CHAPTER 7

7.0 IMPLEMENTATION OF BENEFICIAL REUSE AND DISPOSAL PROJECTS

7.1 INTRODUCTION

Beneficial reuse involves using dredged material for a variety of purposes, such as habitat restoration, rather than disposing of it as a waste. Because beneficial reuse projects result in benefits beyond those associated solely with dredging, diverse stakeholders have supported beneficial reuse opportunities through project implementation, assistance, and funding. The broad consensus among Bay Area stakeholders for beneficial reuse is a cornerstone in implementing the long-term strategy for dredging in the region. Because of the strong commitment among the dredging and environmental communities to support and implement beneficial reuse, the LTMS agencies have decided not to implement allocations limiting in-Bay disposal, but instead rely on the voluntary efforts of the various constituencies to achieve the LTMS goals. Only if these voluntary efforts are not successful will the LTMS agencies implement allocations.

Successful implementation of the LTMS is dependent on the availability of beneficial reuse sites for dredged material. The LTMS technical studies concluded that the following reuse options could feasibly provide significant capacity for material from Bay Area projects: (1) wetland habitat restoration in diked baylands; (2) facilities along the shoreline to rehandle, dry and process dredged material for use as landfill cover or other construction purposes (including confined disposal facilities); and (3) levee rehabilitation. Another reuse option involves using dredged material at tidal areas to create habitat. Reuse opportunities exist around the Bay but are still limited (see Figure 7.1).

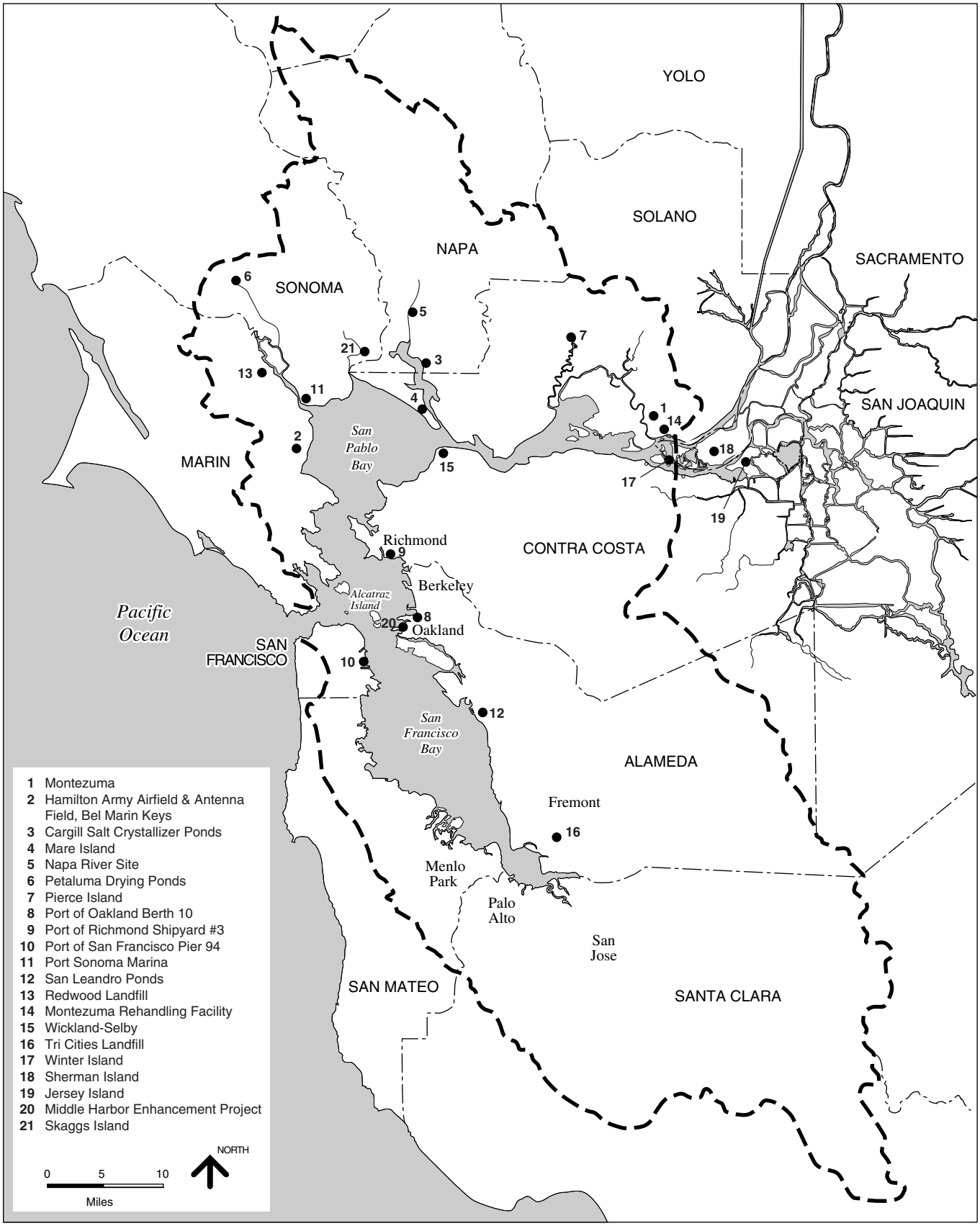
The LTMS studies determined that reuse projects are typically more expensive and difficult to implement than open-water disposal. However, large multi-user projects can achieve economies of scale and lower costs. Several large reuse sites are in the process of being implemented: the Hamilton Wetlands Project in Marin County and the Montezuma Wetlands in Solano County. The authorization of the Hamilton Wetlands Project in the federal Water Resources Development Act of 1999 provides not only for the cost of site construction, but also for the additional costs to bring dredged material to the site from federal channels, which will help overcome the cost-differential between open-water disposal and reuse. The Montezuma project proposes to accept and bury underneath the site, material that is deemed unsuitable for aquatic disposal. In combination, these two projects alone should provide for implementation of the long-term reuse goals, at least over the next decade.

