Chapter 3.
Project Alternatives under Consideration

Introduction

Coastal Conservancy staff, BCDC staff, and the Corps are proposing to restore wetlands at HAAF and the adjacent SLC parcel (Figure 3-1). A 20-acre site owned by the U.S. Navy, which is frequently referred to as the Navy ballfield, is located in the southwest corner of the HAAF parcel. The following discussion and impact analysis includes the Navy ballfield as part of the HAAF parcel.

The project objectives described in Chapter 2 could be attained by restoring wetlands either through the process of natural sedimentation or by actively placing dredged materials on the site. Four wetland restoration alternatives are evaluated in this EIR/EIS. These alternatives include restoration of wetlands in the following areas by the following means:

- HAAF parcel by natural sedimentation (Alternative 2),
- HAAF parcel using dredged material (Alternative 3),
- HAAF and SLC parcels by natural sedimentation (Alternative 4), and
- HAAF and SLC parcels using dredged material (Alternative 5).

Alternative 1: No Action, also described in this EIR/EIS, serves as the baseline condition for evaluating environmental impacts of the other alternatives.

The four project alternatives have been evaluated at an equal level of detail. Coastal Conservancy staff and the Corps have identified Alternative 5 as the preferred alternative because it best meets the project goal and objectives. Under Alternative 5, the use of dredged material would reduce the amount of time necessary for the restored wetlands to become fully functional, the use of dredged material for restoration would help reduce the amount of dredged material that could be disposed of in the bay or the ocean, and maintenance requirements would be lower than under alternatives that do not rely on dredged material.

Project Background

The Hamilton wetland restoration project could include the HAAF and SLC parcels. This section provides information on the current status of each parcel and how these parcels would be integrated into the wetland restoration project.

Hamilton Army Airfield Parcel

Defense Base Closure and Realignment Act of 1988

HAAF is currently owned by the Department of Defense (DoD) and most recently served as a subinstallation to the Presidio of San Francisco (Figure 3-2). BRAC directed DoD to close and dispose of HAAF. Accordingly, the Army evaluated the environmental impacts of disposal and reuse of HAAF in an EIS completed in 1996. A record of decision on disposal and reuse was prepared by the Army in 1997.

Three alternatives were evaluated in the Army's disposal and reuse EIS: no action, disposal without encumbrances, and disposal with encumbrances. The Army identified disposal with encumbrances as its preferred alternative. The record of decision indicates that, as part of the disposal process at HAAF, the Army presently requires new owners to maintain these encumbrances, including maintenance of the Landfill 26 wetland mitigation site, continuation of access easements provided to the Novato Sanitary District (NSD) and the SLC, and provision of a perpetual easement for a flood control levee granted to the New Hamilton Partnership. In addition to these encumbrances, the Army also requires new owners to maintain flood control infrastructure until the new landowner's reuse plan has met all consultation, regulatory, and permitting requirements and has identified a way to control human access to the outboard tidal marsh. However, some of these encumbrances may be modified or eliminated as a result of changed circumstances or actions taken by the Army to meet the conditions of transfer.

Although reuse was not part of the Army's action of disposal, the EIS also disclosed impacts that could occur as a result of the reuse of HAAF. Reuse scenarios evaluated in the EIS included mixed-use development, institutional development, open space with constructed wetland restoration, and open water with natural wetland formation. The reuse scenarios that the Army considered in the EIS were based on the local reuse planning efforts of the City through the Hamilton Reuse Commission (HRC) appointed by the Novato City Council. The HRC's preferred uses of HAAF were wetlands, wetlands with other uses, and low-density mixed-use development. The record of decision for the disposal and reuse EIS did not indicate a preferred reuse scenario and indicated that evaluation and approval of an official reuse plan would be the responsibility of local planning authorities. The Army is committed to clean up HAAF for the purpose of wetland restoration and will continue to pursue the necessary agreements to ensure transfer of HAAF to the Coastal Conservancy.

