project.

Response to Comment 82-50

Refer to Master Response 4 (Purpose and Benefits of the Yosemite Slough Bridge). Despite providing dedicated right-of-way, the route around Yosemite Slough would be substantially more circuitous with 12 to 14 additional signalized intersections and four additional right turns is therefore considered a much less direct connection across Yosemite Slough.

Response to Comment 82-51

The commenter is referencing text that is meant to identify the utility and ease of access that a bridge at the mouth of the slough would provide for multiple modes of transit (pedestrians, bicyclists, and transit riders). The visual and physical connection at the mouth of the slough would encourage travel that would not otherwise occur.

Response to Comment 82-52

Refer to Response to Comment 82-48 with regard to meeting the Project Objectives, and 82-50 regarding a much less direct connection across Yosemite Slough for Alternative 2, compared to the bridge alternative. The commenter is mistaking the text in the Draft EIR which describes how a crossing of Yosemite Slough would provide benefits that would not accrue without a direct bridge connection. The analysis does not refer to grade separation as the distinguishing factor of the bridge. What is referenced is the utility and ease of access that a bridge at the mouth of the slough would provide for multiple modes of transit (pedestrians,

bicyclists, and transit riders). The visual and physical connection at the mouth of the slough would encourage travel that would not otherwise occur. Bicyclists and pedestrians are more likely to travel across the slough as the bridge would provide longer views and quicker access to the shoreline.

Response to Comment 82-53

Refer to Master Response 4 (Purpose and Benefits of the Yosemite Slough Bridge) and Response to Comment 82-50 regarding a less direct connection across Yosemite Slough for Alternative 2 as compared to the bridge alternative.

Response to Comment 82-54

Comment noted.

Response to Comment 82-55

Refer to Master Response 4 (Purpose and Benefits of the Yosemite Slough Bridge) regarding the need for the bridge. Refer to Responses to Comments 47-4 and 82-30 about the difference between the Alternative 2 BRT and the Project transit travel time.

Response to Comment 82-56

Refer to Master Response 4 (Purpose and Benefits of the Yosemite Slough Bridge) for discussion of post-game traffic flow under conditions without the Yosemite Slough bridge. Also refer to Response to Comment 82-32 for discussion of capacity constraints at regional transportation facilities.

Response to Comment 82-57

Refer to Master Response 4 (Purpose and Benefits of the Yosemite Slough Bridge) for discussion of post-game traffic flow under conditions without the Yosemite Slough bridge and discussion of comments by the National Football League stating that a bridge across Yosemite Slough would be crucial to facilitating a new stadium at the Hunters Point Shipyard site.

Response to Comment 82-58

The text in Section VI.D (Environmentally Superior Alternative), page VI-160 has been revised as indicated in Response to Comment 82-26.

Response to Comment 82-59

The text in Section VI.D (Environmentally Superior Alternative), page VI-160 has been revised as indicated in Response to Comment 82-26.

Response to Comment 82-60

The routes toward Ingalls Street and across Yosemite Slough would generally deliver traffic from the new stadium to the same streets that are currently used to provide stadium egress (Harney Way, Carroll Avenue, and Gilman Avenue). The analysis assumes only a modest increase in capacity of the reconstructed Harney

Way interchange compared to existing conditions. Alone, these routes across Ingalls Street and over Yosemite Slough are expected to offer similar capacity to their current capacity following games at Candlestick Park. The improvement in stadium clearance time is due in large part to the location of the stadium, which allows a second main exit route, along Innes Avenue, which provides connections to other regional freeway entrances. No further analysis is required to demonstrate capacity on Carroll Avenue, Gilman Avenue, or Harney Way because the analysis assumes they would have similar exiting capacity to existing conditions.

Response to Comment 82-61

This comment is similar to Comment 82-44. Refer to Response to Comment 82-27 for revisions to Figure VI-1 and description of the BRT route.

Response to Comment 82-62

Refer to Master Response 4 (Purpose and Benefits of the Yosemite Slough Bridge) and Responses to Comments 47-4 and 82-30 for an estimate of BRT travel time around Yosemite Slough.

Response to Comment 82-63

Refer to Master Response 4 (Purpose and Benefits of the Yosemite Slough Bridge) and Responses to Comments 47-4 and 82-30 for an estimate of BRT travel time around Yosemite Slough.

Response to Comment 82-64

Refer to Master Response 4 (Purpose and Benefits of the Yosemite Slough Bridge) and Responses to Comments 47-4 and 82-30 for an estimate of BRT travel time around Yosemite Slough.

Response to Comment 82-65

Refer to Master Response 4 (Purpose and Benefits of the Yosemite Slough Bridge) and Responses to Comments 47-4 and 82-30 for an estimate of BRT travel time around Yosemite Slough.

Response to Comment 82-66

Refer to Master Response 4 (Purpose and Benefits of the Yosemite Slough Bridge) and Responses to Comments 47-4 and 82-30 for an estimate of BRT travel time around Yosemite Slough.

Response to Comment 82-67

Refer to Master Response 4 (Purpose and Benefits of the Yosemite Slough Bridge) and Responses to Comments 47-4 and 82-30 for an estimate of BRT travel time around Yosemite Slough.

Response to Comment 82-68

The comment refers to the statement that the 28L-19th Avenue/Geneva Limited would experience increases in travel time due to Project-generated traffic. The comment notes that this route currently operates between Daly City and the Presidio, several miles west of the Bayview neighborhood, making it

unlikely that Project-generated traffic would affect this route. However, the 28L-19th Avenue/Geneva Limited would be extended from the Balboa Park BART station east along Geneva Avenue into the Project site. East of Bayshore Boulevard, the 28L-19th Avenue/Geneva Limited would provide the Bus Rapid Transit service extending across Yosemite Slough bridge into the Hunters Point Shipyard.

The Project's impacts to this line are due to Project-generated traffic congestion at and just west of the Bayshore Boulevard/Geneva Avenue intersection, when the 28L would operate in mixed-flow travel lanes. As noted in the Draft EIR, Geneva Avenue would be extended from its current terminus at Bayshore Boulevard east to connect with Harney Way at US-101.

Response to Comment 82-69

The commenter has submitted a preliminary design report for a proposed stormwater treatment wetland. The comment is not a direct comment on environmental issues or the content or adequacy of the Draft EIR. The comment will be forwarded to the decision makers for their consideration prior to approval or denial of the Project.

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Letter 83: Arc Ecology (1/12/10)

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Letter 83

Arc Ecology

Environment, Economy, Society, & Peace

12 January 2010

Mr. Stanley Muraoka
Environmental Review Officer
San Francisco Redevelopment Agency
One South Van Ness Avenue, Fifth Floor
San Francisco, California 94103

RE: Public Comment on Candlestick Point-Hunters Point Shipyard Phase II Development Plan Project *(formerly the "Bayview Waterfront Project")* Draft EIR [DEIR]

Dear Sirs:

Arc Ecology has been forwarded these comments from the following individual(s):

Literacy for Environmental Justice (LEJ)

Arc Ecology is submitting these comments to the Agency on behalf of the commenter and also referencing them as a portion of our own commentary on Candlestick Point-Hunters Point Shipyard Phase II Development Plan Project *(formerly the "Bayview Waterfront Project")* Draft EIR [DEIR].

Sincerely,

Saul Bloom
Executive Director
Arc Ecology

Enclosures: LEJ letter

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PHONE: 415.643.1190 | *FAX:* 415.643.1142 | *EMAIL:* info@arcecology.org

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Literacy for Environmental Justice
800 Innes Avenue #11
San Francisco, CA 94124

Mr. Stanley Muraoka
Environmental Review Officer
San Francisco Redevelopment Agency
1 South Van Ness Avenue, Fifth Floor
San Francisco, CA94103

Mr. Bill Wycko
Environmental Review Officer
San Francisco Planning Department
1650 Mission Street
San Francisco, CA 94103

RE: Public Comments on the November 12, 2009 Candlestick Point-Hunters Point Shipyard Phase II Development Plan Project Draft EIR

Literacy for Environmental Justice (LEJ) is an environmental education and youth empowerment organization located in the Bayview Hunters Point neighborhood of San Francisco. Bayview Hunters Point (BVHP) is predominantly a low-income community of color, which has historically served as the dumping ground for San Francisco's most toxic industries. The mission of Literacy for Environmental Justice is to foster an understanding of the principles of environmental justice and urban sustainability in our young people in order to promote the long-term health of our communities. LEJ trains youth from Bayview Hunters Point to become authorities and activists in environmental health research, education, and advocacy; sustainable foods production, marketing, and nutrition education; and environmental conservation, restoration, and horticulture.
Our youth programs combine education sessions with action-based projects, drawing concrete linkages between human health, the environment, and urban quality of life: 83-1

* The ***Bay Youth for the Environment Program*** operates a native plants nursery at Candlestick Point State Park Recreational Area, and is the primary supplier of plant stock to two major restoration projects on San Francisco Bay; including the ***Yosemite Slough Restoration Project***.

* Interns in the ***Youth With A Plan*** -- an environmental health and justice program contribute a strong youth voice to the redevelopment of southeast San Francisco.

* LEJ also spearheads the restoration and stewardship at ***Heron's Head Park*** (formerly Pier 98). Through the efforts of thousands of community volunteers, we've transformed a brownfield into one of the most vibrant wetlands on the southern bay front shoreline. Each year we host some 1,200 school-age youth at the park for free site-based environmental education programs that link science curricula to real-life environmental health and justice issues.

* We're in the final stages of constructing ***The EcoCenter at Heron's Head Park***, a 1,500-square-foot environmental education facility that will model alternative energy and waste water technologies and be San Francisco's first 100% "off-grid" building. Situated at the foot of the former PG&E Hunters Point Power Plant — closed in 2006 after years of community advocacy — the EcoCenter is a success story that will empower youth to act for environmental health and justice.

Youth With A Plan is LEJ's newest program and brings youth engagement to the public process involving the redevelopment of the Hunters Point Shipyard and Candlestick Park. LEJ recruited youth ages 14-17 from area schools to participate in the Youth With A Plan program. These

paid youth interns were educated about the history of BVHP and this joint redevelopment project, in the context of the standards and practices of urban development. During their first eight weeks, the youth learned about city planning; case studies of other redeveloped communities and attended BVHP public meetings addressing environmental conservation, city planning, redevelopment, safety, community design, and transportation. LEJ youth then convened a community panel of longtime leaders of the Bayview Hunters Point community at the Waden Branch of the San Francisco Public Library. Youth led this meeting which included a presentation and Q&A on their experience living, working, educating, and advocating in the Bayview and their hopes for the community's future. This event generated public engagement around the Youth With A Plan project, formed inter-generational connections between elders and upcoming leaders.

83-1 cont'd.

Our goal is to support youth in the community and find effective ways to included youth input into public policy decisions. Our public comments for the draft environmental impact report resulted from a survey created by youth for youth. The surveys were completed by youth who live, work or attend schools in Supervisorial District 10. We have identified four areas that we believe should be addressed in the DEIR. These areas are transportation, housing, youth development and education, and access to parks and open space.

The survey asked youth to answers two key questions:
1) *What do youth need to thrive here in Bayview/Hunter's Point?*
2) How can the redevelopment of the southeast San Francisco support youth education and health?

Through our process, 78 surveys were completed. The youth surveyed ranged from age 11 to age 20, with an average age of 15.6. Of the youth surveyed, 66.2% were female. The youth surveyed belonged to the following race/ethnicity groups: 33.8% were Asian/ Pacific Islander, 29.9% were African American/Black, 31.2% were Latino/Hispanic, 2.6 % were White/Caucasian, 2.6% reported more than one race. 60.3 % of the youth surveyed live in District 10, of these 57% live in Hunters Point, 13% live in Candlestick Point/Executive Park. 11% live in Potrero Hill, 15% live in Visitacion Valley.

Out of a total of 42 question asked on the survey, Youth With a Plan have selected the top questions and responses that we believe are important for City Officials and planners to know in order to properly address the needs of youth in District 10. We have found that safety is a reoccurring concern for youth in District 10 and should be addressed during the evaluation of impacts on the Candlestick Point-Hunters Point Shipyard Phase II Development Plan Project Draft Environmental Impact Report. What follows below are additional comments gathered from youth by LEJ via this program.

Respectfully Submitted By,

Malik Looper, Executive Director
Literacy for Environmental Justice

Rachel Russell, Program Manager
Youth With A Plan

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Public Comments on the November 12, 2009 Candlestick Point-Hunters Point Shipyard Phase II Development Plan Project Draft EIR

TRANSPORTATION

Safety on transportation is a major concern for youth. An astounding 97.1 % of youth have witnessed a crime while on MUNI/school bus. 89.6 % of the youth surveyed ride MUNI. 73.1 % of the youth surveyed feel unsafe riding MUNI or the school bus in District 10 communities. 83-2

How many youth have witnessed a crime while on MUNI/school bus?

- 97.1% of youth surveyed have witnessed a crime while on the MUNI or a school bus

Out of youth riding MUNI/school bus in the following neighborhoods (3rd Street, West Point, Harbor, Oakdale, Alice Griffith/Double Rock, Visitation Valley, Potrero Hill, or Candlestick Park/Executive Park), how many feel unsafe?

- 73.1% of the youth surveyed feel unsafe riding the MUNI or a school bus in the following neighborhoods (3rd Street, West Point, Harbor, Oakdale, Alice Griffith/Double Rock, Visitation Valley, Potrero Hill, or Candlestick Park/Executive Park)

How many kids ride MUNI?

- 89.6% of youth surveyed ride the MUNI

Out of the youth surveyed, how many have witnessed sexual harassment while on the MUNI or school bus?

- 34.2% of the youth surveyed have witnessed sexual harassment while on the MUNI or school bus

COMMENT: We believe that safety of youth on transportation should be addressed.

HOUSING

During our survey we asked youth if they live near a toxic producing location. We considered near to be any location that is close enough to be considered a concern to one's health. 73.2% of youth surveyed live near one or more toxic-producing location (auto repair shop, dry cleaners, freeways and/or a gas station). 23% of youth surveyed live near a power plant, waste treatment facility or the Hunters Point Naval Shipyard. We also found that of the youth living near a current or past toxic-producing location 46.8% have a family member or is dealing with chronic health issues such as asthma, cancer diabetes or heart disease. 83-3

Auto repair shops, dry cleaners, freeways and gas stations all produce toxic chemicals. How many youth live near one of these toxic-producing locations?

- Auto repair shops, dry cleaners, freeways and gas stations all produce toxic chemicals. 73.1% of youth surveyed live near one of these toxic-producing locations

How many youth live near a power plant, a waste treatment plant or the Hunters Point Naval Shipyard?

- 23.9% of youth surveyed live near a power plant, a waste treatment plant or the Hunters Point Naval Shipyard

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How many youth that live near a power plant, waste treatment plant, auto repair shop, dry cleaner, freeway, gas station or the Hunters Point Naval Shipyard have a family member or is dealing with chronic health issues such as asthma, cancer, diabetes or heart disease?

- 46.8% of youth who live near a power plant, waste treatment plant, auto repair shop, dry cleaner, freeway, gas station or the Hunters Point Naval Shipyard have a family member or is dealing with chronic health issues such as asthma, cancer, diabetes or heart disease

Out of the youth surveyed how many do not feel safe in their communities?

- 12.2% of the youth surveyed do not feel safe in their communities

Out of the youth surveyed, how many live in public housing?

- 47.7% of the youth surveyed live in public housing

How many youth have water leaks in their homes?

- 13.8% of the youth surveyed have water leaks in their home

COMMENT: We believe housing development considerations need to address the environmental health of youth and their families.

83-3 cont'd.

YOUTH DEVELOPMENT AND EDUCATION

What are the top five extracurricular activities that youth are interested in?

- The top 5 extracurricular activities that youth surveyed are interested in are:
  - Music: 83.3%
  - Sports: 81%
  - College prep: 78.6%
  - Driving education: 73.8%
  - Technology: 69%

How many youth are interested in extracurricular activities?

- 100% of the youth surveyed are interested in extracurricular activities

How many youth think that their school has adequate facilities?

- 30.7% of youth surveyed think that their school has adequate facilities

How many youth feel safe at their after school or summer programs?

- Among youth surveyed who attend an after school or summer program, 83.3% feel safe at their after school or summer program

COMMENT: We believe that the need for age-appropriate extracurricular activities for youth should be addressed.

83-4

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PARKS AND OPEN SPACE

Safety is also a concern for youth at their local parks. Only 44.1% of youth surveyed feel safe at their local park. 85.2% of youth surveyed have witnessed a crime at the park they visit.

How many actually go to their local park (the nearest one)?

- 78.9% of youth surveyed actually go to their local park (the one nearest to their home)

How many youth have witnessed a crime at the park they visit?

- 85.2% of youth surveyed have witnessed a crime at the park they visit

How many youth feel safe at their local park?

- 44.1% of youth surveyed feel safe at their local park

COMMENT: We believe that the need for safe local parks and open space should be addressed.

83-5

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Contents

Analysis of Transportation Impacts (prepared by LSA and Associates)

Analysis of Biological and Habitat Impacts (prepared by Mike McGowan)

Final Alternatives for Study (prepared by Marcel Wilson and Saul Bloom)

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Preliminary comments on selected impacts and mitigation measures listed in Table ES-2.
Michael F. McGowan, Ph.D. Staff Scientist, Arc Ecology. 12/8/2009

Impact AQ-4 Operation of the Project would violate BAAQMD CEQA significance thresholds for mass criteria pollutant emissions from mobile and area sources and contribute substantially to an existing or projected air quality violation at full build-out in the year 2029.

83-6

1. This significant and unmitigated impact exacerbates local environmental injustice with respect to public health and constitutes a cumulative negative impact on the quality of the environment for the city of San Francisco and the Bay Area. The project should be modified such that project air quality emissions would neither worsen existing air quality, nor contribute substantially to projected air quality violations.

Impact HZ-1 Construction activities associated with the Project would not expose construction workers, the
Public, or the environment to unacceptable levels of hazardous materials as a result of the disturbance of soil and/or groundwater with known contaminants from historic uses.
Impacts HZ-2 to HZ-14

83-7

2. The mitigation measures proposed for these potentially significant impacts are not spelled out in adequate detail to judge whether they would be effective in mitigating the impacts to less than significant. Stating that a plan will be made later to mitigate any hazardous release from construction impacts is not a mitigation measure but a promise of the intent to have a mitigation measure. There is no certainty that any mitigation measures will be possible, therefore these impacts should be considered potentially significant and unmitigable, not less than significant and mitigable.
3. This comment applies especially to **HZ-10b** and its mitigation measure. The installation of pilings through a landfill cap that will be used to contain likely, but unspecified contaminants including radiological materials is extremely problematic. This impact should be considered potentially significant and unmitigable. An unmitigable radiological release is not acceptable, therefore the plan needs to be revised to provide a clear alternative to any option for placing pilings through the cap or cover into contaminated fill.

83-8

Impact HZ-15 Construction and grading activities associated with the Project would not disturb soil or rock that could be a source of naturally occurring asbestos in a manner that would present a human health hazard.

MM HZ-15 Asbestos Dust Mitigation Plans and Dust Control Plans.

83-9

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4. The asbestos air monitoring should be required, not at the option of BAAQMD, because the "no visible dust" standard does not protect against asbestos dust which is not visible to the naked eye.
5. The threshold of asbestos concentration requiring shut-down and implementation of dust control measures should be specified based on accepted cancer risk assessment guidelines and Hunters Point current standards, i.e., fewer than 1 in 10,000 excess cancers.
6. Mitigation should include hiring an independent third party to validate the positioning of the asbestos dust monitors and to review and report the monitoring data to the public.