Chapter 3 identified the steps involved with obtaining authorization to take dredged material to beneficial reuse sites. Chapter 7 focuses on the steps or issues (planning, engineering, environmental

Figure 7.1

SOURCE: Final LTMS EIS/EIR, 1998

Existing and Potential Beneficial Reuse and Upland Disposal Sites



Beneficial Reuse and Disposal Options

- Wetland habitat restoration
- Rehandling facilities and end-uses (e.g., landfill cover)
- Levee rehabilitation
- In-Bay habitat creation

and regulatory) involved with the implementation of reuse projects.[1] Chapter 7 identifies potential reuse sites, constraints involved with implementation, and potential solutions. This chapter also reiterates information contained in the LTMS EIS/EIR that discussed in general terms potential impacts associated with the various reuse options; this information is provided to inform potential project sponsors of the types of issues to consider and address during project planning and implementation. Chapter 7 also includes measures to facilitate implementation of beneficial reuse projects.

7.2 LTMS IMPLEMENTATION MEASURES

The LTMS agencies will implement several measures to achieve the goals of the LTMS as they relate to the implementation of beneficial reuse and disposal projects. These measures are shown as bulleted, italicized text.

7.3 BENEFICIAL REUSE AND DISPOSAL OPTIONS

7.3.1 Wetland Restoration

Wetland restoration projects involve placing dredged material at diked baylands, which have subsided below elevations suitable for the establishment of tidal wetland habitat. Dredged material can be used to raise existing elevations to allow wetland vegetation to establish, thereby accelerating the restoration process at these sites. As indicated in the text box, these sites are identified using BCDC's diked historic baylands definition and thus include: "all areas that: (1) were historically part of San Francisco Bay, including the Bay's marshlands as of 1850; (2) are hydrologically no longer part of San Francisco

Diked Historic Baylands v. "True" Upland Sites

In earlier phases of the LTMS, sites located outside the Bay where dredged material could be used beneficially (e.g., for habitat creation, construction fill, or levee restoration) were referred to as Upland/Wetland/Reuse or "UWR." This earlier definition, however, made it difficult to differentiate between "true" uplands (e.g., landfills) and diked baylands (i.e., seasonal wetlands and other important habitats).

To better define, categorize, and manage existing habitat type and function, sites proposed for beneficial reuse that are located in diked historic baylands (e.g., wetland restoration projects) and not in "true" upland areas are defined as "all areas that: (1) were historically part of San Francisco Bay, including the Bay's marshlands as of 1850; (2) are hydrologically no longer part of San Francisco Bay or its marshlands, as a result of diking; (3) are not "salt ponds" or "managed wetlands"; (4) have not been filled; and (5) are not urbanized." (BCDC 1982).

