AN ANALYSIS OF THE ECONOMIC DEMAND FOR LAND TO SUPPORT THE NEEDS OFWATER-RELATED INDUSTRY AROUND SAN FRANCISCO BAY

FOR: THE SAN FRANCISCO BAY CONSERVATION AND DEVELOPMENT COMMISSION

QED RESEARCH, INC. AND THE SAN FRANCISCO BAY CONSERVATION DEVELOPMENT COMMISSION STAFF, OCTOBER 1986

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EXECUTIVE SUMMARY

In the eighteen years since adoption of the San Francisco Bay Plan, the potential impacts of water—related industry upon the Bay Area have changed profoundly. In 1969, water—related industry was seen as a dynamic driver of Bay Area economic growth with needs for new sites amounting to thousands and probably tens of thousands of acres. To alleviate future requirements for filling parts of San Francisco Bay to meet industry needs, nearly 19, 000 acres of undeveloped land was reserved.

In 1986, water—related industry can hardly maintain its employment level in the Bay Area. Future expansion of production is likely in some industrial segments, especially petroleum refining and storage, but this will occur at existing sites and not require new plants on currently undeveloped land. The need for land on which to locate new plants in this century, including safety margins for the unexpected and improbable, is measured in hundreds of acres rather than thousands or tens of thousands of acres. This conclusion is based upon both an analysis of the general economics of site selection at comparative West and Gulf Coast deep—draft facilities, and a detailed analysis of five industry groupings which have been major users of deep—draft terminals; petroleum refining and storage, chemicals, metal refining and fabrication, food processing, and mineral resource processing.

The utilization of water terminals at developed sites is decreasing in some industries. Improvements in materials handling by general cargo ports, railroads, and trucks has resulted in some plants abandoning the use of their deep—draft water terminals, e.g. two out of three major chemical plants and one out of two food processing plants.

The lack of need for new sites may be fortunate. A reanalysis of the water—related land inventory by the BCDC staff indicates that there are only two prime parcels for

development over the next ten to fifteen years totaling approximately 213 acres. A third parcel at Collinsville of 2, 668 acres has longer run development potential.

Our overall conclusion is that the current and projected characteristics of water—related industry in the Bay Area could be accommodated without reserving land for this purpose. The deep—water sites around the Bay are a unique and limited resource and should be protected for uses requiring deep—water shipping terminals. Water—related industry has an important need for deep—draft terminals, but one which no longer requires a special laud use category based upon its formerly central role in economic growth and large-scale needs for undeveloped land.

Part I.

AN ANALYSIS OF THE ECONOMIC DEMAND FOR LAND TO SUPPORT THE NEEDS OF WATER-RELATED INDUSTRY AROUND SAN FRANCISCO BAY

Chapter One Introduction

San Francisco Bay is a unique resource for the Bay Area, California and the nation. The San Francisco Bay Plan developed by the San Francisco Bay Conservation and Development Commission sets the policies and priorities for the use of the shoreline around San Francisco Bay to provide "substantial public benefits… treating the Bay as a body of water, not as real estate . . . shoreline areas suitable for priority uses--ports, water-related industry, airports, wildlife refuge and water-related recreation--exist only in limited amount and should be preserved for these purposes."

This report is the third report which looks at the priority needs for the use of Bay shoreline for water-related industry. The previous two reports, Waterfront Industry Around San Francisco Bay, by Dr. Dorothy Muncy (1968) and Waterfront Industry Study: A Report to San Francisco Bay Conservation and Development Commission by Gruen, Gruen & Associates (1976), developed somewhat different definitions of what is "water-related industry" and approached the task of estimating the demand from different perspectives. Neither report made an economic analysis

to identify the factors which determine national and West Coast demand for navigable industrial water frontage and San Francisco Bays estimated share of this market.[1]

In the seventeen years since the adoption of the San Francisco Bay Plan there has been much less water frontage development by water-related industry than predicted. Only five permits for new or expanded water-related industries have been issued.[2] However, the past is only an issue to the extent that it foreshadows the future. To understand the future, BCDC needs to know:

- the primary economic determinants' that control the rate of water-related industrial development and,
- the extent these determinants are likely to change in the future such that the resulting rate of water-related industrial growth will be different from the past.

The objective of this report is to perform an economic analysis which: 1) highlights the determinants of water-related industrial development, 2) analyzes the relative advantage of San Francisco Bay compared to other competitive navigable water frontage with respect to those determinants, and 3) assesses the likely future land demand by water-related industry, highlighting the uncertainties and sensitivities in that projection. The primary focus is on the next fifteen years with implication assessed out to 2020, the time period covered in BCDC's charter.

Chapter Two analyzes the comparative economics of San Francisco Bay versus alternative locations for water terminals on a generic basis, i.e. without References to the unique characteristics of specific water-related industries. Chapter Three focuses on specific water-related industries and estimates their future demands for land. Based upon a reanalysis by the BCDC staff (Appendix B) the availability and suitability of the

[1] The first report attempted to use overall ABAG employment projections for the Bay Area, which had no specific economic analysis of the growth factor for water-related industry, as a basis for estimating water-related industry growth. The second used a survey of local industry plans with all the strengths and weaknesses of that type of survey for long-term projections.
[2] Permit actions are described in Appendix B.

undeveloped land reserved for water-related industry, Chapter Four compares the supply of land with the future demand for land. Finally, Chapter Five provides conclusions on the future need for the water-related industry category.

Chapter Two - Economics of New Industrial Site Selection

New or expanded plants represent new jobs and an increased tax base. Many areas with suitable depths for water terminals strongly desire industrial development with the result that the, selection of water-related industrial sites involves a very competitive market place.

While San Francisco Bay has some unique advantages, a number of locations along the West Coast, e.g. Los Angeles-Long Beach, Seattle-Tacoma, and Portland; along the Gulf Coast, e.g. Texas, and Louisiana; and along the Mississippi inland waterways, e.g. Tennessee and Mississippi; are highly competitive with San Francisco Bay for water-related industries. These locations are very actively soliciting heavy industry[1] and have good deep draft facilities available which have equivalent and sometimes better depths than San Francisco Bay.

This, section presents an overview of the comparative economics of new site selection along the West and Gulf Coasts and Mississippi inland waterways. The intent is to establish a general perspective on what factors are favorable, neutral, or unfavorable to the location of new water-related industrial sites in the Bay Area This perspective is applicable to all Bay Area industry, not just the five water-related industries analyzed in Chapter Three - Industry Economics. It therefore provides insight into the answers of "what if' questions on new type of industries or world market conditions that may develop. It is not a conclusive analysis for any single industry because site location priorities shift from industry to industry and even from firm to firm. The discussion will be divided into three general areas; size of market, relative costs, and regulatory/political climate.

[1] For descriptive purposes, this report considers water-related industries to be a subset of heavy industry, i.e. those heavy industries which receive or ship from their own water terminals. However, the detailed analysis by industry is not limited to heavy industries.

Size of Market and Transportation Costs

Many Northern California industries serve the United States and the world from plants in the Bay Area However, the heavy industries which rely upon water transportation for some portion of their raw material inputs also tend to produce bulky, heavy outputs whose market area is limited by transportation costs.[1]

The Bay Area has a relative transportation advantage which is restricted to the general area west of the Sierras (including Western Nevada), north of the Tehachapi Mountains, and south of the Oregon border. Seattle—Tacoma and Portland have less expensive rail transportation to the northern tier of states and Los Angeles—Long Beach has less expensive railroad transportation to the southern tier of states. This is so because the rail lines heading east from the Bay Area cross the steep high Sierra Nevada and Rocky Mountains before reaching the population-rich midwestern and eastern states. The haul over these two mountain ranges consumes more fuel and takes longer than the journey from either Seattle-Tacoma or Los Angeles-Long Beach The trip from Los Angeles-Long Beach east is particularly advantageous because the rail lines skirt the Sierra Nevada and the Rocky Mountains and pass through the fast-growing western sun-belt states.[2]

Ports along the Gulf Coast and Mississippi River inland waterways have channel drafts approximately equal to San Francisco Bay and have both inexpensive rail and water transportation available to the major eastern, midwestern and sun-belt states markets.

Thus, for many types of heavy industrial products, the effective market size for plants around San Francisco Bay is Northern California. This is a market of some eight to ten million people, with relatively low concentration of users of heavy industrial products except for construction materials and transportation fuels. Petroleum refining is the largest water-related industry in the Bay Area For many heavy industrial markets, Northern California tends to be a modest market size. Comparatively, the other port areas offer larger and often faster growing

[1] The discussion of the impacts of transportation costs upon market size is roughly parallel for both heavy industry and cargo ports. However, for heavy industry transportation costs are less significant on a percentage of cost basis.

[2] With deregulation in the railroad industry, transportation costs are increasingly determined by route competition and the shipper's bargaining power for large loads. Therefore, specific rates are highly variable and may not reflect the underlying cost structure.

markets for heavy industrial products which can be served with lower transportation costs. me markets of Northern California can often be adequately served from firms outside Northern California by rail or truck or even by water through San Francisco Bay cargo ports.

On the other hand, one of the significant trends in heavy industry is the movement towards smaller specialized producers of ferrous, nonferrous metal, and chemical products. These producers serve smaller markets. They have higher valve added per unit weight of product than large scale integrated plants thereby making transportation costs a lesser consideration. These more specialized heavy industry plants might choose to locate in the Bay Area, but by the very nature of their scale and more processed inputs they are much less likely to require their own water terminals, i.e. be a water-related industry. On a scale of favorable, neutral or unfavorable, size of market and transportation costs must be seen as unfavorable to firms requiring larger markets than that provided by Northern California

Relative Costs

Five categories of relative cost considered in site selection decisions will be examined: land, labor costs, utility rates, taxes and pollution control. These factors are especially important for heavy industry. Other factors, such as the education level of the work force, are more important to other industries, e.g. hi-tech and financial services, than water-related industries.

Land

There is land available along the Bay, primarily in Contra Costa and Solano counties which has been designated by BCDC as reserved for water-related industries. Additionally, there is more land available along the Sacramento and Stockton ship channels, outside BCDC's jurisdiction. The issue is not availability, but price.

Early on in this study we speculated that the water-related industries designation might keep the value of land artificially depressed compared to its value for alternative uses. This may be true in the case of waterfront parcels covered by BCDC's 100-foot jurisdiction in urban and mixed-use areas. Such areas would have very high value for commercial or residential development. However, the data suggests that in general the price of undeveloped land

reserved for water—related industry is quite consistent with the price of adjacent land of similar characteristics not reserved for water-related industry.

An analysis of current land values was made for three different water-related industry designated sites; one in Richmond, the second in Martinez, and the third in Collinsville. me Richmond site is in the western section of the city and is owned by Chevron USA. The total area is approximately 1,000 acres with much of it covered by the Chevron oil refinery. Unused parcels of land exist and could be sold, though as a practical matter Chevron would probably choose to keep most of this land as a buffer from adjacent urban uses. If sold for industrial uses, this land would be priced between $100,000 and $175,000 per acre. Land suitable for commercial development would be priced between S 175,000 and $300,000 per acre.

The Martinez site consists of 811 acres of land between Interstate Highway 680 on the west, Pacheco Creek on the east, San Francisco Bay on the north, and the Santa Fe railroad tracks on the south All but 140 acres are "bay mud" and were judged to have negative value for industrial use because of the very high development cost. The 140 acres with stable soils for a good structural foundation has value for industrial rather than commercial development It would bring $20,000 to $30,000 per acre as raw land and $65,000 to $75,000 per acre as ready to build sites.

The Collinsville site consists of a large undeveloped area of 2,668 acres in a wide band between Collinsville Road and the Union Pacific Railroad Company tracks, extending inland approximately four miles at Collinsville to Birds Landing. The Collinsville site lies at the western edge of a much larger area extending along the deep-water Sacramento ship channel from Collinsville to Rio Vista which is reserved for water-related industry by Solano County.

This site offers future industrial potential, especially if all the elements of the Collinsville Redevelopment Plan are implemented. Without the infrastructure in the Plan, the site has little current value. Nominally its value might be in the S7,500 to $10,000 per acre range in competition with other new land for industrial use but even at this price there would be few if any interested parties in the near future. This land is on the north side of Suisun Bay and while the south side in Contra Costa County is developed, the north side, except for Benicia, is seen

as too remote from support facilities and lacking a basic infrastructure for industrial operation. This was not seen as changing in this century.[1]

By comparison we found that in Louisiana on the Mississippi near New Orleans, land was available in 100 to 3,000 acres tracts at prices ranging from $6,000 to $20,000 per acre. Much of this land, even at the lower price, was partially or fully developed. In the Tennessee Valley Authority area, water-front property along the Tennessee River Waterway was running from $5,000 to $48,000 per acre. Much of the Gulf Coast was reported as having land prices in the same range as Louisiana

Comparative figures are not readily available from the West Coast If the firm absolutely needed a private terminal in the Los Angeles-Long Beach port area, the cost would likely be very high, if it were available at all. On the other hand, the Ports of Los Angeles and Long Beach have done a good job of developing specialized shared facilities which appear to meet many water transportation needs. For example, petroleum comes into the port of Los Angeles-Long Beach and is temporarily stored at a port shoreside tank farm and then reshipped via pipeline to the refineries inland of the waterfront. Similarly, the port has a "cement ship" onto which all cement shipments are unloaded for later trans-shipment Thus, the cost of land on San Francisco Bay must be compared to "inland" land cost for Los Angeles-Long Beach which results in a condition in which lower effective land prices prevail in Los Angeles-Long Beach than for "water-related" industry than in the San Francisco Bay.

Seattle-Tacoma represents a different situation. Water-front land is available, but it is not sold It is leased for fifty years. To the extent that cost comparisons can be made, Seattle-Tacoma has lower land prices for equivalent land topography and access to industrial infrastructure.

In conclusion, San Francisco does not have any comparative advantage with respect to land prices. In fact, all evidence points to a significant disadvantage. This disadvantage increases if large parcels of land, e.g. over several hundred acres are needed. Except for the Collinsville site (with its remoteness), undeveloped parcels of this size with good soil characteristics are

[1] The evaluation of the price per acre of all three sites was provided by commercial and industrial brokers familiar with the land It is therefore a fair appraisal of what a firm seeking an undeveloped water front site would be told

very limited. As the amount of the land required decreases, the impact of this comparative cost disadvantage also decreases. As previously noted, many of the new industrial configurations are more land conserving, e.g. specialty steel mills and chemical plants, but less likely to be water—related industry. Land is judged an unfavorable site location factor.

Labor Costs

Blue collar workers employed by heavy industry in the North Bay are mostly unionized and have higher wages than the less unionized areas of Los Angeles, the Gulf Coast, and along the Mississippi River or the Northwest. The Bay Area is also a very high cost of living area, with especially high housing prices, which creates a strong upward push on wages.

Comparative wage information for durable goods industries is provided in Table 2.1. This information should be taken as primarily illustrative, because wage rates can be strongly affected by variations in the composition of the durable goods industries across locations. Unfortunately, more detailed information was not uniformly available across locations.

Currently, there is a labor pool of unemployed blue-collar workers from plant closings primarily in Contra Costa county. However, the demographic trends suggest that this is an aging population that will not be replenished. Fifteen years from now, there could well be a thin labor market of heavy industrial blue-collar workers. High housing prices and high white-collar salaries would tend to keep new blue-collar workers from moving into the area in any great numbers.

All the other areas competitive with San Francisco Bay are likely to maintain larger blue-collar labor pools at no higher and often much lower wages.

Labor costs are an unfavorable site location factor.

Table 2.1

Average Hourly Earnings 1981

Durable Goods Industries: SIC's 24, 25, 32-39

Table 2.1 Average Hourly Earnings 1981

Location	Average Hourly Earnings
San Francisco-Oakland, CA	SIO.76 per hour
Los Angeles-Long Beach, CA	$ 8.45 per hour
Portland, OR	$ 9.51 per hour

Seattle—Tacoma, WA[1]	$10.44 per hour
New Orleans, LA	$ 9.08 per hour
Baton Rouge, LA[2]	$10.68 per hour
Chattanooga, TN	$ 7.23 per hour
Houston, TX	S 9.13 per hour
Galveston-Texas City, TX	$ 9.78 per hour
Beaumont-Port Arthur-Orange, TX	$ 9.26 per hour

Source: "Employment, Hours and Earnings, States and Areas, 1939-82" U.S. Department of Labor Bureau of Labor Statistics, January 1984 Bulletin 1370-17.

Utilities

With declining oil and gas prices, Pacific Gas and Electric (PG&E) industrial rates are declining (though this may be only a short-term benefit). However, they are still among the highest in the country. Industrial electric rates along the part of the Mississippi River served by the Tennessee Valley Authority average four cents per kilowatt hour. The rates even lower in the Northwest with their own large hydroelectric resources and even larger resources across the border in British Columbia

The Gulf Coast has rates which have recently climbed due to the construction of nuclear power plants. Louisiana is looking at industrial rates which may cost five to six cents per kilowatt hour and the same will be true in Texas. However, this is still below projected PG&E costs. Moreover, along the Gulf Coast, the impact of these electric prices is cushioned by the very low natural gas prices plus the potential for cogeneration using the low-priced natural gas. Natural gas prices are also very low in the Pacific Northwest due to large surpluses in Canada.

About the only competitor of San Francisco Bay with similarly high utility costs is the Los Angeles-Long Beach area Heavy industrial firms, which are high energy users, would find utility costs a major disadvantage in either of these two areas.

Tables 2.2 provides a profits of utility bills for large industrial users in locations with deep draft water terminals. Utility costs are an unfavorable site location factor.

[1] This figure is statewide for all manufacturing; no finer breakdown was available.
[2] This figure is for all manufacturing, over half of which is in the relatively high paying chemicals and allied products and petroleum category at $12.62 per hour.

Table 2.2
Typical Industrial Electric Bills, January 1985
Billing Demand 5,000 KW and Consumption 2500 MWh

Table 2.2 Typical Industrial Electric Bills, January 1985

Location	Typical Bill
San Francisco-Oakland, CA	$199,388
Los Angeles-Long Beach, CA	$192,524
Portland, OR	$107,999
Seattle-Tacoma, WA	$ 42,500
New Orleans, LA	$108,507
Baton Rouge, LA	$115,325
Chattanooga, TN	$105,375
Houston, TX	$145,645
Galveston-Texas City, TX	$145,645
Beaumont-Port Arthur	$146,925

Source: "Typical Electric Bills, January 1, 1985," Energy Information Administration, Washington D.C., DOE/EIA-0040(85).

