Table 6.2-4. Estimated Unit Costs for Testing, Dredging, and Disposal ($/cubic yard)

Activity	*In-Bay*	*Ocean*	UPLAND, WETLAND REUSE *Tidal*	UPLAND, WETLAND REUSE *Levee*	*Landfill (b)*
Maintenance (100% soft material) (a)					
Testing (c)	0.39-1.65	0.44-1.91	0.10-0.12	0.10-0.12	0.10-0.12
Mobilization (d)	0.06-0.56	0.06-0.56	0.42-4.46	0.11-1.12	0.42-4.46
Dredging (e)	1.74-1.79	1.68-1.69	1.69-1.66	1.68-1.74	1.66-1.69
Transport f)	1.21-2.18	5.04-5.99	2.12-4.96	2.18-5.99	2.12-4.96
Placement (g)	0	0	2.19-3.44	2.00 (i)	2.19-3.44
Rehandling (h)	NA	NA	NA	NA	2.23-5.26
Total	**3.45-6.13**	**7.23-10.14**	**6.52-14.64**	**6.13-10.91**	**8.75-19.90**
New Work (50% hard/50% soft material) (j)					
Testing	0.12-1.65	0.13-1.91	0.09-0.12	0.09-0.12	0.09-0.12
Mobilization	0.02-0.56	0.02-0.56	0.13-4.46	0.03-1.12	0.13-4.46
Dredging	2.29-2.35	2.22-2.23	2.19-2.22	2.23-2.29	2.19-2.22
Transport	1.58-2.87	5.38-6.62	2.79-5.27	2.87-5.38	2.79-5.27
Placement	0	0	2.88-4.54	2.00	2.88-4.54
Rehandling	NA	NA	NA	NA	2.23-5.26
Total	**4.07-7.37**	**7.76-11.31**	**8.11-16.58**	**7.28-10.85**	**10.34-21.84**
Small Dredge (100% soft material) (k)					
Testing	3.30-8.25	3.81-9.53	0.17-0.49	0.17-0.49	0.17-0.49
Mobilization	1.68-8.40 (l)	1.68-8.40	3.28-16.40	3.28-16.48	3.28-16.40
Dredging	1.74-1.79	1.68-1.69	1.66-1.69	1.68-1.74	1.66-1.69
Transport	1.21-2.18	5.04-5.99	2.12-4.96	2.18-5.99	2.12-4.96
Placement (m)	0	0	2.00	2.00	2.00
Rehandling	NA	NA	NA	NA	2.23-5.26
Total	**7.98-20.57**	**12.22-25.60**	**9.26-25.51**	**9.37-26.56**	**11.49-30.77**

For a complete explanation of sources and assumptions, see Appendix N.

a. Maintenance material is typically fine-grained silts and clays that are easily dredged.
b. Represents costs associated with establishing a rehandling site. Costs based on assessment of Mare Island, Rio Vista Airport Borrow Pit, Leonard Ranch and Cargill rehandling sites (LTMS 1994e).
c. Testing costs for ocean based on Green Book, for in-Bay based on Inland Testing Manual, and for UWR on WET test. Ranges based on assumed volumes for low and high cost scenarios. See Tables 9 and 10 in Appendix N for testing cost derivation.
d. Based on Gahagan & Bryant bid model for a given set of equipment. See Appendix N for explanation of bid model. Unit costs derived by dividing mobilization cost by assumed volumes for low and high scenarios listed in Table 6.2-3.
e. Based on Gahagan & Bryant bid model for a given set of equipment. See Appendix N for explanation of bid model. Unit costs derived by dividing dredging cost by average productivity of the particular equipment set. Slight variations in dredging costs due to differences in equipment assumed for each placement environment.
f. Based on distances assumed in Low and High scenarios (see Appendix P: Assumptions for Scenarios)
g. Placement costs include cost of equipment and labor needed for placing dredged material at the disposal site. No placement costs were assumed for in-Bay and ocean disposal, assuming the use of bottom-dump scows.
h. Rehandling costs based on *Analysis of the Potential for Use of Dredged Material at Landfills* (BCDC 1995a). Includes costs of excavating, loading, hauling and unloading dried material from rehandling facility.
i. Placement cost based on use of clamshell dredge with similar cost characteristics to dredging operation.
j. Accounts for inclusion of harder material (unconsolidated sand, or hard-packed deposits of ancient muds or sands). Hard material encountered in new work projects may require different kinds of equipment, and less production and higher unit costs than would be experienced by dredging maintenance material.
k. Includes dredging projects with channel depths of 12 feet below MLLW or less. Harder material is generally not encountered when dredging such shallow channels.
l. Mobilization costs are very sensitive to dredging volumes, because they represent fixed costs that must be spread across the entire project volume.
m. Assumes the use of mechanical placement (clamshell dredge vs. hydraulic offloader and pipeline) at all disposal sites, with cost characteristics similar to levee placement. Assumes that small dredgers most likely will not be required to establish offloading facilities at any given placement environment due to the relatively small volumes offloaded.

Table 6.2-5. Estimated Unit Costs for Site Preparation and Management

Activity	*In-Bay*	*Ocean*	UPLAND/WETLAND REUSE *Tidal Wetlands*	UPLAND/WETLAND REUSE *Levee*	*Landfill* (e)
Initial site prep (a)	0.00 (b)	0.00 (b)	0.60-1.21 (c)	1.84-2.21 (d)	0.51-1.18 (e)
Site operations/maintenance	NA (f)	NA	0.02-0.03 (c)	0.00	0.35-0.39 (e)
Site monitoring	NA (g)	NA (g)	NA (h)	0.27-0.34 (i)	0 (j)
Total	**0.00**	**0.00**	**0.62-1.24**	**2.11-2.55**	**0.86-1.57**

Notes:
a. Initial site preparation includes land acquisition, construction, mitigation, engineering, design, environmental, planning and construction management costs.
b. No site preparation costs were assumed for the ocean and in-Bay sites as these site are currently operational.
c. Based on a cost associated with Hamilton Air Force Base and North Point properties (LTMS 1994e). See page X of that reference for more details.
d. Site construction cost of $147,000 per levee mile based on Jersey Island levee rehabilitation project (LTMS 1994e). Planning, engineering, design and construction management costs estimated to equal $15,000 - $50,000 per levee mile based on Jersey Island project.
e. Represents costs associated with establishing a rehandling site. Costs based on assessment of Mare Island, Rio Vista Airport Borrow Pit, Leonard Ranch and Cargill rehandling sites (LTMS 1994e).
f. No site operations and maintenance costs associated with in-Bay and ocean disposal.
g. Site monitoring at ocean, and in-Bay disposal represents a fixed cost that will not vary with volume. The cost of monitoring is included in the calculation of total costs. See Appendix N for details of monitoring cost estimates.
h. See text for explanation of costs for site monitoring at tidal wetlands.
i. Based on costs of $24,000 - $30,000 per levee mile (personal communication, E. Larson).
j. Monitoring costs for the rehandling facility are included in the site operations and maintenance cost.

6.2.3.2 Evaluation of Socioeconomic Effects

This section presents an evaluation of the socioeconomic effects of the LTMS policy alternatives. The scope of the evaluation is discussed first. General effects that are common to all of the alternatives are then addressed, followed by a specific evaluation of the No-Action alternative and each of the three action alternatives.

Scope of the Evaluation

The cost information included within this EIS/EIR is intended to allow for a full disclosure of the potential effects of each alternative, to allow the public and decisionmakers to assess the comparative costs of the project alternatives, and to allow the public and policymakers to consider whether policies should be considered to offset any disproportional economic effects to different segments of the dredging-related economy. (There is no statutory requirement to make findings concerning the significance of economic effects. The economic effects of a project, by themselves, are not considered impacts on the environment; therefore, no attempt was made to develop significance criteria or to make findings of significance for potential economic effects.)

The economic impacts of the LTMS alternatives are characterized not by the total cost of dredging and disposal under each alternative, but by the *difference* in the cost of each alternative from estimated future costs under existing policies as represented by the No-Action alternative, and among the action alternatives themselves.

The effects of dredging and disposal cost changes on regional economic activity (i.e., regional output and employment) depend on the reactions of individual dredgers to the cost changes. The scope of this analysis does not allow for the assessment of the financial conditions of individual public agencies, such as ports and businesses that conduct dredging work as part of their operations.

Table 6.2-6. Estimates of Total Costs, by Alternative and Work Category
(in millions of dollars)

Alternative	*Low Estimate*	*High Estimate*
No-Action		
Maintenance	883.36	1,481.89
New Work	222.07	372.12
Small	207.47	503.75
TOTAL	**1,312.91**	**2,357.76**
Alternative 1		
Maintenance	1,086.85	1,734.87
New Work	267.41	426.70
Small	233.78	539.48
TOTAL	**1,588.03**	**2,701.06**
Alternative 2		
Maintenance	1,116.96	2,006.16
New Work	282.32	492.22
Small	227.71	553.58
TOTAL	**1,626.99**	**3,051.96**
Alternative 3		
Maintenance	1,250.42	2,147.21
New Work	310.93	522.66
Small	246.46	575.80
TOTAL	**1,807.81**	**3,245.67**

Notes:
a. Total costs are derived from the unit costs presented in tables 6.2-7 and 6.2-8, the assumed volumes presented in Table 6.2-4, and the relative distribution among the work categories as shown in section 6.2.3.1 above.
b. Total costs for in-Bay disposal include the cost of monitoring. Monitoring costs are estimated by EPA and BCDC to equal on average $1.11 million per year, or $55 million over 50 years. Costs were allocated among the work categories according to the relative percentage of dredged material attributed to each work category.
c. Total costs for ocean disposal include the cost of monitoring. Monitoring costs were estimated by EPA and BCDC to equal on average $600,000 per year, or $30 million over the 50-year planning period. Costs were allocated among the work categories according to the relative percentage of dredged material attributed to each work category.
d. Total costs for tidal wetland disposal include costs for site monitoring. Monitoring costs for tidal wetland restoration sites were estimated by BCDC to be $70,000 per year per project, with an average monitoring period of 15 years. Estimates of total monitoring costs were based on the number and timing of wetland site development estimated by BCDC. Total monitoring costs over the 50 years are estimated to equal $4.2 million for No-Action and Alternative 1, and $10.5 million for Alternatives 2 and 3. Costs were allocated among the work categories according to the relative percentage of dredged material attributed to each work category.

For this long-term, regional, policy-level evaluation, analyzing economic effects at the company or institutional level is infeasible and inappropriate. Instead, this analysis programmatically evaluates possible impacts to categories of industries and dredgers over the course of the 50-year LTMS plan. Generally, private sector- or institutional-level socioeconomic analyses will be addressed during the environmental review of specific projects or policies proposed in the future.

The potential effects on major and small dredgers caused by general cost increases under the LTMS alternatives are qualitatively discussed below in the section titled General Effects Common to All Alternatives. To characterize the magnitude of the cost change for dredging-dependent industries, this analysis compared estimated costs that would be borne by non-federal project sponsors under the LTMS alternatives to costs under No-Action conditions, and among the action alternatives.

Table 6.2-7. Estimates of Federal versus Non-Federal Costs, by Alternative
(in millions of dollars)

Alternative	LOW RANGE			HIGH RANGE		
	Fed (b,f)	*Non-Fed*	*Total*	*Fed*	*Non-Fed*	*Total*
No-Action						
Maintenance (c)	762.25	121.11	883.36	1219.08	262.80	1,481.89
New Work (d)	170.52	51.55	222.07	279.59	92.53	372.12
Small Dredger (e)	121.74	85.73	207.47	297.69	206.05	503.75
TOTAL	1,054.51	258.40	1,312.91	1,796.37	561.39	2,357.76
Alternative 1						
Maintenance	935.40	151.45	1086.85	1,409.50	325.37	1,734.87
New Work	188.60	78.81	267.41	291.17	135.54	426.70
Small Dredger	136.69	97.09	233.78	317.69	221.79	539.48
TOTAL	1,260.68	327.35	1,588.03	2,018.36	682.69	2,701.06
Alternative 2						
Maintenance	902.39	214.58	1,116.96	1,410.78	595.38	2,006.16
New Work	188.75	93.57	282.32	291.40	200.81	492.22
Small Dredger	130.82	96.90	227.71	317.97	235.61	553.58
TOTAL	1,221.95	405.04	1,626.99	2,020.16	1,031.81	3,051.96
Alternative 3						
Maintenance	1,022.50	227.92	1,250.42	1,537.73	609.48	2,147.21
New Work	200.98	109.95	310.93	299.12	223.53	522.66
Small Dredger	142.07	104.40	246.46	331.30	244.50	575.80
TOTAL	1,365.55	442.26	1,807.81	2,168.15	1,077.52	3,245.67

Notes:

a. Cost share based on unit costs presented in tables 6.2-4 and 6.2-5, volume estimates from LTMS alternatives, and relative distribution among work categories estimated in Appendix N. Federal/non-federal cost shares estimated according to methodology explained below.

b. *Disposal to Upland Sites.* For disposal to upland, wetland, and reuse (UWR) sites (i.e., tidal wetlands restoration sites, levee restoration sites, and landfill sites), the federal government was assumed to pay for the proportion of costs represented by the least-cost alternative. For the purposes of this analysis, costs associated with disposal to the ocean site were assumed to represent least-cost conditions. It was assumed that the estimated percentage distribution to the in-Bay site (between 20-40 percent of total material) represents the environmentally-acceptable capacity of the in-Bay site. Once that capacity is reached, federal cost-sharing funds would then be allocated according to the next least-costly, environmentally-acceptable alternative, which is assumed to be ocean disposal. It must be noted, however, that depending on the project, upland disposal may actually qualify as the least-cost alternative after in-Bay site capacity is reached. In that case, total costs to both federal and non-federal sponsors would actually be lower than those calculated here. Dredging and disposal costs above the least-cost condition were assumed to be entirely borne by non-federal sponsors. In addition, all site development and management costs for upland disposal were assumed to be born by the local sponsor.

c. **Maintenance:** *In-Bay and Ocean Disposal*. Approximately 90 percent of major maintenance dredging is either dredged by the federal government (COE, USCG, or USN) or is eligible for federal cost-sharing. For that 90 percent of material, the federal government was assumed to cover 100 percent of all costs, through cost-sharing funds, military budget allocations, and federal agency expenditures on aquatic disposal site development and monitoring. Local sponsors were assumed to pay 100 percent of the costs for dredging and disposing the remaining 10 percent of material generated by major non-federal dredging.

d. **New Work:** *In-Bay and Ocean Disposal.* Approximately 90 percent of the material generated by new work is eligible for federal cost sharing. The remaining 10 percent comes from the non-federal portions of new work projects, such as deepening berths and loading facilities. Of that, the federal government was assumed to cover 75 percent of total costs and non-federal sponsors were assumed to be responsible for the remaining 25 percent of costs. For the remaining 10 percent of material local sponsors were assumed to cover 100 percent of the total costs.

e. **Small Dredger:** *In-Bay and Ocean Disposal*. Federally authorized channels account for approximately 60 percent of small dredging projects (depths less than 12 ft below MLLW). It is assumed that the federal government would cover 100 percent of the cost of dredging and aquatic disposal of that material. Other small dredging sponsors (such as marinas and homeowners associations) are assumed to pay 100 percent of the total costs for the remaining 40 percent of dredged material. This analysis assumes continued federal funding for dredging of shallow-draft recreational channels. It is important to note, however, that these projects do not have a high budgetary priority, so increases in costs, and potential decreases in available federal funding, may delay or preclude federal operations and maintenance on these channels. In that instance, local sponsors may have to bear a greater proportion of the cost of continued maintenance.

f. Monitoring costs for aquatic disposal were allocated to federal and non-federal sponsors according to the relative percentage of material generated by federal activities. This actually overstates the cost to local sponsors, as the federal and state governments will pay for most of the monitoring at these sites.

Table 6.2-8. Major Assumptions Underlying Cost Estimates and Economic Analysis

Assumption	*Rationale*	*Potential Effect on Unit Costs (& Total Costs)*	*Comments*
Dredging volume held constant at 296.5 mcy (or 237.3 clean material) over 50-year period.	Allows for comparison of alternatives.	+/- (+)	Dredge volumes will vary under different alternatives and over time. Estimate of 296.5 based on Gahagan & Bryant's high estimate of dredging volume.
Percentage of material disposed in each placement environment held constant over 50 years.	Allows for direct comparison and ease of calculation of total costs.	ne (+)	Total costs likely lower as UWR projects are phased in over time.
Costs estimated for disposal of clean material only.	NUAD material requires special handling and disposal, and it is likely that the same amount of NUAD material would be dredged and disposed of under each alternative.	ne (ne)	Overall costs of disposing NUAD material should not vary among the alternatives.
Costs presented in 1995 constant dollars, and are not discounted.	Existing information does not capture future variations in annual dredging and disposal activities.	ne (ne)	Since costs are not assumed to vary in future years, discounting would not affect the relative difference among the alternatives.
Costs do not attempt to capture non-market (i.e., environmental) costs.	Other portions of the EIS/R will examine environmental effects of the alternatives. Monetizing environmental costs is extremely difficult and is beyond the scope required for a programmatic EIS/R.	- (-)	Inclusion of environmental costs would raise the cost of all alternatives, though it may change the relative difference among the alternatives.
Costs do not incorporate market and non-market benefits associated with each alternative.	Other portions of the EIS/R will examine potential benefits. Monetizing environmental benefits is extremely difficult.	+ (+)	Inclusion of market and non-market benefits would lower the cost of all alternatives, though it may change the relative difference among the alternatives.
For the most part, costs do not reflect the costs of government regulation and management of dredging and dredged material disposal.	Difficult to estimate the direct government costs.	- (-)	Inclusion of government costs would increase the costs of all alternatives. Administrative/ bureaucratic costs for UWR would likely be higher than for ocean or in-Bay disposal.
Estimates based on current regulatory and financial framework for dredging and dredged material disposal.	Cannot speculate about possible changes in policy.	+ (+)	Policy changes (e.g., cost mitigation for small dredgers or changes in cost-sharing) could reduce both unit costs for certain sectors and total costs.
Material from each work category is distributed among the placement environments according to the relative percentage of total material going to that environment (e.g., if 40 percent of all dredged material is slated for UWR, it is assumed that 40 percent of the material generated by each work category will go to that placement environment).	Allows for direct comparison and ease of calculation of total costs. Also, cannot speculate how specific disposal decisions would be made.	+ (+)	Likely that smaller dredging projects will not find it practical to send such a high percentage to higher-cost sites.

Notes:
+ = Assumption likely to make estimates higher than actual costs
- = Assumption likely to make estimates lower than actual costs
+/- = Actual costs likely to be either higher or lower than those calculated here
ne = No effect

The magnitude of regional effects potentially resulting from cost increases was evaluated by assessing the magnitude of dredging and disposal costs in relationship to total revenues generated by the maritime industry. As discussed in the Affected Environment for socioeconomics (section 4.6) and shown in Table 4.6-2 (Summary of Maritime Industry Economic Activity), the maritime industry generated an estimated $7.5 billion in revenues in the Bay Area in 1990. These revenues represented 4.1 percent of the Bay Area's estimated gross regional product in 1990.

Finally, this analysis does not attempt to quantify the environmental benefits or costs to the region associated with any of the alternatives. It also does not estimate potential costs attributable to the current uncertain regulatory climate (such as costs associated with delayed or avoided dredging), nor the effect of that uncertainty on the regional economy.

General Effects Common to All Alternatives

As shown in Table 6.2-7, total dredging and disposal costs for dredgers in the San Francisco Bay Area are estimated to increase under all alternatives compared to No-Action. Public and private entities directly dependent on dredging to sustain or expand their operations would react differently to changes in costs. The general effects on each of the three dredging sectors (federal government, major dredgers, and small dredgers) that would be common to all alternatives are described below.

In addition to the effects on each sector, implementation of any of the LTMS alternatives would improve regulatory certainty for all dredgers in the Bay Area. Establishing a comprehensive set of goals, policies, and guidelines for the implementation of projects would achieve the following:

- Streamline the process for obtaining required permits from the jurisdictional agencies involved in the approval process;
- Reduce delays caused by conflicting policies among the federal and state agencies that have authority over projects; and
- Reduce the time required to gain permit approvals, and therefore reduce the overall costs of projects for all types of sponsors.

Similarly, establishment of multi-user sites for disposal or reuse of NUAD-class material could reduce overall costs of this aspect of disposal, since individual dredgers would not have to bear on their own all the costs of site acquisition, development, and operations.

FEDERAL GOVERNMENT. Federal agencies that undertake and participate in new and maintenance dredging projects, including the COE and the U.S. Navy, receive funding through congressional budget allocations. Increased dredging and/or disposal costs would require increased budget allocations to offset direct dredging costs and cost-sharing responsibilities, assuming federal dredging and cost-sharing requirements remain unchanged in the future.

The ability and willingness of the federal government to provide funding to offset incrementally higher costs for new and maintenance dredging projects under the alternatives is unknown. For the purposes of this analysis, the federal government is assumed to continue funding its existing share of dredging/disposal costs (i.e., the same percentage of higher absolute costs would still be borne by the federal government). In this situation, no adverse regional economic effects would result from increased dredging/disposal costs to federal agencies. It is possible, however, that federal funding may not increase to meet the same percentage of higher dredging and disposal costs. Actual federal funding may remain fixed, or could even decrease. The current cost to the government is illustrated by the No-Action alternative. If actual federal *allocations* for dredging operations and maintenance (O&M) in the region remain fixed, a smaller *percentage* of the higher overall costs would be federally funded. In this case, it is readily apparent that another source of funds would be needed under any of the other alternatives to cover the increased costs. The COE may have to consider options such as maintaining only the highest priority navigation channels, balancing increased costs with decreases in funds to other projects or sectors, or looking to local sponsors to provide an increased percentage share of maintenance dredging operations. These shifts may not impact the region as a whole, but could affect those particular (e.g., private) sectors whose federal funds are effectively cut or whose cost-share percentage is effectively increased.

OTHER MAJOR DREDGERS. Other major dredgers include the ports and bulk shippers, such as oil companies. The reaction of ports in the San Francisco Bay Area to increased dredging/disposal costs are difficult to analyze because of the different cost/revenue structures faced by individual ports. The potential effects of increased dredging/disposal costs on ports can be examined by evaluating how dredging costs affect overall port costs and whether cost increases can be passed along to port customers. Costs faced by ports will only increase for that proportion of material that would not go to in-Bay disposal (primarily material from new work and some portion of material from maintenance dredging).