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1 More specific engineering guidance and additional information regarding the issues and elements to consider in designing and implementing beneficial reuse projects can be obtained from the following LTMS documents: (1) LTMS. 1994a. *Engineering Conceptual Descriptions of Reuse Options.* Prepared by Gahagan & Bryant Associates, Inc. with ENTRIX, Inc.; (2) LTMS. 1995b *Reuse/Upland Site Analysis and Documentation, Feasibility Analyses of Four Sites (Volume II), Final.* Prepared by Gahagan & Bryant Associates, Inc. with ENTRIX, Inc. 102 pp. with appendices. (3) LTMS. 1995a. *Reuse/Upland Site Analysis and Documentation. Reuse/Upland Site Ranking, Analysis and Documentation (Volume I), Final Report.* Prepared by Gahagan & Bryant Associates, Inc. with ENTRIX, Inc. 410 pp. with appendices.

Bay or its marshlands, as a result of diking; (3) are not "salt ponds" or "managed wetlands"; (4) have not been filled; and (5) are not urbanized." Consequently, these areas will include those that are "currently or historically subject to tidal action." Dredged material can also be used to create elevated areas at restoration sites that will be above or inundated only during maximum high tides or above the reach of the tides; these tidal and seasonal wetlands would provide additional habitat diversity in areas where tidal wetland habitat was restored, reestablishing a more natural shoreline that can respond to sea level rise and other natural processes. At habitat restoration sites, dredged material can also be used to construct on-site berms, separate tidal and seasonal wetlands within a site, develop drainage control at areas not influenced by tidal action, and fill low areas where undesirable salt pans form (i.e., at duck clubs within managed wetland areas) (LTMS 1998).

To date, dredged material has been used to restore tidal wetlands at Muzzi Marsh (Marin County), Faber Tract (Santa Clara County), and Salt Pond No. 3 (Alameda County).[2] More recently, tidal wetlands were restored using dredged material at the Sonoma Baylands site (Sonoma County).[3] In the Delta region, dredged material has been used to restore wetlands at Donlin Island and Venice Cut (Sacramento County). Appendix M identifies potential and existing wetland restoration projects.

The Hamilton Wetlands project will restore approximately 2,600 acres of diked baylands (including the Bel Marin Keys parcel). A joint project of the California Coastal Conservancy, BCDC, and the USACE, the project will be constructed as a multi-user project with the principal goal of restoring a mix of wetlands habitat. A conceptual plan has been prepared by the state, a feasibility study has been completed by the USACE, and the environmental review is completed. Hamilton was authorized as a federal project in the 1999 Water Resources Development Act at a total cost of $55 million. In addition to site preparation costs, the authorization will pay for the differential between open water disposal and reuse at Hamilton for federal projects. This funding removes a major impediment to beneficial reuse. The project is presently in final design and use of dredged material is projected to begin in 2002.

The Montezuma Wetlands Project will restore 2,000 acres of wetlands using approximately 17 million cubic yards (mcy) of dredged material. Unlike the Hamilton site, Montezuma is proposed as a private site that will charge a tipping fee for disposal and will accept material that is not suitable for unconfined aquatic disposal.

The LTMS agencies implement the following measures to facilitate wetland reuse projects:

- *With the California Coastal Conservancy, BCDC and USACE will implement the Hamilton Wetlands Restoration project. Further, the LTMS agencies will continue to participate in the Hamilton Restoration Group.*

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2 For more detailed analysis of these sites, see LTMS 1994c, A Review of the Physical and Biological Performance of Tidal Marshes Constructed with Dredged Material in San Francisco Bay, California, Draft Report. Prepared by Gahagan & Bryant Associates, Inc. with Bechtel Corporation, ENTRIX, Inc., and Philip Williams & Associates. 194 pp. with appendices.

3 The Sonoma Baylands project used a new design concept where dredged material was placed below the ultimate marsh plain allowing for natural on-site sedimentation during restoration. This design aspect was developed to reduce the potential of over-filling the restoration site.