Taxes

California is a high tax state compared to its competitors whether one is looking at property taxes, business taxes, income taxes or sales taxes. Perhaps even more important, is the aggressive way in which Gulf Coast and Mississippi River states have attempted to lower the tax burden for new industry. Louisiana was the first state to establish a state level Enterprise Zone Program. While the specifics of the Enterprise Zone Program vary from location to location, the general outline is that for firms locating in an enterprise zone and employing a certain percentage of hard to place employees, rebates are provided on property, sales and use taxes. There is no comparative heavy industry inducement program in the Bay Area, except for the recent designation of East San Jose as an enterprise zone which does not affect water-related industry. Taxes are an unfavorable site location factor.

Pollution Control

High-standard air and water pollution control is established public policy in the Bay Area Meeting pollution control requirements is a major industrial cost in the Bay Area (and Los Angeles). Air pollution is a problem because the Bay air basin has reached a point where a substantial increase in air emissions brought on by a new industrial plant such as an oil refinery, will cause the pollutant standards set by the Bay Area Quality District to be exceeded. Environmental Protection Agency (EPA) attainment standards for 1987 may not be met in the Bay Area and this would place more expensive restrictions on new industries that would desire to locate here. Pollution emission control devices and pollution offset measures can be a considerable cost to industries seeking a Bay Area location as well as for existing plants that wish to expand plant production capacity. Potential future requirements on heavy metals in air emissions may also bode ill for some industries. Currently, the impact of heavy metal s upon humans is not well documented or understood. However, as information grows California is likely to be one of the first states to enact restrictions if negative impacts can be shown.

Industrial water dischargers are required to meet the waste water discharge standards set by the San Francisco Bay Regional Water Quality Control Board pursuant to the federal Clean Water Act and the state Porter -Cologne Act These standards are designed to assure high

Bay water quality. The cost to industrial dischargers to treat their waste water prior to discharge to the Bay can be a high cost. Moreover, firms generally no longer use salt water for cooling purposes, in part because of the corrosive properties of the water. Even firms that use water only for cooling purposes cannot put the municipal water into the bay because of toxic anti—corrosives added to the cooling water by industry.

With currently available pollution control technology and standards, it is possible for a new industrial firm to meet air and water quality requirements. However, the costs are often quite high and can be a substantial cost of operating in the Bay Area Los Angeles is the only area on a par with the level of pollution control costs fot.md in the Bay Area (primarily due to air pollution requirements). Other areas have much lower costs. While their pollution control cost will grow in the future, their geography and demographics will keep costs below those of the Bay Area Pollution control is an unfavorable site location factor.

Regulatory — Political Climate

The overall climate for heavy industry in the Bay Area, particularly compared to the climate for high-tech and service-oriented industries, is not favorable. New firms locating in the Bay Area and expanding existing firms must comply with the stringent Bay Area pollution control laws. Moreover, the traditional political base of heavy industry and blue-collar unionized labor is eroding. City councils which up to the late 1950s were greatly influenced by the major heavy industries are increasing shifting to reflect the values and attitudes of their new constituents, white collar professional workers who often live but do not work in the community. A controlled growth sentiment has recently begun to dominate Contra Costa County politics, particularly in regard to heavy industry.

Controlled growth is also a major issue in Solano County, however the County Board of Supervisors, has taken a positive step toward water-related industrial development along the deep-water Sacramento Ship Channel in the vicinity of Collinsville. However, at the current time industry has shown little desire to locate in the Collinsville area

Moreover, even in the case of Solano County there is not the major push for industrial development that can be found along the Gulf coast and Mississippi inland waterways or in the Pacific Northwest. There are no economic development councils in the Bay Area with large

budgets and Enterprise Zone Programs to lure heavy industry to the Bay Area, nor is there any organization in the Bay Area aggressively assisting industry in finding sites and meeting the federal, state, and local regulations and permit requirements that are seen by some in industry as an extremely complex and time consuming process. Locating a heavy industrial plant on the waterfront in the Bay Area is only for the highly motivated. It is an unfavorable site location factor.

Summary

No single factor in this analysis of the economic factors affecting heavy industry's site location decision, is overwhelmingly negative. Much more disturbing is the fact that there is not a single favorable comparative factor, except location for those firms that want to focus primarily on the Northern California market by comparison, if the discussion was of high-tech industry or financial services for which the Bay Area is a center, a number of Bay Area comparative advantages could be listed. me area has a very well-educated work force and is a world class center of technical and economic innovation.

In talking with industrial developers and researchers, the difficulty of meeting the regulatory standards often came up. Also obtaining permits from both federal, state, and local agencies was identified as a long and often arduous process. While there has been some attempt to provide coordination among the different "single focus" agencies, it is still perceived by some as a very difficult process. For a company that does want to locate in the Bay Area, the use of water transportation through a port is an option. Given the technology, ports are able to economically handle many types of cargoes which in the past might have warranted a private docking facility. This is especially true if the level of utilization of the private water terminal is low. The other option is to use an existing plant and expand or upgrade it. This appears to create many fewer problems and has generally been the option used by large scale water-related industry to increase production in the Bay Area

Overall heavy industry is not expanding in the United States and is not expected to expand in the foreseeable future. The reasons vary by industry. Sometimes the competition is Japan and Western Europe with more modern capital equipment, higher worker productivity and, in the case of Japan, lower wage rates. Sometimes the competition is newly industrialized

nations such as South Korea with very low wage rates and new equipment Sometimes it is the decision of the raw material producing country to capture more of the value added by manufacturing at home such as Saudi Arabia with oil refining and petrochemicals. The impact is always the same, intense competition for American heavy industry.

However, there is always expansion and contraction both across and within industrial sectors. Thus, new plants are being located all the time. There is keen competition for these new plants nationwide and certain areas of the country, notably the Gulf Coast area and the Mississippi River Valley area actively seek heavy, water-related industry and offer economic incentives to locate there. In general, the San Francisco Bay Area is at a relative and often major disadvantage in attracting new water-related industry.

Chapter Three - Industry Analyses

The analysis of site location factors sets the general context for looking at the land demand for new or expansion sites of specific industries in the Bay Area Five major industries will be examined: petroleum refining, storage, and petrochemicals; chemicals; metal refining and fabrication; food processing and mineral resource processing. These account for ninety percent of the currently in use water—related industry designated lands, and practically one hundred percent of the water—related industries, i.e. about ten percent of the water-related industries designated land is used by non-water-related industries.

Petroleum Refining and Storage and Petrochemicals

Petroleum refining and storage is the largest water-related industry on San Francisco Bay. It accounts for eighty-one percent of all the developed land reserved for water—related industry in the San Francisco Bay Plan. Eleven different companies have refineries, tank farms, and storage and blending facilities in the northern bay. [1] Data on incoming and outgoing transportation modes was received from six of the seven largest companies. For these six, none received less than fifty percent of their oil by water. The weighted average of oil receipts appears to be between seventy percent and eighty percent. On the outgoing side much less refined product is shipped by water. The range is from five percent to fifty percent with the

[1] The eleven firms are Chevron USA, Exxon, Landsea, Pacific Refining Company, Shell Oil Company, Tosco, Wickland Oil Co, Unocal, Arco, Petromark, and Texaco.

weighted average between fifteen percent to twenty-five percent Oil industry transportation practice clearly establishes it as a water-related industry in the Bay Area

Currently, the world and the United States have surplus refining capacity. Moreover, the trend is for foreign producers of oil to build or expand their refining capacity as a way of capturing more of the value added in the production and r e fining process. There is also strong political motivation of foreign producers to refine one's own oil even when the economics are not favorable. Currently, on the West Coast, foreign imported oil accounts for approximately five percent of processed crude oil. The last United States oil refinery to be built was constructed in the late seventies.

Current total crude oil processing in the Bay Area is approximately 800 thousand barrels a day with only fifty thousand barrels a day imported from overseas into the Bay Area While production is primarily sized to the Northern California market, the Bay Area refineries presently export to other United States areas a small percentage of their production.

Oil industry analyst believe that there may be a modest expansion of existing refinery capacity demand from a moderately increasing population in the northern California market area However, it is not expected that a new refinery will be built in the Bay Area More likely than new construction would be an upgrading of the capacity of some of the existing refineries. In discussion with refinery experts at Chevron, the view was expressed that they had more than enough land available at the Richmond site for any potential refinery expansion and other major refineries were probably in a similar situation. We see some possible consolidation involving the smaller and financially weaker oil companies. The only scenario that could lead to major new site construction would be one in which a major existing plant was shut down as a result of extreme local political/environmental pressures. This is not judged likely.

The development of new petrochemical capacity in the Bay Area is even less likely tian the development of new refining and storage sites. Currently, there is some limited production of petrochemicals in the Bay Area in existing plants. This is high cost production due to air quality regulations. As future production mixes change, this limited production is likely to be reduced. The current production capacity is overwhelmingly concentrated along the Gulf Coast where the predominant market for petrochemicals is located. Producers and users are linked

together with miles of pipelines that provide both great flexibility in product purchasing and very low transportation costs.

The late seventies were a period of rapid and massive expansion of U.S. petrochemical facilities (and resulting excess productive capacity some of which still exists). This was the period when both Dow Chemical and ARCO contemplated the construction of petrochemical plants in the northern Bay Area This situation is highly unlikely to arise again.

Any major United States petrochemical plant expansion, even along the Gulf Coast, is quite unlikely during the rest of this decade. Plants are being moved to the source of the feedstocks, e.g. Saudi Arabia, thereby greatly reducing the costs of the feedstocks and of the large amounts of energy required in manufacture of petrochemicals.

In summary, given global trends and the economics of alternative site locations, only a modest expansion of petroleum refining and storage capacity will occur in the Bay Area and only within present sites. The same is true of petrochemicals which at present are a marginal user of Bay Area land. No new refineries or petrochemical plants are expected to locate in the Bay Area

Chemicals

Approximately five percent of the currently developed water-related industry land is used by chemical companies (excluding petrochemicals). This industry is currently a marginal user of water transportation. Of the three largest chemical plants, i.e. Allied Chemical, Monsanto, and Stauffer Chemical, two do not use water transportation and the other uses less than ten percent for both receiving and shipping.

Given the diversity of chemicals which are, or could be produced, in the Bay Area, strong growth in international and national demand in some lines is quite likely, though not for chemicals overall. However, given the general economics of site location, e.g. land costs, emission control requirements, etc., it is unlikely that major new sites will be developed for the chemical industry within the area under BCD C jurisdiction. Both the Dow and ARCO proposals for new petrochemical plants in the late 70s were on the Sacramento Ship Channel in Solano County beyond BCDC jurisdiction. It is unlikely that future plants will be proposed for the Delta area in the future.

In summary, the development of new chemical plant sites in BCDC's jurisdiction is highly unlikely although expansion of capacity at current sites could occur. However, this projection may be pointless since all indications are that chemicals are no longer a water-related industry in the Bay Area they no longer transport their product by water but rely on rail and track to transport the raw materials and finished products.

Metal Refining and Fabrication

In 1986 U.S. Steel and POSCO of South Korea concluded a major agreement for a joint venture to produce finished steel products in the Bay Area The old U.S. Steel plant in Pittsburgh will be modernized and expanded to finish iron billets shipped from South Korea These billets will be shipped directly to USSPOSCO's facilities. While this plant is located just outside BCDC's jurisdiction, this expansion highlights a number of factors important to water-related industry in general:

1) it indicates the low likelihood of expansions in iron ore refining capacity in the United States.
2) it focuses the emphasis on finishing and specialty products in which the United States can most favorably compete.
3) it has increased production but as an expansion at an existing site, not a new site development
4) it shows that the investment required to compete in basic industrial markets will not necessarily create new jobs, i.e. the 300-million-dollar modernization expenditure will only serve to maintain employment levels which would otherwise decline.
5) it indicates the potential impact of facilities on water ways which are not part of BCDC's jurisdiction.

Within BCDC's jurisdiction metal refining, finishing, and fabrication uses one percent of the developed water-related industrial land. There are no prospects for large scale new site development for this use. The Bethlehem Steel plant at Point Pinole closed in the 1950s. Peter Kiewitt and Kaiser Industries are continuing to fabricate structural steel products. They state that the ability to transport large fabricated metal structures by water is crucial to their

business. However, third world competition in their line of business, especially construction of off-shore oil drilling platforms by South Korean firms, makes major expansions unlikely and the location of new facilities extremely unlikely.

There is a growing trend in the metal finishing and fabrication business to develop small, specialized, and easily relocatable plants which focus on specific market niches, i.e. specialty high strength steels. It is certainly possible that one or more of these facilities could choose to locate in the Bay Area However, in all likelihood they would not be water-related industry in the sense of requiring a water terminal to receive raw materials or ship a finished product Their scale of operation would be small and they are upstream from the refining of bulk ores in the manufacturing process. If they used water transportation at all, their needs could probably best be served through cargo ports using containers.

In summary, we see no major demand for new water-related industry sites for metal refining or fabricating industries. Even expansion of existing sites appears to have limited potential. The more dynamic segments of this industry have a small scale and limited volume product mix which would not require them to locate on the waterfront to receive materials or ship finished products.

Food Processing

Two major food processing plants are located on the Bay. One is the C&H Sugar Refinery in Crockett and the other is the General Mills flour plant in Vallejo. They occupy less than one percent of the designated water-related industry developed land.

C & H is the largest sugar refinery in the world and receives all its raw cane sugar from Hawaii by water. Given the world economics of sugar, no expansion is foreseen and a major reduction is a distinct possibility by the end of the century. The U.S. sugar industry is a highly protected industry and any increase in quotas will equivalently reduce its production. Even with these barriers, the sugar cane fields of Hawaii are being converted to other uses at a rate which will substantially decrease the source of supply to C&H.

The General Mills plant no longer uses water-based transportation, although it considers this option important due to the potential impact of railroad consolidation on transportation costs. me plant capacity will be expanded by adding new hoppers to store milled

grains prior to shipment to market Both incoming grain and milled flour are transported by either truck or rail. Some of the packaged milled flour is trucked to the Port of Oakland for export abroad. In general, flour milling operations are moving inland from the Bay to the Stockton area which is served by the Stockton Ship Channel.

Mineral Resource Processing

Sand Reclamation

Sand reclamation uses less tian one percent of the developed water-related industry designated land. This industry has a limited need for fifteen acres, currently water-related industry designated along the northeastern shoreline of Contra Costa County for sand dewatering and storage. This parcel is small and narrow and has little value for any alternative industrial or commercial use.

Salt

Salt ponds, traditionally considered a mining activity, are by far the largest users of bay front land. Refined salt is transported to market principally by water. Leslie Salt, now owned by Cargill, has been producing salt from the Bay for decades, but this industry is changing. Bay salt is primarily sold to Pacific Northwest's chlorine producers and used mainly in the production of wood pulp and the manufacture of paper products.

Bay Area salt production competes with salt from Baja California. The market is stagnant, and the competition is growing. Leslie is having some problems with heavy metal contamination of the salt If the waste fired Bay Area Resource Recovery Power Plant project proposed for Redwood City goes ahead, the amount of heavy metal contamination will increase significantly, and Leslie probably will have to eliminate its salt pond production at least around Redwood City. (Chlorine reactors explode if the salt is contaminated) Alternative uses for the land, particularly in Redwood City, have much higher values. The result could be the abandonment of salt production and rezoning of the land for commercial or industrial use, in the Redwood City area in the 1990s. These lands would be marginal, et best, for water-related industry because of their poor load bearing ability and minimal water depths.

Other Uses

In Benicia, sixty-six acres of water-related industry designated land are used for imported auto storage. As part - of the storage one final bit of assembly is done to lower import tariffs. Technically, the further assembly process of the automobiles at this site makes it a water-related industry. Auto import is a cargo activity and all the Bay Area ports are involved, i.e. Oakland, San Francisco, Richmond and Redwood City as well as Benicia.

The rest of the developed water-related industry designated land, i.e. up to nine percent, is in the Benicia Industrial Park and is not water—related, e.g. tanneries and glass blowing.

Summary

Five major water-related industries were analyzed. Two of the four, chemicals and food processing, were found to be marginally water-related industries, only C & H Sugar is significantly water dependent. Two others, petroleum refining, storage and petrochemicals and metal refining and fabrication, were fot.md to have no needs for new sites, now or in the future. Petroleum refining and storage is likely to undergo modest expansion as the Northern California market grows but can easily accommodate the expansion within existing land holdings. Mineral resource processing, had only a limited need for a specific 15 acres for sand reclamation.

Chapter Four - The Supply of Land

In 1969 the San Francisco Bay Plan approved the setting aside of 24,855 acres of land for water-related industry. Of this total, 5,910 acres were estimated to be in use and 18,945 acres undeveloped. Since then land use changes have occurred and the understanding of which parcels are physically able to support water-related industry has improved. Moreover, in the intervening years it has been discovered that what were thought to have been dry applauds were in fact either tidal or seasonal marshes.

This chapter is an overview of information developed by the staff of the San Francisco Bay Conservation and Development Commission on each site which is in Appendix B. The supply will be compared to land demand as developed in Chapters Two and Three.

Table 4.1 provides a summary of land availability comparing 1969 and 1986. From 1969 to 1986 the total amount of water-related industry land has decreased by roughly fifty percent from 24,855 acres to 11,922 acres. Within this overall decrease, land in use increased from 5,910 acres to 8,237 acres, an increase of 2,327 acres or thirty-nine percent.

This increase would be misleading if it were considered to measure the expansion of water-related industry over that time. Over 2,000 acres of the increase is refinery land which acts primarily as buffer zones to other surrounding urban uses, e.g. residential or commercial, or is a provision against possible future expansion needs. Some of this land was bought by the refineries between 1969 and 1986, but most is simply a reclassification of land previously owned by refineries from undeveloped to in use to reflect its non-availability for other uses. Nearly another 1,000 acres was developed for mainly non-water related uses in Benicia., i.e. the Benicia Industrial Park. in addition, 600 acres at Point Pinole which were in use were deleted from the Bay Plan in 1971 when Bethlehem Steel Company decided not to develop a new steel mill at the site and sold the property to the East Bay Regional Park District for tie present Point Pinole Regional Shoreline Park. Thus, the increase in land in use reflects little increase in existing water-related industry activity over the period and no new water-related industry.

Table 4.1

Summary - Acreages Available for Water Related Industry

Table 4.1 Summary - Acreages Available for Water Related Industry

Contra Costa County	**In Use 1969**	**Undeveloped 1969**	**In Use 1986**	**Undeveloped 1986**
Richmond (CC-1)	1700	730	1795[1]	--
Point San Pablo (CC-2)				
Point Pinole (CC-4)	600	730	--	--
Hercules (CC-5)	50	910	160	--
Selby (CC-7)	510	60	510	60
Martinez (CC-8)	530	280	709[2]	--
Martinez (CC-9)				
Avon (CC-10)	1610	4220	2912	153
Avon (CC-11)				
Pittsburg (CC-13)	--	660	--	--
Crockett	90	--	90	--
Solano County				
Collinsville (Sol-1)	--	6210	--	2668
Benicia (Sol-2)	780	950	1672	--
Vallejo (Sol-2)	40	200	209	--
Potrero Hills (Sol-6)	--	3115	--	--
Sonoma County				
Petaluma River				
Mouth (Son-2)	--	880	--	801[3]
Total by Use	**5910**	**18945**	**8237**	**3685**

	1969	1986
Total	24,855	11,922

The drop in the undeveloped land is very large, from 18,945 acres to 3,685 acres. me reasons for this decrease are shown in Table 4.2 and fall into four categories: tidal marsh, plan amendments, developed for other uses, and unsuitable sites.