83-9 cont'd.

83-10

83-11

Impact BI-10a and BI-10b and BI-10c Construction of the Candlestick Point would require the removal of hard substrates (riprap) used by native oysters, but would not have a substantial adverse effect, either directly or through habitat modifications, on this species.

83-12

7. This impact statement is incorrect because the hard substrate used by native oysters is the limiting habitat for the species, therefore removing it would be a significant impact. Acceptable mitigation would be replacement of the square footage of hard substrate with a similar amount of hard substrate preferably made from oyster shells. The mitigation habitat could be placed at or below the tide level of the hard substrate removed by the project. The mitigation should be monitored by a competent biologist to demonstrate successful mitigation.

Impact BI-11c Construction of the Yosemite Slough bridge would not have a substantial adverse effect on designated
critical habitat for green sturgeon and Central California Coast steelhead through permanent and temporary impacts to aquatic
and mudflat foraging habitat.

83-13

8. The mitigation measures for this impact are not complete. A Section 7 consultation with the National Marine Fisheries Service is required to determine potential impacts to green sturgeon and their critical habitat in San Francisco Bay. Depending on the outcome of this consultation, the impact may not be mitigable, in which case the bridge would not be allowed. This should be spelled out clearly in the project description.

Impact BI-19a Implementation of the Project at Candlestick Point would not result in impacts to aquatic organisms through the
re-suspension of contaminated sediments.

83-14

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9. Re-suspension of sediments potentially impact eelgrass, macroalgae, and phytoplankton by blocking sunlight. The potential impacts of re-suspended sediments, whether contaminated or not, on such organisms should be evaluated, or there should be a full explanation why not.

83-14 cont'd.

Impact BI-19b and Mitigation Measure MM BI-19b.1 Work Windows to Reduce Maintenance Dredging Impacts to Fish during Operation of the Marina.

83-15

10. The LTMS (2001) standard is no longer the only regulation that must be considered to protect fish and fish habitat from impacts of dredging. There are no work windows for green sturgeon (federal) or longfin smelt (state) so Section 7 consultations and/or California Department of Fish and Game biological opinions will need to be prepared to mitigate for potential dredging impacts. In addition, if any eelgrass beds are nearby, then light monitoring in compliance with National Marine Fisheries Service protocols will need to be done as a condition of the dredging permits.

Impact BI-20a and MM BI-20a Lighting Measures to Reduce Impacts to Birds.

83-16

11. The proposed mitigation measure in MM BI-20a, "Use strobe or flashing lights in place of continuously burning lights for obstruction lighting. Use flashing white lights rather than continuous light, red light, or rotating beams." May not be permissible near water because the U.S. Coast Guard restricts flashing (strobe) white lights to emergency beacons. Please confirm that the use of white strobe lights to deter birds is allowed under these circumstances or propose a different mitigation measure.

MM BI-18b.1 Maintenance Dredging and Turbidity Minimization Measures for the Operation of the Marina. Maintenance dredging for the marina could remove or generate sediment plumes that could impact special status species, their habitats, and Essential Fish Habitat (EFH). To minimize this effect, the following measures shall be implemented by the Project Applicant:
1. Conduct a detailed survey for native oysters in all suitable substrates within the marina, (and the following under this Mitigation Measure).

83-17

12. This mitigation measure is ill-conceived to address habitat impacts of turbidity plumes from dredging in the new Hunters Point marina. First, native oysters have no special status under federal or state law except catch limits under the Fish and Game Code. Second, substrate within a marina is not the natural habitat of this species so possible effects of dredge sediment plumes are not relevant to protecting native oyster habitat within the marina. Third, dredge sediment plumes should be measured during the first dredging episode to assess potential impact, if any, outside the marina. If no impact is

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found then the monitoring should not be needed in subsequent dredging episodes. Fourth, a detailed hydrodynamic plume model requires extensive data on bathymetry, tidal currents, and other factors, including actual verification and validation of the model by collecting field data. With good field data on the sediment plume there is no need for the model and its input data. Fifth, native oysters are widely distributed in San Francisco Bay but their settlement and survival in any one area is highly variable and good cause and effect relationships with, e.g., suspended sediment, are lacking. While monitoring and restoration of native oysters and their habitat in San Francisco Bay is a worthy endeavor, making it a costly requirement of maintenance dredging in a new marina is not justified.

83-17 cont'd.

MM BI-19b.1 in part "The spawning season for the Pacific herring is March 1 to November 30. Therefore, the window that shall be applied to minimize impacts to sensitive fish species (during which dredging activities cannot occur) is March 1 to November 30."

83-18

13. My comment. This statement about the spawning season is incorrect. In San Francisco Bay the spawning season for Pacific herring is October to April (California Department of Fish and Game website). Therefore an arbitrary dredging window would be May-September. In practice, regulation of dredging impacts on herring is done on an ad hoc basis using real time observations of herring spawning so as not to unneccessarily constrain dredging projects when there are no herring spawning in the bay. The LTMS 2001 Management Strategy Appendix F that was cited in the mitigation measure actually says that dredging will be restricted in historic herring spawning areas, when they are present, during December 1-February 28. Please change the wording in the mitigation measure to reflect the correct spawning season and the correct wording of the regulation with regard to Pacific herring.

Hazardous Materials

In MM HZ-1a: change the word "comparable" in the second paragraph to "equivalent" because the investigation and treatment should be at the same level of protectiveness in the CPSRA areas as in the land subject to San Francisco Health Department Article 22a.

83-19

The proposed mitigation measures seem appropriate if they are properly implemented. There should be a mechanism for peer review of the plans, independent verification of the performance of the mitigation, and community outreach to reassure and confirm the success of the mitigation as implemented.

83-20

Hydrology and Water Quality

The mitigation measures should specify that revegetation will be done with native, non-invasive species.

83-21

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The mitigation measures should specify that shoreline improvements will incorporate the principles of natural, living shorelines, wherever feasible. 83-22

The allowance of three feet for future sea level rise may not be adequate. Other California authorities are using a 55 inches by year 2100 estimate. It would be prudent to allow for more sea level rise because it will be much easier to build out farther if sea level doesn't rise more than expected than it will be to protect existing structures from more than three feet of sea level rise if it does occur.. 83-23

The proposed mitigation measures seem appropriate if they are properly implemented. There should be a mechanism for peer review of the plans, independent verification of the performance of the mitigation, and community outreach to reassure and confirm the success of the mitigation as implemented. 83-24

Shoreline Improvements

The frequent mention of the potential use of natural shorelines is to be commended. Arc Ecology endorses the use of living shorelines for erosion protection, public access and education, and habitat preservation and enhancement. The relative amounts of sandy beach and natural shoreline in the plan are small compared to their potential development. Please consider living shorelines for erosion protection where there is now deteriorating riprap, e.g., at much of the Candlestick Point shoreline where rubble riprap is ineffective, unattractive, and hazardous. Moreover, some areas suitable for natural shorelines were stated to be planned for riprap by the Navy. Please plan for natural shoreline areas at these locations and encourage the Navy to implement them as part of the remedy for contamination so they do not have to be redone later. Examples of these areas are Parcel B IR 7, Parcel B Drydocks 5 to 7, Parcel D Berths 16 to 20, Parcel E Berths 37-42, Parcel E-2 entire shoreline. 83-25

When considering the suitability of the natural, living shoreline, approach to shoreline protection and enhancement be sure to include the construction of deep intertidal and shallow subtidal eelgrass meadows and native oyster beds and reefs. These habitat enhancements also attenuate wave action and thus reinforce the effectiveness of marsh and wetlands plants in stabilizing soil along the shore. 83-26

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COMMENTS ON THE CANDLESTICK POINT-HUNTERS POINT SHIPYARD PHASE II DEVELOPMENT PLAN PROJECT DRAFT EIR DATED NOVEMBER 12, 2009

Section 6, Page 30

Comment 1: "Under Alternative 2, motorized and non-motorized traffic would be required to circumnavigate Yosemite Slough because no bridge would be constructed." 83-27

This statement misleads the reader by implying that additional automobiles would be added to the street network without the bridge when in fact, automobiles would not be allowed on the bridge. The section should correctly inform readers that neither the Project or Alternative 2 would provide bridge access for automobiles.

Comment 2: "The primary roadway connection for automobiles and other vehicular traffic between Candlestick Point and HPS Phase II…" 83-28

This statement is similarly misleading. A more accurate statement would inform the reader that the circulation system proposed for automobiles is the same for the Project and Alternative 2.

Figure VI-1

Comment 3: Although the text clearly indicates that the abandoned rail route would provide dedicated right-of-way for the BRT, the figure displays an "Alternative 2 Proposed BRT Route" along Ingalls Street. This could confuse readers who view the figure without reading the text in depth. Figure VI-1 should be corrected to show the BRT route along the RR ROW, as described in the text. 83-29

Comment 4: At the same time, the line along Innes Avenue should be discussed in the text or removed from Figure VI-1 if Figure VI-1 is in error. 83-30

Section 6, Page 32

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Comment 5: The first paragraph should indicate that, similar to the project, the alternative BRT route would be "rail ready" (not to preclude possible conversion to light-rail). It is illogical to state that the rail right-of-way, to be utilized by the BRT to circumnavigate Yosemite Slough, would not be capable of accommodating rail. 83-31

Section 6, Page 33 – Transportation and Circulation 83-32

Comment 6: "The main roadway connection between Candlestick Point and HPS Phase II would be via Ingalls Street."

This statement misleads the reader by implying that additional automobiles would be added to the street network without the bridge when in fact, automobiles would not be allowed on the bridge. A more accurate statement would inform the reader that the circulation system proposed for automobiles is the same for the Project and Alternative 2.

Section 6, Page 34 – Intersection Conditions 83-33

Comment 7: "In general, intersection conditions would be significant and unavoidable effect of Alternative 2." This sentence misleads the reader into believing that Alternative 2 has significant impacts that the Project avoids, when in fact Alternative 2 and the Project have identical impacts to intersections. This section should inform readers that impacts of Alternative 2 are the same as the Project.

Comment 8: "During game days at the football stadium, with no Yosemite Slough Bridge, the entrance and exiting capacity for vehicles would be reduced about 40 percent compared to the Project; four out of a total 11 exit lanes would be available without the bridge." 83-34

This statement is in error. Section III.D, page 45 indicates that one out of the bridge's four lanes would remain open to off-peak direction traffic for local traffic and emergency vehicles. In addition, Alternative 2 would provide the same number of lanes accessing regional transportation facilities and the same number of lanes in the local street system. Only the number of lanes leaving the parking lot is reduced from ten to seven.

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Comment 9: "A mitigation measure to implement a Travel Demand Management Plan for the stadium events would reduce but not avoid traffic impacts, which would be significant and unavoidable." 83-35

This statement misleads the reader by implying that impacts associated with Alternative 2 cannot be mitigated whereas similar Project impacts could be mitigated. The statement should inform the reader that the Project's Travel Demand Management Plan would also reduce but not avoid stadium traffic impacts which would also be significant and unavoidable.

Section 6, Page 34 – Transit Impacts

Comment 10: The second paragraph misleads the reader into believing that the Alternative 2 route does not provide dedicated right-of-way when in fact the alternative BRT route around Yosemite Slough would still operate in dedicated right-of-way and is technically feasible. 83-36

Comment 11: Pursuant to State CEQA Guidelines Section 15151, the EIR should provide a sufficient degree of analysis to provide decision makers with information which enables them to make a decision which takes into account the environmental consequences of the project. While an EIR must contain facts and analysis, not just an agency's conclusions or opinions (Citizens of Goleta Valley v. Board of Supervisors, 1990), no technical analysis is presented in the Draft EIR justifying the claimed travel time savings. Based on the additional distance around Yosemite Slough (3,205 feet) and average BRT travel speeds (20 to 25 miles per hour), the alternate BRT route should require between 1 minute 27 seconds and 1 minute 49 seconds of additional travel time. 83-37

Comment 12: Identical misleading statements regarding dedicated right-of-way and travel time are made in Appendix D (Transportation Study) and should be removed because these statements are not supported by facts or analysis presented in the Draft EIR. 83-38

Comment 13: The reference to VRT on this page is a typographical error. 83-39

Section 6, Page 58 – Attainment of Project Objectives 83-40

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Comment 14: The statement that Alternative 2 would meet transportation-related objectives to a lesser extent than the Project is inconsistent with the remainder of the section and should be removed from the Final EIR. Earlier in Section 6 the Draft EIR states that construction, intersection, freeway, transit, bicycle, pedestrian, and parking impacts of Alternative 2 are the same as or similar to the Project (Section 6, Pages 33-35). Additionally, Appendix D (Transportation Study) makes the same conclusions:

- "Therefore, the traffic impacts associated with Alternative 2 would be the same as the Project." (Page 235)
- Impacts at Mainline and Weaving Segments are the same (Page 212) and Impacts at Ramp Junctions are the same (Page 216)
- "As with the Project, Alternative 2 impacts on transit capacity would be less than significant." (Page 288)
- "As with the Project, Alternative 2 impacts on bicycle circulation would be less than significant." (Page 295)
- "As with the Project, Alternative 2 impacts on pedestrian circulation would be less than significant." (Page 300)

83-40 cont'd.

Comment 15: Stating that Alternative 2 meets most of the Project objectives is incorrect. Like the Project, Alternative 2 provides for BRT connection between Candlestick Point and Hunters Point along dedicated right-of-way. Alternative 2 and the Project have identical traffic-related impacts. Additionally, the Draft EIR does not provide analysis demonstrating the necessity of the bridge to accommodate game day traffic (a scenario occurring only 10 or 12 times a year). Based on the analysis provided in the Draft EIR, Alternative 2 meets all the Project objectives while reducing impacts to Hazards and Hazardous Material (Section 6, Page 42), Geology and Soils (Section 6, Page 44), and Biological Resources (Section 6, Page 47).

83-41

Table VI-4 – Attainment of Project Objectives Alternative 2

Objective 1

Comment 16: The statement that removing the bridge eliminates direct transit connection is false; Alternative 2 provides a BRT connection in dedicated right-of-way.

83-42

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Comment 17: The statement that removing the bridge eliminates continuous shoreline and open space access contradicts the previous sentence which correctly states that Alternative 2 provides "the same shoreline improvements and open space network" as the Project. 83-43

Comment 18: Alternative 2 meets this objective to the same extent as the Project because a grade-separated connection is not necessary to produce tangible community benefits. 83-44

Objective 2

Comment 19: The statement that removing the bridge eliminates a direct connection between Candlestick Point and Hunters Point Shipyard is false; Alternative 2 provides a BRT connection in dedicated right-of-way. 83-45

Comment 20: Alternative 2 meets this objective to the same extent as the Project because direct connection is provided by transit in dedicated lanes and the opening of Crisp Avenue. 83-46

Objective 5

Comment 21: Alternative 2 includes the same stadium as the Project, the same number of lanes on local streets as the Project, the same connection to U.S. 101 as the Project, and meets Objective 5 as well as the Project. The technical analysis in the Draft EIR does not support the statement that a bridge over Yosemite Slough is necessary infrastructure. An EIR must contain facts, not just an agency's conclusions or opinions (Citizens of Goleta Valley v. Board of Supervisors, 1990). Because the conclusion that the bridge is "necessary infrastructure" is not supported by fact, such statements should be removed from the Final EIR. 83-47

Comment 22: The Draft EIR does not provide an analysis of post-game traffic flow with and without the bridge. The Draft EIR only assumes that a greater number of lanes exiting the parking lot is beneficial. It is possible that a greater number of lanes exiting the parking lot will overwhelm the local street system without speeding the delivery of vehicles onto U.S. 101. 83-48

Comment 23: Because the Draft EIR does not provide an analysis of post-game traffic flow with and without the bridge, it is improper to make a conclusion that the bridge is necessary infrastructure. Such statements should be removed from the Final EIR. 83-49

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Section 6, Page 160 – Environmentally Superior Alternative

Comment 24: "Alternative 2... would avoid Project impacts related to biological resources, water quality, and hazardous materials because the Yosemite Slough [bridge] would not be constructed. However, because the Yosemite Slough bridge would not be constructed, Alternative 2 would result in increased traffic-related impacts, particularly on game days."

This statement is inconsistent with the analysis contained within the section. Earlier in Section 6 the Draft EIR states that construction, intersection, freeway, transit, bicycle, pedestrian, and parking impacts are the same as or similar to the Project (Section 6, Pages 33-35). Additionally, Appendix D (Transportation Study) makes the same conclusions:

- "Therefore, the traffic impacts associated with Alternative 2 would be the same as the Project." (Page 235)
- Impacts at Mainline and Weaving Segments are the same (Page 212) and Impacts at Ramp Junctions are the same (Page 216)
- "As with the Project, Alternative 2 impacts on transit capacity would be less than significant." (Page 288)
- "As with the Project, Alternative 2 impacts on bicycle circulation would be less than significant." (Page 295)
- "As with the Project, Alternative 2 impacts on pedestrian circulation would be less than significant." (Page 300)

83-50

Comment 25: Please explain how this paragraph can state Alternative 2 would result in increased traffic-related impacts when that statement is in direct conflict with Table VI-12: Comparison of the Significant and Unavoidable Impacts of the Project to Each of the Alternatives, which found Alternative 2 to be equal to the Project.

83-51

Comment 26: The Draft EIR assumes that a greater number of lanes exiting the stadium parking lot is beneficial, but provides no analysis demonstrating that the number of vehicles delivered by Ingalls Street and the bridge (three outbound lanes each) will not exceed the capacity of the Harney Way and 3rd Street ramps and U.S. 101. It is possible that metering the flow of vehicles exiting the parking lot, by not providing a bridge, would result in more efficient handling of vehicles and reduce the level of queuing and congestion on local streets.

