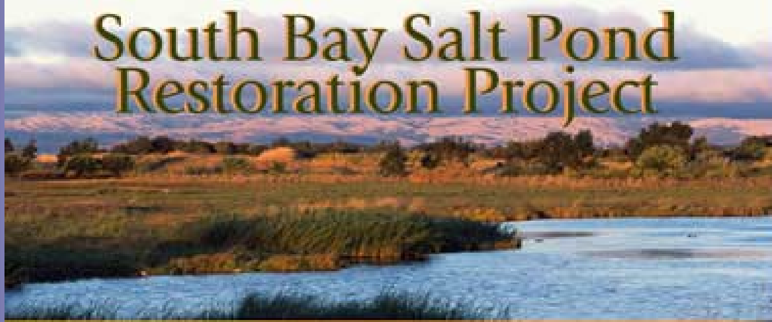


South Bay Salt Pond Restoration Project

CALIFORNIA DEPARTMENT OF FISH & GAME

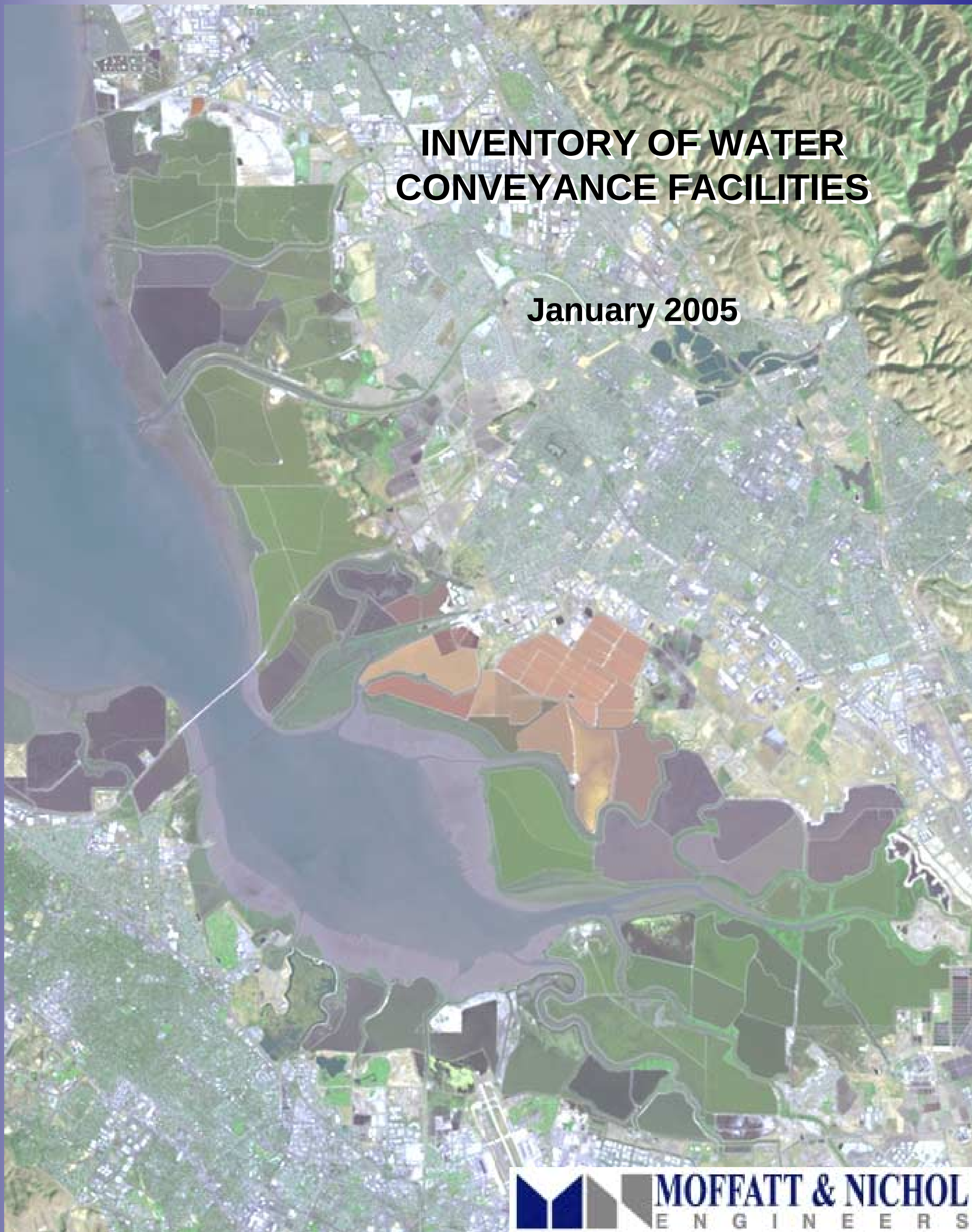
Coastal Conservancy

U.S. FISH & WILDLIFE SERVICE

A San Francisco Bay project provided by the California Department of Fish & Game, Coastal Conservancy and U.S. Fish & Wildlife Service

INVENTORY OF WATER CONVEYANCE FACILITIES

January 2005



MOFFATT & NICHOL ENGINEERS

INVENTORY OF WATER CONVEYANCE FACILITIES

SOUTH BAY SALT POND RESTORATION PROJECT

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ABBREVIATIONS

ACFCWCD	Alameda County Flood Control and Water Conservation District
CFS	cubic feet per second
HOWL	Highest Observed Water Level
LOWL	Lowest Observed Water Level
MGD	Million Gallons Per Day
MHHW	Mean Higher High Water
MHW	Mean High Water
MLLW	Mean Lower Low Water
MLW	Mean Low Water
MSL	Mean Sea Level
MTL	Mean Tide Level
NGVD	National Geodetic Vertical Datum, 1929
NOAA	National Oceanic and Atmospheric Administration
NOS	National Ocean Service
SCVWD	Santa Clara Valley Water District
SFRWQCB	San Francisco Regional Water Quality Control Board
USACE	United States Army Corps of Engineers

1. INTRODUCTION

1.1 BACKGROUND AND PURPOSE

The South Bay Salt Ponds Restoration Project provides an opportunity for improving the physical, chemical, and biological health of the San Francisco Bay, while integrating flood management, public access, wildlife-oriented recreation, and education opportunities. The goal of the project is to restore and enhance a mosaic of wetlands, while maintaining many of the ponds as managed ponds to maximize their use as feeding and resting habitat for migratory shorebirds and waterfowl. The potential restoration project area includes the recently acquired ponds which consist of about 7,500 acres of existing salt ponds in the southern part of the South Bay, 4,800 acres of ponds along the East Bay shoreline, and about 1,500 acres along the West Bay shoreline.

Work described in this report was conducted for the California Coastal Conservancy, as part of the data acquisition phase of the restoration project. The focus of this investigation is integration of flood management with restoration planning to ensure adequate flood protection for local communities.

The planning process will need to account for the potential interactions between the restoration project and water conveyance facilities during design and environmental review, because they may have important design or cost implications for the project. These interactions may include flood conveyance characteristics, as well as changes in the receiving waters of the Bay. Flood conveyance characteristics of local creeks, flood control channels, and rivers will be affected when reestablishing connections to historical flood plains, and some of the ponds levees between the newly created tidal marsh and local communities will need to be enhanced to provide adequate flood protection. Physical processes such as channel scour and sedimentation, tidal hydrodynamics, and upstream water surface elevations may also be affected. The restoration project will also interact with other water conveyance facilities such as water treatment plants and storm drains, and opportunities and constraints need to be identified early during the alternatives formulation process.

The purpose of this task is to identify potential interactions between the restoration project and water conveyance facilities by conducting an inventory of existing and proposed water conveyance facilities in the salt pond area.

1.2 SCOPE OF WORK

The scope of work included the following:

a. **Inventory Hydrologic Connections To Tidal Waters :** This task included identifying and inventorying tidal sloughs, rivers, flood control channels, creeks, and other waterways that drain through the project area to the South Bay.

b. **Identify Stormwater & Wastewater Dischargers :** This task included identifying the major dischargers, jurisdictional boundaries of the dischargers, regulatory bodies which govern their operations, centralized reporting agencies which compile relevant information, and the type of monitoring data that is reported.

c. **Inventory Stormwater & Wastewater Discharge Facilities :** This task included contacting the dischargers, and/or appropriate jurisdictional authority, and obtaining information on their existing outfalls and proposed major improvements to their system.

d. **Inventory Cargill Water Intake and Discharge Facilities:** This task included contacting Cargill and their hydrology consultants for information on existing hydrologic connections between the various ponds (weirs, gates, tunnels, etc), and on new connections being proposed during the interim management period.

e. **Provide Information For GIS:** This task included providing data that could be put into a GIS system for the water discharge facilities.

f. **Identify Potential Interactions Between Discharge Facilities & The Restoration Project :** This task included identifying the constraints related to discharge facilities that the restoration project may encounter, and the potential opportunities that the restoration may present to discharge operations.

2. INVENTORY OF HYDROLOGIC CONNECTIONS

There are numerous waterways in the project area that convey runoff from the surrounding watershed and urban areas to tidal waters of the Bay. This section includes an inventory of tidal sloughs, rivers, flood control channels, creeks, and other waterways that drain through the project area to the South Bay including their geographic extents and flooding history. Characteristics that are documented include watershed size and limits, water level fluctuation, available channel geometry, and history of flooding. Sources of information included USGS, National Ocean Service (NOS) maps, prior reports and studies, and discussions with County, City, and Flood Control District staff.

The South Bay Salt Pond Restoration Project includes the recently acquired salt ponds located in three geographically distinct areas. As shown on Figure 2.1, these sites have been grouped into pond "complexes" and are referred to as follows:

- <u>Baumberg Complex</u>

  The 4800-acre complex of ponds between Hwy 92 and Coyote Hills Slough in Alameda County, which consists of three smaller groups of ponds separated by streams.

- <u>Alviso Complex</u>

  The 7500-acre complex of ponds between Charleston Slough and Mud Slough in Santa Clara and Alameda Counties, which consists of seven smaller groups of ponds separated by streams.

- <u>West Bay Complex</u>

  The 1500-acre complex of ponds in southern San Mateo County, which consists of three smaller groups of ponds separated by Hwy 84 and Ravenswood Slough.

<u>Study Approach, Assumptions, And Limitations</u>

The hydrologic connections (creeks, sloughs, and rivers) in this analysis are grouped by salt pond complex, because each complex has distinct topographical, hydrological, and jurisdictional characteristics.

The project area includes the lower portion of numerous watersheds, limits of which are shown in Figure 2.2. These watersheds are often a consolidation of several smaller watersheds, some of which extend many miles upstream. This analysis is limited to the lower portion of the watersheds which are in the project vicinity.

Knowledge of historical flood occurrences assists in understanding which creeks and sloughs have had flood problems in the past. However, due to construction of various flood control projects, the present condition of a particular creek or slough may differ from historic conditions. For instance, extensive flood control measures along the upper reach of a creek where the banks overtopped regularly may now cause the lower reaches to flood. This report addresses flooding information since the construction of most flood control projects (*ca.* 1950).

Tide gage information was obtained from data and reports published by the U S Army Corps of Engineers (USACE 1984), the National Ocean Service (NOS), and prior reports for the study area (ADEC 2000, Wildlands, 2000). This data is helpful in determining tidal datum differences between different locations. However, many tide stations in the far South Bay

(Coyote Creek, Alviso Slough, etc.) were in operation for limited periods of time in the late 1970's, and thus the data may not reflect present conditions.

Characteristics of South San Francisco Bay

The South Bay, south of Bay Bridge, exhibits the characteristics of a shallow tidal lagoon, with a mean depth of about 11 feet (Denton and Hunt 1986). Tides coming through the north end are reflected and amplified at the closed south end, forming a standing wave. As a result, the tidal range near Dumbarton Bridge is about 50% higher than the tidal range near the Bay Bridge. The Far South Bay[1] is even shallower with a mean depth of about 3 feet, and about 75% of the surface area consisting of mudflats . There is little direct freshwater inflow to the Far South Bay except winter/spring runoff from the local streams. Freshwater input from the Sacramento-San Joaquin Delta influences the Far South Bay only under extreme outflow conditions.

Historically the South Bay consisted of a number of shell beds, with a substantial tidal marsh system south of the Dumbarton Bridge. A composite eco-atlas from *ca.*1770-1820 is presented on Figure 2.3 (Goals Report 1999), and depths from *ca.*1903 are shown on Figure 2.4. Conversion of marshlands to salt ponds, and changes in the sediment budget of the South Bay due to various reasons including hydraulic mining in the Sierra foothills, diking of salt ponds, and building of reservoirs in the upper watersheds have changed the characteristics of the South Bay substantially. Presently, over half of the Far South Bay consists of shallow mudflats which are exposed at low tides. A modern day eco-map from *ca.*1997 is presented on Figure 2.5, and the most recent NOS survey (surveyed mid-1980's) is shown on Figure 2.6. These figures show the extent of changes in the slough system, and deposition in the Far South Bay over the past century.

The significance of the salt ponds restoration is apparent when comparing the size of the potential restoration area to the size of the Far South Bay. The area of the Far South Bay at high tide is approximately 15,000 acres. Full tidal restoration of the acquired Alviso ponds[2] (about 7500 acres) would constitute an increase of about 50% in the surface area at high tide. The approximate diurnal tidal prism of the Far South Bay is 72,000 acre-feet (AF). Full tidal restoration of the acquired Alviso ponds[3] would constitute an increase of about 55% in the diurnal tidal prism, with six ponds (A2E, A2W, A3W, A5, A8, A12) contributing about half of the net increase.

Individual pond sizes, known elevations, and tidal prism estimates (Siegel & Bachand 2002) are provided in Appendix A for reference.

[1] To differentiate the Bay south of Dumbarton Bridge from the South Bay in general, the term "*Far South Bay*" is used in this report.

[2] Pond A18 is not included in the numbers shown, because it is being pursued independently by the City of San Jose.

[3] Assuming no muting, and based on pond volume estimates described in Siegel & Bachand, 2002

2.1 BAUMBERG COMPLEX

The Baumberg Complex recently acquired from Cargill consists of 23 salt ponds which constitute about 4,800 acres, as presented in Figure 2.1.1. The ponds are presently owned by the California Department of Fish and Game. The ponds are bounded by Hwy 92 (San Mateo Bridge) to the north, Coyote Hills Slough to the south, and the Bay to the west. A wide mud flat and tidal marsh (Whale's Tail marsh) exists between the levees and the Bay.

The ponds are separated by Mount Eden Creek and Alameda Creek, with Coyote Hills Slough to the south of the ponds. All the waterways including the watersheds are under the jurisdiction of the Alameda County Flood Control and Water Conservation District Zone 3A (ACFCWCD). The complex is within the lower reaches of the Alameda Creek Watershed, which is the largest watershed in Alameda County covering approximately 695 square miles. About 59% of the watershed is in Alameda County, 32% in Santa Clara County, and 9% in Contra Costa County.

Long-term streamflow data from USGS is available for Alameda Creek at Niles (gaged since 1892) and the Alameda Creek Flood Control Channel at Union City (gaged since 1959). Flooding in the lower reach of the Alameda watershed occurred frequently up to the late 1950's, most significantly in 1955 and 1958, prior to the creation of the flood control district (URS 2003). The federal flood control project, which consists of channels and levees along Alameda Creek, Patterson Creek, and Coyote Hills Slough, was constructed after the 1958 flood (1965 to 1975 period). The flood control project has significantly reduced the frequency of flooding, and high flows in 1986 and 1995 did not result in any overtopping of the levees.

The primary hydrologic connections in the Baumberg Complex are described below, and shown on Figure 2.1.1. The potential 100-year tidal floodplain limit, as estimated by the USACE in the Shoreline Study (USACE, 1988) is also shown on Figure 2.1.1. Data on the hydrologic connections, including jurisdictions, watersheds, applicable tide gage data, known dimensions, flows, and flooding history are provided in Table 2.1.1 for reference.

2.1.1 Coyote Hills Slough

Coyote Hills Slough drains a large portion of the Alameda Creek Watershed. This slough is also the primary flood control channel for the federal project, and consists of USACE built levees on either side of the channel. The channel between the levees is approximately 400 feet wide within the lower reach, and depths in the low flow channel are in the range of 5 feet at a mean tide (MTL).

Ongoing sedimentation in the channels (Bay + fluvial sediments), particularly in the lower reach below Ardenwood Blvd, has significantly reduced the flood conveyance capacity of the channel (URS 2003). The present channel conveys just about a 100-year recurrence interval flow (about 29,000 CFS), which is substantially lower than the original design capacity (about 52,000 CFS). The establishment of smooth cordgrass (*spartina alterniflora*) has also exacerbated depositional processes. Environmental impacts associated with dredging have prevented Alameda County from dredging in the lower reach, and the County is investigating the potential for levee reconfiguration and routing of flood flows through the adjacent salt ponds.

Table 2.1.1

EXISTING HYDROLOGIC CONNECTIONS
(Baumberg Complex - Alameda County)

HYDROLOGIC CONNECTION	CITY (near mouth)	WATERSHED	MAJOR FEEDER CREEKS / SLOUGHS	TIDE STATION	FLOW	GEOMETRY (near mouth)	COMMENTS / FLOODING HISTORY (1950 - current)
Coyote Hills Slough	Fremont, Hayward	Alameda Creek	Serves as flood flow bypass from Alameda Creek	941-4621	100-year flow 29,000 cfs	400 ft wide from levee to levee, 5 ft deep below MSL	1955, 1958
Alameda Creek	Hayward	Alameda Creek	Several small creeks in Upper Watershed	941-4632		200 ft wide, 2 ft deep below MSL	
Mt. Eden Creek	Hayward	Alameda Creek	No significant feeders		Not Significant		

2.1.2 Alameda Creek

Alameda Creek drains a small area within the lower reach of the Alameda Creek Watershed in the city of Hayward, and also serves as a flood control channel. Historically, it used to be a major drainage channel from the Alameda Watershed. The construction of the federal flood control project along Coyote Hills Slough to the south bypasses significant flood flows to the leveed reach. The mouth of the creek is less than 200 feet wide, and shallow (about 2 feet at MTL). Flood conveyance problems, similar to Coyote Hills Slough, have been occurring in this channel.

2.1.3 Mount Eden Creek

Mount Eden Creek drains a small area within the lower reach of the Alameda Creek Watershed in the city of Hayward. This area is part of an ongoing restoration project sponsored by the California Department of Fish And Game that will restore and enhance tidal marsh habitat in the vicinity of Mount Eden Slough and Alameda Creek.

2.1.4 Tidal Benchmark Data

Available tidal benchmark data for tide stations near the Baumberg Complex (see Figure 2.1.1 for location of gages) are presented in Table 2.1.2.

Table 2.1.2 : Tidal Benchmark Data For Baumberg Complex
(elevations in feet, MLLW)

Tidal Plane	941 4458 San Mateo Bridge (West End)	941 4637 San Mateo Bridge (East End)	941 4621 Coyote Hills Slough	941 4632 Alameda Creek
Period Of Measurement	1/81 – 1/88	1/77 – 3/77	12/76 – 3/77	12/76 – 3/77
Duration of Measurements	7 yrs	3 mos	4 mos	3 mos
100-year Estimated Tide (USACE)	10.7	10.7	--	9.1
Highest Observed Water Level [1]	10.7	9.2	8.3	7.6
Mean Higher High Water (MHHW)	7.7	7.7	6.7	6.1
Mean High Water (MHW)	7.1	7.1	6.1	5.5
Mean Tide Level (MTL)	4.1	4.1	3.3	2.9
National Geodetic Vertical Datum, 1929 (NGVD) [2]	3.6	3.7	-	-
Mean Low Water (MLW)	1.2	1.2	0.5	0.3
Mean Lower Low Water (MLLW)	0.0	0.0	0.0	0.0
Lowest Observed Water Level	-2.9	-1.8	-0.3	-0.3

[1] Extreme levels during the period of measurement
[2] Elevation of NGVD is approximate, based on data from NOS and USACE (1984)
Blank values indicate that specific tidal plane not computed

2.2 ALVISO COMPLEX

The Alviso Complex acquired from Cargill consists of 24 salt ponds which constitute about 7,500 acres, as shown on Figure 2.2.1. The ponds are part of the Don Edwards San Francisco Bay National Wildlife Refuge, administered by the United States Fish and Wildlife Service. The group of ponds in Santa Clara County is bounded by Charleston Slough to the west, Artesian Slough and Coyote Creek to the east, and the Bay to the north. The ponds in Alameda County are north of Coyote Creek, and include the island ponds between Mud Slough and Coyote Creek (Ponds 19, 20, 21).

Varying widths of mud flat and tidal marsh exist between the pond levees and the Bay. The primary drainage channels are Mountain View Slough, Stevens Creek, Guadalupe Slough, Alviso Slough, Artesian Slough, Coyote Creek, and Mud Slough. Additionally, Matadero, Barron, and Adobe Creeks drain into the Palo Alto Flood Basin (north of Charleston Slough), which is the primary drainage facility for Palo Alto.