Dredging costs are a component of total port capital and operating expenditures. An increase in dredging costs would exert upward pressure on port vessel charges, cargo charges, lease and rental rates, and prices for other port services. Ports generally set prices to recover fixed and variable costs and provide for a rate of return adequate to cover debt service and to provide funds for reinvestment in port facilities and equipment (MARAD 1994). Assuming that federal cost-sharing policies do not change to offset cost increases, ports would presumably attempt to raise prices high enough to recapture additional dredging and disposal costs under the alternatives.

The ability of ports to pass along cost increases to customers is limited by competitive considerations and lease agreements. Cargo ports such as the Port of Oakland compete for business with ports in Long Beach, Los Angeles, Seattle, and Tacoma. Though future market conditions are difficult to predict, competitive considerations may limit the ability of Bay Area ports to completely or quickly pass along dredging cost increases to port users.

Terminal lease deals may also reduce the ability of some ports to quickly pass along cost increases to port users. Fixed-rate, long-term leases for shipping terminals may limit a port's ability to pass along increased dredging costs in the near term. Other types of lease agreements allow for varying levels of flexibility in setting annual rates over the lease term.

If ports are able to pass along much or all of the dredging/disposal cost increase along to their customers, few regional economic effects would occur under the project alternatives because ports would be generally able to maintain business volumes and employment levels. If ports are unable to pass along all or much of increased dredging/disposal costs to customers because of competitive pressures or lease arrangements, and assuming that cost-share policies do not change, operating income available to ports would be reduced. Ports operating on the financial margin or with net operating income deficits may be adversely affected by any increase in dredging/disposal costs that cannot be passed along to port customers. These ports may need to reduce operations or increase borrowing to finance existing operations. Reductions in port operations would reduce regional employment and revenue levels associated with port industries.

According to a recent study of port financing (MARAD 1994), the ports of Oakland and San Francisco had profits (before taxes and contributions), while the Port of Richmond had a net loss, during 1992. Port financial conditions and profitability change from year to year; however, increased dredging/disposal costs under the project alternatives would likely have adverse economic effects on some ports in the Bay Area.

Other major dredgers, such as oil companies or other bulk shippers, represent approximately 10 percent of total dredged material volume from major dredgers. Oil companies maintain marine facilities near processing plants to accommodate shipping petroleum products to various market areas. These companies would likely pass along increased dredging costs to petroleum products customers in the form of higher prices. Since dredging costs do not represent a large proportion of overall costs for oil companies, any price increase related to dredging costs would likely be very small.

SMALL DREDGERS. Small dredgers include all projects in the "small dredging" category. Federally authorized projects account for approximately 60 percent of dredged material volume from small dredging projects, and the remaining 40 percent is conducted primarily by public and private marinas, yacht clubs, and other small maritime businesses. This analysis assumes continued federal funding for dredging of shallow-draft recreational channels. These projects do not have a high budgetary priority, however, so increases in costs, and potential decreases in available federal funding, may delay or preclude federal operations and maintenance on these channels. In that instance, local sponsors may have to bear a greater proportion of the cost of continued maintenance.

Assuming that no cost mitigation policies are implemented, small dredgers such as private and public marinas, yacht clubs, and shipbuilding and repair companies would probably have difficulty reacting to large increases in dredging and disposal costs. Federal cost-sharing funds are not generally available for small projects, requiring project sponsors to absorb all of the cost increase associated with disposal to more-costly placement environments. In addition, small dredgers such as marinas do not have the borrowing capacity and cash flow of large ports.

The implications of increased costs for small dredgers are not obvious. Similar to ports, marinas would attempt to pass along costs to users through increased assessments, higher berthing fees, or fees for other services. Depending on the magnitude of the cost increase, fee increases needed to offset any additional costs may be high enough to discourage marina use, resulting in decreased use and revenues. Alternatively, the ability of marinas to absorb higher costs would depend on the specific financial health of individual marinas. This assumes, however, that no policies will be implemented to lessen the impact on these small dredgers (e.g., allowing priority use of less-expensive disposal sites). Shallow-draft recreational navigation channels have never been a high priority in COE budgetary requests due to the availability of funds.

No-Action (Current Conditions)

Under No-Action conditions, cumulative costs of dredging and disposal over the planning period are estimated to range from approximately $1.3 billion to $2.4 billion, which is an average of approximately $26 million to $47 million per year (Table 6.2-7). These costs would represent 0.3 to 0.6 percent of the overall $7.5 billion per year dredging-related maritime economy in the Bay Area (in 1990 dollars).

MAJOR DREDGERS. As Table 6.2-7 shows, the total costs of maintenance and new work projects undertaken by major dredgers are estimated to range from $1.1 billion to $1.9 billion over the planning period. The federal government is expected to absorb a large share of this cost based on the estimated cost distributions presented in Table 6.2-7. The simplified assumptions derived from current federal cost-sharing policies indicate that the federal government would absorb from 81 to 84 percent of these costs. Local, non-federal sponsors are estimated to face remaining costs, ranging from $173 million to $355 million over the planning period.

SMALL DREDGERS. Dredging and disposal costs for small dredging projects are estimated to total from $207 million to $504 million over the 50-year planning period (Table 6.2-7). Federally authorized projects for maintaining recreational channels in the Bay Area account for approximately 60 percent of this dredged volume, so federal expenditures are estimated to absorb $122 million to $298 million of these costs. Local, non-federal project sponsors would face costs estimated to range from $86 to $206 million over the planning period, or $1.7 million to $4.1 million annually (see Table 6.2-7). It is anticipated that federal maintenance of recreational channels will be substantially reduced if COE operations and maintenance funding is reduced by Congress. Such a change would dramatically increase costs for local, non-federal project sponsors.

Alternative 1 — Emphasize Aquatic Disposal

Under Alternative 1, costs were estimated based on the following assumed distribution of clean dredge material among placement environments: 40 percent in-Bay, 40 percent ocean, and 20 percent UWR. This alternative, which relies heavily on disposal at existing aquatic disposal sites, would likely be phased in more quickly than alternatives 2 and 3.

Cumulative costs of dredging and disposal over the planning period are estimated to range from approximately $1.6 billion to $2.7 billion under Alternative 1, which is an average of approximately $32 million to $54 million per year (Table 6.2-7). These costs are approximately $6 million to $7 million higher annually than cumulative costs estimated for No-Action conditions (an increase of approximately 15 to 21 percent). These costs would represent 0.4 to 0.7 percent of the overall $7.5 billion per year dredging-related maritime economy in the Bay Area (in 1990 dollars).

MAJOR DREDGERS. As Table 6.2-7 shows, the total costs of maintenance and new work projects undertaken by major dredgers under Alternative 1 are estimated to range from $1.35 billion to $2.16 billion over the planning period. The federal government is expected to absorb from 79 to 83 percent of these costs, similar to the percentage share under No-Action conditions. Local, non-federal sponsors would face remaining costs, estimated to range from $230 million to $461 million over the planning period, or $4.6 million to $9.2 million per year. These local sponsor costs would be approximately $58 million to $106 million higher than the $173 million to $355 million share under the No-Action conditions over the 50 years, or approximately $1.2 million to $2.1 million more per year (a 30 to 33 percent increase).

As discussed above for major dredgers under General Effects Common to All Alternatives (section 6.2.3.2), specific ports and other major dredgers would either pass along cost increases to customers or absorb all or part of the increase in costs. The $1.2 to 2.1 million annual cost increase estimated for local sponsors under Alternative 1 could result in both effects. However, it is likely that a transition to more costly alternatives would be phased in over time, reducing the overall costs

The implications of increased costs for small dredgers are not obvious. Similar to ports, marinas would attempt to pass along costs to users through increased assessments, higher berthing fees, or fees for other services. Depending on the magnitude of the cost increase, fee increases needed to offset any additional costs may be high enough to discourage marina use, resulting in decreased use and revenues. Alternatively, the ability of marinas to absorb higher costs would depend on the specific financial health of individual marinas. This assumes, however, that no policies will be implemented to lessen the impact on these small dredgers (e.g., allowing priority use of less-expensive disposal sites). Shallow-draft recreational navigation channels have never been a high priority in COE budgetary requests due to the availability of funds.

No-Action (Current Conditions)

Under No-Action conditions, cumulative costs of dredging and disposal over the planning period are estimated to range from approximately $1.3 billion to $2.4 billion, which is an average of approximately $26 million to $47 million per year (Table 6.2-7). These costs would represent 0.3 to 0.6 percent of the overall $7.5 billion per year dredging-related maritime economy in the Bay Area (in 1990 dollars).

MAJOR DREDGERS. As Table 6.2-7 shows, the total costs of maintenance and new work projects undertaken by major dredgers are estimated to range from $1.1 billion to $1.9 billion over the planning period. The federal government is expected to absorb a large share of this cost based on the estimated cost distributions presented in Table 6.2-7. The simplified assumptions derived from current federal cost-sharing policies indicate that the federal government would absorb from 81 to 84 percent of these costs. Local, non-federal sponsors are estimated to face remaining costs, ranging from $173 million to $355 million over the planning period.

SMALL DREDGERS. Dredging and disposal costs for small dredging projects are estimated to total from $207 million to $504 million over the 50-year planning period (Table 6.2-7). Federally authorized projects for maintaining recreational channels in the Bay Area account for approximately 60 percent of this dredged volume, so federal expenditures are estimated to absorb $122 million to $298 million of these costs. Local, non-federal project sponsors would face costs estimated to range from $86 to $206 million over the planning period, or $1.7 million to $4.1 million annually (see Table 6.2-7). It is anticipated that federal maintenance of recreational channels will be substantially reduced if COE operations and maintenance funding is reduced by Congress. Such a change would dramatically increase costs for local, non-federal project sponsors.

Alternative 1 — Emphasize Aquatic Disposal

Under Alternative 1, costs were estimated based on the following assumed distribution of clean dredge material among placement environments: 40 percent in-Bay, 40 percent ocean, and 20 percent UWR. This alternative, which relies heavily on disposal at existing aquatic disposal sites, would likely be phased in more quickly than alternatives 2 and 3.

Cumulative costs of dredging and disposal over the planning period are estimated to range from approximately $1.6 billion to $2.7 billion under Alternative 1, which is an average of approximately $32 million to $54 million per year (Table 6.2-7). These costs are approximately $6 million to $7 million higher annually than cumulative costs estimated for No-Action conditions (an increase of approximately 15 to 21 percent). These costs would represent 0.4 to 0.7 percent of the overall $7.5 billion per year dredging-related maritime economy in the Bay Area (in 1990 dollars).

MAJOR DREDGERS. As Table 6.2-7 shows, the total costs of maintenance and new work projects undertaken by major dredgers under Alternative 1 are estimated to range from $1.35 billion to $2.16 billion over the planning period. The federal government is expected to absorb from 79 to 83 percent of these costs, similar to the percentage share under No-Action conditions. Local, non-federal sponsors would face remaining costs, estimated to range from $230 million to $461 million over the planning period, or $4.6 million to $9.2 million per year. These local sponsor costs would be approximately $58 million to $106 million higher than the $173 million to $355 million share under the No-Action conditions over the 50 years, or approximately $1.2 million to $2.1 million more per year (a 30 to 33 percent increase).

As discussed above for major dredgers under General Effects Common to All Alternatives (section 6.2.3.2), specific ports and other major dredgers would either pass along cost increases to customers or absorb all or part of the increase in costs. The $1.2 to 2.1 million annual cost increase estimated for local sponsors under Alternative 1 could result in both effects. However, it is likely that a transition to more costly alternatives would be phased in over time, reducing the overall costs to major dredgers and allowing them time to absorb any cost increases. In addition, increased costs may be offset by greater regulatory predictability. Therefore, the magnitude of the increase may not result in substantial adverse effects for major dredgers. Any adverse overall regional effects (i.e., reductions in regional employment because of reductions in the operations of major dredgers) resulting from cost increases under Alternative 1 would likely be small.

SMALL DREDGERS. Under Alternative 1, total dredging and disposal costs for small dredgers are estimated to range from $234 million to $539 million over the 50-year planning period (Table 6.2-7). Federally authorized projects for maintaining recreational channels in the Bay Area accounts for approximately 60 percent of this dredged volume, so federal expenditures are estimated to absorb $137 million to $318 million of these costs. Local, non-federal project sponsors would face costs estimated to range from $97 million to $222 million over the planning period (Table 6.2-7). These local costs are $11 million to $16 million higher than local costs estimated for No-Action conditions, or $230,000 to $310,000 per year (an increase of 8 to 13 percent).

The implications of increased costs for small dredgers are not obvious. Similar to ports, marinas and private boating clubs would attempt to pass along costs to users and members through higher berthing fees and fees for other services. The 8 to 13 percent increase in costs estimated for Alternative 1 might be low enough to be at least partially passed along to users. Other small dredgers, such as boat repair companies and utilities, would also likely pass some or all of the cost increase on to customers. Any adverse regional socioeconomic effects resulting from cost increases to small dredgers may be small under Alternative 1, but could be significant to individual entities.

Alternative 2 — Emphasize In-Bay and Upland/Wetland Reuse

Under Alternative 2, costs were estimated based on the following assumed distribution of clean dredge material among placement environments: 40 percent in-Bay, 20 percent ocean, and 40 percent UWR. Cumulative costs of dredging and disposal over the planning period are estimated to range from approximately $1.6 billion to $3.05 billion under Alternative 2, which is an average of approximately $33 million to $61 million per year (an increase of approximately 24 to 29 percent over No-Action conditions) (Table 6.2-7). These costs would represent 0.43 to 0.8 percent of the overall $7.5 billion per year dredging-related maritime economy in the Bay Area (in 1990 dollars).

Costs for Alternative 2 are approximately $39 million to $351 million more than Alternative 1, or $0.78 million to $7 million per year. Alternative 2 would likely be phased in much more slowly than Alternative 1 because of the time required to develop additional capacity at UWR disposal sites. The cost increase for this alternative would probably be lower than the estimates presented in tables 6.2-6 and 6.2-7 because these estimates were based on the assumption that the distribution of material assumed for this alternative would occur immediately. In reality, the shift from aquatic disposal sites to generally more-costly UWR disposal sites would occur over time, reducing costs in the initial phases of the 50-year planning period.

MAJOR DREDGERS. As Table 6.2-7 shows, the total costs of maintenance and new work projects undertaken by major dredgers under Alternative 2 are estimated to range from $1.4 billion to $2.5 billion over the planning period. The federal government is expected to absorb from 68 to 78 percent of these total costs, lower than the percentage share under No-Action conditions. Local, non-federal sponsors would face the remaining costs, estimated to range from $308 million to $796 million over the planning period. These local sponsor costs would be approximately $135 million to $441 million higher than the $172 million to $355 million attributed to local costs under the No-Action alternative over the 50-year period, or approximately $2.71 million to $8.8 million more per year (an increase of approximately 79 to 124 percent). Compared to Alternative 1, local sponsors would pay approximately $78 million to $335 million more over the 50 year period, or $1.5 million to $6.7 million per year (an increase of approximately 33 to 73 percent).

This increase in non-federal costs is due primarily to the increased disposal costs and site development and management costs accompanying the increase in UWR disposal. These costs are borne almost exclusively by local sponsors.

As discussed previously, most major dredgers would attempt to pass dredging/disposal cost increases along to customers. The $136 million to $441 million cost increase for local sponsors estimated for Alternative 2, however, is high enough that some major dredgers might not be able to immediately or fully pass all of the costs along to customers. Under highly competitive market conditions, higher customer prices charged by major dredgers such as ports could result in slower growth, operating deficits or, in the worst case, lost shipping business. Reduced port revenues could cause reductions in operations and employment and, subsequently, reductions in regional employment to some degree. It is unclear, however, to what degree those changes in employment would affect the regional economy. Of course, if the federal government paid a larger portion of the site development and maintenance costs, as in the Sonoma Baylands project, the cost to local sponsors would be less than estimated here.

SMALL DREDGERS. Under Alternative 2, total dredging and disposal costs for small dredgers are estimated to range from $228 million to $554 million over the 50-year planning period (Table 6.2-7). Federally authorized projects for maintaining recreational channels in the Bay Area account for approximately 60 percent of this dredged volume, so federal expenditures are estimated to absorb $131 million to $318 million of these costs. Local, non-federal project sponsors would face costs estimated to range from $97 million to $236 million over the planning period (Table 6.2-7). These local costs are $11 million to $30 million more than local costs estimated for No-Action conditions, or $223,000 to $591,000 per year (an increase of 13 to 14 percent). Costs for local sponsors for Alternative 2 would be approximately the same or only slightly more (6 percent) than Alternative 1.

As discussed previously, small dredgers would attempt to pass increased dredging/disposal costs along to marina users, private boating club members, and business customers. The $223,000 to $591,000 annual increase in costs over No-Action may or may not be enough to cause financial problems for many small dredgers. Small dredgers such as public and private marinas do not have the borrowing capacity and the ability to increase cash flow that many large ports have. Some small marinas and businesses that rely on maintenance dredging of harbors and access channels may reduce operations because of higher costs under Alternative 2. Without mitigation such as priority access to in-Bay disposal, homeowner associations that dredge may be the least able to bear these increases. Some loss of employment within the region could result from cost increases for small dredgers.

Alternative 3 — Emphasize Ocean and Upland/Wetland Reuse

Under Alternative 3, costs were estimated based on the following assumed distribution of clean dredged material among placement environments: 20 percent in-Bay, 40 percent ocean, and 40 percent UWR.

Dredging and disposal costs under Alternative 3 would be higher than under the other alternatives because of the increased use of more-costly ocean and UWR disposal sites. Cumulative costs of dredging and disposal over the planning period are estimated to range from approximately $1.8 billion to $3.2 billion under Alternative 3, which is an average of approximately $36 million to $65 million per year (Table 6.2-7). The costs associated with Alternative 3 would represent 0.5 to 0.9 percent of the overall $7.5 billion per year dredging-related maritime economy in the Bay Area (in 1990 dollars).

These costs are approximately $10 million to $18 million per year higher than cumulative costs estimated for No-Action condition, an increase of approximately 38 percent.

Dredging and disposal costs for Alternative 3 are $220 to $545 million more than those under Alternative 1, and $181 to $194 million more than those under Alternative 2.

Similar to Alternative 2, Alternative 3 would likely be phased in much more slowly than Alternative 1 because of the time required to develop additional disposal capacity at UWR disposal sites. The cost increase for this alternative would probably be lower than the estimates presented in tables 6.2-6 and 6.2-7 because these estimates were based on the assumption that the distribution of material assumed for this alternative would occur immediately. In reality, the shift from aquatic disposal sites to generally more-costly UWR disposal sites would occur slowly, reducing costs in the initial phases of the 50-year planning period.

MAJOR DREDGERS. As Table 6.2-6 shows, the total costs of maintenance and new work projects undertaken by major dredgers under Alternative 3 are estimated to range from $1.6 billion to $2.7 billion over the planning period. The federal government is expected to absorb from 67 to 75 percent of these total costs, lower than the percentage share under No-Action conditions. Local, non-federal sponsors would face the remaining costs, estimated to range from $338 million to $833 million over the planning period. These local sponsor costs are approximately $165 million to $478 million higher than the local costs of $173 million to $355 million under No-Action conditions, or $3.3 million to $9.6 million more per year (an increase of 96 to 134 percent). Under Alternative 3, local sponsor costs for major dredgers would increase by $108 million to $372 million over the 50 years (47 to 81 percent) over

Alternative 1, and $30 million to $36.8 million (5 to 10 percent) more than Alternative 2.

As discussed previously, most major dredgers would attempt to pass dredging/disposal cost increases along to customers. The approximately $9.6 million annual cost increase for local sponsors estimated for Alternative 3, however, is high enough that some major dredgers would probably not be able to immediately or fully pass all of the costs along to customers. Under highly competitive market conditions, higher customer prices charged by major dredgers such as ports could result in slower growth, operating deficits or, in the worst case, lost shipping business. Reduced port revenues could cause reductions in operations and employment and, subsequently, possible reductions in regional employment.

SMALL DREDGERS. Under Alternative 3, total dredging and disposal costs for small dredgers are estimated to range from $246 million to $576 million over the 50-year planning period (Table 6.2-6). Federally authorized projects for maintaining recreational channels in the Bay Area account for approximately 60 percent of this dredged volume, so federal expenditures are estimated to absorb $142 million to $331 million of these costs. Local sponsors would be responsible for the remaining $104 million to $245 million, or approximately $2 million to $5 million per year. Under Alternative 3, local sponsors would face costs that are $19 million to $38 million more than under No-Action conditions, or $373,000 to $769,000 more per year (an increase of 19 to 22 percent). Compared to Alternative 1, however, costs to local sponsors would increase by $7 million to $23 million, or $146,000 to $454,000 annually (approximately 7.5 to 10 percent). Under Alternative 3, local sponsor costs would be $7.5 million to $9 million more than under Alternative 2, or $150,000 to $178,000 more per year (an increase of 4 to 8 percent).

As discussed previously, small dredgers would attempt to pass increased dredging/disposal costs along to marina users, private boating club members, and business customers. The $373,000 to $769,000 annual increase in costs estimated for Alternative 3 over No-Action are likely high enough to cause financial problems for many small dredgers. Small dredgers such as public and private marinas do not have the borrowing capacity and the ability to increase cash flow that many large ports have. Some small marinas and businesses that rely on maintenance dredging of harbors and access channels may close or reduce operations because of higher costs under Alternative 3. Some loss of employment within the region could result from adverse cost effects on small dredgers.

6.2.4 Air Quality Assessment

The following is a presentation of air quality impacts that could occur from the four project dredging and disposal alternatives within the San Francisco Bay Area. Since the LTMS program includes a range of dredging and disposal possibilities, an exact description of air quality impacts associated with each project alternative cannot be provided at this time. The approach of the analysis is to present programmatic, yet reasonable impacts that could occur from each alternative that are based on the most current and expected dredging and disposal activities within the San Francisco Bay Area. Factors that could affect the emissions calculated for each alternative will be discussed. Definitive impacts for future projects will be performed on a site-specific EIS/EIR level at the time of final project definition.

6.2.4.1 No-Action Alternative

The general assumption used in the analysis is that the annual dredging and disposal rate would be 4.74 mcy for each project alternative. This is the annual average volume calculated for the LTMS program 50-year planning period. The volume of sediments distributed to each placement environment would be the annual average of the volumes presented in Table 3 of the LTMS unit cost analysis (USEPA 1995). For the No-Action Alternative, these volumes are (1) 3.32 mcy for in-Bay disposal, (2) 0.71 mcy for ocean disposal, (3) 0.40 mcy for habitat restoration, and (4) 0.31 mcy for levee restoration.

