

# SAN FRANCISCO BAY CONSERVATION AND DEVELOPMENT COMMISSION

50 California Street • Suite 2600 • San Francisco, California 94111 • (415) 352-3600 • Fax: (415) 352-3606 • www.bcdc.ca.gov

April 18, 2008

## Revised Application Summary (For Commission consideration on May 1, 2008)

**Number:** BCDC Permit Application No. 3-07  
**Date Filed:** February 5, 2008  
**90th Day:** May 6, 2008  
**Staff Assigned:** Brenda Goeden (415/352-3623 [brendag@bcdc.ca.gov](mailto:brendag@bcdc.ca.gov))

### Revised Application

This document describes revisions to the City and County of San Francisco Recreation and Parks Department's application to maintenance dredge up to 210,000 cubic yards (cy) of sediment from the San Francisco Marina's West Basin and entrance channel and dispose of the fine-grained sediment at the state- and federally-authorized Alcatraz dredged material disposal site in the City and County of San Francisco and beneficially reuse sand from the entrance channel for construction; and to create and maintain a sand trap adjacent to the marina's jetty by dredging up to 550,000 cy of sand and using it for construction purposes.

For Commission reference, please bring Staff Summary and Staff Recommendation for the San Francisco Marina Ten Year Maintenance Dredging and Sand Trap project, dated February 22, 2008 and February 29, 2008, respectively, to the meeting on May 1, 2008.

### Background

At the Commission meeting on March 6, 2008, Department of Recreation and Parks (Department) presented an application to: (1) maintenance dredge of up to 210,000 cy over ten years of fine-grain sediment and sand to a depth of minus 12 feet Mean Lower Low Water (MLLW) from 26.8 acres at the San Francisco West Marina basin and entrance channel and to dispose of the fine-grain sediment at the state- and federally-authorized Alcatraz disposal site and any sand at an authorized upland site; and (2) to create and maintain over a ten-year period sand trap by dredging up to 550,000 cy of sand from 2.8 acres adjacent to the Marina's jetty to a depth of minus 55 feet MLLW, using the dredged sand for construction.

During the public hearing, the Commission raised a number of questions regarding the sand trap. In particular, the Commission was concerned that the sand trap could impact adjacent rec-



*Making San Francisco Bay Better*

reational beaches and requested that the applicant provide additional information on: (1) sediment transport processes in the area; (2) possible slumping into the sand trap from adjacent areas; (3) impacts to Last Chance, Crissy Field, and Aquatic Park beaches; (4) impacts to aquatic wildlife uses of this habitat. The Commission also asked how the maintenance dredging project related to the proposed marina renovation. The Commission also requested more detail on the amount and type of monitoring that would be required as a condition of the requested authorization.

The Commission directed staff to discuss potential impacts of the project with representatives from the Department of Boating and Waterways, Phil Williams and Associates (PWA), NOAA's National Marine Fisheries Service (NOAA Fisheries), the National Park Service (NPS) and the U.S. Geological Survey (USGS). The Commission also requested that staff provide an analysis of the project's consistency with the *San Francisco Bay Plan* (Bay Plan) policies on Recreation and Public Access for this project. The applicant indicated that they needed additional time to provide the requested information, so the Commission requested that the public hearing be held open and the vote postponed until the next meeting.

Attached to this document is information provided in response to the Commissioner's requests from Moffatt & Nichol, the City's consultant (Exhibit A). The Commission also requested a topographic map of Last Chance Beach (Exhibit B). In addition, the applicant provided staff with a modeling study report entitled *San Francisco Marina Renovation Project Breakwater Improvement Study*, which included preliminary sediment transport modeling for the marina. Exhibits C1, C2 and C3 represent the relevant modeling efforts from this study.

The Commission's comments were directed entirely on the sand trap. The applicant has revised their sand trap proposal to respond to the Commission's concerns. The proposal for maintenance dredging of the Marina basin and entrance channel remain unchanged.