The major watersheds above the Alviso Complex, and their sizes are as follows (see Figure 2.2 for watershed boundaries) :

Watershed	Size
Coyote	322 sq. mi.
Guadalupe	170 sq. mi.
Lower Peninsula	98 sq. mi.
West Valley	85 sq. mi.

All the ponds south of Coyote Creek are bounded by waterways under the jurisdiction of the Santa Clara Valley Water District (SCVWD). The SCVWD acts as Santa Clara County's flood protection agency, and is the steward for its watersheds, streams and creeks, aquifers, and reservoirs. As part of their flood protection function they acquire, analyze, and maintain an extensive amount of hydrologic data. They have evaluated the flow regime of the local streams and creeks, as described in several hydraulic studies which were conducted for design and construction of flood protection projects in their jurisdiction.

Ponds north of Coyote Creek are adjacent to waterways which are under the jurisdiction of Alameda County (ACFCWCD). The County Publics Works Department provides flood control functions similar to the one described above for SCVWD. A summary of the characteristics of primary hydrologic connections are presented in the following sections, and also shown on Table 2.2.1.

2.2.1 Matadero, Barron, And Adobe Creeks (Palo Alto Flood Basin)

The creeks are part of the Lower Peninsula Watershed, and drain an area of approximately 28 square miles. The creeks drain into the Palo Alto Flood Basin from where it is discharged into the Bay via flap gates. Although the flap gates function to minimize tidal exchange between the Bay and the flood basin, some tidal exchange is allowed by permanently opening a portion of one flap gate.

The levees enclosing the flood basin were constructed along the historic alignment of Charleston Slough and portions of Mayfield Slough, and the channel dendritic pattern is still visible on aerial photographs of the flood basin. The creeks experienced flooding several times between 1952 and 1958, after which flood control measures were installed. However, incidences of flooding have continued, with several flood occurrences in the 80's and 90's.

USGS maintains streamflow gages on Matadero Creek (at Palo Alto, since 1952) and San Francisquito Creek[4] (at Stanford, since 1931). The City of Palo Alto measures water stage and other water quality parameters on San Francisquito, Adobe and Barron creeks at Highway 101, and levels within and outside the flood basin.

In addition, the SCVWD operates and maintains the ALERT Hydrologic Data Collection System (ALERT - acronym for Automated Local Evaluation in Real Time), which monitors hydrologic data including rainfall, streamflow, and reservoir levels within the watersheds in their jurisdiction. In the Lower Peninsula watershed, the SCVWD operates water level gages upstream of Highway 101 on Adobe, Barron, and Matadero creeks.

2.2.2 Charleston and Mayfield Sloughs

Both sloughs are part of the Lower Peninsula Watershed. Although not a major conveyance of stormwater at present, Charleston Slough and Mayfield Sloughs historically received drainage from Matadero, Barron and Adobe Creeks. The sloughs are primarily tidal since stormwater from the creeks was redirected into the Palo Alto Flood Basin. Wetland restoration of Inner Charleston Slough was initiated in the 1990's by breaching the levee between Inner and Outer Charleston Sloughs, with the objective being to provide tidal marsh habitat between Charleston Slough and Pond A1 to the east.

2.2.3 Permanente Creek (Mountain View Slough)

The creek is part of the Lower Peninsula Watershed, and drains an area of approximately 17 square miles. Permanente Creek becomes Mountain View Slough as it nears the Bay, in the City of Mountain View. The slough is narrow (less than 70 feet at MSL near the mouth), and contributes a small amount of freshwater flow to the Bay (100 year flows in the range of 1,400 CFS) because much of the stormwater is diverted to Stevens Creek via the Permanente Creek Diversion.

Permanente Creek has had a history of recurring floods, with major flooding occurring in 1950, 1952, 1955, 1958, 1963, 1968, 1983, 1995 and 1998. The major portion of channel lining and the construction of the Permanente Creek Diversion was conducted in the 1960's, and there was significant follow-up work in the 1980's. However, it is evident that further flood protection measures are necessary to reduce flood occurrences, and the Santa Clara Valley Water District is conducting a Flood Control Study as part its 15-year Clean, Safe Creeks Program.

2.2.4 Stevens Creek

The creek is part of the Lower Peninsula Watershed, and drains approximately 29 square miles within the city of Mountain View. Peak flows from Permanente Creek are diverted into Stevens Creek via the Permanente Creek Diversion. The creek is narrow in the summer (less than 70 feet at MSL near the mouth) when flow is

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[4] San Francisquito Creek, which primarily drains the San Francisquito Watershed and a small portion of the Lower Peninsula Watershed, is described in further detail in the West Bay Complex section.

negligible. It contributes a significant amount of freshwater flow to the Bay in the winter (100 year flows in the range of 7,200 CFS).

2.2.5 Guadalupe Slough

Part of the West Valley Watershed, Guadalupe Slough drains approximately 81 square miles within the cities of San Jose and Sunnyvale. Calabazas Creek, San Tomas Aquino Creek and Saratoga Creek are the major contributors of freshwater flows to the slough. Urban runoff via Moffett Channel, Sunnyvale East Channel and Sunnyvale West Channel, and treated wastewater from the Sunnyvale Water Pollution Control Plant also drains into the slough. The mouth of the slough (between levees) is about 300 feet wide and approximately 10 feet deep at a mean tide.

Station data and discussion with SCVWD staff indicates that the tidal influence extends upstream toward an approximate limit near Hwy 237. Flooding in the area of Calabazas Creek occurred in 1978 and 1986, and Sunnyvale West Channel overtopped in 1983. Water levels are monitored on Calabazas Creek (SCVWD) and near the treatment plant discharge point (Sunnyvale Plant).

2.2.6 Alviso Slough

Part of the Guadalupe Watershed, the slough drains approximately 170 square miles of Santa Clara County. Guadalupe River, which becomes Alviso Slough as it nears its connection with Coyote Creek, is fed by several upstream creeks including Alamitos, Calero, Canoas, Golf, Greystone, Los Gatos, and Ross. The slough is approximately 300 feet wide near the mouth and depths range from about 3 feet to 10 feet at a mean tide. The watershed provides a significant amount of freshwater flow to the Bay in the winter (100-year flow is about 18,350 CFS).

Discussions with SCVWD, along with tide gage data, indicate that the tidal influence in Alviso Slough extends up to an approximate upstream limit near Montague Expressway. Stream flow and water level is recorded at several locations in the Guadalupe Watershed by SCVWD. The USGS also began operating a gage immediately upstream of Highway 101 in May 2002. Prior to that the gage was located in downtown San Jose at the St John St Bridge.

Flooding is an ongoing problem along the Guadalupe River. The Lower Reach (downstream of Interstate 880) has flooded over 15 times since ca. 1950, with 1955 being the worst flood in recorded history. The Downtown Reach (between I-280 and I-880) has also flooded frequently, with one of the most severe floods occurring in 1995, when the river overtopped its banks along several reaches. The estimated 11,000 CFS peak flow in the 1995 event corresponded to about a 30-year recurrence interval. The Upper Reach (Willow Street to Blossom Hill approximately) has flooded 5 times since 1982, with the worst flooding occurring in 1995. The Downtown Project began in the 1940s, and the District (or its predecessor) has been working with the USACE since 1952. Congress authorized the flood control project in the early 1980s, and the reaches are in various stages of completion.

The Lower Guadalupe Flood Control Project, which has the most relevance to the proposed Salt Pond Restoration project, involves improving conveyance capacity from the Bay to Hwy 880 and allowing for overflow into Pond A8 during high flows

(SCVWD 2002). Sedimentation in the Lower Reach has also been a concern to flood and stormwater conveyance.

Local flooding, caused by stormwater backing up in drainage systems, is also a concern in the Lower Reach of Guadalupe River. Because stormwater must either pass through a lift station or a gravity-flow flap gate, the ability of water carried by a drainage system pipe to discharge is dependent on the capacity of the lift station or flap gate. Undersized lift stations and flap gates forced shut by high water levels in the creek will not allow pipes to discharge into a creek.

2.2.7 Artesian Slough

The eastern boundary of the Alviso Complex salt ponds, Artesian Slough drains a small area of the Coyote Watershed. Its primary source of water is treated effluent water from the San Jose / Santa Clara Water Pollution Control Plant, which discharges into the slough at its upstream terminus.

2.2.8 Coyote Creek

One of the largest creeks in the South Bay, and the largest in Santa Clara County, Coyote Creek drains about 322 square miles of the Coyote Watershed. From its connection to San Francisco Bay, Coyote Creek forms a portion of the border between Santa Clara and Alameda County before turning south into the City of San Jose. It is under the jurisdiction of both the ACFCWCD and the Santa Clara Valley Water District (SCVWD).

In Alameda County, it drains the northern portion of the Coyote Watershed and is fed by several tributaries and flood control channels. Mud Slough is a branch of the Coyote Creek network, and forms the northern boundary of the Island Ponds (A19, A20, A21). It is fed by Arroyo de La Laguna, Agua Caliente, and other smaller creeks which provide flood control to the Cities of Fremont and Newark. The Fremont Flood Control Channel (fed by Scott and Torogas creeks) also drains into Coyote Creek north of the Newby Island Landfill.

In Santa Clara County it drains the southern and eastern portion of the Coyote Watershed and is fed by several tributaries and flood control channels including the Lower Penitencia Creek (fed by Berryessa, Tularcitos, Los Coches, Piedmont and Sierra creeks). Standish Dam, which was constructed northeast of the San Jose Treatment Plant to control salinity intrusion into Coyote Creek, is no longer operational. Flood control improvements constructed by SCVWD in the late 1980s and early 1990s include a flood flow bypass channel south of the BFI/Newby Landfill. The natural Coyote Creek channel, north of the landfill, was designed to convey up to 4000 CFS during 100-year flows, with the bypass channel conveying up to 14,600 CFS.

Several stream flow and water level gages, operated by SCVWD, USGS, and ACFCWCD, measure flows in Coyote Creek and its tributaries. The USGS began operating a gage just upstream of Highway 237 in 1999. The width of the creek varies from about 300 feet (between levees at UP Railroad Bridge) to approximately 1600 feet downstream of Alviso Slough. Depths at a mean tide vary from about 9 feet at the UPRR bridge to about 13 feet near the Alviso Slough. The creek provides a significant amount of freshwater flow to the South Bay in the winter.

Flooding occurred in 1958, 1969, 1978, 1982, 1983, 1997, and 1998. Severe flooding occurred in 1982, resulting in damages in excess of $6 million. Improvements to the Lower Reach of Coyote Creek (downstream of Montague Expressway) include the bypass channel completed in 1996 as part of the Coyote/Berryessa Flood Protection Project. The flood control project was effective in protecting the area from storm-induced flows in 1997, which produced record flows in Coyote Creek, and high flows in 1998.

2.2.9 Tidal Bench Mark Data

Available tidal benchmark data for tide stations near the Alviso Complex (see Figure 2.2.1 for location of gages) are presented in Table 2.2.2.

Table 2.2.1

EXISTING HYDROLOGIC CONNECTIONS
(Alviso Complex - Santa Clara County)

HYDROLOGIC CONNECTION	CITY (near mouth)	WATERSHED	MAJOR FEEDER CREEKS / SLOUGHS	TIDE STATION	FLOW	GEOMETRY (near mouth)	COMMENTS / FLOODING HISTORY (1950 - current)
Mud Slough	Fremont	Coyote	Arroyo de La Laguna, Agua Caliente				
Coyote Creek	San Jose	Coyote	Scott Creek, Penetencia Creek, Berryessa Creek, Calera Creek, Silver creek	941-4551, 941-4585, 941-4589	100-year flow 14,500 cfs	300 - 1600 ft wide between levees from UPRR bridge to Alviso Slough, 9 - 13 ft deep below MSL from UPRR bridge to Alviso Slough	1958, 1969, 1978, 1982, 1983, 1997, 1998
Artesian Slough	San Jose	Coyote	San Jose / Santa Clara Waste Water Treatment Plant	941-4561	Designed for 167 MGD (about 260 CFS)		
Alviso Slough	San Jose	Guadalupe	Guadalupe River, Ross Creek, Canoas Creek, Los Gatos Creek	941-4551, 941-4575	100-year flow 17,000 cfs	300 ft wide, 3-10 ft deep below MSL	1952, 1955, 1958, 1963, 1967, 1980, 1982, 1983, 1986, 1995, 1998
Guadalupe Slough	San Jose, Sunnyvale	West Valley	Calabazas Creek, Sunnyvale East Channel, Sunnyvale West Channel, San Tomas Aquino Creek, Saratoga Creek, Moffett Channel	941-4548, 941-4549		300 ft wide, 10 ft deep below MSL	1978, 1983, 1986
Stevens Creek	Mountain View	Lower Peninsula	Permanente Creek Diversion		100-year flow 7,200 cfs	70 ft wide at MSL	
Mountain View Slough	Mountain View	Lower Peninsula	Permanente Creek		100-year flow 1,400 cfs	70 ft wide at MSL	1950, 1952, 1955, 1958, 1963, 1968, 1983, 1995, 1998
Palo Alto Floodbasin	Palo Alto	Lower Peninsula	Matadero Creek, Barron Creek, Adobe Creek	941-4525		---	1952, 1955, 1956, 1958, 1973, 1983, 1985, 1986
Charleston Slough	Palo Alto	Lower Peninsula	---	941-4525	Not Significant	---	
San Francisquito Creek	Palo Alto	San Francisquito	---	941-4525	100-year flow 6,100 cfs		1956, 1958, 1982, 1998

Table 2.2.2 : Tidal Benchmark Data For Alviso Complex
(elevations in feet, MLLW)

Tidal Plane	941 4519 Mowry Slough	941 4521 Mud Slough Railroad Br.	941 4525 Palo Alto Yacht Harbor	941 4537 Palo Alto CM No 8	941 4548 Guadalupe Slough	941 4549 Upper Guadalupe Slough	941 4551 Gold Street Bridge	941 4561 Coyote Creek (Artesian Sl)	941 4575 Coyote Creek (Alviso Sl)	941 4589 Coyote Creek Tributary 2
Period Of Measurement	12/76 - 6/77	11/76 - 2/77	6/84 - 12/84	6/76 - 3/77	12/74 - 3/76	12/76 - 1/77	5/75 - 11/75	11/76 - 3/77	3/75 - 3/76 4/84 - 3/85	6/77 - 1/78
Duration of Measurements	6 mos	4 mos (highs only)	7 mos	10 mos (highs only)	16 mos (highs only)	2 mos	5 mos	5 mos	13 mos + 12 mos	4 mos (highs only)
100-YR	11.5	12	11.5	11.5	11.9	12.3	12.4	12.4	12.5	12.3
HOWL	10.2	-	--	-	10.3	11	11	10.7	10.8	-
MHHW	8.5	-	7.6	-	8.6	9.3	9.3	8.5	9	-
MHW	7.9	-	7	-	8	8.7	8.7	7.9	8.4	-
MTL	4.6	-	3.9	-	4.6	5	5	4.4	4.8	-
MLW	1.2	-	0.8	-	1.1	1.3	1.2	0.8	1.2	-
MLLW	0	-	0	-	0	0	0	0	0	-
LOWL	-	-	-	-	-0.7	-1.7	-1.2	-1	-1.8	-

Blank values indicate that specific tidal plane not computed

2.3 WEST BAY COMPLEX

The West Bay Complex (Figure 2.3.1) contains 7 salt ponds totaling 1,500 acres which are owned by the USFWS. This group of ponds is bounded by Flood Slough to the northwest, the Hetch-Hetchy Aqueduct to the southeast, and the Bay to the northeast. A narrow mud flat and tidal marsh exists between the levees and the Bay. The three sub-groups of ponds are separated by Ravenswood Slough and Hwy 84 (Dumbarton Bridge).

The main watershed adjacent to the West Bay Complex is the San Francisquito Watershed, draining an area of 45 square miles. The other watershed adjacent to the complex is the Redwood Watershed to the north.

2.3.1 San Francisquito Creek

San Francisquito Creek (and Los Trancos Creek) forms the boundary between the counties of San Mateo and Santa Clara. The watershed is primarily in San Mateo County, where Bear Creek and Corte Madera Creek (through Searsville Lake) feed into San Francisquito Creek. A portion of the watershed lies in Santa Clara County as part of the Lower Peninsula Watershed. It is primarily regulated by the San Mateo County Flood Control District, with some assistance from the Santa Clara Valley Water District (SCVWD). The creek provides a significant amount of freshwater flow to the Bay in the winter (100 year flows in the 7,000 CFS size range).

The creek is subject to significant tidal action in its lower reach, with the tides extending upstream to Hwy 101. The upper reach of the stream is being gaged by USGS at Stanford University since 1931, and long-term statistics are available. Water levels in the lower reach are monitored by the City of Palo Alto.

Although parts of San Francisquito Creek typically are dry for 6 months every year, it has had recent severe flooding. The largest flood of record occurred in 1998. Flood protection was installed in 1955, but flooding continued, with the creek overtopping its banks in 1956, 1958, and 1982. The capacity of the creek had decreased to below the as-built capacity in 1958, and flood control improvements to the creek in 2002 restored the creek conveyance capacity to its former state. The San Francisquito Creek Joint Powers Authority and other stakeholders has been working with the USACE to investigate the impacts of removing Searsville Dam, and the potential for flood control projects in the lower and other reaches.

2.3.2 Ravenswood Slough

Just north of the Dumbarton Bridge, Ravenswood Slough is a short slough draining portions of Redwood City, East Palo Alto, and a portion of the unincorporated area along Hwy 101. It drains one of four sub-zones within San Mateo County. Tidal flooding in the vicinity of the Bayfront Canal and around Ravenswood Slough occurred in 1973, 1982, 1983, and 1986.

2.3.3 Westpoint Slough

The southeastern portion of Redwood City drains into the Bayfront Canal, then south to Flood Slough and Westpoint Slough.

Tide gage data from the closest stations (see Figure 2.1.2 for location) are listed in Table 2.3.

Table 2.3.1

EXISTING HYDROLOGIC CONNECTIONS
(West Bay Complex - San Mateo County)

HYDROLOGIC CONNECTION	CITY (near mouth)	WATERSHED	MAJOR FEEDER CREEKS / SLOUGHS	TIDE STATION	FLOW	GEOMETRY (near mouth)	COMMENTS / FLOODING HISTORY (1950 - current)
San Francisquito Creek	Menlo Park	San Francisquito	Small creeks and ditches in upper watershed	941-4525	100-year flow 6,100 cfs		1956, 1958, 1982, 1998
Ravenswood Slough	Menlo Park		Tidal slough	941-4514	Not Significant		1973, 1982, 1983, 1986
West Point Slough	Menlo Park		Tidal slough	941-4507	Not Significant		

Table 2.3.2 : Tidal Benchmark Data For West Bay Complex
(elevations in feet, MLLW)

Tidal Plane	941 4507 Westpoint Slough	941 4509 Dumbarton Bridge	941 4525 Palo Alto Yacht Harbor	941 4537 Palo Alto CM No. 8
100-YR	11.2	11.6	11.5	11.5
HOWL	--	10.2	--	--
MHHW	8.0	8.5	7.6	--
MHW	7.4	7.9	7.0	--
MTL	4.3	4.5	3.9	--
MLW	1.2	1.2	0.8	--
MLLW	0.0	0.0	0.0	--
LOWL	--	-2.2	-2.1	--

3. INVENTORY OF DISCHARGERS

Three main types of dischargers exist in the vicinity of the salt pond complexes: stormwater, wastewater, and industrial. This section provides an inventory of the discharge facilities that may interact in some manner with the proposed restoration project.

The basic elements of stormwater systems in the South Bay consist of inlets, pipes and channels. Stormwater from the watersheds draining into South Bay is collected in drainage inlets, transported via pipes to drainage creeks or flood control channels where it discharges either by gravity or by pump/lift stations, and ultimately discharged into San Francisco Bay. Typically, Cities have jurisdiction over inlets, pipes, and smaller pumps, while creeks, larger pumps, and flood control channels are under the jurisdiction of the County Flood Control Districts. Although the stormwater discharged to the Bay is under County jurisdiction, each County has formed a Countywide collaborative group with its various Cities as co-permitees.

Wastewater treatment plants in the South Bay collect municipal waste and provide tertiary treatment, which results in an effluent that is substantially clean. Most effluent is discharged into the Bay, while some is recycled for landscape irrigation and industrial purposes. Flows from these plants are generally steady, with some interruptions of flow for plant maintenance. The only stormwater which enters the wastewater system is runoff from the treatment plants themselves.

Industrial discharges result from collecting local runoff, and water used by certain facilities for various operations, and discharging into the Bay. Some type of treatment may be necessary prior to discharge.

Each discharger has a different impact on the receiving water of the Bay, resulting from varying effluent characteristics, including the following parameters:

- flow rate
- flow variability (daily, seasonal, storm event)
- chemical properties (metals, oxygen content, salt content, organics, nutrients, etc.)
- physical properties (turbidity, odor, temperature)

Additionally, each discharger has varying responsibilities according to the requirements set by the permitting agency. The type, location, and frequency of monitoring data collection, along with reporting requirements vary according to the permit.