83-52

Appendix D, Chapter 6, Page 288

83-53

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Comment 27: The second paragraph of Alternative 2-No Bridge misleads the reader into believing that the Alternative 2 route does not provide dedicated right-of-way when in fact the alternative BRT route around Yosemite Slough would still operate in dedicated right-of-way and is technically feasible. **83-53 cont'd.**

Comment 28: Pursuant to State CEQA Guidelines Section 15151, the EIR should provide a sufficient degree of analysis to provide decision makers with information which enables them to make a decision which takes into account the environmental consequences of the project. While an EIR must contain facts and analysis, not just an agency's conclusions or opinions (Citizens of Goleta Valley v. Board of Supervisors, 1990), no technical analysis is presented in the Draft EIR justifying the claimed travel time savings. Based on the additional distance around Yosemite Slough (3,205 feet) and average BRT travel speeds (20 to 25 miles per hour), the alternate BRT route should require between 1 minute 27 seconds and 1 minute 49 seconds of additional travel time. **83-54**

Comment 29: The third paragraph of Alternative 2-No Bridge asserts that the alternative BRT route would increase travel time by 5 minutes and decreases ridership by 15 percent. These statements are not supported by analysis presented anywhere in the Draft EIR and should be removed from the Final EIR. **83-55**

Comment 30: The travel time increase in the Draft EIR is similar to statements made in the Bayview Transportation Improvements Project (BTIP) Transportation Study dated August 15, 2008 which identified 4 minutes 37 seconds in travel time savings with the bridge. The BTIP, however, erred when determining the differences in travel time by adding 1 minute to the travel time of the no-bridge alternative west of the bridge and failing to add travel time across the bridge to the with-bridge alternative. It should be noted that the BTIP no-bridge alternative assumed the BRT would travel on Ingalls Street in mixed-flow lanes. Alternative 2 of the Draft EIR includes use of dedicated lanes within abandoned Navy rail right-of-way. The Project BRT route and Alternative 2 BRT route would both utilize dedicated lanes for the entire trip. Because the BRT would not travel in mixed-flow lanes in Alternative 2, the travel time savings of the bridge identified in the Draft EIR would be less than the corrected BTIP travel time savings. **83-56**

Comment 31: The stated 5 minute increase in travel time with Alternative 2 is greatly exaggerated. Between Carroll Avenue and Shafter Avenue the bridge route would travel approximately 2,245 feet. The route around Yosemite Slough for Alternative 2 is approximately 5,450 feet. Stating that the trip around Yosemite Slough, in dedicated lanes, requires 5 additional minutes is equivalent to stating that the BRT has an average speed of 7.3 miles per hour. **83-57**

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Comment 32: Based on other BRT lines operating in dedicated lanes, the expected average speed should be between 20 and 25 miles per hour. This would equate to a travel time savings for the Yosemite Slough Bridge of between 1 minute 27 seconds and 1 minute 49 seconds. 83-58

Comment 33: Errors in calculating the travel time savings of the bridge were undoubtedly carried forward into estimations of BRT ridership to and from the Hunters Point Shipyard and impacts to route 28L-19th Avenue/Geneva BRT route. All analyses that utilized the incorrectly calculated travel time savings should be corrected and reported so that the actual costs and benefits of the bridge can be considered. 83-59

Appendix D, Chapter 6, Page 290 83-60

Comment 34: Please explain how development in Bayview (and specifically whether or not a bridge providing approximately 1.5 minutes of travel time savings is built) affects a bus line travelling between Daly City and the Presidio.

Letter 83: Arc Ecology (1/12/10)

Response to Comment 83-1

This comment contains introductory, closing, or general background information and is not a direct comment on environmental issues or the content or adequacy of the Draft EIR. No response is required.

Response to Comment 83-2

The comment cites a number of statistics regarding crime rates on Muni, and comments that the safety of youth on transportation should be addressed. Although crime on Muni is an existing serious concern, the commenter provides no evidence suggesting that the Project would have any impact on crime rates on Muni.

Draft EIR page III.D-119 presents a discussion of potential pedestrian safety impacts resulting from increased travel demand. With the Project, the number of pedestrians on streets outside of the Project site would increase as a result of the expanded recreational uses, extension of transit lines, and overall increase in commercial activity in the area. Similar to the anticipated "safety in numbers" benefit from increased pedestrian activity in the Project area, the increase in Muni ridership and the general overall increase in pedestrians, bicyclists, and transit riders for a variety of purposes throughout the day could increase safety conditions on Muni and on the streets and sidewalks. No further analysis is required.

Response to Comment 83-3

Impact AQ-6, which is provided on Draft EIR pages III.H-33 through -34, assessed the environmental health concerns associated with Project operation. Because new R&D facilities would be located on HPS Phase II, the potential for cancer and non-cancer health risks was evaluated. With certain locational requirements identified in MM AQ-6.1 and MM AQ-6.2, potential exposure would be below the BAAQMD thresholds. Consequently, future residents of HPS Phase II would be protected from significant health effects.

The BAAQMD is recommending community-scale impact analyses for TAC and $PM_{2.5}$. Refer to Master Response 19 (Proposed BAAQMD Guidelines), which provides updated community-scale analyses based on the most recent guidance. Refer also to Master Response 5 (Health of the Bayview Hunters Point Community) for a discussion of health outcomes in the Bayview community.

Response to Comment 83-4

This comment does not provide a direct comment on environmental issues or the content or adequacy of the Draft EIR. No response is required.

Response to Comment 83-5

Provisions for adequate law enforcement services are discussed on pages III.O-1 through -12 of Draft EIR Section III.O (Public Services). The Draft EIR identified no need for new or improved services as a result of the Project. Also, the Project aims to provide high-quality parks that will encourage use and help anchor a vibrant, safe community. This comment is not a comment on the technical adequacy of the environmental analysis of the Project.

Response to Comments 83-6

Comments 83-6 through 83-26 are identical to Comments 82-2 through 82-22. Therefore, the following responses to these comments 83-6 through 83-25 reference the corresponding responses in Letter 82 without the need to summarize the issues.

Refer to Response to Comment 82-2.

Response to Comment 83-7

Refer to Response to Comment 82-3.

Response to Comment 83-8

Refer to Response to Comment 82-4.

Response to Comment 83-9

Refer to Response to Comment 82-5.

Response to Comment 83-10

Refer to Response to Comment 82-6.

Response to Comment 83-11

Refer to Response to Comment 82-7.

Response to Comment 83-12

Refer to Response to Comment 82-8.

Response to Comment 83-13

Refer to Response to Comment 82-9.

Response to Comment 83-14

Refer to Response to Comment 82-10.

Response to Comment 83-15

Refer to Response to Comment 82-11.

Response to Comment 83-16

Refer to Response to Comment 82-12.

Response to Comment 83-17

Refer to Response to Comment 82-13.

Response to Comment 83-18

Refer to Response to Comment 82-14.

Response to Comment 83-19

Refer to Response to Comment 82-15.

Response to Comment 83-20

Refer to Response to Comment 82-16.

Response to Comment 83-21

Refer to Response to Comment 82-17.

Response to Comment 83-22

Refer to Response to Comment 82-18.

Response to Comment 83-23

Refer to Response to Comment 82-19.

Response to Comment 83-24

Refer to Response to Comment 82-20.

Response to Comment 83-25

Refer to Response to Comment 82-21.

Response to Comment 83-26

Refer to Response to Comment 82-22.

Response to Comment 83-27

Comments 83-27 through 83-60 are identical to Comments 82-35 through 82-68. Therefore, Responses to Comments 83-27 through 83-60 refer to the corresponding responses in Letter 82 without the need to summarize the issues.

Refer to Response to Comment 82-35 for text changes to the description of Alternative 2.

Response to Comment 83-28

Refer to Response to Comment 82-36.

Response to Comment 83-29

Refer to Response to Comment 82-37.

Response to Comment 83-30

Refer to Response to Comment 82-38.

Response to Comment 83-31

Refer to Response to Comment 82-39.

Response to Comment 83-32

Refer to Response to Comment 82-40.

Response to Comment 83-33

Refer to Response to Comment 82-41.

Response to Comment 83-34

Refer to Response to Comment 82-42.

Response to Comment 83-35

Refer to Response to Comment 82-43.

Response to Comment 83-36

Refer to Response to Comment 82-44. Refer also to Response to Comment 82-27 for revisions to Figure VI-1 and a description of BRT routing.

Response to Comment 83-37

Refer to Response to Comment 82-45. Refer also to Master Response 4 (Purpose and Benefits of the Yosemite Slough Bridge) and Responses to Comments 47-4 and 82-30 for discussion of BRT travel time estimates.

Response to Comment 83-38

Refer to Response to Comment 82-46. Refer also to Master Response 4 (Purpose and Benefits of the Yosemite Slough Bridge) and Responses to Comments 47-4 and 82-30 for discussion of BRT travel time estimates.

Response to Comment 83-39

Refer to Response to Comment 82-47.

Response to Comment 83-40

Refer to Response to Comment 82-48.

Response to Comment 83-41

Refer to Response to Comment 82-49.

Response to Comment 83-42

Refer to Response to Comment 82-50. Refer also to Master Response 4 (Purpose and Benefits of the Yosemite Slough Bridge) for BRT routing under Alternative 2.

Response to Comment 83-43

Refer to Response to Comment 82-51.

Response to Comment 83-44

Refer to Response to Comment 82-52.

Response to Comment 83-45

Refer to Response to Comment 82-53. Refer also to Response to Comment 82-50 for discussion of BRT routing for Alternative 2 and Master Response 4 (Purpose and Benefits of the Yosemite Slough Bridge) for BRT routing under Alternative 2.

Response to Comment 83-46

Refer to Response to Comment 82-54.

Response to Comment 83-47

Refer to Response to Comment 82-55.

Response to Comment 83-48

Refer to Response to Comment 82-56. Refer also to Response to Comment 82-32 for discussion of capacity constraints at regional transit facilities and Master Response 4 (Purpose and Benefits of the Yosemite Slough Bridge) for BRT routing under Alternative 2.

Response to Comment 83-49

Refer to Response to Comment 82-57.

Response to Comment 83-50

Refer to Response to Comment 82-58.

Response to Comment 83-51

Refer to Response to Comment 82-59. Refer also to Response to Comment 82-26 for revisions to Alternative 2 impact discussion.

Response to Comment 83-52

Refer to Response to Comment 82-60.

Response to Comment 83-53

Refer to Response to Comment 82-61. Refer also to Response to Comment 82-27 for revisions to Figure VI-1 and description of BRT route.

Response to Comment 83-54

Refer to Response to Comment 82-62. Refer to Master Response 4 (Purpose and Benefits of the Yosemite Slough Bridge) and Responses to Comments 47-4 and 82-30 for an estimate of BRT travel time around Yosemite Slough.

Response to Comment 83-55

Refer to Response to Comment 82-63. Refer to Master Response 4 (Purpose and Benefits of the Yosemite Slough Bridge) and Responses to Comments 47-4 and 82-30 for an estimate of BRT travel time around Yosemite Slough.

Response to Comment 83-56

Refer to Response to Comment 82-64. Refer to Master Response 4 (Purpose and Benefits of the Yosemite Slough Bridge) and Responses to Comments 47-4 and 82-30 for an estimate of BRT travel time around Yosemite Slough.

Response to Comment 83-57

Refer to Response to Comment 82-65. Refer to Master Response 4 (Purpose and Benefits of the Yosemite Slough Bridge) and Responses to Comments 47-4 and 82-30 for an estimate of BRT travel time around Yosemite Slough.

Response to Comment 83-58

Refer to Response to Comment 82-66. Refer to Master Response 4 (Purpose and Benefits of the Yosemite Slough Bridge) and Responses to Comments 47-4 and 82-30 for an estimate of BRT travel time around Yosemite Slough.

Response to Comment 83-59

Refer to Response to Comment 82-67. Refer also to Response to Comment 82-30 for discussion of BRT travel time estimates.

Response to Comment 83-60

Refer to Response to Comment 82-68.

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Letter 84: Arc Ecology (1/12/10)

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Letter 84

Arc Ecology

Environment, Economy, Society, & Peace

January 12, 2010

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Mr. Stanley Muraoka
Environmental Project Officer
San Francisco Redevelopment Agency
One South Van Ness Avenue
San Francisco, CA 94102

Mr. Muraoka:

Attached please find the Alternatives for Study commentary on the Candlestick Point Hunters Point Shipyard Draft Environmental Impact Report and supplementary materials from LSA Associates, Far West Engineering and other associated comments and materials. Arc Ecology by reference incorporates the Santa Clara Draft Environmental Impact Report for the proposed Forty Niner Stadium.

We are submitting this comment under protest for the inadequate extension of the public comment period which we believe unfairly penalizes the public's review of this Draft Environmental Impact Report.

Thank you,

Saul Bloom
Executive Director

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PHONE: 415.643.1190 | *FAX:* 415.643.1142 | *EMAIL:* info@arcecology.org

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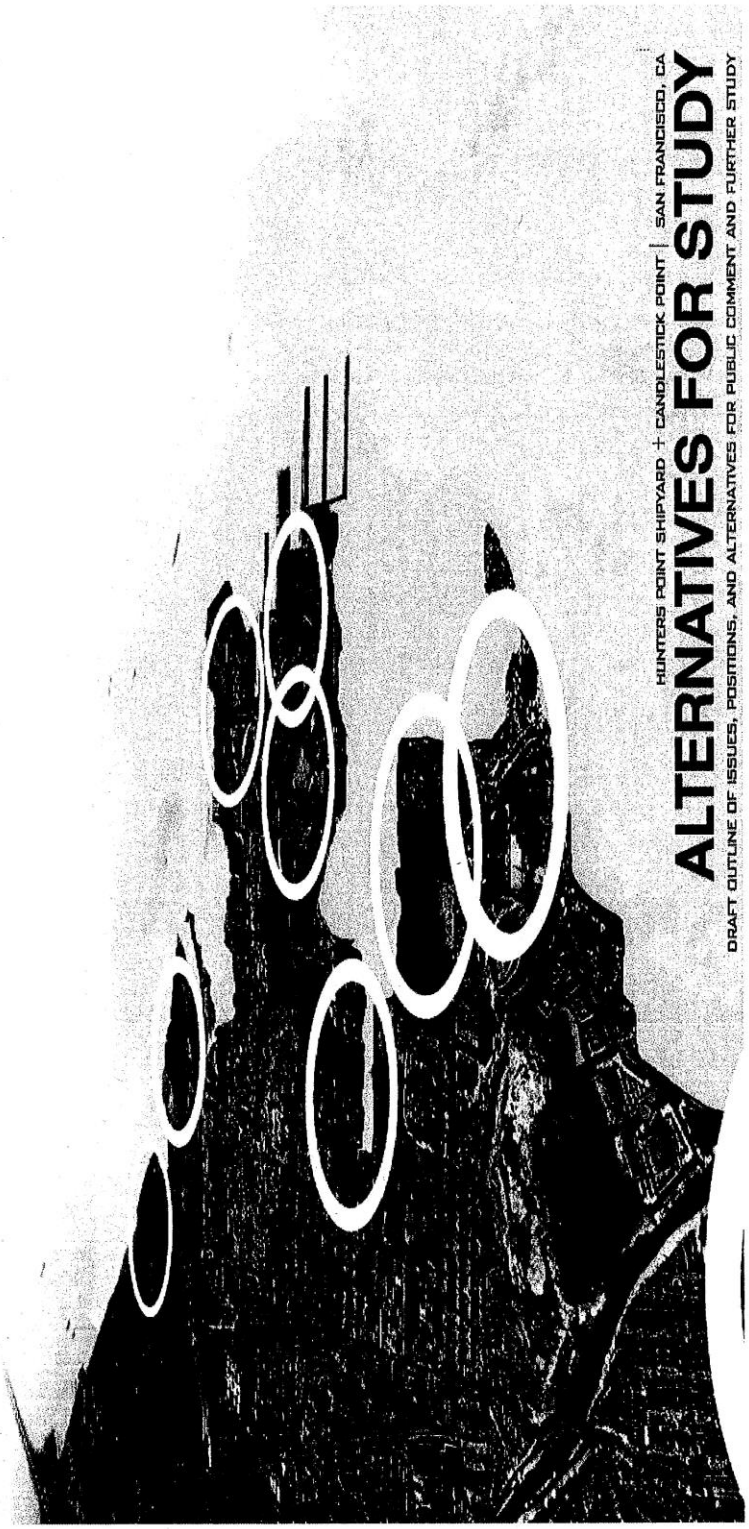


COMMENTARY ON THE CANDLESTICK POINT HUNTERS POINT SHIPYARD DRAFT ENVIRONMENTAL IMPACT STATEMENT JANUARY 12, 2010

Preface

The purpose of this *Final Alternatives for Study Preferred Alternatives Report* (*AFS FINAL)* is to present two of the Alternatives discussed in the DEIR in a different light, thereby demonstrating how a different orientation toward this effort could satisfy the criteria established for the development while lessening its environmental impacts. We present this document as commentary on the Candlestick Point Hunters Point Shipyard DEIR.

Arc Ecology
Golden Gate Audubon
Kristine Enea, resident of India Basin
Literacy for Environmental Justice,
Sierra Club San Francisco Bay Chapter,
Scott Madison, former Chair, Hunters Point Shipyard Citizens Advisory Committee
Urban Strategies Council
Visitation Valley Greenway Project
Visitation Valley Planning Alliance

Alternatives for Study – Presentation of Final & Preferred Project Alternatives

In January 2009, Arc Ecology and our consultant planning team from Bionic Planning & Landscape produced and distributed *Hunters Point Shipyard & Candlestick Point Alternatives for Study: Draft Outline of Issues, Positions and Alternatives for Public Comment and Further Study DRAFT* (*AFS DRAFT*). The goal of Alternatives for Study was to "address shortcomings" within the City's and Lennar's planning process and investigate issues and strategies to help inform the development of the Candlestick Point Hunters Point Shipyard Draft Environmental Impact Report.

After the release of the report, a series of three Alternatives for Study community dialogues were held at the Bayview Opera House. The purpose of these dialogues was to engage community residents in a discussion regarding the concepts posed in AFS, provide the attending public with an overview of the planning and entitlement process for the Candlestick Shipyard development, and to deepen our understanding of how residents used transit and gain their views on how transit in the Bayview could be improved. Over the course of these workshops the Urban Strategies Council and the Sierra Club San Francisco chapter joined the process of sponsoring the dialogues and, thus, the project grew beyond Arc Ecology to something larger. Some 200 unduplicated individuals attended the AFS Dialogues.

A fourth "workshop on wheels" was provided at which members of the Shipyard Citizens Advisory Committee, Project Area Committee, and members of other related advisory committees toured China Basin Park, the Embarcadero, the Moscone Playing Fields, Crissy Field, Coyote Point, and Candlestick Point State Recreation Area to compare and contrast the park and open space strategies proposed in the Lennar Urban Design plan with actual examples. Participants in the tour filled out a survey to help us understand their response to what they had seen. 84-1

On November 12, 2009, eleven months after the release of AFS *DRAFT*, the San Francisco Redevelopment Agency and the Planning Department produced the Candlestick Point Hunters Point Shipyard Draft Environmental Impact Report (DEIR). 84-1 cont'd.

AFS Comment 1: Unfortunately, many of the same shortcomings identified in *AFS Draft* remain in place today.

- The DEIR does not provide a comprehensive sustainability plan, although elements are presented as impact mitigations; 84-2
- The DEIR fails to address other adjacent development projects such as the Area C plan, piecemealing the evaluation of the project's impact; 84-3
- The DEIR fails to present reasonable justification and/or mitigations for the impacts of locating the proposed stadium on the Shipyard; 84-4
- The DEIR fails to evaluate the potential for the development of port-related heavy industrial activities on the Hunters Point Shipyard, possibly excluding this use from future consideration for this site; 84-5
- The DEIR does not evaluate the alternate route around Yosemite Slough proposed by the environmental community to protect and enhance the environment of the last unbridged inlet of San Francisco Bay on San Francisco's eastern waterfront; 84-6
- The DEIR does not adequately disclose the massing and girth of structures on Candlestick Point despite the substantial variance in environmental impacts these factors might produce; 84-7
- The DEIR innaccurately analizes the environmental benefits of alternate park, open space, shoreline, and waterfront access activities; 84-8
- The DEIR does not address the CEQA and Proposition P implications of early transfer. 84-9
- The DEIR does not adequately address impacts to wildlife species 84-10

84-11

AFS Comment 2: The public comment period was inadequate for a document this complex; the release of the DEIR over the winter holiday season undermined public review; in particular, the short time for review and the timing of the release added to the difficulty of compiling these comments; the release of the DEIR at this time contravenes a commitment made by the Mayor's office of this and prior administrations to refrain from releasing a shipyard related document like this over the holidays.