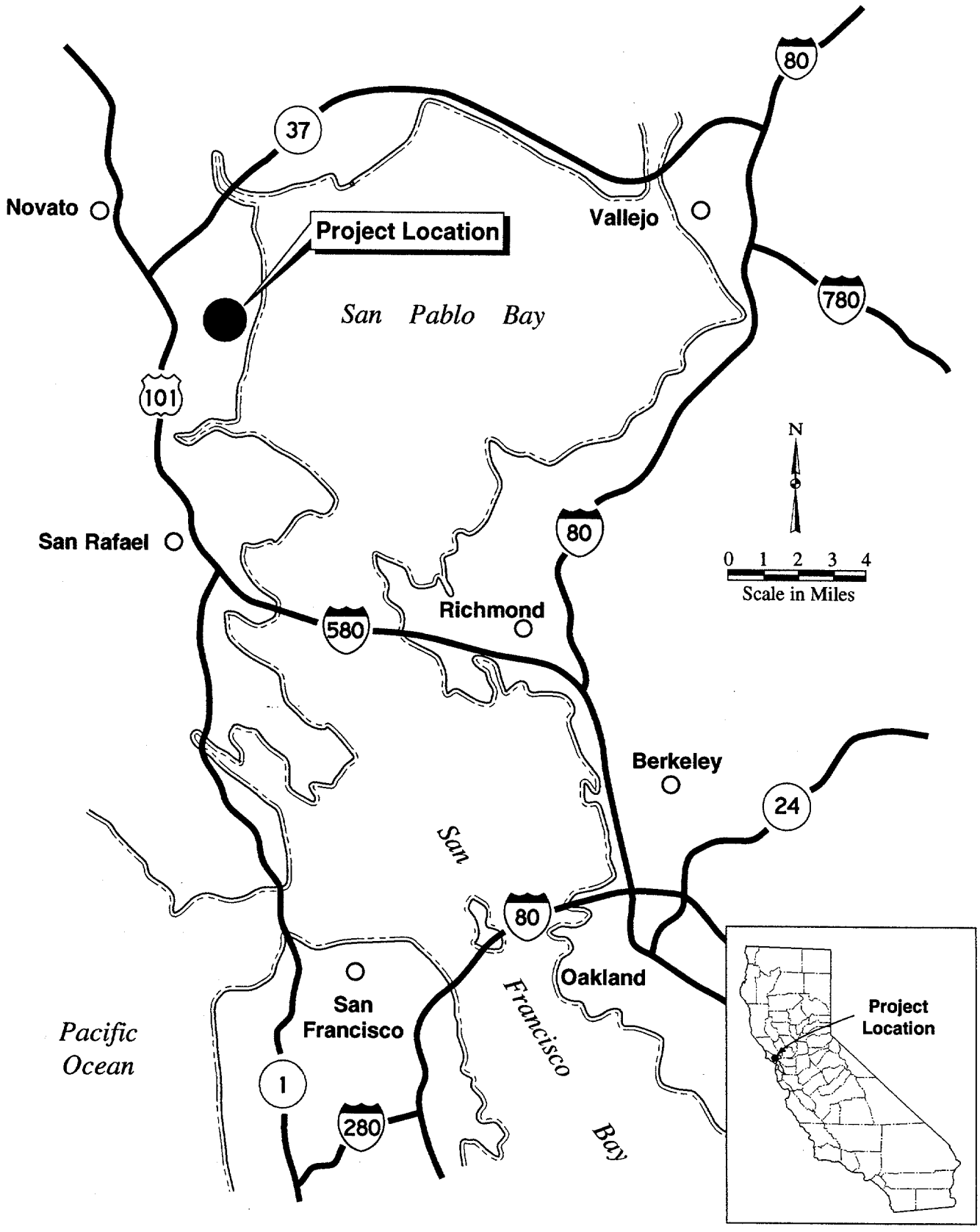

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Figure 3-1
Regional Location of the
Hamilton Wetland Restoration Project

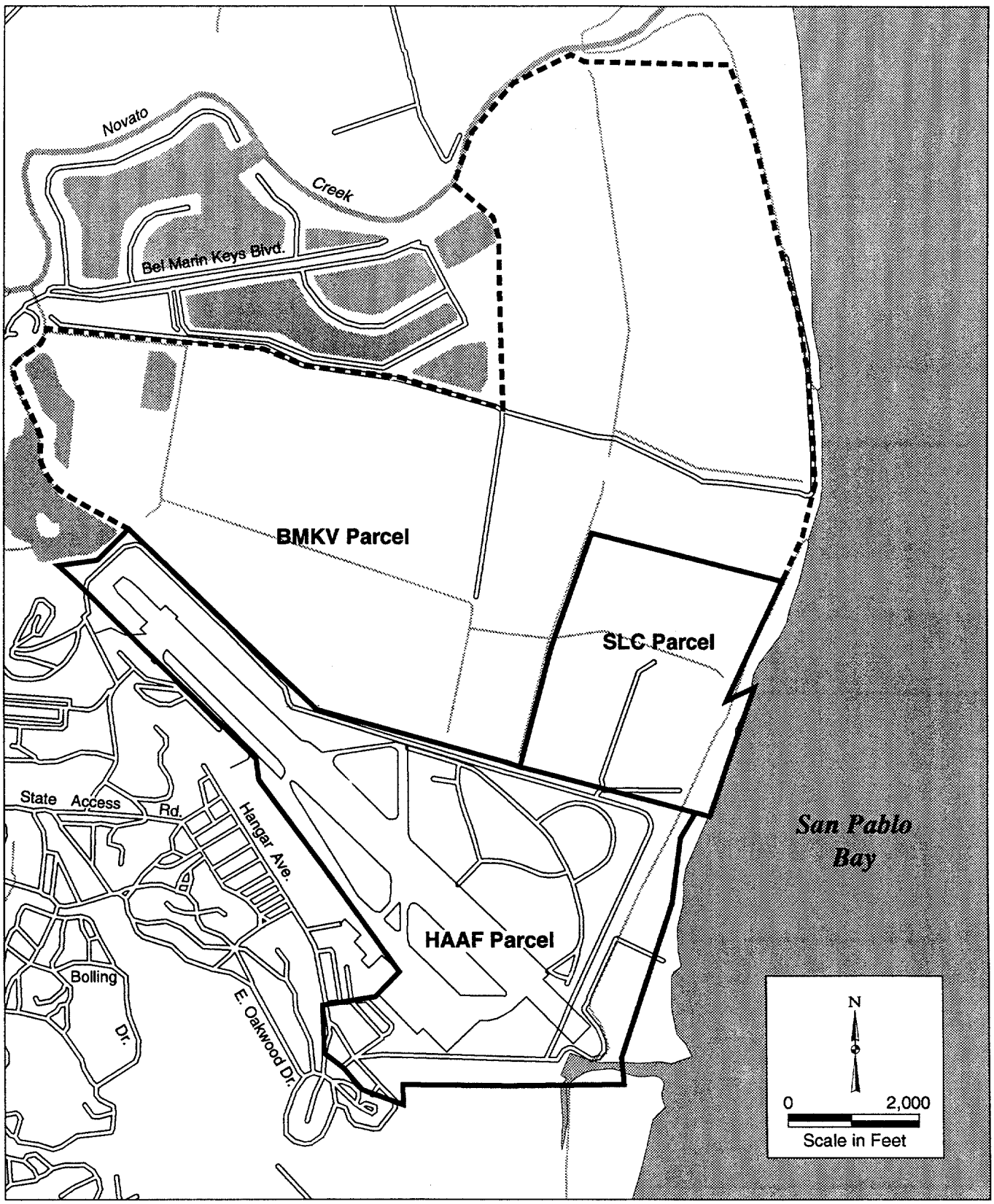

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Figure 3-2
Hamilton Wetland Restoration Project Site