The following sections describe the relevant information that was collected pertaining to the dischargers in the vicinity of the pond complexes.

3.1 REGULATORY AND JURISDICTIONAL FRAMEWORK

3.1.1 Water Quality

All stormwater and wastewater in the study area is regulated, and requires a permit from the San Francisco Bay Regional Water Quality Control Board (SFRWQCB). The SFRWQCB issues permits under the National Pollutant Discharge Elimination System (NPDES) permit program, and waste discharge orders, which govern discharges to the Bay. Most existing NPDES Orders can be viewed on the SFRWQCB web site.

As authorized by the Clean Water Act, the NPDES was designed to control water pollution by regulating point sources that discharge pollutants into waters of the United States. Point sources are conveyances such as pipes or man-made ditches. Individual homes that are connected to a municipal system, use a septic system, or do not have a surface discharge do not need an NPDES permit; However, industrial, municipal, and other facilities must obtain permits if their discharges go directly to surface waters.

Wastewater

Because wastewater and industrial discharges can be traced to a discrete source, NPDES permits are required by treatment plants and industrial dischargers. The permits describe limits and thresholds for specific pollutants, depending on several factors such as mass loading to the system, background water quality, toxicity to benthic and/or other species, and others as described in the Basin Plan. The limiting criteria are *water quality* based because the source can be traced to a single discrete discharger.

All wastewater treatment plants participate in the Regional Monitoring Program (RMP) for Trace Substances, which is implemented by the San Francisco Estuary Institute (SFEI). The RMP was created by the SFRWQCB in 1993 to provide the information needed to manage chemical contamination in the Estuary. The RMP is a collaboration between the SFRWQCB, the regulated discharger community that funds the Program (currently 83 wastewater dischargers and dredgers), and SFEI, an independent non-profit scientific research organization. Based on the results of the annual RMP findings, key decisions regarding the health of the estuary are made, which may include periodic updates to guidance documents and the NPDES program.

The treatment plants in the South Bay have been subject to several amendments to their original NPDES permits based on operational history, background levels of contaminants, state of knowledge relative to impacts to organisms, and impacts to local environment. These amendments have resulted in an ongoing change in their practices, including adding tertiary treatment to their system because of the low flushing characteristics of the South Bay, mitigation due to potential impacts on salt water marshes, and adding other innovative technologies to reduce pollutant load to the estuary. The criteria are among the most stringent in the country, and a small amount of perturbation to the system (change in background water quality or pollutant loading) has a potential to affect their operations.

The NPDES permit sets the monitoring and reporting requirements for the wastewater treatment plants. Monitoring periods vary from continuous to annual depending on the constituent. Monitoring data is typically reported in the monthly Self-Monitoring Reports and in an Annual Report. Additionally, the three treatment plants near the Alviso Ponds participate in the Santa Clara Basin Watershed Management Initiative (WMI), with one of the objectives being development of site-specific water quality goals including the Total Maximum Daily Load (TMDL) for copper and nickel in South San Francisco Bay. These treatment plants report to the SFRWQCB every six months to provide a status update on efforts to support the WMI.

Stormwater

Stormwater discharges usually cannot be traced to a single source, but rather hundreds or thousands of drainage inlets collecting surface runoff. Although this diffuse source network makes the application of an NPDES permit seem peculiar, the permit still applies due to the eventual collection of runoff into a single "source" waterway such as a creek or slough. This is explained by the EPA as follows:

> *"Storm water discharges are generated by runoff from land and impervious areas such as paved streets, parking lots, and building rooftops during rainfall and snow events that often contain pollutants in quantities that could adversely affect water quality. Most storm water discharges are considered point sources and require coverage by an NPDES permit."*

Limiting criteria for stormwater cannot be implemented because the discharge cannot be traced to a discrete discharger, so the criteria are *practice based* requiring that Best Management Practices (BMPs) be implemented by all stormwater dischargers. Many variables are considered prior to issuance of an General/Countywide NPDES permit, most of which are intended to avoid adverse impacts to receiving water quality. The NPDES permit also requires the stormwater dischargers in the South Bay to participate in the RMP.

In the project area, permits have been issued to Countywide collaborative programs, which are required to implement "management plans" to prevent and control stormwater induced pollution. The three countywide programs are listed below:

Alameda County: The Alameda Countywide Clean Water Program (ACCWP) consists of the following co-permitees: Alameda County Flood Control and Water Conservation District (ACFCWCD), Zone 7 of ACFCWCD, Alameda County, Alameda, Albany, Berkeley, Dublin, Emeryville, Fremont, Hayward, Livermore, Newark, Oakland, Piedmont, Pleasanton, San Leandro, Union City.

Santa Clara County: The Santa Clara Valley Urban Runoff Pollution Prevention Progam (SCVURPPP) consists of the following co-permitees: Santa Clara Valley Water District, Santa Clara County, Cupertino, Los Altos, Los Altos Hills, Milpitas, Mountain View, Palo Alto, San Jose, Santa Clara, Sunnyvale, Campbell, Los Gatos, Monte Sereno, and Saratoga.

San Mateo County: The San Mateo County Stormwater Pollution Prevention Program (STOPPP) consists of the County, the City/County Association of Governments of San Mateo County, and the cities and towns in San Mateo County.

Salt Pond Control Structures (ISP)

In addition to the countywide programs, the SFRWQCB issued a Waste Discharge Requirement Order / Water Quality Certification (WDR/WQC) for the project under the Initial Stewardship Plan to regulate the discharge of water from within the salt ponds. The WDR/WQC contains water quality objectives and requirements similar to other discharges, with specific monitoring requirements because of the potential for large variability in background and pond salinity and resultant impacts on wildlife and fisheries.

Regarding the ponds which have been retained by Cargill (Newark and Redwood City), no evidence was found that they discharge into the Bay. Therefore, this study did not include those ponds.

3.1.2 Levees and Flood Control

The USACE has regulatory jurisdiction in "Waters of the United States" under Section 10 of the Rivers & Harbors Act, which includes the Bay and most waterways draining into the Bay. In San Francisco Bay, construction of instream structures or levees, dredging, or other physical alterations require a USACE permit. The USACE has jurisdiction over the restoration project for several reasons:

- Proposed breaching or lowering levees to open the salt ponds to tidal influence physically alters the Bay shoreline;
- Potential changes in the water level in the Bay and estuary adjacent to outboard levees;
- Potential upstream changes in the water level in the numerous waterways feeding into the Bay.

In addition to the above, the USACE has jurisdictional authority over filling of wetlands under Section 404 of the Clean Water Act.

The County Flood Control Districts have local jurisdiction for development of flood control projects. In the project area these agencies are:

- Santa Clara Valley Water District (SCVWD)
- Alameda County Flood Control and Water Conservation District (ACFCWCD)
- San Mateo County Flood Control District (SMCFCD)

These Flood Control Districts are responsible for providing flood protection to the Cities and Counties in their jurisdiction, and are also the issuing agency for encroachment permits for storm drain outfalls into flood control channels.

3.2 BAUMBERG COMPLEX

3.2.1 Stormwater

An inventory of dischargers is presented in Tables 3.2.1 and 3.2.2. In the lower reach of the watersheds, stormwater is carried through pipes and channels to lift stations along the Alameda County flood control channels and then into the Bay. At several locations, the flood control channel has tide gates to prevent tidal action upstream but allow stormwater to flow downstream at low tides. The gates, lift stations, large outfalls, and the J-ponds are shown on Figure 3.2.1, and summarized in Table 3.2.3. The County owned J-ponds are used for flood control and are subdivided into 3 units - J, J2 and J3 (see Figure 3.2.1). The ponds serve as detention basins during storms, and are connected to the main drainage channels via large culverts.

Lift stations are the primary means of discharging stormwater from low lying areas into the flood control channels, and should be relatively unaffected by slight variations in tidal stage. There is a possibility of local backwater effects near the discharge point, with potential to raise the water surface to an elevation such that the adjacent levees do not have adequate freeboard.

An exception to the above is runoff from the State right of way by Caltrans (for example Hwy 92), which discharges into adjacent ponds (Ponds 10 and 11) and is not under County jurisdiction. Discharge from these areas typically goes into a ditch and eventually into the ponds via outfalls. Some of these outfalls may be affected by full tidal restoration of the pond where the outfall exists. However, discharges in the vicinity of the Baumberg are not as significant as farther south in Newark where restoration is not envisioned at the present time.

3.2.2 Wastewater

Wastewater from the Union Sanitary District Alvarado sewage treatment plant (serves the Cities of Fremont, Newark, and Union City) flows north for treatment and ultimate discharge into the Bay through the East Bay Dischargers Authority’s outfall. The point of discharge is in Alameda County, north of Oakland and will not be affected by the restoration project.

3.2.3 Industrial Dischargers

FMC Corporation has been issued an NPDES permit for final site cleanup of the former chemical processing and manufacturing facility in Newark. The facility has not been in operation since 1995, and current chemical operations consist of a hydrogen peroxide trans-loading facility. Other site operations include a groundwater remediation system which discharges to the Union Sanitary District, and a groundwater monitoring system.

3.2.4 Pond Water Control Structures

The salt ponds have numerous intake, outfall, and transfer structures (gates, pumps) throughout the complex. Although many are for inter-pond transfer of brine, some are directly connected to the Bay or to tidal waters. The ISP envisions retaining some of these structures, and adding a significant number of new control structures to reduce salinity in the ponds. Existing and proposed control structures as presented in the ISP are shown on Figure 3.2.2, and summarized in Table 3.2.4.

The local Flood Control District is also evaluating the potential for using some of the acquired ponds as detention basins to reduce the risk of flooding, and to minimize the need for dredging the lower part of the flood control channels for flood conveyance capacity. Depending on the restoration alternative, some of these structures will act as drainage outfalls to adjacent restored ponds and should be considered in the alternatives analysis.

An NPDES permit has not yet been issued for these structures and discharges, but has been applied for.

Table 3.2.1
BAUMBERG COMPLEX - ALAMEDA COUNTY
(Existing Stormwater Dischargers)

DISCHARGER	DISCHARGE FROM	DISCHARGE TO	TYPE OF DISCHARGE	JURISDICTION
Alameda County Flood Control and Water Conservation District (ACFCWCD)	Coyote Hills Slough	South San Francisco Bay	Open-channel	Alameda Countywide Clean Water Program (ACCWP)
	Alameda Creek	South San Francisco Bay	Open-channel with Tide Gate	ACCWP
	Mt. Eden Creek	South San Francisco Bay	Open-channel	ACCWP
	Mud Slough	Coyote Creek	Open-channel	ACCWP
City of Fremont	City Storm Drain System	Coyote Hills Slough	Pipe	ACCWP
City of Union City	City Storm Drain System	Alameda Creek, Coyote Hills Slough	Pipe	ACCWP

Table 3.2.2
BAUMBERG COMPLEX - ALAMEDA COUNTY
(Existing Wastewater & Industrial Dischargers)

FACILITY	DISCHARGE LOCATION	CONTRIBUTORS	PIPE SIZE / FLOW	MONITORING DATA
FMC Corporation	Ditch 4000' upstream of Plummer Creek Slough	Chemical processing & manufacturing site (final cleanup)		Per NPDES Order No. R2-2002-0060

Table 3.2.3

BAUMBERG COMPLEX - ALAMEDA COUNTY
(Existing Stormwater & Wastewater Facilities)

I.D.	STRUCTURE	STATUS	WATERWAY	DESCRIPTION
ACLS1	Lift Station	Existing	Alameda Creek	Alvarado Lift Station
ACLS2	Lift Station	Existing	Patterson Creek to Coyote Hills Slough	Located corner of Delores Dr. and Deborah Dr.
ACLS3	Lift Station	Existing	Feeds to Alameda Creek	Located approx. 2200 ft. downstream of Hwy. 880, Besco Lift Station
ACLS4	Lift Station	Existing	Mt Eden Creek	Eden Landing Pump Station
ACLS5	Lift Station	Existing	Ditch feeding into J-3 Pond and Alameda Creek	J-3 Pump Station located approx. corner of Union City Blvd and Silverside Drive
ACG1	Tide Gate	Existing	Alameda Creek	Located 0.5 mile upstream from Alvarado Lift Station (ACLS1)
ACOF1	Outfall	Existing	Alameda Creek	48" R.C.P. at Alvarado Blvd. (enters south side of channel)
ACOF2	Outfall	Existing	Coyote Hills Slough	Four (4), 48" outfalls from J Pond system
ACOF3	Outfall	Existing	Coyote Hills Slough	Three (3) 48" culverts from J-2 Pond system

Table 3.2.4
BAUMBERG COMPLEX - ALAMEDA COUNTY
(Salt Pond Control Structures)

I.D.	STRUCTURE	TYPE	STATUS	WATERWAY	DESCRIPTION
B1	Intake Gate	Gravity	New	New Mt. Eden Creek to Pond B10	4x48" gates
B2	Gates	Gravity	Existing	Pond B10 to Pond B11	2x48" gates
B3	Gates	Gravity	New (by others)	Pond 11 to New Mt. Eden Creek	48" gate
B4	Gates	Gravity	New (by others)	Pond B10 to Pond B11	48" gate
B5	Gates	Gravity	New (by others)	Pond 10 to New Mt. Eden Creek	48" gate
B6	Inlet Gate	Gravity	New	North Creek to Pond B8	48" gate
B7	Gates	Gravity	Existing	Pond B14 to Pond B9	2x58" wood gates
B8	Gates	Gravity	Existing	Pond B13 to Pond B14	2x42" wood gates
B9	Pump	Pump	Existing	Brine ditch to Pond 12 & Pond 13	10,000 gpm brine pump
B10	Gates	Gravity	Existing	Pond 14 to Pond 8x	2x42" wood gates
B11	Pipe	Gravity	Existing	North Creek to Pond 8x	48" pipe
B12	Gates	Gravity	Existing w/ new weir	Pond 9 to Pond 8A	48" gate
B13	Pipe	Gravity	Existing w/ new weir	Pond 9 to Pond 8A	42" pipe
B14	Gates	Gravity	New (by others)	North Creek to Pond 8A	48" gate
B15	Outlet Gate	Gravity	New	Pond 8A to Old Alameda Creek	48" gate
B16	Inlet Gate	Gravity	New (by others)	North Creek to Pond 8	48" gate
B17	Gates	Gravity	Remove/Replace	Pond 8 to Pond 6B	24" gate
B18	Gates	Gravity	Existing	Donut 2 to Pond 6B	36" gate
B19	Pump	Pump	Existing	Donut 2 to Pond 8	Continental Pump
B20	Gates	Gravity	Existing	Donut 1 to Pond 8	36" gate
B21	Siphon	Gravity	Existing	Donut 1 to Pond 6	36" siphon to 6
B22	Gates	Gravity	Existing	Donut 1 to Pond 6A	36" gate
B23	Gates	Gravity	Existing	Donut 1 to Donut 2	36" gate
B24	Outlet Gate	Gravity	New	Pond 6A to Old Alameda Creek	48" gate
B25	Inlet Gate	Gravity	New	Old Alameda Creek to Pond B1	4x48" gates
B26	Pump	Pump	Existing	Old Alameda Creek to Pond B1	30,000 gpm pump
B27	Gates	Gravity	New	Pond B1 to Pond B2	48" gate (replaces 8x42"
B28	Gap	Gravity	Existing	Pond B1 to Pond B2	Fill existing gap
B29	Gates	Gravity	New	Pond B1 to Pond B7	48" gate
B30	Gap	Gravity	Existing	Pond B7 to Pond B4	25' gap
B31	Gap	Gravity	Existing	Pond B4 to Pond B2	40' gap
B32	Outlet Gates	Gravity	New	Pond B2 to Bay	2x48" gates
B33	Inlet Siphon	Gravity	New	Pond B1 to Pond B6	36" siphon from continental (System 6A)
B34	Pump	Pump	New	Old Alameda Creek to Pond B6	30,000 gpm pump
B35	Gap	Gravity	New	Pond B6 to Pond B5	15' gap (replaces 4x45"
B36	Gates	Gravity	New	Pond B5 to Pond B6C	48" gate (replaces 45"
B37	Gates	Gravity	New	Pond B5 to Pond B6C	48" gate (replaces 36" gate - to be removed)
B38	Pipes	Gravity	Existing	Pond B6C to Pond B4C	2x30" pipes
B39	Cut	Gravity	Existing	Pond B1C to Pond B5C	25' cut
B40	Gap	Gravity	Existing	Pond B5C to Pond B4C	25' gap
B41	Gates	Gravity	Existing	Pond B4C to Pond B3C	2x30" wood gates
B42	Cut	Gravity	Existing	Pond B3C to Pond B2C	25' cute w/ bridge
B43	Pipe	Gravity	Existing	Pond B1C to Pond B5C	24" pipe
B44	Gates	Gravity	New	Pond B2C to Alameda Flood Control Channel	2x48" gates
B45	Pipe	Gravity	Existing	Pond B2C to Pond B1C	30" pipe
B46	Pump	Pump	Existing	Alameda Flood Control Channel to Pond B1C	7,660 gpm pump
B47	Outlet Pump	Pump	Existing	Pond B2C to Plan 1A	Cal Hill transfer
B48	Gates	Gravity	Remove	Bay to Pond B10	4x48" gates
B49	Gates	Gravity	Remove	Pond B7 to Pond B6	48" gate to Pond B6
B50	Gates	Gravity	Remove	Pond B4 to Pond B5	3x42" wood gates to B5
B51	Gates	Gravity	Remove	Pond B4 to Pond B5	3x42" wood gates from B4

3.3 ALVISO COMPLEX

3.3.1 Stormwater

An inventory of dischargers is presented in Tables 3.3.1 and 3.3.2. Similar to the Baumberg Complex in Alameda, storm water from the lower reaches of the Santa Clara watersheds is typically conveyed in storm drain pipes and ditches toward flood control channels, and ultimately pumped into the channel via numerous lift stations. The SCVWD using data provided by local municipalities has just completed an inventory of storm drains, outfalls, and lift stations for all of Santa Clara County, which included a GIS-based system showing location, size, and alignment of storm drains. Although invert elevations were not included in the system, it is a thorough inventory of existing drainage structures.

Storm drainage from the Cities and unincorporated County areas flows into Guadalupe Slough, Alviso Slough, Artesian Slough, Coyote Creek, Stevens Creek, Permanente Creek, and San Francisquito Creek as shown on Figure 3.3.1, and summarized in Table 3.3.3. Stormwater also reaches the Bay from the Palo Alto flood basin via culverts equipped with flap gates.

Because most of the stormwater from areas in the lower reaches (north of Hwy 101) eventually passes through a lift station into a flood control channel, the operation of the lift station is critical. The lift stations are typically constructed and operated under an encroachment permit (under a Countywide NPDES permit) from the SCVWD which has jurisdiction over the channels. While current permits put no restrictions on lift station operations, it is anticipated that future permits may require the lift station to alter its operations when the water level in the receiving channel rises to an elevation where there is inadequate levee freeboard.

Until recently, the various dischargers did not need any permits other than the encroachment permits from SCVWD. However, the SFRWQCB has promulgated laws to prevent and control storm water induced pollution, which has resulted in the formation of the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP). The SCVURPPP was issued its first stormwater permit in 1990. The SFRWQCB issues permits to this countywide collaborative, which requires all co-permittees to implement best management practices. In addition to best management practices (BMPs), the permit requires outreach activities, monitoring, interagency collaboration, and other activities beyond standard BMPs.

3.3.2 Wastewater

The Alviso Complex area contains three wastewater treatment plants, all of which discharge into shallow water channels (see Figure 3.3.1). These high-capacity plants together discharge about 150 million gallon per day (MGD) of treated effluent, which is an equivalent of 232 CFS average over a day.

San Jose / Santa Clara Water Pollution Control Plant (WPCP)

The San Jose / Santa Clara WPCP provides tertiary treatment for the Cities of San Jose, Santa Clara, Milpitas, County Sanitation District 2-3, the West Valley Sanitation District (Campbell, Los Gatos, Monte Sereno and Saratoga), and the Cupertino, Burbank, and Sunol Sanitary Districts. It treats and discharges about 100 MGD (about 155 CFS) into Artesian Slough, which then flows to Coyote Creek and into the Bay. The Plant has a higher rated capacity of up to 167 MGD.

The WPCP typically discharges a constant flow of treated freshwater effluent, and as such can be considered similar to a perennial creek. Artesian Slough remains freshwater to brackish for most of the year. The discharge is regulated by their NPDES permit issued in 1998, as modified in 2000.

Sunnyvale Water Pollution Control Plant (WPCP)

The Sunnyvale WPCP provides tertiary treatment for the City of Sunnyvale, Rancho Rinconada and Moffett Field. The plant discharges up to 16 MGD (about 25 CFS) of treated wastewater into Moffett Channel. The WPCP also owns two former salt ponds northwest of Moffett Channel that are used as oxidation ponds during secondary treatment processes.