There is the sense among some in San Francisco's political community that organizations and individuals asking for an extension of public comment periods are simply waging a project opposition campaign by other means. This is unfortunate. True, some may attempt to wage a campaign of delay to bring down a project, but there is danger in this view because it discounts the views of those, like the organizations contributing to these comments, that support the project but see serious deficiencies, wish to address those weaknesses in the proposed plan and contribute proposals to make substantive improvements.

Were government and industry always right, a public comment period would be unnecessary. However the California Environmental Quality Act and its associated Environmental Impact Report Process were enacted precisely because government and industry aren't always right.

CEQA was created because projects have environmental impacts. CEQA was created because the neighborhoods, the interested public, and those we share this planet with were being forced to live with the consequences of bad decisions by government and industry. These decisions often imperiled their health, environment, livelihood and community. Therefore, CEQA was created to ensure that the public understood the large details of a project and its impacts on the environmental health and wellbeing of the affected community and its ecology.

Governments and industry frequently focus on this specific aspect of CEQA; that environmental impact reports are disclosure documents. Often the argument goes as follows: because an EIR is effectively a disclosure document, and because there have been numerous public discussions, presentations, and meetings, extending public comment periods are unnecessary. This, however, is only part of the story because CEQA does one other important thing, it gives the participating public legal standing in the decision making process regarding a project's approval. For the length of a public comment period, during that brief moment of time in the lifespan of a project, the door has been opened to the public to read, learn, and opine on its impacts. Government and industry must then respond in writing to these concerns on pain of possible lawsuit.

84-11 cont'd.

Furthermore, not only is the decision-making authority formally opened for that time only, it is also a requisite for a project's approval. Without an approved Environmental Impact Report, a project cannot be permitted and built.

In the seven meetings before the Hunters Point Shipyard Citizens Advisory Committee, the Bayview Hunters Point Project Area Committee, the Redevelopment Commission and the Planning Commission, this point was never mentioned and understandably so. If one views these procedures as a battleground, one does not disclose a potential tactical advantage to one's potential adversary. One certainly would try to minimize any extension of the public review process because the longer the look, the better a project and its impacts are understood, and the flaws of any report are identified.

The rub is, of course, that a democracy exists only through the informed consent of the governed and that efforts to hide the ball, unreasonably limit public comment periods, and limit the public's understanding of a process are all inherently unhealthy for our system.

On a very practical level, the release of the DEIR over the holidays, and the inadequate review period:

- Dramatically limited the time professional consultants had to review portions of the DEIR;

- Made it very difficult to acquire documents referenced in the DEIR but not included in the DEIR and other assistance since Agencies and Departments were closed and staffs were on vacation;
- Made it impossible for us to conduct public workshops to gain constituent feedback on the DEIR.

84-11 cont'd.

84-12

AFS Comment 3: The problems with the DEIR public comment process are further complicated by the appearance that the City may be in violation of the State's requirement to notify Native Americans. Discussions with representatives of the Ohlone People indicate that the San Francisco Planning Department was in possession of an official list of Ohlone representatives to contact in these instances, but that they failed to contact any of these individuals. The lack of specific formal notification and the failure to extend the deadline for public comment period to allow the Ohlone to properly evaluate the document and obtain technical services in that regard has undermined their capacity to comment, further disenfranchising this community.

Bayview Hunters Point is a polyglot community with residents hailing from all corners of the globe. Of this multitude of communities, the African American community is a plurality and it continues to confront many of the historic challenges that have marred this nation's history.

One community that has been all but invisible in Bayview Hunters Point is Native Americans and, specifically, the Ohlone, who are the indigenous residents of Bayview Hunters Point with historic hunting grounds on both Hunters Point and Bayview Hill prior to the invasion of Spanish settlers. The DEIR presents the Ohlone associated with the project area as lost, the victims of western genocide. However remnants of the Ohlone People continue to live in Bayview Hunters Point and are part of a larger community of Ohlone who have recently rediscovered their historic roots to the district through research conducted in the archives of Mission Dolores.

Recent attempts to reassert an Ohlone voice into the process of redeveloping the Hunters Point Shipyard and Candlestick Point have been undermined by the lack of a credible messenger. This individual notwithstanding, the San Francisco Planning Department is in possession of documentation regarding the presence of Ohlone artifacts in the vicinity of the project area. The Planning Department is also in possession of a list of Ohlone leaders to contact when a project planned for this area may come into conflict with known—and areas with potential—finds of patrimony and archeological/ historic significance.

84-12 cont'd.

There is already good reason to be concerned about the management of the project relative to the rights of Native Americans. Recent inquiries into the process for preparing Parcel A for grading revealed that required archeological core samples may not have been taken. The failure to appropriately consult and the potential lack of samples may have seriously compromised the environmental review process. Ohlone representatives have indicated that a dialogue has recently opened with the Planning Department. Nevertheless, the cure for the failure to consult must be the extension of the public comment period for the DEIR to allow this community the opportunity to comment on the administrative record.

84-13

AFS Comment 4: The Proposed Project presents the most significant and substantial impacts of any of the five scenarios presented in the DEIR.

While CEQA does not require the selection of the scenario with the least damaging environmental impacts, the DEIR Executive Summary and descriptions of alternatives, use the term "reduced development" for anything but the full build out with stadium and bridge. This terminology suggests that anything other than the full development is somehow inferior to the other alternatives—as if the other alternatives don't live up to the full potential of the project. This pre-judges consideration of alternatives such that the most housing units and the highest impacts are presumed to be superior, with all other choices inferior. In effect, the alternatives are lumped in with the "no-project" alternative as unacceptable. This presentation is argumentative and prejudicial to a fair consideration of alternatives. The two AFS Alternatives presented below pose fewer and less substantial impacts than any of the DEIR discussed Alternatives.

AFS Comment 5: Brisbane Baylands

84-14

In the draft version of Alternatives for Study, the Brisbane Baylands were identified as a potential alternate site for a new 49ers Stadium. For a number of reasons it is likely that this site is the best in the region to host a new Stadium.

Like the Oakland Coliseum, this site fronts a major highway. The Brisbane Baylands site fronts Highway 101 and is a few miles from Highway 380, which joins Highway 280 with 101. This makes the site accessible by essentially three freeways. Furthermore, the site is less than 15 miles miles further north from the San Mateo Bridge giving East Bay fans two major bridges from which to easily access the stadium. As such, the site is superior to that of the Coliseum, the Hunters Point Shipyard, and the proposed Santa Clara location for vehicular access. In addition, the site is located along what will in the future be the new BART Geneva extension, making access to the site from the southern portion of San Francisco more direct than it has been in the past.

The Brisbane site also provides opportunity for ample parking, which would have the impact of reducing parking on neighborhood streets in Visitation Valley, Little Hollywood and other adjacent communities.

Also like the Coliseum, the Brisbane site is located along a major commuter rail line – in this case CALTRAIN. The proximity to CALTRAIN makes this site easily accessible via mass transit from either San Jose or San Francisco. Furthermore, the adjacent location to CALTRAIN is vastly superior to that of an adjacent ferry terminal as the capacity for passengers is much greater. The nearby T Line, Geneva Avenue bus service, and SAMTRANS San Mateo Bus Service all make this site a highly effective location for access via mass transit.

Given its proximity to transit, freeways, and the lack of immediately adjacent neighborhoods, the Brisbane Baylands location is likely least impactful from an environmental, ecological, and public health standpoint.

84-14 cont'd.

The City rejected study of this site because it is not within San Francisco's jurisdiction. While this change of heart may make our adjacent neighbors very happy, the fact remains that San Francisco Airport, the Hetch Hetchy Reservoir, the Sunol Reservoir and most of the San Francisco Water Districts fresh water supply, the Hetch Hetchy Electrical Transmission Lines, and our County Jail all are located outside of the physical bounds of the City and County of San Francisco. Given this precedents, the argument that the Baylands lies outside of San Francisco and, therefore, cannot be considered is faulty. Furthermore, discussions with the staff and locally elected officials of the Brisbane City Government all indicated a willingness to enter into discussions regarding the potential location of a Stadium on the Baylands.

We recognize that the property is in private hands and that the Universal Paragon Corporation may see this use as significantly less profitable than their other plans for the site. Nevertheless, the failure to give this option serious consideration—a nearby site that is literally a ten minute drive from the stadium's current location and poses potentially fewer environmental impacts than any competing location—is a significant and important weakness of the DEIR.

AFS Comment 6: AFS Major Differences with the DEIR Preferred Plan

AFS 6A: Economic Development & Employment 84-15

The original goal for the redevelopment of the Hunters Point Shipyard was to help lift the residents and economy of Bayview Hunters Point out of poverty. While there is reason to be concerned that far too much responsibility for this goal has been placed on the Shipyard and Candlestick project, there is ample cause for concern that the economic development and employment strategy will not reach as far into the Bayview Hunters Point community as could reasonably be accomplished.

Economies and societies mirror the natural ecology in that the more diverse a system is, the more stable it becomes. The AFS analysis focused

on the following criteria for investigating economic development and employment opportunities in the project area:

- Must include a broader range of industrial, commercial, small scale entertainment and hospitality business strategies and employment opportunities;
- Must give priority to activities that create jobs with a future and maximize long-term employment or career opportunities;
- Must include opportunities for ownership by District 10 residents.

DEIR Proposed Activities: The DEIR proposed project promotes four basic forms of economic activity:

- Construction (temporary/short term);
- Sports (temporary/short term);
- Retail & Entertainment (temporary/short term);
- Green Tech/ Research & Development (long-term & career oriented).

AFS Proposed Alternatives embrace these forms of economic and employment development strategies and add the following:

- Port-oriented Heavy Industry (temporary/ short terms/ long-term & career oriented);
- Enhancement of Waterfront Oriented Retail, Food & Entertainment.

84-15 cont'd.

AFS 6A.1: Heavy Industry - Maritime Activities: The lack of a meaningful assessment of Maritime Port usage for the Hunters Point Shipyard waterfront in the DEIR will preclude this use in the future, at a minimum requiring an additional costly supplemental EIR process.

84-16

In 1994, the San Francisco Redevelopment Agency and Arc Ecology cooperated in the creation of an obsolete ship recycling program. In 1995 the Navy leased the dry dock, and scrapping took place at the facility until the election of George Bush in 2000 when this pilot project was ended.

In 2002, it was not unreasonable to be skeptical about the potential for including maritime activities on the Hunters Point Shipyard. At that time, the Navy's pilot ship dismantling program had been discontinued, the Maritime Administration was shipping Non Retention Fleet vessels to Brownsville in Texas for dismantling, and a conveyance agreement for Shipyard Parcels had not yet been concluded.

Today, however, the conditions are very different and this perspective needs to be reassessed. The Navy's aging fleet and other issues have created an environment in which the return of this asset to active duty can be contemplated.

The Hunters Point Shipyard contains one of the most unique maritime assets on the West Coast of the United States: Dry Dock 4, the largest graven dry dock on the coast and the only such dry dock capable of hosting a 90,000 ton Nimitz Class Carrier – the largest class of Naval vessel. Changes in the maritime industry present new and important options for the Hunters Point Shipyard. A substantial portion of the Navy's fleet—particularly Capital Ships, the largest vessels in the Navy—are in excess of 25 years old and some are beyond their useful service life. As such, a new decommissioning and recycling program for these vessels is being contemplated. In addition, the Maritime Administration recently entered into an agreement with BAE at Pier 70 to conduct short term paint scraping and sea grass removal for vessels slated for sale or recycling. A contract is also being let at Mare Island for use of its dry docks for ship recycling. The Suisun Bay Non Retention Fleet offers a potentially permanent source of vessels for eventual recycling. While some of this work could be accommodated at Pier 70, ship recycling is a lengthy process and encumbering the floating dry docks at that location with this activity would interfere with an already thriving ship repair business. Augmenting the activities at Pier 70 with the use of dry docks at Hunters Point opens a new and exciting opportunity for local industry and neighborhood residents with metal and building trades experience with minor training requirements. Dry Dock 4 and the Shipyard's industrial waterfront afford an opportunity to expand this industry in San Francisco by bringing to market one of the truly unique assets of the facility.

84-16 cont'd.

AFS 6A.2: Failure to present a robust study of the impacts of a substantial waterfront oriented retail, food & entertainment district within the DEIR may also preclude some or most of the activities potentially able to be located along this very important asset.

84-17

The Shipyard's second most significant economic development opportunity is its substantial waterfront. While the view from this waterfront is different than the dynamic scenery of the City's northeastern waterfront from AT&T Park to Crissy Field, the placid waters and East Bay and South Bay views, in combination with the best weather in San Francisco, offer an equally compelling development portfolio. On the other hand, improvements to the waterfront to make these assets viable require a deeper discussion within the DEIR relative to traffic, waste, and related issues. At this point the project descriptions for Hunters Point North and East seem to ignore this potential reuse and instead focus on more pedestrian and marina-oriented uses and impacts.

AFS 6B: Transit & Transportation

84-18

It is unclear from reading the DEIR whether the transportation analysis is based upon how the Bayview Hunters Point Community and the new residents of this development currently use and will use mass transit or whether it is based on how the MTC and the Developer would prefer for them to use transit and transportation. This difference is not insignificant because for these strategies to succeed they must meet both the user and the Agency/ Developer's needs.

84-19

AFS 6B.1: Extension of MUNI Lines. While some extension of the lines to the project area makes sense, a system providing better connection between the neighborhoods of Bayview Hunters Point should also be studied.

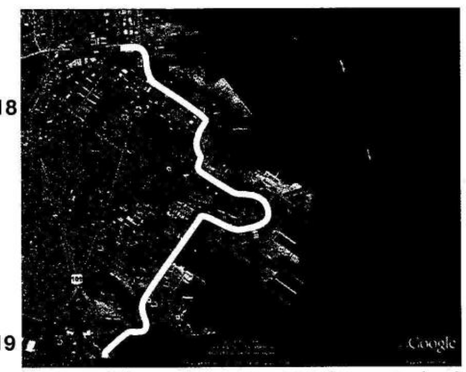
One consistent theme of the project appears to be that mass transit planners have focused on getting people to and from the project area through the Bayview, however connections to the neighborhood seem to be included only as stops along the way as opposed to destinations in and of themselves. It is our view that this paradigm will exacerbate the community's feeling of isolation from the City and the project rather than their integration within the fabric of San Francisco as a whole.

Our recommendation i to study implementing a Bayview Hunters Point Loop route that connects the neighborhoods South to North utilizing Third Street as the transit hub, as well as providing connections to the City's outlying neighborhoods and downtown.

84-19 cont'd.

84-20

AFS 6B.2: The Yosemite Slough Bridge: Presentation of the Yosemite Slough Bridge as a transit-only or a game day traffic bridge is dishonest and is an effort to evade regulatory review what is essentially the proposed construction of an alternate Highway 101 Business Route equivalent. This route joins Harney Way, Hunters Point Expressway, the putative Arelious Walker Bridge, Crisp Avenue, Spring/Galvez, Innes, and Cargo Way to create a business bypass to either Third Street North or Highway 280 on the North side and Highway 101 on the South.



The image to the left shows the completed route. The segmentation of this route between the Candlestick Point Hunters Point Shipyard DEIR, the forthcoming Area C DEIR, and the prior Bayview Hunters Point Project Area Plan masks the full impact of the entire route. Total expected vehicular use, noise, congestion, and air pollution impacts are underestimated as a result of the failure to link the segments in one comprehensive analysis. Addressing this question in the forthcoming Bayview Transportation Improvement Project analysis undermines the assessment of the contribution of the Candlestick Hunters Point Shipyard project to the impacts of the route.

AFS Comment 7: Alternatives to the Proposed Project

AFS 7A: Alternatives to the Proposed Project are not inconsistent with Proposition G

84-21

We believe other scenarios presented within the DEIR and below in this document are consistent with the goals and objectives outlined and supported by the voters in Proposition G. Proposition G, otherwise called the Jobs, Housing, Park, and Stadium initiative, called for the construction of a stadium on the Shipyard – *pending environmental review*. It is our conclusion that the DEIR demonstrates that the proposed Stadium on the Shipyard presents the most extreme environmental impacts of any of the DEIR proposed alternatives and, therefore, fails to meet the environmental review provision in Prop G. The scenarios presented herein, on the other hand, meet the Prop G criteria of creating housing, jobs, parks, and a premier stadium location as well or better than any of the scenarios evaluated in the DEIR.

AFS 7B: Criteria for AFS Alternative Development

84-22

1. **Land use**
   - Must include all or most of the activities in the City/Lennar urban development plan/DEIR;
   - Must make more efficient use of available property based upon the Proposition G criteria of lawyers, guns and money;
   - Must avoid displacement of commercial/residential property;
   - Must not compete with development plans for Third Street or contribute to the blighting of other areas of BVHP.
2. **Employment & Economic Development**
   - Must include a broader range of industrial, commercial, small scale entertainment and hospitality business strategies and employment opportunities;
   - Must give priority to activities that create jobs with a future and maximize long term employment or career opportunities;
   - Must include opportunities for ownership by D10 residents.
3. **Sustainability**
   - Low impact on surrounding environment/infrastructure;
   - Must attempt energy self-sufficiency;
   - Must be sustainable over next 100 year projected criteria.
4. **Environment & Public Health**
   - Must create a livable, walkable community environment;
   - Must meet Prop P cleanup criteria on Shipyard;
   - Must be fully compliant with standards for residential development on non-shipyard project property.
5. **Transit & Transportation**
   - Must service the needs of both the existing and new communities;
   - Must reduce dependence on cars;
   - Must increase available mass transit & make logical connections with existing BVHP transit grid.
6. **Housing**
   - Must be consistent with the scale of the surrounding community;
   - Must integrate subsidized housing/public housing into market rate developments;
   - Must produce a similar number of units (+/- 1,000 u) as the Lennar/City project.
7. **Parks & Open Space**
   - Must create an integrated strategy of park and open spaces;
   - Must create logical and substantive connections between parks and open spaces, such as Bayview Hill and Candlestick Point State Park;
   - Must enhance, not stress, existing biological resources and habitats and comply with ABAG guidelines for habitat preservation;
   - Must create more park/open space area than existed prior.
8. **Arts & Culture**
   - Must include African Cultural Cues & International African Marketplace;
   - Must preserve the existing arts community and create a new arts district;
   - Must include historical references focused on Native American, Samoan, & Naval activities.

84-22 cont'd.

AFS 7C: Comparison of AFS Alternatives with DEIR Alternatives

These scenarios were developed after gaining feedback in four AFS community workshops held at the Bayview Opera House and Arc Ecology's offices. In addition, meetings with the City, Redevelopment Agency, Lennar, members of both the PAC and CAC, members of the India Basin Neighborhood Association, labor, other neighborhood groups, employment development organizations, as well as Potrero Hill and Visitation Valley based organizations, and City-wide/regional environmental organizations helped inform these alternatives. The scenarios presented include a new Arc Ecology variant of a southern R&D campus instead of a large retail development on Candlestick Point and housing on Parcels D and E. Both scenarios call for a heavy industrial port activity centered around Dry Dock #4.

AFS 7C.1: DEIR "Alternative 2: CP-HPS Phase II Development Plan; No Yosemite Slough Bridge"

Alternative 2 would have the same land use program proposed with the Project, including the State Parks agreement. Alternative 2 would not include the Yosemite Slough bridge. The main roadway connection between Candlestick Point and HPS Phase II would be via Ingalls Street. A bus rapid transit (BRT) route would be constructed along an abandoned railroad right-of-way to provide access between Candlestick Point and HPS Phase II. This alternative assumes that the 49ers Stadium is relocated to HPS Phase II and the Agency enters into an agreement with CPSRA to reconfigure CPSRA land in the same way as for the Project.