Other than disposal volumes, the assumptions used to calculate disposal emissions at each of the placement sites for the No-Action Alternative analysis are the same as those used in the placement site analyses presented in section 6.1.5. Assumptions used to calculate dredging emissions include the following: (1) 0.95 mcy of sediment would be dredged by a 2,000-horsepower hopper dredge at a rate of 360 cy per hour and would be transported to an in-Bay placement environment; (2) the remaining 3.79 mcy of sediment would be dredged by two 5,000-horsepower clamshell dredges at a rate of 275 cy per hour and would be transported by barge and distributed to placement environments by the amounts mentioned in the previous paragraph; (3) each dredge would operate 22 hours per day until the above volumes are completed; and (4) for the calculation of peak daily emissions, disposal activities would not occur at more than one site per day.

A presentation of equipment usage and emission calculations associated with the No-Action Alternative are contained in Appendix O.

Summaries of daily and total emissions that would occur from the No-Action Alternative are provided in tables 6.2-9 and 6.2-10, respectively. Peak daily emissions from the alternative would exceed the BAAQMD emission thresholds for ROG, NO_x, and PM_{10}. Peak daily emissions of TOG, ROG, PM, and PM_{10} would occur during simultaneous dredging and disposal at the ocean location and peak daily emissions of all other pollutants would occur during simultaneous dredging and disposal at a levee restoration location. Additionally, with an annual CO emission rate of 223.1 tons, the alternative would trigger a conformity determination for this pollutant.

Table 6.2-9. Daily Emissions Associated with Each LTMS Alternative

Alternative/Dredging or Disposal Site	DAILY EMISSIONS (POUNDS)						
	TOG	*ROG*	*CO*	*NO_x*	*SO_2*	*PM*	*PM_{10}*
No-Action Alternative							
Dredging	266	255	1,197	5,059	337	161	120
Ocean	302	290	470	2,704	189	218	209
In-Bay	121	117	171	1,021	72	74	69
Habitat Restoration	147	141	327	1,640	113	86	76
Levee Restoration	229	220	741	3,324	230	174	155
Rehandling Facility	0	0	0	0	0	0	0
PEAK DAILY (a)	568	545	1,938	8,383	566	379	329
Alternative 1							
Dredging	266	255	1,197	5,059	337	161	120
Ocean	302	290	470	2,704	189	218	209
In-Bay	121	117	171	1,021	72	74	69
Habitat Restoration	147	141	327	1,640	113	86	76
Levee Restoration	229	220	741	3,324	230	174	155
Rehandling Facility	0	0	0	0	0	0	0
PEAK DAILY (a)	568	545	1,938	8,383	566	379	329
Alternative 2							
Dredging	266	255	1,197	5,059	337	161	120
Ocean	302	290	470	2,704	189	218	209
In-Bay	121	117	171	1,021	72	74	69
Habitat Restoration	147	141	327	1,640	113	86	76
Levee Restoration	229	220	741	3,324	230	174	155
Rehandling Facility	288	277	700	2,823	196	191	175
PEAK DAILY (a)	568	545	1,938	8,383	566	379	329
Alternative 3							
Dredging	266	255	1,197	5,059	337	161	120
Ocean	302	290	470	2,704	189	218	209
In-Bay	26	25	19	160	12	5	3
Habitat Restoration	147	141	327	1,640	113	86	76
Levee Restoration	229	220	741	3,324	230	174	155
Rehandling Facility	288	277	700	2,823	196	191	175
PEAK DAILY (a)	568	545	1,938	8,383	566	379	329
BAAQMD Significance Criteria	**NA**	**80**	**NA**	**80**	**NA**	**NA**	**80**

Note: a. Transport and disposal for ocean, in-Bay, habitat restoration, levee, and landfill sites occur at only one site at a time. Peak daily CO, NO_x, and SO_2 emissions occur during dredging and transport and disposal to a levee site. Peak daily emissions of all other pollutants occur during dredging, transport, and disposal to an ocean site.

Table 6.2-10. Total Emissions Associated with Each LTMS Alternative

Alternative/Dredging or Disposal Site	TOTAL EMISSIONS (TONS)						
	TOG	*ROG*	*CO*	*NO_x*	*SO_2*	*PM*	*PM_{10}*
No-Action Alternative							
Dredging	34.11	32.75	181.12	743.19	49.17	23.31	17.33
Ocean	9.64	9.25	15.02	86.36	6.03	6.96	6.68
In-Bay	7.94	7.62	10.85	65.72	4.63	4.62	4.32
Habitat Restoration	2.22	2.13	4.94	24.79	1.71	1.30	1.15
Levee Restoration	3.44	3.30	11.14	49.97	3.45	2.62	2.32
Rehandling Facility	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	57.35	55.06	223.08	970.03	64.98	38.81	31.81
Alternative 1							
Dredging	34.11	32.75	181.12	743.19	49.17	23.31	17.33
Ocean	25.75	24.75	40.20	231.11	16.13	18.62	17.87
In-Bay	4.40	4.23	5.25	33.87	2.41	2.07	1.87
Habitat Restoration	3.00	2.88	6.67	33.47	2.31	1.76	1.55
Levee Restoration	4.44	4.26	14.38	64.47	4.45	3.38	3.00
Rehandling Facility	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	71.74	68.87	247.62	1,106.10	74.46	49.14	41.63
Alternative 2							
Dredging	34.11	32.75	181.12	743.19	49.17	23.31	17.33
Ocean	12.89	12.38	20.10	115.55	8.06	9.31	8.94
In-Bay	4.40	4.23	5.25	33.87	2.41	2.07	1.87
Habitat Restoration	6.61	6.35	14.70	73.76	5.08	3.87	3.42
Levee Restoration	4.44	4.26	14.38	64.47	4.45	3.38	3.00
Rehandling Facility	5.16	4.95	14.59	42.00	2.85	3.79	3.56
TOTAL	67.62	64.92	250.14	1,072.84	72.02	45.73	38.12
Alternative 3							
Dredging	34.11	32.75	181.12	743.19	49.17	23.31	17.33
Ocean	25.79	24.75	40.20	231.11	16.13	18.62	17.87
In-Bay	2.04	1.96	1.51	12.56	0.93	0.36	0.23
Habitat Restoration	6.61	6.35	14.70	73.76	5.08	3.87	3.42
Levee Restoration	4.44	4.26	14.38	64.47	4.45	3.38	3.00
Rehandling Facility	5.16	4.95	14.59	42.00	2.85	3.79	3.56
TOTAL	78.15	75.02	266.49	1,167.08	78.60	53.33	45.41

The overwhelming majority of emissions from the No-Action Alternative would occur during dredging activities, as a result of the intense usage of the clamshell dredges, with their large, 5,000-horsepower rated engines. The placement environment with the largest contribution of disposal emissions for the alternative would be the ocean location, even though disposal volume at this location would be almost one-fifth the volume of the in-Bay site (0.71 versus 3.32 mcy). This is due to a much longer transport distance to the ocean site, which would produce substantial tug boat emissions. Tugboats are the main contributors to disposal emissions for this alternative.

Feasible measures to reduce significant emissions from the alternative would include (1) injection timing retard of diesel-powered equipment control for NO_x control, and (2) use of reformulated diesel fuel to reduce ROG and SO_2 emissions, as described previously in section 6.1.5.2. Retarding injection timing by two degrees would reduce NO_x emissions by about 15 percent from diesel-powered equipment. Use of reformulated fuel (ARB diesel fuel) would reduce ROG and SO_2 emissions by 15 and 64 percent, respectively, from diesel-powered equipment. Although electrification of diesel-powered dredges would eliminate a substantial amount of emissions from the alternative, this measure has been deemed infeasible, due to the high incidence of mechanical failures (USACE and Port of Oakland 1994). The most efficient way to minimize air quality impacts from the alternative would be to dispose of sediments at the placement environment nearest the dredging site. This would minimize the sediment transport distance and corresponding tug boat emissions, the largest contributor to disposal emissions. This effect is apparent in Table 6.1-6, which shows that in-Bay disposal generates the least amount of emissions per unit volume for any placement environment, largely due to having the shortest transport distance.

Emissions of PM_{10} in the form of wind blown dust could occur if site preparation during habitat or levee restoration activities disturbs dry soils. However, implementation of the BAAQMD PM_{10} control measures would ensure that fugitive dust emissions remain insignificant. Handling and disposal of sediments would not produce any fugitive dust, due to a high water content. Sediments from levees that remain exposed to the atmosphere eventually would be covered with vegetation and would produce a minimal amount of fugitive dust.

Historical handling of dredged sediments in the San Francisco Bay region has generated only minimal odor complaints from the public, as identified in section 6.1.5.4. Disposal at a rehandling facility would represent the greatest potential for odor impacts of any placement environment. Since this activity is not proposed for the No-Action Alternative, odor impacts would be insignificant.

No-Action Alternative emissions would be spread over a large portion of the Bay Area, between the dredging sites and placement environments. This area would stretch from the ocean disposal site to the levee restoration location in the Delta subregion. Emissions would be most concentrated in the location of the clamshell dredges, since these sources would produce the largest amount of emissions for this disposal activity and they would be quasi-stationary. Site-specific analyses would be required to determine if emissions in proximity to the clamshell dredges would potentially exceed any ambient air quality standard. Since the remaining disposal emission sources would be mobile, pollutant impacts in a localized area from these sources would not be large enough to exceed any ambient air quality standard.

6.2.4.2 Alternative 1

The volume of sediments that would be distributed to each placement environment for the Alternative 1 analysis are (1) 1.90 mcy at in-Bay locations, (2) 1.90 mcy at ocean locations, (3) 0.54 mcy at habitat restoration locations, and (4) 0.40 mcy at levee restoration locations. Other than disposal volumes, the assumptions used to calculate dredging and disposal emissions for the analysis are the same as those used in sections 6.1.5 and 6.2.4.1. A presentation of equipment usage and emission calculations associated with Alternative 1 is contained in Appendix O.

Summaries of daily and total emissions that would occur from Alternative 1 are provided in tables 6.2-9 and 6.2-10, respectively. Peak daily emissions from the alternative would exceed the BAAQMD emission thresholds for ROG, NO_x, and PM_{10}. Peak daily emissions of TOG, ROG, PM, and PM_{10} would occur during simultaneous dredging and disposal at the ocean location and peak daily emissions of all other pollutants would occur during simultaneous dredging and disposal at a levee restoration location. Additionally, with an annual CO emission rate of 247.6 tons, the alternative would trigger a conformity determination for this pollutant.

As with the No-Action Alternative, the overwhelming majority of emissions from Alternative 1 would occur during dredging activities, due to intense usage of the clamshell dredges. The placement environment with the largest contribution of disposal emissions for the alternative would be the ocean location. Even though the disposal volume at this location would be equal to the volume for in-Bay disposal, emissions for ocean disposal would be almost seven times higher compared to the in-Bay site. This is due to a much longer transport distance to the ocean site, which would produce substantial tug boat emissions. Tugboats are the main contributors to disposal emissions for the alternative.

Feasible measures to reduce significant emissions from the alternative would include (1) injection timing retard of diesel-powered equipment control for NO_x control and (2) use of reformulated diesel fuel to reduce TOG/ROG and SO_2 emissions. Retarding injection timing by two degrees would reduce NO_x emissions by about 15 percent from diesel-powered equipment. Use of reformulated fuel (ARB diesel fuel) would reduce TOG/ROG and SO_2 emissions by 15 and 64 percent, respectively, from diesel-powered equipment. Although electrification of diesel-powered dredges would eliminate a substantial amount of emissions from the alternative, this measure has been deemed infeasible, due to the high incidence of mechanical failures (USACE and Port of Oakland 1994). The most efficient way to minimize air quality impacts from the alternative would be to dispose of sediments at the placement environment nearest the dredging site. This would minimize the sediment transport distance and corresponding tug boat emissions, the largest contributor to disposal emissions. This effect is apparent in Table 6.1-6, which shows that in-Bay disposal generates the least amount of emissions per unit volume for any placement environment, largely due to having the shortest sediment transport distance.

Emissions of PM_{10} in the form of wind blown dust could occur if site preparation during habitat or levee restoration activities disturbs dry soils. However, implementation of the BAAQMD PM_{10} control measures would ensure that fugitive dust emissions remain insignificant. Handling and disposal of sediments would not produce any fugitive dust, due to a high water content. Sediments from levees that remain exposed to the atmosphere eventually would be covered with vegetation and would produce a minimal amount of fugitive dust.

Historical handling of dredged sediments in the San Francisco Bay region has generated only minimal odor complaints from the public, as identified in section 6.1.5.4. Disposal at a rehandling facility would represent the greatest potential for odor impacts of any placement environment. Since this activity is not proposed as part of this alternative, odor impact would be insignificant.

Alternative 1 emissions would be spread over a large portion of the Bay Area, between the dredging sites and placement environments. This area would stretch from the ocean disposal site to the levee restoration location in the Delta subregion. Emissions would be most concentrated in the location of the clamshell dredges, since these sources would produce the largest amount of emissions for this disposal activity and they would be quasi-stationary. Site-specific analyses would be required to determine if emissions in proximity to the clamshell dredges would potentially exceed any ambient air quality standard. Since the remaining disposal emission sources would be mobile, pollutant impacts in a localized area from these sources would not be large enough to exceed any ambient air quality standard.

6.2.4.3 Alternative 2

The volume of sediments that would be distributed to each placement environment for the Alternative 2 analysis are (1) 1.90 mcy for in-Bay disposal, (2) 0.95 mcy for ocean disposal, (3) 1.19 mcy for habitat restoration, (4) 0.40 mcy for levee restoration, and (5) 0.30 mcy for disposal at rehandling facilities. Other than disposal volumes, the assumptions used to calculate dredging and disposal emissions for the analysis are the same as those used in sections 6.1.5 and 6.2.4.1. A presentation of equipment usage and emission calculations associated with Alternative 2 is contained in Appendix O.

Summaries of daily and total emissions that would occur from Alternative 2 are provided in tables 6.2-9 and 6.2-10, respectively. Peak daily emissions from the alternative would exceed the BAAQMD emission thresholds for ROG, NO_x, and PM_{10}. Peak daily emissions of TOG, ROG, PM, and PM_{10} would occur during simultaneous dredging and disposal at the ocean location and peak daily emissions of all other pollutants would occur during simultaneous dredging and disposal at a levee restoration location. Additionally, with an annual CO emission rate of 250.1 tons, the alternative would trigger a conformity determination for this pollutant.

As with the No-Action Alternative and Alternative 2, the overwhelming majority of emissions from Alternative 2 would occur during dredging activities, due to intense usage of the clamshell dredges. The placement environment with the largest contribution of disposal emissions for the alternative would be the ocean location. Even though the disposal volume at this location would be one-half the volume for in-Bay disposal (0.95 versus 1.90 mcy), emissions for ocean disposal would be about four times higher compared to the in-Bay site. This is due to a much longer transport distance to the ocean site, which would produce substantial tug boat emissions. Tugboats are the main contributors to disposal emissions for the alternative.

Feasible measures to reduce significant emissions from the alternative would include (1) injection timing retard of diesel-powered equipment control for NO_x control, and (2) use of reformulated diesel fuel to reduce TOG/ROG and SO_2 emissions. Retarding injection timing by two degrees would reduce NO_x emissions by about 15 percent from diesel-powered equipment. Use of reformulated fuel (ARB diesel fuel) would reduce TOG/ROG and SO_2 emissions by 15 and 64 percent, respectively, from diesel-powered equipment. Although electrification of diesel-powered dredges would eliminate a substantial amount of emissions from the alternative, this measure has been deemed infeasible, due to the high incidence of mechanical failures (USACE and Port of Oakland 1994). The most efficient way to minimize air quality impacts from the alternative would be to dispose of sediments at the placement environment nearest the dredging site. This would minimize the sediment transport distance and corresponding tug boat emissions, the largest contributor to disposal emissions. This effect is apparent in Table 6.1-6, which shows that in-Bay disposal generates the least amount of emissions per unit volume for any placement environment, largely due to having the shortest sediment transport distance.

Emissions of PM_{10} in the form of wind blown dust could occur if site preparation during habitat and levee restoration or rehandling activities disturbs dry soils. However, implementation of the BAAQMD PM_{10} control measures would ensure that fugitive dust emissions remain insignificant. Disposal of sediments would not produce any fugitive dust, due to a high water content. Sediments from levees that remain exposed to the atmosphere eventually would be covered with vegetation and would produce a minimal amount of fugitive dust. Dust emissions from rehandling facilities and landfill sites would occur if sediments become dry. However, these emissions could be adequately mitigated with the use of water sprays. Additionally, if sediments become dry enough to emit dust emissions, trucks could be covered and/or loads sprayed with water so that dust would not be generated during transport of the sediments to landfill sites.

Historical handling of dredged sediments in the San Francisco Bay region has generated only minimal odor complaints from the public, as identified in section 6.1.5.4. Disposal at a rehandling facility or landfill site would represent the greatest potential for odor impacts of any placement environment. Therefore, location of sensitive receptors in proximity to a rehandling facility or landfill site should be considered to ensure that impacts to this portion of the population remain insignificant. If odor impacts become an issue, this impact would be mitigated by decreasing the number of times the sediment would be turned by earth-moving equipment.

Alternative 2 emissions would be spread over a large portion of the Bay Area, between the dredging sites and placement environments. This area would stretch from the ocean disposal site to the levee restoration location in the Delta subregion. Emissions would be most concentrated in the location of the clamshell dredges, since these sources would produce the largest amount of emissions for this disposal activity and they would be quasi-stationary. Site-specific analyses would be required to determine if emissions in proximity to the clamshell dredges would potentially exceed any ambient air quality standard. Since the remaining disposal emission sources would be mobile, pollutant impacts in a localized area from these sources would not be large enough to exceed any ambient air quality standard.

6.2.4.4 Alternative 3

The volume of sediments that would be distributed to each placement environment for the Alternative 3 analysis are (1) 0.95 mcy for in-Bay disposal, (2) 1.90 mcy for ocean disposal, (3) 1.19 mcy for habitat restoration, (4) 0.40 mcy for levee restoration, and (5) 0.30 mcy for disposal at rehandling facilities. Other than disposal volumes, the assumptions used to calculate dredging and disposal emissions for the analysis are the same as those used in sections 6.1.5 and 6.2.4.1. A presentation of equipment usage and emission calculations associated with Alternative 3 is contained in Appendix O.

Summaries of daily and total emissions that would occur from Alternative 3 are provided in tables 6.2-9 and 6.2-10, respectively. Peak daily emissions from the alternative would exceed the BAAQMD emission thresholds for ROG, NO_x, and PM_{10}. Peak daily emissions of TOG, ROG, PM, and PM_{10} would occur during simultaneous dredging and disposal at the ocean location and peak daily emissions of all other pollutants would occur during simultaneous dredging and disposal at a levee restoration site. Additionally, with an annual CO emission rate of 266.5 tons, the alternative would trigger a conformity determination for this pollutant.

As with all the alternatives, the overwhelming majority of emissions from Alternative 3 would occur during dredging activities, due to intense usage of the clamshell dredges. The placement environment with the largest contribution of disposal emissions for the alternative would be the ocean location, due to the longest transport distance of any placement environment, which would result in substantial tug boat emissions. Tugboats are the main contributors to disposal emissions for the alternative.

Feasible measures to reduce significant emissions from the alternative would include (1) injection timing retard of diesel-powered equipment control for NO_x control and (2) use of reformulated diesel fuel to reduce TOG/ROG and SO_2 emissions. Retarding injection timing by two degrees would reduce NO_x emissions by about 15 percent from diesel-powered equipment. Use of reformulated fuel (ARB diesel fuel) would reduce TOG/ROG and SO_2 emissions by 15 and 64 percent, respectively, from diesel-powered equipment. Although electrification of diesel-powered dredges would eliminate a substantial amount of emissions from the alternative, this measure has been deemed infeasible, due to the high incidence of mechanical failures (USACE and Port of Oakland 1994). The most efficient way to minimize air quality impacts from the alternative would be to dispose of sediments at the placement environment nearest the dredging site. This would minimize the sediment transport distance and corresponding tug boat emissions, the largest contributor to disposal emissions. This effect is apparent in Table 6.1-6, which shows that in-Bay disposal generates the least amount of emissions per unit volume for any placement environment, largely due to having the shortest sediment transport distance.

Emissions of PM_{10} in the form of wind blown dust could occur if site preparation during habitat or levee restoration or rehandling activities disturbs dry soils. Disposal of sediments would not produce any fugitive dust, due to a high water content. Sediments from levees that remain exposed to the atmosphere eventually would be covered with vegetation and would produce a minimal amount of fugitive dust. Dust emissions from rehandling facilities and landfill sites would occur if sediments become dry. However, these emissions could be adequately mitigated with the use of water sprays. Additionally, if sediments become dry enough to emit dust emissions, trucks could be covered and/or loads sprayed with water so that dust would not be generated during transport of the sediments to landfill sites. Implementation of BAAQMD PM_{10} control measures would ensure that fugitive dust emissions remain insignificant.

Historical handling of dredged sediments in the San Francisco Bay region has generated only minimal odor complaints from the public, as identified in section 6.1.5.3. Disposal at a rehandling facility or landfill site would represent the greatest potential for odor impacts of any placement environment. Therefore, location of sensitive receptors in proximity to a rehandling facility or landfill site should be considered to ensure that impacts to this portion of the population remain insignificant. If odor impacts become an issue, this impact could be mitigated by decreasing the number of times the sediment would be turned by earth-moving equipment.

Alternative 3 emissions would be spread over a large portion of the Bay Area, between the dredging sites and placement environments. This area would stretch from the ocean disposal site to the levee restoration location in the Delta subregion. Emissions would be most concentrated in the location of the clamshell dredges, since these sources would produce the largest amount of emissions for this disposal activity and they would be quasi-stationary. Site-specific analyses would be required to determine if emissions in proximity to the clamshell dredges would potentially exceed any ambient air quality standard. Since the remaining disposal emission sources would be mobile, pollutant impacts in a localized area from these sources would not be large enough to exceed any ambient air quality standard.

6.2.4.5 Comparison of Project Alternatives

Emissions estimated for each project alternative were based on simplified assumptions related to sediment volumes, dredging and disposal techniques, sediment transport distances, and associated equipment usage. Each alternative could ultimately be conducted somewhat differently than analyzed, resulting in a variation in the emissions presented. However, since the assumptions are based on typical and expected dredging and disposal activities within the San Francisco Bay region, the analysis represents a reasonable basis for a programmatic comparison among the alternatives.