The dimensions of Moffett Channel have not been determined, but the bottom elevation is believed to be higher than low tide elevation. The discharge is regulated by their NPDES permit issued in 1998 and as modified in 2000.

Palo Alto Regional Water Quality Control Plant (RWQCP)

The Palo Alto RWQCP provides tertiary treatment for the East Palo Alto Sanitary District and the Cities of Palo Alto, Mountain View, Los Altos, Los Altos Hills, and Stanford University. The RWQCP discharges up to 25 MGD (about 38 CFS) of treated wastewater into a slough north of the Palo Alto Airport. Additionally, the RWQCP discharges 1 to 2 MGD along with saltwater from the Bay, into the Emily Renzel Marsh, just north of Matadero Creek at Hwy 101. The water from the Marsh is pumped into Matedero Creek just downstream of Highway 101.

The unnamed slough receiving the treated effluent does not appear to have a deep-water connection to the Bay, and thus would likely be dry at low tide if not for the constant flow from the RWQCP. The discharge is regulated by their NPDES permit issued in 1998 and as modified in 2000.

3.3.3 Pond Water Control Structures

Similar to the Baumberg Complex, the salt ponds have numerous intake, outfall, and transfer structures (gates, pumps) throughout the complex. Although many are for inter-pond transfer of brine, some are directly connected to the Bay or to tidal waters. The ISP envisions retaining some of these structures, and adding a significant number of new control structures to reduce salinity in the ponds. Existing and proposed control structures as presented in the ISP are shown on Figure 3.3.2, and summarized in Table 3.3.4.

The local Flood Control District is also evaluating the potential for using some of the acquired ponds (A8 in particular) as detention basins to reduce the risk of flooding, and to minimize the need for dredging the lower part of the flood control channels for flood conveyance capacity. Depending on the restoration alternative, some of these structures will act as drainage outfalls to adjacent restored ponds and should be considered in the alternatives analysis.

An NPDES permit has not yet been issued for these structures and discharges, but has been applied for.

Table 3.3.1

ALVISO COMPLEX - SANTA CLARA COUNTY
(Existing Stormwater Dischargers)

DISCHARGER	DISCHARGE FROM	DISCHARGE TO	TYPE OF DISCHARGE	JURISDICTION
Santa Clara Valley Water District (SCVWD)	Alviso Slough	Coyote Creek	Open-channel	SCVURPPP
	Artesian Slough	Coyote Creek	Open-channel	SCVURPPP
	Guadalupe Slough	South San Francisco Bay	Open-channel	SCVURPPP
	Coyote Creek	South San Francisco Bay	Open-channel	SCVURPPP
	Stevens Creek	South San Francisco Bay	Open-channel	SCVURPPP
	Mountain View Slough	South San Francisco Bay	Open-channel	SCVURPPP
City of Fremont	City Storm Drain System	Mud Slough		ACCWP
City of Los Altos	City Storm Drain System	Permanente Creek	Pipe	Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP)
City of Milpitas	City Storm Drain System	Coyote Creek	Pipe	SCVURPPP
City of Mountain View	City Storm Drain System	Mountain View Slough	Pipe, Lift Station	SCVURPPP
	City Storm Drain System	Palo Alto Floodbasin	Flap Gate, Lift Station	SCVURPPP
City of Palo Alto	City Storm Drain System	Palo Alto Floodbasin	Open-channel into Floodbasin	SCVURPPP
	City Storm Drain System	San Francisquito Creek	Open-channel	SCVURPPP
City of San Jose	City Storm Drain System	Alviso Slough	Lift Station	SCVURPPP
	City Storm Drain System	Guadalupe Slough	Pipe	SCVURPPP
	City Storm Drain System	Coyote Creek	Pipe	SCVURPPP
City of Santa Clara	City Storm Drain System	Calabazas Creek, Saratoga Creek, San Tomas Aquino Creek, Guadalupe River, Eastside Basin, Westside Basin	Pipe, Open-channel, Lift Station	SCVURPPP
City of Sunnyvale	City Storm Drain System	Stevens Creek	Pipe	SCVURPPP
	City Storm Drain System	Mountain View Slough	Pipe	SCVURPPP

Table 3.3.2

ALVISO COMPLEX - SANTA CLARA COUNTY
(Existing Wastewater & Industrial Dischargers)

FACILITY	DISCHARGE LOCATION	CONTRIBUTORS	PIPE SIZE / FLOW	MONITORING DATA
San Jose/Santa Clara Water Pollution Control Plant	1/4 mi north of Los Esteros Rd Discharge into Artesian Slough Lat 37 26 06 Long 121 57 08	San Jose, Santa Clara, Milpitas, Campbell, Cupertino, Los Gatos, Burbank, Sunol, County Sanitation Districts 2& 3, Saratoga, Monte Sereno (300-square mile area)	- 2 outfall pipes: Elliptical (121"x77"), Round (84") Current Avg Discharge: 108 MGD (week of 25th) Max Flow (capacity) = 167 MGD	Per NPDES Order No. 98-052, 99-050, 00-108, 00-109 Monthly Report (data collected daily). Flow Rate, CBOD, Settable Solids, Total Suspended Solids, Oil and Grease, Total Coliform, Chlorine Residual and Dosage, Toxicity, Dissolved Oxygen, Dissolved Sulfides, pH, Ammonia Nitrogen, Nitrate Nitrogen, Total Organic Nitrogen, Total Phosphate, Turbidity, Metals, Tributyltin, Phenol, PAH's, etc
Palo Alto Regional Water Quality Control Plant	1. Unnamed slough near the Palo Alto airport. First parallel to airport, and then makes a 45 degree turn about 1500 feet from the point of discharge. Lat 37 27 11, Long 122 06 36 2. Matedero Creek via Emily Renzel Marsh	East Palo Alto, Los Altos, Los Altos Hills, Mountain View, Palo Alto, Stanford University (These cities have their own sanitary districts, collect their own sewers)	- 54-in pipe - max 80 MGD - 25 MGD in summer	Per NPDES Order No. 98-054, 99-050, 00-109 Month Discharge Repts Flow Rate, CBOD, Settable Solids, Total Suspended Solids, Oil and Grease, Total Coliform, Chlorine Residual and Dosage, Toxicity, Dissolved Oxygen, Dissolved Sulfides, pH, Ammonia Nitrogen, Nitrate Nitrogen, Total Organic Nitrogen, Total Phosphate, Turbidity, Metals, Tributyltin, Phenol, PAH's, etc
Sunnyvale Water Pollution Control Plant	Lat 37 26 00, Long 122 02 00 North of Plant, into Sunnyvale west storm channel. Discharges into Moffett Slough, then to the Guadalupe Slough, then to the south bay	Provides advanced secondary treatment of wastewater from domestic, commercial and industrial sources within the City of Sunnyvale, Rancho Rinconada and Moffett Field The plant is under the Environmental Division of Sunnyvale Public Works. The collection system is under Field Services Division.	48" Design flow = 29.5 MGD, Annual Avg last yr=15.5 MGD, this yr's avg=15.2 MGD	Per NPDES Order No. 98-053, 99-050, 00-109 Monthly self monitoring NPDES report filed to the State Regional Water Quality Control Board and EPA. Flow Rate, CBOD, Settable Solids, Total Suspended Solids, Oil and Grease, Total Coliform, Chlorine Residual and Dosage, Toxicity, Dissolved Oxygen, Dissolved Sulfides, pH, Ammonia Nitrogen, Nitrate Nitrogen, Total Organic Nitrogen, Total Phosphate, Turbidity, Metals, Tributyltin, Phenol, PAH's, etc

Table 3.3.3

ALVISO COMPLEX - SANTA CLARA COUNTY
(Existing Stormwater & Wastewater Facilities)

I.D.	STRUCTURE	STATUS	WATERWAY	DESCRIPTION
SVLS2	Lift Station	Existing	Guadalupe River	800' north of Hwy. 238
SVLS1	Lift Station	Existing	Sunnyvale West Channel	East of sewage treatment plant, along
SVOF1	Outfall	Existing	Calabazas Creek	36" R.C.P at end of Havenwood Ave. (enters at west side of channel)
SVOF2	Outfall	Existing	Calabazas Creek	4" C.M.P. 500' north of Havenwood Ave. (enters at west side of channel)
SVOF3	Outfall	Existing	Calabazas Creek	42" R.C.P. behind 1229 Manzano Ave. (enters at west side of channel)
SVOF4	Outfall	Existing	Calabazas Creek	Unknown size behind 1209 Manzano Ave. (enters at west side of channel)
SVOF5	Outfall	Existing	Calabazas Creek	12" R.C.P. behind 1198 Manzano Ave. (enters at west side of channel)
SVOF6	Outfall	Existing	Calabazas Creek	48" at end of Palamos Ave. (enters at west side of channel)
SVOF7	Outfall	Existing	Sunnyvale East Channel	48" R.C.P at Carribean Dr. (enters at east side of channel)
SVOF8	Outfall	Existing	Sunnyvale East Channel	36" C.M.P. at the extension of Baltic Way (enters at west side of channel)
SVOF9	Outfall	Existing	Sunnyvale East Channel	36" C.M.P. behind 1320 Orleans Dr. (enters at west side of channel)
SVOF10	Outfall	Existing	Sunnyvale East Channel	18" R.C.P. behind 383 Greenlake Dr. (enters east side of channel)
SVOF11	Outfall	Existing	Sunnyvale East Channel	48" from behind Fair Oaks (enters west side of channel)
SVOF12	Outfall	Existing	Sunnyvale East Channel	15" R.C.P. at the Hetch Hetchy easement intersection (enters west side of channel)
SVOF13	Outfall	Existing	Sunnyvale East Channel	36" R.C.P. at the Hetch Hetchy easement intersection (enters east side of channel)
SVOF14	Outfall	Existing	Sunnyvale West Channel	21" R.C.P. at Ross Dr. (enters east side of channel)
SVOF15	Outfall	Existing	Sunnyvale West Channel	18" at Ross Dr. (enters west side of channel)
SVOF16	Outfall	Existing	Sunnyvale West Channel	12" R.C.P. at 1120 Lockheed Martin Way (Fire Stn.) at Mathilda (enters west side of channel)
SVOF17	Outfall	Existing	Sunnyvale West Channel	18" across from Fire Station (enters east side of channel)
SVOF18	Outfall	Existing	Sunnyvale West Channel	30" approx.. 2700' south of Caribean (enters west side of channel)
SVOF19	Outfall	Existing	Sunnyvale West Channel	30" approx.. 2100' south of Caribean (enters west side of channel)
SVOF20	Outfall	Existing	Sunnyvale West Channel	30" approx.. 600' south of Caribean (enters west side of channel)
SVOF21	Outfall	Existing	Sunnyvale West Channel	36" at Caribean (enters west side of channel)
SWPCP	Discharge Point	Existing	Moffett Channel	Sunnyvale Water Pollution Control Plant Discharge Point

Table 3.3.3 (continued)

ALVISO COMPLEX - SANTA CLARA COUNTY
(Existing Stormwater & Wastewater Facilities)

I.D.	STRUCTURE	STATUS	WATERWAY	DESCRIPTION
SJLS1	Lift Station	Existing	Alviso Slough	At Gold St. and Elizabeth St.
SJLS2	Lift Station	Existing	Guadalupe River	End of Liberty St. (at east side of river), Liberty Station
SJLS3	Lift Station	Existing	Guadalupe River	84" dowstream of River Oaks Pl., River Oaks Station
SJLS4	Lift Station	Existing	Guadalupe River	96" flapgate at Montague Expressway (at east side of river), Monteague Station
SJOF1	Outfall	Existing	Alviso Slough	24" at Alviso Marina
SJOF2	Outfall	Existing	Alviso Slough	36" near Gold St. and Elizabeth St.
SJOF5	Outfall	Existing	Guadalupe River	Approx. 500' downstream of Hwy. 237
SJOF6	Outfall	Existing	Guadalupe River	Approx. 500' downstream of Hwy. 237
SJOF7	Outfall	Existing	Guadalupe River	Approx. 225' downstream of Hwy. 237
SJOF8	Outfall	Existing	Guadalupe River	Approx. 225' downstream of Hwy. 237
SJOF11	Outfall	Existing	Coyote Creek	Flapgate, 54" at Trimble Rd (enters east side of creek)
SJOF12	Outfall	Existing	Coyote Creek	Flapgate, 36" at Trimble Rd (enters east side of creek)
SJOF13	Outfall	Existing	Guadalupe River	Flapgate, 36" at Trimble Rd. (enters east side of river)
SJOF14	Outfall	Existing	Guadalupe River	Riprap, 21" at Trimble Rd. (enters west side of
SJOF15	Outfall	Existing	Guadalupe River	54" approx. 750' upstream of Trimble Blvd. (enters west side of river)
SJOF16	Outfall	Existing	Guadalupe River	72" FM approx. 1050' upstream of Trimble Blvd. (enters west side of river)
SJOF17	Outfall	Existing	Guadalupe River	78" FM approx. 1050' upstream of Trimble Blvd. (enters west side of river)
SJOF18	Outfall	Existing	Guadalupe River	Flapgate, 12" at extension of Component Dr. (enters east side of river)
SJOF19	Outfall	Existing	Coyote Creek	30" at extension of Paragon Dr. (enters east side of river)
SJOF20	Outfall	Existing	Coyote Creek	24" at Charcot Ave. (enters east side of river)
SJOF21	Outfall	Existing	Coyote Creek	72" at just upstream of Charcot Ave. (enters west side of river)
SJOF22	Outfall	Existing	Coyote Creek	24" just downstream of Hwy. 880 (enters west side of river)
FOF7	Outfall	Existing	Arroyo Agua to Mud Slough	36" C.M.P. at Laguna Creek (Line E)
FOF8	Outfall	Existing	Coyote River	24" C.M.P. at Line B
FOF9	Outfall	Existing	Coyote River	36" C.M.P. at Line B
PAOF12	Outfall	Existing	San Francisquito Creek	under Highway 101 Bridge (probably 36")
PAOF13	Outfall	Existing	San Francisquito Creek	96" just east of Hwy. 101 (enters east side of creek)
PAOF14	Outfall	Existing	Palo Alto Yacht Harbor	12" storm drain ino Yacht Harbor
PALS1	Lift Station	Existing	San Francisquito Creek	Just upstream of Highway 101
PA RWQCP	Discharge Point	Existing	Unnamed Slough	Palo Alto Regional Water Quality Control Plant Discharge Point

Table 3.3.3 (continued)

ALVISO COMPLEX - SANTA CLARA COUNTY
(Existing Stormwater & Wastewater Facilities)

I.D.	STRUCTURE	STATUS	WATERWAY	DESCRIPTION
MVLS1	Lift Station	Existing	Permanente Creek	Just north of Amphitheater Parkway
MVOF1	Outfall	Existing	Permanente Creek	Approx. 300' north of Amphitheater Parkway
MVOF2	Outfall	Existing	Permanente Creek	Flapgate, 54" R.C.P. north side of Hwy. 101 (enters east side of creek)
MVOF3	Outfall	Existing	Stevens Creek	36" R.C.P. at east end of L'Avenida
MVOF4	Outfall	Existing	Stevens Creek	33" R.C.P. at south side of Hwy. 101 crossing (enters west side of creek)
MVOF5	Outfall	Existing	Stevens Creek	81" R.C.P. appox. 150' south of Hwy. 101 crossing (enters east side of creek)
MVOF6	Outfall	Existing	Stevens Creek	30" R.C.P. approx. 150' south of Hwy. 101 crossing (enters west side of creek)
MVOF7	Outfall	Existing	Stevens Creek	18" R.C.P. from west end of Walker Dr., south side of Moffett Blvd. (enters east side of creek)
MVOF8	Outfall	Existing	Stevens Creek	66" R.C.P. at corner of East Middlefield Rd. an Stevens Creek Fwy. (enters east side of creek)
MOF1	Outfall	Existing	Penitencia Creek	24" Approx. 210' upstream of Hwy. 880 (enters north side of creek)
MOF2	Outfall	Existing	Penitencia Creek	Approx 280' upstream from Hwy. 880 (enters south side of creek)
MOF3	Outfall	Existing	Penitencia Creek	72" C.M.P. at Jurgens Dr. (enters east side of creek)
MLS1	Lift Station	Existing	Penitencia Creek	Approx 700' east of Creek, North of Milano Terrece , Feeds MOF3 through 72" RCP
MLS2	Lift Station	Existing	Penitencia Creek	2x18" PVC pipes outfall, at Penitencia Creek and Berryessa Creek junction
MLS3	Lift Station	Existing	Coyote Creek	84" R.C.P. outfall, at extension of Bellew Dr. (enters east side of creek)
MLS4	Lift Station	Existing	Coyote Creek	78" R.C.P. outfall, Approx. 700' west of Bellew Dr.
MLS5	Lift Station	Existing	Coyote Creek	54" R.C.P. outfall, Approx. 1,600' upstream from MLS4
MLS6	Lift Station	Existing	Coyote Creek	84" C.M.P. outfall, approx. 350' east of Sycamore Dr. (enters east side of creek)
MDM1	Dam	Existing	Coyote Creek	Approx. 30' west of Milpitas Sanitary District Treatment Plant (enters west side)
-	Discharge Point	Existing	Artesian Slough	San Jose/Santa Clara Water Pollution Control Plant Discharge Point

Table 3.3.4

ALVISO COMPLEX - SANTA CLARA COUNTY
(Salt Pond Control Structures)

I.D.	STRUCTURE	TYPE	STATUS	WATERWAY	DESCRIPTION
A1	Inlet Gate	Gravity	Existing	Charleston Slough to Pond A1	60" gate
A2	Siphon	Gravity	Existing	Pond A1 to Pond A2W	72" siphon
A3	Siphon	Gravity	Existing	Pond A2W to Pond A2E	siphon to Pond A2E (A3W System)
A4	Outlet Gate	Gravity	New	Pond A2W to Bay	48" gate
A5	Inlet Gate	Gravity	New	Bay to Pond B1	48" gate
A6	Inlet Gate	Gravity	Existing	Bay to Pond B1	36" gate
A7	Gap	Gravity	Existing	Pond B1 to pond B2	60' gap
A8	Gate	Gravity	New	Pond B1 to pond A2E	48" gate
A9	Siphon	Gravity		Pond A2W to pond A2E	Siphon from Pond A2W
A10	Pipes	Gravity	Existing	Pond A2E to pond A3W	2x36" pipes in series
A11	Gate	Gravity	New	Pond B2 to Pond A3W	36" gate
A12	Gate	Batch	Existing	Pond B2 to Pond A3N	24" gate
A13	Gate	Batch	Existing	Pond A3N to Pond A3W	24" gate
A14	Outlet Gates	Gravity	New	Pond A3W to Guadalupe	3x48" gates
A15	Inlet Gate	Gravity	New	Guadalupe Slough to Pond A5	2x48" gates
A16	Cut	Gravity	New	Pond A5 to Pond A7	12' cut
A17	Gap	Gravity	Existing	Pond A4 to Pond A7	Fill existing gap
A18	Gate	Gravity	Existing	Pond A7 to Pond A8	24" gate
A19	Siphon	Gravity	Existing	Pond A4 to Pond A5	siphon from Pond A4
A20	Pump	Pump	New	Pond A8 to Pond A11	4,000 gpm pump, new piping from existing pump
A21	Outlet Gates	Gravity	New by others	Pond A7 to Alivso Slough	2x48" gates
A22	Weir	Gravity	New by others	Guadalupe Slough to Pond A8 (exact position unknown)	overflow weir
A23	Inlet Gates	Gravity	Existing	Alviso Slough to Pond A9	2x48" gates
A24	Gate	Gravity	Remove/Replace	Pond A9 to Pond A10	48" gate
A25	Gate	Gravity	Existing	Pond A10 to Pond A 11	48" gate
A26	Gate	Batch	Existing	Pond A11 to Pond A12	48" gate
A27	Gate	Batch	Remove/Replace	Pond A12 to Pond A13	48" gate
A28	Siphon	Batch	Existing	Pond A15 to Pond A16	30" siphon to Pond A16
A29	Gate	Gravity	New	Pond A11 to pond A14	48" gate
A30	Gate	Batch	Existing	Pond A14 to Pond A13	36" gate
A31	Pump	Pump	Existing	Pond A13 to Pond A15	22k gpm pump to Pond A15
A32	Gate	Alt. Intake	New	Coyote Creek to Pond A15	48" gate
A33	Gate	Batch	Repair by others	Pond A15 to Pond A14	36" gate
A34	Gate	Gravity	New by others	Pond A9 to Pond A14	36" gate
A35	Outlet Gates	Gravity	New	Pond A14 to Coyote Creek	2x48" gates
A36	Inlet Gate	Gravity	New	Coyote Creek to Pond A17	48" gate
A37	Siphon	Gravity	Existing	Pond A17 to Pond A18	30" siphon w/ gate to Pond A18
A38	Cut	Gravity	Existing	Pond A17 to Pond A16	50' cut
A39	Siphon w/ gate	Gravity	Existing	Pond A15 to Pond A16	30" siphon w/ gate from Pond A15
A40	Outlet Gate	Gravity	New	Pond A16 to Artesian Slough	48" gate
A41	Siphon	Gravity	Existing	Pond A18 to Pond A19	Siphon from A18
A42	Siphon Pump	Gravity	Existing	Pond A18 to Pond A19	Coyote siphon pump
A43	Siphon	Gravity	Existing	Pond A19 to Pond A20	siphon
A44	Siphon	Gravity	Existing	Pond A20 to Pond A21	siphon
A45	Gate	Gravity	Existing	Pond A21 to Mud Slough Pump	24" gate
A46	Pump	Pump	Existing	Pond A21 to Plant 2	Mud Slough pump to Plant 2
A47	Gate	Gravity	New	Mud Slough to Pond A22	48" gate
A48	Gate	Gravity	New	Mud slough to Pond A23	48" gate
A49	Gate	Gravity	Existing	Pond A22 to Pond A23	24" gate at pump station
A50	Gate	Gravity	Existing	Pond A23 to Pond A22	24" gate at pump station
A51	Pump	Gravity	Existing	Pond A24 to Plan 2 CP4/CP5	4,000 gpm Crabby Joe Pump

3.4 WEST BAY COMPLEX

3.4.1 Stormwater

An inventory of dischargers is presented in Tables 3.4.1 and 3.4.2. San Francisquito Creek is the main waterway In the vicinity of the ponds. It receives water from numerous gravity-flow pipes and seven lift stations before discharging into the Bay. Ravenswood Slough and Westpoint Slough receive smaller stormwater flows from local drainage. The discharge facilities are shown on Figure 3.4.1, and summarized in Table 3.4.3. Lift stations are the primary means of discharging stormwater from low lying areas into the flood control channels, and should be relatively unaffected by slight variations in tidal stage. There is a possibility of local backwater effects near the discharge point (mouth of San Francisquito Creek), with potential to raise the water surface to an elevation such that the adjacent levees do not have adequate freeboard.