The remaining 3,685 acres of undeveloped land can be further sub-divided. First, 804 acres is at the month of the Petaluma River in Sonoma County and is suitable only for shallow-draft vessels such as barges. This land was originally set aside when the technology of Lighter

[1] Room for physical expansion of additional tank storage on point San Pablo.
[2] All owned by Shell Oil; some possible physical expansion possible.
[3] Shallow draft site.

Aboard Ships (LASH) was thought to be the wave of the future. It was thought that barge sites were needed for construction materials such as sand, gravel and cement.

The LASH technology never came of age in the Bay Area and, as of 1986, this technology is moribund and probably dead Moreover, sub regional barge sites for heavy bulk construction materials area and has exhibited no demand in the Bay Area We can foresee no additional water-related industry demand for this land based upon lighter/barge technology.

Table 4.2

Reasons for Deletions of Land from the Water-Related Industry Category

Table 4.2 Summary - Acreages Available for Water Related Industry

	In Use	**Acreage Undeveloped**	**Total**
Tidal Marsh and Other Wetlands	--	1,063	1,063
Bay Plan Amendments	600	9,115	9,715
Areas Developed for Other Uses	--	925	925
Areas with Unsuitable Physical Characteristics	--	1,154	1,154
Deleted by Permits		76	76
		12,333	**12,933**

The second piece of undeveloped land is a single 2,668-acre site at Collinsville. While this land is currently the subject of the proposed Collinsville-Montezuma Hills Redevelopment Project, our analysis of current industrial land trends indicates that major development before the turn of the century is unlikely. While this land may have considerable future value, its medium-term value to support water-related industry development appears limited.

Thus, there are only 213 acres of "prime" water-related industry land that is currently undeveloped. Is these 213 acres too little, enough, or too much given our analysis of the demand for water-related industry land? There are several perspectives one can take in answering this question.

Perspective I: 213 Acres is only one percent of the 18,945 acres that were thought to be available. This is a precipitous decline in the available undeveloped land and therefore a cause for great concern.

Comment It is a precipitous decline, but whether it is a cause for concern and what should be done, is question of current and future demand, not change in past supply.

Perspective II: 213 acres is only three percent of the land in current use and as such is much too small to be a safe buffer against future needs.

Comment A three percent buffer would appear to be very tight buffer given the nearly 35—year time horizon of BCDC in its Bay Plan target of 2020. However, one needs to look more closely at the industrial segments of land use. Table 4.3 shows the percentages of land in use by industry. Refineries, which use eighty-one percent of the land in use can be excluded from future demand because they appear to have more than enough land reserved for any potential future expansion. Our analysis indicates that any expansion will be rather moderate and confined to existing land holdings. Of the remaining industrial segments, many are not water-related or have a majority of firms which no longer use water transport, e.g. 2 out of 3 chemical plants and 1 out of 2 food processors.

Table 4.3
In Use Acreage by Industry

Table 4.3 In Use Acreage by Industry

	Percent of In Use Land
Petroleum Refining	81%

Food Processing	1%
Chemicals	5%
Sand Reclamation	1%
Metal Fabrication	1%
Auto Assembly[1]	1%
Non-Water-Related Industry Uses[2]	9%
Total	**99%**

Perspective Ill: Less than two percent of the current in use land is occupied by water-related industry which is likely to require new, currently undeveloped sites. This two percent is 150 acres compared to an undeveloped prime land supply of 213 acres.

Comment: While a demand versus supply comparison is the most appropriate, the amounts of land have decreased sufficiently to raise questions about the inherent accuracy of such a broad, long-range study, i.e. is this study accurate to a few hundred acres. Moreover, the effectiveness of BCDC in preserving specific pieces of land must be questioned since it only has permit authority over the first 100 feet of shoreline. In sum, the scale has changed from thousands of acres to hundreds of acres and the impacts of this upon BCDC policy and study accuracy must be carefully assessed.

Perspective IV: The land most important in the next ten to fifteen years is found in three parcels: Collinsville (Sol-I), Selby (CC-7) and Martinez/Avon (CC9, 10, 11). Each parcel should be individually analyzed, and recommendations made based upon its unique characteristics.

Comments: This perspective is correct in the sense that with so little land available, a parcel by parcel review is certainly warranted. Appendix B provides such a review.

Both Perspectives Ill and IV are valid and point to issues which are outside the purview of this report.

[1] Auto imports are unloaded at Benicia and parked for storage on 66 acres of land. However, one final assembly is added to reduce import tariffs.

[2] 2These uses are mainly in the Benicia Industrial Park and include tanneries, glass works, etc.

Chapter Five - Conclusions

Industrial demand for sites with deep-draft access is limited. This analysis concludes that some limited expansion of production is likely, especially in petroleum refining and storage, but nearly all that expansion will occur at existing plants.

The largest water-related industry in the Bay Area is the petroleum refining and storage industry. It uses eighty-one percent of the land currently in use. This industry has already purchased large amounts of land around their current refineries to act as a buffer between their operations and other uses and/or to hold against future expansion needs. We foresee only moderate expansion of existing capacity of the large Bay Area refineries in the future and most likely a consolidation of the smaller refineries. Our conclusion is that this industry will not need any undeveloped land expansion capability in the Bay Area well into the next century.

Much of the rest of the occupied land is not used by firms currently using water transportation. Even new industrial development requiring a doubling of the land usage by water-related industry, excluding refineries, would only generate a demand for several hundred acres. Such a doubling of land demand is very unlikely.

Water-related industry is generally a stagnant or slowly growing part of American industry, with the result that a limited number of new plants are opened in the U.S. each year. me competition for these plants is fierce and other areas on the West and Gulf Coasts and Mississippi inland waterways, with deep-draft terminal locations, have a decided competitive advantage. Strong competition also comes from the general cargo ports and the expanded use of very efficient materials handling techniques such as containers and pipelines. For example, the old General Motors plant in Fremont has been able to reopen as a joint General Motors and Toyota venture with the Bay Area ports handling the large in-flow of parts and sub-assemblies from Japan.

We cannot exclude the possibility that a few firms with unique requirements will want their own new deep-draft terminals on San Francisco Bay and thereby create a demand for several hundreds of acres of land. We do exclude the possibility of a demand for thousands of acres of currently undeveloped land given current trends in land prices, labor costs, taxes, and pollution control requirements.

This reduction in the scale of demand for land for new plants from thousands to hundreds of acres is paralleled by reduction in the supply of undeveloped land. In the analysis of Chapter Four and Appendix B, provided by the San Francisco Bay Commission staff, the 18,945 acres of undeveloped land reserved in 1969 is found in 1986 to currently contain only 213 acres of prime land for development over the next ten to fifteen years. The major development of another 2,668 acres at Collinsville may have to wait until the next century.

Our conclusion is that the 213 acres will probably be enough to meet any likely needs of water-related industry within this century. Backup land to these 213 acres is provided by the Collinsville site, and the possibility of purchase of existing deep-draft terminals no longer in use by firms located on those sites. Additional "expansion" could occur by restricting water terminal usage, e.g. as at Los Angeles-Long Beach, and transshipping materials to plants further inland.

The more basic question, which underlies the issue of how much land is "enough", is whether a water-related industry designation is still warranted and useful. Have the underlying economic trends which shifted the scale of the analysis from thousands of acres to hundreds of acres, also eroded the basic justification for a special category to protect land for water-related industries? Are part of the unique deep-draft water terminal resources of the Bay best reserved for water-related industry, or should they be managed to best meet the combined needs for water transportation of all industry and commerce in the Bay area? To answer these questions, the history and assumptions justifying this category will be reviewed.

A special designation for industry dependent upon water transportation was originally developed because of: 1) the importance of heavy industry to Bay Area economic development, 2) the needs of many heavy industries for water transportation, and 3) the desire to avoid the necessity for further Bay fill to meet those needs. Each of these reasons will be reviewed in light of the situation in 1968, in 1986, and in the future.

Importance of Heavy Industry to Bay Area Economic Development

In 1968 heavy industry was believed to be a primary engine for Bay Area economic development Not only would heavy industry itself provide jobs, but the associated industries, which would be drawn to the area to support it and use its output, would greatly multiply the impact of the direct heavy industry employment Dr. Dorothy Muncy conducted a study for the

San Francisco Bay Commission to help it determine what areas with Bay frontage would likely be needed by which industries. She defined ninety-eight “water-oriented" industries. Over time the definition evolved, and the number of industries covered by the definition declined. This history is described in Appendix A

Eighteen years later in 1986, it is clear that heavy industry is on the decline in the United States in general, and the Bay Area in particular. This area has become a center for hi -tech research and development, light industrial manufacturing and financial service industries. While heavy industry remains an important source of existing employment to a few towns, it clearly will not be an important generator of future employment growth for the Bay Area

This study has focused upon the five industry groupings which represent the industries in operation with water-related industry priority use areas. It found that two of those groupings, chemicals and food processing, were marginally water-related industries, (only one chemical firm received about ten percent of its raw materials by water and C & H Sugar received all its raw sugar by water). Two other groupings, petroleum refining, storage and petrochemicals and metal refining and fabrication, were water-related industries but neither had need of new sites and only the former was likely to expand at existing sites. The final category of materials resource processing (sand reclamation) had a limited need for 15 acres of Bay front land.

The prospects for employment increase in water-related industries are even worse than might initially be thought based upon the limited expansion that is projected to occur in some industries, e.g. petroleum refining. Given the competition from low labor cost foreign producers, the only way American heavy industry can economically increase production is by heavily automating the production process and reducing labor costs. Expansions of production in the Bay Area and concomitant plant modernizations, seldom result in employment increases. A case in point is the new USS-POSCO joint venture which will result in a 300-million-dollar modernization of the old U.S. Steel plant at Pittsburgh. At best the employment impact will only be to nearly maintain current employment levels at a plant that might otherwise have had to reduce employment.

The Bay Area's largest water-related industry in terms of land use, petroleum refining and storage, has one of the highest capital to labor ratios in heavy industry. Future

modernization and expansion at these plants will further increase this ratio; even marginally increased refinery employment in the future is by no means a certainty. The secondary induced employment impacts of petroleum refining expansion have been limited in the Bay Area in the past, e.g. we have very little petrochemical production, and are not likely to be large in the future.

In summary, heavy industry in 1986 does not have an importance to the Bay Area economy which would justify a special water-related industry designation to meet its needs.

Heavy Industry's Need for Water Transportation

There has been a dramatic change in materials handling since 1968 which has increased the relative economic advantages of using general port facilities versus firm owned water terminals. This is reflected in the erosion of the number of industries which still meet the requirements of the water-related industry classification.

Private water terminals will remain important to some existing firms in the Bay Area and could be a requirement for some new firms in the future. However, in terms of the development of new sites, such requirements would be numbered in ones and twos (or less) per decade rather than tens and twenties. Such limited requirements would hardly appear to warrant a special water—related industry category.

Requirements for Future Bay Fill

The ultimate objective of the water-related industry designation was to prevent a requirement for further Bay fill to meet the land needs of a major force for economic development, water-related industry. Neither the relative political power of heavy industry based upon its economic importance nor its needs for Bay frontage for terminals sustains any likelihood that future Bay fill will be required to meet the needs of water-related industry. As a category designed to protect the San Francisco Bay, the water-related industry designation is of little practical importance.

Therefore, our conclusion is that in terms of the limited objectives of preventing Bay fill and meeting the needs of economic growth, the designation of land reserved for water-related industries could be eliminated. In this conclusion, we have chosen to emphasize the limited objectives of the special water-related industry designation. There are other broader objectives for land which can serve as deep-draft water terminals.

Land for deep-draft terminals is clearly limited. It is a scarce and valuable transportation resource whose conservation and use for the benefit of the current and future Bay Area community is clearly part of BCDC's charter. The limited conclusion of this study is that heavy industry should no longer have a specially protected claim upon such land. We have not concluded that industry in general has either limited or declining needs for water transportation. Such an analysis is beyond the scope of this study.

In the Bay Area Regional Seaport Plan adopted by BCDC in 1982, there was some attempt to accommodate the similar needs of both water—related industry and ports for deep-draft sites, i.e. the Selby site was designated for both port and water-related industry use. This process was inhibited by the separate designation of water-related industrial and port use lands. We believe that the separate designation of the two land uses could be eliminated and a single port designation applied to the deep-draft sites.

Appendix A - Definitions of Water-Related Industry

In the McAteer-Petris Act, the Legislature found that water-related industries were essential to the public welfare of the bay area and that provisions should be made for adequate and suitable locations for water-related industry to m in i m i ze future fill in the Bay to accommodate such uses. In 1968, the Commission engaged Dr. Dorothy Muncy to help it determine what areas would likely be needed by which industries. The first task was to ascertain what categories of industries needed waterfront locations on the Bay.

The initial definition by Muncy was of "water—oriented" industry. Muncy reported that sites on navigable waters such as San Francisco Bay were actively sought by four types of industries seeking a waterfront location. These "water— oriented" industries were: (1) industries that use water for transportation of materials; (2) industries requiring large quantities of water in the manufacturing process; (3) industries attracted to the shoreline for reasons not directly related to the water, such as airports that require a clear zone for aircraft take-offs and landings; and (4) industries that seek the amenity value of a waterfront site. Muncy concluded that the group of industries which use water transportation were the most critical to the Bay region because these industries were thought to be basic industries to the regional economy, e.g. chemical plants, petroleum refineries, primary metal industries, food processing industries and ship building.

These industries tend to be basic processors of raw materials the first stage in the manufacturing process upon which many other industries depend. Most of these industries seek locations on deep water because it is significantly cheaper to ship the heavy materials by water primarily by deep-draft ship, and in some cases by barge. It was anticipated that the demand by these industries for navigable deep-draft and shallow-draft (barge) waterfront sites would increase. It was thought that other industries that relied on the products manufactured by these industries would tend to locate around them providing a significant number of jobs.

Based in large part on the information in Muncy's report and on her recommendations, in 1969 the Commission adopted the following definition of water-related industry as part of the Bay Plan: "[Industries of many types require frontage on navigable waters to receive raw

materials and to distribute processed materials by ship. These are 'water-related industries'." The Commission designated a number of deep-draft and shallow-draft sites around the Bay on the Bay Plan maps as sites reserved for water-related industry.

The water transportation uses Muncy described were very broad and included ninety-eight different industrial classifications such as fisheries, petroleum refiners, steel foundries, papermills, utilities and transportation firms. In the Bay Plan, the Commission distinguished between refining, processing, or manufacturing uses and solely distribution uses requiring a navigable waterfront location. The distribution-oriented uses were defined as port uses rather than water-related industry. This reduced Muncy's initial set of industries by about forty percent, since she had included such non-industrial distribution firms as ferries and cargo handling facilities in her examples of water-related industry.

In 1978, based primarily on the recommendations in the Gruen report, the Commission modified its definition of water-related industry requiring that in addition to needing a waterfront site for transport of materials or products by water, the specific industry must gain a significant economic advantage by using water for transportation. The Commission amended its 1969 definition as follows: "[c]ertain industries use water for transportation thereby gaining significant economic benefits by fronting on navigable water. These are defined as 'water-related industries'."

More recently, Robert F. Goodwin developed the concept of "water dependency" for Puget Sound's Maritime Industries study.[1] His approach is based upon the assumption "that the degree to which an industry is concentrated on shoreline sites attests to its relative water-dependency". Thus, if an industry has a greater proportion of its firms located on the shoreline than the average for all industries in the area, it is relatively water-dependent The higher this concentration, the higher the relative water-dependency until the limit is reached when firms in the industry are only located on the shoreline.

The study conducted harbor-by-harbor inventories of commercial and industrial establishments occupying waterfront parcels on Puget Sound for the years 1962, 1972, and

[1] "Industrial Change & Water Dependency: An Aspect of Coastal Management in Puget Sound" by Robert F. Goodwin, Washington Sea Grant Marine Advisory Services, May 1986

1982. These years were chosen to coincide with Bureau of the Census' reports which provided overall area information. The study was not only able to measure current water-dependency, but also the direction and magnitude of change over a twenty-year period.

The initial results of the study suffered from data problems, but new and better data sources have been found and are currently being used to revise the study. However, even the initial results were very interesting in terms of the patterns of usage they showed and provide an empirical basis for supporting decisions on who needs to locate on Puget Sounds' shoreline.

The strength of the Goodwin study is the historical perspective and the large number of industrial and commercial categories it covers. The weakness, for our purposes, is that it does not explicitly separate out firms which require their own water terminals nor the factors which increase or decrease future needs, except as incorporated in historical trends. This is no criticism of the study, given its own objectives. Its results could be very useful in other contexts, e.g. an analysis of what usages to support on the San Francisco water front north of pier 54.

Part II.

SUPPLY OF WATER-RELATED INDUSTRIAL LAND AROUND SAN FRANCISCO BAY

In her 1968 report to the San Francisco Bay Conservation and Development Commission, Waterfront Industry Around San Francisco Bay, Dr. Dorothy Muncy recommended setting aside between 22,000-44,000 acres of undeveloped land for future water—related industrial use, in addition to land already in use by water—related industries. However In 1969, based on new population figures prepared by the Bay Area Transportation Study Commission (BATSC) which reduced the forecast of the Bay Area population by the 2020 target date of the Bay Plan, the Commission determined that no more than 18,945 undeveloped acres need be set aside to meet future water—related Industrial demand for new land, in addition to the 5, 910 acres in industrial use at that time. The Commission felt that the combined almost 25, 000 acres of land in use and land undeveloped but reserved for water—related industry was sufficient, particularly when augmented with: (1) acreage that might be added by Bay fill in accord with the Bay Plan and McAteer—Petris Act; (2) sites that might be used by water—related industries on unreserved areas of the shoreline; and (3) sites on some shoreline military bases (i.e. , Mare Island Naval Shipyard and the Concord Naval Weapons Station) that could be used in the future

in the event the military no longer needed the sites. Furthermore, the Commission noted that there was a substantial area along the Sacramento River upstream from the Commission's jurisdiction suitable for water—related Industry.