### **Revised Project**

The applicant has revised the sand trap portion of the project (see Exhibit A for exact wording) and proposes the following:

#### Sand Trap:

1. Develop the sand trap as a pilot project.
2. The sand trap would remain in the same general location as originally proposed, but the sand trap would be reduced to 1.8 acres from the originally proposed 2.4 acres and would be located below the minus 15 -foot MLLW contour in the area of the ridge. In the area closest to Last Chance Beach, dredging would be limited to areas below minus 30-foot MLLW contour (Figure 3 of Exhibit A).
3. The dredging slope would be no greater than a ratio of four feet horizontally to one foot vertically (Figure 4 of Exhibit A)
4. The maximum dredging depth would be minus 55-feet MLLW.
5. The dredging volume during the first year would be limited to 25,000 cy of sand.
6. The sand trap and marina entrance channel would be dredged at the same time to assess how the sand trap affects shoaling at the entrance channel.

#### Monitoring:

1. Prior to each sand trap dredging episode, a pre-dredge hydrographic survey of both the sand trap and the entrance channel would be performed. The survey would extend 2,000 feet to the west and 300 feet to the east of the jetty tip, extend out to the minus 55-foot MLLW contour, and include the Marina basin and Last Chance Beach.
2. A pre-dredge dredging plan and template would be provided to the Dredged Material Management Office (DMMO) agencies for review and approval.
3. A post-dredge hydrographic survey of the same areas listed above would be submitted within 30 days of the completion of the dredging episode.
4. An annual spring and fall hydrographic survey would be required, covering the same areas listed above.
5. All surveys, observed changes and analysis would be submitted on an annual basis, and would include analysis of any changes to Last Chance Beach, Bay bathymetry and Aquatic Park Beach.
6. A monitoring station would be established at Aquatic Park Beach.
7. At the end of five and ten years, if the sand trap project continues, a trend analysis would be provided.

#### Criteria for Continued Dredging of Sand Trap:

1. The bathymetric contours above minus 40 feet MLLW do not retreat (move south) over a distance of 400 feet west of the sand trap in area D. This would be evident in a comparison between a pre-dredge hydrographic survey and a survey conducted within 30 days of dredging.
2. It can be demonstrated that shoaling within the marina entrance channel has decreased in response to dredging the sand trap.

### Staff Analysis

#### Issues

**Raised:** The staff believes that the application raises three primary issues: (1) whether creation of a sand trap would minimize dredging, and is consistent with Bay Plan Dredging Policy No. Two; (2) whether the potential impacts of a sand trap would be consistent with the Bay Plan Subtidal Areas Policies; and (3) whether the potential impacts of the sand trap are consistent with the Bay Plan Recreation Policies.

1. **Subtidal Areas.** The Bay Plan Subtidal Areas Policy No. One states that "Any proposed filling or dredging project in a subtidal area should be thoroughly evaluated to determine the local and Bay-wide effects of the project on: ... (b) tidal hydrology and sediment movement; (c) fish, other aquatic organisms and wildlife; ... (e) the Bay's bathymetry. Projects designed in subtidal areas should be designed to minimize, and if feasible, avoid harmful effects."

Bay Plan Subtidal Areas Policy No. Two states "subtidal areas that are scarce in the Bay or have an abundance and diversity of fish, other aquatic organisms and wildlife (e.g. eelgrass beds, sandy deep water or underwater pinnacles) should be conserved. Filling, changes in use, and dredging projects should only be allowed if: (a) there is no feasible alternative; and (b) the project provides substantial public benefit."

- a. **Fish and Other Aquatic Organisms.** As discussed in the original application summary, to minimize disturbance to endangered or threatened species, the applicant would conduct the proposed activities during the environmental work windows for dredging. Unavoidable impacts described by the applicant include temporary water column impacts and benthic disturbance.

At the direction of the Commission, staff had further discussions with representatives of NOAA Fisheries and the Department of Fish and Game (DFG). According to these resource agencies, while limiting work the environmental work windows would minimize the dredging impacts on endangered species, impacts to other native species would be likely, though further minimized by the reduction in size of the revised sand trap. According to NOAA Fisheries, the area adjacent to the Marina will be designated critical habitat for the threatened green sturgeon, which is present in the Bay year-round and feeds on the Bay bottom. According to NOAA staff, green sturgeon “hunker down” in the sediment when disturbed rather than swimming away, making them particularly vulnerable to dredging. The applicant’s California Environmental Quality Act (CEQA) document did not address impacts to the threatened green sturgeon.