An exception to the above is runoff from the State right of way by Caltrans (for example Hwy 84), which discharges into adjacent ponds (Ponds 2, 3, and SF2) and is not under County jurisdiction. Discharge from these areas typically goes into a ditch and eventually into the ponds via outfalls. Some of these outfalls may be affected by full tidal restoration of the pond where the outfall exists.

3.4.2 Wastewater

The 2 wastewater treatment plants in the vicinity of the West Bay Complex are the San Mateo WWTP and the South Bayside System Authority. Both plants discharge via submerged diffuser pipes in deep water, and are at a sufficient distance from the restoration area that their operations may not be affected at all. Additional information is provided in the following.

<u>San Mateo Waste Water Treatment Plant (WWTP)</u>

Serves the cities of San Mateo, Foster City, Hillsborough, portions of Belmont, and unincorporated area in San Mateo County. It discharges a daily average of 13.8 MGD (about 22 CFS) into the Bay, via a submerged diffuser pipe 45 feet below MLLW. The discharge point is located about 3700 feet offshore, and 500 feet north of the San Mateo Bridge. The discharge is regulated by their NPDES permit issued in 2001.

<u>South Bayside System Authority (SBSA)</u>

Serves the West Bay Sanitary District and the cities of Belmont, Redwood City, San Carlos and portions of unincorporated area in San Mateo County. Discharges a daily average of 20.7 MGD (about 32 CFS) into the Bay, via a submerged diffuser pipe 50 feet below MLLW. The discharge point is located about 3.5 miles south of the San Mateo Bridge, and 6300 feet offshore. The discharge is regulated by their NPDES permit issued in 2001.

3.4.3 Cargill Initial Stewardship Project (ISP)

The salt ponds have numerous intake, outfall, and transfer structures (gates, pumps) throughout the complex. Although many are for inter-pond transfer of brine, some are directly connected to the Bay or to tidal waters. The ISP envisions retaining some of these structures, and adding a significant number of new control structures to reduce salinity in the ponds. Existing and proposed control structures as presented in the ISP are shown on Figure 3.4.2, and summarized in Table 3.4.4.

Table 3.4.1

WEST BAY COMPLEX - SAN MATEO COUNTY
(Existing Stormwater Dischargers)

DISCHARGER	DISCHARGE FROM	DISCHARGE TO	TYPE OF DISCHARGE	JURISDICTION
San Mateo County	San Francisquito Creek	South San Francisco Bay	Open-channel	STOPPP
City of East Palo Alto	City Storm Drain System	various	Pipe, Open-channel flow, lift station	San Mateo County Stormwater Pollution Prevention Program (STOPPP)

Table 3.4.2

WEST BAY COMPLEX - SAN MATEO COUNTY
(Existing Wastewater & Industrial Dischargers)

FACILITY	DISCHARGE LOCATION	CONTRIBUTORS	PIPE SIZE / FLOW	MONITORING DATA
South Bayside System Authority	Approximately 3.5 miles southerly from the San Mateo Bridge through a submerged diffuser about 6300 feet offshore at a depth of 50 feet below Mean Lower Low Water. The discharge point is approximately 2.5 miles form the Foster City shellfish beds. Lat 37 33 48 Long 122 12 55	Belmont, San Carlos, Redwood City, Unincorporated areas, Menlo Park, Atherton, Portola Valley All the cities involved are in the Joint Powers Authority, where each city owns a certain percentage of the plant. Each city is responsible for their own sewer collection. Jurisdiction does not change until the sewage water reaches the plant	Current Avg Flow: 17 MGD Annual Avg: 20 MGD Avg Max Cap: 24 MGD 66-inch pipe	Per NPDES Order No. 01-012 Monthly report of treatment proceses. Lab results ('i.e. BOD), industrial data biannual to state and annual report Flow Rate, pH, Temperature, Dissolved Oxygen, CBOD, Tss, Oil & Grease, TSS, Settleable Matter, Fecal Coliform, Sulfides, Unionized Ammonia, Chlorine Residual, Copper, Mercury, Metals, Cyanide, Dioxin, Tributylin, etc
San Mateo Waste Water Treatment Plant	Lat 37'34'50", Long 122'14'45 3700 feet offshore, 500 ft North of San Mateo Bridge Through a submerged diffuser, 41 feet below Mean Lower Low Water	San Mateo, Foster City, Half of Hillsborough, Parts of Belmont, Unincorporated areas of San Mateo County (Cities have their own collection system that ultimately tie into the treatment plant.)	48" diameter	Per NPDES Order No. 01-071 Standard permit required data: Flow Rate, pH, Temperature, Dissolved Oxygen, BOD, TSS, Settleable Matter, Turbidity, Fecal Coliform, Chlorine Residual, Toxicity, Cyanide, Mercury, Metals, Tributyltin, Dioxin, Dieldrin, etc

Table 3.4.3
WEST BAY COMPLEX - SAN MATEO COUNTY
(Existing Stormwater & Wastewater Facilities)

I.D.	STRUCTURE	TYPE	STATUS	WATERWAY	DESCRIPTION
RCLS1	Lift Station		Existing	Bayfront Canal to Flood Slough (via L.S. RCLS2)	24" outfall with flapgate (see photo)
RCLS2	Lift Station		Existing	Bayfront Canal to Flood Slough	Pumps through 42" force main at Douglas Ct. (enters west end of canal)
RCLS3	Lift Station		Existing	Bayfront Canal to Flood Slough	Pumps through 42" at end of Fifth Ave. (enters south side of canal)
RCOF1	Outfall		Existing	Bayfront Canal to Flood Slough	24" outfall from East Bayshore Rd.
RCOF2	Outfall		Existing	Atherton Channel to Flood Slough	Free outfall at Hoover St. (enters west side of channel)
RCOF3	Outfall		Existing	Atherton Channel to Flood Slough	Free outfall at Page St. (enters west side of channel)
RCG1	Tide Gate		Existing	Bayfront Canal at Atherton Canal	See photo of Bayfront Tide Gate
MPP1	Pump		Existing	Bayfront Canal	Corner of Bayfront Expressway and Chrysler Dr. (enters at south side of canal)
MPLS1	Lift Station		Existing	Ravenswood Slough	Bayfront Expressway to Dumbarton Bridge, just before University Ave.

Table 3.4.4
WEST BAY COMPLEX - SAN MATEO COUNTY
(Salt Pond Control Structures)

I.D.	STRUCTURE	TYPE	STATUS	WATERWAY	DESCRIPTION
W1	Gates	Gravity	Existing	Ravenswood Slough to Pond WB1	2x60" gates
W2	Gates	Gravity	New	Ravenswood Slough to Pond WB1	48" gate
W3	Gates	Gravity	New	Ravenswood Slough to Pond WB3	2x48" gates
W4	Pump	Pump	Existing	Pond WB1 to Pond WB3 or WB4	Ravenswood pump from Pond WB1
W5	Gates	Gravity	New	Ravenswood Slough to Pond WB2	2x48" gates
W6	Gates	Gravity	Existing	Pond WB2 to Pond WB1	2x42" wood gates
W7	Gates	Gravity	New	Bay to Pond SF2	3x48" gates
W8	Siphon	Gravity	Existing	Pond WB2 to Pond SF2	36" siphon
W9	Siphon	Gravity	Existing	Pond WB3 to Pond WB2	30" siphon
W10	Gates	Gravity	Existing	Pond WB3 to Pond S5	36" wood gate
W11	Gap	Gravity	Existing	Pond WB5 to Pone WB4	existing gap
W12	Gates	Gravity	New	Flood Slough to Pond S5	48" gate
W13	Gates	Gravity	Existing	Pond S5 to Pond WB5	2x36" wood gates
W14	Gates	Gravity	New	Bay to Pond WB4	3x48" gates

4. OPPORTUNITIES AND CONSTRAINTS

The inventory of water conveyance facilities presented in the earlier sections indicates that the primary facilities discharging to waters subject to tides (assumed to be up to the 100-year USACE estimated tidal flood plain limit) are County regulated creeks, City operated storm drains and lift stations, and wastewater treatment plants. It is important to separate out the creeks from the storm drains and sewer outfalls and analyze them individually, because they operate under different jurisdictions and have distinct operational and cost considerations.

Most of the stormwater runoff from areas within the lower reaches of the watersheds is pumped into the creeks via lift stations, and very few gravity drains discharge into them. The primary reason for this is land subsidence in the lower South Bay, which makes gravity discharge infeasible. Theoretically, this implies that minor changes in tidal water levels in the creeks should not affect storm drain operation because the water is pumped and operations are not restricted by water levels in any case. In reality, most of the creeks offer just enough conveyance capacity to convey the design flood flows (100-year in most cases). Some creeks which do not offer this protection are being modified to contain the design flood flows and the projects are in various stages of development (for example Coyote Hills Slough, Lower Guadalupe River, Permanente Creek, San Francisquito Creek, etc.). Therefore changes in tidal water levels in these creeks, even minor, will change the conveyance capacity due to changes in backwater elevation (effect of downstream tide on upstream water level) and affect the level of flood protection to adjacent communities. The SCVWD already regulates the amount of stormwater that is pumped into the creeks during high flows. This implies that the area affected by these restrictions in the lower reach have to accommodate excess stormwater under high flow conditions, or tolerate temporary flooding of certain areas.

It is important to quantify the impacts of the restoration project on tidal hydrology and water quality in the lower reaches of the creeks. Both, short- and long-term changes need to be considered because the creeks will most likely have a delayed morphologic response to significant changes in tidal prism such as those expected from the restoration project. At this stage in the planning process where alternatives have not been identified or evaluated, quantitative analyses are premature. However, an opportunities and constraints analysis is possible based on knowledge of geomorphic processes, and data from other projects. Identification of potential benefits and constraints to the restoration project, and interactions with existing conveyance facilities, is important at this stage because the interactions may have cost implications for the project. A qualitative discussion of the potential for hydrolographic changes in the project area (defined as the pond complexes and adjoining sloughs) as well as the study area (South Bay in general) is presented in the following sections.

4.1 HYDRODYNAMICS

Stormwater conveyance and operations of wastewater facilities which are in the tidal reach of the South Bay could be affected by changes in tidal hydrodynamics. Changes in the hydraulic parameters of significance, which are water levels, velocity, and circulation will result in changes in conveyance capacity and level of existing flood protection because the interior levees in the restored ponds will need to function as Bayfront, flood protection levees. A change in water level has implication on flood protection, and is discussed in this section. Changes in velocity have implications on channel morphology and existing habitat, as well as integrity of existing interior levees (because of wave and current induced erosion processes), and is discussed in the next section.

Changes in tidal water levels in any of the creeks will be highly dependent on changes in tidal prism in the creek itself. A substantial increase in tidal prism in a fully tidal channel will usually result in a short-term (on the order of months) lowering of high water level, a change in the time of high water level, and increase in channel velocity. The lowering of high water, or “tidal muting”, is explained by the fact that the tidal period (time between successive high or low tides) does not change, and the increase in inundated area and water volume due to pond breaching is compensated by a reduction in tidal range over the entire inundated area.

The data reviewed indicates that tidal flooding by itself is not a significant issue (assuming that the physical condition of the levee itself is sound). However, flooding concerns arise at times of high stormwater flows combined with extreme high tides. If the elevation of high tide near the mouths of the sloughs/creeks do not change, then there will be no apparent change in the level of flood protection that the levees presently offer. However, if there are changes in the level of high tide upstream of the mouth, then the level of flood protection will change. An important note again in this discussion relates to the integrity of slough and interior levees. Changes in water levels will usually be accompanied by a change in velocity too. This has implications on levee integrity (scour / erosion processes), which may require armoring to maintain flood protection.

It is quite likely that breaches through the existing Bayfront pond levees may not result in any increase in high tide elevation upstream of the creek mouth. On the contrary, there may be benefits to flood conveyance since the restored ponds would allow routing of storm flows over existing slough levees (by constructing sills or overflow weirs). However, not all ponds have Bayfront levees, and restoration of some of the interior ponds may involve breaching through the slough levees. Breaches through the existing slough levees may result in changes in levels and time of high water, depending on the size of the existing slough. Sloughs with large cross sectional areas may not result in differences in high tide elevation between the mouth of the sloughs and upstream near the breach. However, some of the smaller sloughs where the high tide is muted due to shallow depths may see an increase in high tide elevation, resulting in flooding concerns farther upstream (due to higher backwater).

4.2 CHANNEL MORPHOLOGY

An increase in slough channel velocity, due to a larger tidal prism resulting from breaching of low elevation ponds, will typically be accompanied by channel erosion (bed lowering and bank erosion) until a new equilibrium channel geometry is achieved. This occurs relatively quickly (few years), and may result in erosion of tidal flats and fringe marshes along levees, channel headcutting which migrates upstream, as well as levee erosion. The increase in channel geometry, if substantial, may be accompanied by an increase in tide range. Over the long-term (several decades), sedimentation in the ponds will bring the system back into equilibrium, with water levels approaching present day water levels.

The mudflats fronting the pond levees have accreted over the past 100+ years since diking of the salt ponds. Changes to these mudflats, resulting from restoration of the ponds, will also need to be evaluated during the feasibility phase. Mudflats in the immediate vicinity of the breach, and along the evolving channel, will scour by re-suspending deposited sediment. Depending on sediment composition, metals and other contaminants bound to the sediment may also be an issue.

4.3 Location of Breach

From the above discussion it is apparent that the size of restoration, and location of breaches are going to be critical parameters in evaluating the implementation potential of specific phases of the restoration project. The location of the breaches have an effect on near-field processes (within pond and adjacent creek), and should be evaluated as such. A brief discussion on the relative pros and cons of breach location is presented in the following.

However, what is unique about this project is the large size of the restoration, which makes the evaluation of far-field processes (Far South Bay and perhaps even beyond Dumbarton) and cumulative impacts as important as near-field processes. Prior studies (ADEC 2000) have indicated that the net result of restoring most of the Alviso ponds over a short period of time (5 to 10 years) is a lowering of high tide by a few inches in the Far South Bay, and a small increase in residence time which affects water quality. With a good restoration design, it is conceivable that these impacts could be viewed as beneficial, or mitigated for.

Breaches Through Slough Levees

A larger change in tidal prism of the creeks is possible if the breach is through the slough levees (levee separating pond from creek), the pond is low relative to MSL, and the objective is full tidal marsh restoration. The resultant impacts to conveyance of flood flows are described below. Implications of the restoration on flood protection and integrity of existing levees are presented in Section 4.1 and are not repeated here.

Pros: Breaches through slough levees at the location of historic channels will allow a more complex channel dendritic pattern to be created. They may also result in smaller impacts to the mudflats bordering the Far South Bay. For a normal tide range, they would also provide some flood relief to upstream areas, as flood flows enter the ponds effectively acting as detention basins. As the channel downstream of the breaches scours in response to the increase in velocity, there will be an additional increase in conveyance.

Cons: Some of the smaller sloughs may see an increase in high tide elevation, resulting in flooding concerns farther upstream. The increase in velocity and resultant channel scour may lower the bed and induce erosion near the toe of the existing slough levees. The channel may also be subject to headcutting which will migrate upstream if left uncontrolled.

Unknown: Although the potential for direct hydrodynamic impacts on other discharge facilities such as storm drains and sewer outfalls seem to be minor, changes in water levels may impact the duration of lift station operations which have impacts on upstream flooding. These indirect impacts can be quantified after changes in the local hydrology are estimated.

Breaches Through Bayfront Levees

Breaching the pond through the existing Bayfront levee will result in a relatively small change in tidal prism in the creeks. The resultant impacts to conveyance of flood flows are described below.

Pros: Breaches through Bayfront levees will not alter the hydrological characteristics of the creeks significantly. In fact, the ponds could function as detention basins resulting in lowering of flood levels immediately upstream.

Cons: The interior (towards pond) side of slough levee may have to be armored to avoid erosion and levee failure due to tidal and freshwater flood flows. In the event that the slough levees fail, it would be similar to the above situation (breaches through slough levees).

4.4 WATER QUALITY

Flushing Time

Experience has shown that a substantial increase in tidal prism of a water body also results in slower flushing (longer residence time[5]) of the water body, on average. This is explained by the fact that the same volume of tidal water entering the Far South Bay (which does not change at a far enough point, Dumbarton or farther) has to flush a larger water body (caused by the increase in tidal prism). The implications of longer residence time is significant to water quality, especially in water bodies with poor flushing characteristics such as the Bay south of the Dumbarton bridge. Prior studies have shown that this area has a summer season residence time of over 3 months.

Since the portion of Bay south of the Dumbarton bridge has already been assessed to be an impaired water body, and 3 of the 4 treatment plants evaluated in this study discharge into the project area, it is important to assess potential impacts to water quality and future operations. As discussed in Section 3, water quality in this area of the Bay has been an ongoing concern for the SFRWQCB and several regulations and limitations have been promulgated over the past few years, which has resulted in intensive monitoring of stormwater and wastewater. The treatment plants have been upgraded to modern technology, and exceedances (of allowable levels of pollutants) are infrequent.

Pros: Although average residence time will increase in the study area, the alternatives could be formulated such that better flushing will result in the sloughs where wastewater currently discharges. The increased tidal prism may also allow for more dilution of the wastewater.

Cons: A longer residence time in the sloughs where wastewater currently discharges may result in higher concentrations of pollutants. The restoration alternatives should avoid an increase in residence time in these sloughs.

[5] Residence time is defined as the average time a water particle remains in a water body before being renewed by incoming tides.

Unknown: If allowed to, much of the suspended sediment after restoration will settle out in the tidally restored ponds. The contaminants bound to suspended sediments will also accumulate in the ponds. A water quality analysis need to be conducted to evaluate the potential for increases in levels of contaminants in the ponds.

Salinity & Groundwater

One possible result of a higher residence time could be higher salinity. The potential for salinity intrusion beyond present levels in some of the creeks could pose a constraint in terms of impacts to fisheries, and groundwater extraction. Although most of the areas in the lower reaches of the watersheds do not rely on groundwater extraction, the extent of salinity intrusion needs to be evaluated for areas farther upstream.

4.5 OTHER INTERACTIONS

Dredging: Both ACFCWCD and SCVWD frequently dredge the mouths of the major flood control channels (Alviso, Coyote Hills Slough, etc.) to maintain flood conveyance capacity. This activity frequently requires mitigation because of habitat impacts. With the restoration of ponds which are designed to also act as detention basins, the need for frequent dredging may be reduced.

Effluent Quality: Permit requirements imposed by the SFRWQCB on the City of San Jose include monitoring, for conversion of salt marsh to brackish marsh in the area. They also include mitigation requirements if salt marsh conversion takes place due to the freshwater effluent discharge. The restoration project could be designed to alleviate any ongoing or future potential for salt marsh conversion.

PG&E Towers: Restoration of certain ponds will have to address the constraints posed by the transmission towers, in terms of allowing access to them.