Local Reuse Plan

After the Army completed the EIS on the disposal and reuse of HAAF, the City adopted a reuse plan for the former Hamilton Air Force Base. The reuse plan included HAAF and indicated a preferred reuse of the area as open space and wetlands. The reuse plan established goals and policies for planning areas throughout the former Hamilton Air Force Base, including the HAAF parcel. The plan identified development of wetlands as the goal for reuse of the HAAF parcel.

The reuse plan eliminated from consideration other uses of the HAAF parcel, such as residential or commercial development and aviation. Because these uses have been addressed previously, the environmental impact analysis contained in this EIR/EIS is focused on evaluating restoration of wetlands in the HAAF and SLC parcels (Hamilton Local Reuse Authority 1996).

State Lands Commission Parcel

The area known as Antenna Field, or the SLC parcel, was transferred to the SLC as part of the closure of Hamilton Air Force Base. Communications facilities were previously constructed on the parcel by the Air Force (Figure 3-2). The Air Force also granted an easement over the parcel to the NSD for access to wastewater dechlorination facilities. No reuse plan has been developed for the SLC parcel.

The SLC parcel will not be transferred to the Coastal Conservancy as part of the Hamilton wetland restoration project. It will be included in the restoration project only if it is remediated to a level suitable for wetland restoration.

Hamilton Wetlands Conceptual Restoration Plan

The description of alternatives evaluated in this EIR/EIS is based on the concepts developed in the draft Hamilton Wetlands Conceptual Restoration Plan (Woodward-Clyde 1998) prepared for the Coastal Conservancy and BCDC. The plan provides detailed information on restoration of wetlands on the HAAF and SLC parcels through natural sedimentation and using dredged materials. The plan served as the primary information source for the following description of alternatives and is hereby incorporated by reference into this EIR/EIS. A copy of the executive summary of the plan is included as Appendix A.

Conditions for Transfer

The EIR/EIS assumes that certain management issues associated with the HAAF parcel would be resolved before the Army transfers the parcel to the Coastal Conservancy. These issues include providing an access route to the HAAF parcel, addressing flooding and drainage issues, and remediating contaminated areas. Existing buildings would be removed by the Army if necessary to remediate contaminated areas.

Access

Access to the wetland restoration site would be provided by an easement over existing and new roads through the General Services Administration (GSA) Sale Parcel at HAAF. The road would connect Nave Drive and Perimeter Road and would serve as the primary access route to the restoration site during the construction phase and for monitoring and caretaking purposes once the construction phase is completed. The road would also serve as access to the NSD outfall pipeline and the SLC parcel. The proposed alignment for the access route is shown in Figure 3-3.

Flood Control and Drainage

The flood control and drainage facilities in the HAAF parcel affect the hydrologic characteristics of surrounding properties, including the New Hamilton Partnership development, the St. Vincent's and Las Gallinas Sanitary District properties, the Bel Marin Keys Unit V (BMKV) development parcel, Landfill 26, Ignacio Reservoir, and the SLC parcel (Figure 3-4). The Coastal Conservancy has indicated that before its acceptance of the HAAF parcel, existing flood control and drainage issues between the Army and surrounding landowners would be resolved. ~~Methods to resolve these issues could include the following:~~

- ~~modification of storm drainage flows from the St. Vincent's and Las Gallinas Sanitary District properties,~~
- ~~identification and implementation of measures to address ponding of water at Landfill 26, and~~
- ~~discontinuance of surface flows from the BMKV parcel to the HAAF parcel.~~

The Army's goal is to resolve flooding and drainage issues with surrounding properties so that flooding and drainage characteristics of parcels surrounding the HAAF parcel are not adversely affected as a result of base closure. To ensure that closure of the HAAF parcel would not affect these flooding and drainage characteristics, the Army has committed to making modifications to the drainage facilities of the surrounding parcels: the St. Vincent's, Las Gallinas Sanitary District, and U.S. Navy properties; Landfill 26; the SLC parcel; and the BMKV development parcel.

The Army has agreed to address these drainage issues as part of the closure of HAAF. It has indicated that it will undertake any additional environmental impact analysis that may be required to implement these solutions before transfer of the HAAF parcel. A copy of a recent letter to the Coastal Conservancy from the Army describing these commitments is included in Appendix B of this EIR/EIS.