Summary of Impacts: This alternative was selected to avoid impacts to biological resources associated with bridge construction and operation. Significant traffic, noise, and air quality impacts would not be reduced." **CP/HPS DEIR 11-09**

AFS 7C.1a: Comparison with DEIR Alternative 2

84-23

The AFS Stadium Alternative keeps the Stadium on Candlestick Point, creates additional housing on the Hunters Point Shipyard, and includes a heavy industrial port-related application on Shipyard Parcel C as an additional layer of economic activity to supplement "green research and development" and other commercial enterprises proposed for the property. Because the stadium would remain on Candlestick, no bridge would be needed, reducing the overall cost of the project and eliminating the threatened impact on efforts to restore Yosemite Slough and adjacent habitats. Proximity to the Harney Way Highway 101 on-ramp would remain as it is currently, thereby eliminating one mile of additional driving to reach the Shipyard and providing the associated reduction in carbon. The AFS proposed BRT route around Yosemite Slough via the railroad right of way would be enhanced by a neighborhood oriented transit loop connecting the new development with the existing neighborhood, Third Street T line, other bus routes, and the Oakdale CAL Train Station. As a result, traffic, noise and air quality impacts would be less than that considered in this alternative. The current footprint of Candlestick Point would be adjusted away from the SB 792 boundary on the South Basin side to comply with ABAG minimum habitat width Guidelines. The AFS Alternative is superior to CP-HPS Alternative 2 because it eliminates the impacts of that Alternative, while enhancing open space connectivity, housing opportunity, and diversifying the types of industries located on the Shipyard. Air pollution impacts on Candlestick Point would resemble the no-project alternative.

84-23 cont'd.

AFS 7C.2: DEIR "Alternative 3: Reduced CP-HPS Phase II Development; San Francisco 49ers Stay at Existing Candlestick Park Stadium; Limited State Parks Agreement; Yosemite Slough Bridge Serving Only Transit, Bicycles, and Pedestrians"

Alternative 3 would be a reduced development alternative. Total housing with this alternative would be 5,210 units, about half of the units proposed with the Project. At Candlestick Point residential development would be decreased and retail and arena uses would not be developed. Replacement of the Alice Griffith Public Housing site would occur and consist of 1,210 housing units. Minor improvements would be made to the CPSRA under the

84-24

Alternatives for Study: Comments on Candlestick Point Hunters Point Shipyard DEIR - Final Page 10

Limited State Parks Agreement. At HPS Phase II, housing would be increased; other uses at HPS Phase II would be similar to the Project. A new Yosemite Slough bridge serving only transit, bike and pedestrian traffic would extend Arelious Walker Drive from Candlestick Point to HPS Phase II. This alternative assumes that the 49ers football team would continue to use the existing Candlestick Park stadium. At HPS Phase II, the alternative would not include a new 49ers Stadium. This alternative would result in greater transportation-related impacts on game days because vehicular ingress and egress to and from the stadium would be delayed and traffic levels would be increased on local streets, including Innes Avenue, Evans Avenue, and Ingalls Street.

84-24 cont'd.

This alternative was selected to provide an alternative to the Project that reduces construction related impacts generally and operational impacts associated with traffic, air quality, noise, demand for public services, biological resources, and other growth-related impacts. The development program of this alternative would be reduced compared to the Project and would generate fewer vehicle trips and reduce the area subject to development. This alternative would reduce traffic and noise impacts associated with an increase in vehicle trips and air quality impacts associated with Project construction and operation. This alternative would reduce impacts to biological resources associated with bridge construction and operation as a result of the narrower bridge footprint and reduced bridge traffic. Construction and/or operational impacts related to the amount of development and the development footprint, such as soil erosion and storm water runoff, as well as operational impacts related to population and employment growth, such as police and fire services, would also be reduced by this alternative. **CP/HPS DEIR 11-09**

AFS 7C.2a: Comparison with Alternative 3

Alternative 3 is the closest comparison to the AFS Stadium Alternative. It comports with a developing perspective that a more limited approach to the project would constrain project costs and impacts making the entire development more affordable over a shorter period of time. The AFS Alternative differs from the DEIR alternative in the alignment of Stadium parking, the inclusion of the heavy industrial port activity on the Shipyard side, a larger housing configuration on the Shipyard site, the more integrative approach to park and open space systems – particularly as it regards to Bayview Hill, the focus on neighborhood=oriented loop transit to make trunk line connections, and the absence of a bridge across Yosemite Slough.

84-24 cont'd.

AFS does not find credible the assessment that this alternative, and particularly the lack of a bridge, would create an equivalent or greater impact of game day traffic on the Shipyard North-Side India Basin located streets of Evans and Innes. This route does not currently and is probably the least likely to suffer major impacts from a Candlestick Point located stadium as it poses the greatest challenges to easily accessing the site. Southbound traffic from either Highways 101 or 280 would select the closer more practical freeway exits of Silver, Paul, and Tunnel Road over the respective Caesar Chavez exits and a route that is essentially 5 miles longer. Northbound freeway traffic is also unlikely to forgo the current Harney Way and Third Street exits in favor of traveling another mile north to return southbound three miles through the India Basin neighborhood over Middle Point Road to the Bayside industrial flatlands along Ingalls. As a simple test of this theory, Arc Ecology asked Mapquest, Google, and Yahoo to provide routes to Monster Stadium; none identified this route. San Francisco residents would use such familiar main thoroughfare access strategies as Carrol, Gillman, Jamestown, and Geneva to Tunnel Road to Harney Way.

Impacts on Harney Way into Visitation Valley, Jamestown, Paul and Gillman would remain the same as in the no-project alternative, although a DPT controlled preferred routing alternative of Third Street to Carrol Street could channel traffic through the industrial Bayside as opposed adjacent neighborhood streets. The uncontrolled strategy incorporated

into the DEIR's Alternative 3 seems likely to ensure that neighborhood streets would continue to be heavily impacted by game day traffic and the pursuit of free on-street parking. One community benefit offset would be to provide Bayview Hill community residents with a limited number of free parking permits per residence to enable DPT to ticket and, therefore, discourage game day nonresident parkers. 84-24 cont'd.

AFS 7C.3: DEIR Alternative 4: Reduced CP-HPS Phase II Development; Historic Preservation; No HPS Phase II Stadium, Marina, or Yosemite Slough Bridge"

—Alternative 4 would also be a reduced development alternative. Total housing with this alternative would be 7,350 units, about 30 percent less than proposed with the Project. The proposed floor areas for most uses would be approximately 30 percent smaller at full build-out in comparison to build-out of the Project. No improvements would be made in the CPSRA. This alternative includes preservation of three potentially historic structures at HPS Phase II. This alternative does not include construction of a bridge over Yosemite Slough.

This alternative was selected to provide a reduced development alternative to the Project. This alternative would reduce the area subject to development and would avoid significant impacts to historic resources at HPS Phase II. Reduced development would result in fewer vehicle trips. This alternative would reduce traffic and noise impacts associated with the increase in vehicle trips and air quality impacts associated with Project operation and construction. This alternative would also avoid impacts to biological resources associated with bridge construction and operation. Construction and/or operational impacts related to the amount of development and the development footprint, such as soil erosion and storm water runoff, as well as operational impacts related to population and employment growth, such as police and fire services, would also be reduced by this alternative. **CP/HPS DEIR 11-09**

84-25

AFS 7C.3a: Comparison with Alternative 4

The AFS No Stadium Alternative builds upon some of the concepts presented in the DEIR while doing a superior job of maximizing employment, economic development, transit access, park and open space preservation and enhancement, and housing distribution. In the AFS No Stadium Alternative all of the same Shipyard assets discussed above are carried over. As such, heavy industrial activities, a research & development campus, the historic, arts and cultural district, parks and housing strategy remain the same. The AFS No Stadium Alternative also retains the marina. As such, the Shipyard side of the AFS Alternative remains an economically, socially, and environmental diverse project consistent with the Project objectives.

On the Candlestick side, the AFS No Stadium Alternative presents a different mix than Alternative 4 as well. In this scenario the total number of housing units on this property would be reduced, and a southern research and development campus would take the place of the retail mall proposed for the site. The AFS alternative favors increased research and development over expanded retail opportunity because of its potential for higher paying career-oriented job development. By combining a second R&D campus with the heavy industry proposal, destination parks, and art, culture and historical attractions, it is the AFS position that this strategy hews closer to the intent the voters endorsed in the Jobs, Housing, and Parks slogan of Prop G than the DEIR proposed project. 84-25 cont'd.

AFS 7C.4: DEIR "Alternative 5: Reduced CP-HPS Phase II Development; No HPS Phase II Stadium, State Parks Agreement, or Yosemite Slough Bridge"

Alternative 5 would have the same land use program proposed with the Project, except that the new stadium at HPS Phase II and the Yosemite Slough bridge would not be constructed. The total number of housing units would be the same as the Project; however, because this alternative would not include the CPSRA boundary reconfiguration, the land area available for development would be smaller. Approximately 1,350 units would be shifted 84-26

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from Candlestick Point to HPS Phase II. This alternative assumes a State Parks agreement does not occur and there is no agreement with the 49ers for a stadium at the Project site.

84-26 cont'd.

This alternative was selected to reduce construction impacts generally and to avoid impacts to biological resources associated with bridge construction and operation. Significant traffic, noise, and air quality impacts would not be reduced. Construction impacts that relate to the size of the development footprint would also be reduced by this alternative. **CP/HPS DEIR 11-09**

AFS 7C.4a: Comparison with Alternative 5

Alternative 5 could be configured to provide the benefits outlined in the AFS Stadium Alternative.

AFS Comment 8: Early Transfer & Implications for CEQA Review and Proposition P

84-27

It is our view that Early Transfer or the acceptance of a portion of the Federal Superfund cleanup responsibility in exchange for faster development brings that portion of the cleanup undertaken in this process under the umbrella of CEQA review for San Francisco and the Redevelopment Agency as an arm of the State. While exemptions apply within CEQA for jurisdictional changes with cleanup requirements, the acceptance of Early Transfer responsibility brings the City and Redevelopment Agency directly into the chain of responsible parties for cleanup liabilities. Furthermore, the strategies implementing early transfer requirements will have implications for the project's land use options. Given the City's possible responsibilities for implementing Early Transfer activities, it is also likely that the City's response in that regard is now covered by the terms of Proposition P, which was adopted by unanimous acclimation by the San Francisco Board of Supervisors under the sponsorship of Supervisor Maxwell and then Supervisor Newsom. These issues should be addressed in the DEIR.

AFS Comment 9: Summary of Comparisons of DEIR and AFS Project Alternatives

84-28

Activity	DEIR Alternatives	AFS Alternatives
Jobs & Economic Development		
• R & D	2 campuses	1 campus
• Retail	Concentrated in mall on Candlestick with neighborhood serving on the Shipyard	First floor and neighborhood serving retail similar to other SF neighborhoods on both CP and HPS
• Commercial	Yes	Yes
• Heavy Industrial	No	Yes
• Port/ Waterfront	No	Yes
• Hospitality & Food	Yes	Yes
Waterfront or Shorefront Stadium	Yes	Yes
Neighborhood Serving Mass Transit	Limited to extending inter-district bus lines & Bus Rapid Transit line connection with BART and CALTRAIN	Yes, includes BRT & focuses on providing smaller neighborhood loop-oriented mass transit methods making transfer connections with to City and regional trunk line e.g. T line, and CALTRAIN
Housing: Providing between 5,000 and 10,500 units	Yes	Yes
Parks & Open Space	Less than 300 acres of new and replacement parks	More than 300 acres of new and existing parkland including integration with Yosemite Slough & Neighborhood
Bridge	Yes	No
Prop P Compliant Cleanup	No	Yes

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84-29

AFS Comment 10: Attainment of Project Objectives

ATTAINMENT OF PROJECT OBJECTIVES – AFS STADIUM ALTERNATIVE		
Objective	*Meets Project Objective?*	**Analysis:** AFS Stadium Alternative would include some of the same development program and uses as the Project, ***however it is superior to the Project in meeting the attainment objectives***:
1. The integrated development should produce tangible community benefits for the Bayview and the City.	Y+	The addition of a heavy industrial seaport component would create more job and economic development opportunities than those presented in the DEIR Project Alternatives. This proposal takes advantage of changes in federal orientation toward ship recycling and utilizes existing assets such as Dry Dock 4, the largest graven dry dock on the west coast, to attract work. This scenario is likely to produce more work for a broader spectrum of workers earlier in the redevelopment process than those activities proposed in the DEIR. The exclusion of this use from the DEIR will prevent this opportunity from being exploited. The AFS Alternative would include the renovation and replacement of the artist studios at HPS Phase II and create a permanent space for artists. However it would expand the reach of the arts community to include performance, culinary and other formats providing space for these activities within the area of the proposed arts, cultural and historic district. The AFS Alternative would promote an Afro Centric Cultural District on the shipyard to create greater context for the International African Market Place. The AFS Alternative would also include an Ohlone oriented cultural use on the site. The AFS Alternative would include the same shoreline improvements and open space network, including a Bay Trail extension along the shoreline, and the same improvements to the CPSRA as the Project. However, unlike the proposed project it would promote the removal of the industrial dump on Parcel E2 by proposing its replacement with wetlands that would also treat street contaminants from rain run-off prior to reaching the bay. Ongoing studies of this location as compared to alternative sites on Parcel E are ongoing and funded by San Francisco International Airport under an order from the Regional Water Quality Control Board. The FEIR should incorporate this study within its discussion of developing plans around parks, storm water, water treatment and wetlands. The wetlands described would enhance State Parks efforts to create protected rookeries for water fowl. There would be no Yosemite Slough bridge, therefore the water quality of Yosemite Slough would not be potentially undermined by the facilitation of siltation by the bridge pilings. The lack of a bridge would prevent the blocking of the ever improving Yosemite Slough view shed, would not impede the migration of animals along the shoreline and its absence would also prevent its use as a perch for predatory birds and wildlife that could negatively impact the planned rookeries.. Contrary to the assertion in the DEIR, the lack of a bridge would enhance rather than undermine the natural shoreline connection between the Shipyard and Candlestick Point. In place of the bridge and in combination with the extended MUNI lines, the AFS Alternative would focus on neighborhood-serving, smaller scale mass transit designed to link to district trunk lines, such as the T, and regional rail, such as the planned Oakdale CALTRAIN station, therefore providing greater transit use incentives for community residents.

ATTAINMENT OF PROJECT OBJECTIVES – AFS STADIUM ALTERNATIVE

Objective	*Meets Project Objective?*	**Analysis:** AFS Stadium Alternative would include some of the same development program and uses as the Project, ***however it is superior to the Project in meeting the attainment objectives***:	
2. The integrated development should reconnect Candlestick Point and the Hunters Point Shipyard site with the larger Bayview neighborhood and should maintain the character of the Bayview for its existing residents.	Y+	Aside from continuing the street grid on the Candlestick Point side of the project, the Proposed Project and all of its alternatives and variants do a poor job of integrating with the larger Bayview neighborhood. Although the Proposed Project states that alternatives that do not include the Yosemite Slough bridge "preclude a direct connection between CP and HPS, particularly for transit", the Yosemite Slough Bridge creates the appearance of a community divided as does the proposed entryway adjacent to Parcel B. The AFS Stadium Alternative, while attempting to work within the design framework proposed by the City and Lennar, attempts to address this weakness by incorporating a different transit and traffic strategy focused on bringing the BRT closer to non-project residences and businesses, proposing a neighborhood connecting transit loop to serve both the project and surrounding neighborhoods, and boulevard access to Third Street though the South Basin Industrial Area. The AFS Alternative attempts to better integrate Alice Griffith with the adjacent State Park by reorienting the configuration of the development's park, creating a similar wedge configuration to the one proposed for Candlestick South. While the DEIR Proposed Project and its alternatives claim "the mix of uses and urban design concepts would provide a direct physical, visual, and architectural connection to the Bayview Neighborhood and City", clearly its visual references are more deeply connected to South of Market and Oyster Point than it is to Bayview Hunters Point where there are no towers and no buildings taller than 5 stories currently in use. Therefore, while the Proposed Project and its alternatives would meet this Project objective, it would not meet it to as great an extent as the AFS Proposed Alternatives.	84-30
3. The integrated development should include substantial new housing in a mix of rental and for-sale units, both affordable and market-rate, and encourage the rebuilding of Alice Griffith Public Housing.	Y+	As with the Lennar/ City Proposed Project and its alternatives, the AFS proposed alternatives "would include a variety of unit types, sizes, and structures, and a wide range of affordability levels." The AFS Alternative "would also include the redevelopment of the Alice Griffith Public Housing site." Therefore, the AFS Alternative would meet this Project objective.	84-31
4. The integrated development should incorporate environmental sustainability concepts and practices.	Y+	The DEIR does not present a sustainability plan, but rather concepts that appear to mitigate impacts rather than address the fundamental concepts of sustainability. The AFS Alternatives do a better job of integrating parks and open space with the new and existing communities, providing community oriented transit, promoting walking between the two projects, incorporating storm water treatment wetlands, supporting the implementation of Prop P levels of toxic cleanup on the Shipyard and promoting the cleanup of the South Basin industrial neighborhood. Therefore, the AFS Alternatives do a superior job of incorporating sustainability concepts.	84-32
5. The integrated development should encourage the 49ers—an important source of civic pride—to remain in San Francisco by providing a world-class site for a new waterfront stadium and necessary infrastructure.	Y-	In the Santa Clara DEIR, the 49ers specifically reject the Project's Proposed Stadium Alternative as being unworkable. In a recent press statement, the 49ers stated a preference for Oakland over San Francisco for precisely the same reasons AFS found problematic with the proposed plan. It is hard to see how ignoring the 49ers' criteria makes them more likely to want to work with San Francisco. While the AFS Candlestick Point stadium alternative is closer to the freeway by a mile than the DEIR proposed project, and is therefore closer to what the 49ers want, we will readily concede that this site is not as well situated as the Brisbane Baylands site, which we continue to believe is a vastly superior site to Santa Clara, Oakland and San Francisco.	84-33
6. The integrated development should be fiscally prudent, with or without a new stadium.	Y-	None of the DEIR proposed alternatives appear particularly fiscally prudent. This problem is evidenced by the extremely long time Lennar has reported it will take for them to break even, let alone reach their IRR. By eliminating the costly bridge, proposing a smaller and more integrated retail environment, and proposing a second industrial campus, AFS does a better job of being fiscally prudent than the proposed project & its alternatives.	84-34