5. REFERENCES

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APPENDIX A

POND SIZES, ELEVATIONS, TIDAL PRISM ESTIMATES

ALVISO PONDS - AREA, ELEVATION, TIDAL PRISM

No	Pond Number	Pond Area (ac)	Pond Elev (NGVD)	Distance to MHHW (ft)	Volume To MHHW (AF)
1	B2	28	0.5	4.2	116
2	B2	108	0.5	4.2	452
3	B2	51	0.5	4.2	214
4	B1	158	-1.3	6.0	945
5	A23	180	1.2	3.0	532
6	A23	275	1.2	3.0	813
7	A22	89	3.0	1.2	104
8	A22	184	3.0	1.2	213
9	A21	142	2.3	1.8	256
10	A20	67	1.8	2.3	156
11	A19	276	1.8	2.4	649
13	A17	136	1.1	3.0	406
14	A16	241	0.6	3.6	856
15	A15	252	0.7	3.4	866
16	A14	351	-0.1	4.8	1,671
17	A13	283	-1.1	5.2	1,470
18	A12	314	-2.0	6.1	1,902
19	A11	268	-1.8	6.5	1,738
20	A10	253	-0.8	5.5	1,402
21	A9	372	0.5	4.2	1,562
22	A8-South	175	-0.5	5.2	912
23	A8	444	-3.4	8.1	3,592
24	A7	269	-0.8	5.5	1,474
25	A5	661	-1.9	6.6	4,391
26	A3W	606	-3.2	7.9	4,780
27	A3N	185	-1.5	6.2	1,140
28	A2W	457	-0.9	5.6	2,566
29	A2E	315	-3.0	7.7	2,424
30	A1	285	-1.9	6.6	1,892
Subtotal		**7,425.0**			**39,496**

March 2003 acquisition area only. Ponds A4 and A18 not shown
Source : Siegel & Bachand, 2002

BAUMBERG PONDS - AREA, ELEVATION, TIDAL PRISM

No	Pond Number	Pond Area (ac)	Pond Elev (NGVD)	Distance to MHHW (ft)	Volume To MHHW (AF)
31	1	297	2.2	1.8	541
32	1c	65	3.7	0.3	18
33	2	692	2.1	1.9	1,294
34	2c	32	2.7	1.2	40
35	3c	180	2.9	1.0	187
36	4	202	2.9	1.1	216
37	4c	168	3.2	0.8	138
38	5	172	2.4	1.6	275
39	5c	96	3.0	1.0	99
40	6	183	2.4	1.6	299
41	6a	329	1.1	2.9	957
42	6b	293	1.7	2.3	683
43	6c	85	2.8	1.2	103
44	7	217	2.5	1.5	319
45	8	156	2.8	1.2	192
46	8a	310	4.0	0.0	0
47	8-middle	42	2.8	1.2	52
48	8-north	31	2.8	1.2	39
49	9	386	2.8	1.2	444
50	10	269	2.3	1.6	441
51	11	128	3.0	1.0	124
52	12	117	2.9	1.1	128
53	13	134	3.3	0.7	91
54	14	172	3.7	0.3	46
Subtotal		4,756			6,725

March 2003 acquisition area only.
Source : Siegel & Bachand, 2002

WEST BAY PONDS - AREA, ELEVATION, TIDAL PRISM

ID	Pond Number	Pond Area1 (ac)	Pond Elev2 (NGVD)	Pond Distance to mhhw4 (ft)	Pond Void Space to mhhw5 (AF)
94	1	446	2.0	2.3	1,030
95	2	141	1.9	2.5	346
96	3	296	2.1	2.3	679
97	4	307	2.1	2.2	681
98	5	35	2.5	1.9	67
110	s5	38	2.5	1.6	61
111	sf2	239	2.1	1.9	460
Subtotal		1,503			3,324

March 2003 acquisition area only.
Source : Siegel & Bachand, 2002

APPENDIX B

LIST OF CONTACTS FOR STORMWATER AND WASTEWATER FACILITIES

CONTACTS / REFERENCES

AGENCY	NAME	TITLE / DEPT	PHONE
STORMWATER			
Baumberg Complex			
Alameda County Flood Control & Water Conservation District	Ralph Johnson		510-537-0757
	Frank Codd		510.670.5783
	Mike Chun	Design Engr.	510.670.5480
	Jim Scanlin	Clean Water Division	510.670.6548
City of Fremont	Robert Hale	Supervisor	510.670.5563
	Barbara Silva	Environmental Services	510.494.4740
City of Newark	Nicole Narver		510.494.4740
City of Union City	Rick Olesky		510.742.4801
	Farooq Azim	Drainage Information	510.471.3232 x368
San Mateo County Flood Control District	Robert Frame	Flood Control	650.599.1489
Alviso Complex			
Santa Clara Valley Water District	Dipankar Sen		408.265.2600
	James Wang	Engineering Unit Manager, Hydrology & Geology Services	408.265.2607 x2622
	Jennie Micko	West Valley & Lower Peninsula Watersheds	408.265.2607 x2756
	Pat Showalter	Sr. Engineer, West Valley Watershed & Lower Peninsula Watershed	408.265.2607 x2939
	Scott Katric	Watershed Assoc. Engr., Coyote Watershed	408.265.2607 x2301
	Al Guerevich	Watershed Program Support Guadalupe Watershed	408.265.2607 x2018
City of Mountain View	Mike Mulhearn	Waste/Stormwater	650.903.6311
	John Welbourn	Manager, Env Eng	650.903.6219
City of Palo Alto	Joe Teresi	Public Works	650.329.2129
City of San Jose	Dave Kowal	Storm Drain Section	408.277.4638
	Randolph Shipes	Deputy Director, Watershed Protection Division	408.945.5192
City of Santa Clara	Dan Contreras	Street Department	408.615.3080
City of Sunnyvale			408.730.7415
West Bay Complex			
San Mateo County Flood Control District	Robert Frame	Flood Control	650.599.1489
City of East Palo Alto	Jay Farr	Stormwater Drainage	650.853.3105
	Fernando Bravo	City Engineer	650.853.3159
City of Menlo Park	Shawn Mao	Public Works-Engineering	650.330.6740
	Yaw Owusu	Project Supervisor, Capital Improvement	650.330.6742
City of Redwood City	Chu Chang	Public Works	650.780.7382
WASTEWATER & INDUSTRIAL			
Baumberg Complex			
FMC Corporation			510.818.1680
Alviso Complex			
San Jose/Santa Clara Water Pollution Plant	Dale Ihrke	Maintenance Engineer	408.945.5198
	Dave Tucker	Lab Manager	408.945.5302
	Bill Pounders	Operations Manager	
Sunnyvale Water Pollution Control Plant	John Addeo	Operations Manager	408.730.7260
	Dave Grabiec	Plant Engineer	408.730.7704
Palo Alto Regional Water Quality	Bill Miks		650.329.2598
Control Plant	Daisy Stark	Sr. Plant Engineer	650.329.2287
West Bay Complex			
San Mateo Waste Water Treatment Plant	Steve Danehy	Plant Manager	650.522.7385
South Bayside System Authority	Chris Smith	Technical Supervisor	650.594.8411 x141

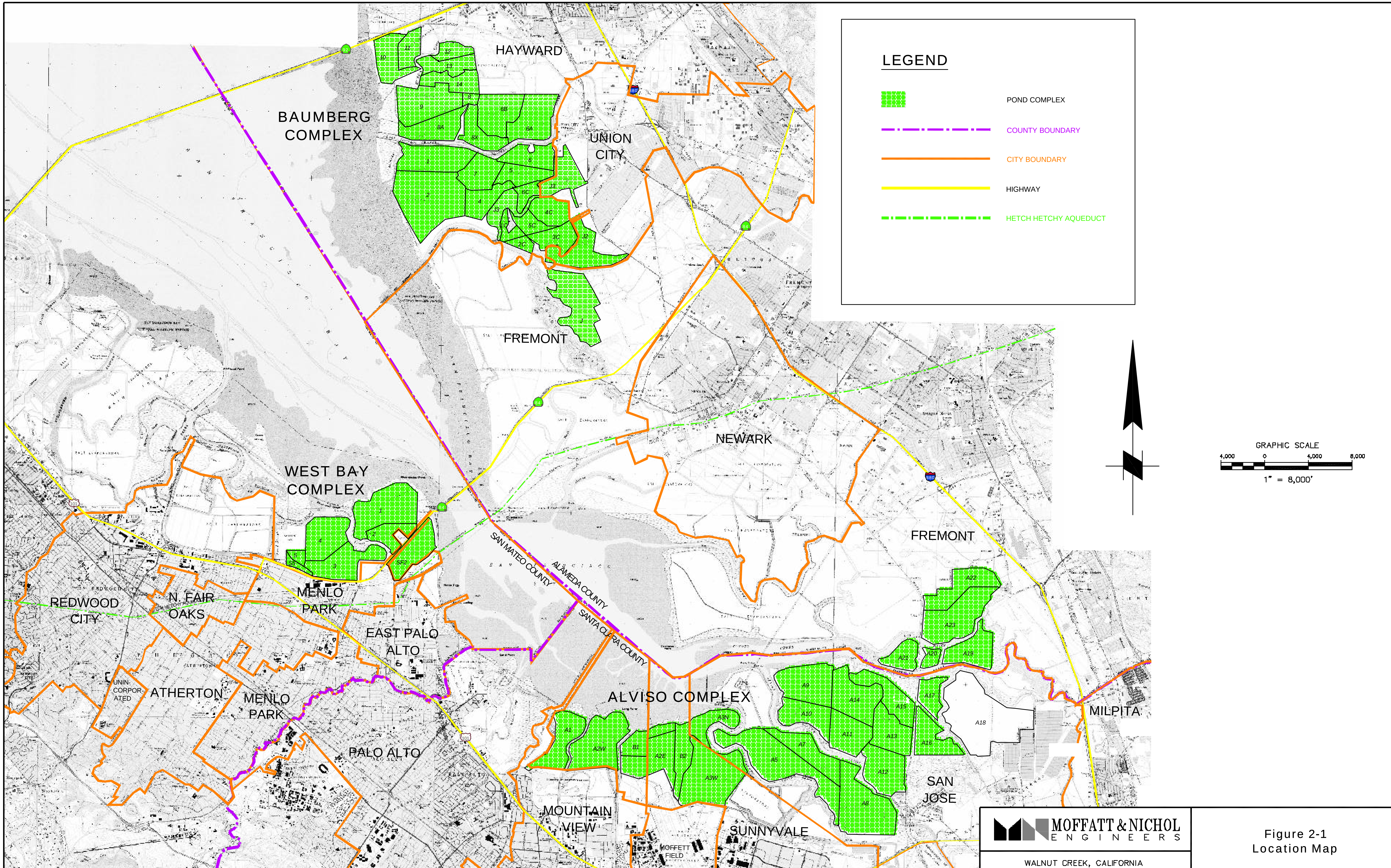


Figure 2-1
Location Map

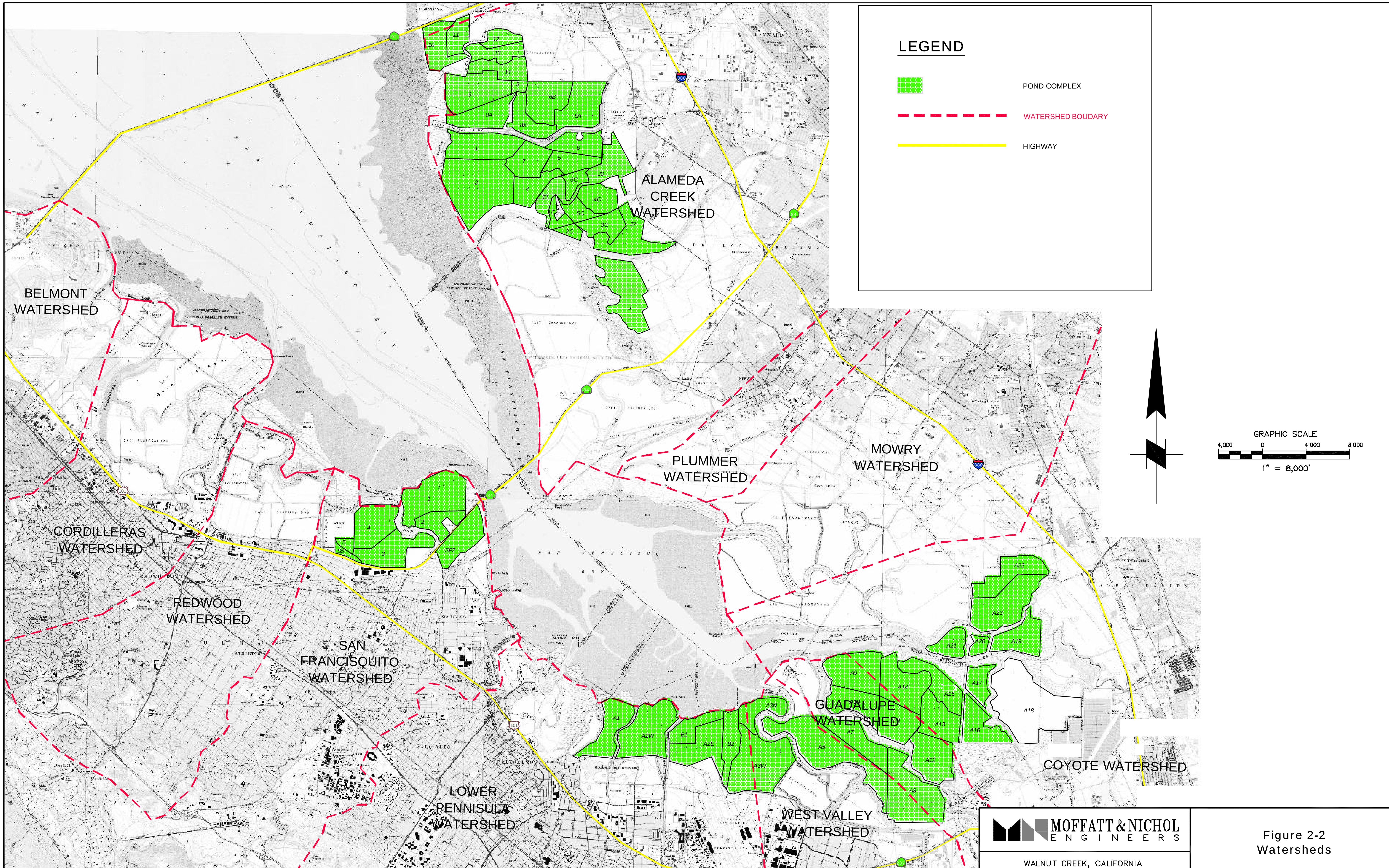
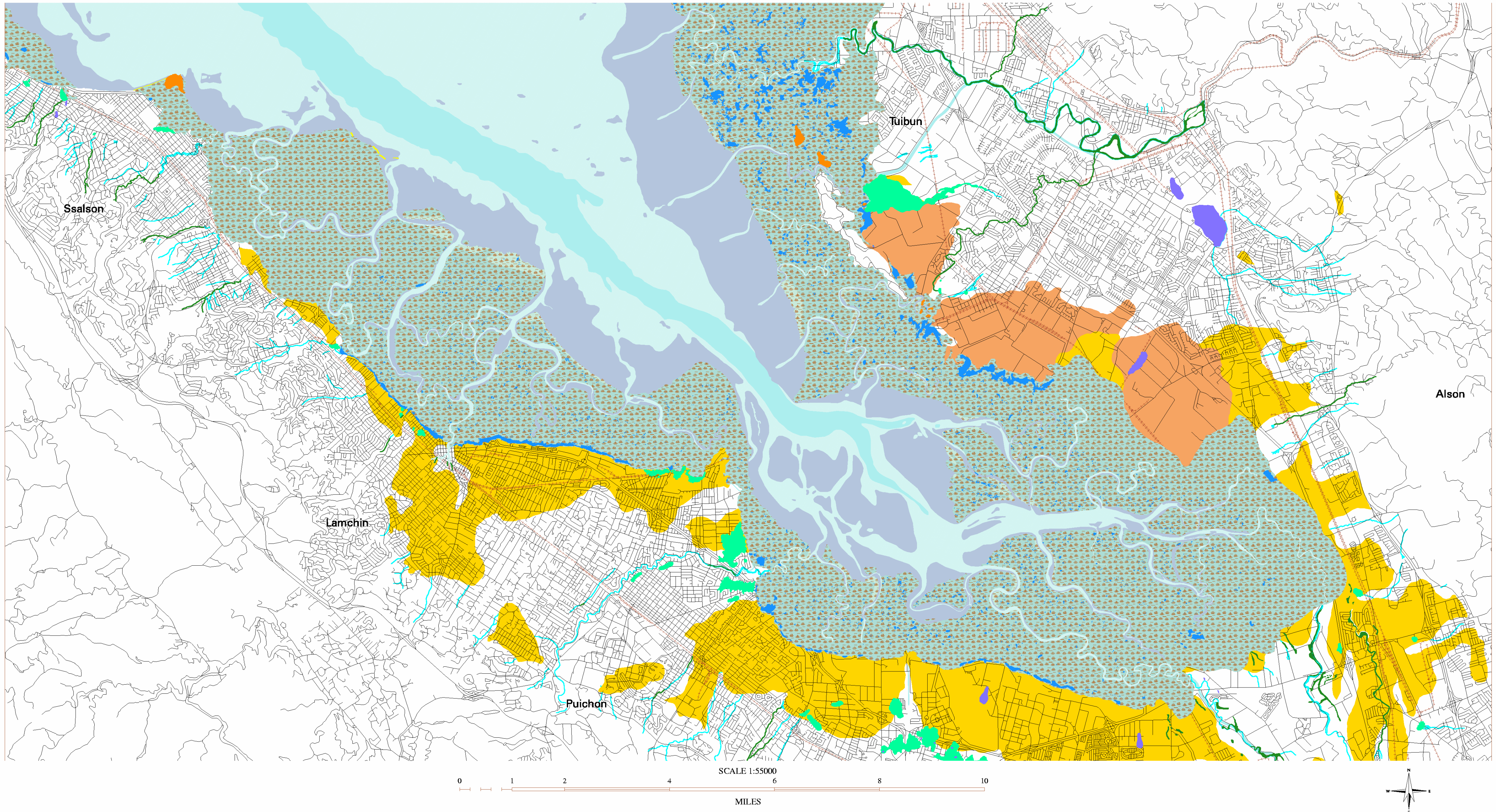


Figure 2-2
Watersheds

Historical View of South Bay Subregion
ca. 1770 –1820
Based Upon Bay Area EcoAtlas Version 1.50pr4



- Ocean, Bay or Channel (> 3 fathoms)
- Bay or Channel (≤ 3 fathoms)
- Intertidal Flat
- Lagoon
- Beach
- Young Tidal Marsh
- Mature Tidal Marsh
- Muted Tidal Marsh
- Perennial Pond
- Tidal Marsh Panne
- Vernal Pool
- Willow Grove
- Riparian Zone
- Seep or Wet Soil
- Vernal Pool Soil
- Upland within Tidal Extent
- Lowland River or Creek
- Modern Road
- Modern Railroad
- Ytgin Tribal Region

Historical View Primary Sources:
US Coast Survey, US Geological Survey, US Department of Agriculture, Spanish disenos, explorers' journals
Tribal Regions courtesy of Randall Milliken.

