

Introduction

INTRODUCTION

In accordance with the provisions of the National Environmental Policy Act of 1969 (42 U.S.C. Sect. 4332 et seq.), the San Francisco District U. S. Army Corps of Engineers has prepared a Composite Environmental Statement for maintenance dredging of existing navigation projects in the San Francisco Bay Region, California. Maintenance dredging is the periodic removal of shoal material from the navigation channels in order to maintain the channels' authorized or existing dimensions.

This Composite Environmental Statement has two purposes. First, it assesses the impacts of Corps authorized maintenance dredging and other federal maintenance dredging projects under permit from the Corps. There are 20 federal navigation projects (12 Congressionally authorized and 8 under permit from the Corps) that are described in this report. The second purpose of this environmental statement, since it assesses the general impacts of dredging and disposal in San Francisco Bay, is to use this statement as a reference to evaluate future Corps permit applications for dredging in the Bay. This document will aid the Corps in determining whether the applicant will need to prepare an environmental statement for his specific dredging project.

This environmental statement gives a detailed description and environmental evaluation of 20 federal dredging projects and the projects' relationship to the general commerce of the Bay region and to the military mission of the U. S. Navy. It also discusses related non-Federal navigation projects and the various alternatives of dredging and disposal operations, including the alternative of no dredging. A special appendix entitled "Fundamentals of Dredging" is included to facilitate the layman's understanding of the basic principles and types of dredges used.

San Francisco Bay, in a physical sense, is a body of water resulting from the mixing action of the Sacramento-San Joaquin River system with the tidal

waters of the Pacific Ocean. It is the most valuable, single natural resource of a metropolitan region of over four million people, and provides:

- a. one of the world's great harbors;
- b. a natural air-conditioning system which gives the Bay Area its mild, year-round climate;
- c. a home for fish and wildlife and one of the most important anadromous fish passageways in North America.
- d. a strategic resting place for millions of migratory birds along the great Pacific Flyway;
- e. a potential commercial source of sea food;
- f. a source of recreational boating, sailing, fishing, and bird watching;
- g. a vital medium for commercial navigation (and an inconvenient barrier for commuters across the Bay);
- h. a receptacle for sewage and urban runoff;
- i. a source of minerals, sand and water for salt production; and
- j. the most prominent physical feature of the region, contributing to the special character and scenic beauty of the Bay Area.

The Bay system, because of its inland waterway connections to such important maritime ports as San Francisco, Oakland, Richmond, Stockton and Sacramento, and to strategic military bases at Alameda and Mare Island, is a very important navigation route for transportation of a great variety of commodities. The importance of this route can readily be seen in the annual tonnage and cargo types transported through the Bay system, and by the volume of maintenance dredging required for major navigation channels.

The San Francisco District of the Corps of Engineers may, in any given year, dredge from four to eight million cubic yards of sediments from existing channels and turning basins in the Bay. The average annual quantity is 6.9 million. In addition, the Corps issues maintenance dredging permits to other interests which dredge an additional 3.5 million cubic yards of sediments per year. By comparison, total dredging (maintenance and new work) in the Bay system is expected to average 13.9 million cubic yards annually through the late 1970's:

AVERAGE ANNUAL DREDGING IN SAN FRANCISCO BAY
1975-1980

Corps maintenance	6.9 million cubic yards
Maintenance dredging permits	3.5 million cubic yards
Corps planned improvements	<u>3.5 million cubic yards</u>
TOTAL	13.9 million cubic yards

During the past five years, in compliance with the provisions of NEPA, the Corps has publicly issued environmental impact statements on particular Corps maintenance dredging projects in the San Francisco Bay region. These included:

San Leandro Marina (Interim Report)	October 1970
Redwood City Harbor (Draft Statement)	June 1972
Oakland Outer Harbor (Draft Statement)	September 1972
Mare Island Channel (Draft Statement)	June 1973
Pinole Shoal Channel (Draft Statement)	July 1973
Richmond Inner Harbor (Final Statement)	August 1973
Alameda Naval Air Station (Draft Statement)	August 1973
Petaluma River (Final Statement)	August 1975

The Corps of Engineers presently performs maintenance dredging in 20 different areas in the San Francisco Bay region. Instead of issuing separate environmental impact statements for each project area, the San Francisco District has decided to write one Composite Environmental Statement incorporating all 20 projects, for the following reasons:

- a. to analyze the cumulative impacts of maintenance dredging operations on the natural environment of the Bay (as opposed to the piecemeal effects of individual dredging projects);

b. to analyze the cumulative impacts of maintenance dredging on the social and economic environment of the Bay region; and

c. to incorporate and publicly disseminate the in-depth results of the San Francisco District's \$2.9 million Dredge Disposal Study (221), which explores the impacts of dredging operations on the natural environment and impacts of alternative methods of dredge material disposal. A summary of the Dredge Disposal Study is included as Appendix B.