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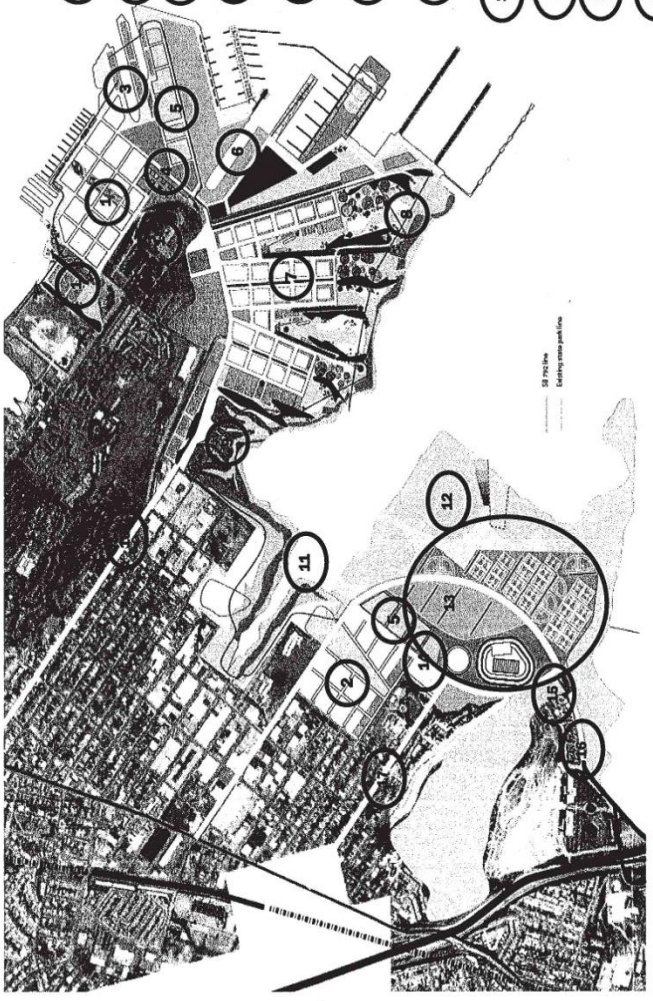
84-35

AFS Comment 11

ALTERNATIVES FOR STUDY – PROPOSED ALTERNATIVE: STADIUM

Stadium Rebuilt on Candlestick, Housing on D/E, Heavy Industry on C



1. Areas unchanged from DEIR/ Project Plan
2. Alice Griffith – Slight modification in park size & orientation to improve neighborhood orientation to recreational open space
3. Historic Shipyard District including International African Marketplace
4. Arts & Cultural District
5. R&D/ Green Tech Districts
6. New – Proposed port-oriented heavy industrial
7. Parcel D/E Housing – Slight modification from DEIR, assuming Prop P compliance
8. Expanded Parcel E park & living shoreline
9. New – Proposed wetlands, assuming E2 removal or major remedial excavation
10. New – Palou – Innes – 3rd Street Transit Loop
11. No bridge, habitat enhancement
12. CPSRA area unchanged
13. Stadium rebuilt on site with adjacent arena – green parking to perimeter of State Park
14. New Harney Way Alignment
15. Park connection to Bayview Hill
16. HWY 101 + Game Day BART BRT Route
17. New – Gilman / Carroll / 3rd St Transit Loop

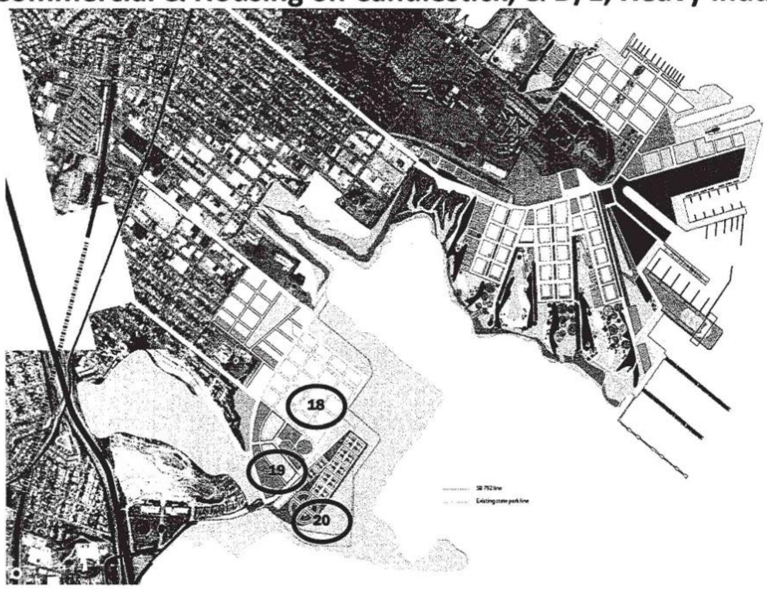
This proposed final alternative is based upon **Alternative 2 in CPHPS DEIR as Variant 2.** This Alternative to that studied within the EIR presents a greater number of economic and park and open space options while keeping the stadium closer to Highway 101, thereby eliminating the bridge concept for game day traffic. Instead of a bridge, two transit loops are proposed (Palou to Innes on the north side, Gillman to Armstrong on the south) to connect both parts of the project to Third Street and the T street car line. This proposed Alternative features less housing overall due to limiting the height of structures on the Shipyard to 10 stories on Parcel D/ E development. On the other hand, the project is also less expensive to construct because of reduced requirements for infrastructure. Other changes include the incorporation of a heavy maritime industrial activity around Dry Dock 4, an arena adjacent to the stadium, a new alignment for Harney Way, a Parcel E2 wetlands, a living shoreline on Parcel E and an expansion of the Park and Open Space area.

84-36

AFS Comment 12

ALTERNATIVES FOR STUDY – PROPOSED ALTERNATIVE: NO STADIUM

Commercial & Housing on Candlestick, & D/E, Heavy Industry on C



This proposed final alternative is based upon **Alternative 5 in the CPHPS DEIR**. This Alternative is the No Stadium variant to the one shown above. This Alternative reduces the area of the Lennar/ City proposed project known as Candlestick Point North and expands the State Park perimeter to a distance of 400 feet from the shoreline of South Basin from the SB 792 perimeter of 200 feet. This alternative still provides Lennar with an intrusion of some 150 feet into the current park boundary for housing development as a concession to their development strategy. It does however eliminate all of the proposed Candlestick Point South development in favor of creating a combined active and passive recreational opportunity similar to those available through regional park systems. The area of the project indentified as Candlestick Point Center is modified to combine a second Research & Development campus with the possibility of an arena and smaller community and CPS/ HPS, Executive Park, and BVHP project area serving retail and commercial development versus the current strategy of creating a regional retail center. CP South housing is relocated to Parcels D&E on the Shipyard assuming Prop P compliant cleanup levels. Total project housing development is increased by 500 units, R&D space is increased to 3.5 million square feet, heavy industrial port land is revived, and park and open space is increased by 40 acres over the Arc Ecology Alternative 2 – AE.afs.v1 concept presented on the prior page.

NO STADIUM ALTERNATIVE

The land uses described above remain consistent in this alternative except there is no stadium. In this proposed alternative the following changes have been made:

18 An additional housing component is added, bringing the total number of Phase 2 units to above 11,000, but within a 5-10 story limit.

19 A modified version of the retail and arena node in the Candlestick Point Center proposal. This alteration of the plan would add a second research & development complex to the proposed retail/ commercial, 10,000-seat arena, and structured parking. A portion of the Shipyard R&D campus has been relocated to Candlestick to offset the addition of the heavy industrial port activity around Dry Dock 4 so there is no loss in R&D space. The total for R&D square footage between the campuses is increased to 3.5 million.

20 The large sports field complex lost in the City/ Lennar non-stadium alternative is retained and integrated into a larger City/ State regional park system.

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84-37

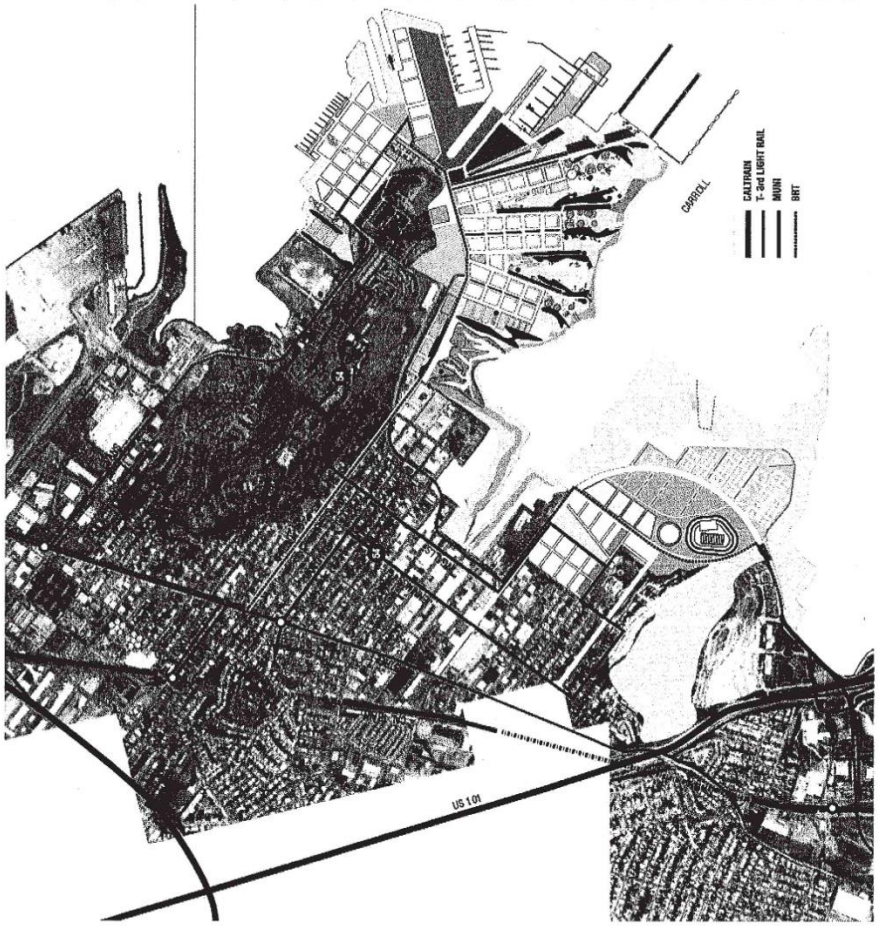
AFS Comment 13

ALTERNATIVES FOR STUDY –

Transit Routing Alternative

This alternate routing proposal attempts to address the negative environmental impacts of the Yosemite Slough Bridge by routing BRT, traffic, bicycle and pedestrian activity around the slough. The route around utilizes the Rail Road right of way and proposes to preserve the rail road bed for train transport to serve the revitalized port activity. This route is superior to the proposed Yosemite Slough Bridge because it limits the need for pilings, can be built by expanding the right of way, preserves an industrial asset, and still connects both sides of the project. According to LSA Associates the route around Yosemite Slough increases transit time by less than two minutes.

The BRT route pictured here combines with the extended 54 Bus line to create a neighborhood serving bus loop connecting Bayview Hill, the South Basin Industrial Flats, and Hunters Point Hill with the Third Street Transit Trunk, CALTRAIN at Oakdale and continues the 54 route west. This proposed route responds to comments made during the AFS Transportation Workshop for a system that connected the eastern BVHP neighborhoods.



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AFS Comment 10: Supplemental Commentary

Comment: The accuracy and completeness of the following statements is questionable: 84-38

III.N-94
Consequently, as the Project would not interfere substantially with the movement of native resident or migratory wildlife species, established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites, impacts would be less than significant. No mitigation is required.

But the development could impede the inland migration of tidal marsh habitat. 84-39

III.N-95
Although the bridge and the road crossing it would impede movement of terrestrial species from one side of the bridge to the other, sufficient terrestrial space would be present above the high tide line at the abutments to allow terrestrial wildlife to pass under the bridge. Consequently, Project activities within HPS Phase II and Yosemite Slough would not substantially interfere with the movement of any native resident or migratory terrestrial species.

Will this be true under all the projected seal level rise scenarios? 84-40

III.N-115
Impact BI-24 Implementation of the Project would not have a substantial adverse effect on federally protected wetlands and other waters as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, coastal, etc.) through direct removal, filling, hydrological interruption, or other means. (Less than Significant with Mitigation) [Criterion N.c]

The development could have negative impacts on the wetlands in the locations where they will need to be in the future. 84-41

As sea level rises, the tidal wetland resources within the project and immediately bayward of it will become inundated and will be lost unless provisions are made now to allow for the inland **migration** of the saltmarsh habitat. It is not sufficient to mitigate impacts on the wetlands in their existing locations and configurations. The topography should be designed and engineered to create a gradual change in elevation adjacent to the existing tidal marshes so that their inward movement and reestablishment will not be impeded and they will not shrink in size or value as the water level rises. Specific attention should be paid to two marshes on the north shore of Candlestick Point State Recreation Area – one located in the area of the failed boat launch facility and the other to the west of it, commonly called "Double Rock Marsh." These two wetland areas are adjacent to steep slopes, a problem exacerbated several years ago when the temporary overflow parking area was graded and the spoils pushed into a berm along the wetland edge. The berm needs to be removed or relocated many yards inland, and the shoreline slope needs to be reconfigured.

If the ill-advised bridge were to be included in the selected alternative, how would the "sufficient terrestrial space" above the high tide line at the abutments continue to allow terrestrial wildlife to pass under the bridge as sea level rises? 84-42

While the DEIR appears to deal adequately with the impacts of future sea level rise on the proposed developed areas, it fails to address the impacts on tidal wetlands, and the wildlife that depends on them, and the need for adaptive measures. 84-43

Comment: The draft EIR is inadequate because it uses a lower standard for evaluating an element of the plan than it should -- a standard that, if held to, could result in less park space per 1000 residents in this Bayview Hunters Point redevelopment project, than that currently enjoyed by the residents of other, more affluent San Francisco neighborhoods. 84-44

Stating that "the City does not have an adopted parkland-to-population ratio standard" (III.P, p. 11), the decision is made to use 5.5 acres of parkland per 1000 population as an adequate measure of parkland supply within the project area. This ratio was apparently chosen because that was "...the per capita supply of public open space within the City... at the time of the General Plan's adoption [in] 1986" (III.P, p. 11).

Yet on page 1 of III.P, we find that on Jan. 1, 2008, the ratio of acres of publicly-accessible parks and recreational facilities per 1000 residents for the city of San Francisco as a whole was 7.1. I would argue that this is the standard that should have been used. Why use a lower standard for this project?

Comment: The draft EIR is inadequate because it fails to provide sufficient neighborhood park space in the Candlestick Point part of the Project area.

The benchmark ratio chosen underlies the analysis pertaining to Impact RE-2 (Deterioration or Degradation of Existing Parks and Recreational Facilities), the heart of section III.P. 84-45

The main question is whether or not the Project would cause the deterioration of existing parks and recreational facilities through overuse, or result in the need for new parks and facilities. In attempting to answer the question, we find the following:

"Overall, the Project would provide approximately 336 acres of new and/or improved park land and recreational facilities to accommodate the estimated build-out population of approximately 24,465 residents within the Projecct site..." This would yield "a ratio of about 13.7 acres of parkland per 1000 residents within the Project site". Including 10,730 expected daily employees in the population yields a ratio of "9.5 acres per 1000 employees/residents." (All quotes from III.P, p. 29).

Both ratios are greater than the benchmark 5.5 acres/1000 population; therefore, the report concludes its discussion of Impact RE2 as follows: "Overall, the increase in the resident and daytime population of the Project site would not lead to substantial physical deterioration or degradation of existing facilities, nor would it result in the need for new or expanded facilities. The Project would, therefore, not cause a significant impact and no mitigation is required." Stated in plain English: there would be a sufficient supply of parkland.

Since the ratios noted above (13.7 and 9.5) are also both higher than 7.1, the benchmark I think should have been used, changing the benchmark would not by itself affect the adequacy of the EIR. HOWEVER, consider what happens if one separates the two pieces of the Project, and calculates acres of parkland per 1000 population for each part.

84-45 cont'd.

HPS Phase II -- Planned Acres of parkland: 231.6
Projected Population at Build-out: 6,175
Acres per 1000 population: 37.5

Candlestick Point -- Planned Acres of parkland: 104.8
Projected Population at Build-out: 18,290
Acres per 1000 population: 5.7

First, there is quite a discrepancy! Second, although each of these ratios is greater than 5.5, the ratio for Candlestick Point alone is less than 7.1, the ratio I think should have been used. Furthermore, note that only 8.1 acres of the 104.8 at Candlestick Point represents true neighborhood parkland. The rest is the reconfigured Candlestick Point State Recreation Area. As wonderful as that resource will be, I do not see that it will function well as a place where neighborhood children can play. Therefore, I believe there needs to be mitigation in the form of increased neighborhood parkland in the Candlestick Point area.

84-46

Comment: Section III.P of this EIR is inadequate because it does not consider construction impacts on Biological Resources.

In the analysis of Impact RE-1 (Construction of Parks, Recreational Uses, and Open Space) on p. 12, reference is made to several other sections of the EIR which contain "discussion of project-related construction impacts". There is no reference to section III.N (Biological Resources). Surely, there would be construction related impacts to plants and animals, some of which could be significant?

Much of this project is admirably designed, and the redevelopment is certainly badly needed. I hope these comments will help make the project even better than it already is.

84-47

Comment: Air quality impact on future residents

In reference to Section III.H. Air Quality, the EIR talks about Toxic Air Contaminants.

According to various studies, the BVHP community is currently host to a number of causes of air contaminants including the power plant, the city of San Francisco's largest wastewater treatment facility, both federal and state Superfund sites, hazardous waste storage facilities, and 280 "hot spots" containing toxic substances. Bayview Hunters Point is also home to the second largest concentration of leaking underground storage tanks in the city with 53.

This has led to an array of health problems including unusually high breast cancer rates, asthma and bronchitis that impacts current residents and would impact future residents of BVHP. The EIR does not take in to account the number of air pollutants that could adversely affect the over 20,000 new residents who would be affected by the toxic air. Specific emphasis has also not taken in to account the industrial processes, such as petroleum refining, auto painting, chemical manufacturing, electric utilities, chrome plating; commercial operations, such as gasoline stations, dry cleaners and the fact that the Bayview community has the high amount of diesel truck traffic in the area.

In 1999, Bayview Hunters Point Health and Environmental Assessment Task Force researchers conducted a community health survey (in collaboration with the University of California San Francisco and the San Francisco Department of Public Health). In the study, adults were asked how many people in their households had asthma. Overall, 10 percent of Bayview Hunters Point residents said they have asthma, compared to 5.6 percent nationally. 84-48

(Lenfant, C and Khaltaev, N. (1995) "Global Initiative for Asthma (GINA), Global Strategy for Asthma Management and Prevention: NHLBI/WHO Workshop Report" National Institutes for Health, National Heart, Lung and Blood Institute, Publication Number 95-3659, 1995, in Mann, Jennifer, San Francisco Department of Public Health. Community Health Epidemiology and Disease Control. "Asthma in San Francisco." November 2000.)

The asthma rate for children in Bayview Hunters Point was one in six (15.5 percent).
(Bayview Hunters Point Health and Environmental Task Force Community Survey, Draft Presentation, presented at "The Landscape of Out Dreams Environmental Health Symposium," Oct. 9, 1999.)

From 1994-96 the asthma hospitalization rate of Bayview Hunters Point residents was the highest in San Francisco (491 per 100,000 compared to 355 per 100,000 overall). The hospitalization rate for Bayview Hunters Point children was 781 per 100,000. 3
Mann, Jennifer, San Francisco Department of Public Health. Community Health Epidemiology and Disease Control. "Asthma in San Francisco." November 2000.