Emissions generated from an alternative are ultimately dependent on the distribution of sediments to the various placement environments. Table 6.1-6 in section 6.1.5 identifies the level of emissions per unit volume of disposed sediment that would occur at each placement environment. The ranking of emissions at these locations, from the highest to lowest are (1) rehandling facility, (2) levee restoration, (3) ocean site, (4) habitat restoration, and (5) in-Bay site. Assuming that transport distance and resulting tug boat emissions to each placement environment would be equal, the ranking from highest to lowest would be (1) rehandling facility, (2) levee restoration, (3) habitat restoration, and (4/5) ocean and in-Bay (since disposal emissions would be minimal due to bottom-dumping scows).

Review of Table 6.2-10 shows that Alternative 3 would produce the highest emissions of all the alternatives, followed by Alternative 1, Alternative 2, then the No-Action Alternative. Subtracting dredging emissions, which is a constant for all of the alternatives, disposal emissions for Alternative 3 would be roughly double the disposal emissions that would occur from the No-Action Alternative (for example, 423.9 versus 226.8 tons of NO_x). The main reason for this difference is that 40 percent of the sediment proposed for disposal in Alternative 3 would occur at an ocean site, with a relatively high level of emissions per unit volume, and 70 percent of the sediment proposed for disposal in the No-Action Alternative would occur at an in-Bay site, which would produce roughly one-seventh the amount of emissions per unit volume compared to ocean disposal.

The following generalities can be derived from the analysis: (1) transport distance is the most important factor in determining the magnitude of disposal emissions; (2) subsequent tiers of sediment handling upon disposal at an initial placement environment creates additional emissions, compared to the simplest technique of bottom-dumping from barges, which produces essentially no disposal emissions; and (3) dredges produce the overwhelming majority of the total emissions from combined dredging and disposal activities. These findings are consistent with the results of analyses of recent site-specific dredging and disposal projects proposed in the San Francisco Bay region (USACE and Port of Oakland 1994; USACE and Port of Richmond 1995; and USACE and Contra Costa County 1995).

The air quality analysis identified measures that would mitigate project emissions, based on equipment modifications, the use of clean fuels, and implementation BAAQMD fugitive dust control measures. However, the most effective measure to minimize emissions from the LTMS program would be to dispose of sediments as close to the dredging site as possible, thereby minimizing transport distance and equipment usage from the largest contributor to disposal emissions, tug boats.

6.3 ADDITIONAL POLICIES IDENTIFIED AS NEEDED BASED ON EVALUATION OF POTENTIAL IMPACTS

The previous sections of this chapter have presented an evaluation of effects that are potentially associated with a range of alternative comprehensive management approaches for San Francisco Bay area dredged material. The potential impacts that are identified already take into account a variety of policy level, or programmatic, features or actions (the common "policy-level mitigation measures" described in Chapter 5) to minimize impacts and maximize benefits under each of the alternatives. However, based on the evaluation of impacts in this chapter, additional policy-level measures have been identified that would further reduce particular potential impacts, or increase potential benefits. The LTMS agencies therefore propose to adopt the following additional policies along with selection of any of the action alternatives.

6.3.1 Special Consideration for "Small Dredger" Projects

Section 6.2.3 above presented an evaluation of the potential socioeconomic impacts of the alternatives. That analysis represents a reasonable worst-case scenario of potential overall economic effects, in that (1) it did not directly take into account the value of regional environmental benefits associated with increased beneficial reuse of dredged material; (2) the economic estimates used were in several ways highly conservative and overstate likely economic impacts; and (3) the economic estimates assumed current regulatory practice and therefore do not reflect possible savings from regulatory streamlining efforts (see Appendix P). Nevertheless, the evaluation in section 6.2.3.2 clearly established that "small dredgers" as a group are relatively the most susceptible to potentially significant economic consequences under any of the action alternatives, unless policy-level measures are incorporated to mitigate this possibility. Therefore, the LTMS agencies propose to jointly adopt the following "small dredger" policy.

- *The LTMS agencies will give special consideration in the LTMS Management Plan to minimizing potential economic impacts to "small dredger" projects, for example, by reserving some of the available capacity at the least expensive disposal or reuse sites or by other means. The specific approach/policy for minimizing economic impacts to small dredgers will be established with public input as the LTMS Management Plan is developed, and will be incorporated as appropriate under the overall Management Plan in the specific Site Management and Monitoring Plan(s) for the in-Bay sites.*

On project-specific permit decisions, existing regulatory requirements, including the "practicability" test under the Clean Water Act Section 404(b)(1) Guidelines, would of course continue to apply.

6.3.2 Establishment of Additional Capacity for Rehandling and for Upland/Wetland Reuse or Disposal

None of the action alternatives can be fully implemented until additional multi-user capacity for rehandling of dredged material, and for upland/wetland reuse or disposal, can be made available. It is clear from the discussions and analyses presented in this EIS/EIR that the current lack of established capacity for these purposes is one of the most important constraints to achieving the LTMS goals. As discussed in section 6.2.2 above, the means for overcoming this constraint are largely beyond the direct control of the LTMS agencies, given their current authorities. However, the LTMS agencies recognize the great importance of establishing capacity for management of dredged material at other than unconfined aquatic disposal sites, and are committed to jointly using their authorities to the maximum extent possible both today, and under any new or revised authorities they may receive in the future. To this end, the following policy is proposed to be jointly adopted.

- *The LTMS agencies will establish or support, to the full extent of their authorities, sufficient capacity at rehandling facilities and at upland/wetland reuse or disposal sites to appropriately manage NUAD-class dredged material and to meet the dredged material placement distribution for SUAD-class dredged material established in the Policy EIS/ Programmatic EIR's preferred alternative.*

The LTMS Management Plan developed based on the selected alternative, and each of its subsequent revisions, will reflect the current status of the agencies' authorities and the measures the agencies can take at that time to work toward full implementation of the selected alternative.

6.4 SUMMARY OF THE PREFERRED ALTERNATIVE

The LTMS agencies have chosen Alternative 3 as the preferred alternative. Alternative 3 combines the highest level of upland/wetland reuse and the lowest level of in-Bay disposal of all the alternatives. It includes low disposal volumes at in-Bay sites, medium disposal volumes in the ocean, and medium volumes of upland/wetland reuse placement. This corresponds to long-term average targets of 20 percent disposal in the Bay, 40 percent disposal in the ocean, and 40 percent placement at upland/wetland reuse sites. This alternative combines the maximum environmental benefit of any of the alternatives with minimum risks to the Estuary and negligible risks to the ocean.

Overall, the LTMS agencies believe the preferred alternative has the best balance of environmental benefits and reduced risks to the Estuary. It will provide for reduced risk of impacts in the Bay because it will reduce the amount of dredged material that is disposed of in the Bay. In addition, it will provide for increased environmental benefits from increased upland/wetland reuse projects. This will primarily benefit water quality, fish and wildlife habitat, and special status species through habitat restoration projects. There may be some impacts/risks associated with this increase in UWR projects because some sensitive areas may not be avoided However, the LTMS agencies believe the benefits outweigh the risks. In addition, mitigation for some of these impacts is likely to be found during project-specific environmental analysis. Alternative 3 includes the policy-level mitigation measures discussed in chapters 5 and 6. Please see sections 6.1 through 6.3 for a complete discussion and analysis of the comparison of alternatives.

6.4.1 Achieving the Preferred Alternative

Alternative 3 is a long-term approach that emphasizes beneficial use and ocean disposal of dredged material, with limited in-Bay disposal. The LTMS agencies believe Alternative 3 provides the best balance of the overall goals and objectives of the LTMS. It balances environmental benefits and impacts/risks, best reflects the national dredging policy, and is economically implementable over the long term. However, the management goal of emphasizing beneficial use and ocean disposal will need to be phased in over time. In particular, policy and management actions will need to be taken by respective agencies and upland/wetland reuse sites will need to be made available. The implementation section of this EIS/EIR discusses the measures that the LTMS agencies are considering to achieve the preferred placement emphasis. Section 6.5 below discusses how the LTMS agencies expect the transition to Alternative 3 to occur. The description of the transition to Alternative 3 presented in this document is conceptual. The implementation of the LTMS and the transition to Alternative 3 will occur through the LTMS Management Plan development process and only after extensive public input.

6.5 INITIAL IMPLEMENTATION OF ALTERNATIVE 3 — TRANSITION PERIOD

6.5.1 Overview

The LTMS agencies will not immediately be able to fully implement the 20/40/40 disposal distribution of suitable dredged material, as called for in Alternative 3. Instead, a multi-year transition period will be used to meet the goals of Alternative 3. This transition is intended to reduce economic dislocations to dredgers by allowing time for new disposal sites to be brought on line, to allow time for dredgers to prepare for new equipment and practices to be implemented, and to allow needed funding mechanisms and arrangements to be established. This also reflects the expectation that sufficient planning for new UWR projects takes time to ensure potential impacts and design issues are adequately addressed. This will enable UWR sites to be brought on line that will provide benefits rather than adverse impacts.

The transition framework is based on reasonable assumptions of the increasing availability of disposal sites over time and the feasibility of their use. For simplicity, a stepped decrease in disposal capacity at the in-Bay disposal sites over time will be used to help encourage the establishment of UWR sites, while ensuring that reduced in-Bay disposal will be implemented in a predictable manner, rather than potentially being delayed indefinitely. The overall transition period framework is discussed in the following sections. The LTMS Management Plan will provide further details of the policies and procedures for implementing the transition period.

6.5.2 Disposal Goals

Disposal goals for each of the three main disposal environments will be used to guide dredged material disposal during the early implementation of Alternative 3, as described in the following paragraphs.

UWR Goal

The goal of UWR disposal is simply to maximize the beneficial reuse of dredged material. However, significant UWR capacity may not be available, particularly in the early stages of the transition. Further, the analysis in this document shows that, at very high levels of UWR disposal, environmental impacts may decrease the desired benefits of UWR. Consequently the goals for the transition are to maximize UWR disposal up to the amount of permitted capacity at UWR sites, based on the assumption that permitted sites will have passed environmental review to ensure that their use will have overall benefits rather than unacceptable environmental impacts. The volume of future UWR capacity is not known at this time, but is expected to increase over the period of the transition. Of course, if significant UWR capacity becomes available relatively quickly (for example, the currently proposed Montezuma and Hamilton wetlands projects could accommodate approximately 25 mcy of reuse over the next 5-10 years), the 20/40/40 goal could be realized much sooner.

Ocean Disposal Goal

The goal for ocean disposal is to provide capacity for material that can be diverted from in-Bay disposal, when sufficient UWR capacity is not available or is not practicable. In essence, the SF-DODS acts as a "release valve" for steadily decreasing in-Bay disposal volumes. Originally (in 1994), the annual disposal limit at the SF-DODS was set at 6 mcy. This interim volume limit reflected the full amount of suitable (SUAD) dredged material expected to be generated from Bay area dredging on average, given the estimate at that time that an overall average of 8 mcy of dredging (SUAD plus NUAD material) would occur each year. Since that time, due primarily to military base closures in the area, LTMS has substantially lowered the long-term estimate of average annual dredging to a total of 6 mcy of SUAD plus NUAD material (Chapter 3). On this basis, in 1996 EPA revised the SF-DODS interim disposal volume limit to 4.8 mcy per year (80 percent of the total annual average of 6 mcy). Note that the SF-DODS disposal limit was not lowered due to any expectation of adverse impact at higher levels. The SF-DODS EIS (USEPA 1993a) determined that no significant adverse impacts were likely at the full 6 mcy per year, and annual site monitoring to date has indicated that the SF-DODS is performing as predicted in that EIS. Since the SF-DODS is intended to provide an alternative to in-Bay disposal when beneficial reuse is not available or practicable, and since adverse environmental impacts are not expected at the current disposal volume limit (or even at the higher volume of 6 mcy per year), the LTMS agencies recommend that EPA retain the current 4.8 mcy level as the permanent disposal volume limit for the site (also see section 6.5.6).

In-Bay Disposal Goal

The goal for in-Bay disposal is to reduce disposal to minimal volumes while still providing capacity for those dredging projects for whom ocean disposal and beneficial reuse are not practicable. This would most often be the case for "small dredgers," but proponents of all projects must address practicability of alternatives to in-Bay disposal.

To move toward these goals, a volume for in-Bay disposal that decreases over time will be used to help move dredged material disposal practices toward full implementation of Alternative 3. The implementation of the in-Bay disposal volume limit will occur in two stages:

(1) Following the signing of the Record of Decision at the federal level and the certification of the document by the state lead agency, the federal agencies will immediately begin managing disposal at the three multi-user in-Bay sites based on an initial overall limit of 2.8 mcy per year. Disposal under this initial limit will be allocated through the DMMO on a first-come, first-served basis until the LTMS Management Plan is finalized (e.g., through

adoption of San Francisco Bay Plan and Basin Plan amendments — actions that will involve the opportunity for extensive public involvement).

(2) After completion of the LTMS Management Plan and adoption of the Bay Plan and Basin Plan amendments, the overall in-Bay volume limits will be reduced periodically in the manner called for in the Management Plan. (For example, the LTMS agencies currently propose that during the transition period the overall in-Bay disposal limit would be reduced by 380,000 cy every third year, as described in following sections.)

The in-Bay disposal volume limit will initially be less ambitious than the long-term disposal goals, to take into account unexpected conditions and to ensure that the transition requirements are prudent and reasonable. However, even when the in-Bay limit would not be exceeded, each project must still evaluate and use alternative disposal options if feasible and practicable, consistent with the LTMS goals.

6.5.3 Assumptions Regarding Capacity

There is great interest and broad-based support for increasing UWR capacity throughout the San Francisco Bay region. This support is also reflected in national policies and initiatives. Several local large UWR projects are now in the planning and permitting stage. The Montezuma Wetlands Project (see Appendix E) proposes to accept approximately 17 to 20 mcy of dredged material for use on site. Additionally, the proposed Hamilton Wetlands Project, which encompasses the Hamilton Air Field, Antennae Field, and possibly the Bel Marin Keys Unit Five sites (Appendix E), could accept 8.7 mcy to over 30 mcy of dredged material depending upon the final site size and design. These sites both could become available by the year 2000. The Department of Water Resources also has extensive need for material to protect levees and increase habitat in the Sacramento-San Joaquin Delta (see Chapter 4, section 4.4.4.4). The LTMS agencies estimate that, combined, such projects could result in potential UWR capacity after the year 2000 sufficient to meet much, if not all, of the Bay dredging needs (let alone the LTMS goal for UWR) (Appendix M).

6.5.4 Transition Period Initial Disposal Limit

The starting point of the transition is based on the recent level of disposal. However, dredging needs vary from year to year, so an average estimated dredging volume is used to establish the starting volumes for the transition. The dredging volume estimate of 6 mcy per year that is used as a basis for the impact analysis in this EIS/EIR reflects high but reasonable estimates of the average new dredging plus maintenance dredging volumes. However, average dredging volumes over recent years have been lower than this estimate and some historic dredging projects — for example, closed military bases — will no longer contribute as much to dredging in the region. Consequently, use of the 6 mcy per year volume to set the starting point of the transition would have the effect of skewing the transition and delaying achievement of the LTMS goals for a longer period than necessary.

The LTMS agencies propose to use an overall in-Bay disposal volume limit of 2.8 mcy per year as the starting point for the transition period. As illustrated in Table 6.5-1, the average disposal volume for the years 1991 through 1997 was 2.3 mcy per year. (Note that disposal volume records from years before 1991 are less reliable and thus were not used. Similarly, since the LTMS agencies had already determined that large new work projects could not be accommodated at the existing in-Bay disposal sites, new work projects occurring during the 7-year period of record were not included in the calculation of the average disposal volume. Finally, projects that already utilize UWR disposal sites were not included in calculating the 2.3 mcy figure.)

Although the average annual maintenance dredging volume was 2.3 mcy, the maximum annual in-Bay maintenance dredging disposal volume that occurred over the same time period was 3.3 mcy. The proposed initial LTMS transition period limit of 2.8 mcy per year is the mean of the 2.3 mcy and the 3.3 mcy figures, and represents a reasonable starting point that should provide for the needs of the dredging community while alternative disposal options and infrastructures are developed. This initial transition period limit will be implemented beginning with the signing of the Record of Decision (ROD) for the EIS/EIR, as discussed in section 6.5.2. After the Bay and Basin plans are amended by the San Francisco Bay Conservation and Development Commission and the San Francisco Bay Regional Water Quality Control Board, respectively, the limit will be periodically further reduced.

The 2.8 mcy per year initial disposal volume limit will decrease *allowable* in-Bay disposal by just over 50 percent. However, this volume limit would still fully accommodate the average annual volume of maintenance material that has been dredged over the decade. Therefore, to the extent that practicable

Table 6.5-1. Total and Average Annual Maintenance Dredging Volumes (1991 — 1997)[1]
(page 1 of 4)

Category[2]	*Site*	*Project*	*Project Depth (MLLW)*	*Year* 1991	*Year* 1992	*Year* 1993	*Year* 1994	*Year* 1995	*Year* 1996	*Year* 1997	*Total Volume Dredged: 91-97*	*Annual Average Volume 91-96 (BCDC)*	*Annual Average Volume 91-96 [M&N (5)]*	*Annual Average Volume 91-97 (BCDC)*
S	SF-11	Aeolin YC	-9	13,454[a,b]	0	0	0	0	0	0	13,454	2,242		1,922
S	SF-11	Allied	-5	0	0	0	16,800[b]	0	0	0	16,800	2,800		2,400
S	SF-11	Ballena Bay	-5	527[a,b]	0	0	0	0	0	0	527	88		75
S	SF-11	Belvedere Cove (Home-owners)	-6	0	0	0	0	0	10,503[d]	0	10,503	1,751		1,500
S	SF-11	Berkeley Marina	-12	111,987[a]	12,182[a,b]	32,169[b]	0	0	0	0	156,338	26,056	7,362	22,334
S	SF-10	Black Point Launch Ramp	?	0	0	0	0	0	200	235[g]	435	33		62
S	SF-11	Brickyard Cove	-10	0	0	0	0	0	2,750[d]	0	2,750	458		393
S	SF-11	Candlestick Point	-8	0	0	0	0	0	50,700	0	50,700	8,450		7,243
S	SF-9	City of Benicia Marina	-11	6,651[a]	39,000[a,b]	19,766[b]	919[b]	15,809[a,b]	0	16,090[g]	98,235	13,691	12,582	14,034
S	SF-11	City of Corte Madera	?	0	0	29,000[b]	0	0	0	0	29,000	4,833		4,143
S	SF-11	City of Emeryville	?	35,029[a]	3,000[a]	0	0	0	0	0	38,029	6,338	5,642	5,433
S	SF-9	City of Vallejo Ferry Terminal	-12	0	0	8,000[b]	0	0	0	8,305[g]	16,305	1,333		2,329
S	SF-11	Clipper YC	-8	0	0	0	9,880[c]	800[b,c]	34,730[d]	0	45,410	7,568	7,568	6,487
S	SF-11	Contra Costa Flood Dist	?	0	0	0	4,800[b]	0	0	0	4,800	800		686
S	SF-11	Corinthian Yacht Harbor	-5	0	2,100[a]	0	0	0	0	7,825[g]	9,925	350		1,418
S	SF-11	Coyote Pt Marina	-12	0	0	0	118,500[b]	250[b,c]	0	0	118,750	19,792	19,792	16,964
S	SF-11	Emery Cove	-9	40,273[a]	0	0	0	0	55,175[d]	0	95,448	15,908	7,125	13,635
S	SF-9	Glen Cove Marina	-10	0	0	0	0	0	2,600	13,990[g]	16,590	433		2,370
S	SF-11	Greenbrae Marina (City of Larkspur)	-10	0	0	0	75,000[b,c]	0	0	0	75,000	12,500	14,820	10,714
S	SF-10	Greenbrae Marina (City of Larkspur)	-10	0	0	0	0	13,920[b]	0	0	13,920	2,320		1,989
S	SF-11	Karl Limbach	?	0	792[a]	0	0	0	0	0	792	132		113
S	SF-10	Loch Lomand Marina	?	0	0	0	0	0	0	32,570[g]	32,570	0		4,653
S	SF-11	Marin Rowing Ass.	-5	0	3,342[a]	0	0	0	0	0	3,342	557		477

Table 6.5-1. Total and Average Annual Maintenance Dredging Volumes (1991 — 1997)[1]

(page 2 of 4)

Category[2]	Disposal	Project	Project Depth (MLLW)	Year 1991	Year 1992	Year 1993	Year 1994	Year 1995	Year 1996	Year 1997	Total Volume Dredged: 91-97	Annual Average Volume 91-96 (BCDC)	Annual Average Volume 91-96 [M&N (5)]	Annual Average 91-97 (BCDC)
S	SF-10	Marin YC	-8	3,700 [b]	0	42,000 [b]	1,000 [b]	0	0	3,475 [g]	50,175	7,783	7,783	7,168
S	SF-11	Marinship Yacht Harbor	?	0	200 [a]	0	0	0	0	0	200	33		29
S	SF-11	McNear Pier	?	0	0	0	0	32,800 [b,c]	0	0	32,800	5,467	5,467	4,686
S	SF-11	Paradise Cay	<-8	40,691 [b]	0	0	0	16,175 [b]	800 [d]	11,700 [g]	69,366	9,611	11,399	9,909
S	SF-10	Pt. San Pablo Yacht Harbor	-8	15,155 [a]	0	0	0	0	0	0	15,155	2,526		2,165
S	SF-11	Pullman Building	-10	41,518 [a,b]	14,312 [a]	0	0	0	0	0	55,830	9,305		7,976
S	SF-11	Redrock Marina	?	0	14,950 [a]	0	0	0	0	0	14,950	2,492		2,136
S	SF-11	Redwood City YC	?	0	0	54,000 [b]	15,000 [b]	0	0	0	69,000	11,500	11,500	9,857
S	SF-11	San Leandro Marina	-7	0	0	0	0	0	0	60,150 [g]	60,150	0		8,593
S	SF-10	San Rafael Canal	-8	0	0	0	0	122,507 [b,c,d]	35,700 [d]	28,750 [g]	186,957	26,368	22,879	26,708
S	SF-11	San Rafael Canal	-6	0	0	0	0	0	0	750 [g]	750	0		107
S	SF-9	San Rafael Yacht Club	?	2,445 [a]	12,310 [a]	920 [b]	0	1,900 [b,c]	0	0	17,575	2,929		2,511
S	SF-11	Sausalito Marine Corp	-8	0	1,400 [a]	0	0	0	0	0	1,400	233		200
S	SF-11	Sausalito Yacht Club	-13	160 [a,b]	0	0	0	0	0	0	160	27		23
S	SF-11	SF Marina	-12	0	0	0	11,544 [c]	0	22,863 [d]	0	34,407	5,735	12,887	4,915
S	SF-11	St. Francis YC (Belvedere)	-11	0	16,299 [a]	0	1,544 [b]	4,775 [b,c]	0	0	22,618	3,770	13,988	3,231
S	SF-11	Strawberry Rec Dist	-6	0	137,000 [a,b]	81,136 [b]	0	0	45,675 [d]	0	263,811	43,969	42,810	37,687
S	SF-10	Vallejo Yacht Club	-9	0	0	0	0	0	0	1,500 [g]	1,500	0		214
S	SF-11	W.B. Clausen	?	0	820 [a]	0	0	0	0	0	820	137		117
S	SF-11	Wickland Oil	?	0	0	0	0	0	3,604 [d]	0	3,604	601		515
TOTAL				*311,590*	*257,707*	*266,991*	*254,987*	*208,936*	*265,300*	*185,340*	*1,750,851*	*260,919*	*223,240*	*250,122*