It should be emphasized that the Composite Statement will discuss the environmental impacts of only the maintenance dredging performed, funded, and/or permitted by the Corps for navigation purposes. Corps flood control projects, new Corps dredging projects (which propose creation of channels beyond depths presently maintained), and other activities requiring permits from the Corps, are discussed only as they might relate to the anticipated maintenance dredging. Environmental impacts of these other activities under Corps jurisdiction have been or will be discussed in other environmental impact statements.

Project Descriptions I

SECTION I

PROJECT DESCRIPTION

A. REGIONAL SUMMARY

- 1.001 Twenty Federal navigation projects, also referred to as Operation and Maintenance (O&M) projects, are discussed in detail in this Final Composite Environmental Statement. Of the twenty, four are located in Suisun Bay and 16 in San Francisco Bay. In addition, non-Federal maintenance dredging permits are briefly discussed, since this environmental statement will be used as a reference source to evaluate future Corps permit applications for dredging.
- 1.002 The O&M projects in the San Francisco Bay Area range from the San Francisco Bar outside the Golden Gate to Mare Island Strait at the northeast end of San Pablo Bay, east to the confluence of the Sacramento and San Joaquin rivers, and south to Redwood City Harbor in South San Francisco Bay (Plate I-1). These projects, combined with permit activities, involve the average annual removal of 8,754,500 cubic yards of bottom sediments (Table I-1), which, of course, is only approximate and may actually vary from five to ten million cubic yards for any given year.
- 1.003 Twelve of the O&M projects were authorized by the United States Congress under various Rivers and Harbors Acts (R&HA's). The R&HA's, which are updated by Congress periodically to reflect changing requirements for navigation channels, authorize and appropriate funds for all Corps dredging in the U.S. The earliest dredging in California was San Francisco Harbor, authorized in 1868, followed by Oakland Harbor in 1874. Since then, new channels have been added, and existing ones widened and deepened to accommodate larger, more modern ships. Today the Corps annually dredges approximately 5,723,000 cubic yards in the Bay and its tributaries to maintain these R&HA channels. Some of these channels are dredged as frequently as twice a year whereas others require dredging only once in 12 to 16 years. The total cost of maintaining these channels will be nearly four million dollars for Fiscal Year 1976 and is rapidly escalating.
- 1.004 The other eight O&M projects listed are performed by the Corps at the request of the Army, Navy and Coast Guard. The Corps may perform the work with its own dredges or contract the work to private dredging firms. An annual average of approximately 1,120,500 cubic yards will be dredged by the Corps for these agencies over the next few years. The total cost to other agencies to maintain these channels will be about 2.5 million dollars for Fiscal Year 1976, and is escalating at a comparable rate to Corps costs.

TABLE I-1

CORPS MAINTENANCE DREDGING (O&M) PROJECTS IN SAN FRANCISCO BAY AREA

Location	Authorization	Approximate Qty. Draged ⁴ (cubic yards)	Frequency	Proposed Disposal Site	Proposed Date of Next Maintenance	Average Annual Qty. (cubic yds) ¹
San Francisco Harbor	R&HA ² of 1927 and amendments	1,000,000	1 yr.	San Francisco Bar	FY 76	1,000,000
Main Ship Channel		none	completed	-	-	0
Rock removal		none	inactive	-	-	0
Presidio Shoal		none	inactive	-	-	0
Alcatraz Shoal		none	inactive	-	-	0
Black Point Shoal		none	inactive	-	-	0
Point Knox Shoal		none	inactive	-	-	0
S.F. Airport Channel		none	inactive	-	-	0
Islais Creek Entrance		257,000	16 yr.	Alcatraz	indefinite	13,000
San Rafael Creek	R&HA of 1919	240,000	6-8 yr.	land	FY 77	34,000
Petaluma River (Phase 1)	R&HA of 1930	396,000	12 yr.	San Pablo Bay	FY 77	33,000
San Pablo Bay and Mare Island Strait	R&HA of 1927 and amendments					
Pinole Shoal Channel		649,000	2 yr.	San Pablo Bay	FY 76	324,000
Mare Island Strait		1,250,000	0.5 yr.	Carquinez Straits	FY 76	2,500,000
Richmond Harbor	R&HA of 1917 and amendments	480,000	1 yr.	Alcatraz	FY 77	480,000
Oakland Harbor	R&HA of 1874 and amendments					
Oakland Outer Harbor		300,000	1 yr.	Alcatraz	FY 76	300,000
Oakland Inner Harbor		350,000	1 yr.	Alcatraz	FY 76	350,000
San Leandro Marina	R&HA of 1970	225,000	5-6 yr.	land	FY 78	42,000
Redwood City Harbor	R&HA of 1910 and amendments	325,000	1 yr.	land	FY 76 or 77	325,000
S.F. Hbr. & Bay - Sausalito Operations Base	R&HA of 1950	90,000	3-4 yr.	Alcatraz	FY 77 or 78	26,000
Suisun Bay Channel	R&HA of 1919 and amendments	220,000	1 yr.	Suisun Bay	FY 76	220,000
Suisun (Slough) Channel	R&HA of 1910 and amendments	180,000	2-3 yr.	land	indefinite	72,000
New York Slough	R&HA of 1876 and amendments	15,000	3-5 yr.	land	indefinite	4,000
TOTAL R&HA PROJECTS						5,723,000
Concord Naval Weapons Station	inter-service support agreement	50-52,000	2 yr.	Suisun Bay	FY 78	25,000
Alameda NAS (Navy)	"	900,000	1 yr.	Alcatraz and/or 100-Fathom	FY 76	900,000
MOTBA ³ North (military)	"	80,000	6-10 yr.	Alcatraz	indefinite	10,000
NSC-Oakland (Navy)	"	125,000	2-3 yr.	Alcatraz	FY 77 or 78	50,000
MOTBA East (Navy)	"	120,000	3 yr.	Alcatraz	indefinite	40,000
Point Molate (Navy)	"	228,000	2-3 yr.	Alcatraz	FY 77	91,000
Gov. Island (Coast Guard)	"	20-30,000	5-10 yr.	Alcatraz	indefinite	3,500
Horseshoe Cove (Army)	"	10-15,000	10-15 yr.	Alcatraz	indefinite	1,000
TOTAL INTER-SERVICE PROJECTS						1,120,500
TOTAL PERMITS						3,511,000
TOTAL ALL PROJECTS						10,354,500