Consequently, in the 1969 Bay Plan, the Commission established 1.7 water—related industry priority use areas In Contra Costa, Solano, and Sonoma Counties. Following Is a description of each site including an Identification of the Commission's Bay Plan amendment and permit activities affecting the acreage reserved for water—related industry, site constraints to water—related industrial development, and an analysis of the current status of each site for water—related industrial development. These sites and the acreage In use and not in use but available for water—related Industrial development in 1969 and what we conclude are available today are shown in Table B—l.

Contra Costa County

By far the greatest number of sites reserved for water—related industry, 11 sites, are in Contra Costa County. These sites are at Richmond, San Pablo Point, Hercules, Selby, Crockett, Martinez, Avon, and Pittsburg.

1. Richmond (CC—I)/ San Pablo Point (CC—2). The Richmond (CC—I) and adjacent San Pablo Point (CC—2) sites are in the City of Richmond (see Figure 1). Although established as separate sites in Muncy t s report, they are joined here for ease of analysis (it is difficult to determine the 1969 boundary between the two sites precisely).

The composite site extends along the Bay from Point Richmond to Point San Pablo and north to the Richmond City boundary at San Pablo Creek. Most of the 2,430-acre site has been developed by Chevron U.S.A. as a major oil refinery. Crude oil is transported to the refinery by ship. In addition to the refinery, a small site, approximately 30 acres, is owned and operated by the Allied Chemical Company which relies on water for receiving some of its raw materials.

The Richmond/San Pablo Point site is an excellent one for a petroleum refinery; the site fronts on deep—water, is served by the Chevron, Southern Pacific, and Unocal petroleum pipelines, and has good land transportation being served by the Southern Pacific, Santa Fe, and Richmond Belt Line rail lines. The site also has good access to Interstate 80 and Highway 17. The

soils of the site form a good foundation for heavy, bulk crude oil and refining facilities. Further, the site is well served by local water, sewer, and power facilities.

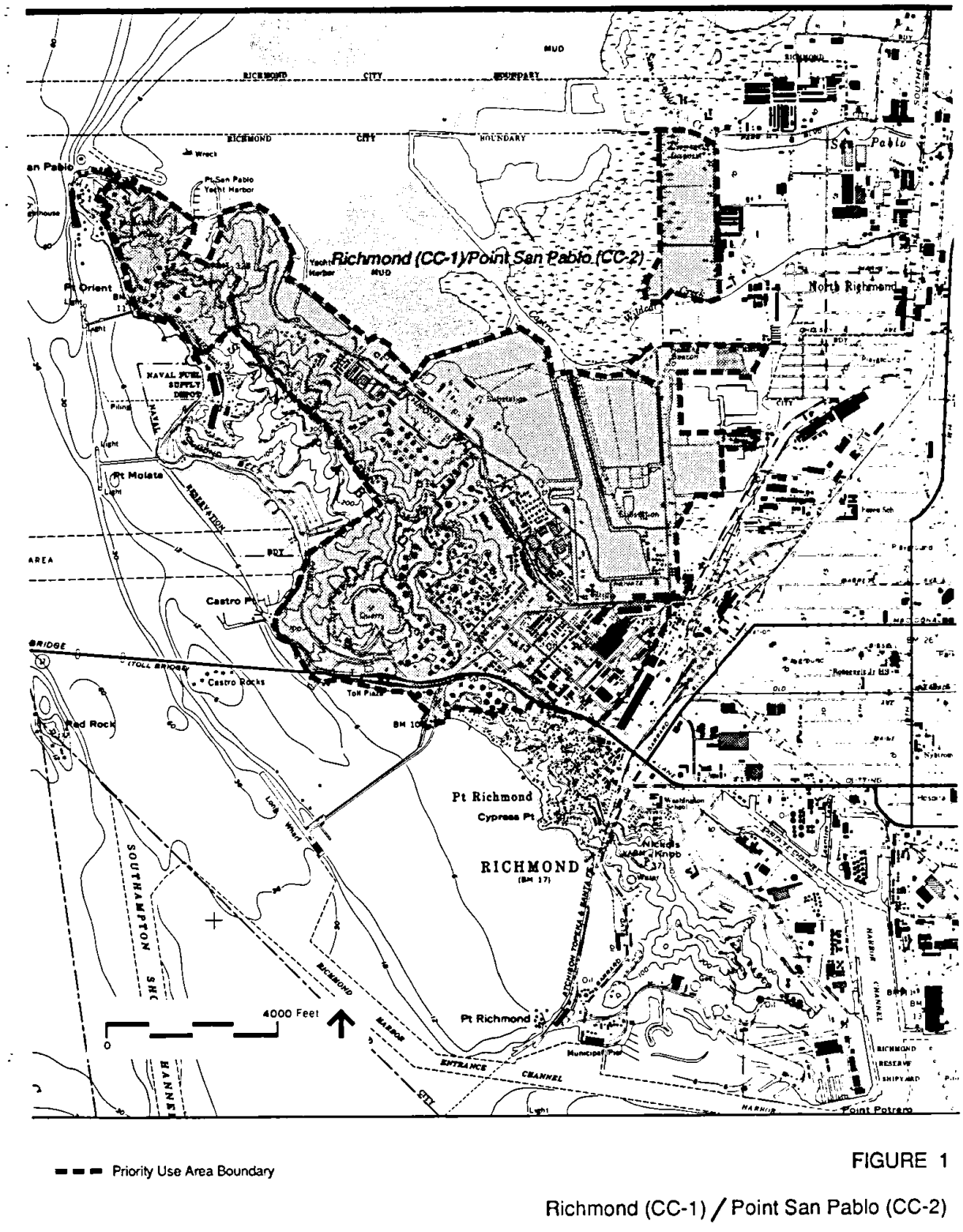


Figure 1 Richmond (CC-1)/Point San Pablo (CC-2)

The area is designated for Industrial use in the Richmond General Plan, except for a small undeveloped area on the northern end of San Pablo Point that is designated for open space use. However, the entire site Is zoned for industrial use by the City.

In 1969, the Commission designated all of the 800—acre Richmond (CC—I) site as in water—related industrial use and 900 acres of the 1,630—acre San Pablo Point (CC—2) site as In water—related industrial use. The remaining 730 acres of the San Pablo Point site were designated not in use and available for water—related industrial development.

In 1983 the Commission deleted 330 acres from the priority use area site (Bay Plan Amendment No. 1—83) because that area was tidal marsh and was therefore Incorrectly designated. This action reduced the combined Richmond/ San Pablo Point priority use area from 2,430 acres—of which 1 ,700 acres were in use by industry and 730 acres were not In use——to 2,100 acres of which 1, 700 acres were in use and 400 acres were not in use by water—related industries.

Of the vacant 400 acres assumed available for industrial development today, the 125—acre Western Contra Costa Sanitary Service parcel, which Is separated from the remainder of the Richmond/ San Pablo Point priority use area (see Figure 1), has been developed as a sewage treatment facility and should no longer be reserved for water—related industrial use. Thus, at this time, there are approximately 275 acres of undeveloped land available for water—related industry development at the site. However, the 275—acre figure is misleading because much of the land is very steep and difficult to develop. In addition, as with many heavy industries in urban and urbanizing areas, undeveloped buffer areas are maintained to insulate the Industry from urban residential and commercial uses.

We must conclude, therefore, that the Richmond/San Pablo Point site is effectively developed for water—related industry use, although some land Is available for limited refinery expansion, and the site is not available for new water—related Industrial development. With the deletion of the 125—acre West Contra Costa Sanitary Service land, the site would contain 2,100 acres of land in use by water—related Industry.

2. Point Pinole (CC—4). The 1 ,330—acre Point Pinole (CC—4) site was deleted by the Commission in 1971 when It adopted Resolution No. 16 which set the final priority use area

boundaries. In 1969, When the Commission established the site in the Bay Plan in 1969, 600 acres were in use by the Bethlehem Steel Corporation for finishing steel products and the remaining 730 acres owned by Bethlehem were undeveloped. The Commission deleted the site based on Bethlehem's decision not to construct a proposed new major steel plant at the site and the subsequent sale of the property by Bethlehem to the East Bay Regional Park District for development of Point Pinole Regional Shoreline.

3. Hercules (CC—5). The 960—acre Hercules (CC—5) site in the City of Hercules (see Figure 2) was owned originally by the Hercules Powder Company and was one of the first explosives manufacturing facilities in the western United States. At the time the Commission designated this site for water—related industrial use, 50 acres were in water—related industrial use and the remaining 910 acres were either undeveloped or included in the old powder mill site that was no longer in use and was thought desirable for redevelopment for water—related industry.

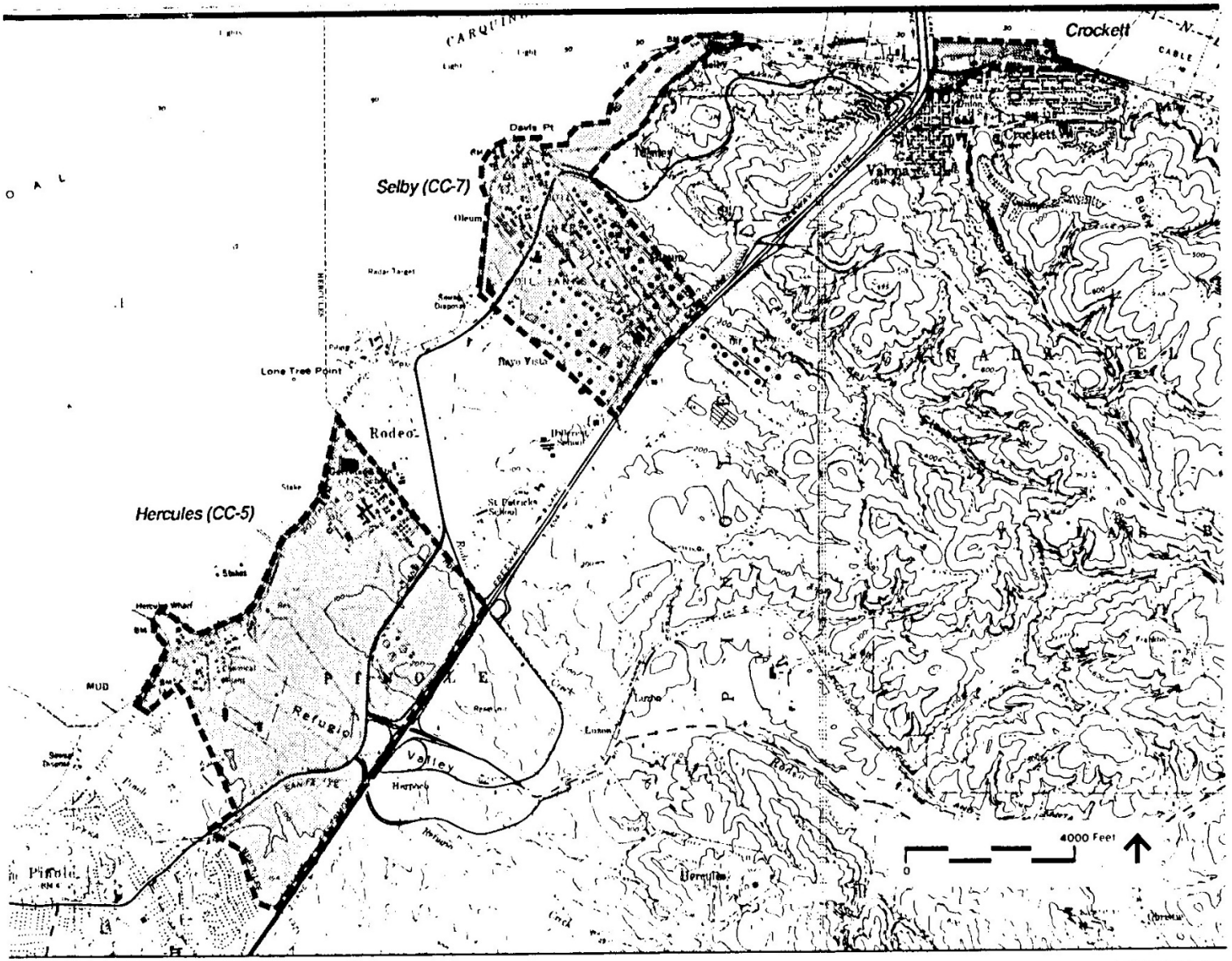


FIGURE 2

Hercules (CC-5) / Selby (CC-7) / Crockett

Figure 2Hercules (CC-5/Selby (CC-7)/Crockett

The deep—water ship channel is located approximately two miles off—shore making the site difficult for immediate access by either deep—draft or shallow—draft vessels because of the shallowness of the Bay in this area. Thus unless an extensive long—wharf were to be constructed to deeper water and an access channel, requiring substantial initial and continual maintenance dredging, were to be constructed, there is no direct ship access to the shoreline, However, liquid bulk materials, such as crude oil, could be pumped to the site via pipeline from a pier with deep water access in the nearby Point Davis area (see Figure 2).

The site is served by the Chevron, Southern Pacific, and Unocal petroleum pipelines and has excellent land transportation with easy access to Interstate 80 and Highway 4 and service by both the Southern Pacific and Santa Fe rail lines. The site is adequately served with water, sewer, and power utilities and the soils provide good foundation for heavy industrial uses.

However, except for the existing 160—acre Pacific Refining Company's oil refinery on the northeastern segment of the site, which receives its crude oil by ship, the remaining 800 acres are primarily outside the Commission's permit jurisdiction and have either been developed, are in the process of being developed, or planned to be developed for other uses.

Pacific Gas and Electric Company has developed a 55—acre parcel next to Interstate 80 as a station to pump fuel oil from the Chevron refinery to PG&E's Pittsburg power plant. The Bio—Rad laboratories Is developing a 150—acre industrial park in a campus setting for use by research and development—oriented companies. Other lands are held by Suburban Reality (104 acres), Pacific Development Corporation (18 acres), lands of Hercules, Inc. (268 acres), and Hercules Properties Limited (205 acres). All of these lands are proposed to be developed for uses other than water—related industry.

The Hercules General Plan designates most of priority use area for Industrial use. However, except for the Pacific Refining Company property, the industrial use Intended Is research and development—oriented industrial parks, such as the Bio—Rad Laboratories development. In addition, the lands near Interstate 80 are planned for highway—oriented commercial development. The remainder of the priority use area is designated for residential, school, and open space use.

Because the local government has planned the remaining undeveloped land in the Hercules priority use area for uses other than water—related industry and the land owners intend to develop the property with non-water—related industrial uses, we believe the land in the Hercules priority use area, other than the 160—acre Pacific Refining Company property, should not be considered available for water—related Industrial development.

4, Selby (CC—7). 570—acre Selby (CC—7) site is In the jurisdiction of Contra Costa County and situated between the Hercules site and the Carquinez Bridge (see Figure 2). The site is owned by two oil refining companies, Unocal (formerly Union Oil Company of California) and Wickland, Inc. (formerly Wick land Oil Company) . In 1969, as today, 570 acres of the site, the Unocal property, are developed for water—related Industry and 60 acres, the current Wickland property, are undeveloped.

The Selby site Is a good site for water—related industry. It is located immediately adjacent to the deep—water ship channel, has direct access to the Southern Pacific railroad main line, and has good access to Interstate 80. The Southern Pacific petroleum pipeline passes through the property and the site is served adequately with water, sanitary treatment, and power facilities.

The American Smelting and Refining Company processed gold, silver, and other precious metals at the Wickland property from 1886 until 1976. A result of processing was the creation of a metallic slag heap on the Bay shoreline and In the Bay at the site consisting of toxic heavy metals including arsenic, lead, zinc, and cadmium. Before development can occur on the shoreline of this area, or dredging for construction of a marine terminal, cleanup of the toxic materials must occur.

In 1979 the Commission issued Permit No. 17—79 to Wickland Oil Terminals (predecessor to Wickland, Inc.) to develop a 1.5 million barrel deep—water petroleum products (gasoline and diesel fuel) terminal and storage facility. The deep—water terminal was to receive petroleum products refined at other sites In the Bay and outside the Bay for storage at the site and distribution to the company's northern California, western Nevada, and southern Oregon market. The project was never built, and the permit lapsed and became void in 1984.

In 1981, Wickland had proposed, as an amendment to the permit, to construct a coal terminal at the site exporting from two to three million tons of coal per year, brought In by rail from the Mountain West, to overseas Pacific Rim destinations. However, this project was eventually abandoned.

The Wickland site at Selby remains an excellent site for uses requiring a deep—water terminal, such as water—related industries or port facilities. Consequently, in 1982, as part of the Bay Area Regional Seaport Plan, the Commission designated the Wickland Inc. part of the Selby site as both a water—related industry and a port priority use area (Bay Plan Amendment No. 5-82).

In addition to the undeveloped land within the Selby priority use area, Wickland, Inc. also owns property upland of the site that was to be part of its petroleum products storage area (see Figure 3). This 239—acre upland area could be added to the priority use area. However only approximately 25 percent of that area, a flat to gently sloping valley, is available for water—related Industry because the remainder is too steep, and the East Bay Regional Park District has an open space and public access easement over part of it as provided for in Commission Permit No. 17—79.

At this time, the Selby site contains, as it did in 1969, 510 acres in use by a water—related industry (Unocal) and 60 acres undeveloped and available for water—related industrial use. The 60—acre area is a prime water—related industry site. We believe the existing Selby Site should remain designated for water—related industry.

5. Crockett. The 90—acre Crockett site on the shoreline of Carquinez Strait (see Figure 2) was in 1969, as it is today, occupied entirely by the C&H Sugar Company which receives all its cane sugar for refining by ship from Hawaii. The Crockett refinery is one of the largest sugar refineries in the world producing approximately 700, 000 tons of sugar products per year. The site is on deep water with its own shipping terminal, adjacent to Interstate 80, and served by the Southern Pacific and Santa Fe Railroad main lines. The site has sufficient water, sewer, and power services for industrial use. The Southern Pacific petroleum, pipeline also passes through the property. There is no land available for additional water—related industry at this site.

6. Martinez (CC—8). The Martinez (CC—8) site is occupied by the Shell Oil Company refinery (see Figure 4). In 1969 the 810—acre Martinez site consisted of 530 acres in use by the refinery and 280 acres that were undeveloped but owned by Shell and available for water—related industrial use.

The Martinez site is adjacent to the deep—water ship channel, is served by the Getty, Southern Pacific, and Shell Oil Company petroleum pipelines, and has excellent land transportation being on the Southern Pacific and Santa Fe railroad main lines and adjacent to Interstate 680. In addition, the site consists of a relatively high hill, or ridge, with soils that provide good foundation for heavy oil storage tanks and the refinery plant. The site is served adequately with water, sewers, and power.