- *The LTMS agencies will continue to work to resolve issues and process applications for implementation of the Montezuma Wetlands Project.*

7.3.2 Rehandling Facilities and Potential End Uses

Prior to Reuse at Landfills

Project proponents should:

(1) Contact landfill operators regarding site-specific Waste Acceptance Criteria

(2) Determine whether on-site drying facilities are available or investigate off-site rehandling options

Rehandling facilities are typically located adjacent to the Bay where dredged material is transported, dried or processed (i.e., contaminant or salinity content diluted or removed), excavated, and, in most cases, eventually taken to an off-site location for use as landfill cover or construction material. Fine-grained materials (silts and clays)—the predominant material dredged from the Bay—and coarse-grained materials (cobbles, gravels, and sands), as well as material unsuitable for unconfined aquatic disposal (NUAD) could be taken to rehandling facilities. In the Bay Area, rehandling facilities have been constructed as either temporary (e.g., Port of Oakland's Berth 10 facility) or permanent (e.g., Port Sonoma marina), and are typically comprised of single or multiple cells where material is placed and dried. These existing facilities have been used to process relatively small volumes of material or material from specific dredging projects. Appendix M identifies existing and potential rehandling facilities (existing facilities are identified on Figure 7.1).

The clays and fine silts that comprise most dredged material from the Bay are often suitable for use as cover, capping, or lining material at landfills. The use of dredged material at landfills has high potential because landfills: (1) need a large amount of material for daily cover and final capping; (2) typically have limited natural resource values; (3) are designed to contain contaminants and manage runoff; and (4) do not usually have adequate on-site sources of cover or capping material. Appendix R provides more information about taking material to landfills. Most landfills cannot accept material until it has first been dried to acceptable moisture levels. Furthermore, most landfills do not have on-site drying facilities. Therefore, prior to delivery to and acceptance at a landfill, dredged material will need to be dried at an off-site rehandling facility. At this time, however, such facilities are limited in number and capacity in the Bay Area, and more are needed in order to facilitate reuse of dredged material at landfills.

7.3.3 Levee Rehabilitation

The reclaimed islands and other low-lying areas of the Sacramento and San Joaquin River Delta region are surrounded by a 1,100-mile levee system that protects infrastructure (e.g., public highways, utility lines, private and public land uses, recreational areas), environmentally sensitive habitat, and the Delta's freshwater supply (i.e., by preventing salinity intrusion). Initially, the Delta levees were built with peat material taken from adjacent channels and sloughs. More recently, the levees have been constructed with materials containing a higher percentage of mineral soils from adjacent channels. The high organic matter of these materials together with an overall disparity in levee construction standards throughout the Delta have resulted in levee decomposition, subsidence and

instability.[4] In 1988, the Delta Flood Protection Act was passed (Senate Bill 34) which directed the DWR to develop and implement flood protection projects at eight western Delta islands.[5] In 1994, the Federal Emergency Management Agency determined that 39 reclamation districts in the Primary Flood Control Zone of the Delta did not fully comply with the state's Flood Hazard Mitigation Plan, which outlines levee rehabilitation standards.

Material dredged from the Bay could be used to increase levee crests, toes, and landward slopes bringing existing levees up to modern design standards. The LTMS estimates indicate that approximately 26 mcy of dredged material could be used in the Delta over the next 50 years.[6] Use of material dredged from the Bay in the Delta has been complicated by the potential for introduction of saline material into a freshwater environment. In addition, project coordination can be difficult given that those generating and regulating material from the Bay and those regulating and planning Delta reuse projects are not necessarily the same parties and do not usually have overlapping jurisdictions. Appendix S provides additional information regarding Delta regulatory and planning agencies.

Although existing regulatory and environmental concerns limit the use of Bay dredged material in the Delta, levees at Sherman, Twitchell, Jersey, and Winter Islands have been repaired with material from the Bay. These projects involved transporting material to the islands by barge and off-loading it either by clamshell or hydraulic pump.[7] Typically, clamshell equipment involves positioning a barge 100 feet off the off-loading crane and in 200 feet of levee placement. Hydraulic off-loading usually involves placing the material into a temporary settling pond and stockpiling it until needed. Material placement could occur separately from or concurrent with off-loading. Dried material could also be transported to the levee repair site by truck or rail, if necessary. Appendix M identifies existing and potential levee restoration projects (existing projects are identified on Figure 7.1).