¹ Average Annual Quantity is the average volume of sediments which would be removed if the project was performed once a year. For example, if 200,000 cubic yards are removed once every 5 years, then the average annual quantity is 200,000 divided by 5, or 40,000 cubic yards.

² Rivers and Harbors Act

³ Military Ocean Terminal, Bay Area

⁴ For any given year that a project is dredged, this figure can vary ± 30-40 percent.

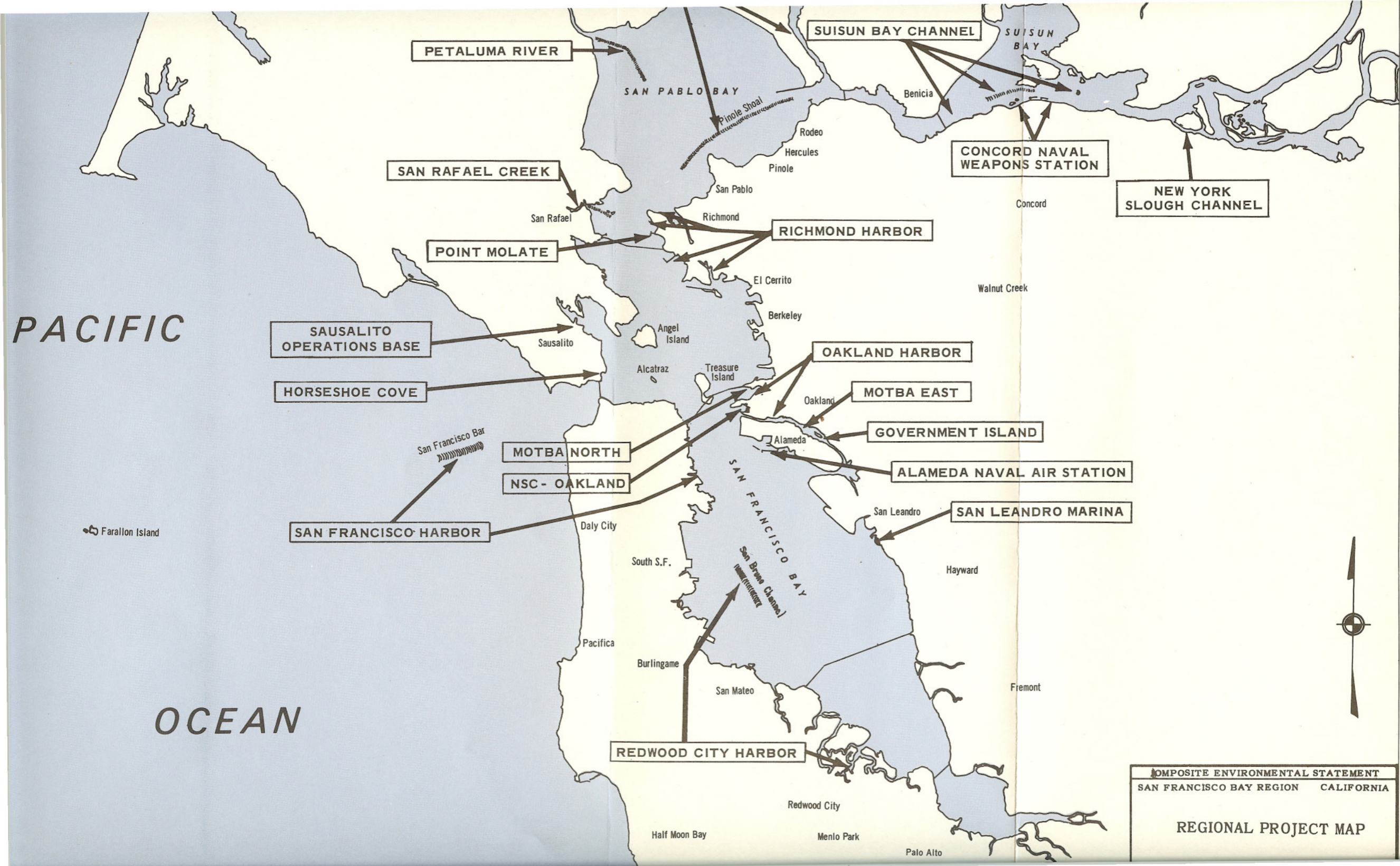
- 1.005 In addition to the twenty O&M projects, the discussion will include dredging permits totalling an additional 3.5 million cubic yards of annual dredging.
- 1.006 Approximately 43 percent of the overall annual total of 8,754,500 cubic yards is dredged to keep channels open for use by the United States Navy; 56 percent to maintain deepwater channels for commercial shippers; and one percent for the Army, Coast Guard, and recreational boaters.
- 1.007 Disposal of the dredged material takes place at eleven sites within the San Francisco Bay region, either on land, in the Bay, or in the Pacific Ocean (Plate I-2). Before 1972, aquatic disposal in the Bay occurred just about anywhere, which was primarily dictated by economics. In May 1972, in order to regulate indiscriminate dumping and to reduce the amount of dispersion of dredged material, the Corps established five aquatic disposal sites in the Bay (west of Carquinez Strait) which were to be used for all aquatic disposal of dredged material in the Bay. Subsequently, in cooperation with the Environmental Protection Agency, the Corps reduced the number of sites from five to three. The two that were eliminated were those used in South San Francisco Bay. The three remaining Bay sites, a fourth site located south of the Farallon Islands at the 100-fathom depth (added by the Ocean Dumping Regulations pursuant to the Marine Protection, Research and Sanctuaries Act of 1972), a fifth site along the San Francisco Bar, and a sixth site in Suisun Bay, are now the aquatic disposal sites for 15 of the 20 O&M projects and permit activities, receiving an