In 1983, the Commission deleted 70 undeveloped acres from the Martinez priority use area because the acreage was tidal marsh and had been incorrectly designated as upland in the Bay Plan (Bay Plan Amendment No. 1—83). Thus, currently the site contains 740 acres; 210 acres of which would be considered undeveloped. However, 31 acres of the undeveloped portion next to Interstate 680 is now owned and managed as a marsh by the Mountain View Sanitary District for treating the District's sewage (see Figure 5). Consequently, this 31 —acre area, because it is no longer owned by Shell and is an undevelopable wetland, should not be reserved for water—related industry.

As with the Chevron refinery at the Richmond/ Point San Pablo site, there is some opportunity for an increase in capacity and an expansion of facilities at the site, but much of what was vacant land in 1969 has been developed for refinery uses and the remainder provides an industrial buffer area around the plant insolating It from the adjacent Martinez residential and commercial uses. No new water—related industry would locate within the remaining undeveloped part of the Martinez (CC—8) site and It is unlikely that a major expansion of the refinery will take occur. Consequently, for all practical purposes, the 709—acre site should be considered in water—related industrial use at this time.

7. Martinez (CC—9). In 1969 the Commission included three sites together——Martinez (CC—9), Avon (CC—IO), and Avon (CC—II) ——for water—related Industry analytical purposes. In this study, in addition to retaining the three sites as one for continuity with the previous study

(see the following composite Martinez Martinez CC—9, Avon CC—10, and Avon CC—II priority use area description), the Martinez (CC—9) site (see Figure 4) has been separated to provide better site—specific information concerning its future designation for water—related industry. This is particularly Important because the City of Martinez and Contra Costa County have requested that the Commission amend the Bay Plan deleting the 245—acre CAZ Development Company site from water—related industrial use designation, and Contra Costa County has also requested that the Commission delete the 356—acre Acme landfill Corporation site and adjacent smaller parcels owned by IT Corporation, the Martinez Gun Club, and Henry's Tree Service from water—related industrial use designation (See Figure 6).

In 1969 the Commission determined that the Martinez (CC—9) site contained approximately 1,372 acres of undeveloped land available for water—related industrial development. However, in 1983, the Commission determined that 26 acres of the site was tidal marsh and therefore deleted the land from the priority use area. Thus, at present 1, 346 acres are designated for water—related industry use.

The area has many water—related industry attributes. The deep—water ship channel is located along the shoreline allowing for marine terminal development and pipeline access inland for liquid bulk industries, such as occurs at the adjacent Shell Oil Company and Tosco oil refineries. The site has good land transportation with immediate access to Interstate 680 and Highway 4, as well as the Southern Pacific and Santa Fe rail lines. Further, the site is served by the Southern Pacific, Shell, and Getty petroleum pipelines. Adequate water, sewer, and power service would have to be provided to the site, but provision of those services in this urban area should present little problem.

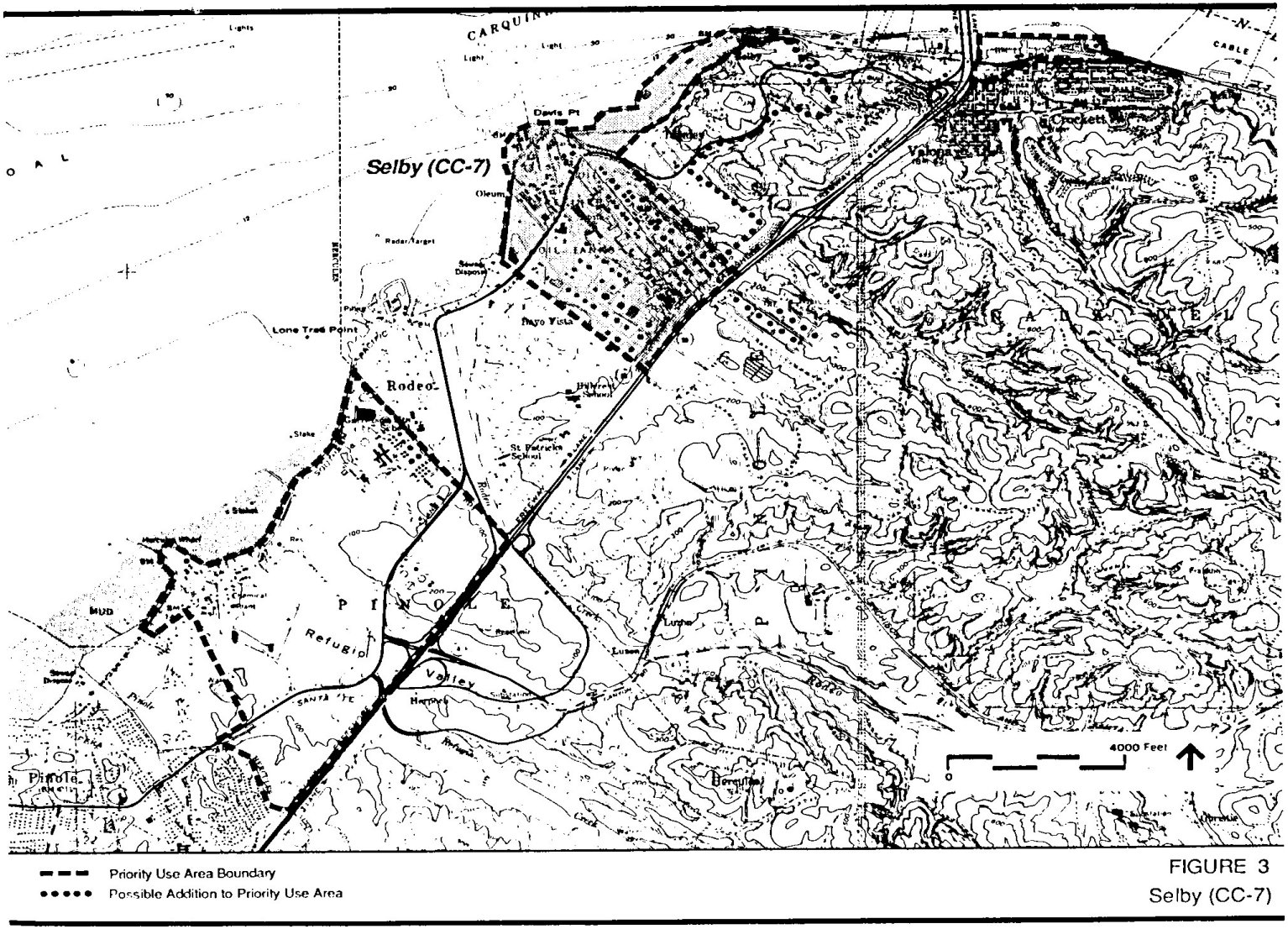


Figure 3 Selby (CC-7)

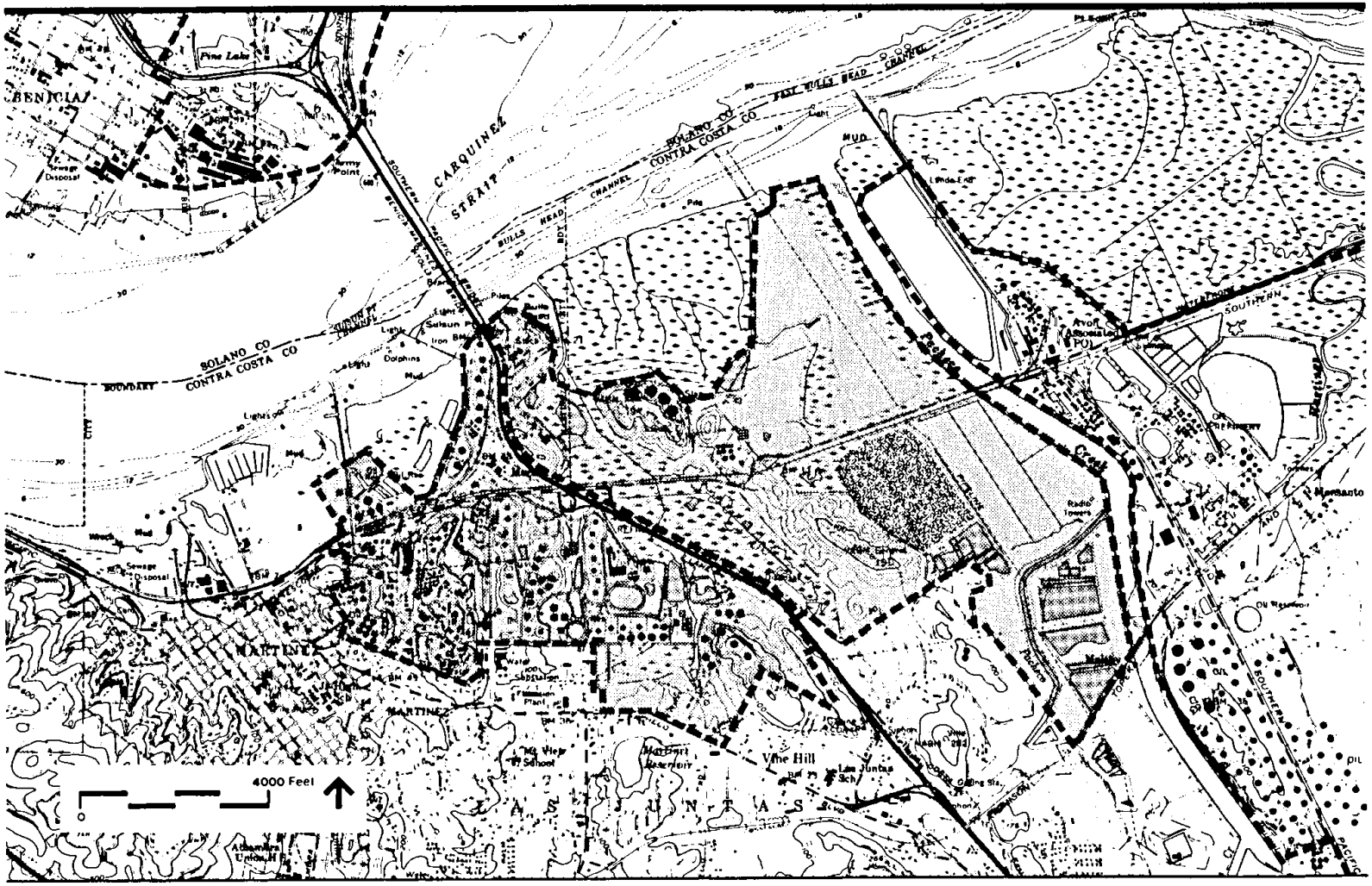


FIGURE 4

Priority Use Area Boundary

Martinez (CC-8) / Martinez (CC-9)

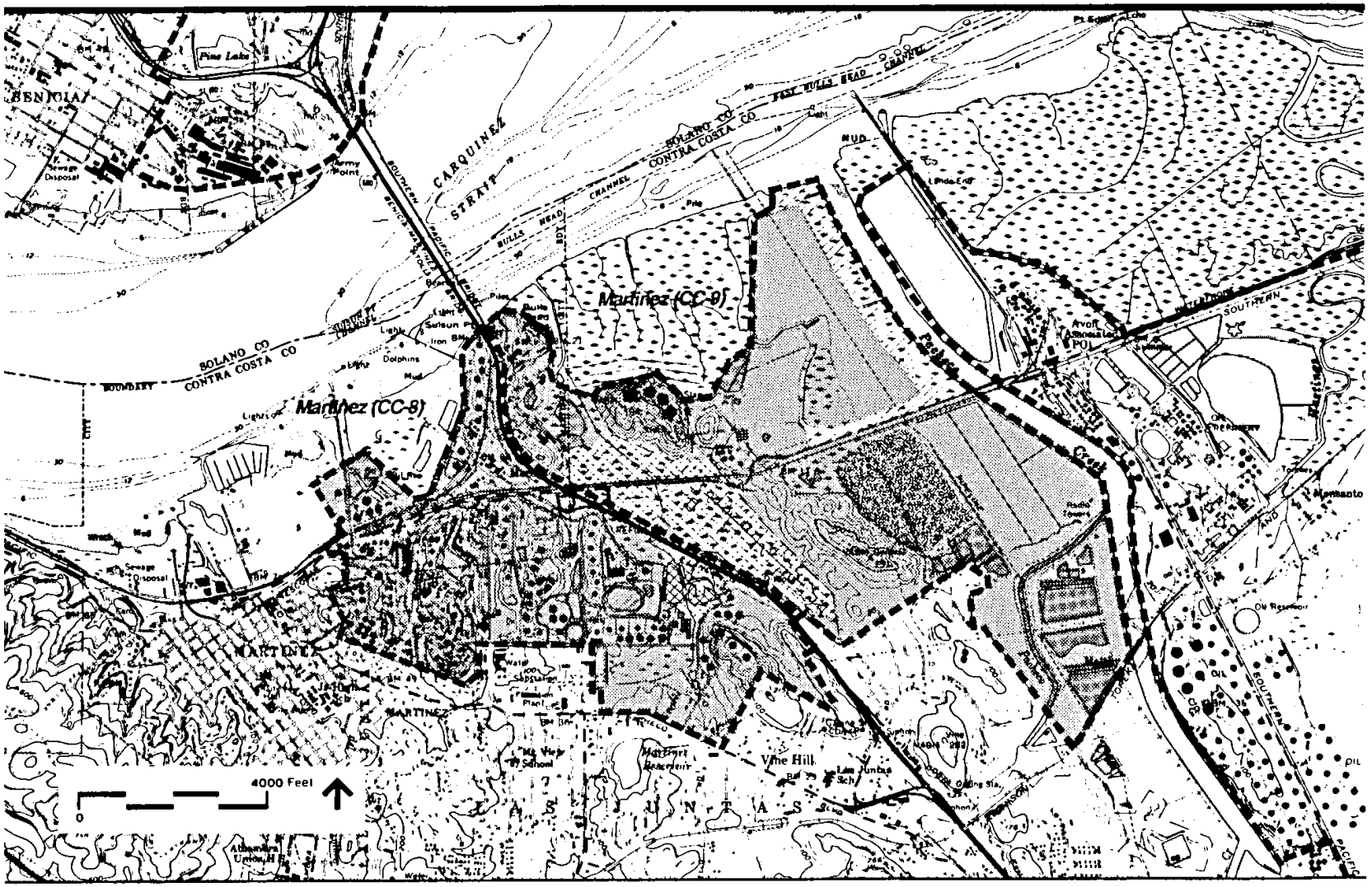


FIGURE 5

Martinez (CC-8) / Martinez (CC-9)

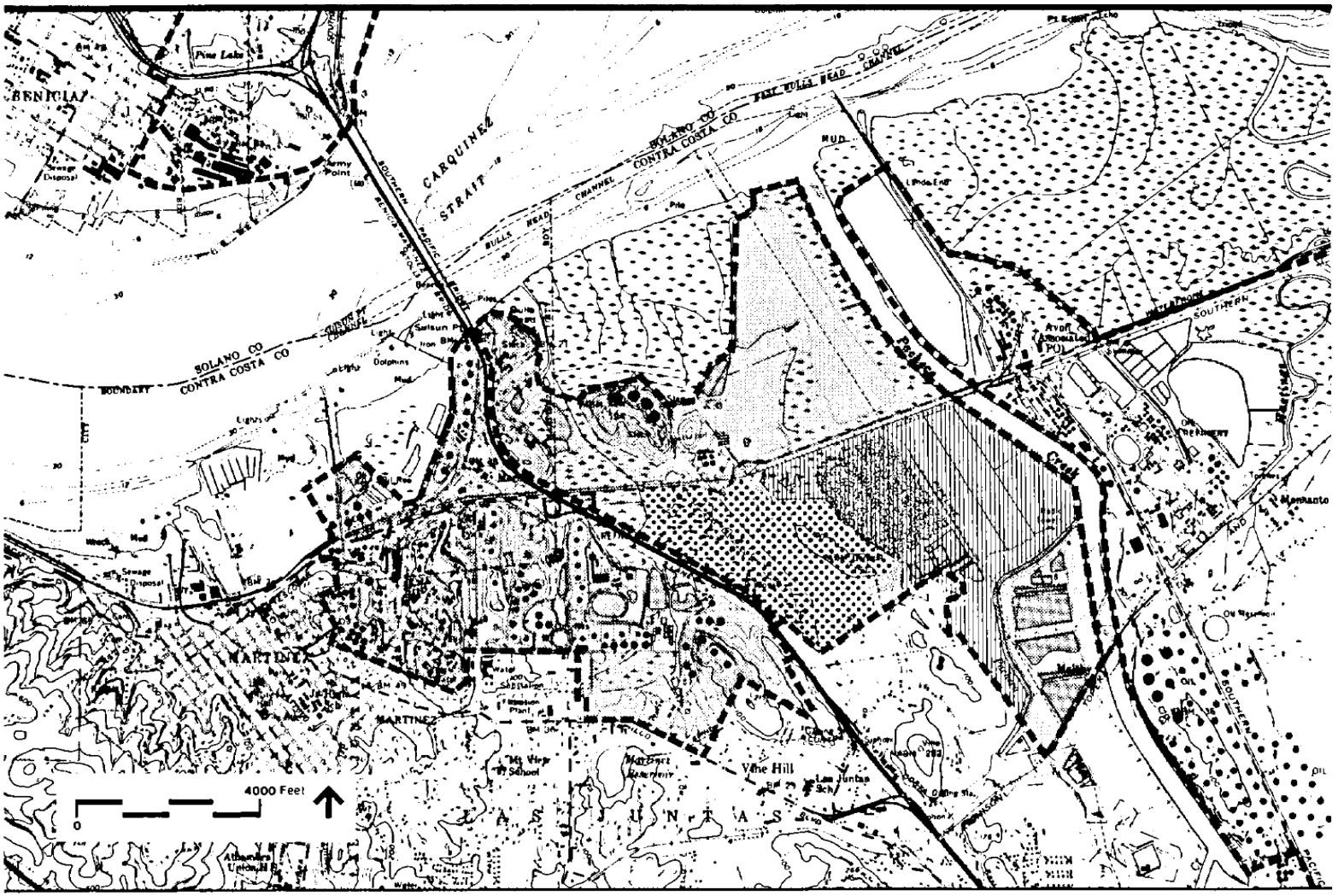


FIGURE 6

Martinez (CC-8) / Martinez (CC-9)

Figure 6 Martinez (CC-8)/Martinez (CC-9)

However a major problem to developing most of the site for water—related industry, which by nature includes heavy materials or products, such as crude oil, and heavy processing facilities, such as oil refineries and storage tanks, are the weak soils under most of the site that provide very poor building foundation for heavy loads unless piles are driven to support the loads. This process although possible, is extremely expensive and would be done normally only where there is a very large demand for developing heavy industrial uses on the property.

The weak soils are present because most of the site was historically part of the Bay and is underlaid by deep bay muds and has a high ground water table. In addition, 89 acres of the site are tidal marsh and 191 acres are seasonal wetlands (see Figure 5). The seasonal wetlands are subject to U. S. Army Corps of Engineer's authority and practically cannot be considered developable for industry. Only approximately one—quarter of the site, the ridge area discussed below, has soil foundation conditions suitable for supporting water—related industry.