Table 6.5-1. Total and Average Annual Maintenance Dredging Volumes (1991 — 1997)[1]
(page 3 of 4)

Category[2]	*Disposal*	*Project*	*Project Depth (MLLW)*	*Year* 1991	*Year* 1992	*Year* 1993	*Year* 1994	*Year* 1995	*Year* 1996	*Year* 1997	*Total Volume Dredged: 91-97*	*Annual Average Volume 91-96 (BCDC)*	*Annual Average Volume 91-96 [M&N (5)]*	*Annual Average 91-97 (BCDC)*
M	SF-11	ARCO	-35	35,000[a,b]	0	0	0	0	0	0	35,000	5,833	5,833	5,000
M	SF-9	Benicia Port Terminal	-39	27,600[a,b]	45,000[b]	28,000[b]	25,771[b,f]	0	72,335[d]	2,149[g]	200,855	33,118	26,853	28,694
M	SF-11	Chevron (Richmond Long Wharf)	-45	284,800[a,b]	0	261,110[b]	0	141,634[b,d]	156,802[d]	283,030[g]	1,127,376	140,724	149,485	161,054
M	SF-10	City of Larkspur	?	20,285[c]	0	0	0	13,920[c]	0	0	34,205	5,701		4,886
M	SF-9	Exxon (Benicia)	-35	19,500[a,b]	40,000[a,b]	11,700[b]	7,597[b,f]	12,200[b,c]	61,086[d]	19,000[g]	171,083	25,347	20,183	24,440
M	SF-11	Larkspur Ferry Terminal	-15	0	0	217,200[b]	0	466,937[b,c]	0	20,905[g]	705,042	114,023	114,023	100,720
M	SF-11	PG&E	-16	31,200	16,000	0	0	0	0	0	47,200	7,867		6,743
M	SF-9	Pacific Refining Co.	-38	102,906[a]	0	0	0	0	0	0	102,906	17,151		14,701
M	SF-11	Port of Oakland (berths)	-42	302,586[a]	156,000[b]	328,806[b]	126,490[f]	42,335[b]	178,272[b,d]	176,200[g]	1,310,689	189,082	154,677	187,241
M	SF-11	Port of Richmond (Berths)	-38	8,446[a,b]	0	0	28,500[b]	124,600[b]	0	0	161,546	26,924	26,924	23,078
M	SF-11	Port of SF (Berths & Fisherman's Wharf)	-40	60,343[a]	51,000[a,b]	30,000[b]	26,000[b,f]	45,079[b,c,d]	140,832	0	353,254	58,876	39,735	50,465
M	SF-11	San Rafael Rock Quarry	-16	33,300[b]	0	0	0	0	0	0	33,300	5,550	5,550	4,757
M	SF-11	SF Drydock (SW Marine)	-35	0	89,000[a,b]	0	0	119,000[b,c]	0	0	208,000	34,667	34,667	29,714
M	SF-11	Schnitzer Steel	-37	0	0	13,440[b]	0	0	15,811[d]	7,284[g]	36,535	4,875		5,219
M	SF-9	Unocal/Tosco	-35	55,600	0	50,655	0	0	89,556	26,300[g]	222,111	32,635	17,709	31,730
M	SF-11	USCG (Horseshoe Cove & YB Is.)	-18	0	0	0	55,000[b]	0	0	0	55,000	9,167	7,603	7,857
Total				*981,566*	*397,000*	*940,911*	*214,358*	*965,705*	*485,557*	*249,689*	*4,804,102*	*664,183*	*608,203*	*604,969*
	SF-9	Mare Is Strait	-36	154,242[a,b]	304,838[a,b]	976,415[b]	1,200,000[b]	0	0	0	2,635,495	439,249	433,783	376,499
COE	SF-10/ Sonoma Baylands	Petaluma ATF	-8	0	115,000[b,c]	0	340,460[b,c]	0	200[d]	0	455,660	75,943	55,075	65,094
COE	SF-10	Pinole Shoal	-45	88,885[a]	0	55,213[b]	0	373,829[b,d]	0	256,846[g]	774,773	86,321	97,184	110,682
COE	SF-11	Oakland Harbor	-42	98,904[a,b]	231,922[a,b]	267,185[a,b]	154,206[h]	118,350[c,d]	69,334	213,982[g]	1,153,883	156,650	145,108	164,840

Table 6.5-1. Total and Average Annual Maintenance Dredging Volumes (1991 — 1997)[1]

Category[2]	*Disposal*	*Project*	*Project Depth (MLLW)*	*Year 1991*	*Year 1992*	*Year 1993*	*Year 1994*	*Year 1995*	*Year 1996*	*Year 1997*	*Total Volume Dredged: 91-97*	*Annual Average Volume 91-96 (BCDC)*	*Annual Average Volume 91-96 [M&N (5)]*	*Annual Average 91-97 (BCDC)*
COE	SF-11	Richmond Harbor	38 to 45	475,500[a]	379,000[b]	353,214[a]	300,000[b]	476,532[d]	491,850[d]	346,024[g]	2,822,120	412,683	382,476	403,160
COE	SF-11	Redwood City Harbor	-30	0	251,000[a,b]	399,544[b]	0	0	965,998[d]	0	1,616,542	269,424	288,368	230,935
COE	SF-11	San Rafael ATF	-6	0	9,500[b]	0	0	0	0	191,829[g]	201,329	1,583		28,761
COE	SF-11	San Rafael Creek	-6	0	15,00 0[b]	0	0	0	0	0	15,000	2,500	108,678	2,143
COE	Suisun Bay/ Jersey Is.	Suisun Bay Channel	-35	88,885[b]	32,900[b]	32,900[b]	66,321[b]	37,206[b,d]	284,981[d]	0	543,193	90,532	46,919	77,599
Total				*906,416*	*1,339,160*	*2,084,471*	*2,060,987*	*1,005,917*	*1,812,363*	*1,008,681*	*10,217,995*	*1,534,886*	*1,492,550*	*1,459,714*
TOTAL				2,199,572	1,993,867	3,292,373	2,530,332	2,180,558	2,563,220	1,443,710	16,772,948	2,459,987	**2,323,993**	2,314,805
		(old totals)		1,783,937	1,996,629	3,290,603	2,595,008	2,166,898				2,299,770		
		(Total - Old Total)		415,635	-2,762	1,770	-64,676	13,660				160,217		

Notes: For all numerical values reported, when more than one value was available, the higher volume was used.

1. Average annual maintenance dredging volumes (excluding sand dredging, new work, SF Bar Channel, and U.S. Navy projects. Projects with dedicated upland disposal sites (e.g., San Leandro) and Delta projects (e.g., New York Slough) excluded.
2. S = project depth <-12 feet and >50,000 cy/yr, non-COE project
   M = not small and non-COE projects
   COE = all Corps-maintained projects

References cited below:

a. COE — San Francisco Bay Dredging Records, 1985-1993
b. SFBRWQCB & BPC, San Francisco Bay Dredging Volumes, 1991-1995
c. COE, Annual Report and 4th Quarter Summary, FY 1995
d. COE, Annual Report and 4th Quarter Summary, FY 1996
e. Moffatt & Nichol Engineers, 1997, Inventory of San Francisco Bay Area Dredging Projects
f. BCDC & COE, 4/7/95, Dredging and Disposal Roadmap
g. COE, Annual Report and 4th Quarter Summary, FY 1997
h Personal communication, Jon Amdur, Port of Oakland, 1998

disposal alternatives are not available right away, significant changes in disposal practices may not immediately occur. In-Bay limits will slowly decrease as described below (section 6.5.6), allowing dredgers time to phase-in to the implemented alternative while ensuring that a long-term reduction of in-Bay disposal will, in fact, occur.

6.5.5 Decreasing the in-Bay Disposal Limit

The Alternative 3 long-term disposal goal is 20 percent to in-Bay disposal sites, 40 percent to the SF-DODS, and the remaining 40 percent to UWR sites. This distribution would result, on average, in the placement of approximately 1 mcy per year at the in-Bay disposal sites, and approximately 2 mcy per year at UWR sites and at the SF-DODS. In the event that other efforts to meet the long-term LTMS goals are not successful in providing viable alternatives to in-Bay disposal, the transition period volume limits will define the maximum in-Bay disposal that will occur.

During the transition period, the LTMS agencies proposed to reduce the in-Bay disposal volume limit every third year by 380,000 cy. This rate of reduction level is intended to be neither too precipitous, nor too slow to provide an incentive to seek alternatives to in-Bay disposal. Dredgers should be able to plan for and implement alternatives to in-Bay disposal before the lowering in-Bay limits significantly constrain routine operations. The agencies will review progress toward the Alternative 3 goal and consider changes needed to LTMS policies every 6 years. This will allow the transition to be adjusted, as needed, based on changing conditions in the region, such as changes in overall dredging needs and regional and national policies.

The "endpoint" for this process will be reached when the overall volume limit is reduced to 1.25 mcy per year (this is slightly higher than the actual long-term goal of 1 mcy per year, to account for the inherent variability in dredging operations and needs). This final disposal volume limit would be reached approximately 10 years after the start of the transition period (Figure 6.5-1), if other efforts to increase UWR capacity do not reduce in-Bay disposal even sooner.

6.5.6 UWR and Ocean Disposal During the Transition Period

The date by which adequate capacity will be available in the UWR environment to accommodate the long-term LTMS goal of approximately 2 mcy per year cannot be determined, since the availability of UWR sites is unpredictable. However, during the time that is required for UWR sites to become available, ocean disposal at SF-DODS is expected to provide the "relief valve" between the slow mandatory reduction of in-Bay disposal and an increase in placement at UWR sites. To provide this relief, the permanent SF-DODS volume limit should be set at its present interim limit of 4.8 mcy per year. This volume was established because it is estimated to be sufficient to accommodate all suitable dredged material in an average year from the region, if necessary. Therefore, even if no UWR sites were available during the transition period, the ocean site disposal limit combined with the remaining allowable in-Bay disposal volume would exceed the overall 6 mcy annual dredging volume that is the basis for the LTMS planning goals. (Also see section 6.5.2.)

6.5.7 Potential Strategies for Implementing Alternative 3

The general framework for the transition to Alternative 3 is described above in sections 6.5.5 and 6.5.6. This section presents a range of options for how the LTMS agencies could manage the allocation of the allowable in-Bay disposal volume, which will be steadily decreasing over time until the long-term LTMS goals (20 percent in-Bay, 40 percent ocean disposal, 40 percent UWR) are effectively met. The LTMS agencies are soliciting comments on these options, which will be further evaluated via the LTMS Management Plan development process. Development of the LTMS Management Plan, as well as amendments to the Bay and Basin plans, will include significant opportunity for additional public comment on these allocation options.

As explained in sections 6.5.4 and 6.5.5, implementation of Alternative 3 will include an initial in-Bay disposal volume limit of 2.8 mcy per year. This in-Bay disposal volume limit will then decrease in increments of 380,000 cy every third year (see Figure 6.5-1). At any time during the transition period, the allowable in-Bay disposal volume must be allocated in some way among the three multi-user disposal sites, and among dredging project proponents. Also, some provision for emergencies and other unforeseen circumstances (a "contingency" volume) should be established. Finally, the issue of disposal site monitoring fees should be addressed. The following paragraphs discuss these issues, which would be common to all the allocation strategy options presented in the remainder of this chapter.

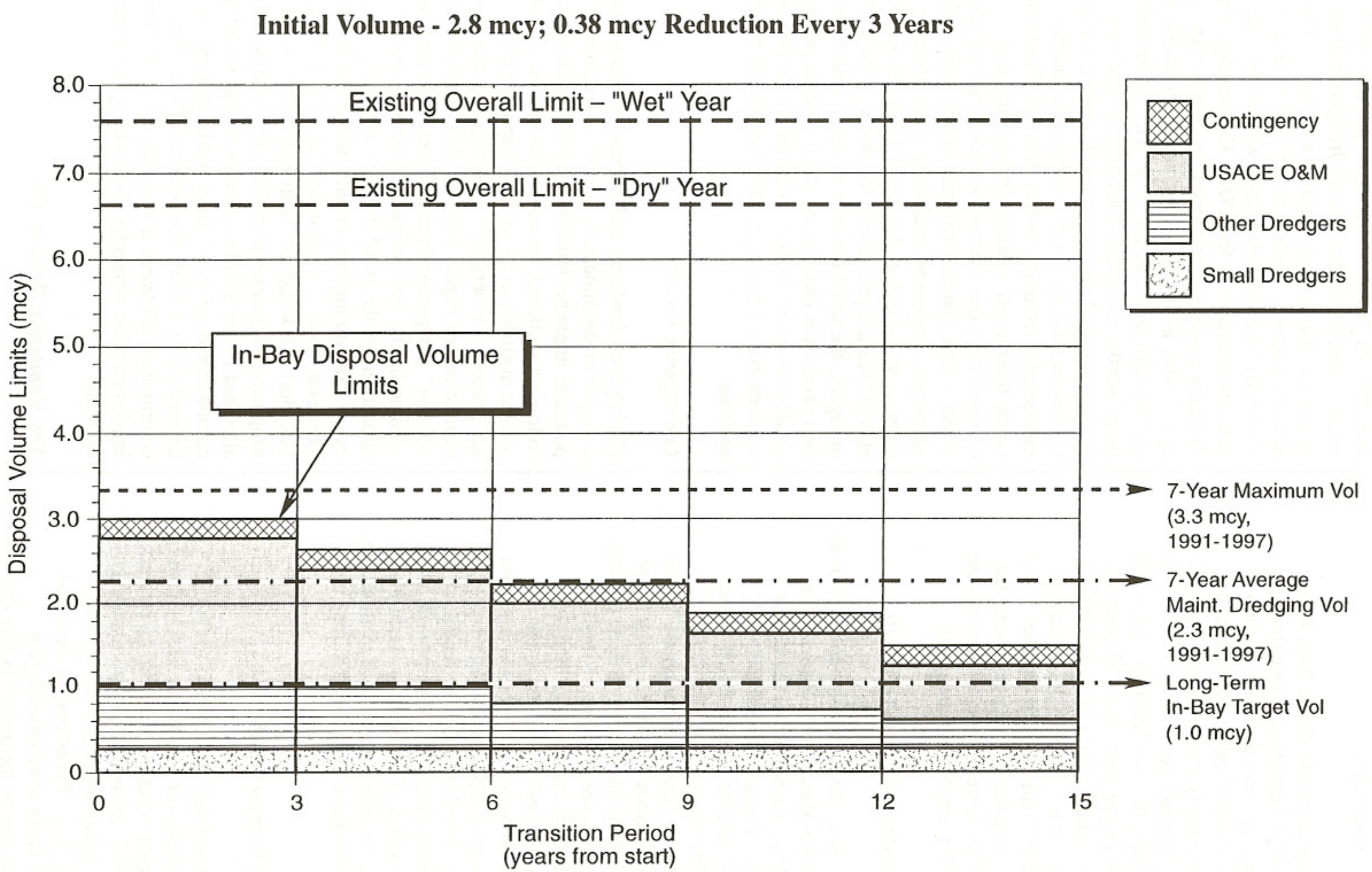

Figure 6.5-1. Proposed In-Bay Disposal Volume Limits Over Time – Alternative 3

Allocation Among Disposal Sites

Initially, the LTMS agencies will divide the 2.8 mcy overall in-Bay disposal volume limit among the three multi-user in-Bay sites, in approximate proportion to their existing relative volume limits. Therefore, the Alcatraz site, which currently accommodates about 60 percent of all in-Bay disposal, could receive up to 1.65 mcy per year. Similarly, the San Pablo Bay site could receive up to 300,000 cy per year (about 10 percent), and the Carquinez site could receive up to 850,000 cy per year (about 30 percent). These initial allocations among the existing in-Bay sites may be changed based on public comment and further evaluation, during the LTMS Management Plan development process and the Bay Plan and Basin Plan amendment processes.

Allocation Among Dredging Project Proponents

During the initial stages of the transition period (prior to finalization of the LTMS Management Plan and the Basin Plan and Bay Plan amendments), the LTMS agencies will generally allocate available disposal volume at each in-Bay disposal site on a first-come, first-served basis. This approach will be modified, however, according to the three dredger types: "small dredgers," "medium dredgers" (medium dredgers are defined for the purposes of this section as those projects that are not COE maintenance dredging or small dredger projects), and COE maintenance dredging. Specifically, "small dredgers" as defined in this document will generally be exempt from the transition period's specific volume limitations, as described below. Subsequently, based on public comment and further evaluation during the LTMS Management Plan development process and the Bay Plan and Basin Plan amendment processes, a different approach to allocation among the "medium dredgers" and the COE may be adopted.

Set-Aside for "Small Dredger" Projects

"Small dredgers" are defined by LTMS as having projects with design depths of –12 feet or less, and with average annual dredging volumes of 50,000 cy or less. Between 1991 and 1997, an average of approximately 250,000 cy has been generated each year by small dredgers (see Table 6.5-1). Furthermore, the actual volume has remained fairly constant each year. Therefore, 250,000 cy per of the overall in-Bay disposal volume limit at any time will be "set aside" for small dredger projects (see Figure 6.5-1). This means, for example, that of the initial 2.8 mcy per year overall in-Bay disposal volume limit, 2.55 mcy per year would be available for "medium dredger" projects and COE maintenance dredging. Small dredgers will be assumed to use the full set-aside volume each year. Even if they actually dispose of less than 250,000 cy in a given year, the "extra" disposal allocation will not be transferred to medium dredgers or the COE. Conversely, if the small dredgers dispose of somewhat more that their 250,000 cy set-aside in any year, that year's allocation to medium dredgers and the COE will not be reduced. In other words, an overall allowance is made for the average disposal volume of small dredgers as a group, but beyond that they will generally be exempt individually from any in-Bay disposal allocations. Given their small volumes individually and cumulatively, this exemption should not significantly affect in-Bay disposal volumes in any year. (However, no project proponent, including small dredgers, will be allowed to dispose in the Bay if UWR or ocean disposal alternatives are practicable for them.) Unlike for other dredgers, the small dredger set-aside volume will not be decreased over time during the transition period. This small dredger set-aside is common to all the potential implementation strategies discussed in the following sections.

Contingency Volume

During each dredging and disposal allocation period (the duration of the allocation period varies among the five potential implementation strategies discussed in the following sections), an additional volume of 300,000 cy will be available at the in-Bay disposal sites to accommodate emergency dredging and other unforeseen situations (see Figure 6.5-1). This "contingency volume" is separate from the overall disposal site volume limits, and independent of any specific dredger allocations or the small dredger set-aside. This 300,000 cy overall contingency volume applies to the in-Bay sites as a whole (i.e., it is not 300,000 cy for each in-Bay site). It would not be available for routine projects proposing to dispose at in-Bay sites, and would not be allocated by the LTMS agencies except under specific circumstances of over-riding public interest, to be defined in the LTMS Management Plan. This contingency allotment is common to all the potential implementation strategies discussed in the following sections.

Site Monitoring Disposal Fees

Disposal fees would require state legislative action to implement. Such fees would be assessed on in-Bay disposal, and administered to monitor and manage in-Bay disposal sites. The fees likely would vary according to disposal volume with "small dredgers" and others with smaller volumes paying lower fees per cubic yard than those disposing of larger volumes. The fee would thus be proportional to the level of use and potential for impacts. Fees would be used for in-Bay disposal site monitoring and management, and potentially to subsidize or help support the development of practicable beneficial reuse alternatives. The assumption that there would be an in-Bay disposal fee is common to all the potential implementation strategies discussed below.

The following sections present five potential strategies for allocating in-Bay disposal volume among the "medium dredgers" and COE maintenance dredging. As noted above, all these options include a small dredger set-aside, a small "contingency volume" for unforeseen situations, and the assumption that in-Bay disposal fees of some kind would be assessed. These options will be discussed further through the LTMS Management Plan development process, and the Bay Plan and Basin Plan amendment processes, each of which will provide opportunity for public review and comment.

6.5.7.1 Strategy 1 — 3-Year Allotments with "Banking" and "Trading" Allowed

This option allows both "banking" and "trading" of the in-Bay disposal volume allotments that would be made to individual dredgers.

Banking means that a dredger who has been given a certain in-Bay disposal volume allotment for the year, but who does not need to dredge as much as has been allotted, may carry forward any unused portion of his or her allotment to a subsequent year within the same allotment period. (Banking can therefore apply only in strategies where multi-year allotments are given.) This provides the dredger with flexibility to dredge when and how much is needed (annual allocations are made based on a dredger's average dredging history, but many projects do not dredge every year, or need to dredge different amounts in different years). Note that in no case may banking result in the overall annual limit for an in-Bay disposal site to be exceeded; therefore proposed banking of allotments must in all cases be coordinated with the LTMS agencies through the DMMO. Also, banking does not eliminate the need for the party receiving the allotment to establish whether there are practicable alternatives to in-Bay disposal for that project.

Trading means that a dredger who does not need to dredge as much as has been allotted, may at his or her discretion transfer the remaining volume of the allotment *to another dredger* who does not otherwise hold a sufficient allotment. The exchanges may be simple transfers, or trades for volume from a future year's allotment, or trades for other considerations (allotted volume may be marketed). However, trades must in all cases be coordinated with the LTMS agencies through the DMMO. Also, trading does not eliminate the need for the party receiving the allotment to establish whether there are practicable alternatives to in-Bay disposal for that project.