overall annual total of 7,737,500 cubic yards, or 88 percent of the overall annual total of 8,754,500 cubic yards (Table I-2). The other 12 percent of the total, for the remaining five O&M projects and permit activities, is proposed for land disposal at five sites adjacent to or within a few miles of the corresponding dredging operation.
- 1.008 The environmental impacts of land disposal at four of the five sites are not to be discussed in the Final Composite Statement. Only Redwood City Harbor land disposal will be discussed. When sufficient environmental data on the other four sites becomes available, the effects of land disposal at these sites will be discussed in a supplement to the Composite Statement, to be publicly issued at a later date.

TABLE I-2

AQUATIC DISPOSAL SITES
(refer to Plate I-2 for sites)

<u>Corps Designation</u>	<u>Description</u>	<u>Average Annual Quantity (c.y.)</u>
SF 7	100-Fathom Line Location: 29.6 nautical miles from Golden Gate Depth: 100 fathoms (600 ft.) Size: circle with radius of 1000 yards	125,000
SF 8	San Francisco Channel Bar Location: 2.8 nautical miles from shore Depth: 35 to 46 feet, average 40 feet Size: rectangle 5000 x 1000 feet, 2500 yards south and parallel to channel	1,000,000
SF 9	Carquinez Strait Location: 0.8 nautical miles from Mare Island Strait entrance Depth: 28 to 56 feet, average 42 feet Size: rectangle 1000 x 2000 feet, long axis bearing 80°T	2,635,000
SF 10	San Pablo Bay Location: 2.6 nautical miles NE of Pt. San Pedro at Black and White Marker buoy Depth: 28 to 56 feet, average 42 feet Size: rectangle 1500 x 3000 feet, long axis bearing 50°T	357,000
SF 11	Alcatraz Location: about 0.3 nautical miles south of Alcatraz Island Depth: 95 to 160 feet, average 130 feet Size: circle with radius of 1000 feet	3,375,500
none	Suisun Bay Location: 0.6 nautical miles from shore Depth: 30 feet Size: area 500 feet x 11,200 feet, parallel to Suisun Bay Channel	245,000
Total Aquatic Disposal		7,737,500

Note: There are no government "designated" land disposal sites which are routinely used for dredge disposal