St. Vincent's, Las Gallinas Sanitary District, and U.S. Navy Properties

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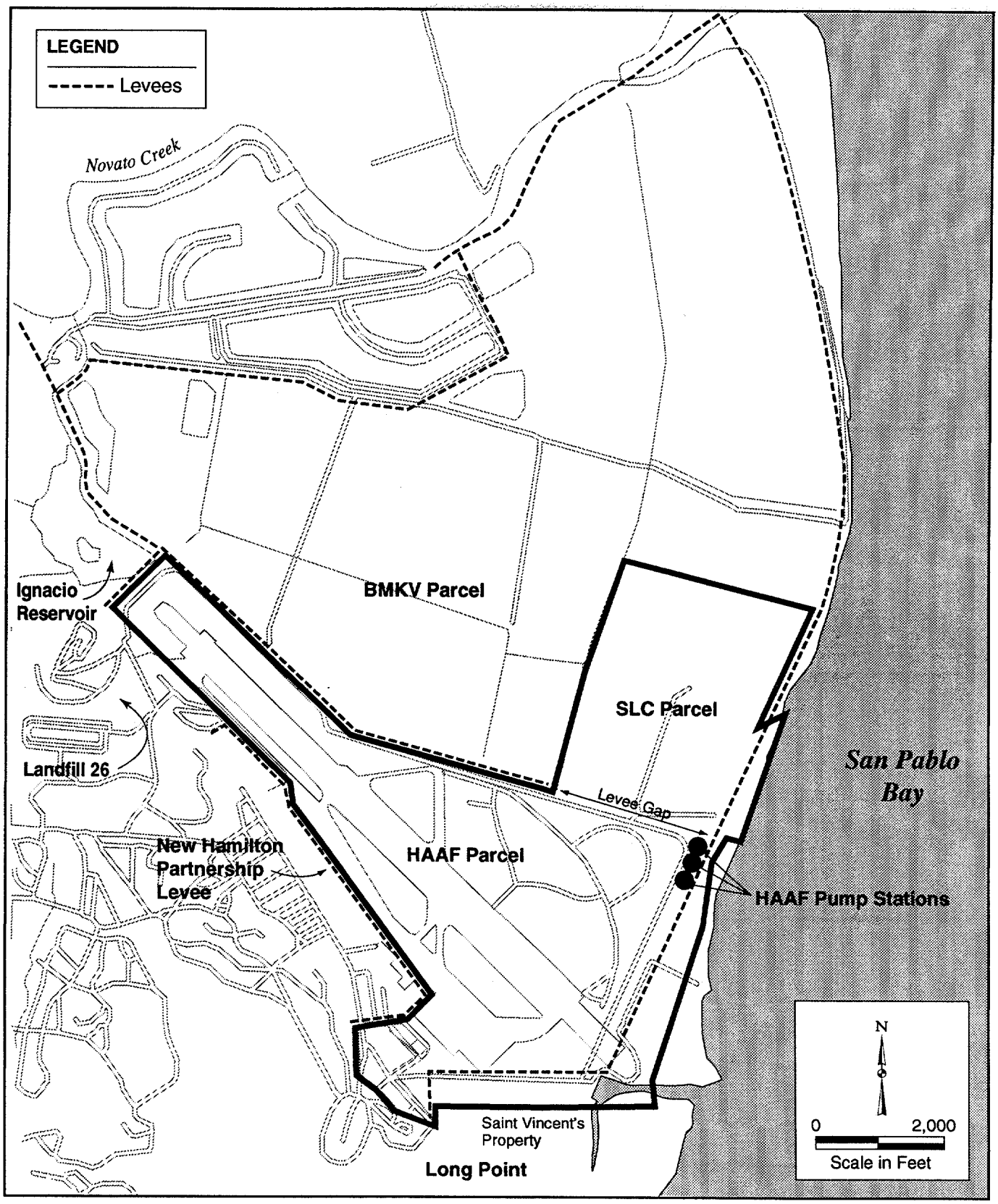
Figure 3-3
Proposed Access Route to the Hamilton Wetland Restoration Project Site



SOURCE:
U.S. Army Corps of Engineers 1996a.

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Figure 3-4
Existing Levees and Adjacent Land Uses

The Army proposes to permanently close the slide gate on the canal that currently drains these properties onto the HAAF parcel. The existing St. Vincent's pump station is currently being repaired and upgraded so that it will be able to accommodate any additional drainage onto the St. Vincent's parcel resulting from closing the slide gate. The Army will pay for a portion of the cost to repair and upgrade the St. Vincent's pump station. This drainage would be redirected to the upgraded pump station being constructed by St. Vincent's and managed by the Las Gallinas Sanitary District.

Landfill 26

The Army proposes to construct a pump station to convey water from Landfill 26 and the surrounding area to the HAAF parcel. The discharge will be placed at an elevation that allows for gravity drainage through the proposed wetland restoration project. The Army and the City of Novato are negotiating an agreement stating that the City will maintain and operate the pump station as a condition of using Landfill 26 for recreation purposes. The resolution of this issue is pending formal response from the City to accept and manage the pump station.

State Lands Commission Parcel

As part of the original transfer of the "antenna field" from the Army to the SLC, the Army reserved the right to block the drainage of surface water from the SLC parcel onto the HAAF parcel. This right will be transferred to the Coastal Conservancy as part of the transfer of the HAAF parcel.

Bel Marin Keys Unit V Parcel

Three 30-inch-diameter corrugated steel pipes run through the perimeter levee that separates the HAAF parcel from the BMKV parcel. The pipes are plugged and do not provide drainage between the HAAF and BMKV parcels. The Army is working with the owner of the BMKV parcel to resolve this issue and is determining the function of the drainage. It is the Army's intent to obtain approval from the landowner to permanently block the culverts without making modification to the BMKV parcel drainage system. If this agreement is not reached, the Army will undertake the additional steps necessary to secure approval of the adjacent landowner to permanently block the drainpipes.

The EIR/EIS discloses hydrologic impacts that are directly attributable to restoration of wetlands in the HAAF and SLC parcels.

Flood control for the New Hamilton Partnership development has been resolved through construction of a flood control levee between the development and the HAAF parcel. The new levee and pumping facilities provide adequate flood protection and drainage for the new development. Drainage from the development would continue to be discharged to the restored wetlands.