As described in sections 6.5.4 and 6.5.5, overall in-Bay disposal volume limits will be reduced every 3 years during the transition period. Under this strategy option, dredgers will be given 3 years' worth of annual allotments at the beginning of each 3-year period, for use at any time during the period (provided that overall annual disposal volume limits at any in-Bay disposal site would not be exceeded).

For example, at the beginning of the transition to Alternative 3, each "medium dredger" and COE dredging project would receive an allotment (of the total 2.8 mcy per year allowable in-Bay disposal volume) equal to three times their annual in-Bay disposal volume allocation (as calculated by the midpoint between their 7-year average and 7-year maximum volumes — see Table 6.5-1). In each subsequent 3-year period the overall annual in-Bay disposal volume would be reduced by 380,000 cy, and individual dredger's allotments would also be reduced proportionately. This process would continue throughout the transition period. As noted earlier, individual small dredgers are exempt from this allocation system.

Once a project sponsor uses its total in-Bay disposal volume allocation, no dredged material from its subsequent dredging episodes could be disposed in the Bay during that allocation period unless an additional unused allocation is obtained by trading with another dredger. Instead, alternative disposal options would need to be used or further dredging would have to be deferred until the next 3-year allocation period. Note that all dredgers would still be required to determine whether UWR and ocean disposal alternatives may be practicable, as a part of the permit application process to the DMMO.

6.5.7.2 Strategy 2 — 3-Year Allotments with "Banking" and "Trading" Allowed and a Fixed Overall Yearly Disposal Cap

This alternative would be identical to Strategy 1 with the exception that the overall in-Bay disposal limit would not decrease over time as the in-Bay allotments are decreased. This would allow greater flexibility to dredgers and greater volumes of dredged material to be disposed at in-Bay sites in any given year. However, as the allotments to dredgers would decrease over time, so would in-Bay disposal decrease toward the Alternative 3 disposal goal. The overall disposal limit could be set as low as the 2.8 mcy per year starting volume, or as high as the current in-Bay disposal targets. This strategy will effectively allow dredgers to use their entire allotment in any given year of the allotment period as long as the disposal limit for the year is not exceeded.

6.5.7.3 Strategy 3 — 1-Year Allotments with Trading Allowed

This option differs from Strategy 1 in that only 1-year allotments would be given. Therefore individual dredgers could not by themselves "bank" their allotment from one year in order to conduct a larger volume of dredging in a subsequent year. Nevertheless, dredgers would still be allowed to trade or market any unused portion of their year's allotment to other dredgers. Since these trades could be made in exchange for future year allotments, trading among dredgers could be carried out so as to have the same effect as banking by an individual dredger (though via a more complicated process). Otherwise, annual allotments would be calculated in the same manner as described for Strategy 1 (see Table 6.5-1). Similarly, the annual allotments would be reduced every 3 years in the same manner as described under Strategy 1.

Once a project sponsor uses its annual in-Bay disposal volume allocation, no dredged material from its subsequent dredging episodes could be disposed in the Bay that year unless an additional unused allocation is obtained by trading with another dredger. Instead, alternative disposal options would need to be used or further dredging would have to be deferred until the next year. Note that trading may not result in the exceedance of the overall annual disposal volume limit for any in-Bay site. Also, trading does not eliminate the need for the party receiving the allotment to establish whether there are practicable alternatives to in-Bay disposal for that project. Therefore, trades must in all cases be coordinated with the LTMS agencies through the DMMO. As noted earlier, individual small dredgers are exempt from this allocation system.

6.5.7.4 Strategy 4 — First-Come, First-Served

Under the first-come, first-served strategy, "medium dredger" and COE projects would not receive individual allotments on either an annual or multi-year basis. Instead, dredgers would have the opportunity to apply for disposal of dredged material at in-Bay sites until the annual disposal volume limit for each in-Bay site is met. Approval for disposal would occur on a first-come, first-served basis as determined by the date of agency approval of the permit or dredging episode. Consequently, dredgers intending to dispose in-Bay after disposal volume limits had been reached would need to find alternative disposal options, or defer dredging until the next year.

Note that all dredgers must still establish whether there are practicable alternatives to in-Bay disposal for their project. Also, individual small dredgers are exempt from this allocation system, and their ability to dredge and dispose would not be affected by the date of their project approval.

Also note that in-Bay disposal allocation during initial implementation of the transition period (prior to completion of the LTMS Management Plan and the Bay Plan and Basin Plan amendment processes) will be on a first-come, first-served basis as described here (see section 6.5.2).

6.5.7.5 Strategy 5 — Reduced In-Bay Disposal of COE Maintenance Material Only

Based on data from 1991-1997, the highest annual maintenance volume dredged by the COE was approximately 2.0 mcy, which occurred in 1993. During the same period, the highest annual maintenance volume dredged by "medium dredgers" was 970,000 cy, while the highest annual maintenance volume dredged by small dredgers was approximately 300,000 cy (see Table 6.5-1). Given these numbers, it is apparent that the long-term LTMS goals could be substantially achieved if all COE maintenance dredged material was placed at alternative sites, even if all other dredgers continue to use in-Bay disposal sites as in the past. (The maximum maintenance volume shown above for medium plus small dredgers — 1.27 mcy — approximates the long-term annual in-Bay disposal volume limit of 1.25 mcy.)

Although under this strategy access to in-Bay disposal capacity would likely be less restricted compared to the other strategies discussed, dredgers would still be required to establish whether UWR and ocean disposal alternatives may be practicable, as a part of the permit application process reviewed by the DMMO.

Note that implementation of this strategy would minimize direct economic effects to local dredgers. However, it would mean that the federal government (i.e., the Harbor Maintenance Trust Fund) would be carrying a significant portion of the financial burden of using alternative disposal practices to achieve the LTMS goals. Legislative changes would likely be needed to provide the new federal and state (for cost-sharing purposes) funding needed for this option.

CHAPTER 7.0 IMPLEMENTATION OF THE SELECTED ALTERNATIVE

The preceding chapters of this EIS/EIR developed and analyzed four alternative approaches for management of dredged material in the San Francisco Bay Area for the next 50 years. The LTMS agencies have received public comments on the Draft EIS/EIR and have selected Alternative 3 as the preferred alternative. Alternative 3 achieves a balance between maximizing environmental benefits and minimizing environmental risks in an economically sound manner. This approach consists of a desired long-term distribution of dredged material among each of the three environments and a set of policy-level mitigation measures. A dredged material management system that fully achieves the goal of the selected approach requires detailed implementation measures. The LTMS agencies will be preparing a Management Plan for implementation following the finalization of this EIS/EIR. The Management Plan will describe the specific actions the agencies will take to implement that approach to the extent possible in the short-term and to achieve the long-term policy goal. This chapter initiates the process of developing the Management Plan by presenting a number of different options for achieving desired material distribution. The LTMS agencies are inviting public comment on these options and will consider these comments when drafting the Management Plan.

There are two sets of actions that the participating agencies will undertake to implement the policies established in this EIS/EIR. The first set consists of actions that can be carried out under existing authorities of the agencies within a short time after the EIS/EIR is finalized (section 7.1). Among these types of actions are those that address planning, sediment testing, site monitoring and management. The second set of actions consists of specific implementation options that have been identified during the course of the LTMS studies and through this EIS/EIR that need further development or cannot be implemented immediately. Some of these potential implementation measures may increase or decrease the overall costs of achieving the long-term desired material distribution or shift the financial responsibilities between federal and non-federal interests. These include different ways of allocating in-Bay disposal volumes (section 6.5.7) and financing increased beneficial reuse (sections 7.2 and 7.3). Some of the options in this second set can be implemented under existing authorities of the LTMS agencies. Other options, particularly those that could remove existing institutional barriers, lie outside existing agency authorities (section 7.4).

Nothing in this document is intended to influence, directly or indirectly, congressional representatives to favor or oppose any legislation. It is the policy of the Chief of Engineers that all Corps of Engineers (COE) personnel fully adhere to the spirit and intent of 18 U.S.C. 1913, which prohibits such advocacy. The purpose of presenting these options is to inform the public of the basic differences between potential administrative mechanisms that could achieve the long-term policy goal, to solicit comments from interested parties, and to present an array of other implementation options that are beyond the LTMS agencies' existing authorities.

7.1 ACTIONS TO BE TAKEN BY PARTICIPATING AGENCIES BASED ON THIS EIS/EIR

There are a number of actions that the LTMS agencies will take following the finalization of this document. First, the agencies will consider the public comments submitted pertaining to this Final EIS/EIR. Following any agency action in regard to these submittals, the COE and EPA will sign a Record of Decision (ROD) completing the federal requirements for finalizing the EIS process. The state lead agency, the State Water Resources Control Board, will also certify the final document pursuant to the requirements of the California Environmental Quality Act.

Following the Final EIS/EIR certification/ROD signing process, the LTMS agencies will jointly complete the Management Plan for the implementation of the LTMS selected preferred alternative. At the same time that the Management Plan is being completed, the agencies will be individually taking the following steps:

- EPA: Designate a permanent allowable disposal volume limit for the San Francisco Deep Ocean Disposal Site (SF-DODS);
- BCDC: Revise the Bay Plan and associated regulations to incorporate new policies pertaining to dredging activities; continue to issue a Coastal Zone Management (CZM) consistency determination for the COE's Maintenance Dredging using the findings in this EIS/EIR;

- SFBRWQCB: Revise the Basin Plan to incorporate new dredging policies and continue to issue Water Quality Certifications (under Section 401 of the Clean Water Act) for dredging projects using the findings in this EIS/EIR;

- COE: Confirm or revise Dredged Material Management Plans for existing maintenance projects in San Francisco Bay; perform NEPA reviews as needed, including supplementing the Final Composite EIS for Maintenance Dredging as necessary, using the findings in this EIS/EIR; and

- SWRCB: Revise statewide policies as appropriate to support the selected alternative.

7.1.1 Improved Sediment Evaluation and Testing Procedures

The LTMS agencies will take a variety of steps, both in the near term following completion of the EIS/EIR and continuously throughout the 50-year LTMS planning period, to institute scientific and regulatory improvements in sediment testing, site management, and monitoring.

Since the Draft EIS/EIR was published, the EPA and COE have adopted the Inland Testing Manual (ITM) for nationwide use. The LTMS agencies are publishing initial local guidance for using the ITM in the San Francisco Bay Area. That initial guidance will remain in effect until supplemented by the Regional Implementation Manual (RIM). The RIM will be published under a comprehensive LTMS Management Plan. It will include the current testing and evaluation guidance for all placement environments including detailed consolidated guidance on sediment testing under the ITM as well as the ocean dumping manual (Green Book). The RIM is expected to be a loose-leaf document that can be easily updated as new sediment evaluation approaches are developed (such as appropriate chronic toxicity tests, or numeric sediment quality criteria or objectives), or other regulatory or scientific advancements occur. For example, the proposed standardized LTMS testing system for NUAD-class dredged materials (described in section 3.2.5.2), when instituted through the Management Plan, would be included in the RIM, along with testing procedures for aquatic disposal at in-Bay and ocean sites.

In addition to instituting the standardized NUAD testing requirements, the LTMS agencies will continue to work with individual landfills, the Integrated Waste Management Board, and other agencies as appropriate, to get standardized NUAD testing requirements formally adopted as adequate and appropriate for dredged material disposal at landfills.

Also beginning in the near term, the LTMS agencies will work to systematically compile sediment quality data for individual dredging projects to help identify the appropriate level of future sediment testing. Data from previous dredging activities, if of sufficient quality compared to current testing methods, can often be used in "Tier I" of the sediment evaluation process (described under Tiered Testing in section 3.2.5.1). This can streamline future testing requirements for projects whose sediment quality does not vary substantially over time. These data can also serve to identify early in the planning process any focused areas where more intensive testing may be needed and reduce the need for expensive and time-consuming retesting.

Over a somewhat longer timeframe, the LTMS agencies will continue development work on numeric sediment quality criteria (federal) and objectives (state). As these become adopted, they will be incorporated into future versions of the RIM and Management Plan as appropriate. Numeric sediment quality criteria and objectives and other numeric chemical screening values that may be developed have the potential to streamline sediment testing needs by reducing the degree to which comprehensive toxicity testing (bioassays) need to be conducted on individual sediment samples.

7.1.2 Improved Site Management and Monitoring Procedures

As described in section 5.1.1.2, every disposal or reuse site for dredged material will be operated under a site management and monitoring plan. Depending on the specific site, the details of and timeframe for monitoring will vary. However, all site management and monitoring plans would include the ability to incorporate information obtained through previous monitoring at the site, with the possibility of modifying their management and monitoring parameters based on that information. Monitoring requirements at a particular site may be reduced as site performance is confirmed, or increased if aspects of site performance indicate cause for concern. In all cases, the range of appropriate management actions, up to and including termination of continued site use, will be identified in the site-specific management and monitoring plans.

In addition to continuously re-evaluating disposal or reuse site performance, the agencies will periodically re-evaluate the need for dredging projects as described in section 5.1.1.3. For proposed new construction projects, alternatives will be evaluated in light of public input, as part of the standard environmental review process. This may include review under the Metropolitan Transportation Commission's Seaport planning process coordinated with BCDC. For ongoing maintenance dredging of existing federal channels, the COE will perform NEPA reviews as needed including supplementing the Composite EIS for Maintenance Dredging. These reviews will include consideration of channel widths, depths, and configurations, and potential structural measures that could reduce the volume of dredging necessary to meet the navigational needs of each project.

7.1.3 Improved Regulatory Coordination

As noted in section 5.1.1.4, the LTMS agencies are committed to improved regulatory compliance. This has occurred in part by establishing a multi-agency Dredged Material Management Office (DMMO) which provides a single point of contact for potential dredging project proponents. The DMMO utilizes a simplified permit application form that covers the information required by each of the participating state and federal agencies. The DMMO format is used to coordinate a streamlined time-frame for permit and sediment quality analysis reviews by the participating agencies. The intent is to identify all agencies' information needs early in the permitting process, and to make the individual agencies' review processes more concurrent rather than sequential. In the future, the LTMS agencies may also move toward a single, joint state-federal permit. However, this is currently outside the agencies' authorities and would require additional statutory changes.

Public review and comment will remain an integral aspect of any future regulatory process for dredging projects. All existing public input opportunities would remain under the coordinated DMMO that the LTMS agencies propose to establish in the short term. Although a single permit application is used, each of the individual agency actions that are required today would still be needed before dredging and disposal activities could begin. All of these actions include their own public review and comment processes, as described in section 4.8. If, however, statutory changes allow future development of a single permit, new procedures that guarantee adequate opportunity for public input would have to be included in the process.

Perhaps the most important aspect of improving the regulatory system, both in the short term and over time, will be the establishment of available and affordable multi-user rehandling and beneficial reuse options for the region. New, appropriately designed disposal and reuse alternatives will maximize flexibility for dredging interests, minimize regulatory complications, ensure adequate environmental protection, and provide for the environmental benefits of dredged material reuse.

7.1.4 Responding to a Changing Environment

This EIS/EIR has been developed using the best available scientific information generated under both the LTMS program and by numerous researchers and agency staff. The LTMS has also developed a full characterization of the technical, operational, regulatory, and financial characteristics of dredging and material disposal in the region. This information was also used to develop well-grounded projections of dredging needs, material volumes, and the suitability of sediment for a variety of uses. The quality of this information and the extent to which the preferred approach actually achieves the desired balance among environmental benefits, environmental risk, and economic costs depends on updating the management of dredged material disposal to keep pace with future changes.

The participating agencies are committed to responding to the changing environment and will periodically review and modify LTMS policies and implementation measures. There are several issues that staff expect will be the subject of review in the near term. First, there will be a review of sediment testing requirements based on a careful examination of project history and new approaches to classifying sediment. As the LTMS Management Plan is formulated, the COE must provide economic justification when major new investments or other significant increases in maintenance cost are identified. Where projects or portions of projects are not justified for continued maintenance, a separate management plan for the project shall provide appropriate adjustments in the maintenance program, including deferral of dredging, minimization of project dredging dimensions, or the orderly curtailment of maintenance.

It is expected that the agencies will be involved in the development and approval of new disposal and reuse sites. As monitoring data from restoration projects become available, the agencies expect to review the projections of regional environmental benefits and habitat goals. Finally, as new species are listed as threatened or endangered at the state or federal level, the agencies will update LTMS policies as needed to ensure that material disposal does not adversely affect such species.

There are a number of actions that were not considered in the development of this policy EIS/EIR that the participating agencies may take in the future. These include consideration of new in-Bay sites in addition to acquiring and operating rehandling facilities or confined disposal facilities. Demonstration of consistency with LTMS policies and a complete, separate state and federal environmental review would be required for each project.

7.2 OPTIONS FOR ACHIEVING THE LONG-TERM DESIRED DREDGED MATERIAL DISTRIBUTION: LIMITING AND ALLOCATING AQUATIC DISPOSAL

The previous section described a number of specific actions that the LTMS agencies will take immediately following the completion of this EIS/EIR. Section 6.5 also describes the initial transition to the preferred alternative based on the LTMS agencies' existing authorities. However, none of the proposed actions specifically addresses the question of how LTMS will achieve the long-term goal for the UWR environment that is part of the preferred approach.

Several of the LTMS's upland technical studies have triggered additional efforts and analyses regarding potential upland/reuse sites in the Bay area. For instance, the U.S. Army Corps of Engineers — San Francisco District prepared a reconnaissance report in 1995 regarding the establishment of rehandling facilities at several sites, which were determined to have significant potential through the LTMS, including the Leonard Ranch site in Sonoma County as well as two other alternative locations, the Praxis/Pacheco in Contra Costa County and the Cargill Salt crystallizer ponds in Napa County (LTMS 1995d). The COE's analysis assumed that use of the rehandling facilities would be only for dredged material that was suitable for unconfined aquatic disposal and that dried material would be taken only by existing end-users (markets). The COE's investigation concluded that further feasibility studies not be prepared for the Leonard Ranch site due to economic considerations.

The difference in the outcome of the COE and LTMS studies was likely due to the assumptions used by the COE including the restriction of rehandling facilities to "suitable" rather than "unsuitable" material only and to "existing" rather than "potential" markets only. Despite its conclusion, the COE recommended that rehandling facilities be developed and further site studies be undertaken in order to reduce the volume of material disposed at in-Bay sites and increase the volume of material available for beneficial use at upland sites.

One study currently underway is examining the feasibility of restoring tidal and seasonal wetland habitat at the former Hamilton Army Airfield in Marin County, which is currently in the base closure process. The potential area for wetland restoration at this site also includes the adjacent properties including the decommissioned Hamilton Antenna Field, which will be available for transfer once site remediation is complete, and the Bel Marin Keys Unit V site, whose current owners are interested in selling the property. This study will determine, among other things, whether the 2,700-acre site would best be restored by using dredged material or by relying on natural sedimentation to raise existing elevations to facilitate marsh development. The LTMS studies found that the reuse potential for wetland restoration was high at the Hamilton Army Airfield and adjacent properties, and that up to 30 mcy of dredged material could be accommodated at the combined project site (LTMS 1995d).

The Hamilton feasibility study is being managed by the state Coastal Conservancy and the San Francisco Bay Conservation and Development Commission in close coordination with the City of Novato and the Hamilton Restoration Group, which is comprised of federal, state, and local government representatives, as well as technical experts, non-profit organizations, and interested citizens. The restored site would provide habitat for endangered and special status species, waterfowl using the Pacific flyway, anadromous and resident fish species, flood protection to adjacent properties, and water quality improvement functions. The technical studies needed to develop a conceptual wetland restoration plan and assess the project's feasibility were completed in April 1998. Presently, the final restoration plan is being developed and the CEQA/NEPA process for the project has been initiated. It is presently anticipated that the site will be ready for restoration near the end of 1999, and, if determined feasible, ready to accept dredged material starting in January 2000.

Other efforts currently underway to implement upland/reuse projects include the Montezuma Wetlands and rehandling facility project in Solano County. Approximately 17 mcy of dredged material could be accommodated over time at the wetland restoration portion of the project, while up to 2.0 mcy of material could be processed annually at the rehandling facility. The Final EIR/EIS for the project is currently being finalized and is scheduled for completion in August 1998. Subsequently, the permitting process would start; it is presently scheduled to be completed in early 1999. In the event environmental review and permitting occur as presently scheduled, the project will likely commence sometime in mid-1999.

Another effort involves the existing dredged material disposal ponds at the former Mare Island naval shipyard in Solano County, whose reuse potential was determined high (LTMS 1995d). With the closure of the shipyard, the ponds are no longer being used exclusively by the U.S. Navy, and could provide capacity for over 1.0 mcy of material per drying cycle if used as a rehandling facility, or for over 10.0 mcy of material if used as a confined disposal facility. In September 1997, the City of Vallejo completed an evaluation of the ponds as a multi-user rehandling and/or confined disposal facility, and concluded that further evaluation should be conducted regarding their potential as a facility for dredged material that is unsuitable for unconfined aquatic disposal.

7.3 FINANCING OPTIONS TO PROMOTE BENEFICIAL REUSE

It is a national COE policy to select the "least-cost, environmentally acceptable" alternative for federal maintenance projects (federal standard) and the "national economic development" (NED) plan (described in Chapter 4), which maximizes net economic development benefits in the selection and authorization of new work projects. The "federal standard" and NED have resulted in disposal of most material at in-Bay sites.

Two conditions, working in concert, effectively promote material placement at in-Bay sites. The first is a disparity between federal funding policies for open water sites (for which site development and monitoring costs are largely borne by the federal government) and beneficial reuse and confined disposal (for which similar costs are largely non-federal). This creates a strong economic incentive for a non-federal sponsor to urge the use of in-Bay disposal sites, which are seemingly "free" to the non-federal sponsor, especially if suitable upland and nearshore sites are not already owned by the non-federal sponsor. The second condition is the lack of available regional upland or nearshore sites that would allow consideration of practical alternate placement options for each project. There is currently no authority for any of the LTMS agencies to acquire and manage multi-user upland or wetland reuse sites. If such sites were available, the added costs for acquisition, development, and management may not be economically prohibitive to prospective individual users. In combination, these conditions serve to focus disposal on existing in-Bay and ocean sites, create a disincentive for the beneficial reuse of material, and may potentially result in local economic inefficiencies.