Furthermore, part of the area is included in an A1quist—Pri010 Act Seismic Study Zone (see Figure 9). Seismic safety zones are designated under the Act to assist local and state agencies in "the exercise of their responsibility to prohibit the location of development and structures for human occupancy across the trace of active faults. " (Public Resources Code Section 2621.5) However, development may be approved within a designated seismic safety zone if it can be shown that a fault trace does not exist at the site. In order to determine whether a fault trace does not exist, a trench must be excavated along the inferred trace line. Because the trace line at the Martinez (CC—9) site passes under the eastern one—half of the Acme Landfill site that has been or will soon be filled with forty feet of unconsolidated garbage, excavation of the required trench(s) in the bay muds below the garbage would be very difficult.

The Martinez (CC—9) site is divided by the Southern Pacific railroad tracks which run east and west (see Figure 4). On the north, between the railroad tracks and the Bay, is the 165—acre Stauffer Chemical Company property next to the Benicia—Martinez Bridge; the 234--acre Landsea Company on the east side of the Stauffer Chemical; and the 150—acre United Towing Company parcel and a small parcel owned by the City of Martinez used as an automobile wrecking yard between the Landsea property and Pacheco Creek.

Three parallel ridges separated by low—lying areas that were historically part of the Bay extend from the Bay shoreline Inland in the Martinez (CC—9), Avon (CC—IO), and Avon (CC—11) priority use area (see topographic relief in Figures 4 and 7). The existing water—related industries in these areas have located on these ridges because of the good soil foundation for heavy industry. The first ridge, the ridge on which the Shell Oil Company is located extends to the Bay at the Benicia—Martinez Bridge. The Stauffer Chemical Company property Is on the end of the ridge extending from the Bay and the deep—water ship channel inland along the bridge approach to the Southern Pacific railroad tracks. The chemical plant no longer utilizes water for transportation, but the property remains, except for a small portion of seasonal wetland, a good site for water—related industrial use.

The second ridge north of the Southern Pacific railroad tracks is occupied by the Landsea Company, and also remains a good site for water—related industry. In 1973 the Commission issued Permit No. 6—73 to the Ulrich Oil Company to construct a marine petroleum terminal in the Bay, a pipeline trestle over the tidal marsh between the Bay and the upland portion of the property, and a gasoline storage and blending facility on the upland area of what is now the landsea property. As a condition of the permit, the Commission required that the 16—acre parcel on the west side of the ridge be dedicated for public access and consequently this area should not be considered available for water—related industry. In 1979, UCO 011 Company, the successor to Ulrich, proposed the addition of an oil refinery at the site, but the refinery was not approved by the Bay Area Air Quality Management District. The property was subsequently purchased by Landsea.

As with the Stauffer Chemical Company property, a 27 —acre portion of the Landsea property on the westerly side of the ridge is a seasonal wetland and therefore not appropriate for designation for water—related Industrial use.

The remainder of the Martinez (CC—9) site between the Landsea property and Pacheco Creek, the United towing and Martinez property, consists of low—lying hydraulically pumped dredge spoils fill over deep, soft bay muds. The area also includes 89 acres of tidal marsh (see Figure 5). This area, because the soils do not provide sufficient support for heavy industry, and part of the area is tidal marsh, is Inappropriate for designation for water—related industrial use.

However, it would be appropriate for pipelines, supported on piles, to cross this area linking an off—shore deep—water marine terminal to an inland industrial site.

South of the Southern Pacific railroad tracks, is the 245—acre CAZ Development Company property, the 356—acre Acme landfill Company, the 20--acre Martinez Gun Club; the 3—acre Henry's Tree Service; the 37 —acre IT Property and the 152—acre Environmental Corporation of Contra Costa County property which is owned and is part of the IT Corporation hazardous waste disposal facility.

The CAZ Development Company property, immediately east of Interstate 680 and south of the Southern Pacific railroad tracks (see Figure 6), consists of 92 acres of seasonal wetland and 153 acres of upland. The upland area is the extension of the second ridge referred to above, on which the Landsea gasoline storage and blending facility Is located. The 92—acre seasonal wetland area is not appropriate for designation for water—related industry, however the upland area continues to be a good site for water—related industry. The property is zoned by Contra Costa County for industrial use, however the City of Martinez, whose sphere of influence Includes the area, has adopted a policy that the hill and ridge line be should kept in its natural state as a community aesthetic asset. However, industrial development could occur on the east side of the ridge, as with the Landsea property, and the west side of the ridge facing urban Martinez could be left undisturbed. In this way industrial development of the site could occur consistent, it would appear, with the City of Martinez policy.

The remainder of the Martinez (CC—9) priority use area south of the railroad tracks is no longer suitable for water—related industry. The area is underlaid by deep bay muds that are an unsuitable soil foundation for industrial development unless the heavy loads are supported on pilings. Moreover, part of the site is in a Seismic Safety Zone with an indicated fault trace passing through the easterly portion of the site (see Figure 9). Finally, the Acme landfill site, the largest parcel, is covered with up to 40 feet of unconsolidated garbage, a condition that cannot be considered favorable for development of heavy industry.

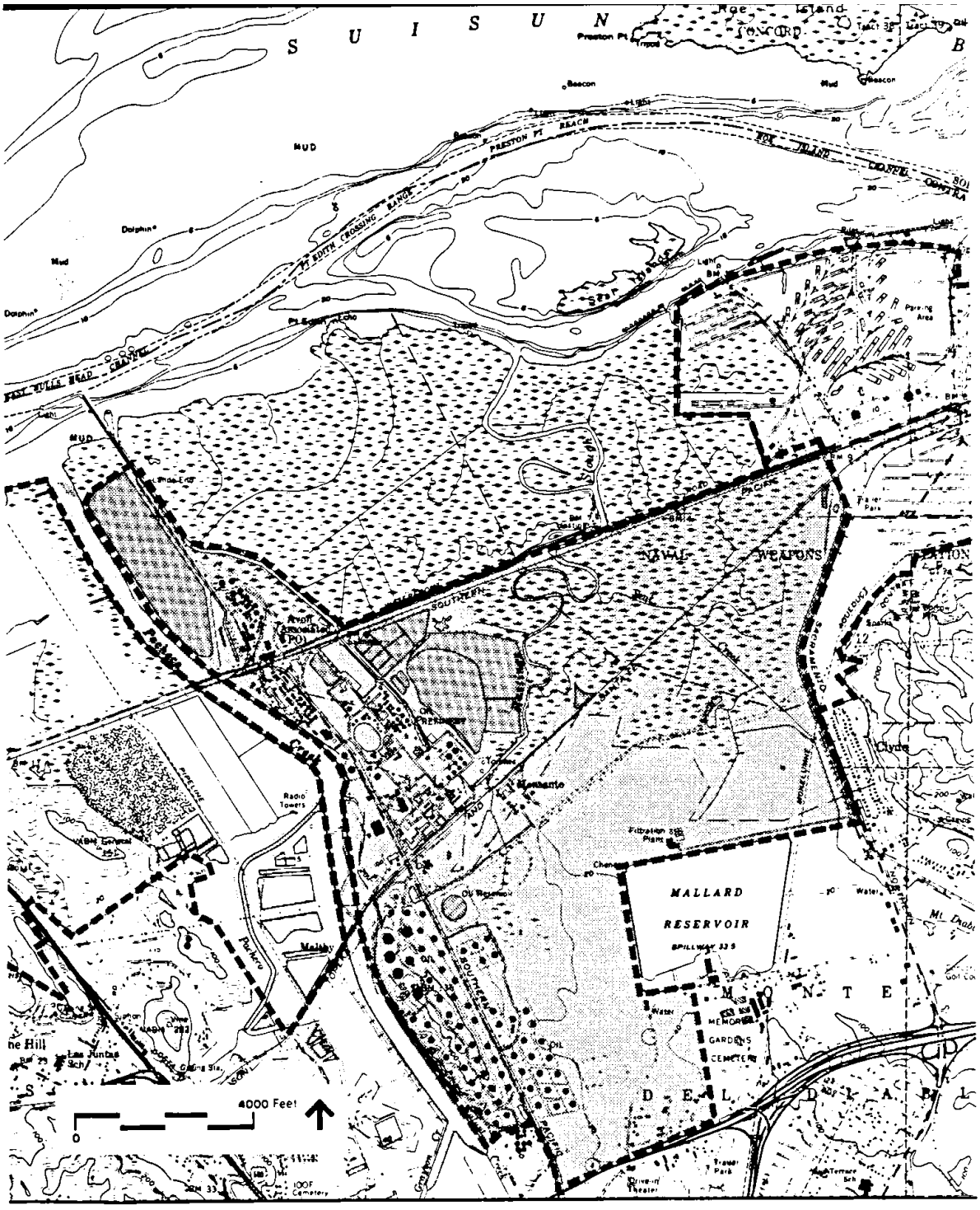
Of the 1,346—acre Martinez (CC—9) site, 336 acres (excluding 47 acres of seasonal wetlands) 145-acres of the Stauffer Chemical Company property and the 191 acres of the Landsea

Company property——are in industrial use; 153 acres of the CAZ Development Company property are undeveloped but available for water—related industrial use; and the remaining 857 acres are not, we believe, appropriate for water—related Industry.

8. Martinez (CC—9), Avon (CC—10), and Avon (CC—11). In 1969 the Martinez site discussed above, and the Avon sites were included as a composite site by the Commission. For analytical continuity, these sites will be discussed as an aggregate site here.

The Avon sites are situated between Pacheco Creek and the Concord Naval Weapons Station (see Figure 7). Most of the Avon site is located one mile or more from the Bay, separated from the Bay by an expanse of tidal marsh. However, the site does have access to the deep—water ship channel via a pipeline that extends across the marsh from the Tosco 011 refinery to a deep—water terminal at the mouth of Pacheco Creek and a pipeline to a marine petroleum terminal at the Benicia—Martinez Bridge. The Shell, Getty, Unocal and Holly petroleum pipelines pass through the site. The site has good land transportation, being served by the Southern Pacific and Santa Fe railroad lines and has easy access to Highway 4 and nearby Interstate 680. The site is well served for water—related industrial use by water, sanitary service, and power facilities.

The third ridge referred to above in the Martinez (CC—9) discussion traverses the westerly edge of the Avon site adjacent to Pacheco Creek, extending from just north of the Southern Pacific railroad tracks to Highway 4. The remainder of the site consists of gently sloping upland and tidal marsh. The ridge area provides particularly good foundation for heavy industry and the gently sloping upland area also has adequate soils for industrial use. However, as mentioned above, 804 acres of the designated priority use area are tidal marsh (see Figure 8) and are not appropriate for designation as a water—related industrial reserve area.



Priority Use Area Boundary

FIGURE 7

Avon (CC-10 and CC-11)

Figure 7 Avon (CC-10 and CC-11)

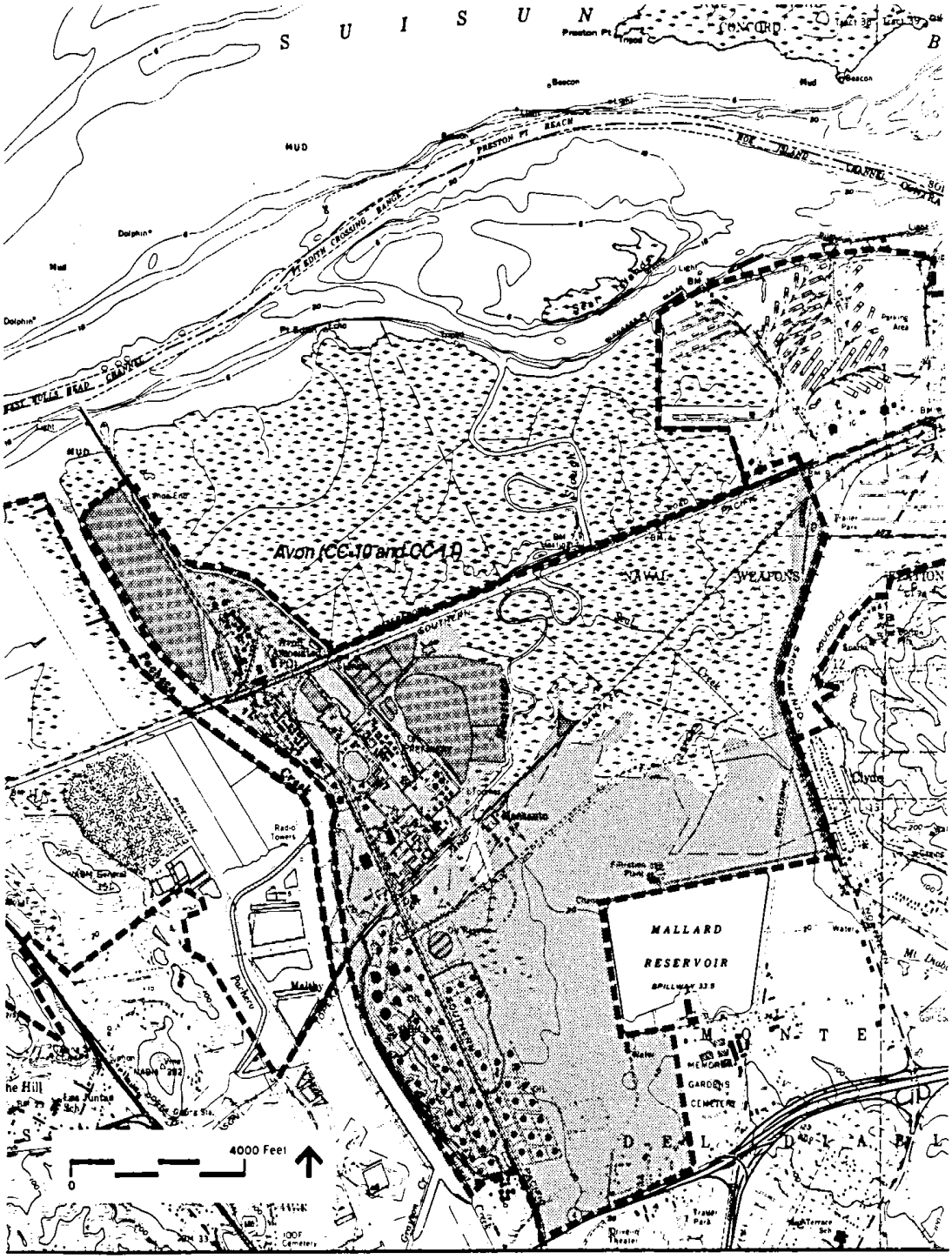


FIGURE 8

Avon (CC-10 and CC-11)

Figure 8 Avon (CC-10 and CC-11)

As Indicated on Figure 9, the Seismic Study Zone, discussed in the section on the Martinez (CC—9) site above, traverses the western edge of the area.

The approximately 2,200-acre Tosco oil refinery occupies most of the site, receiving a substantial amount of its crude oil supply by ship and shipping some of the refined product by water as well. The Tosco refinery is connected by pipeline to deep water terminals at the mouth of Pacheco Creek and near the Benicia—Martinez Bridge. Other industries at the Avon site, which do not use water for transportation, include the Pacific Gas and Electric Company which produces power for Tosco on land leased from Tosco, the Monsanto Chemical Company, and Chevron USA which operates an inland petroleum terminal that transfers refined petroleum products from pipeline to truck for market distribution. In addition, some of the site, on the easterly side, is owned by the U. S. Navy and the undeveloped land serves as a buffer to the adjacent Concord Naval Weapons Station. Most of this land Is part of the 804—acre tidal marsh referred to above.

The Avon site is within the sphere of influence of the City of Concord. Concord has petitioned the Contra Costa County Local Agency Formation Commission for permission to annex approximately 100 acres on the southwesterly boundary of the priority use area The City and potential developers have proposed construction of an Industrial park(s) in this area, most likely for office and warehouse use. Although Tosco continues to own this area and at this time the area should be considered in water—related industrial use by Tosco, it is apparent that the southerly part of the priority use area is subject to immediate land use change pressures.