III.B.20

Proposition P should be included in this section, particularly as the City is considering utilizing the Early Transfer process and undertaking aspects of cleanup responsibility. Prop P established the community acceptance criteria for HPS cleanup under the NCP. Prop P was adopted by the City as its policy in 2000 with 87% of the electorate voting in favor, a much higher level of voter support than Prop G. A resolution presented by Supervisors Maxwell and Newsom in 2001 was enacted unanimously by the Board of Supervisors and compliance with its objectives should establish City policy as to the level of cleanup acceptable in property transfer and thus it is an appropriate CEQA/ DEIR issue and should be incorporated here. 84-49

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Letter 84: Arc Ecology (1/12/10)

Response to Comment 84-1

This comment contains introductory or general background information and is not a direct comment on environmental issues or the content or adequacy of the Draft EIR. No response is required. However, page VI-160 of the Draft EIR affirms the receipt of the alternatives study mentioned in this comment, stating:

> A number of alternatives were proposed during the planning and public scoping process for the Project. Several of these alternatives were identified by Arc Ecology, a local community organization. In January 2009, Arc Ecology published a report titled *Alternatives for Study, Draft Outline of Issues, Positions, and Alternatives for Public Comment and Further Study* (Arc Ecology Report).[1350]

As stated on page VI-165 of the Draft EIR:

> Five alternative land use plans were proposed by Arc Ecology and studied in concept for this document. They include proposals to locate the stadium on Parcels B, C, and G of HPS Phase II; one proposal with no stadium at HPS Phase II; and one alternative land use plan for Candlestick Point. …

Each of these alternatives has been analyzed on pages VI-165 through VI-172 of the Draft EIR.

Response to Comment 84-2

A Sustainability Plan has been developed for the Project. The Sustainability Plan sets forth the vision, goals, and strategies for achieving this standard and for transforming the Project site into a local, regional, and international model for sustainable living. The Sustainability Plan integrates overarching goals for seven focus areas spanning the economic, social, and environmental aspects of sustainability, which include, but are not limited to economic vitality and affordability, community identity and cohesion, public well-being, safety and quality of life, accessibility and transportation, resource efficiency, ecology, information and communications technology. Numerous elements of the Sustainability Plan have been incorporated into other Project documents and plans including the Infrastructure Plan, Transportation Plan, and MMRP. The Project has set an energy efficiency performance target of 15 percent below the energy efficiency standards set forth in California law and Vertical Developers will be required to implement measures such as high-performance glazing, efficient lighting, daylighting, shading, envelope optimization, reflective roofs, and natural ventilation in the design of vertical improvements. Additionally, ENERGY STAR appliances are proposed for all new residential units. Strategies to conserve water include the potential use of recycled water for non-potable water uses, the use of drought tolerant plant species, and the use of efficient irrigation systems such as drip irrigation, moisture sensors, and weather data-based controllers; and progressive stormwater management to retain and treat stormwater on site and/or in adjacent areas. The Sustainability Plan will be a part of the DDA to be submitted for approval by the Board of Supervisors.

Response to Comment 84-3

Area C (which is referred to in the Draft EIR as India Basin Shoreline) was evaluated in the Draft EIR as part of the cumulative impact analysis, along with numerous other adjacent projects. As stated on page III.A-6 and -7 of the Draft EIR:

> For the purposes of this EIR, the analysis of the potential for the Project's incremental effects to be cumulatively considerable is based upon a list of related projects identified by the City and neighboring jurisdictions and/or on full implementation of the City's General Plan and/or other planning documents, depending upon the specific impact being analyzed. For example, the cumulative analysis for the Traffic Study (which is the basis for many of the cumulative analyses in this document) uses the San Francisco County Transportation Authority (SFCTA) travel demand forecasting model, which projects general background growth based on Association of Bay Area Governments (ABAG) projections and is consistent with build-out of the City's General Plan. The Traffic Study specifically updated the background growth assumptions based on information regarding a number of major related projects, including (Figure III.A-1 [Cumulative Development in the Project Vicinity]):
>
> - Yosemite Slough Restoration Project
> - India Baseline Shoreline
> - Hunters Point Shipyard Phase I
> - Hunters View
> - Jamestown
> - Executive Park
> - Brisbane Baylands
> - Cow Palace
> - Visitacion Valley/Schlage Lock

The purpose of the cumulative impact analysis is to determine whether or to what extent impacts from individual projects, when considered together, could result in a significant environmental impact, which eliminates the potential for "piecemealing."

Response to Comment 84-4

The Draft EIR presents 111 mitigation measures that have been designed for the express purpose of avoiding or reducing environmental impacts, including those associated with stadium, and the document, in total, provides nearly 4,400 pages of data and analysis, all of which collectively provides substantial evidence for the conclusions made in the document. While the commenter expresses an opinion that the Draft EIR "fails to present reasonable justification and/or mitigations for the impacts of locating the proposed stadium on the Shipyard," no specific comment is provided.

Response to Comment 84-5

Refer to Response to Comment 48-3 regarding the selection and evaluation of alternatives.

The alternative the commenter suggests (port-related heavy industrial uses) is not compatible with the City's vision or the redevelopment plans adopted for the area. Further, this alternative would not achieve the Project's objectives and would not provide any benefit not achieved by the Project. In addition, industrial activities would be expected to result in far greater environmental impacts than those of the Project's proposed land uses. Table VI-11, page VI-170, of the Draft EIR states with regard to maritime industrial uses: "Maritime industrial uses are not proposed under the Project. Construction and operation of such uses at HPS Phase II could result in new impacts including, but not necessarily limited to, impacts on air quality, noise, hydrology and water quality, and biological resources."

Response to Comment 84-6

The Draft EIR does analyze an alternative with no bridge and in which the proposed BRT route would travel in the route around Yosemite Slough proposed by the commenter. Refer to Section VI.C (Analysis of Project Alternatives) in the Draft EIR, and refer to Subsection VI.C.2 (Alternative 2 [CP-HPS Phase II Development Plan; No Yosemite Slough Bridge]).

Response to Comment 84-7

Chapter II (Project Description) of the Draft EIR identifies the total amount of area (in gross square feet) associated with each land use type (and for the residential areas, the density per acre), the height limits associated with specific areas of the Project site, and within Section III.E (Aesthetics) provides visual simulations of the Project site. This information provides the reader with an understanding of the massing, scale, and density of the Project.

Table II-2, page II-8, provides the net change in development as a result of the Project. Table II-3, page II-9, provides the total development area (in gross square feet) by land use type and by location on either Candlestick Point or HPS. Residential development is identified by density range. Figure II-5, page II-12, identifies the maximum building heights. Pages II-13 through II-23 provide a description of each land use type followed by a description of each district and the uses within each district.

Section III.E (Aesthetics), pages III.E-49 to III.E.50, of the Draft EIR states that:

> To demonstrate the changes in visual character that would result with implementation of the Project, visual simulations of the Project from each of the viewpoints identified in Section III.E.2 (Setting) in Figure III.E-10 through Figure III.E-30 as well as other photographs contained in this section were used to evaluate changes in both views and visual character based on height, bulk, massing, and type of development when compared to existing conditions. Where appropriate, the simulations also include views of the approved HPS Phase I development, currently under construction, and the approved Visitacion Valley Redevelopment Plan. For the purpose of analyzing cumulative impacts, the simulations also include potential development under the proposed India Basin Shoreline Plan and the Executive Park Sub Area Plan.
>
> The visual simulations are distinguished as long-range views (Figure III.E-11 through Figure III.E-18), and short- and mid-range (Figure III.E-19 through Figure III.E-30) depictions. The visual simulations include development with the Project and with other development noted, above. The analysis determines whether the Project would result in substantial blockage of or other substantial negative changes to existing views from the public viewpoints identified in Figure III.E-11 through Figure III.E-18, particularly to views of scenic open space and water, as well as whether the Project would result in degradation of the visual character or quality of the setting (refer to Figure III.E-19 through Figure III.E-30). The simulations are taken from fixed viewpoints and do not show all possible views of the Project site. For example, they do not provide the dynamic views that would be experienced while driving, walking, or cycling in the Project vicinity. In addition, the simulations depict the overall location, height, and dimension of development, with general exterior features or materials, window patterns, landscaping, or other details. The new buildings shown in views of Candlestick Point and HPS Phase II represent building types, heights, and dimensions that would reflect the Project land use plan and urban design guidelines. The simulations do not represent final architectural design that would occur with the Project. However, the simulations are sufficient for an adequate analysis of changes in scenic vistas, scenic resources, and visual character."

Refer to Section B (Project Refinements) of this EIR for discussion regarding the description of Variant 2A and Variant 3: Tower Variant D, as well as Alternative 2 and Subalternative 4A.

Response to Comment 84-8

Because the Project would not have any significant, unavoidable impacts related to recreation, CEQA does not require the analysis of alternatives focused on reducing or avoiding such impacts.

Response to Comment 84-9

Refer to Response to Comment 84-27 acknowledging that early transfer brings the portion of the hazardous materials cleanup to be performed by the Agency or Project Applicant under the umbrella of CEQA.

Refer to Master Response 15 (Proposition P and the Precautionary Principle) for a discussion of how Proposition P and the Precautionary Principal relate to the remediation program and the project.

Response to Comment 84-10

The comment states that the assessment of impacts to wildlife is inadequate. While the commenter expresses an opinion, no specific comment is made that can be responded to. The EIR contains an extensive analysis of setting, impacts, and mitigation measures related to biological resources on pages III.N-1 through III.N-141. Specifically, an analysis of wildlife impacts is provided in Impacts BI-2 through BI-13b, BI-15a through BI-20b, and BI-22 through BI-25 of Section III.N (Biological Resources) of the Draft EIR. The Lead Agencies believe the EIR more than adequately addresses these issues for the public and for decision-makers to make informed decisions with respect to these issues.

Response to Comment 84-11

Refer to Response to Comment 1-1 for a discussion of the adequacy of the public comment period, including the many opportunities for providing comments on the Draft EIR.

In terms of accessing the documents referenced in the Draft EIR, as stated on page I-10 of the Draft EIR:

> The documents referenced in this Draft EIR are available for public review by appointment at the San Francisco Redevelopment Agency, One South Van Ness Avenue, Fifth Floor, San Francisco, CA, 94103, or at the City Planning Department, 1650 Mission Street, Fourth Floor, San Francisco, CA, 94103. The EIR will be posted for public review at http://www.sfplanning.org and www.sfgov.org/sfra.

Therefore, the reference documents were available. With respect to the assertion that the reference documents were difficult to obtain because City and Agency offices were closed during the public review period, they were only closed on four business days during the entire 60-day public review period: November 26 and 27 (Thanksgiving), December 25 (Christmas), and January 1 (New Year's Day). Further, in the event of staff vacations, another staff member was available to provide the requested materials.

Response to Comment 84-12

Refer to Master Response 1 (SB 18) for a discussion of consultation with the Native American community under Senate Bill 18 (SB 18).

Refer to Response to Comment 73-16, with regard to archaeological information for Parcel A at Hunters Point Shipyard Phase I. The comments states "required archeological core samples may not have been taken" at Parcel A in Phase I. Response 73-16 notes that the Mitigation Monitoring and Reporting Plan (MMRP) for Hunters Point Shipyard Phase I required that, for any project disturbance below the layer of historic fill within four identified archaeological sensitivity zones, that archaeological consultants prepare an archaeological treatment plan and monitoring plan. Zone 1 in Phase 1 specifically related to Native American sites. No Phase I activity has occurred in the four identified archaeological sensitivity zones that would trigger the preparation of an archaeological treatment and monitoring plan as required in the MMRP. The MMRP did not require archaeological core sampling or other investigation in the absence of activities in the sensitivity zones. No other disturbance of archaeological resources has been identified during Phase I development.

Response to Comment 84-13

Refer to Response to Comment 48-3 regarding the selection of alternatives. The AFS Alternatives are specifically addressed in Response to Comment 84-23.

Response to Comment 84-14

The Brisbane Baylands alternative sites for Candlestick Stadium were analyzed on Draft EIR pages VI-161 through -163, concluding that:

> The Brisbane Baylands locations are not considered feasible sites for the 49ers stadium for the following reasons:
>
> - The Baylands Specific Plan, although not yet formally adopted, does not include a stadium as an allowed use in either the northern or southern portions of the site. Both sites are designated for commercial, office institutional, and industrial uses. While planning considerations in a particular jurisdiction can evolve over time, it is expected that the range of uses identified in the Phase I Specific Plan reflect Brisbane's long-term planning goals for the Brisbane Baylands, which plans do not include developing a professional football stadium.
> - The Brisbane sites are outside of the City and County of San Francisco. Planning review, and approval of a stadium in Brisbane Baylands would be subject to City of Brisbane jurisdiction. Neither the San Francisco Redevelopment Agency (Agency), the City and County of San Francisco, nor Lennar Urban would reasonably be able to acquire, control, or otherwise have access to a Brisbane site for the purpose of pursuing such alternative locations. Thus, the Brisbane Baylands sites were determined to be infeasible for development of the stadium, and were rejected from further consideration in the EIR.

While the ability to acquire, control, or otherwise have access to a Brisbane site for the purpose of pursuing an alternative stadium location was one factor that contributed to rejecting the site as infeasible, perhaps the more important factor is that the City of Brisbane does not envision a stadium at that location. Therefore, even if Lennar Urban were able to acquire the site from Universal Paragon Corporation, the Baylands Specific Plan, which would guide land use development at the site, would not allow a stadium.

Response to Comment 84-15

Refer to Response to Comment 84-5 regarding the inability of the suggested alternative (port-related heavy industrial uses) to achieve the Project's objectives or to offer any benefit beyond that provided by the Project, and its incompatibility with the City's vision or the redevelopment plans adopted for the area. This

comment expresses an opinion as to what the goals of the Project should be. Refer to Pages II-5 to II-7 of the Draft EIR outline the Project objectives.

Response to Comment 84-16

Refer to Response to Comment 84-5 and 85-15 for a discussion of why such uses would not achieve the Project's objectives nor offer any benefit beyond that provided by the Project, and the incompatibility of such uses with the City's vision or the redevelopment plans adopted for the area.

Response to Comment 84-17

The Project offers a substantial mixed-use development, much of which is oriented to the waterfront. The alternatives analyzed explore different combinations of land uses that could also achieve the Project's objectives. The EIR comprehensively analyzed traffic, waste, and "related issues" of the shoreline improvements that are part of the Project. Refer to Response to Comment 84-5 regarding the inability of the suggested alternative (port-related heavy industrial uses) to achieve the Project's objectives or to offer any benefit beyond that provided by the Project, and its incompatibility with the City's vision or the redevelopment plans adopted for the area.

Response to Comment 84-18

The predicted transit usage is based on a statistical regression analysis developed from travel patterns currently made by travelers within other neighborhoods of San Francisco that have similar transit service to what is proposed by the Project. The forecasting model accounts for type of trip (work vs. non-work), destination parking costs, and travel times as influential predictors of transit use. Other variables were considered but found to not be statistically significant (i.e., they were not useful predictors of transit use).

Response to Comment 84-19

This comment contains opinion, anecdotal, or general information and is not a direct comment on environmental issues or the content or adequacy of the Draft EIR. No response required.

Response to Comment 84-20

Refer to Response to Comment 17-1 for a discussion of the process that would be required for the bridge to be open for public use.

Refer to Master Response 4 (Purpose and Benefits of the Yosemite Slough Bridge) for a discussion of travel time and reliability improvements, as well as a reduction of mixed-traffic congestion, arising from the use of the Yosemite Slough bridge for bus rapid transit. Also refer to Response to Comment 43-2, which describes the relationship of this Draft EIR with the BTIP Draft EIR, which is at yet unpublished.

Response to Comment 84-21

The CEQA Guidelines, Section 15151 provide that "an EIR should be prepared with a sufficient degree of analysis to provide decision-makers with information which enables them to make a decision which intelligently takes account of environmental consequences." The EIR presents the environmental impacts

of the Project, variants, and alternatives so that decision-makers are fully informed as they deliberate on what to ultimately approve.

Refer to Response to Comment 48-3 regarding the selection of alternatives.

Response to Comment 84-22

These comments outline criteria for alternatives development. Refer to Response to Comment 48-3 for the discussion of the CEQA criteria for alternatives development, as well as the process that was employed to identify alternatives in the Draft EIR.

Response to Comment 84-23

The commenter is proposing a comparison of two alternate alternatives to the Alternatives identified in the Draft EIR. As stated in Response to Comment 48-3, all possible alternatives need not be analyzed, just a reasonable range of alternatives. Further, many of the concepts in these two new alternate alternatives were previously addressed in the Draft EIR. As these new alternate proposals include some portions of the Project, some portions of the Alternatives, and some portions of the Variants identified in the Draft EIR, it is difficult to try to compare these alternate scenarios to any one proposal (Project, variant, or alternative) in the Draft EIR. (Also refer to Responses to Comments 84-24 to 84-28 for additional discussion of these alternatives.) However, the key concepts in those scenarios can be addressed. The key components of the AFS Stadium Alternative identify several aspects: retaining Candlestick, additional housing on HPS Phase II, heavy industrial port-related uses on Parcel C, and a neighborhood-oriented transit loop. This alternative could supposedly eliminate one mile of driving to the HPS Phase II, reduce traffic/air/noise with a new transit loop, and comply with ABAG minimum habitat guidelines.

Retaining Candlestick stadium is addressed in Alternative 3 and Alternative 5, which both include this possibility. Alternative 3 reduces seven significant unavoidable impacts identified for the Project in traffic, air quality, and noise. Alternative 5 reduces five significant unavoidable impacts identified for the Project in traffic and noise. Additional housing on HPS Phase II is addressed in Alternative 5, which also retains Candlestick stadium. Alternative 5 reduces five significant unavoidable impacts identified for the Project in traffic and noise. As these alternatives have already been evaluated in some form within the Draft EIR, no new analysis involving such alternatives is necessary.

Heavy industrial port-related uses were not identified for the Project. As identified on page VI-170, these uses could "result in new impacts, including, but not necessarily limited to, impacts on air quality, noise, hydrology and water quality, and biological resources." Refer to Response to Comment 84-5 for more discussion of Port heavy industrial uses.

A neighborhood-oriented transit loop was not identified for the Project. The Project would provide enhanced transit services, as described on page II-39 of the Draft EIR:

> ### *Transit Services*
>
> Supported by Project revenues and infrastructure, the San Francisco Municipal Transportation Agency proposes the following transit services:
>
> - Extending existing Muni bus routes to better serve the Project site

- Increasing frequencies on existing routes to provide more capacity
- Complementing existing routes with new transit facilities and routes that would serve the Project's proposed land use program and transit demand
- Connecting to regional transit with BRT

The Transportation Plan would propose new direct transit service to serve employment trips to and from downtown San Francisco. Connections to the regional transit network (BART and Caltrain) would serve employment centers in the South Bay. The proposed transit improvements are illustrated in Figure II-13 (Proposed Transit Improvements) and described below:

A. **Extended bus routes and new bus routes.** Existing Muni routes 24-Divisadero, 44-O-Shaughnessy, and 48-Quintara-24th Street would be extended to HPS Phase II; route 29 would terminate at Candlestick Point. Service frequencies on these lines would be increased. New Downtown Express routes would connect both Candlestick Point and HPS Phase II with the Financial District.

B. **Harney/Geneva BRT/Transit Preferential Street.** The Harney Way/Geneva Avenue corridor would have exclusive bus and BRT lanes between Hunters Point Transit Center and Bayshore Boulevard, through Candlestick Point and the Bayshore Caltrain Station.

C. **Hunters Point Transit Center.** Hunters Point Transit Center would serve HPS North and Hunters Point Village Center districts. The transit center would have approximately ten bus bays. Most bus lines serving HPS Phase II would terminate at the transit center.