The LTMS agencies implement the following measure to facilitate Delta reuse projects:

- *To facilitate implementation of Delta levee projects using material from the Bay, to ensure protection of Delta water quality, and to prevent unacceptable or contaminant-related effects, the LTMS agencies will work with the Central Valley Regional Water Quality Control Board, the California Department of Water Resources, local*

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4 Delta levees are characterized as either federal project levees or non-project levees. The federal project levees were constructed in relation to either a navigation or flood control project and are maintained by the State of California to federal standards. Non-project levees are classified as either private or direct-agreement levees. Private levees were privately constructed and are owner maintained; neither the state nor the federal government maintain jurisdiction over these levees. Direct-agreement levees are either private levees or under the jurisdiction of a local authority, such as a reclamation district, that are maintained by and through an agreement with the federal government, typically the USACE.

5 Sherman, Twitchell, Bradford, Webb, Bethel, and Jersey Islands, and the Hotchkiss and Holland tracts.

6 Although the use of dredged material for levee maintenance and stabilization has been found to be highly feasible in the Delta region, such uses of dredged material are also possible in other portions of the Planning Area. Access constraints, however, appear to be the limiting factor for such uses outside the Delta region. Therefore it is assumed that much of the dredged material used for levee maintenance and stabilization in the lower reaches of the Estuary will come from rehandling facilities rather than directly from dredging projects.

7 Optimum channel depth for waterside access is a minimum of 15 feet MLLW.

governments, and local reclamation districts. Further, the USACE will pursue a Water Resource Development Act Section 204 study to reuse Bay dredged material in the Delta. The LTMS agencies will develop a strategy to improve coordination with the CALFED program, and, as a first step, the LTMS Management Committee will send a letter to the CALFED Policy/Management Committee co-chairs urging CALFED to examine the potential for reuse of Bay dredged material in the Delta.

7.3.4 In-Bay Habitat Creation

Dredged material can also be used to change the substrate or depth of sites within the Bay. Although this alternative was not considered as part of the LTMS technical studies, the Port of Oakland proposed and studied the potential to raise the elevation of a former dredged area in the Oakland Middle Harbor to an elevation suitable for the formation of eelgrass. Deeper areas of the Bay that have low light penetration do not support the high level of primary production of shallower areas. Eelgrass, in particular, only grows in shallow areas of the Bay having suitable environmental conditions. Carefully designed and constructed projects could provide habitat benefits of higher productivity or growth of eelgrass. However, similar to reuse in diked baylands these projects will impact existing habitat and site conditions. Because much of the Bay is already fairly shallow and because there are only limited areas potentially suitable for eelgrass projects in the Bay, such projects likely will be limited in number.

7.4 BENEFICIAL REUSE AND DISPOSAL PROJECT PLANNING AND IMPLEMENTATION ISSUES

The use of dredged material to restore wetlands, provide cover and construction material to landfills and other facilities, rehabilitate levees, and create sub-tidal habitat will result in important benefits to the region as well as help to accomplish the LTMS goals. It is possible, however, that such projects will have the potential to impact certain sites (such as conversion of existing wildlife habitat). Therefore, individual projects will require site specific analysis and design, and separate environmental and regulatory review pursuant to the California Environmental Quality Act (CEQA) and/or the National Environmental Policy Act (NEPA). Although each project will be unique, there are some general issues regarding potential projects that project proponents will likely need to consider during the planning and implementation phases, as discussed below.

7.4.1 Site Selection and Evaluation

A variety of beneficial reuse and disposal sites currently exist in the region. However, most are not equipped to accept material from multi-users and instead have generally been used for material from a single previously-designated source. Potential beneficial reuse sites that could be developed as regional facilities and thus be equipped to take material from a variety of sources have been identified through the LTMS and other efforts (e.g., the Dredged Material Reuse Project). Because of the costs and time involved, most dredgers seeking a beneficial reuse or disposal option will likely not design or implement a new site, but instead will use one of the existing or potential options (Appendix M).