Structures

Structures remaining in the HAAF parcel include three buildings; three pump stations and the associated drainage ditches; miscellaneous structures, such as runway landing lights and small outbuildings; and the main runway, taxiways, and aircraft parking areas. The EIR/EIS assumes that the Army would leave in place the main runway, taxiways, and aircraft parking areas and those facilities needed by the Coastal Conservancy until the bayward levee is breached. The Army would remove buildings from the HAAF parcel if necessary to remediate contaminated areas.

Process by Which the Site Is Being Remediated

Several federal and state agencies have regulations that govern the use, generation, transport, and disposal of hazardous substances. The principal federal regulatory agency is EPA. The primary state agency in California with similar authority and responsibility is the California Environmental Protection Agency (Cal-EPA) Department of Toxic Substances (DTSC), which may delegate enforcement authority to other local agencies. Federal regulations applicable to hazardous substances are contained primarily in Titles 29, 40, and 49 of the Code of Federal Regulations (CFR). State regulations have been consolidated into California Code of Regulations (CCR) Title 26.

This subsection describes the governing agencies responsible for oversight and cleanup of hazardous substances at the HAAF and SLC sites.

HAAF Parcel

CERCLA. The identification, decontamination, and disposal of hazardous waste at HAAF is regulated by the Resource Conservation and Recovery Act (RCRA); Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA); CCR Titles 22 and 23; and all applicable or relevant appropriate requirements (ARARs). The Army is responsible for the cleanup process and performs the cleanup with funding provided through BRAC (Public Law 100-526). The DTSC is the lead agency for regulatory enforcement and oversight of those cleanup activities; however, the Army also must submit findings regarding the effectiveness of the cleanup to EPA and the San Francisco Bay RWQCB.

Any transfer of property must be accompanied by a Finding of Suitability for Transfer (FOST) issued by the Army. A FOST is issued when a property has been determined to be environmentally suitable for transfer. CERCLA Section 120(h)(3) identifies the requirements for environmental suitability.

Regardless of the assessment and cleanup methods used by the Army, the ultimate condition of contaminated areas of HAAF must comply with regulatory cleanup levels established on the basis of the reuse plan for the property. Under certain circumstances, a FOST can be issued for a property with ongoing remediation of previous contamination when CERCLA Section 120(h)(3) requirements have been met, the proposed land use (e.g., wetlands) is compatible with the environmental condition of the

property, no additional public or environmental health risk exists, and issuing such a finding does not interfere with the ongoing action, which is the proposed wetland restoration project.

The BRAC parcel at HAAF is not on the National Priorities List of contaminated sites requiring cleanup. A decision was made to pursue a programmatic approach for cleanup based on EPA's Guidance on Conducting Time-Critical Removal Actions under CERCLA (U.S. Army Corps of Engineers 1998b).

The BRAC parcel will be cleaned up under a sequence of regulatory phases. The Army identified the nature and extent of contamination during a series of assessments and investigations culminating in the Comprehensive Remedial Investigation Report (U.S. Army Corps of Engineers 1998c). Based on those investigations, site-specific removal actions during 1998 and 1999 will be used to clean up contamination to preliminary screening levels recommended by oversight regulatory agencies. A combination of confirmatory sampling, toxicity testing, and ecological and human health risk assessments will provide information used to determine final cleanup goals (remedial action objectives) in a focused feasibility study during 1999. It is intended that all remedial action required to meet those goals will be completed during the removal and confirmatory stages of fieldwork, leading to an environmental Record of Decision that does not require further work; however, if necessary, further remediation will be taken to meet final cleanup goals.

As part of the BRAC process, the Army is planning or conducting activities at sites to address contaminated soils at these sites. Sites affected by petroleum hydrocarbons include underground storage tanks at buildings 15, 20, 35, and 41; the east levee tank pad; the former sewage treatment plant sludge-drying beds; the perimeter stormwater drainage ditch; and the former aircraft revetment that was used for firefighter training activities. Sites with electrical transformers include the east levee boat dock and buildings 82, 92, and 94. These sites are shown in Figure 1, Appendix B.

Soil removal and treatment guidelines for the sites at the HAAF parcel were recommended by regulatory agencies. The soil removal and treatment guidelines are consistent with the proposed restoration of wetlands at HAAF. For all nonpetroleum chemicals of interest, guidance levels are ER-Ms derived from Long 1991 and Long et al. 1995. Guidelines for petroleum chemicals of interest, including TPH-purgeable, TPH-extractable, and BTEX, are based on RWQCB standards (Regional Water Quality Control Board 1995).

Other Concerns. Although petroleum hydrocarbons are not covered by CERCLA, cleanup of these substances is being addressed through the state oversight process. Concerns have been raised about asphalt proposed to be left in place because it contains polyaromatic hydrocarbons (PAHs).

Asphalt contains high-molecular-weight PAHs, which are the least toxic fraction of this class of chemicals. Further, these PAHs are tightly bound in the matrix of the asphalt. For these reasons, weathered asphalt does not pose a significant toxicity risk from PAHs and can be used widely in the environment with little concern. The asphalt in the wetlands project will be buried under sediments and therefore will not be exposed to significant tidal action, which potentially could grind up the asphalt and increase bioavailability. Those areas where asphalt would interfere with tidal channels forming on the site will be removed before dredged material is placed.

Because of the depth of sediments to be placed over the tidal portions of the site, ingestion or bioturbation by benthic infauna also is not expected to be a problem. More than 6 feet of dredged

material will be placed, on average, over the existing substrate and asphalt in the tidal areas. Sedimentation will then increase the depth of cover. Therefore, even if the asphalt were broken up substantially because of the weight of emplaced dredged material and presents more surface area, it will not be exposed to benthic organisms. The only remaining contaminant pathway is through groundwater. High-molecular-weight PAHs have very low solubility, particularly in the low-oxygen groundwater environment in the marsh. Therefore, there is little risk that these tightly bound PAHs in the asphalt would contaminate groundwater, even if the asphalt cracks and presents more surface area because of the weight of emplaced dredged material.