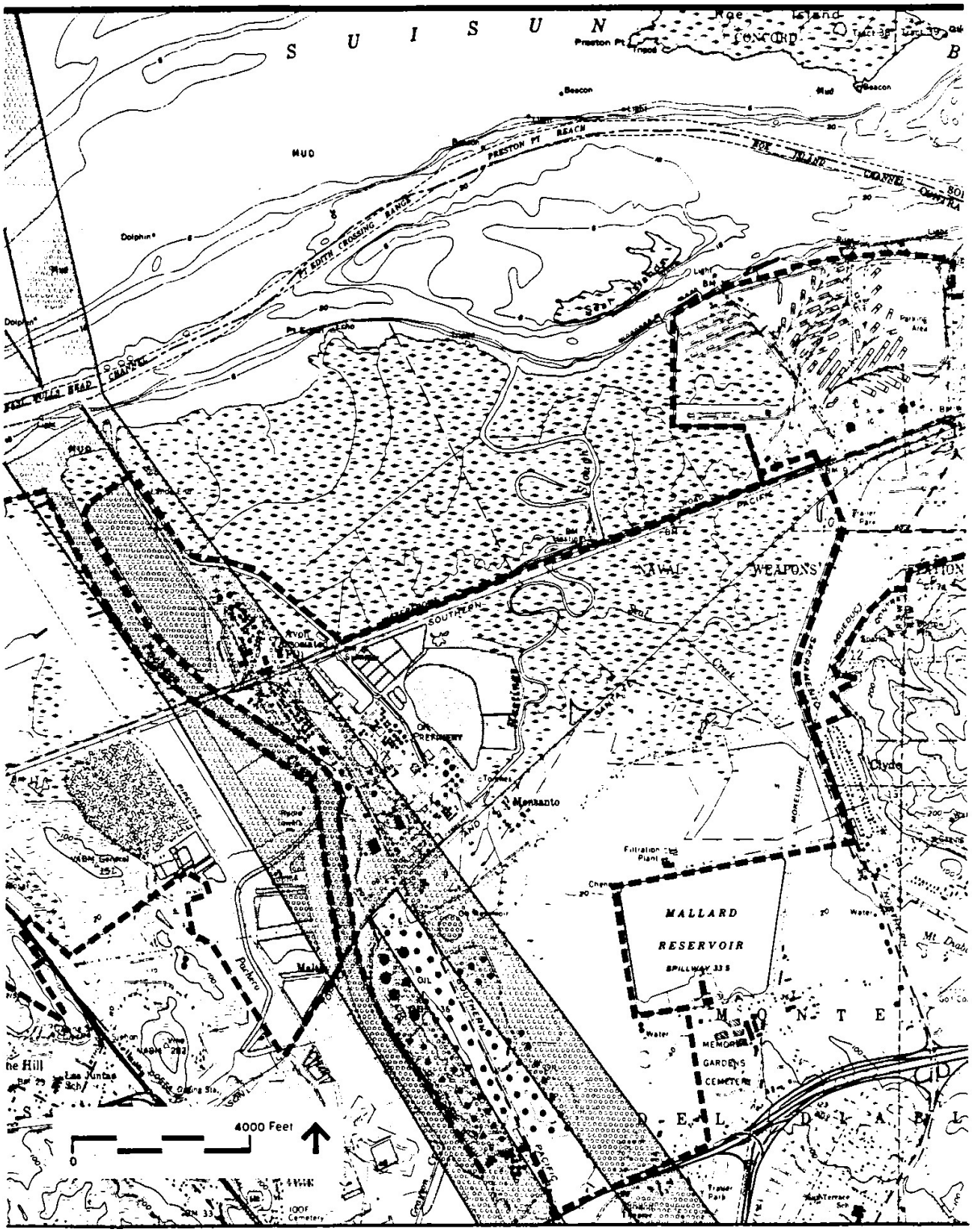


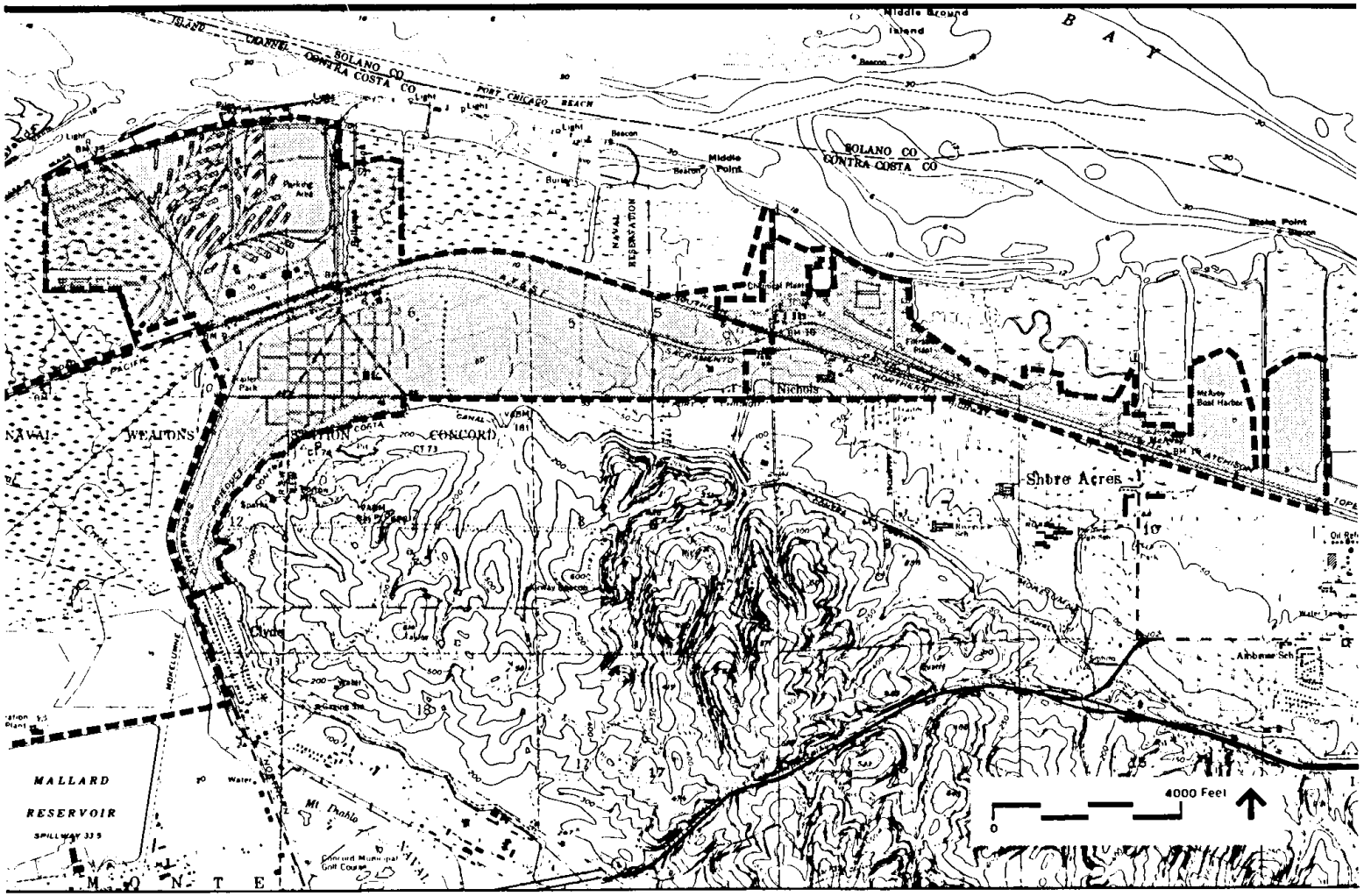
Figure 9 Seismic Study Zones Source: California Division of Mines and Geology, January 1, 1977. Priority Use Area Boundary

In 1969 the Commission determined that the combined Martinez (CC—9), Avon (CC—I O), and Avon (cc—Il) priority use area contained 5,820 acres; 1,610 in use by water—related industries and 4,220 acres vacant and available for water—related industry development. But in 1983 the Commission determined that 1,104 acres of the site were tidal marsh and deleted this area from the priority use site (Bay Plan Amendment No. 1—83) Based on the information above , we conclude that an additional 1,032 acres of the combined sites are tidal marsh and seasonal wetlands and therefore should not be designated for water—related industrial use . Further, 629 acres are unsuitable for water—related Industrial development and should also not be designated for water—related industry. This action would result in 2, 912 acres of the site designated as in use by water—related industry and 153 undeveloped acres that are suitable for water—related industrial development. The entire site would total 3,065 acres.

9. Pittsburg (CC—13). The Pittsburg site (CC—13), is a relatively narrow strip of land immediately east of the Concord Naval Weapons Station at Port Chicago and extends to the Commission's eastern jurisdiction at Stake Point (see Figure 10). In 1969 the Pittsburg site contained 660 undeveloped acres reserved for water—related industry.

Although part of the area is adjacent to the deep—water ship channel, no deep—draft docking facilities have been developed at the site. However, facilities for off—loading sand from barges for processing on the site for distribution to Bay Area markets does exist. The Chevron and Shell petroleum pipelines cross the site, the site is served by the Southern Pacific and Santa Fe rail lines, and the site has good access to nearby Highway 4 that connects with Interstate 680.

The soils of most of the site, however, are not desirable for heavy industrial development. The land bay ward of the railroad tracks (see Figure 10) was once part of the Bay and is underlaid with soft bay muds. The 79—acre parcel south of the railroad tracks is an upland area with more favorable soil characteristics for industrial development.



Priority Use Area Boundary

FIGURE 10

Concord Naval Reservation / Pittsburg (CC-13)

Figure 10 Concord Naval Reservation/Pittsburg (CC-13)

The land configuration of the site Is also not conducive to development of new water—related industries because the site consists of a narrow band of land between the railroad tracks and the Bay, in addition to the isolated parcel south of the railroad tracks and does not provide the large parcels of land normally necessary for water—related industrial development. The site consists of many small parcels held by a number of owners—Pfizer Chemical and Pigment Company, Allied Chemical, Union Chemical, Pacific Gas and Electric Company, two private individual land owners, the State of California, and the United States government. Only one of the private individual land owners, F. E. Crites, operates a water—related industry. The Crites property is used for receiving, processing, and distributing sand dredged from Suisun and Honker Bays and transported by barge to the site. None of the chemical companies use water transportation in their manufacturing process but instead use rail and truck transport. Moreover, as properties in the area become available, the Navy is purchasing them to serve as a buffer to the adjacent Concord Naval Weapons Station.

In 1983 the Commission determined that 135 acres of the priority use area were tidal marsh and deleted the marsh area from the Bay Plan (Bay Plan Amendment No. 1—83). Consequently, today the Pittsburg site contains 525 acres reserved for water—related industry. Because of the unfavorable soil conditions, land configuration, and ownership patterns, the Pittsburg site is not a site that should be reserved for water—related industry.

Solano County

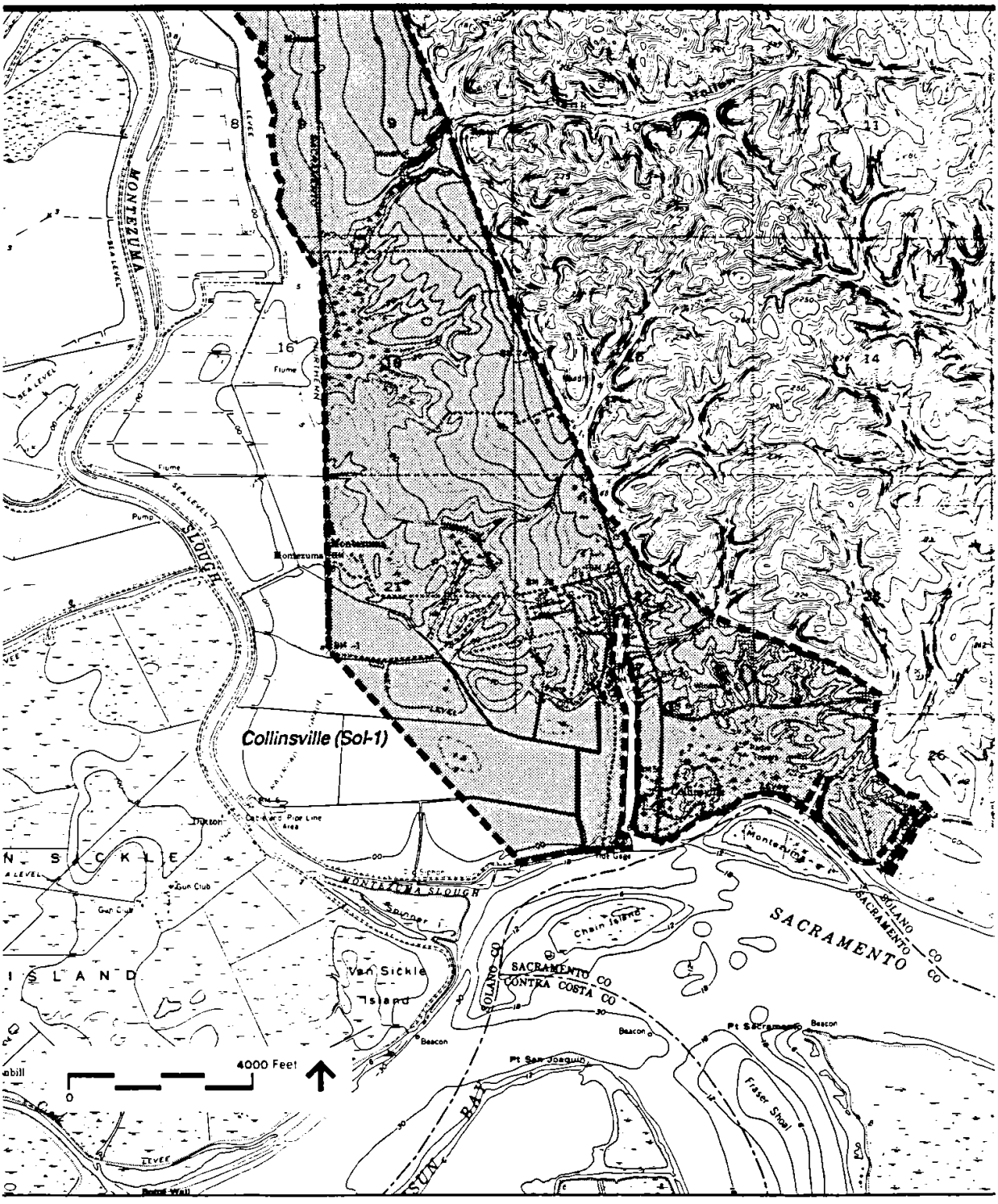
1. Collinsville (Sol—I). Located in southern Solano County at the eastern edge of the Commission's jurisdiction, the Collinsville site (Sol—I) (see Figure 11) Is the last large undeveloped water—related industry designated site on deep water in the Commission's jurisdiction. In 1969 the site consisted of 6,210 acres of agricultural land. In 1978, as required by the Suisun Marsh Preservation Act of 1977, the Commission deleted 3,542 acres of seasonal wetlands from the priority use area in order that the Bay Plan be consistent with the Commission's Suisun Marsh Protection Plan. Consequently today 2,668 acres of undeveloped land at Collinsville is reserved by the Commission for water—related industrial use.

The Collinsville site lies at the western edge of a much larger area reserved for water—related industry by Solano County that extends up the Sacramento River shoreline from Collinsville to the vicinity of Rio Vista. This area is designated for water—dependent Industry in Solano County's Montezuma Hills Specific Plan and in its zoning code. Solano County is the only local jurisdiction around the Bay to have adopted specific water—dependent industry plan designations and policies and zoning provisions to protect and guide development of deep—draft sites for water—related industry.

Most of the flat and gradually sloping Collinsville site consists of alluvial soils that provide good foundation for heavy Industrial construction. However, soils along the waterfront consist of unconsolidated bay muds and structures, including wharfs and ship terminals, would require pile supports.

The Collinsville site fronts on the Sacramento deep—water ship channel that is maintained at —35 feet MSL. However, land transportation to the site is limited. Narrow two—lane Shiloh Road, which is incapable of supporting constant heavy truck traffic, serves the site. Shiloh Road connects with two—lane Highway 12 ten miles from Collinsville and Highway 12 connects with Interstate 80 in Fairfield 13 miles from the Shiloh Road and Highway 12 junction. There is no rail service to the site, although the former Sacramento Northern Railroad (Union Pacific Railroad) rail line right—of—way serves the site. No pipelines, except natural gas pipelines, are near the site. There is no water, sewer, or power service in place to serve industrial use at the site.

The Collinsville Redevelopment Plan (Solano County) calls for the redevelopment agency (the County Board of Supervisors) to construct an industrial—level road, rail line, deep—draft ship berths, and industrial—level utilities and services such as water and sewerage treatment facilities at Collinsville. There are existing electrical power transmission lines and natural gas lines crossing the area that could be used to serve industrial facilities.



Priority Use Area Boundary

FIGURE 11

Collinsville (Sol-1)

Figure 11Collinsville (Sol-1)

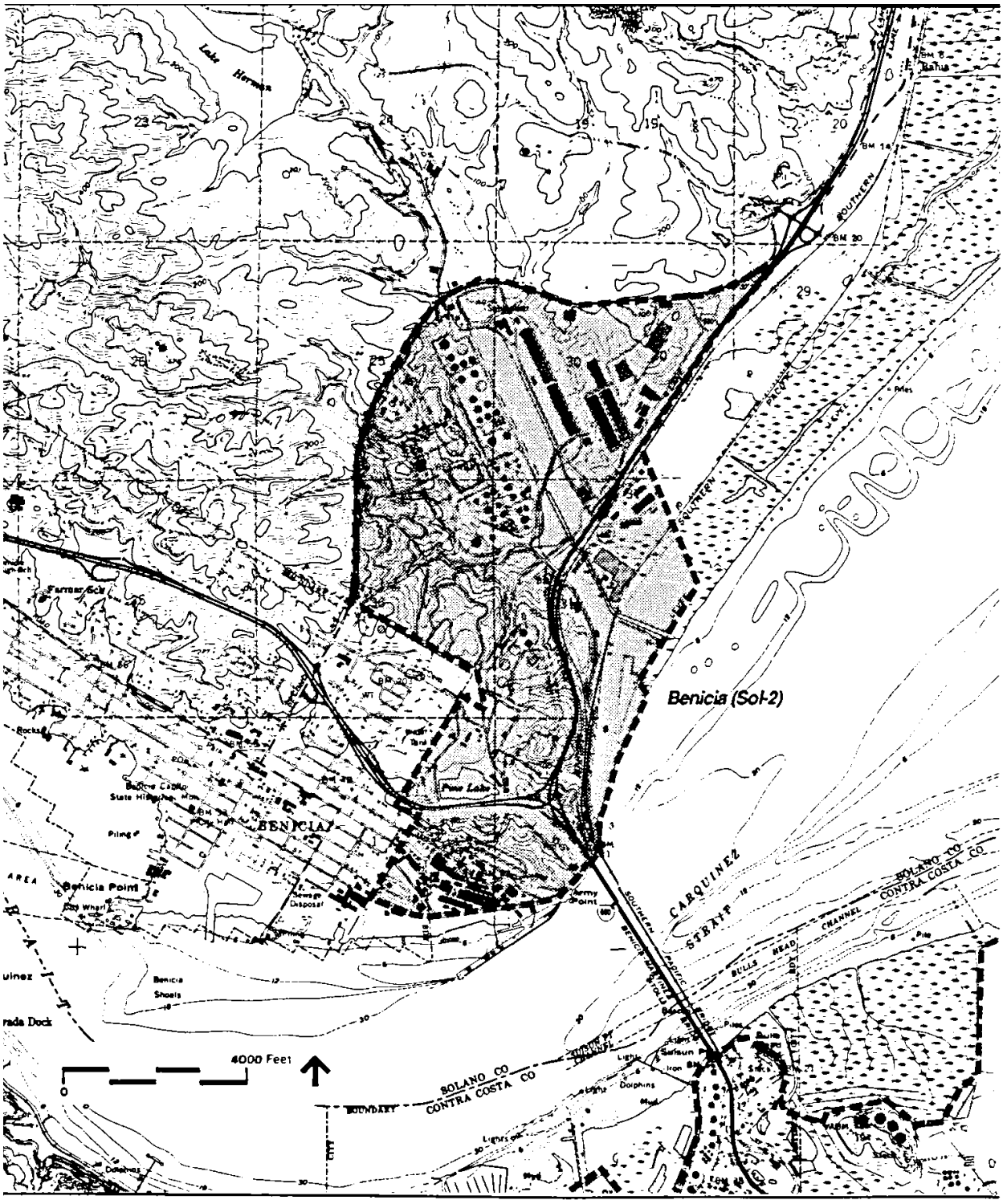


Figure 12 Benicia (Sol-2)

Because of its Isolated location and lack of Industrial development infrastructure, the Collinsville site is unattractive for water—related industrial development at this time. However, as mentioned earlier, the Collinsville site is the largest undeveloped site with good water—related Industry development potential in the Commission's Jurisdiction and if the redevelopment plan is carried out, the site has great value for future water—related industrial development.

2. Benicia (Sol —2) In 1969 the Commission designated 1, 730 acres at Benicia for water—related industrial use (see Figure 12). At that time, 780 acres were developed by water—related industries and 950 acres were undeveloped. The marine terminal at the adjacent Port of Benicia, which is privately—owned by Benicia Industries, serves both a port function (active marine terminal) by transferring cargo from ship to shore for distribution and a Water—related industrial function by transferring raw materials, such as crude 011, from ship to shore for processing within the upland water—related industry priority use area.