NOAA Fisheries also provided input regarding potential impacts to Essential Fish Habitat. Anticipated impacts would include loss of foraging area and prey items, as well change in habitat type, from shallow sandy bottom to a deep sandy habitat if the remaining substrate is sand. NOAA staff thought that the habitat changes resulting from development of the sand trap would also include decreased temperature and light penetration, increased pressure (from change in water depth), and temporary change in substrate type.

DFG staff directed Commission staff to studies performed at the adjacent Presidio Shoal (*Dungeness Crabs and Sand Mining Operations in Central San Francisco Bay, San Francisco Bay Delta Aquatic Habitat Institute and Special Studies for Sand Mining Discharges if the Tidewater Sand and Gravel Company, MEC 1993*). These studies indicated that a number of fish and invertebrate species inhabit the sand shoals and indicated there is potential for entrainment of these species by the sand dredge.

- b. **Tidal Hydrology and Sediment Movement.** The applicant states that the proposed sand trap is a practical alternative to performing maintenance dredging in the marina entrance channel. However, the sand trap would require continual dredging to remain effective. The applicant’s consultant has revised the project and suggested it be continued as a pilot project with sufficient monitoring to determine if there are affects to sediment movement.
- c. **Sediment Transport.** In conversations with Mr. Bob Battalio, P.E., of Philip Williams and Associates (PWA), and Mr. Dan Hanes, Research Oceanographer of the USGS, Ms. Susan Tonkin, PhD., P.E., and Mr. Dilip Trivedi, Dr. Eng., P.E., of Moffatt & Nichol (M&N), all agreed that the general net sediment transport in the area of the San Francisco Marina is from west to east. They also agreed that the likely regional sediment transport in this area is north along Ocean Beach, through the Golden Gate, east along Crissy Field to the marina’s jetty then northwest away from the jetty, along Presidio Shoal, back out through the Golden Gate, to the San Francisco

Ebb Tide Bar, then south and east, where it heads back north along Ocean Beach before returning through the Golden Gate. (*Sediment Transport Processes at Ocean Beach, San Francisco, CA*, R.T. Battalio & D. Trivedi) The sediment grain size analysis appears to support this theory. However, due to tides, currents, wind and storms, sediment transport in this area is considered extremely complex and the exact transport pattern in the area adjacent to the Marina is not well defined. PWA's monitoring of Crissy Field sediment transport has determined that approximately 25,000 to 40,000 cy of sand moves west along Crissy Field is approximately 25,000 to 40,000 cy each year. The net transport rate along the Marina jetty is not known, but may be similar to Crissy Field

The applicant directed staff to the *San Francisco Marina Renovation Project Breakwater Improvement Study, San Francisco, CA*, prepared by Moffatt & Nichol. This document examines alternative methods of reducing wave energy inside the marina and discusses preliminary sediment transport findings along the marina's jetty. It also includes a preliminary modeling effort. Ms Susan Tonkin, PhD., P.E. (M&N) has advised staff that the modeling effort includes only one tide cycle and therefore is limited in its utility. However, the modeling study is the best information available to date in this area and includes model runs with tides only, local seas only and local swells only (Exhibits C1 through C3). In the exhibits, red denotes accretion and blue denotes erosion. In each instance, the sediment direction appears to be moving away from the tip of the jetty to the northwest and to the northeast. Staff notes that areas of accretion and erosion are immediately adjacent to each other, representing an extremely complex system with no clear determination that sand is traveling around the tip of the jetty and shoaling in the entrance channel. Based on the directional arrows, it is possible that the sand creating the shoal could be coming directly from the east. Large sand shoals have been observed as far east as Berth 35 at the Port of San Francisco. Also, the bathymetry along the northern tip of the jetty drops off rapidly, raising questions about whether sand is moving around the tip into the Marina's entrance channel. Additional analysis of this area may help in determining the optimal location and size. The applicant's consultants agree that there is not currently enough data available to determine the effectiveness of the proposed sand trap, if another location would be better, or if simply maintaining the entrance channel would be sufficient to address the shoaling problem inside the marina.