PETALUMA RIVER

SUISUN BAY CHANNEL

SAN RAFAEL CREEK

CONCORD NAVAL WEAPONS STATION

NEW YORK SLOUGH CHANNEL

POINT MOLATE

RICHMOND HARBOR

SAUSALITO OPERATIONS BASE

OAKLAND HARBOR

HORSESHOE COVE

MOTBA EAST

San Francisco Bar

MOTBA NORTH

GOVERNMENT ISLAND

NSC - OAKLAND

ALAMEDA NAVAL AIR STATION

SAN FRANCISCO HARBOR

SAN LEANDRO MARINA

REDWOOD CITY HARBOR

COMPOSITE ENVIRONMENTAL STATEMENT
SAN FRANCISCO BAY REGION CALIFORNIA

REGIONAL PROJECT MAP

PACIFIC

OCEAN



Farallon Island

SAN PABLO BAY

SUISUN BAY

SAN FRANCISCO BAY

Pinole Shoal

Benicia

Rodeo

Hercules

Pinole

San Pablo

Richmond

Concord

Walnut Creek

El Cerrito

Berkeley

Angel Island

Sausalito

Alcatraz

Treasure Island

Oakland

Alameda

San Leandro

Hayward

Fremont

South S.F.

Pacifica

Burlingame

San Mateo

Half Moon Bay

Redwood City

Menlo Park

Palo Alto

B. R&HA PROJECTS

1. San Francisco Harbor.

1.009 a. Congressional Authorization. The San Francisco Harbor project extends from the Pacific Ocean offshore approach channel (through the San Francisco Bar) to the San Francisco Airport, which is located on the bayshore south of San Francisco (Plate I-3). The original project was adopted by various Congressional Acts from 25 July 1868 to 22 September 1922, and provided for channel dredging and rock removal. The project was modified to existing dimensions by Rivers and Harbors Acts of 21 January 1927, 3 July 1939, 30 August 1935, 26 August 1937 and 27 October 1965, and provided for dredging a channel 2,000 feet wide and 55 feet deep^{1/} through San Francisco Bar; the removal to a depth of 40 feet of Presidio and Black Point Shoals, Blossom Rock, Rincon Reef Rocks, and Alcatraz Shoal to within 2,500 feet of Alcatraz Light; the removal to a depth of 35 feet of Arch Rock, Harding Rock, Shag Rocks 1 and 2, and Point Knox Shoal westward of north-south line through Point Stuart Light; an approach area to Islais Creek, 35 feet deep; and a channel 750 feet wide and 10 feet deep to San Francisco Airport ending in a basin approximately 2,000 feet wide and 10 feet deep.

1.010 b. Inactive Areas. Rock removal was completed in 1932 and no longer requires maintenance. Presidio Shoal was first deepened to its authorized depth in 1931. Since then, very little maintenance dredging has been required. The last dredging was performed in 1963 when 44,900 cubic yards were removed. Although the area is no longer dredged by the Corps, private interests use it as a borrow area for sand and fill material. Similarly, Point Knox and Alcatraz Shoals, deepened in 1933 and 1932, respectively, are no longer dredged by the Corps but by private interests as sand borrow areas. Black Point Shoal, deepened in 1937, no longer requires maintenance dredging. San Francisco Airport channel and turning basin were first deepened to their authorized depth in 1941. Dredging is no longer required since the channel is no longer used for waterborne commerce.

^{1/} Unless otherwise indicated, all depths mentioned are measured from the reference level ("datum") of mean lower low water (MLLW) which is the average of the lower of the two low tides of each day over a considerable period of time. This datum is determined by records published by the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, and varies from area to area. The MLLW datum is generally higher upstream.

c. Active Areas.

(1) San Francisco Bar Channel.

- 1.011 (a) Congressional authorization. The San Francisco Bar Channel (also known as the Main Ship Channel) is located about five miles west of the Golden Gate and extends across an arc-shaped submerged sandbar known as the San Francisco Bar (Plate I-3). The channel was adopted as part of the San Francisco Harbor project under the Rivers and Harbors Act of 30 August 1935, which provided for a channel 2,000 feet wide and 50 feet deep across the Bar - a length of about four miles. The Act of 27 October 1965 allowed for deepening to 55 feet, which is the depth presently maintained. The Main Ship Channel is the only deepwater ocean entrance to San Francisco Bay and is used by all ocean-going shippers in the Bay Area.
- 1.012 (b) Dredging history. The Main Ship Channel has usually been dredged on an annual basis. It was first dredged to a depth of 40 feet in 1922 - 13 years before it was officially authorized - as part of the general intent of the San Francisco Harbor authorization. It was deepened to 45 feet in 1932-34. Between 1942 and 1943 a portion of the channel was dredged to 50 feet which was finally completed in 1959. Listed below are dredging records since 1931:

TABLE I-3

DREDGING HISTORY OF SAN FRANCISCO BAR PROJECT

<u>Fiscal Year</u>	<u>Quantity Removed (c.y.)</u>	<u>Method of Dredging</u>
1931	1,554,000	hopper
1932*	1,329,000	"
1933*	1,284,000	"
1934*	2,542,000	"
1935	948,000	"
1936	1,365,000	"
1941	55,000	"
1942*	888,000	"
1943*	1,100,000	"
1950	697,000	"
1951	5,000	"
1952	410,000	"
1953	1,004,000	"
1954	245,000	"
1955	1,430,000	"
1956	310,000	"
1957	595,000	"
1958	626,000	"
1959	2,465,000	"
1959*	1,375,000	3,840,000
1960	763,000	"
1961	875,000	"
1962	1,145,000	"
1963	842,000	"
1964	581,000	"
1965	669,000	"
1966	412,000	"
1967	433,000	"
1968	476,000	"
1969	661,000	"
1970	204,000	"
1971	1,048,000	"
1972*	1,355,000	1,958,000
1972	603,000	"
1973*	1,347,000	2,087,000
1973	740,000	"
1974*	1,632,000	2,271,000
1974	639,000	"
1975*	1,430,900	"
1976	840,000	"

* new work (deepening).

1.013 The Main Ship Channel was deepened to 55 feet in 1972-75 to comply with the Rivers and Harbors Act of 1965. This latest improvement increased the length of the channel by over one-half mile, increased the volume by a factor of 1.7, and increased future maintenance dredging requirements by the same factor, to approximately 1,000,000 cubic yards per year. Before 1971 all material was disposed of in deep water outside the Bar about one mile southwest of the channel entrance. All disposal since 1971 has occurred south of and parallel to the channel along San Francisco Bar (Plate I-2). The latest improvement to the Main Ship Channel was previously discussed in an environmental statement prepared by the Corps of Engineers in March 1971 (214), and in Appendix A of the Dredge Disposal Study (203).

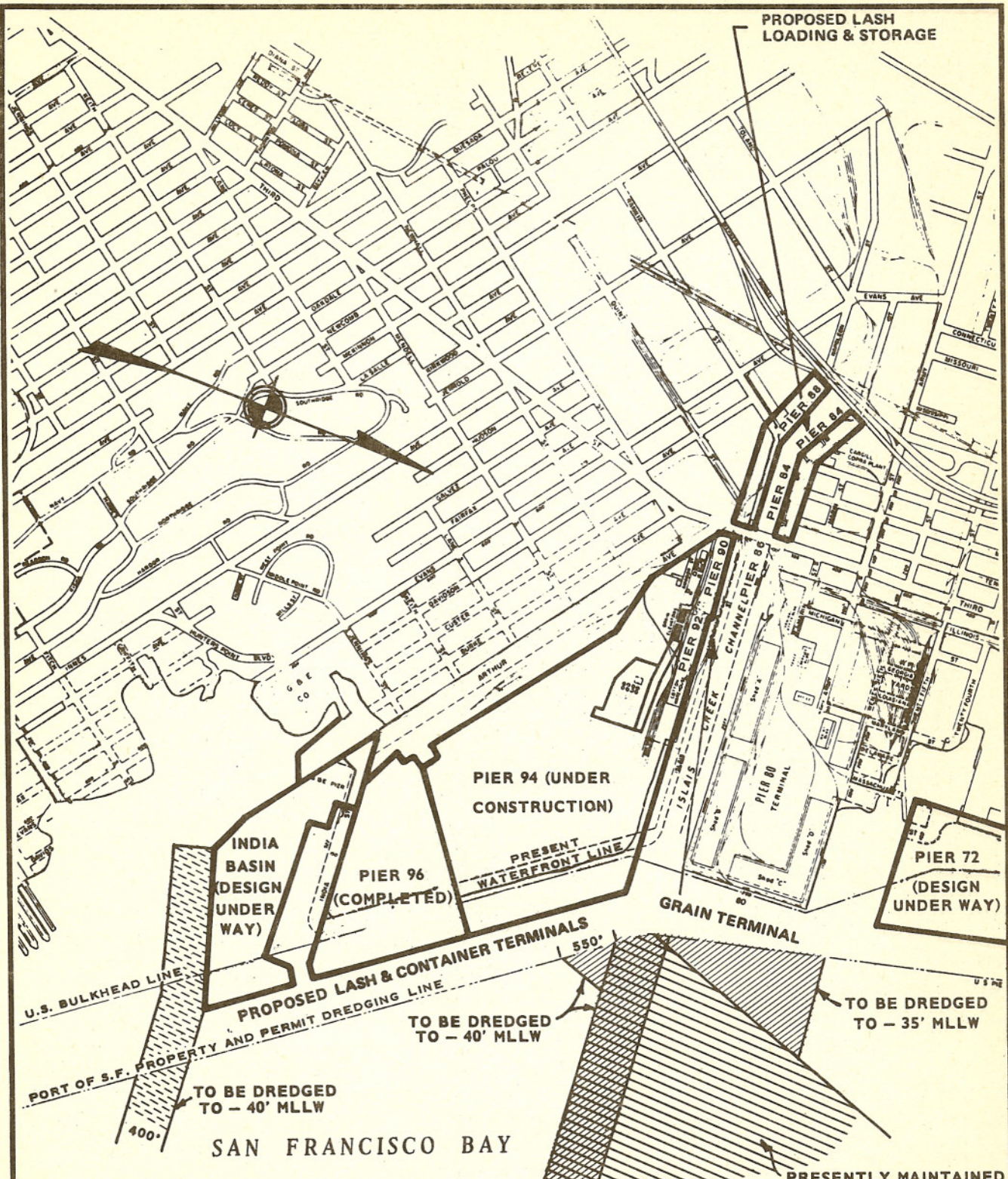
1.014 (c) Proposed maintenance. Next maintenance is scheduled for December 1975 through March 1976 (Fiscal Year 1976) when the Corps hopper dredge "Biddle" will remove approximately 840,000 cubic yards and deposit the material along the Bar south of and parallel to the channel, at a distance of no less than 6,000 yards. To accomplish the greatest dispersion, disposal will take place with the vessel underway. Dredge/disposal cycle time is about two hours. Maintained channel dimensions will be 55 feet deep plus two feet overdepth dredging; 2,000 feet wide; and about 4.5 miles long.