The Benicia site, as mentioned above, is served by the deep—water Port of Benicia terminal. The site also has good land transportation being on the Southern Pacific railroad main line and with good access to Interstate 680 and 780, both of which connection to Interstate 80. That portion of the site upland from the Interstate freeways (see Figure 12), has good soil foundation for heavy Industrial structures, however there Is some very steep terrain on the site that limits additional development of that area. The area Bayward of the freeways is underlaid by bay muds and would not support heavy Industrial facilities unless the facilities were pile supported.

Land use patterns in the Benicia site are varied. The large Exxon oil refinery occupies a majority of the area upland of the two freeways and the refinery waste water treatment plant occupies a large portion of the area below the freeways. Exxon receives much of its crude oil by ship through the Port of Benicia terminal. The 17 —acre Huntway asphalt plant (Commission Permit No. 21—81), also located above the freeways, receives its crude oil supply by water through the Port of Benicia, Automobiles shipped from Japan are off—loaded at the Port of Benicia and driven to sites above and below the freeway

for final assembly before distribution to market. All these uses are water—related Industrial uses.

A variety of other uses, that are not water—related industries, such as offices, warehouses, small manufacturing plants, and craft shops have been developed in the northeastern and southwestern part of the priority use area. There are few parcels left in the Benicia priority use area for development. Most of the designated site is developed and over 300 undeveloped acres owned by Exxon are being held as an undeveloped buffer area to isolate the plant from encroaching urban residential and commercial uses. Consequently, the entire 1, 630—acre site should be considered developed and unavailable for new water—related industry.

3. Vallejo (sol-3). In 1969 the Commission reserved 240 acres for water—related industry at Vallejo (see Figure 13). Of the 240 acres, 40 acres were developed by water—related industries and 200 acres were vacant. In 1971, at the request of the City of Vallejo, the Commission deleted 31 acres of undeveloped land from the priority use area (Resolution No. 16).

The site is a deep-water site only because It fronts on the federally—maintained Mare Island Strait ship channel that provides access to the Mare Island Naval Shipyard. The site has good access to Interstate 80 and is served by the Southern Pacific railroad. Site users include the General Mills flour company, that predated the Commission's jurisdiction, and which does not now use water for transportation, and the Peter Kiewit and Kaiser Steel metal fabrication yards. Both construction yards were developed pursuant to Commission permits (Permit No. 7—74 and Permit No. 4—81). The Kaiser Steel yard Is used for the construction of off—shore oil drilling platforms and bridge structural components. The Peter Kiewit yard Is used for construction of pre—cast concrete pilings. The products produced in the yards are shipped by water to off—shore drilling or shoreline construction sites. The Vallejo site Is completely developed at this time.

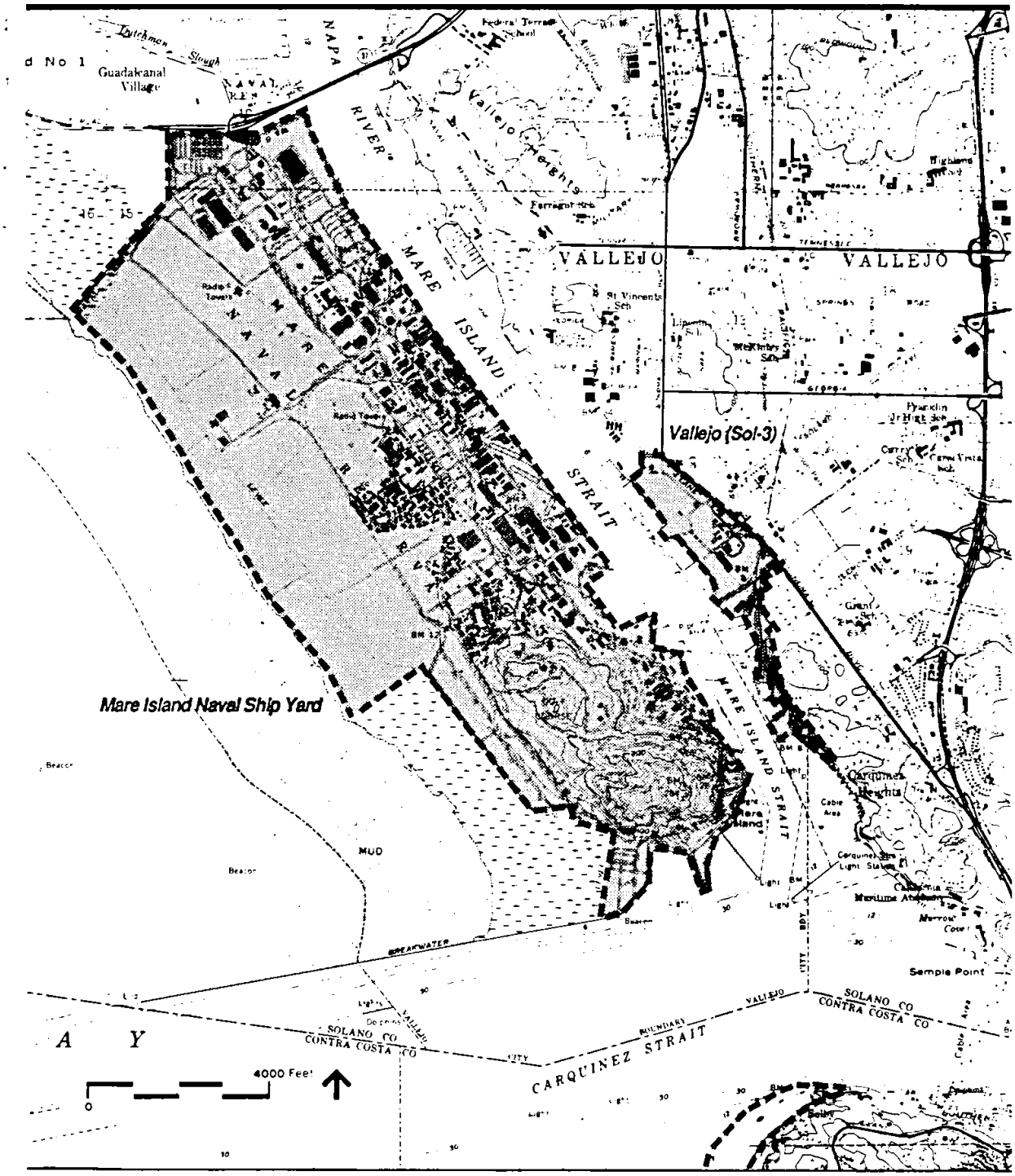


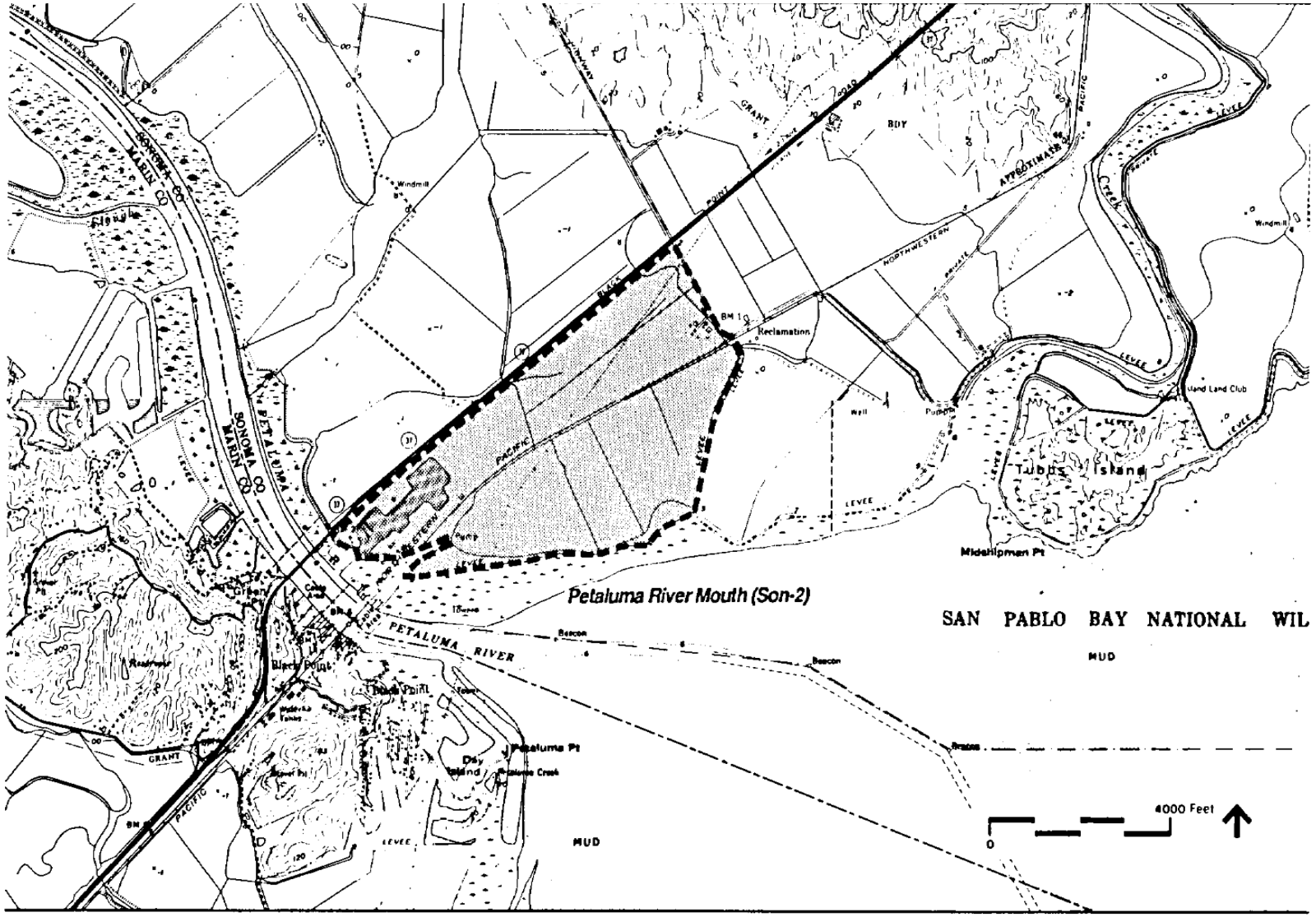
Figure 13 Mare Island Naval Ship Yard/Vallejo (Sol-3)

4. Potrero Hills (Sol —6). The 3,115—acre undeveloped Potrero Hills site in the Suisun Marsh near Suisun City and next to Montezuma and Suisun Sloughs, was designated for shallow—draft barge use by the Commission in 1969. In 1971, at the request of the city of Suisun City, the Commission deleted 410 acres from the site (Resolution No. 16). men in 1978, in compliance with the Suisun Marsh Preservation Act of 1977, the Commission deleted the remaining 2, 705 acres from the site (Bay Plan Amendment No. 2—78 and Bay Plan Amendment No. 3—78)

Sonoma County

1. Petaluma River Mouth (Son-2). In 1969 the Commission designated 880 undeveloped acres at the mouth of the Petaluma River for shallow—draft, or barge, water—related industrial use (see Figure 14). The site is a considerable distance from the Bay shipping channels but Is on the federally—designated Petaluma River shallow—draft navigation channel that terminates up—river in the City of Petaluma. The site has good access to Highway 37 that connects with Highway 101 at Novato and Interstate 80 at Vallejo. The site is inadequately served with water for industrial development and has no sewers. Electric power and natural gas service would have to be upgraded to serve Industrial development. The County of Sonoma has planned and zoned the area for agricultural and natural resource conservation uses and County representatives Indicate that the County does not want the area developed for industrial uses.

In 1974, the Commission issued Permit No. 16—74 to Shellmaker, Inc. for development of a 33—acre marina at the site. In 1978, the Commission issued Permit No. 7—78 to Shellmaker, Inc. to develop a 43—acre recreation and commercial facility at the marina. Although these permits were issued on an interim use basis (because the area was designated as a water—related industry priority use area), and the first permit opened 31 acres to the Bay that could be used by barges as part of a future water—related industrial use of the site, the permit action essentially reduced the Petaluma River Mouth site from 880 acres to 804 acres.



Priority Use Area Boundary

FIGURE 14

Petaluma River Mouth (Son-2)

Figure 14 Petaluma River Mouth (Son-2)

Priority Use Area Boundary

Tidal Marsh

FIGURE 15

Concord Naval Reservation / Pittsburg (CC-13)

Figure 15 Concord Naval Reservation/Pittsburg (CC-13)

This site has water—related industrial value for shallow—draft use only. However, because there has been no demand for shallow—draft water—related industry around the Bay, and it appears that there will be no foreseeable future demand, serious consideration should be given to deleting the site as a water—related industry priority use area.

Military Sites

1. Concord Naval Weapons Station. The 1 ,498—acre Concord Naval

Weapons Station site (see Figure 10) was not included in Dr. Muncy or the Commission's initial study of sites appropriate for water—related industry primarily because of the Navy's use of the site as a munitions storage, testing, and shipping center. However, because the facility fronted on the deep—water ship channel and was an operating marine terminal with back—up land sufficient for future water—related industrial development, in 1969 when the Commission adopted the Bay Plan it Included the site as water—related industry priority use area with the notation on the Bay Plan maps that if and when the site was not needed by the Navy, first consideration for reuse should be given to port or water—related industry use.

The Navy does not plan on terminating use of the site In the foreseeable future and the site should not, therefore, be considered an active reserve for water—related industry. However, as the Bay plan note now states, if and when the Navy should no longer need the site, consideration should be given to uses that need a deep—water terminal such as port or water—related industrial uses.

The Bay Plan maps however incorrectly designate a 72—acre tidal marsh as upland area reserved for future water—related Industrial use at the Naval Weapons Station (see Figure 15). This tidal marsh area should be correctly designated on the Plan maps.

2. Mare Island Naval Shipyard. The 2,245—acre Mare Island Naval Shipyard is in a category similar to the Concord Naval Weapons Station (see Figure 10). The shipyard was not included in Dr. Muncy's or the Commission's initial study of water—related industry sites primarily because the site was an active naval shipyard. But because the site is adjacent to deep water and could be easily developed as a ship terminal, when the Commission adopted the Bay Plan it designated the site as a water—related industry priority use area with a policy note on

the Bay Plan Maps that the site should be considered for port or water—related industrial use if and when the Navy determined it no longer needed the site.

However, a major problem with this site Is that it remains accessible to deep—draft ships only as long as the Island Strait is dredged. The average annual maintenance dredging for the channel is 2,500, 000 cubic yards —— a considerable amount of dredging that costs nearly $2 million per year. Without this dredging, Island would be accessible to shallow—draft vessels only.

The Navy has no plans to abandon Mare Island Shipyard. Given this situation and the physical and economic considerations discussed above, Mare Island cannot be considered an active water—related industry reserve. However, because shallow—draft ships could utilize the site in the future, the site should remain designated for future consideration for water—related industry or port use should the Navy determine that it no longer needs the site.

Conclusions

In 1969 when the Commission adopted the San Francisco Bay Plan, it designated 24,855 acres of land In Contra Costa, Solano, and Sonoma Counties as reserved for water—related industry. Of the total acreage reserved, 5, 910 acres were already in use by water—related industries and 18, 945 acres were vacant and available for future development for water—related industry. Since 1969 the Commission has deleted 9, 715 acres——600 acres in use by water—related industry and 9,115 acres not in use (see Table B-1). Thus currently 15,140 acres of land in use 9,830 acres of land not in use are designated by the Commission as reserved for water-related industry.

Our evaluation indicates that of the 9,830 acres of undeveloped land currently reserved for water—related Industry, 1, 063 acres are tidal marsh or seasonal wetland, 1,154 acres are not suitable for development for water—related industry because of physical limitations, 76 acres have been deleted by Commission permit action, and 925 acres have been developed for other uses. In addition, 2,927 acres of land considered previously undeveloped have either been developed by water—related Industries or should be considered in use by the Industries.

We conclude, therefore, that today 8,237 acres of land are in use by water—related industries and 3, 685 acres are undeveloped and available for water—related industrial use (see Table B—l). However, the 3,685—acre figure is deceiving because 804 of those acres are usable by shallow—draft vessels only, the Petaluma River Mouth (Sol —2) site, and 2, 668 acres are contained in the Collinsville (Sol—I) site. mere is not now, nor do we believe that there will be in the future, a demand or need for shallow—draft sites reserved specifically for water—related industry. The Collinsville site, we believe, must be viewed as a long—range development site for water—related industry, most likely not being needed until the next century. With the subtraction of consideration of the Petaluma River Mouth site as a water—related industry site and the consideration of the Collinsville site as a long—term site, we believe, only 213 acres of undeveloped land in the water—related industry priority use area can be considered "prime" for development for water—related Industry in the near—term—the 60—acre Selby (CC—7) site and the 153—acre ridge area at the Martinez (CC—9) site.

Location	1969 In Use	1969 Unde-veloped	1969 Total	Deleted by BPA In Use	Deleted by BPA Unde-veloped	Deleted by BCDC Permit Unde-veloped	Deleted Marsh and Wet-land	Delete Deve-loped for Other Use	Delete Unsuitable for Industry	1986 In Use	1986 Unde-veloped	1986 Total
CONTRA COSTA COUNTY												
Richmond (CC-1)	800	0	800							800		800
San Pablo Pt.(CC-2)	900	730	1,630		330			125		1,175		1,175
Point Pinole (CC-4)	600	730	1,330	600	730			800				0
Hercules (CC-5)	50	910	960							160		160
Selby (CC-7)	510	60	570							510	60	570
Martinez (CC-8)	530	280	810		70		31			707		707
Martinez (CC-9)		0	0									0
Avon (CC-10)	1,610	4,220	5,830		1,104		1,032		629	2,912	153	3,065
Avon (CC-11)		0	0									0
Pittsburgh (CC-13)		660	660		135				525			0
Crockett	90	0	90							90		90
			0									0
SOLANO COUNTY			0									0
			0									0

Collinsville (Sol-1)	6,210		6,210		3,542						2,668	2,668
Benicia (Sol-2)	780	950	1,730		58					1,672		1,672
Vallejo (Sol-3)	40	200	240		31					209		209
Potrero Hills (Sol-6)		3,115	3,115		3,115							0
			0									0
SONOMA COUNTY			0									0
			0									0
Petaluma River			0									0
Mouth (Son-2)		880	880			76					801	801
TOTAL	**12,120**	**12,735**	**24,855**	**600**	**9,115**	**76**	**1,063**	**925**	**1,154**	**8,235**	**3,682**	**11,917**