- d. **Bay Bathymetry.** The Bay Plan Subtidal Areas Policies state that any proposed in the revised project, the Bay bathymetry in Area D would be deepened to minus 25 feet MLLW during the pilot phase of the project and potentially minus 55 feet MLLW if no effects were measured, a long-term alteration of the Bay's bathymetry. If the sand trap concept is successful, it is possible that this area would be maintained at minus 55 feet MLLW in perpetuity. Whether this action would affect adjacent sand shoals is unknown at this time.
- e. **Scarce Resource.** The sand trap would be constructed in both sandy deep-water, as sandy shallow-water shoals. Sandy shoals are scarce in the Bay. The sand trap has been reduced in size from 2.8 to 1.8 acres, partly to reduce the potential impacts to this habitat and Last Chance Beach. The creation of the sand trap would change a portion of the subtidal area from sandy shallow water to sandy deep water. Regular maintenance of the sand trap is would also affect the habitat value of that area.

Potential alternatives to reduce such impacts would include a smaller sand trap, an alternate location, or annual maintenance dredging of the entrance channel. It is likely that dredging the marina or entrance channel on a more frequent basis would be more costly to the applicant, but would reduce the area of overall subtidal disturbance. The CEQA analysis did not consider such alternatives to the originally proposed project.

The Commission must determine whether dredging the revised sand trap in Area D is consistent with Bay Plan polices on Subtidal Areas.

2. **Recreation Polices.** Bay Plan polices on recreation state, in part, that “D[d]iverse and accessible water-oriented recreational facilities, such as marinas, launch ramps, beaches, and fishing piers, should be provided to meet the needs of a growing and diversifying population...” and “R[r]ecreational facilities, such as waterfront parks, trails, marinas, live-aboard boats, non-motorized small boat access, fishing piers, launching lanes, and beaches, should be encouraged and allowed by the Commission, provided they are located, improved and managed consistent with the following standards:...be feasible from an engineering viewpoint...”

The Bay Plan further addresses marinas and beaches in the following policies: (1) Marinas should be allowed at any suitable site on the Bay. Unsuitable sites are those that tend to fill up rapidly with sediment and require frequent dredging; have insufficient upland; contain valuable tidal marsh, or tidal flat, or important subtidal areas; or are needed for other water-oriented priority uses....” “Sandy beaches should be preserved, enhanced, or restored for recreational use, such as swimming, consistent with wildlife protection...”

The San Francisco Marina was constructed in the 1930’s and the jetty was constructed in the 1950’s to protect small craft from strong waves created by the local conditions. The jetty was extended to the north in an effort to prevent sand from building up in the marina’s entrance channel. The marina supports an active recreational boating community. Sand transport in the area has provided a small, sandy beach (Last Chance Beach) that has persisted over time. Last Chance Beach is used by an active wind surfing community, other recreational users, and shorebirds, uses encouraged and supported by Bay Plan policies.

The applicant’s sand trap proposal may reduce the shoaling in the Marina’s entrance channel. The applicant’s preliminary modeling suggests that another location in closer proximity to the entrance channel, and a greater distance from Last Chance Beach may also reduce shoaling. Annual dredging of the entrance channel is a third option. According to permit records, the City has not regularly dredged the entrance channel in the past decade.

- a. **Potential Impact to Adjacent Beaches.** In an effort to determine potential impacts from development and maintenance of the sand trap originally proposed by the Department, staff requested that Mr. Battalio (PWA) and Mr. Hanes (USGS) review the Department’s *San Francisco Marina, West Basin Sand Deposition and Conceptual Model* (January 3, 2008). The applicant requested that their consultant, Mr. Trivedi of Moffatt & Nichol review the proposal as well. Both Mr. Battalio and Mr. Hanes stated that the original proposal would likely cause erosion of Last Chance Beach,

perhaps permanently, depending on the extent of the sand trap. Both reviewers acknowledged the shoaling problems at the entrance channel, suggested limiting the size, area and depth of the sand trap, and recommend extending the monitoring to areas along the Golden Gate National Recreation Area to determine possible adverse effects.

The City's consultant made a series of recommendations to reduce the scope of the sand trap, the frequency of the dredging, and increase the scope of the monitoring that has been incorporated into the applicant's project. Mr. Trivedi and Ms. Susan Tonkin, PhD., P.E., developed the recommendation included in the revised proposal for M&N on behalf of the Department. The M&N analysis states that if the M&N proposal were to be implemented, impacts to Last Chance Beach would be minimized. It also states that due to the proximity of the dredging to Last Chance Beach, a closer examination of this issue would be valuable.