The buildings planned for removal may contain lead-based paint or asbestos or both. The Army has agreed to remove any asbestos found in the buildings. The Corps and Coastal Conservancy plan to remove any lead-based paint in conjunction with the removal of buildings.

SLC Parcel

The SLC parcel was owned by the Air Force and was operated as part of Hamilton Air Force Base until 1974. While the base was in active use by the Air Force, the parcel was used for a variety of purposes, including a rifle range, a pistol range, skeet shooting, firefighting training, and as a communication facility with a number of large antennae. Following the decommissioning of Hamilton Air Force Base, the State of California acquired the parcel and leased a portion of the rifle range to the City of Novato Police Department for small-arms training.

Because ownership of the SLC parcel was transferred from the U.S. Department of Defense (DoD) in 1974, environmental cleanup falls under the Formerly Used Defense Site (FUDS) program. The FUDS program, an element of the Defense Environmental Restoration Program (DERP) (10 USC 2701 et seq.), requires remediation of contaminated sites consistent with CERCLA. The objective of the FUDS program is to reduce, as swiftly and cost-effectively as possible, the risk to human health, safety, and the environment resulting from past DoD activities. Apportionment of liability for contamination associated with the subsequent property owner, or third parties, is addressed through the Potentially Responsible Party (PRP) component of the DERP FUDS process. The goal of the PRP process is to negotiate a fair and equitable settlement that represents DoD's responsibility for contamination at a property.

The SLC parcel is currently in the preliminary assessment/site investigation portion of the CERCLA process. This investigation includes the rifle range, which is a PRP site. Subsequent investigation of the SLC parcel will be conducted, if necessary, during a remedial investigation. The remedial cleanup values developed for the HAAF parcel also will be used for the SLC parcel because the contaminants, geology, and anticipated future land use are similar for both parcels. An interim removal action is planned for the conclusion of the site investigation. This interim removal action will include the rifle range if PRP negotiations have resulted in a settlement. After a Record of Decision is agreed to by DoD and federal and state regulators, any remaining cleanup will be conducted.

Level to Which the Site Will Be Cleaned

As committed to by the Army, the sites will be remediated to a level suitable for wetland restoration as determined by the regulatory agencies overseeing the cleanup of the HAAF and SLC parcels. This remediation will exceed the CERCLA requirements for base closure by taking into account the impacts of any contaminants or other site conditions in the context of the proposed breach of the bayfront levees and other wetland restoration activities; it will include the elimination or reduction of potential impacts from asbestos, pesticides, or petroleum products found onsite. An ecological risk assessment will be used to set the acceptable levels for contamination, and soil bioassays will be used to determine toxicity. As stated previously, these cleanup activities are being conducted as part of an ongoing regulatory process that includes public review.

HAAF Disposal and Reuse EIS Encumbrances

Certain encumbrances and mitigation measures were identified in the Army's record of decision on the HAAF disposal and reuse EIS, including the following:

- maintenance of the Landfill 26 wetland mitigation site,
- an access easement over HAAF to the NSD outfall and dechlorination plant,
- an access easement over HAAF to the SLC parcel,
- an easement on the HAAF parcel to construct the New Hamilton Partnership perimeter levee, and
- control of human access to the salt marsh to protect endangered species.

Implementation of the wetland restoration plan would result in filling the Landfill 26 wetland mitigation site. Before proceeding with this modification, the Coastal Conservancy would secure approval by the California Regional Water Quality Control Board (RWQCB) to modify the waste discharge requirement (Order 92-029) under which the wetlands were constructed.

The Coastal Conservancy would continue to provide easements to the NSD for access to the outfall pipeline and to the SLC for access to the SLC parcel. The requirement for access to the SLC parcel would no longer be an issue if the SLC parcel were incorporated into the wetland restoration project, as is expected under Alternative 4 or 5.

The easement on the HAAF parcel to construct the New Hamilton Partnership perimeter levee would be conveyed to the ~~Coastal Conservancy~~ City of Novato~~, and~~. The City of Novato also would take title to the underlying fee interest of the perimeter levee. In addition, the City would convey an easement to the Coastal Conservancy to allow flooding and surcharge on the HAAF parcel side of the levee. ~~the~~ The wetland restoration plan does not provide for uncontrolled public access to the salt marsh.

Alternative 1: No Action

Under Alternative 1, the HAAF parcel would not be transferred from the Army to the Coastal Conservancy, and the wetland restoration plan developed by the Coastal Conservancy would not be implemented. HAAF would remain under Army ownership until the parcel was transferred from the Army to a new owner. Under Alternative 1, it is assumed that the Army would:

- complete the cleanup of contaminants at HAAF already under way;
- continue to operate and maintain drainage and pumping facilities;
- provide easements across HAAF to the NSD, SLC, and New Hamilton Partnership; and
- maintain the Landfill 26 wetland mitigation site.

Ground-disturbing activities at HAAF would end when the cleanup of contaminants at HAAF is completed and the parcel is placed in caretaker status. During the period when the Army maintains ownership, acreage of wetlands or other habitat types in the HAAF parcel may change over time. However, any discussion of how habitats in the HAAF parcel could change in the absence of a management plan is speculative. For the purpose of assessing the impacts of the various alternatives, habitat conditions in the HAAF parcel under future without-project conditions are assumed to be the same as existing conditions.

The SLC parcel is currently open space and is not being actively managed. The current acreage and distribution of habitat types in the SLC parcel would continue under future without-project conditions because land uses in the area are not expected to change.