To fully implement any of the alternatives that include reducing in-Bay disposal, increased beneficial reuse must also be made available and financed. Some of these actions are beyond the control of the LTMS agencies and are mentioned here as options that could satisfy the regional need to make available dredged material placement sites other than the existing aquatic sites. Changes to existing institutional policies may also need to be adopted to accommodate the beneficial reuse of dredged material associated with maritime projects in the region. In addition, there is also a need to provide for use and/or disposal of material that is unacceptable for unconfined aquatic disposal. The following sections describe alternate options that could fully implement the objectives and goals of the LTMS through an integrated regional dredged material management system.

7.3.1 Federal Financing

There are several existing options for financing the federal share of project costs. These are summarized below from *Financial Analysis of Implementation Approaches for the Long-Term Management Strategy, Task 3 Report: Alternative Financing Methods and Institutional Issues* (LTMS 1995b; see also Appendix Q). The funding described below could be used for individual projects or the development of multi-user disposal sites. Where applicable, changes in funding policies provided by WRDA '96 have been noted. For further detain on WRDA '96 provisions, see section 4.8.

7.3.1.1 Develop More Dredging-Related Wetlands Restoration Projects

New regulations issued by the COE in draft form in April 1995 (EC 1105-2-209) encourage commanders at the division and district level to implement programs using the COE's new authority in Section 204 of the Water Resources Development Act (WRDA) of 1992. This authority allows the COE to carry out projects for the protection, restoration, and creation of aquatic and ecologically related habitats, including wetlands, collectively referred to as "ecosystem restoration projects." A national appropriations limit of $15 million per year has been approved. These funds would also be subject to actual annual appropriations by Congress and availability. Requests for such programmatic funds are submitted nationwide. WRDA '96 provisions have modified the cost sharing of O&M activities to be the cost sharing of the general navigation feature, including design and construction of UWR sites.

An ecosystem restoration project with incremental costs in excess of the base plan can be approved by the COE for a navigation project, provided the monetary and non-monetary benefits of the ecosystem restoration justify the added cost. If such a project is recommended, the project can receive up to 75 percent federal financing of construction costs. The non-federal sponsor must also agree to pay 100 percent of the future costs for the operation, maintenance, replacement, or rehabilitation of the ecosystem restoration project.

7.3.1.2 Develop Projects that Use Funds Designed to Restore or Enhance Habitat Associated with Already-Constructed Navigational Projects

The COE's authority in Section 1135 of WRDA 1986 could be used for this financing option. This section now provides up to $25 million per year nationally, limited to not more than $5 million per project, to modify existing water resource projects to improve the quality of the environment in the public interest. A non-federal, cost-sharing partner must contribute 25 percent of the restoration project costs, which may include required land costs. Normally, the non-federal sponsor would be responsible for 100 percent of operation, maintenance, repair, and replacement costs. Funds are subject to actual annual appropriations and other nationwide requests. WRDA '96 provisions have modified the cost sharing of O&M activities to be the cost sharing of the general navigation feature, including design and construction of UWR sites.

7.3.1.3 Use Exceptions Presently Allowed to the NED Plan Process to Approve More Projects with Upland Disposal and Beneficial Reuse Features

Although outside of the regional COE decisionmaking authority, the Assistant Secretary of the Army for Civil Works may grant an exception to recommending the NED plan when there are overriding reasons such as provisions of significant environmental outputs (ER 1105-2-100 paragraph 5-16c). The Assistant Secretary of the Army has approved several such exceptions. Environmental restoration is presently a COE budget priority and, therefore, an acceptable reason for an exception. Such exceptions, made where regional environmental restoration could dictate, would allow for 75 percent federal financing of additional disposal costs for an environmentally beneficial disposal option at an upland site for congressionally authorized projects. Although it may be possible for a District Engineer to recommend a deviation, such approvals are not routine, nor are such deviations intended to circumvent the statutory cost-sharing requirements. WRDA '96 provides that, rather than being treated as an exception, cost sharing for environmentally beneficial reuse of dredged material and design and construction of UWR sites now shall be treated as a general navigation feature and cost shared accordingly.

Another exception to adopting the NED plan that has been utilized is the development of a locally preferred plan. In the case where the locally preferred plan is more costly than the NED plan, and the increased development is not sufficient to warrant full federal participation, the local sponsor would be required to pay the difference in cost between the NED plan and the locally preferred plan. Federal participation in the more costly locally preferred plan is limited by the federal share of the federally supportable plan, one that maximizes net economic development benefits while satisfying environmental requirements. In such cases where a locally preferred plan is recommended, the plan is usually approved with the level of federal participation based on the NED plan.

7.3.1.4 Expand Use of the Harbor Maintenance Trust Fund

Although beyond the authority of the regional offices of the COE, expansion of the use of the Harbor

Maintenance Trust Fund through a broadening of what the COE defines as "operations and maintenance" work could be considered. The WRDA of 1986 gives the COE the authority to identify eligible operation and maintenance costs that are part of ". . . all operations, maintenance, repair and rehabilitation, including maintenance dredging reasonably necessary to maintain . . . a harbor; but exclude: provision of land, easements, rights-of-way, dredged material disposal areas, or performing relocation." Some of the needs identified with operations and maintenance work regionally include, for example, construction of diking for confined aquatic disposal, site preparation of planned upland disposal sites, added costs of transporting and offloading of "unsuitable" materials at upland sites, and site monitoring.

7.3.1.5 Identify Beneficial Reuse Projects Appropriate for Supplemental Environmental Projects Undertaken through Enforcement Actions

EPA and the COE take enforcement action against entities that violate federal water quality or ocean dumping laws and regulations. In some cases, violators are given the option of sponsoring "supplemental environmental projects" in exchange for a monetary reduction in fines. The first step in funding individual or multi-user beneficial reuse projects with such funds is to identify appropriate projects within the region and to make the list available to parties in enforcement cases.

7.3.1.6 Wetland Mitigation Banking

Mitigation Banking is the restoration, creation, enhancement and, in some exceptional cases, the preservation of wetlands or other aquatic resources expressly for the purpose of providing compensatory mitigation in advance of authorized adverse impacts to similar resources. The objective of a mitigation bank is to provide for the replacement of chemical, physical, and biological functions of (or equivalent to) wetlands or other aquatic resources that are lost as a result of authorized impacts. Using appropriate methods, the newly established functions are qualified as mitigation "credits" that are available for use by the bank sponsor or other parties to compensate in advance for adverse impacts ("debits"). The existence of appropriate mitigation banks can thus speed the permitting process. Mitigation banks can also provide more certainty that adverse impacts will be adequately compensated, as well as a greater degree of environmental benefit, since the new habitat ("credits") must be established in advance of adverse impacts ("debits").

National Mitigation Banking Guidance has been developed jointly by the COE, EPA, the Department of Agriculture, the U.S. Fish and Wildlife Service, and the Department of Commerce. The Mitigation Banking Guidance document, which became effective on December 28, 1995, sets forth the conditions under which the agencies will consider and approve mitigation banks. In the San Francisco Bay Area, mitigation banks could potentially be proposed and constructed by ports and other dredging interests, and used as mitigation for future approved dredging or filling projects. The LTMS agencies would follow the National Mitigation Banking document, and supplemental technical documents developed subsequently, as guidance in the consideration of any such proposals.

7.3.2 State Financing Options

7.3.2.1 Mitigation Funds

One option for making state funds available to promote beneficial reuse is through the use of mitigation funds. Currently, state agencies collect fines from violators of environmental laws and regulations. The Regional Board, for example, deposits monies from fines into the statewide Cleanup and Abatement account. The account is then used to fund restoration projects at high priority sites such as abandoned mines around the state. Within the San Francisco Bay region, entities that are responsible for violating water quality laws and regulations are given the option of identifying supplemental environmental projects in exchange for a reduction in the amount of a monetary penalty. Usually, these supplemental projects restore or enhance wildlife or aquatic habitat near where the violation occurred, but can also include pollution prevention and reduction work, environmental auditing, and public awareness (SFBRWQCB, Enforcement Policy, February 1994). The State Lands Commission and BCDC have also established similar funding systems.

Funds to support the beneficial reuse of dredged material could be made available through application to the Cleanup and Abatement funding process, or by listing specific reuse projects as acceptable supplemental environmental projects that dischargers may choose when considering this option under the Regional Board's Enforcement Policy. Another option would be to establish a special fund or new joint powers district exclusively for dredging-related fines and beneficial reuse projects.

Funds from fines are used to make dredging-related loans or grants. Financing could be used for capital costs to acquire and develop upland disposal sites. Users could include ports, districts, and other public sector dredgers.

7.3.2.2 State Regional Dredging Trust

Through new legislation, the state could authorize the formation of a regional dredging trust to collect all dredging fees. These would replace dredging fees now collected or would authorize additional fees. The amounts collected would be used to cover regulatory costs and to fund a newly created trust that could make loans. Financing could be used for capital costs to acquire and develop upland disposal sites or as operating expenses for state-run rehandling or reuse facilities. Users could include state agencies, such as the California Coastal Conservancy, authorized to acquire upland sites. Public and private sector local dredgers would use such uplands sites to meet environmental requirements.

7.3.2.3 Allow Privately-Owned, Multi-User Disposal Sites to Receive Limited Financial Incentives

A regional dredging trust, formed as described above, allocates a portion of its loan funds for financing multi-user sites managed by private sector firms. Such multi-user sites could repay some or all of this financing by accepting agreed quantities of sediments at a zero or discounted tipping fee (explained in more detail in Chapter 4), using contract procedures issued by the regional dredging trust. Financing could be used for capital costs to acquire and develop upland disposal sites. Users of financing could include firms developing multi-user upland disposal sites.

7.3.2.4 Fund Staff Position to Identify Markets and Uses for Dredged Material During Project Planning Phase

At the current time, there are no staff resources from any of the LTMS agencies assigned specifically to the task of "brokering" dredged material and identifying a range of beneficial uses during the initial planning phases of each project. Allocating staff resources specifically for identifying construction and other upland projects needing fill material and organizing beneficial reuse early in the project planning phase would help maximize the environmental benefits of reuse and identify those cases when dredged sediments are marketable commodities. The same information could be used to identify beneficial reuse projects that could be matched with enforcement fines.

7.3.2.5 New State or Regional Tax

A new tax or assessment could be implemented at the state or regional level. This tax could be used to spread the costs of dredging and disposal over a wider economy than ports, marinas, etc. The revenue from this tax or assessment could be used to implement UWR projects and subsidize some or all of the cost differential between in-Bay disposal and disposal at the SF-DODS or UWR sites. At one extreme, the tax could be levied on all residents of the state or region, on the theory that everyone benefits from a healthy maritime economy. On the other extreme, the tax could be more narrowly focused on those sectors that benefit more directly from any given dredging project, such as shippers, boaters, etc. This approach could be modeled after the tax on outboard motors in Louisiana that is used to help fund wetland restoration efforts there.

7.3.3 State and Federal Financing Options

7.3.3.1 CALFED

The LTMS could coordinate with other state/federal programs that have overlapping interests and goals and that can provide sources of revenue to fund mutually beneficial projects. The Bay-Delta CALFED program is a perfect match with the LTMS. CALFED is providing extensive funding for projects that meet the program's goals. Dredged material can be used for habitat and/or levee projects pursuant to the CALFED program, thus providing benefits to both programs.

7.4 FACILITATING AN EFFICIENT REGIONAL DREDGING MANAGEMENT SYSTEM

Full implementation of the alternative approaches presented in this EIS/EIR will require the development of several different systems to ensure that the desired material placement distribution is attained. The Management Plan will address these implementation needs. At the same time, however, there are institutional barriers that currently limit the administrative tools that can be used to develop an effective implementation plan. The potential for changes described in this section may allow a greater degree of flexibility in designing an effective, efficient, and integrated dredged material management system.

7.4.1 Institutional Barriers Limiting the Flexibility of Regional Disposal Planning

This section first describes several institutional barriers that limit the flexibility of regional disposal management planning, then several alternate options that could address these barriers (LTMS 1995b). The institutional barriers described below have emerged during the regional LTMS process. They are also the subject of a discussion on national dredging policy (see Appendix D). The recent improvements provided by WRDA '96 in facilitating a more efficient dredging management system are noted in the following sections. Section 207 allows the Assistant Secretary of the Army to select disposal methods that are not the least cost option if incremental costs are reasonable in relation to the environmental benefit, including creation of wetlands and shoreline erosion control.

7.4.1.1 Developing Cost-Sharing Arrangements to Include All Local Beneficiaries Can Be Difficult

When a channel to an upstream port, such as the Port of Sacramento, is deepened, many small harbors along the route also benefit. It is difficult, however, to project the benefits to small harbors, and it may be impractical to obtain their agreement to provide some financing for the project. Additionally, beneficiaries of deepening projects often include foreign-owned ships. Designing a structure that allows for cost sharing among such a widely dispersed group of benefiting parties is difficult.

7.4.1.2 Federal Cost-Sharing Policies for Dredging Activities Favor Aquatic (in-Bay and Ocean) Disposal Methods

O&M dredging work is based on the "federal standard." This standard requires that the COE perform its maintenance dredging and disposal work in the least costly manner that is consistent with sound engineering principles and meets all applicable federal and state environmental standards. Current practice utilizes, for the most part, the least costly in-Bay site meeting environmental requirements.

For new construction work, the cost-sharing formulas are based on the approved NED Plan for the project. This would be the plan with the highest net economic benefit consistent with protecting the environment. In theory, it does not have to be the lowest cost plan, especially if the environmental benefits from using a beneficial reuse or upland disposal site are expressed in monetary terms or included in benefit-cost analysis in a way that increases the net economic benefit. However, in actual practice, the lower costs of available, in-Bay disposal sites appear to have a major influence on the selection of the NED Plan.

The use of an upland site requires the local sponsor to pay all the added costs for disposal at such a site, regardless of whether a deviation from the NED Plan is granted (see section 7.4.1.3 for a more complete discussion of this option). This provision is specified in the 1986 WRDA. The transportation costs associated with using a site provided by the local sponsor, however, would be considered a project cost subject to federal-local sponsor sharing. In addition, the local sponsor must provide the site itself, paying for the costs for land, easements, rights-of-way, and utility relocations. WRDA '96 has now provided for cost sharing for this purpose. Section 217 allows for the design and use of excess capacity in authorized dredged material disposal facilities at the request and expense of a non-federal interest.

7.4.1.3 Absence of Programs for Federal and State Government Participation in the Acquisition and Development of Disposal Sites for "Unsuitable" Materials

Federal and state regulation changes in recent years have increased significantly the quantities of dredged sediments that are considered "unsuitable" for unconfined aquatic disposal. Local cost-sharing sponsors for federal projects, such as the Port of Oakland, must now provide a disposal site and must pay all the added cost of disposing of such sediments. Although the increased need for such disposal sites arose from federal and state regulatory actions to protect environmental quality and prevent further environmental degradation, no government programs exist to help local sponsors finance the acquisition of land or the development costs needed to create disposal sites for "unsuitable" sediments.

7.4.1.4 Prerequisites to Qualify for Federal Financing of New Project Dredging Can Be Costly

Federal law requires ports to pay 50 percent of the cost of pre-authorization feasibility studies and planning work for a dredging program in a lump-sum payment to the COE. This requirement, which can be relatively costly, has caused some ports to fund dredging costs without federal assistance on a pay-as-you-go basis.

7.4.1.5 Revenues Available to Disposal Sites are Limited

The Sonoma Baylands project sponsors initially had hoped to charge a tipping fee for accepting dredged materials from the Port of Oakland's deepening project. The project sponsors eventually decided against charging a tipping fee because of the additional cost burden that the tipping fees would impose on the Port of Oakland under the COE's cost-sharing requirements. Without tipping fees or other income for debt repayment, a disposal site or habitat restoration sponsor will be unable to raise sufficient private sector financing for long-term needs such as monitoring, site management, or future expansion.

7.4.1.6 Absence of Governmental Funds for Site Monitoring of Beneficial Uses

After material from dredging projects has been deposited at a beneficial reuse site, the dredging project is considered complete. The financial burden of continued monitoring and management of the site rests with the owner and users. No federal or state cost-sharing funds are usually available for such site monitoring costs. An exception to this practice was approved by Congress specifically for the Sonoma Baylands project; however, monitoring costs typically must be borne by local sponsors or by other public agencies. No long-term mechanisms are available for monitoring; current funding is on an ad hoc basis. WRDA '96 has now provided for cost sharing for this purpose. Section 201 states that land-based and aquatic dredged material disposal facilities for construction and O&M will now be considered general navigation features and cost shared in accordance with Title I of WRDA '86.

7.4.1.7 Federal Guidelines for Carrying Out Section 404(b)(1) of the Clean Water Act Can Be a Barrier to Wetland Restoration Projects in Sensitive Jurisdictional Wetland Areas

The existing 404(b)(1) guidelines were specifically designed to avoid loss of wetlands to development and to establish safeguards when development must occur. These guidelines require a project sponsor to analyze alternative sites and identify the one where development would cause the least adverse impact. Recent experience indicates that the same guidelines that require an alternatives analysis have hindered wetland enhancement and restoration projects. The main barrier is that the current guidelines do not effectively distinguish between development and environmental restoration projects, and can require extensive analysis of alternate sites by restoration project sponsors.

7.4.2 Options for Facilitating Effective and Efficient Disposal Planning

There are many actions that could remove the institutional barriers to efficient dredged material planning and full implementation of the policies identified in this EIS/EIR. Some of these actions are within the existing authorities of the LTMS agencies, but many others lie outside those authorities. This section presents different options that could remove or reduce the barriers listed in section 7.4.1; specific options that could be taken are matched with the agency or governmental body that has the authority to take those actions. Similar options are the subject of discussion at the national level (see Appendix D). Changes in federal legislation including WRDA '96 (see section 4.8) now provide the capability for increased federal participation in alternatives to in-Bay disposal scenarios. The cost of upland disposal site development and maintenance may now be cost shared or 100 percent federal funded using the Harbor Maintenance Trust Fund.

7.4.2.1 Change Federal Cost-Sharing Formulas

Many of the barriers listed in section 7.4.1 identify different elements of the federal cost-sharing requirements that, if modified by Congress, could facilitate the use of dredged material in beneficial reuse projects. These options include allowing new project exemptions from the NED least-cost alternative requirements when EPA determines that alternative disposal sites are required to meet environmental standards. For maintenance dredging projects eligible for federal cost-sharing, this would allow 100 percent federal funding for NED-exempt projects, including federal funds for the costs of disposing of "unsuitable" dredged materials. Cost-sharing policies also could be changed to allow 75 percent federal cost-sharing for development of confined aquatic and upland disposal sites, such as was provided for the Sonoma Baylands project. Finally, cost-sharing policies could also be changed to reflect the cost of site monitoring and maintenance following material disposal (including consideration of that portion of tipping fees necessary to cover such ongoing costs).

7.4.2.2 Authorize an Agency to Acquire and Oversee Upland Disposal Sites

Proposed changes to existing federal legislation have recommended that a state agency, such as the California Coastal Conservancy, be allowed to acquire and manage land for upland disposal sites of dredged material. Changes in state law would also be needed. Using funds in the regional dredging trust proposed below, the management agency would invest in development costs for its sites. The management agency also would have authority to enter into public-private partnerships to obtain private financing to develop sites and to obtain site management and monitoring services.

7.4.2.3 Replace the Existing State Lands Dredging Fee, the BCDC Dredging Fee, and the SFBRWQCB Permit Fee with a Single Regional Dredging Fee

This option requires a change in state law. A fee would be paid when dredging applications are submitted to the "single stop" dredging permit office now on a pilot basis. The dredging fee would be set at a level to cover the costs for permit processing and provide funds to invest in upland and beneficial reuse sites. The fee should be high enough to provide a significant revenue stream into the proposed regional dredging trust for expanding the use of upland sites.

7.4.2.4 Authorize the Creation of a State Regional Dredging Trust

Such a trust could be created through new legislation. The dredging fees collected from dredgers, except for amounts needed to fund regulatory agency costs, would be deposited in a newly created trust. The amounts collected from year to year would vary with the level of dredging activity. The funds in the trust would be reserved to finance acquisition and development of sites for upland disposal of "unsuitable" dredged sediments and the beneficial reuse of dredged sediments. Such funds could also be used for site monitoring. These funds could not be spent for other state government purposes.

7.4.2.5 Change Policies on the Use of the Harbor Maintenance Trust Fund

The harbor maintenance trust fund and the policies regarding its use are established by Congress. One option that would facilitate local policies would be for Congress to modify the policy so that the fund pays the federal 75 percent cost share for channel-deepening projects serving commercial navigation. WRDA '96 (see section 4.8) now provides for the use of the Harbor Maintenance Trust Fund in funding construction of confined disposal facilities for O&M projects. Section 601 provides that the Harbor Maintenance Trust Fund will be the source of the federal portion of funds for construction of dredged material disposal facilities for O&M.

7.4.2.6 Streamline Federal Requirements under 404(b)(1) Guidelines for Restoration Projects

There are several options for streamlining the 404(b)(1) guidelines to support environmental restoration projects. At the local level, the LTMS agencies could commit to a streamlined process for restoration projects that meet certain criteria. A second option would be for the COE to issue a national regulatory guidance letter that spells out how restoration projects using dredged material would be reviewed under the 404(b)(1) guidelines. A third option would be for the COE and EPA to amend federal regulations and add a streamlined process for restoration projects. A fourth option would be for Congress to amend the Clean Water Act.

CHAPTER 8.0 CUMULATIVE BENEFITS AND IMPACTS

Cumulative benefits and impacts are the result of the incremental benefits and impacts of a proposed action when added to other past, present, and reasonably foreseeable future actions. This chapter summarizes the potential cumulative benefits and impacts associated with the placement of dredged material within the in-Bay, ocean, and upland environments, as described in the Affected Environment Section (Chapter 4) of this document. The potential cumulative benefits and impacts associated with implementation of the LTMS are described for the three proposed action alternatives, described in Chapter 6, that have been brought forward for public comment.

Potential cumulative impacts are primarily discussed on a regional programmatic basis since the impacts of specific projects would not be known until case-by-case, project specific analyses are performed. The benefits associated with the implementation of an action alternative are also accrued on a regional basis. However, localized benefits associated with upland/wetland reuse of dredged material are also likely. These cumulative local and regional benefits, as analyzed on a programmatic level, are discussed below. As explained in Chapter 2, a primary goal of the LTMS is to shift the current dredged material disposal practices, primarily unconfined aquatic disposal, at in-Bay sites, to a more productive long-term distribution of dredged material that would provide for increased beneficial reuse and avoid long-term environmental impacts.