Regarding impacts to other adjacent beaches, the applicant's consultant noted that the next down-coast beach from the Marina is Aquatic Park, which is one-half mile to the east. They believe that the sand trap has no potential to impact this beach because of the distance. The applicant's consultant notes that Crissy Field is up-current, and with a west to east net sediment transport, they do not expect the sand trap to impact Crissy Field, though simultaneous monitoring of both Crissy Field and the Marina's sand trap would provide valuable information. The National Park Service requested such coordination in their public notice comment letter to the U.S. Army Corps of Engineers regarding this project.

- b. **Beneficial Reuse of Sand.** During staff's discussions with the Department of Boating and Waterways and other interested parties, the suggestion was made that if possible, the sand should be kept within the Bay sediment system. Areas along Ocean Beach, both subtidally and in the adjacent dunes are eroding. Use of this sand for beach nourishment at Crown Beach in Alameda, Coyote Point in San Mateo, and the dunes at Ocean Beach were all suggested. The Department of Boating and Waterways suggested some funding may be available if appropriate partnerships could be established. The sand trap concept is designed to reduce costs to the Marina's dredging program. Sand miners would likely remove the sand at no cost. Sand miners would also likely remove sand at the entrance channel at no cost to the Marina. If the Department were required to pay for the dredging of the sand trap, or placing the sand at beneficial reuse site, the economic incentive for this portion of the project would likely be eliminated.

The Commission must decide whether dredging the revised sand trap in Area D is consistent with the Bay Plan policies on recreation.

3. **Dredging.** Bay Plan Dredging Policy No. One states, in part, that "...dredging and dredged material disposal should be conducted in an environmentally and economically sound manner." And "...(d) the siting and design of the project will result in the minimum dredging volume necessary for the project ..."

- a. **Operational Issues:** In order to better understand the feasibility and risks project alternatives, staff discussed with a sand miner potential operational issues of: (1) dredging a sand trap outside the jetty, or (2) dredging sand from the entrance channel only. According to the sand miner, dredging the sand trap uses the traditional sand mining equipment, which allows hydraulic loading of sand onto a barge as fine-grain sediment is separated and washed overboard ("washing"). The hydraulic dredge excludes large objects. The dredging would take place in deeper water, and therefore normal mining equipment would be used and the navigational safety issues are reduced. The sand would be dredged and transported to an upland sand yard. The miner would pay a royalty to the Department for the sand.

Dredging the entrance channel requires the use of three tugboats to steady the dredge and scow adjacent to the shoal, and a backhoe to remove the sand. This method involves navigational risk for the sand miner due to the shallower depths and additional recreational vessels in the entrance channel during dredging. Using this method, the sand has to be "washed" at a processing site before sale and larger unusable items are often grabbed by the dredge. The Department would have to pay the sand miner for this work because of the additional operational costs. The sand would still be available for construction purposes. The sand miner assumes that if a sufficient sand trap were created (the miner recommends a larger sand trap than is proposed), the entrance channel would need to be dredged only once.

- b. **Minimize Dredging.** The applicant proposes to reduce maintenance dredging inside the marina's west basin by creating a sand trap adjacent to the entrance channel. The applicant's revised proposal reduces the first dredging episode to 25,000 cy. Thereafter, the dredging may continue at 25,000 annually, or be increased depending on the outcome of the monitoring. If the sand trap solves the shoaling problem, the total volume of sand dredged would be 250,000 – 550,000 over ten years, with some unknown amount of dredging in the marina entrance channel. If the annual

dredging of the entrance channel was undertaken without the use of the entrance channel, using an estimate of 20,000 cy per year, 200,000 cy may be dredged and the entrance channel would remain open. Sand miners would have the opportunity to

mine the sand at the entrance channel, which, according to grain size analysis is similar to the sand on the shoal. It is also possible that based on the marina's dredging history, that less dredging in the entrance channel would be needed.

The Commission must decide whether dredging the revised sand trap in Area D would be consistent with Bay Plan policies on dredging.

#### **Exhibits**

- A. Moffatt & Nichol Letter (on Behalf of the Department)
- B. Topographic Map of Last Chance Beach and Jetty
- C1. Preliminary Sediment Transport Modeling Results - Tides Only
- C2. Preliminary Sediment Transport Modeling Results - Local Seas Only
- C3. Preliminary Sediment Transport Modeling Results - Local Swells'