1.015 (d) Related projects. Deepening of the Main Ship Channel to 55 feet is only one of a series of channel enlargements in the Bay system authorized by the Rivers and Harbors Act of 1965. The entire series, called the John F. Baldwin and Stockton Ship Channels Project, is currently under study by the Corps of Engineers. A separate Environmental Statement will be issued on this project in the near future. If completed, the entire project would consist of channels extending intermittently from the Main Ship Channel through San Pablo and Suisun Bays to Stockton, California. The deepening of the Main Ship Channel is the first part of the series to be completed.

(2) Islais Creek Entrance Channel.




1.016 (a) Congressional authorization. Islais Creek entrance channel is located 2.5 miles south of the Bay Bridge on the eastern San Francisco waterfront (see Plates I-3 and I-4). The original channel was adopted by the Rivers and Harbors Act of 21 January 1927 and consisted of a flared channel approaching the mouth of Islais Creek, 3,300 feet wide at the Bay end and 500 feet wide at the U.S. Pipehead Line end, and 34 feet deep. At

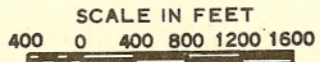
PROPOSED LASH
LOADING & STORAGE



SAN FRANCISCO BAY

LEGEND

-  EXISTING ISLAIS CREEK ENTRANCE CHANNEL MAINTAINED BY CORPS
-  PROPOSED IMPROVEMENT PROJECT TO BE PERFORMED BY CORPS (PLAN C)
-  PROPOSED PIER 98 CHANNEL TO BE DREDGED BY PORT OF S. F.



COMPOSITE ENVIRONMENTAL STATEMENT
SAN FRANCISCO BAY REGION CALIFORNIA
ISLAIS CREEK ENTRANCE CHANNEL

PROJECT LOCATION
AND RELATED PROJECTS

U.S. ARMY ENGINEER DIST., SAN FRANCISCO, C OF E
DRAWN: FILE NO.
TRACED: TO ACCOMPANY REPORT
CHECKED: DATED FEB 1975

that time, the State of California maintained a grain terminal on the creek and had leased adjacent areas for oil and lumber storage. In order to provide for increasing waterborne commerce and to conform with the 35-foot deep State navigation channel in Islais Creek, the State requested that the Federal navigation channel be deepened to 35 feet. Deepening was authorized by the Rivers and Harbors Act of 1935 and is the authorized depth of the Islais Creek entrance channel today. The primary users of the entrance channel are commercial shipping firms operating out of Piers, 80, 84, 86, 88, 90, 92 and 96 owned by the Port of San Francisco.

- 1.017 (b) Dredging history. The entrance channel was first dredged to the above dimensions in 1939. Through the 1950's large quantities of sediments were removed from the entrance channel, but little dredging has been required since then:

TABLE I-4

DREDGING HISTORY OF ISLAIS CREEK ENTRANCE CHANNEL

<u>Fiscal Year</u>	<u>Quantity Removed (c.y.)</u>	<u>Method of Dredging</u>
1950	465,000	hopper
1953	294,000	"
1955	194,000	"
1956	68,000	"
1957	257,000	"
1958-1972	None	-
1973	17,800	hopper

- 1.018 Based on the 16-year period (1957-1973) between recent dredgings and the amount removed recently (257,000 cubic yards), the average annual quantity removed and the corresponding annual shoaling rate are roughly estimated at 13,000 cubic yards. Although shoaling has decreased dramatically in recent years, the future shoaling rate in this area is difficult to estimate, and it must be assumed for planning purposes that this decreased rate is uncharacteristically low for the Islais Creek entrance area.