For the purposes of this analysis, two baseline conditions were evaluated. For comparison with Alternatives 2 and 3, baseline conditions are represented by existing conditions in the HAAF parcel. For comparison with Alternatives 4 and 5, baseline conditions are represented by existing conditions in the HAAF and SLC parcels.

Alternative 2: Restoration of Wetlands in the HAAF Parcel through Natural Sedimentation

Under Alternative 2, tidal wetlands would be restored in the HAAF parcel through the process of natural sedimentation. A cross-panhandle levee on the HAAF parcel and a perimeter levee surrounding the area of the HAAF parcel proposed for tidal marsh restoration would be constructed and the bayward levee would be breached. Dredged material would not be used to restore wetlands.

Restoration Targets

The ultimate objective for a fully functioning wetland restoration project under Alternative 2 is to create tidal coastal salt marsh, seasonal wetlands, and grasslands. The acreage of each habitat type created or enhanced under Alternative 2 is shown in Table 3-1. The estimated rates at which these habitat types are expected to form under Alternative 2 are shown in Figures 3-5a, 3-5b, and 3-5c. The predominant habitat type would be tidal coastal salt marsh, followed by seasonal wetland. The distribution of habitat types in the HAAF parcel is shown in Figure 3-6.

The restoration of these habitats would benefit numerous wildlife species. Restored seasonal wetlands would provide foraging habitat for wintering waterfowl and wintering and migrant shorebirds. Seasonal wetlands are also expected to provide suitable refuge habitat for shorebirds that use coastal marshes during periods of extreme high tides that inundate their coastal habitats. Restoration of coastal salt marsh and associated aquatic habitats is expected to contribute to the recovery of populations of several special-status species dependent on San Pablo Bay. The restoration of coastal salt marsh would increase the available habitat area for the endangered California clapper rail, California black rail, and salt marsh harvest mouse and two DFG-designated California Species of Special Concern, the saltmarsh common yellowthroat and San Pablo song sparrow. Restoration of subtidal, tidal, and intertidal habitats associated with restored marsh vegetation would also benefit several other special-status species that use San Pablo Bay, including the chinook salmon, Central Valley steelhead, longfin smelt, California brown pelican, and double-crested cormorant.

The tidal marsh and aquatic habitat area that would be restored under Alternative 2 is similar to that expected to be restored under Alternative 3 once the restoration has evolved to maturity except that no tidal pannes would be created under Alternative 2. Coastal salt marsh habitat areas, however, are expected to establish more slowly under Alternative 2. Consequently, less habitat area would be available for species dependent on coastal salt marsh and more habitat area would be available for species dependent on subtidal and intertidal aquatic habitats during the period when the restoration is evolving than under Alternative 3. The total area of tidal marsh and aquatic habitats restored under Alternative 2 is less than the area that would be restored under Alternatives 4 and 5.

Construction and Restoration Timing

Complete restoration of tidal wetlands under Alternative 2 is estimated to take up to 50 years. Site preparation is estimated to take 2 years to complete and would end with the breaching of the bayward levee. The proposed restoration of tidal wetlands in the HAAF parcel is characterized by the following steps, including the estimated time necessary for the restored wetlands to become fully functional:

- sediment accretion to mean high water level (year 3 through year 12),
- development of mean high water marsh plain (year 13 through year 27),
- development of mean high water marsh plain in back marsh (year 18 through year 32),