In the event, however, a project proponent wishes to conduct a preliminary evaluation of potential sites, a site ranking system developed through the LTMS could be used by project proponents or sponsors.[8] Further, in developing site-specific assessments of potential beneficial reuse projects using dredged material, project proponents should consider and analyze certain elements common to projects identified in the individual tables contained in Appendix N.[9]

To facilitate selection and implementation of beneficial reuse or disposal options, the LTMS agencies implement the following measures:[10]

- *The LTMS agencies will work closely with the dredging and environmental communities to implement and fund beneficial reuse projects.*

- *To facilitate preliminary investigation and selection of beneficial reuse and upland disposal sites, the LTMS agencies will work with project proponents during the project planning stage to assess potential sites.*

- *The LTMS agencies will provide status reports regarding potential and existing beneficial reuse and disposal options through LTMS Program Management quarterly public workshops.*

- *The LTMS agencies will create one new staff position with responsibility for facilitating selection and implementation of beneficial reuse and upland disposal options, including serving as the point of contact for such projects, attending relevant meetings, and pursuing funding and legislative opportunities for project implementation*.

7.4.2 Wetland Restoration Physical Design and Biological Goals

The ultimate goal of wetland restoration is to support Bay plant and animal species and migratory animals, birds and fish in a stable, functioning ecosystem. During the design phase of reuse projects, clearly defined biological goals should first be determined by the project proponent for use in developing physical design features (e.g., salinity regimes, topographic gradients, slough system

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8 For more information about the LTMS site ranking system, project proponents should refer to: (1) LTMS. 1995b Reuse/Upland Site Analysis and Documentation, Feasibility Analyses of Four Sites (Volume II), Final. Prepared by Gahagan & Bryant Associates, Inc. with ENTRIX, Inc. 102 pp. with appendices. (2) LTMS. 1995a. Reuse/Upland Site Analysis and Documentation. Reuse/Upland Site Ranking, Analysis and Documentation (Volume I), Final Report. Prepared by Gahagan & Bryant Associates, Inc. with ENTRIX, Inc. 410 pp. with appendices. It should be noted that the LTMS site ranking system database cannot be used for selecting potential in-bay habitat creation sites since this reuse option was not considered during the earlier stages of the LTMS when the database was created.

9 It should be noted that these same issues would be considered and analyzed by the lead agency(cies) during the environmental review (per CEQA and/or NEPA) and permitting stages.

10 In addition to measures proposed by the LTMS agencies, to date the LTMS stakeholders have committed to take the following steps in order to facilitate selection and implementation of Delta reuse sites: (1) Bay Planning Coalition will pursue legislator (Pat Johnston) support for Delta reuse; (2) DWR will coordinate and hold a summit meeting with the various stakeholders to develop a partnership on Delta reuse funding; and (3) Save San Francisco Bay Association will prepare a briefing for CALFED regarding Delta reuse of Bay material.

development) needed to achieve these goals. The goals will improve the success of projects in providing target habitat values and help identify when and how changes in project design or other remediation measures are needed to improve the restoration project. Additionally, the success of restoration projects depends in part on a better understanding of how to develop such projects. This will come in part from improved technical data regarding certain aspects of restoration. Currently, the U.S. Geological Survey (USGS) is conducting a study, *Meteorological and Flow Variability at Wetland Sites in the San Francisco Bay Ecosystem*, which will provide data regarding suspended sediment transport associated with wetland restoration efforts in the Estuary.[11]

To facilitate successful wetland restoration at sites using dredged material, the LTMS agencies implement the following measures:

- *The LTMS permitting agencies will work with project proponents during the design phase of habitat restoration projects using dredged material to ensure the development of biological goals and physical design features (including fill elevations and material placement guidelines, and appropriate physical and chemical characteristics of dredged material) to achieve these goals. Additionally, the LTMS permitting agencies will require, as legally appropriate, that proposed restoration projects include biological goals, physical design features, and monitoring and remediation measures.*

- *The LTMS agencies will foster, sponsor, or undertake, as resources allow, technical analyses of issues concerning habitat restoration using dredged material, and make scientific data available to improve the design and management of restoration sites.*

7.4.3 Habitat Conversion or Loss and Regional Habitat Goals

Although restoration projects would be geared primarily toward habitat enhancement, implementation of certain beneficial reuse and disposal projects could result in the conversion or loss of existing habitat, and the loss of important habitat functions for local and migratory shorebirds and waterfowl (including supplemental foraging habitat during high tides for small shorebirds, nesting habitat for resident species, and winter storm refugia). In the case of dredged material reuse at landfills and at existing rehandling facilities, habitat conversion or loss is a minor issue in light of the already disturbed nature of these sites and resultant limited habitat value.[12] Habitat conversion or loss takes on greater significance in the case where diked baylands are used for habitat restoration, the

11 The study focuses on developing a quantitative model of suspended sediment concentrations brought about by wind, wave, and current forces present at various San Francisco Bay wetlands. One of the study locations is the outboard marsh along the eastern edge of the former Hamilton Army Airfield. Instrument packages include meteorological measurements consisting of wind shear, wind direction, barometric pressure, and air temperature; and sediment flux measurements consisting of current and suspended sediment, as well as water temperature, salinity, and current direction and strength. The other study areas include two sites associated with the San Francisco Bay National Wildlife Refuge in South San Francisco Bay and outboard of the Sonoma Baylands Wetland Restoration Project (LTMS 1998).