Sections 8.2, 8.3, and 8.4 below discuss the identified potential regional cumulative impacts associated with the implementation of an action alternative. These impacts include potential increases in air emissions, increases in the volume of waterborne and land transportation, changes in land use, and habitat conversion/modification. The principal identified cumulative benefits would be associated with the reuse of dredged material in the upland/wetland reuse environment. As discussed below, these cumulative benefits include the restoration of depleted tidal wetland habitat, water quality improvements, Delta flood protection, and the indirect benefits associated with the reduction of in-Bay disposal.

8.1 POTENTIAL CUMULATIVE EFFECTS OF ACTION ALTERNATIVES ON THE IN-BAY ENVIRONMENT

No direct cumulative benefits are associated with the use of any of the existing in-Bay disposal sites. The principal indirect cumulative benefit associated with the implementation of an action alternative is the reduction of dredged material disposed of in the Bay, with attendant reduction in the risk of adverse impacts from such disposal. The potential cumulative impacts associated with the use of existing in-Bay disposal sites are described below.

8.1.1 Water Quality

Impacts

As addressed in the Generic Analysis, section 6.1.1, some degree of water quality impacts will occur with dredged material disposal within the in-Bay environment, at any disposal volume. These water quality effects would be associated with sediment plumes from the initial disposal event and with the subsequent resuspension of material from the dispersive in-Bay sites. However, it is at the higher disposal volumes where the greatest potential for cumulative degradation of water quality would occur. This water quality degradation would be due to the higher potential occurrence of high-frequency disposal events which are more likely to occur with higher disposal volumes (i.e., there would be the likelihood for multiple disposal events occurring within a limited time period).

No significant cumulative impacts are anticipated in association with the implementation of any of the action alternatives. In fact, the implementation of any one of the action alternatives would provide for a reduction in the current in-Bay disposal volume, thereby reducing the potential occurrence of high frequency disposal events. However, combined with pollutant loading to the Bay from urban and non-urban sources, and other types of stresses on the Estuary, the high in-Bay dredged material disposal volumes of the "No Action" alternative could result in some cumulative impacts.

8.1.2 Changes to the Bay System

Impacts

The implementation of any one of the action alternatives will result in a long-term reduction in the quantity of dredged material disposed of in the Bay. The cumulative effects of such a change in dredged material management on the functions of the Bay system is not known. The implementation of an action alternative will result in an increase in dredged material being placed in the upland environment and disposed of at the ocean site. Subsequently, there will be less material placed at dispersive in-Bay sites and thus less resuspension of dredged material within the Bay system. The possible effects of this include less available material for marsh sediment accretion and an overall reduction of sediment deposition throughout the Bay. However, this is not expected to be significant given that sediment suspended from mud flats each year is many times greater than that associated with dredged material disposal.

8.1.3 Air Quality

Implementation of any one of the action alternatives, presented in Chapter 6, would result in cumulative impacts to air quality. Emissions associated with in-Bay disposal would occur on the waters of the San Francisco Bay. These emissions would predominately be transitory and would occur away from sensitive receptors. On a programmatic evaluation level, in-Bay disposal associated air emissions would not be expected to adversely impact sensitive receptor populations. However, project-specific cumulative impact analyses would need to be evaluated within individual project-level EIS/EIRs since they are not evaluated in this Policy EIS/Programmatic EIR.

8.2 POTENTIAL CUMULATIVE EFFECTS OF ACTION ALTERNATIVES ON THE OCEAN ENVIRONMENT

Similar to the disposal of dredged material at existing in-Bay disposal sites, there are no direct cumulative benefits associated with the use of the Deep Ocean Disposal Site. The principal indirect cumulative benefit associated with the use of the site is the reduction of material disposed of in the Bay. The potential cumulative impacts associated with the use of the Deep Ocean Disposal Site are described below.

8.2.1 Water Quality

The Final EIS for the Deep Ocean Disposal Site designation (USEPA 1993) concluded impacts to water quality associated with dredged material disposal at the site are expected to be local, transitory, and insignificant. The transitory nature of water column impacts would preclude additive (cumulative) effects. The water quality model for sediment dispersion at the site predicted a low probability that fine-grained sediments would reach the boundary of any National Marine Sanctuaries following a disposal action. Moreover, only dredged material that meets all applicable water quality criteria and sediment quality guidelines will be disposed of at the Deep Ocean Disposal Site. Therefore, the USEPA determined that water quality impacts (direct and cumulative) would not be significant.

8.2.2 Increased Maritime Traffic

The implementation of any one of the three actions alternatives, presented in Chapter 6, would result in an increase in waterborne barge traffic to the Deep Ocean Disposal Site. However, as addressed in the EIS for the designation of the Deep Ocean Disposal Site (USEPA 1993), the Deep Ocean Disposal Site is located outside of designated commercial vessel traffic lanes and away from any restricted passage areas, precautionary zones, or anchorages for commercial shipping. Other ocean related projects considered in a cumulative analysis were determined to be well away from the site. Additionally, it was determined that the use of the Deep Ocean Disposal Site would result in negligible impacts to recreational or commercial fishing. Therefore, it is not anticipated that cumulative impacts associated with increased marine traffic would occur.

8.2.3 Air Quality

Implementation of any one of the action alternatives, presented in Chapter 6, would result in cumulative impacts to air quality. The air quality analysis conducted for this EIS/EIR concluded that the dredged material placement environment with the largest contribution of emissions would be the Deep Ocean Disposal Site, even though disposal volumes at this site would be approximately one-fifth the volumes of in-Bay sites, depending on the action alternative chosen (see sections 6.1.5.1 and 6.2.4). This difference is due to the much longer transportation distance to the Deep Ocean Disposal Site, which would produce substantially greater tugboat emissions. Emissions associated with ocean disposal activities would generally occur on the waters of the San Francisco Bay and offshore regions. Consequently, these emissions would occur at a considerable distance from any sensitive receptors and would not be expected to adversely impact this portion of the population. Ocean disposal would be the least threatening to sensitive receptors of all the proposed placement environments.

Project-specific cumulative impacts to sensitive receptors would need to be addressed within individual project-level EIS/EIRs and were not evaluated for this Policy EIS/Programmatic EIR.

8.3 POTENTIAL CUMULATIVE BENEFITS AND IMPACTS OF ACTION ALTERNATIVES ON THE UPLAND/ WETLAND REUSE ENVIRONMENT

Each of the action alternatives, presented in Chapter 6, effectuates to a greater or lesser extent the upland/wetland reuse of dredged material. It is this reuse opportunity which provides for the greatest potential cumulative benefits associated with the implementation of the LTMS. In contrast to the primarily localized adverse impacts associated with upland/wetland reuse, both local and regional cumulative benefits could be realized. These benefits, as well as potential cumulative impacts are discussed below by benefit/impact type.

8.3.1 Habitat Conversion

Benefits

The past modification of the Estuary, as describe in Chapter 4, has greatly impacted its ecosystem. The reduction of wetlands, associated with diking and filling along the margins of the Bay, have deprived the Estuary of this habitat type to a significant extent, resulting in a patchwork of wetlands that have reduced value to wildlife, greatly reduced the filtering and absorption of pollutants, and significantly reduced regional biodiversity. Although it is evident that areas of the diked former bayland support wildlife habitat, a newfound recognition of the importance of the Estuary's tidal wetland systems has spurred efforts to restore such wetlands, especially those at the margins of the San Pablo Bay and within the Delta. In addition to the reintroduction of tidal action to a site, tidal wetland restoration projects of areas that were diked off from the Bay, require either extensive natural sedimentation to occur or the placement of soil/sediment material at a site to raise the land surface elevation to that suitable for vegetative colonization. The reuse of dredged material is one method of achieving a site's elevational needs.

Potential opportunities for the restoration of wetlands utilizing dredged material have been identified through the LTMS Technical Studies (Gahagan & Bryant Associates 1994b). The creation of tidal marsh habitat is one of the principal identified cumulative benefit associated with upland/wetland reuse of dredged material (see Section 4.4.4.1). The creation of tidal marsh habitat utilizing dredged material presents an opportunity to more rapidly create this greatly depleted habitat type than may otherwise be possible through other means. Such restoration activities would have significant benefits both on a local and regional level for many fish and wildlife species which are dependent on tidal wetland as a primary or temporary (seasonal or nursery ground) habitat.

Impacts

The construction of upland/wetland reuse projects could result in the conversion of existing habitat at potential reuse sites. For example, seasonal wetlands habitat found within some of the diked historic baylands sites would be lost through the conversion of these sites to tidal marsh habitat or the construction and operation of rehandling facilities. While the conversion of bayland sites to tidal wetlands reflects the historical distribution of tidal marshes, the conversion will result in the loss of the some important habitat functions for local and migratory shorebirds and waterfowl, including supplemental foraging habitat during high tides for small shorebirds, loss of nesting habitat for resident species, and winter storm refugia (see Chapter 4, section 4.4.4.1). Combined with other past, present, and potential activities within the baylands which may result in the loss of habitat value (e.g., urban development, intensified agricultural practices, etc.), the conversion of seasonal wetlands to tidal wetland habitat or rehandling facilities may results in an overall regional loss of these important functions. Such a loss of these seasonal wetland functions could result in a significant cumulative impact.

The policy-level mitigation measures, presented in Chapter 5 of this document were developed to address the cumulative, as well as localized impacts associated with habitat conversion. As discussed above, the development of increased tidal wetland habitat along the Bay margins is considered to be a net cumulative benefit, replacing a habitat type which was lost due to past diking and other Bay fill activities. However, this cumulative benefit would not apply in the case of rehandling facilities, were any existing land uses, including wildlife habitat, would be changed to reflect an this industrial type activity. As explained in Chapter 6, the development of rehandling would require specific habitat replacement mitigation, thereby reducing the associated cumulative habitat conversion impacts.

8.3.2 Water Quality

Benefits

In contrast to potential localized adverse water quality impacts, region-wide water quality benefits are attainable through the implementation of any one of the action alternatives. For example, when properly sited and designed, habitat restoration projects (particularly tidal wetland restoration) can result in a significant net benefit to water quality by contributing to increased sediment retention, filtration of pollutants, and shoreline stabilization. Additionally, indirect regional benefits could be obtained through the reduction of in-Bay disposal of dredged material and through the flood protection achievable in the Delta region through the reuse of dredged material for levee repair and stabilization. Cumulatively, reuse of dredged material in the upland/wetland environment could result in significant benefits.

Impacts

The placement of material determined to be suitable for aquatic disposal (SUAD) in the upland/wetland reuse environments (see Chapter 3, section 3.2) can have either beneficial or adverse cumulative impacts on water quality, depending on the specific type of reuse and circumstances at placement sites. In general, regional cumulative water quality impacts associated with upland/wetland reuse are not anticipated. For this reason, adverse water quality impacts would need to be evaluated on a case-by-case, site-specific basis. An exception to this may occur on Delta islands where dredged material would be utilized for levee maintenance and repair activities. Due to the sensitivity of the Delta inner-island environments, already impacted by agricultural practices, including fertilizer and pesticide use, as well as ground and surface water pumping, inner-island cumulative impacts association salt loading may occur (see Chapter 6, section 6.1.3.2). However, even these impacts would be considered fairly localized.

8.3.3 Air Quality

Benefits

There are no direct cumulative air quality benefits associated with upland/wetland reuse of dredged material.

Impacts

It is anticipated that air quality impacts associated with the reuse of dredged material would likely be short-term (with the exception of ongoing operations at rehandling facilities), localized, and not contribute to significant cumulative changes in air quality. Potential cumulative air quality impacts, including incremental additions of vehicle and construction equipment exhaust emissions associated with sediment transport, handling, and placement would occur, depending on the reuse parameters. These parameters include the placement method chosen, the location of reuse sites within regional air basins, and the proximity of reuse sites to sensitive receptors. Project-specific, case-by-case cumulative impact evaluation and application of appropriate mitigation measures would be necessary prior to the implementation of individual reuse projects. The construction and operation of rehandling facilities would result in the highest amount of air emissions per unit volume of disposed material compared to other placement options. However, relatively few such facilities (one or two) would need to be operated to meet the regional needs.

Project-specific cumulative impacts to sensitive receptors would need to be addressed within individual project-level environmental reviews and were not evaluated for this Policy EIS/Programmatic EIR.

8.3.4 Truck Traffic

Benefits

There are no direct cumulative benefits associated with the upland transport of dredged material. Indirect cumulative benefits, however, would be associated with the use of dredged material at landfills, levee repair and stabilization projects, and other upland use. The use of dredged material for these purposes replaces the need for excavating and transporting other material to these sites, while meeting beneficial reuse goals for dredged material.

Impacts

As discussed in Chapter 4, section 4.4.4.3 and Chapter 6, section 6.1.4.3, the construction and operation of rehandling facilities will result in an increase in truck traffic in the areas where such facilities would be located.

Whether such increases would result in significant cumulative impacts would need to be analyzed on a project-specific basis for each proposed rehandling facility prior to the construction of a new facility or expansion of existing facilities. However, preliminary estimates based upon the plenary dredged material volume figures, presented in Section 4.4.3, indicate that under a high upland reuse scenario (not a proposed alternative) approximately 780,000 cubic yards of material would be rehandled each year. Given that haul-truck capacities range from 10- to 20-cubic yards and that material shrinkage (due to drying) would be approximately 20 to 40 percent, truck traffic requirements would be approximately 64 to 170 trucks per day, for all rehandling facilities (new or existing) combined. Under the medium upland reuse scenario, truck needs would be reduced to approximately 31 and 85 round trips per day for all rehandling facilities combined. Cumulative impacts associated with increases in truck traffic would depend on various factors such the number of new facilities constructed, the throughput capacities of the facilities, and the location of the facilities in relation to existing traffic patterns and routes to end-use sites.

CHAPTER 9.0 SHORT-TERM USES VS. LONG-TERM PRODUCTIVITY

Pursuant to National Environmental Policy Act (NEPA) regulations (40 CFR 1502.16) an Environmental Impact Statement must consider the relationship between short-term uses of the environment and the maintenance and enhancement of long-term productivity. Similarly, Section 15126(e) of the California Environmental Quality Act (CEQA) Guidelines instructs that a Programmatic EIR should be prepared in a manner that addresses the relationship between local short-term uses of the environment and the maintenance and enhancement of long-term productivity, and that special attention should be given to impacts that narrow the range of beneficial uses of the environment or pose a long-term risk to human health or safety.

Dredged material is a valuable resource that has many potential beneficial uses. Under past and present practices, the majority of Bay Area dredged material is being managed as a waste to be disposed of so that its potential is not being realized. As explained in Chapter 2, a primary goal of the LTMS is to shift the current dredged material disposal practice from one that focuses on short-term, project-specific uses of the environment (i.e., unconfined aquatic disposal, primarily in-Bay) to a more productive long-term distribution of dredged material that would provide for increased beneficial reuse and avoid long-term environmental impacts. Implementation of any one of the three action alternatives (presented in Chapter 6) would result in a fundamental change in the way material dredged from the Bay is disposed, while providing a long-term increase in upland/wetland reuse of dredge material.

Increased upland/wetland reuse would include habitat restoration, levee repair and maintenance, and uses at landfills. This would offset the need for other sources of fill material to accomplish these uses, representing a long-term productivity gain for the regional environment. This long-term productivity gain would be a sharp contrast to the current short-term dredged material disposal practices that result in environmental impacts without achieving environmental benefits.

Beneficial reuse of dredged material would, however, include some short-term uses of the environment including barge and truck traffic, and short-term increases in noise and air quality impacts associated with construction and operation of specific rehandling facilities or reuse sites. In addition, there would be some short-term impacts associated with habitat conversion. However, these impacts are not expected to be significant and would be more than offset by long-term habitat gains. These short-term uses would not occur at the expense of long-term productivity, as is the case with the current practice of unconfined aquatic disposal. Further, with the implementation of the policy-level mitigation measures presented in Chapter 5 of this EIS/EIR, many of the environmental impacts associated with upland beneficial reuse could theoretically be reduced to insignificant levels.

CHAPTER 10.0 IRREVERSIBLE OR IRRETRIEVABLE COMMITMENTS OF RESOURCES

Section 15126(f) of the CEQA Guidelines specifies that an EIR should address any significant irreversible or irretrievable environmental changes that would result from a proposed action if it were implemented.

As discussed in Chapter 9 (Short-Term Uses vs. Long-Term Productivity), dredged material represents a valuable resource having a variety of potential beneficial uses. The practice of disposing of dredged material as a waste at unconfined aquatic disposal sites effectively constitutes an irretrievable loss of the potential use of the material as a resource. All of the action alternatives evaluated in this EIS/EIR include an overall long-term increase in the volume of dredged material being reused for beneficial purposes. In this regard, all of the action alternatives are improvements over the No-Action alternative from the standpoint of reducing the irretrievable commitment of resources.

The action alternatives evaluated in this EIS/EIR (see Chapter 6) involve the use of both natural and socioeconomic (industrial) resources. General industrial resources that would be associated with the implementation of an action alternative include capital resources, labor resources, fuels, and other construction-related materials. Natural resources utilized or changed under any of the action alternatives would include biotic resources, water resources, and existing land uses. In general terms, the use and/or associated changes of natural and industrial resources would be considered irretrievable under any of the action alternatives. There may be an exception to this for water resources which, on a regional scale and over time, may in fact be retrievable.

Dredging activities remove the benthic organisms at a dredging site, including those that have recolonized a previously dredged area. Continued maintenance dredging would disrupt or inhibit subsequent recolonization of the benthic community at these locations. However, disposal at ocean or in-Bay sites would not result in irreversible impacts because the overall habitat type would remain the same and recolonization of the site by benthic organisms would rapidly progress once disposal operations ceased.

Placement of dredged material in the upland/wetland reuse environment would likely result in changes in land use. Exceptions to this would be the reuse of dredged materials at landfills, on levees, or for construction fill. These activities are not solely dependent on the availability of dredged material. However, the construction of new rehandling facilities and the reuse of dredged materials at new habitat restoration sites would result in irreversible land use changes. For rehandling facility sites, existing land uses and/or habitat functions would be modified, creating an industrial use area. In the case of habitat restoration sites, existing habitat functions at a site would be modified. In many cases, seasonal wetlands would be replaced when tidal wetlands are restored at a site. However, many of the habitat functions that seasonal wetlands provide would be augmented by the creation of new habitat, such as tidal wetlands. Similar to dredged material reuse at landfills and levee maintenance sites, habitat restoration activities do not necessarily depend on the availability of dredged material. However, the implementation of any of the action alternatives would make material more available for such uses. The availability of such material may make such beneficial/reuse activities more likely to occur.

CHAPTER 11.0 GROWTH-INDUCING IMPACTS

NEPA offers no specific guidance with respect to growth-inducing impacts. However, Section 15126(g) of the CEQA guidelines require an EIR to discuss how the project may "foster economic or population growth, or the construction of additional housing . . . in the surrounding environment . . . [and] the characteristic of some projects which may encourage and facilitate other activities that could significantly affect the environment."

Overall, the alternatives evaluated by the LTMS are based on meeting existing and reasonably foreseeable dredging and transportation needs in the San Francisco Bay. As such, the actions alternatives themselves are unlikely to cause substantial regional growth impacts. There are several elements of the LTMS action alternatives, however, that may cause more localized growth impacts.

The implementation of a regional strategy that meets the LTMS goals and objectives listed in Chapter 2 may provide opportunities for growth in industries dependent on maritime activities, such as deep-draft cargo shipping, military facility operations, commercial fishing, ship repair, recreational fishing, ferries, recreational boating and tourism. The LTMS approach could affect growth in dredging dependent industries in two major ways: (1) through the planning for adequate capacity for dredged material from new work projects; and (2) through a streamlined dredged material management framework. Both of these outcomes could increase regulatory certainty and facilitate the removal of dredging-related obstacles to growth in maritime industries, spurring development that otherwise may not have occurred.

To plan for a reasonable estimate of potential future dredging, this EIS/EIR assumes that growth will occur and new-work projects will be conducted, resulting in an estimated material volume from new-work projects that is twice that of currently planned projects (see section 3.1.2.2). The additional new material could come from the expansion of existing ports and channels or the development of new maritime facilities. Disposal capacity developed as a result of the LTMS may increase the likelihood that new work projects will be undertaken, leading to increased employment and development in maritime industries.

Bay Area ports will likely seek to maintain or increase their competitive position in relation to other West Coast ports by developing deeper channels and berths to accommodate increasingly larger cargo ships. Should terminal operations at the ports increase, on-shore activities such as freight handling, trucking, and intermodal rail services would also likely increase, leading to job growth in those related sectors. However, such economic growth depends on many factors unrelated to dredging, such as macro-economic factors, commodity shipping patterns, and marketing efforts. In addition, any demands for additional employees resulting from these activities can be expected to be met by the local populations (USACE and the Port of Oakland 1993).

Other new-work projects could include expansion of ship building facilities, bulk shipping terminals, or commercial fishing capacity, as well as new private marinas and residential communities such as Bel Marin Keys, in Marin County. There are, however, many factors other than the availability of disposal capacity that contribute to the practicability of such new dredging projects. At this point it is impossible to project the number, location, and scope of such projects. Any growth-inducing impacts from individual new-work projects will be appropriately addressed in site-specific environmental reviews.

While it is impossible to predict military dredging needs and expenditures in the future, current plans for Bay Area military facility consolidation and existing base closures make growth in that sector unlikely. Removing uncertainties about dredging may make the Bay Area more attractive for expanding existing military facilities or developing new ones, but dredging issues will likely play a very small role in future siting or expansion decisions.

The growth-inducing effect of regulatory certainty on other dredging-dependent industries is even less clear. Commercial fishing, ship repair, and tourism and recreation-based industries may realize economic benefits through faster project approval and reduced regulatory burdens. However, it is unlikely that such benefits alone could result in substantial growth in any particular industry or location within the LTMS study area. These industries make up less than one-half of one percent of total regional maritime economic activity (LTMS 1990a).

By contrast, the analysis relies on high estimates of maintenance dredging based on historic averages. These estimates include continued maintenance dredging at five military facilities slated for closure.

These facilities, therefore, are expected to remain in operation, although the distinct future uses and dredging requirements are not currently known.

Therefore, under these assumptions, employment at these facilities cannot be expected to increase due to dredging.

There should be no substantial growth-inducing impacts associated with developing additional upland or wetland reuse sites. However, the availability of material for Delta levee repair and maintenance may contribute to increased restoration and repair activities beyond those currently performed. These activities would not be considered growth, rather, they would represent accelerated maintenance of an existing development type (levee work). It is more likely that dredged material for levee repair will provide a replacement for other (upland) material sources.

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