Projection:
1927 North American Datum
Universal Transverse Mercator Projection, UTM Zone 10

Production:
Science coordination, GIS and Map Design by the San Francisco Estuary Institute
Richmond, California http://www.sfei.org EcoAtlas 1.50 ©1997 SFEI

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WALNUT CREEK, CALIFORNIA

Figure 2-3
HISTORICAL VIEW OF SOUTH BAY, 1770-1820

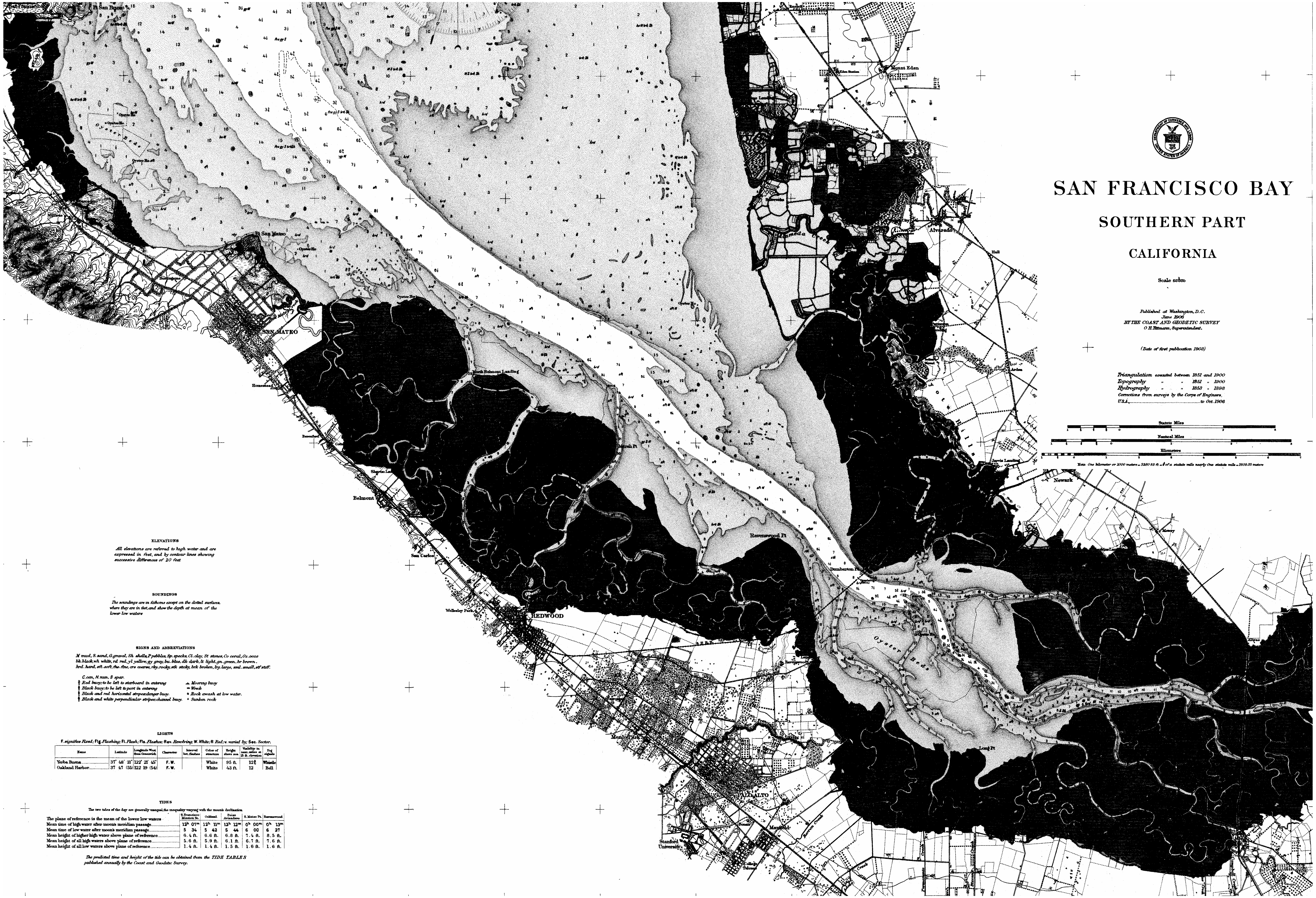

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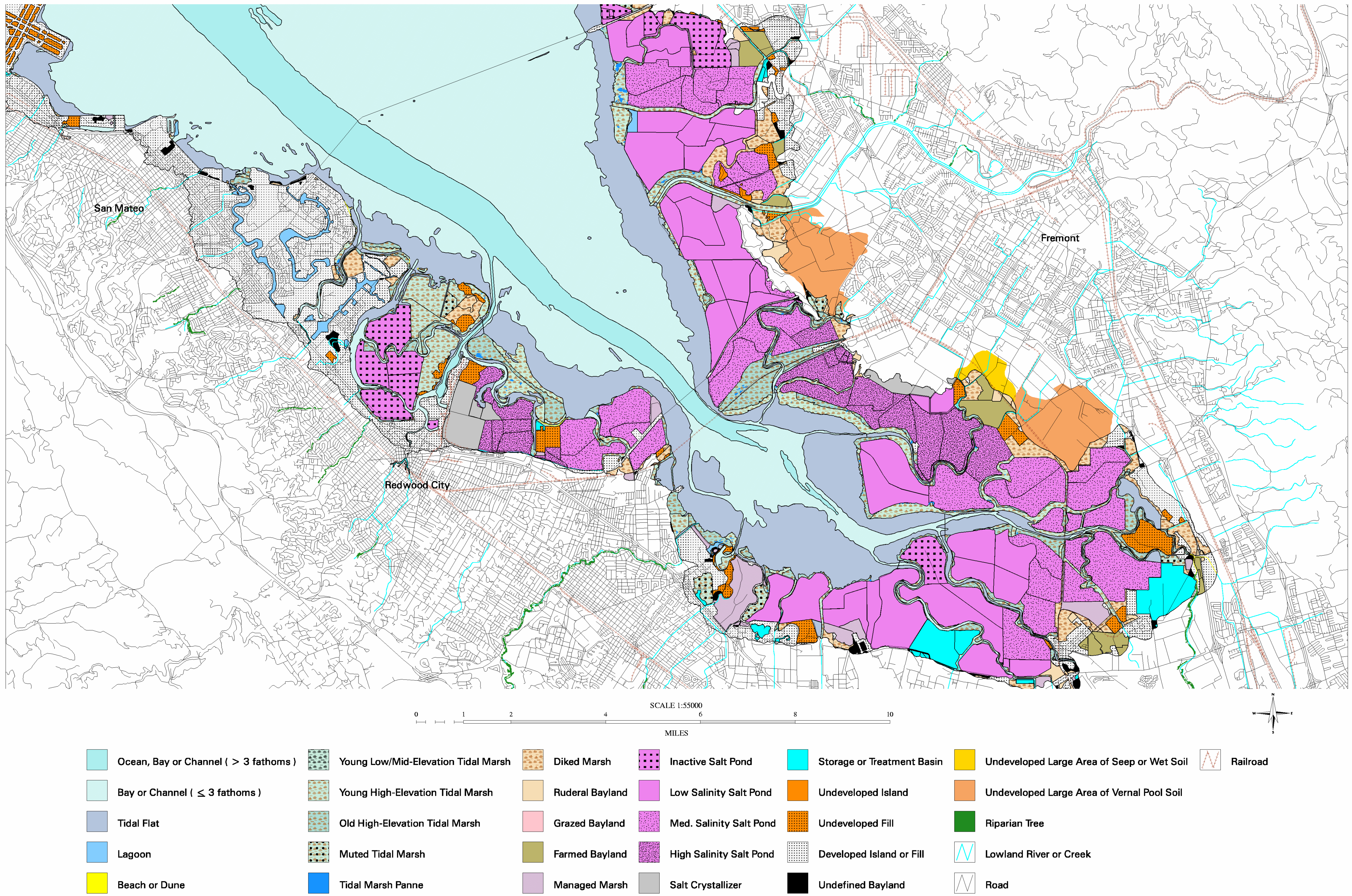
Figure 2-4
HISTORICAL VIEW OF SOUTH BAY, 1903

Modern View of South Bay Subregion
ca. 1997
Based Upon Bay Area EcoAtlas Version 1.50pr5



Modern View Primary Sources:
CA State Lands Commission, US Geological Survey, US Fish and Wildlife Service,
US National Aeronautical and Space Administration, and local experts.

Projection:
1927 North American Datum
Universal Transverse Mercator Projection, UTM Zone 10

Production:
Science coordination, GIS and Map Design by the San Francisco Estuary Institute
Richmond, California http://www.sfei.org EcoAtlas 1.50 ©1997 SFEI

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Figure 2-5
MODERN VIEW OF SOUTH BAY, 1997

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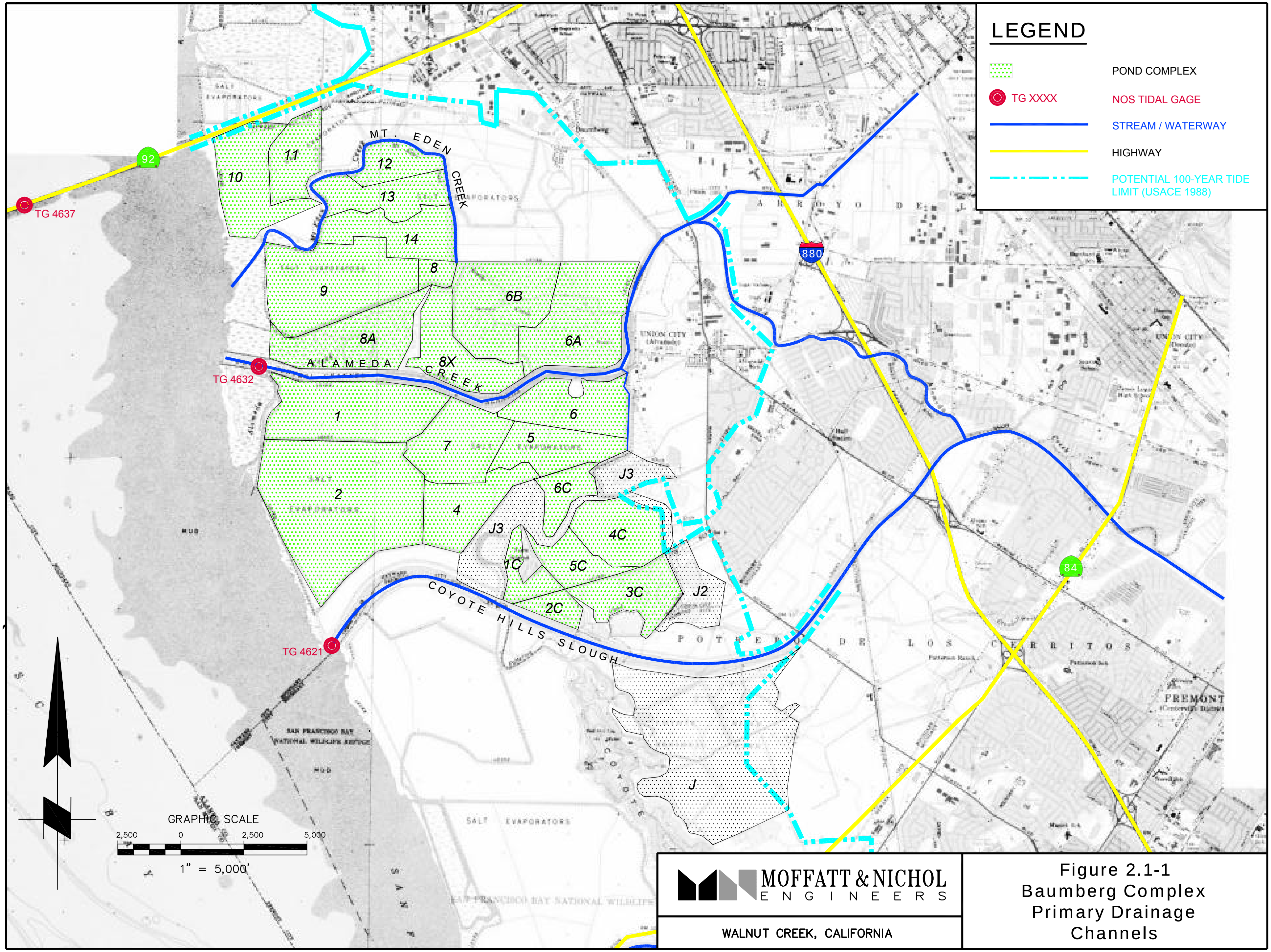
WALNUT CREEK, CALIFORNIA

Figure 2-6
NOAA NAUTICAL CHART FOR SOUTH BAY, 1992



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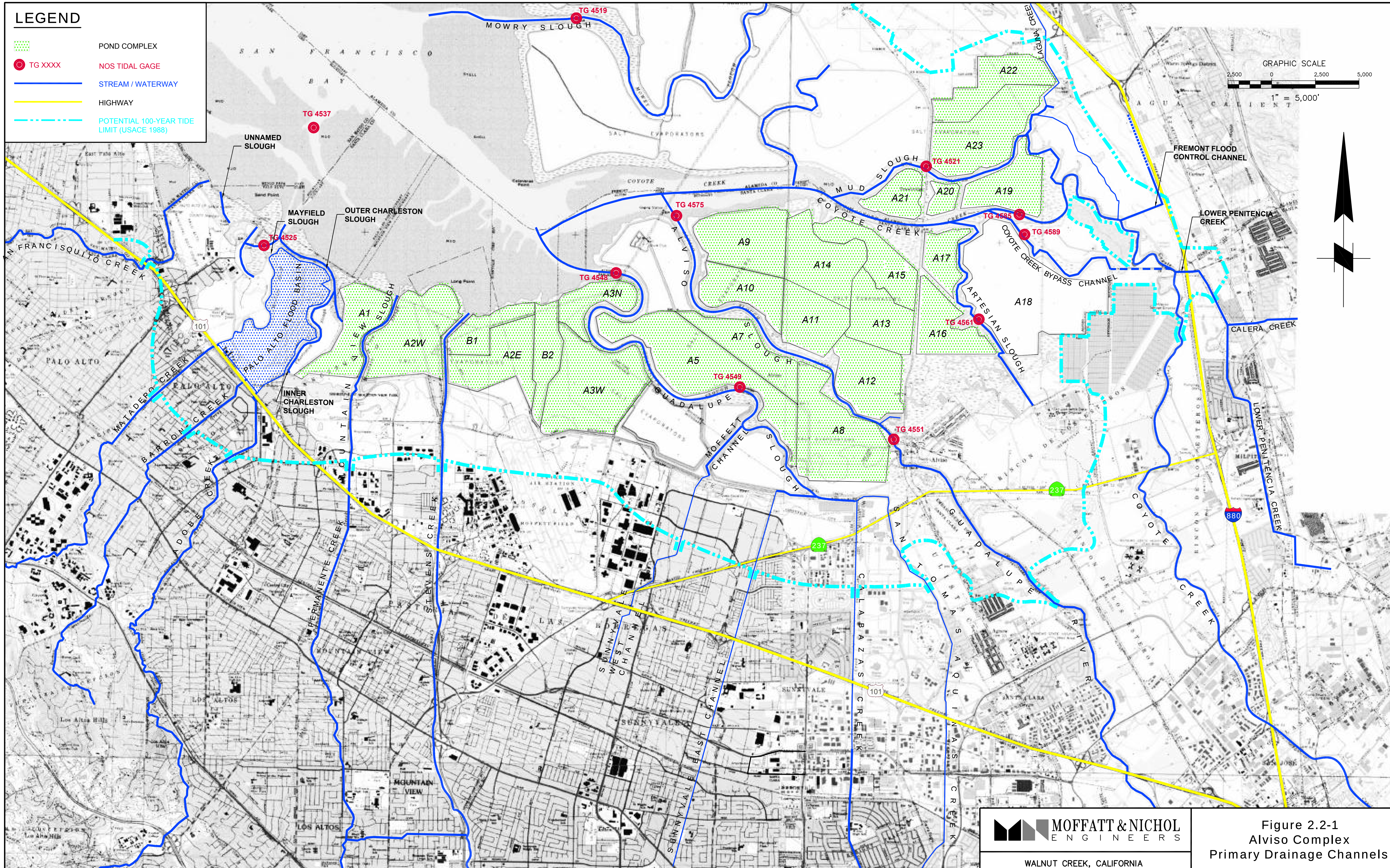
WALNUT CREEK, CALIFORNIA

Figure 2.1-1
Baumberg Complex
Primary Drainage
Channels



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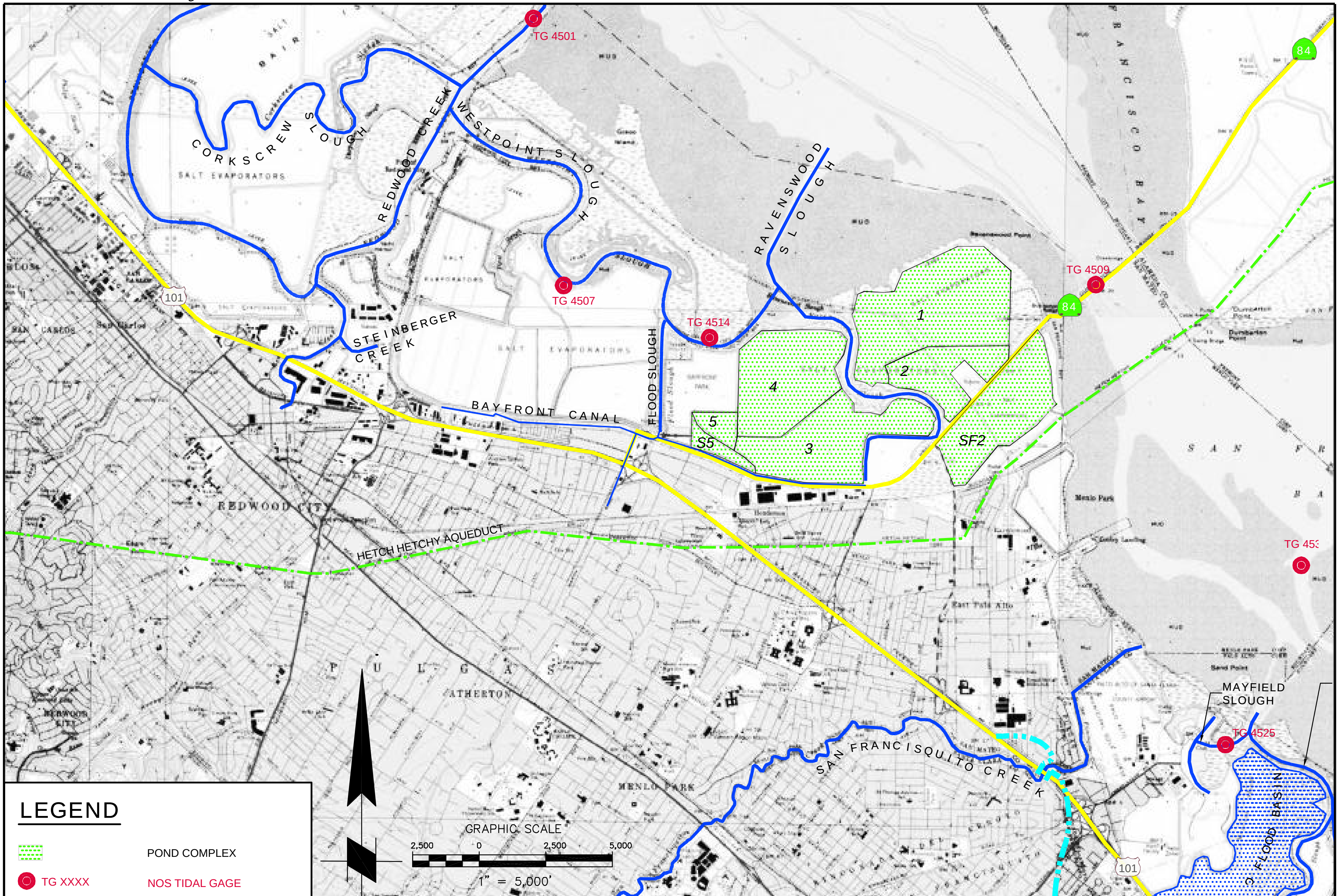
WALNUT CREEK, CALIFORNIA

Figure 2.2-1
Alviso Complex
Primary Drainage Channels



LEGEND

(pond complex symbol)	POND COMPLEX
TG XXXX	NOS TIDAL GAGE
(blue line)	STREAM / WATERWAY
(yellow line)	HIGHWAY
(cyan dash-dot line)	POTENTIAL 100-YEAR TIDE LIMIT (USACE 1988)

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Figure 2.3-1
West Bay Complex
Primary Drainage
Channels

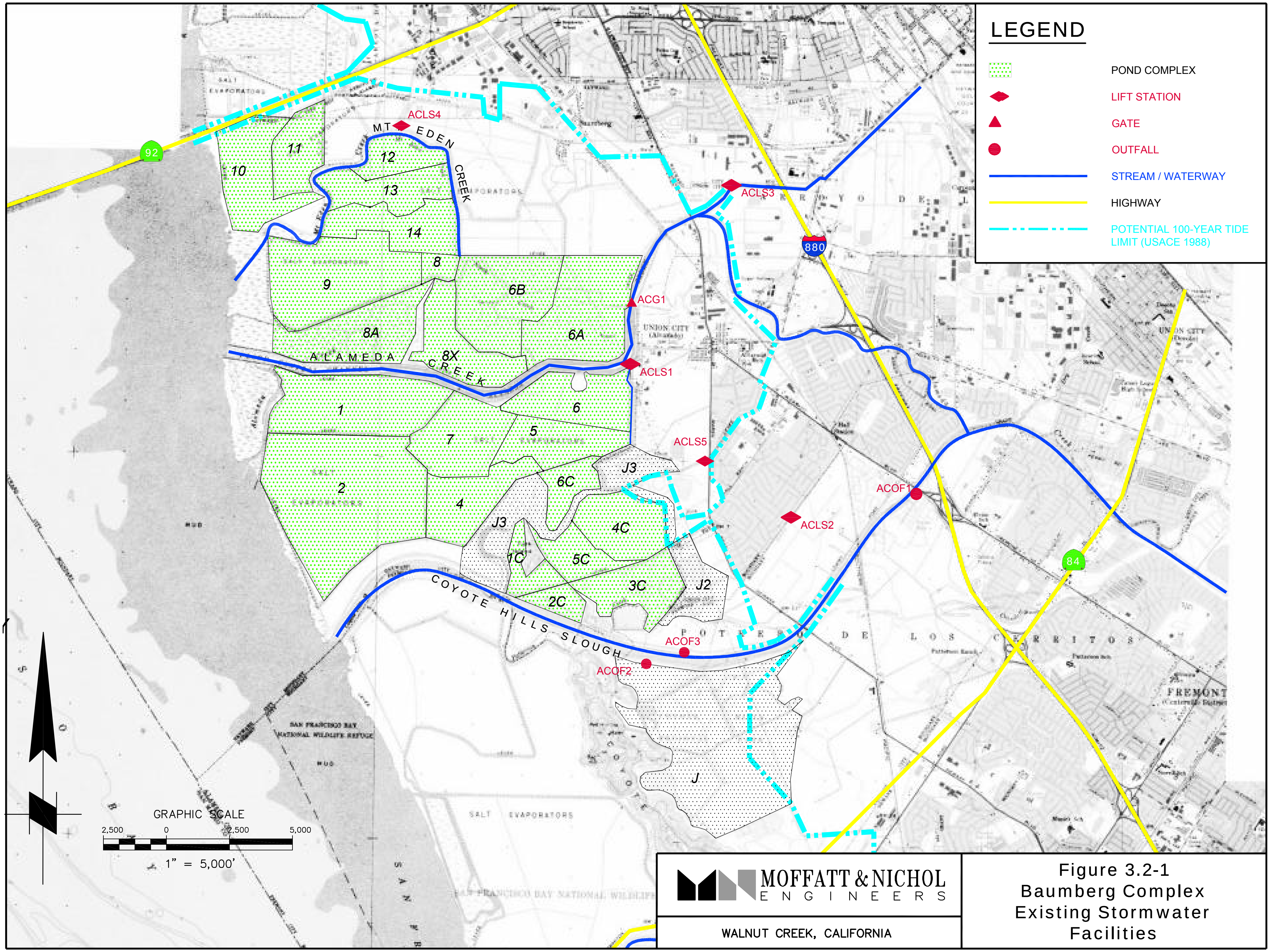

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Figure 3.2-1
Baumberg Complex
Existing Stormwater
Facilities