12 However, it should be noted that several existing rehandling facilities (e.g., the City of Petaluma's and the City of San Leandro's ponds) serve an important habitat function during the periods in which the ponds are not actively used for rehandling and are managed solely for wildlife use.

construction or expansion of a new rehandling facility, or levee construction.[13] Projects proposed in the Bay are of particular concern given the high value of most existing Bay habitats and the historic loss of Bay habitat.

Beneficial reuse sites could directly impact protected and listed species existing on-site (Appendix F lists potential existing protected and listed species). In addition, beneficial reuse and disposal projects could impact adjacent off-site habitat (e.g., existing tidal marsh that would be scoured upon breaching of outboard perimeter levees), and produce localized and short-term impacts resulting in interference with and stress in wildlife behavior or habitat abandonment.

To avoid potential loss of important habitat types such as seasonal wetlands, the LTMS agencies implement the following measures:

- *To ensure an ideal mix of wetland patterns and types and to minimize impacts of local habitat conversion, the LTMS agencies will work to maximize the consistency of projects with applicable regional habitat goals (e.g., USFWS's Endangered Species Recovery Plans, the San Francisco Bay Area Wetlands Ecosystem Goals Project, and the San Francisco Bay Joint Venture). As stated in the LTMS EIS/EIR: "the LTMS agencies will encourage and authorize as legally appropriate, restoration efforts using dredged material that are designed to be consistent, to the maximum extent practicable, with specific habitat goals established by regional planning efforts—with the understanding that such projects are dynamic, changing processes—for managing the region's natural resources." To ensure restoration of the full range of Bay habitats, the LTMS agencies will require dredged material restoration proposals to include, as appropriate, an assessment of project consistency with regional habitat goal projects.*

- *As stated in the LTMS EIS/EIR, for restoration projects using dredged material in areas not covered by regional habitat goals, "the LTMS agencies will also encourage and authorize as legally appropriate, such projects which would clearly result in an overall net gain in habitat quality and would minimize loss of existing habitat functions. Whenever feasible, such projects will provide, as part of the project design, for a no net loss in the habitat functions existing on the project site or, where necessary, provide compensatory mitigation for lost habitat functions in accordance with state and federal mitigation requirements."*

- *The LTMS agencies recognize that temporal losses in existing habitat may occur at sites and will work with project proponents to minimize such losses. During the planning stage, project proponents should clearly define, evaluate, and, if feasible, incorporate existing habitat types at a potential reuse site. Proposed projects could be sited in areas that minimize loss of existing wetland habitat, where possible. Further,*

13 Other possible impacts on wildlife—as well as human—receptors associated with beneficial reuse and disposal operations include noise associated with tugboats, scows, pump-out barges, trucks and trains used to transport dredged material, transfer station pumps, and construction and operation equipment, traffic that would be associated with transporting material to and from (if taken to an end-use location) sites, and air quality.

restoration projects could be designed to include restoration of seasonal and other important habitat types.

- *Where possible, proposed rehandling facilities should be located in areas that minimize loss of existing habitat or alternatively on sites located outside of the diked historic baylands with limited habitat value.*

- *During the planning stage, rehandling project proponents should, if feasible, incorporate habitat values at proposed facilities by including individual ponds that could be managed solely for habitat use or by managing the facility for habitat use during periods when dredged material is not processed. Where necessary, project proponents should provide compensatory mitigation for lost habitat functions in accordance with state and federal mitigation requirements.*

- *Project proponents should develop long-term management plans for beneficial reuse and upland disposal sites, and appropriate mechanisms to ensure permanent protection of restored habitat values. In projects where significant existing habitat is proposed to be impacted, project proponents could be required to develop project-specific mitigation goals, conduct monitoring, and, if necessary, remediate. The LTMS agencies will fully and appropriately apply existing laws, regulations, and policies to ensure that adverse impacts associated with project implementation will be minimized and, as necessary, mitigated.*