D. **Bus Rapid Transit Stops.** BRT stops would be at Hunters Point Shipyard Transit Center, at three locations within Candlestick Point, and at two intermediate locations.

E. **Palou Avenue Transit Preferential Street.** One Muni line (24-Divisadero) would be extended along Palou Avenue to serve Hunters Point Shipyard Transit Center. Transit-priority technology would be installed on Palou Avenue including installation of new traffic signals. This would improve transit travel times and reliability on the 24-Divisadero and also the 23-Monterey and 54-Felton, which would continue to operate on Palou Avenue but would not be extended into the Project.

Many of the proposed transit lines would include transit priority systems, with roadway sensors that would detect approaching transit vehicles and would alter signal timing to improve transit efficiency."

It is not clear that a neighborhood-oriented transit loop would provide benefits beyond those identified for the Project transit improvements. Development of a neighborhood-oriented transit loop would require consultation with the SFMTA, and is speculative at this time.

The reduction in any one element of the Project would not necessarily reduce the cost of the Project, or eliminate Project impacts as asserted by the commenter, since other elements or features would be introduced. As can be seen with the Yosemite Slough bridge, alternatives without the bridge encounter Project impacts in other resource areas, either from elimination of that access point or from construction of new elements to replace the bridge. The tradeoffs among alternatives are rarely simple numeric calculations but involve a trading and weighting of desirable and often mutually excluding objectives.

Response to Comment 84-24

The commenter states that the Draft EIR describes Alternative 3, as compared to the Project, as having greater transportation-related impacts on game days because vehicular ingress and egress to and from the stadium would be delayed and traffic would be increased on located streets, including Innes Avenue, Evans Avenue, and Ingalls Street, and the commenter states that this assessment is not credible. The commenter

is incorrect in characterization of the Alternative 3 game day traffic impacts. Both the Transportation Study (pages 342 through 343) and the Draft EIR discussion of Alternative 3 impacts (page VI-65) state that game-day impacts would be similar to the No Project conditions. No further response is necessary.

Response to Comment 84-25

Refer to Response to Comment 48-3 regarding the selection of alternatives. As addressed in 48-3, a reasonable range of alternatives is presented in Chapter VI of the Draft EIR.

With respect to the "port-related heavy industrial uses" portion of the suggested alternative, refer to Response to Comment 84-5 for a discussion of why such uses would not achieve the Project's objectives nor offer any benefit beyond that provided by the Project, and the incompatibility of such uses with the City's vision or the redevelopment plans adopted for the area. The other aspects of the AFS No-Stadium Alternative (research and development, historic, arts and cultural, parks, and housing) have been addressed in the analysis of the Project contained in Chapter III of the Draft EIR. Table VI-11, pages VI-170 to VI-172, of the Draft EIR identifies specific proposals and identifies why they could result in greater impacts than those outlined by the Project or Alternatives.

Response to Comment 84-26

Refer to Response to Comment 84-5 for a discussion of why the "port-related heavy industrial uses" portion of the suggested alternative would not offer any benefit beyond that provided by the Project; therefore, reconfiguration of Alternative 5 is not warranted.

Response to Comment 84-27

The comment that early transfer brings the portion of the cleanup to be performed by the Agency or Project Applicant under the umbrella of CEQA is acknowledged. The Draft EIR evaluates the potential environmental activities undertaken by the Agency or Project Applicant in the case of early transfer. Impact HZ-12 analyzes the potential impacts of such remediation, and characterizes the impact as less than significant with mitigation. Under mitigation measure MM HZ-12, the Agency, Project Applicant, or contractor, shall comply with all requirements incorporated into remedial design documents, work plans, health and safety plans, dust control plans, and any other document or plan required under the Administrative Order on Consent. Under the agreements, the Agency and Project Applicant would be responsible for remediating previously unidentified hazardous material releases to the extent agreed to with the Navy; the Navy would pay the Agency for completing the specified work and would pay for the costs of environmental insurance for the work. The Navy will remain liable for costs not covered by the agreement or insurance, and in particular for any radiological material releases that need to be addressed. Refer to Impact HZ-12 and mitigation measure MM HZ-12 for further detail.

Refer to Master Response 15 (Proposition P and the Precautionary Principle) for a discussion of for the applicability of Proposition P to early transfer.

Response to Comment 84-28

Refer to Response to Comment 48-3 regarding the selection of alternatives.

Response to Comment 84-29

Refer to Response to Comment 84-5 regarding the inability of the suggested alternative (port-related heavy industrial uses) to achieve the Project's objectives or to offer any benefit beyond that provided by the Project, and its incompatibility with the City's vision or the redevelopment plans adopted for the area.

Response to Comment 84-30

Page VI-59 of the Draft EIR describes how a direct crossing of Yosemite Slough would provide benefits that would not accrue without a direct bridge connection. The visual and physical connection at the mouth of the slough, the utility and ease of access that a bridge at the mouth of the slough would provide for multiple modes of transit (pedestrians, bicyclists, and transit riders), would each encourage travel that would not otherwise occur.

With regard to the compatibility of high-rise towers with the existing five story, and fewer, buildings of the Bayview neighborhood, less than significant impacts were identified. Page III.B-39 of the Draft EIR states regarding Candlestick Point:

> The Project would result in a substantially different built environment compared to the existing character of the site and vicinity. The scale of development would contrast with existing patterns; Candlestick Point would include residential towers ranging from 220 feet to 420 feet in height, and regional retail and arena uses. The mixed-use pattern with the Project at Candlestick Point would transition from lower-density residential uses near existing neighborhoods to higher density residential and commercial uses. Development at Candlestick Point would have similar land uses as existing and proposed uses in Executive Park immediately to the west. With the transition in scale and uses, the extension of the existing street grid, and with the connectivity of new open space with existing shoreline open space, the Project would be compatible with surrounding land uses. The Project would not result in a substantial adverse change in the existing land use character at Candlestick Point or adjacent areas. The impact would be less than significant.

Further, page III.B-40 of the Draft EIR states regarding HPS Phase II:

> The Project would result in a substantially different built environment compared to the existing character of the site and vicinity. The scale of development would contrast with existing patterns; HPS Phase II would include two residential towers ranging from 270 feet to 370 feet in height. The football stadium would be a large-scale public facility, with related parking and dual-use open space areas. While this would be a new land use element at HPS Phase II, it would replace the similar-scale use at Candlestick Point. The mixed-use pattern with the Project at HPS Phase II would transition from lower-density residential uses near existing neighborhoods to higher density residential and R&D uses. With the transition in scale and uses, the extension of the existing street grid, and with the connectivity of new open space with existing shoreline open space, the Project would be compatible with surrounding land uses. The Project would not result in a substantial adverse change in the existing land use character at HPS Phase II or adjacent areas. The impact would be less than significant.

Therefore, towers would be located away from existing low-scale residential uses, and would not be incompatible with existing uses.

Response to Comment 84-31

The comment makes an affirmative statement, and proposes that the AFS alternatives are superior to the Project without stating any reasons. No response is required.

Response to Comment 84-32

As described on pages II-49 and II-50 of the Draft EIR:

II.E.6 Green Building Concepts

The Project would comply with all applicable provisions of the City's Green Building Ordinance, which is contained in Chapter 13c of the San Francisco Building Code, and would provide recycling, composting, and trash facilities as required by the City's specifications. The Project has set an energy efficiency performance target of 15 percent below the energy efficiency standards articulated in Title 24, Part 6 of the 2008 California *Code of Regulations* (CCR). Lennar Urban would include measures such as high performance glazing, efficient lighting, daylighting, shading, envelope optimization, reflective roofs, and natural ventilation in the Project design. ENERGY STAR appliances are proposed for all new residential units. In addition, Lennar Urban could also implement renewable energy strategies, such as the use of photovoltaic cells to provide electricity; the use of solar thermal energy to provide space cooling with the use of absorption systems; and/or water for space heating and domestic water systems.

Lennar Urban has also voluntarily committed to constructing all Project buildings to the LEED® for Neighborhood Development Gold standard based on the Pilot Version of the rating system released in June 2007.[29] Following the 2007 LEED® ND Pilot Program rating system, preliminary analysis indicates the Project could achieve approximately 63 points, which is in the LEED® ND Gold range, through strategies including but not limited to the following:

- Compact, infill development (including 90 percent of the new buildings fronting on public streets or open space)
- Enhanced habitat values
- Brownfield remediation and urban reuse
- Close proximity to transit and bicycle networks (75 percent of all development would be within ¼-mile walk to a transit stop and Class I, II, and III bikeways provide connections throughout the site and to the greater Bayview community)
- Urban design that promotes walking and discourages driving
- Diversity of land uses and housing types
- Affordable housing that supports a community of mixed ages and income
- Community participation in the community planning and design
- Compliance with the San Francisco Green Building Ordinance
- ENERGY STAR compliance to be documented by a Home Energy Rating System (HERS)
- Unbundled parking
- Drought tolerant plant species and the use of efficient irrigation systems such as drip irrigation, moisture sensors, and weather data-based controllers
- Tree-lined streets throughout the development and streetscape improvements extending from the Project Site to Third Avenue along Gilman and Palou
- Access to public space and recreational amenities through the creation of parks and playfields
- Efficient use of water and the potential use of recycled water for non-potable water uses such as irrigation, toilets, vehicle washing
- Progressive stormwater management to retain and treat stormwater on site and/or in adjacent areas

Essentially, a sustainability plan that identifies each of the strategies that the Project would employ would be adopted as part of the Project. This would address parks and open space, transit, pedestrian connections,

storm water treatment wetlands, and hazardous remediation and cleanup. There is no evidence provided that the AFS Alternatives would meet the Project objectives to a greater degree than the Project.

Response to Comment 84-33

A discussion of the Brisbane Baylands site as a proposed 49ers stadium site is discussed in the Draft EIR on pages VI-161 through VI-163. Page VI-163 states:

> The Brisbane Baylands locations are not considered feasible sites for the 49ers stadium for the following reasons:
>
> - The Baylands Specific Plan, although not yet formally adopted, does not include a stadium as an allowed use in either the northern or southern portions of the site. Both sites are designated for commercial, office, institutional, and industrial uses. While planning considerations in a particular jurisdiction can evolve over time, it is expected that the range of uses identified in the Phase I Specific Plan reflect Brisbane's long-term planning goals for the Brisbane Baylands, which plans do not include developing a professional football stadium.
> - The Brisbane sites are outside of the City and County of San Francisco. Planning review, and approval of a stadium in Brisbane Baylands would be subject to City of Brisbane jurisdiction. Neither the San Francisco Redevelopment Agency (Agency), the City and County of San Francisco, nor Lennar Urban would reasonably be able to acquire, control, or otherwise have access to a Brisbane site for the purpose of pursuing such alternative locations. Thus, the Brisbane Baylands sites were determined to be infeasible for development of the stadium, and were rejected from further consideration in the EIR.

In conclusion, the Brisbane Baylands site is not a feasible alternative.

Response to Comment 84-34

The AFS Alternative is likely to have a similar "fiscal prudence" to Alternatives 2, 4, and 5, since those alternatives similarly do not include a bridge. Refer to Response to Comment 48-3 about the selection of alternatives. Alternatives are selected to reduce identified significant impacts, and also to attain most of the basic objectives of the Project.

Response to Comment 84-35

Refer to Response to Comment 84-23 about the key concepts in the AFS alternatives and how they have already been evaluated in some form within the Draft EIR; therefore, no new analysis involving such alternatives is necessary. In addition, these ideas were addressed in Chapter VI Alternatives (pages VI-160 through VI-173). Page VI-167 states:

> Overall, the Arc Ecology land use alternatives are rejected because they do not reduce or avoid environmental effects of the Project in ways different from the Alternatives examined above. …

Response to Comment 84-36

The commenter is proposing a comparison of two alternate alternatives to the Alternatives identified in the Draft EIR. The alternate proposals include some portions of the Project, some portions of the Alternatives, and some portions of the Variants identified in the Draft EIR and so are not directly comparable to any one proposal (Project, variant, or alternative) in the Draft EIR. However, the key concepts in these alternate scenarios can be addressed. The key components of the AFS No-Stadium

Alternative include several aspects (aside from the key concepts in common with the AFS Stadium Alternative which are addressed in Response to Comment 84-23): housing is increased to 11,000 units; a second research and development campus on Candlestick Point, with total of 3.5 million of R&D; more parks instead of a new stadium. This alternative would increase housing, R&D, and parks and open space.

Increasing housing in lieu of developing a stadium was evaluated in the Housing Variant (Variant 2) (in Chapter IV (Project Variants). The Housing Variant (Variant 2) included analysis of 10,500 units, which is within 5 percent of the AFS No Stadium Alternative housing. The Draft EIR analysis shows that the Housing Variant (Variant 2) would likely have fewer impacts compared to the Project in traffic, aesthetics, shadows, wind, noise, hydrology and water quality, and public services.

Increasing R&D in lieu of developing a stadium was evaluated in the R&D Variant (Variant 1) in Chapter IV (Project Variants). The R&D Variant (Variant 1) included analysis of 5 million gsf of R&D, which is more than that proposed in the AFS No Stadium Alternative. The Draft EIR analysis shows that the R&D Variant (Variant 1) would likely have fewer impacts compared to the Project in shadows and wind; and greater impacts compared to the Project in traffic, noise, hydrology and water quality, public services, and greenhouse gas emissions.

Increasing parks in lieu of developing a stadium was evaluated in Alternatives 3 and 5. Alternative 3 proposes less development all around and is not a good comparison to the AFS No Stadium Alternative. Alternative 5 was developed to reduce construction impacts generally and to avoid impacts to biological resources associated with bridge construction and operation. Significant traffic, noise, and air quality impacts would not be reduced. Construction impacts that relate to the size of the development footprint would be reduced by this alternative.

As with the analysis of the AFS Stadium Alternative, the reduction in any one element of the Project would not necessarily reduce the cost of the Project, or eliminate Project impacts as asserted by the commenter, since other elements or features would be introduced. The tradeoffs among alternatives are rarely simple numeric calculations but involve a trading and weighting of desirable and often mutually excluding objectives.

Response to Comment 84-37

The Draft EIR does analyze an alternative with no bridge and in which the proposed BRT route travels in the route around Yosemite Slough proposed by the commenter. Refer to Section VI.C (Analysis of Project Alternatives) in the Draft EIR, and refer to subsection VI.C.2 Alternative 2 (CP-HPS Phase II Development Plan; No Yosemite Slough Bridge).

Response to Comment 84-38

The commenter suggests that the Project could impede the inland migration of tidal marsh habitat, presumably as sea level rises. In a few areas that are gradually sloped from the bay shoreline inland, small patches of tidal salt marsh could gradually migrate inland as sea level rises. In most area, however, in the absence of the proposed shoreline improvements, shoreline habitat would be lost to sea level rise, and high waters of the Bay may encroach into developed areas that do not provide suitable conditions for tidal marsh. However, the proposed shoreline improvements will allow for shoreline conditions to be adapted as sea level rises. Furthermore, sediment accretion on the outboard sides of these shoreline treatments may

keep pace with sea level rise so that at least some mud flat, and possibly some tidal marsh, could be maintained in areas that currently provide such habitat (i.e., in more sheltered areas such as South Basin that are not subject to heavy erosion).

Response to Comment 84-39

In reference to the comment that sea level rise may inhibit the movement of wildlife under the Yosemite Slough bridge in the future, refer to Response to Comment 75-7.

Response to Comment 84-40

In reference to the comment that the Project could impede the inland migration of tidal marsh habitat, refer to Response to Comment 84-38. The commenter's suggestions regarding the potential locations of areas on CPSRA where planning for marsh progression as sea level rises may have merit, but restoration of marshes on CPSRA would be subject to the master planning effort being performed by State Parks rather than being something that can be planned by the CP/HPS applicant.

Refer to Response to Comment 101-34 for a discussion of how the Project ensures no net loss of wetlands or jurisdictional/regulated waters.

Response to Comment 84-41

Refer to Responses to Comments 84-38 and 84-40 for a discussion of potential effects of the Project on the locations of tidal wetlands as sea level rises

Response to Comment 84-42

In reference to the comment that sea level rise may inhibit the movement of wildlife under the Yosemite Slough bridge in the future, refer to Response to Comment 75-7.

Response to Comment 84-43

In reference to the comment that the Draft EIR does not adequately address the impacts of sea level to tidal wetlands and the wildlife that depends on them, refer to Response to Comment 57-3.

Response to Comment 84-44

Refer to Response to Comment 47-29 for a discussion of how the EIR arrived at an appropriate standard of significance for evaluating impacts to recreational facilities, and how parkland ratios at the Project site would be well above this significance standard at all phases of the Project.

Response to Comment 84-45

Candlestick Point and HPS Phase II will provide a continuous set of parks that will allow, and invite, residents and others to view and use them as a single, integrated open space. Pedestrian, bicycle, and transit travel between the two sections of the site will be facilitated by the proposed bridge over Yosemite Slough,

which would connect two key pieces of open space with its proposed green roadway. Thus, it is reasonable to consider the parkland ratio for the Project site as a whole.

As the commenter notes, the parkland ratios for both Candlestick Point and HPS Phase II exceed the ratio that the EIR uses as a standard of significance standard of significance—there is sufficient parkland in both sub-areas to avoid a significant adverse impact. Even if the two subareas of the Project are considered separately, each subarea has sufficient parkland to serve its population without causing substantial physical degradation.

Moreover, the commenter's calculation includes employment figures as part of the population using parkland. The "benchmark" figure that the commenter proposes, however, the 7.1 parkland acres per 1,000 population ratio in the City as a whole in 2008 does not include employees. Adding employees to this ratio would reduce it substantially, and the Project's parkland ratios would be much closer to the proposed "benchmark."

Moreover, including employees in the parkland ratio, the approach that is also used by the Draft EIR, is quite conservative. Many people employed on the Project site will also live here; these population figures count such residents twice, and therefore overstate the service population. Further, it is very likely that people employed on the site would use local parks at a significantly lower frequency than residents. To accurately account for the use caused by people working on the site (and the accompanying degradation of the facilities), an analysis would likely count each such user as some fraction of a resident, because they use parks less than residents. Thus, the effective population served by the Project's parkland likely will be smaller than reported in the EIR and the parkland ratios likely will be higher. The Draft EIR, by taking a conservative approach and counting every person employed on the site as a part of the service population, overstates the use of parks. The calculations in the Draft EIR demonstrate that there will be sufficient parkland on site to meet residents' and employees' needs without causing overuse and deterioration of parks.

Response to Comment 84-46

In reference to the question regarding whether construction-related impacts to biological resources were assessed in the Draft EIR, refer to the "Construction Impacts" section of Section III.N (Biological Resources) on pages III.N-50 through III.N-100 of the Draft EIR.

Response to Comment 84-47

Refer to Response to Comment 83-3 for a discussion of environmental health concerns associated with Project operation. Further, the Project evaluated potential health effects due to potential exposure to diesel particulate matter during construction activities in Impact AQ-2 and proposed MM AQ-2.1 and MM AQ-2.2 to address these issues. TACs from construction activities were addressed in Impact AQ-3. Refer to Master Response 19 (Proposed BAAQMD Guidelines), which provides updated community-scale analyses based on the most recent guidance, and Master Response 5 (Health of the Bayview Hunters Point Community) for a discussion of health outcomes in the Bayview community.

Response to Comment 84-48

Refer to Response to Comment 84-47.

Response to Comment 84-49

Refer to Master Response 15 (Proposition P and the Precautionary Principle) for a discussion of Proposition P.