- 1.019 In an area such as Islais Creek, where dredging is very infrequent and the shoaling rate varies dramatically, future dredging needs are difficult to predict. If the assumptions of a 16-year frequency and 13,000 cubic-yard-per-year shoaling rate are followed, maintenance dredging would next

occur in 1980 when roughly 91,000 cubic yards would be removed. However, dredging will only be performed if hydrographic surveys indicate significant shoaling has occurred above the 35-foot depth. The next dredging is therefore considered indefinite at this time.

1.020 (c) Related projects. Projects other than maintenance dredging are contemplated in the Islais Creek area. The impacts of these projects will not be discussed in the Composite. One project currently being planned proposes enlargement of the Islais Creek Entrance Channel. A draft environmental impact statement issued in October 1973 (209) describes five alternative plans of enlargement (Plans A-E) with Plan C as the preferred alternative (shown on Plate I-4). Plan C involves deepening of a 500-foot wide strip of the presently maintained approach area to 40 feet, intended primarily to serve the large, dry bulk carriers using the Grain Terminal on Islais Creek, and dredging the shoal area immediately east of the Army Street Terminal to a depth of 35 feet. The dredged volume of this project, including the two-foot overdepth dredging, is estimated at 560,000 cubic yards. If the project is performed, the annual shoaling rate and corresponding average annual quantity of maintenance dredging are expected to increase to 20,000 cubic yards. The environmental impacts will be discussed in a final environmental impact statement to be publicly issued in the near future.

1.021 Other related projects include maintenance dredging and pier construction by the Port of San Francisco. The Port maintains Islais Creek Channel to a depth of 32 feet and areas adjacent to the piers to a depth of 40 feet. This dredging is performed under a blanket permit from the Corps which allows the Port to dredge up to 500,000 cubic yards of bottom material per year on the waterfront from Aquatic Park to India Basin. The Port is also constructing a four-berth shipping terminal at Pier 94 and designing a two-berth terminal at India Basin (future Pier 98). These terminals and Pier 96, which is already completed, are planned for containerized cargo (Plate I-4). The Corps has issued Permit No. 73-73 for the Pier 94 project and Permit No. 71-3 for the India Basin project. These projects are described in greater detail under Port and Terminal Characteristics (Section II-E).

2. San Rafael Creek.

1.022 a. Congressional Authorization. The San Rafael Creek channel, located along the entire length of San Rafael Creek in Marin County, was adopted by the Rivers and Harbors Act of 1919 and provides for dredging a channel 100 feet wide and eight feet deep across the flats in San Francisco Bay to the mouth of the creek, thence 60 feet wide, six feet deep in the creek to Irwin Street in San Rafael, with a turning basin 100 feet wide, 200 feet long, six feet deep, at San Rafael (Plate I-5). The primary users of the channel are the San Rafael, Marin, and Loch Lomond Yacht Clubs and other recreational boaters.

1.023 b. Dredging History. A historic summary of dredging is shown below:

TABLE I-5

DREDGING HISTORY OF SAN RAFAEL CREEK PROJECT

<u>Fiscal Year</u>	<u>Quantity Removed (c.y.)</u>	<u>Method of Dredging</u>
1931	37,700	hydraulic pipeline
1933	246,200	" "
1935	108,000	" "
1938	510,400	" "
1942	101,000	" "
1947	141,000 (outer)	" "
	42,500 (inner)	" "
1951	127,100 (outer)	" "
1954	189,100 (outer)	" "
	76,800 (inner)	" "
1962	244,400	" "
1970	242,900	" "

1.024 c. Proposed Maintenance. The frequency of dredging is estimated at six to eight years and the quantity at 240,000 cubic yards, which is equivalent to an average annual quantity of 34,000 cubic yards. Based on these estimates, maintenance dredging has been tentatively scheduled for fiscal year 1977 (in the winter) when roughly 240,000 cubic yards will be removed by hydraulic pipeline dredge and deposited at a suitable land disposal site provided by the City of San Rafael (shown on Plate I-5). The dredging will be performed by a private dredging firm under contract from the Corps.

1.025 In previous years dredge material has been deposited at land sites along the creek. Most of these sites are now used for residential housing and other purposes, such that potential disposal sites are now scarce. The City of San Rafael is currently negotiating with Holiday Magic, Inc., to obtain a nearby land disposal site.

1.026 d. Related Projects. Four marinas and a homeowners group also perform maintenance dredging along San Rafael Creek. Their dredging needs may be met by "signing on" with the dredging contractor who is performing the Corps project. "Signing on" is an economical practice which enables small, local groups to take advantage of elaborate dredging equipment already assembled in the area. If some or all of these groups sign on with the contractor in Fiscal Year 1976 or 1977, their dredge material would add 20-30,000 cubic yards to the Corps project. These groups would be required to apply for a Corps permit for any dredging outside the Congressionally authorized channel.