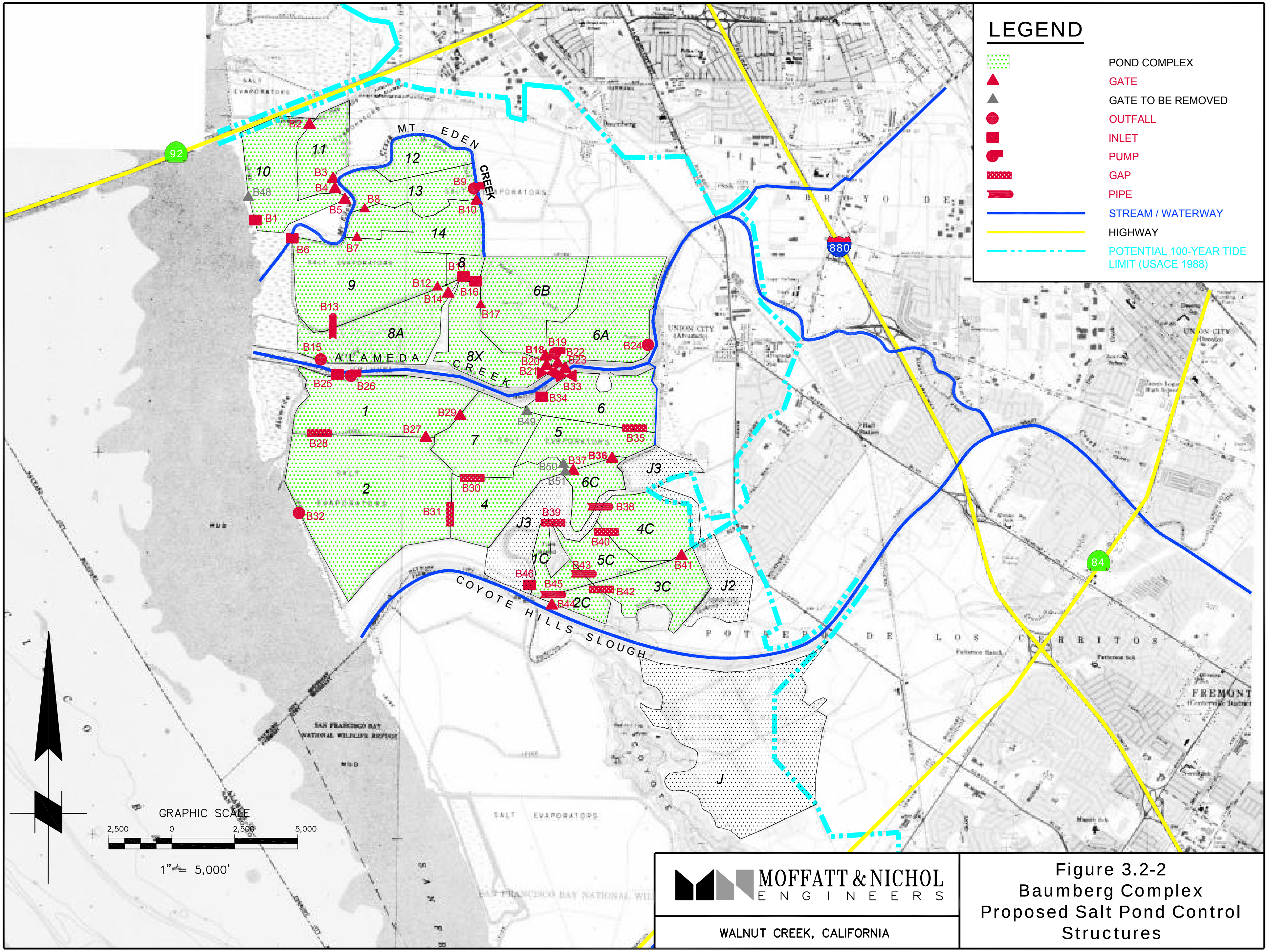

Figure 3.2-2
Baumberg Complex
Proposed Salt Pond Control Structures

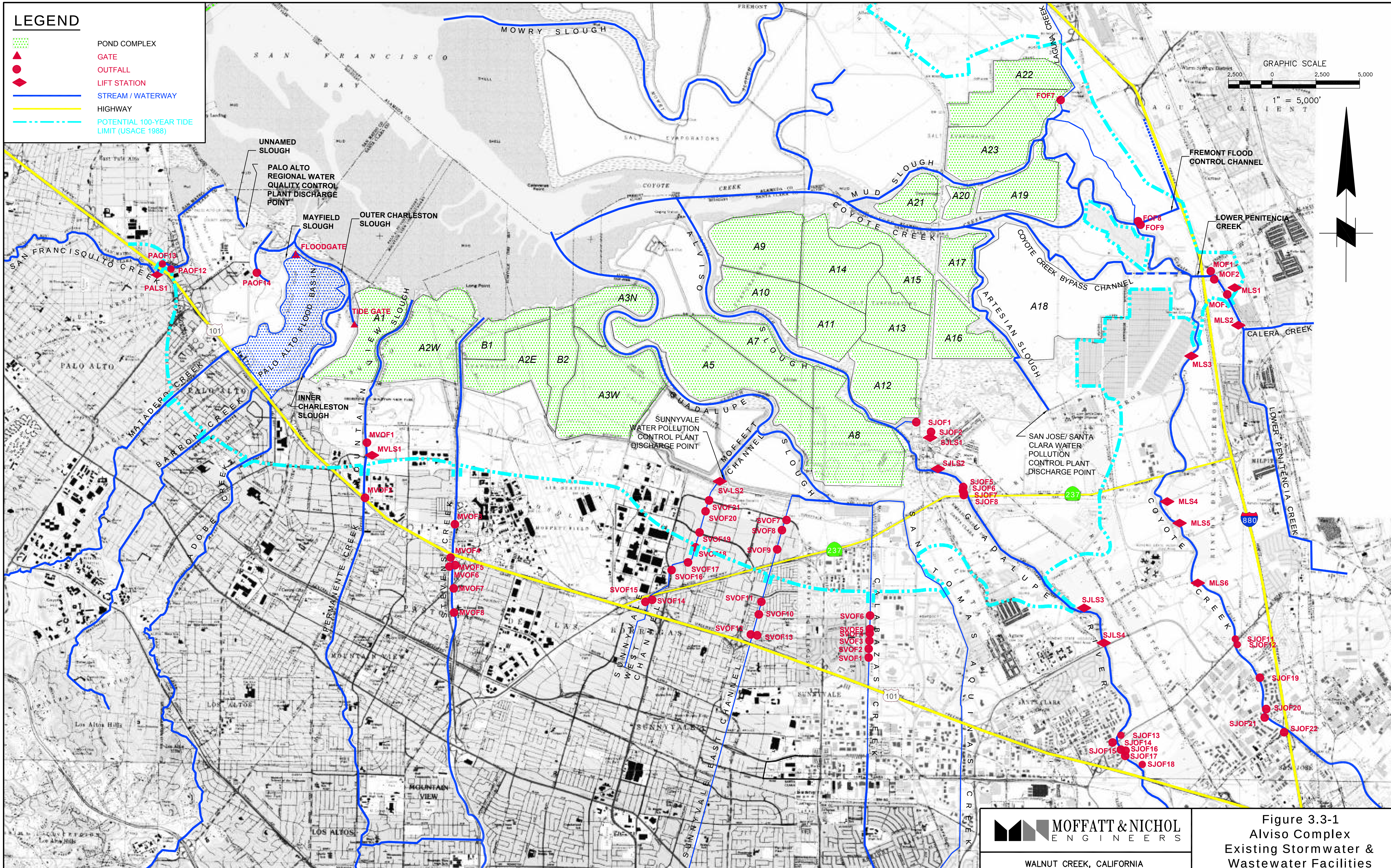

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Figure 3.3-1
Alviso Complex
Existing Stormwater & Wastewater Facilities

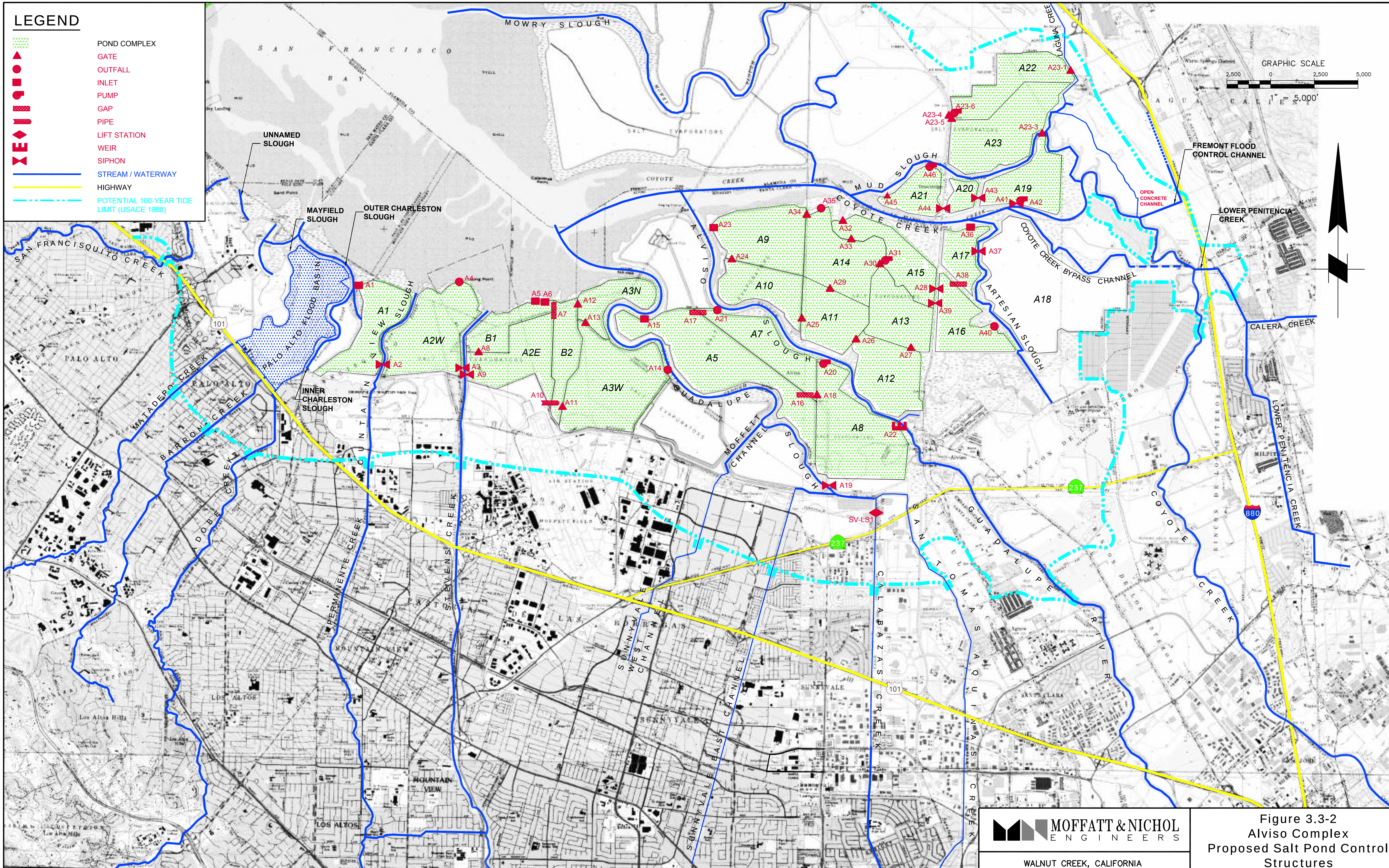

Figure 3.3-2
Alviso Complex
Proposed Salt Pond Control Structures

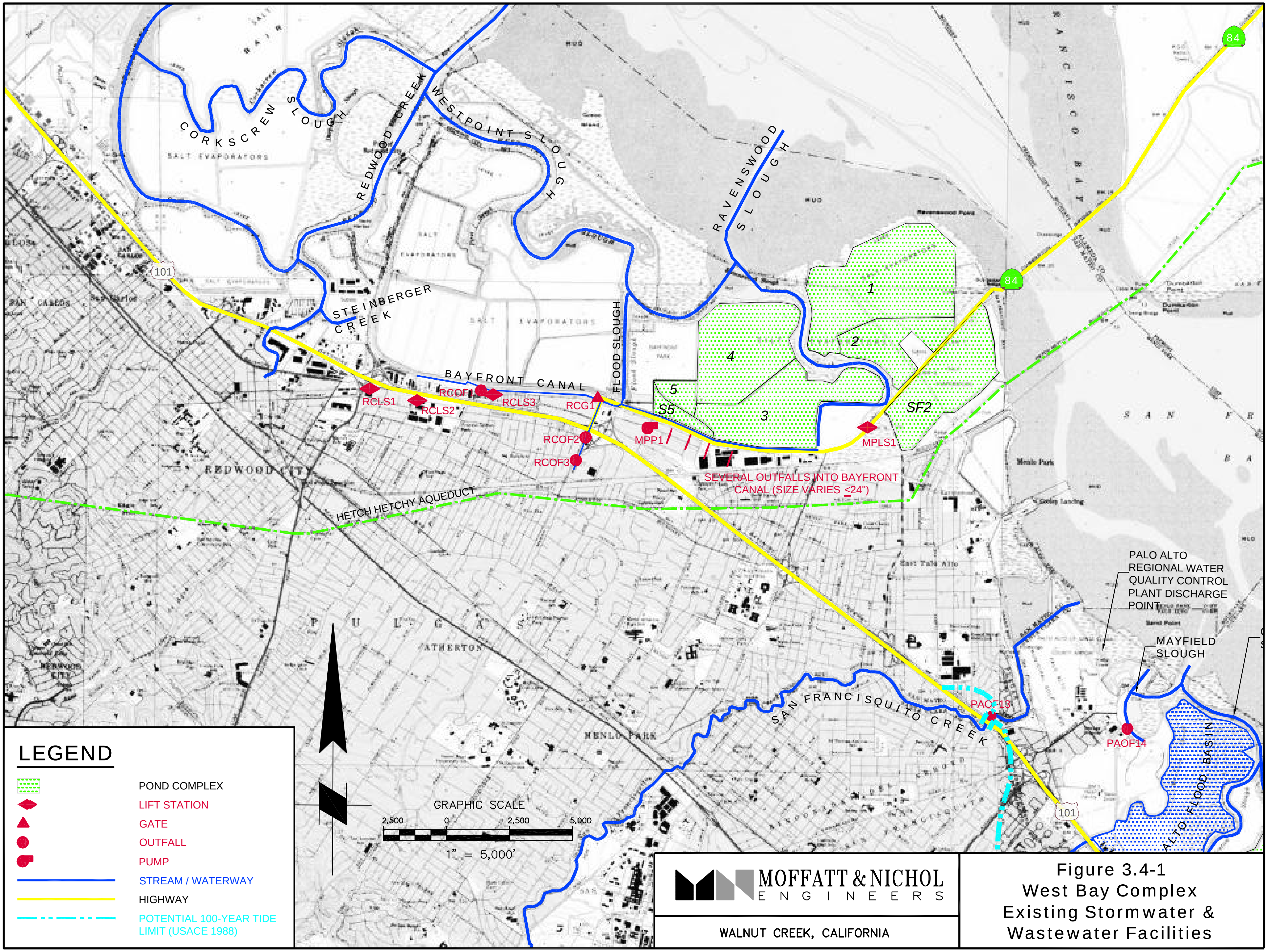

Figure 3.4-1
West Bay Complex
Existing Stormwater & Wastewater Facilities

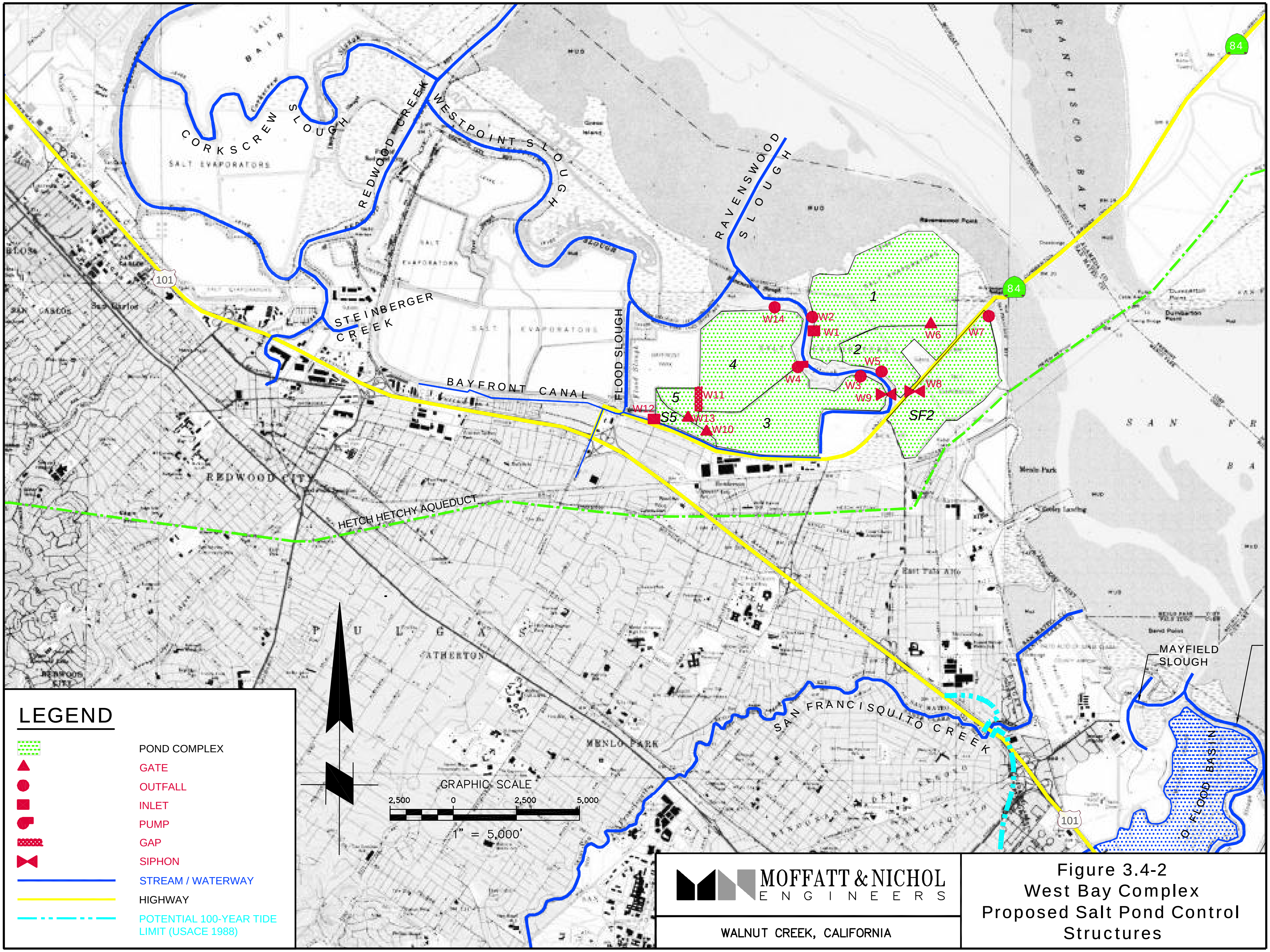

Figure 3.4-2
West Bay Complex
Proposed Salt Pond Control Structures