7.4.4 Contaminant and Salinity Exposure and Mobility

The beneficial reuse of dredged material could potentially result in the release of contaminants or salt to on-site surface waters, groundwater, and off-site receiving waters (from any surface or drainage water). Additionally, dredged material could undergo a change in pH due to oxidation of material following placement, and acidification of material may solubilize metals that would otherwise be stable and bound to the sediment in its previous anoxic aquatic environment.[14] Further, these constituents (including dust) could be released during initial placement and from earth-moving activities (during site preparation, construction, and maintenance) as well as along transportation routes to or from the reuse site.[15]

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14 The way that sediment oxidation affects heavy metal release is not completely understood. Recent research conducted by the USACE at the Waterways Experiment Station on John F. Baldwin Ship Channel sediments indicated that concentrations of heavy metals contained in material subjected to experimentally controlled upland placement and simulated rainfall had statistically reduced metals in runoff samples after drying and oxidation compared to material maintained under anoxic conditions. Additionally, most of the metals within the material that were allowed to oxidize remained bound to particulate matter and were therefore considered insoluble. Such studies do not fully address this potential impact and further research is needed (Lee, et al. 1993).

15 Additionally, the placement of dredged material in a fresh water setting in the Delta also poses concerns regarding bromide ions. Bromide is a constituent of total dissolved solids (TDS) and is found in higher concentrations in sea water than fresh water. Bromide is a concern in regard to municipal water supplies. When water containing bromide is chlorinated for use as drinking water, trihalomethane (THM) compounds are created. Regulated under federal drinking water standards, the increased THM levels may result in water that exceeds state or federal drinking water standards for THM content.

In accordance with state and federal regulatory requirements, landfills have been constructed with drain/leachate systems to collect contaminants. Rehandling facilities would also be designed to process dredged material while ensuring the isolation of material and the collection and containment of contaminants (including salinity). Further, any water discharged from these sites would be required to meet state and federal standards set by law. As such, contaminant mobility at these sites would likely be a nominal issue.

The Jersey Island levee restoration project (1995-1996) did not reveal any significant water quality impacts which ensured in part that water discharged from the site met the established CVRWQCB water quality standards. In addition, the CVRWQCB issued Waste Discharge Requirements for the site, which included a site monitoring plan designed to address questions regarding potential salinity and other contaminant release and migration associated with the use of dredged material. Nevertheless, the potential salinity impacts from Bay dredged material on the freshwater Delta environment will continue to be an issue of concern.

Another potential concern for the beneficial reuse of dredged material in creating wetlands is that of mercury methylation. Wetland environments have the potential to enhance the methylation of inorganic mercury associated with sediments. Mercury methylation converts inorganic forms of mercury, which are relatively unavailable to organisms, to methyl-mercury, a form which more readily bioaccumulates in organisms and can lead to chronic toxicity and mortality in high trophic-level organisms. This issue is being studied on a regional basis (e.g., by CALFED) and should be addressed during the planning process for the development of major new wetland projects.

All sediments will be required to be adequately characterized for the proposed placement or disposal site, using appropriate physical, chemical, and biological testing methods. Further, sediment quality evaluations will include consideration of potential effects related to the specific pathways of concern identified for the proposed placement site. Lastly, authorizations from the LTMS agencies will include appropriate design or operational features necessary to control all contaminant pathways of concern at a given site, and be adequate to manage the worst-case material considered for placement at a site. Moreover, all material and any discharged water will meet the waste discharge and monitoring requirements of the appropriate SFBRWQCB prior to any drainage water release from the site.

To avoid or reduce the release of these constituents from sites and the potential impacts on habitats and sensitive receptors, the LTMS agencies implement the following measure:

- *The LTMS agencies will work to address potential salinity impacts in the Delta associated with using Bay dredged material for levee restoration. The LTMS agencies will pursue funding and research opportunities to help understand how Bay material affects the freshwater environment. Data collected and other "lessons learned" from initial projects will be analyzed by the LTMS agencies, in coordination with appropriate Delta entities, to determine the feasibility of other projects and to improve project design (including salinity control measures) and management.*