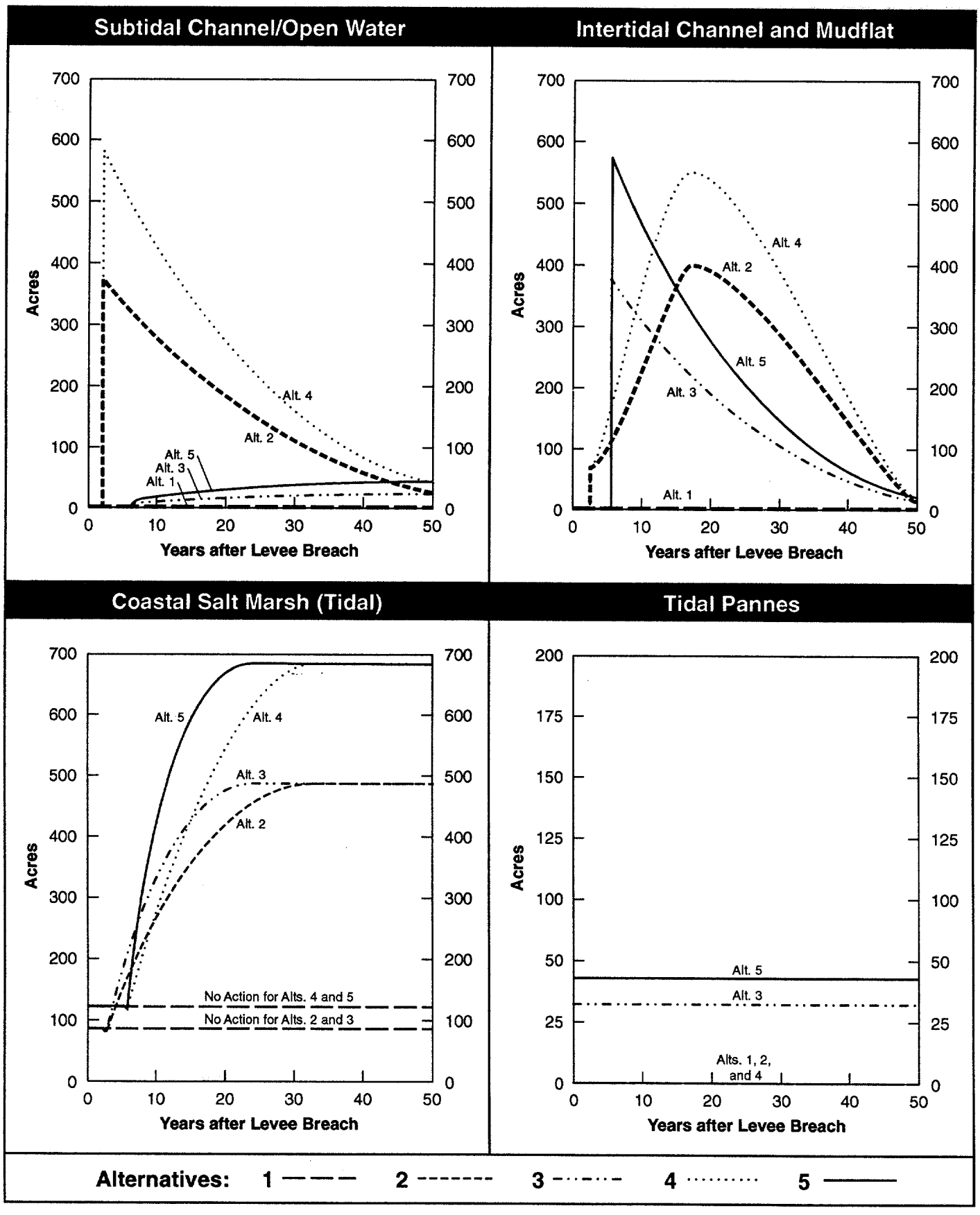

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Figure 3-5a
Habitat Acreages at Levee Breach and 50 Years after Levee Breach

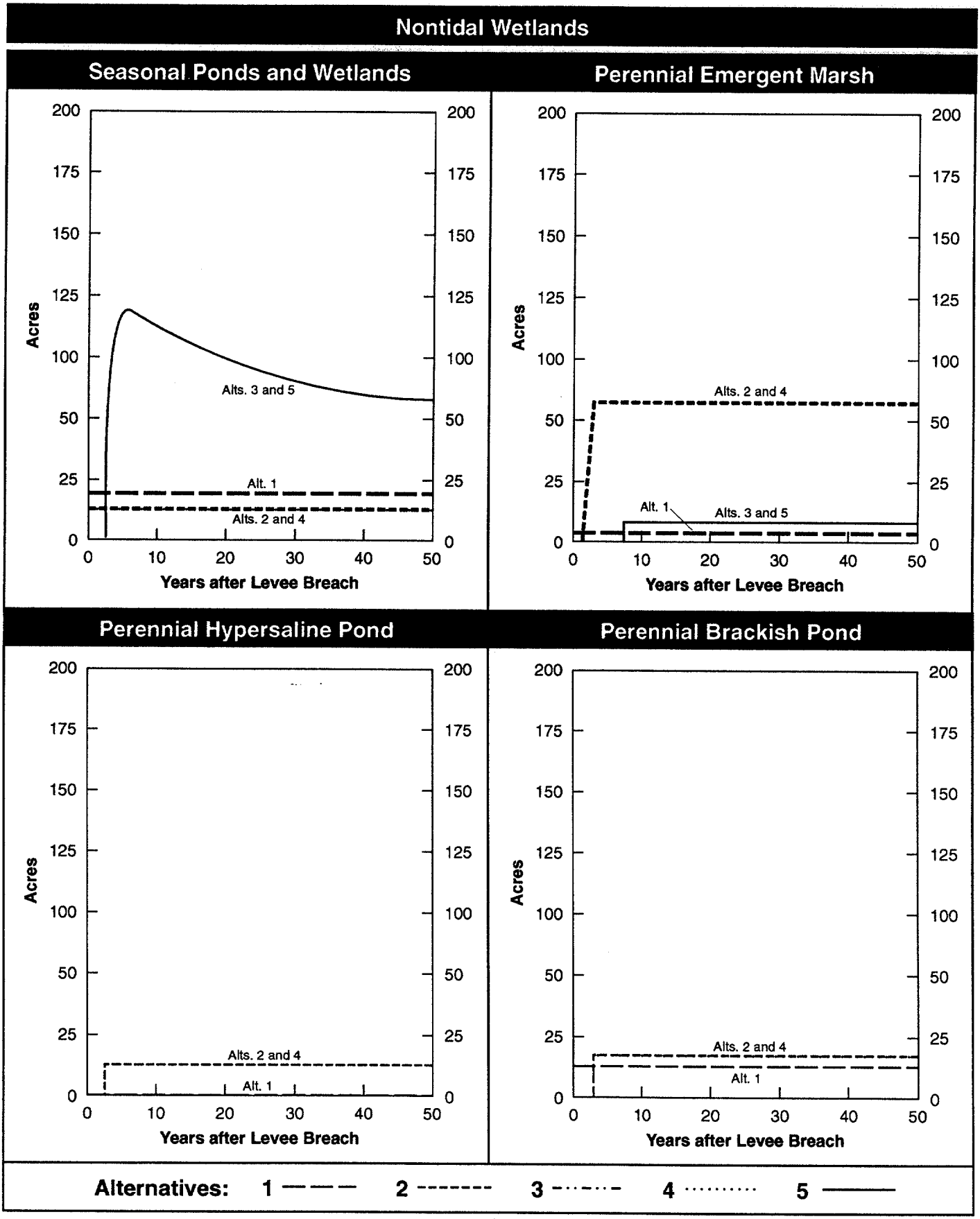

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Figure 3-5b
Habitat Acreages at Levee Breach and 50 Years after Levee Breach

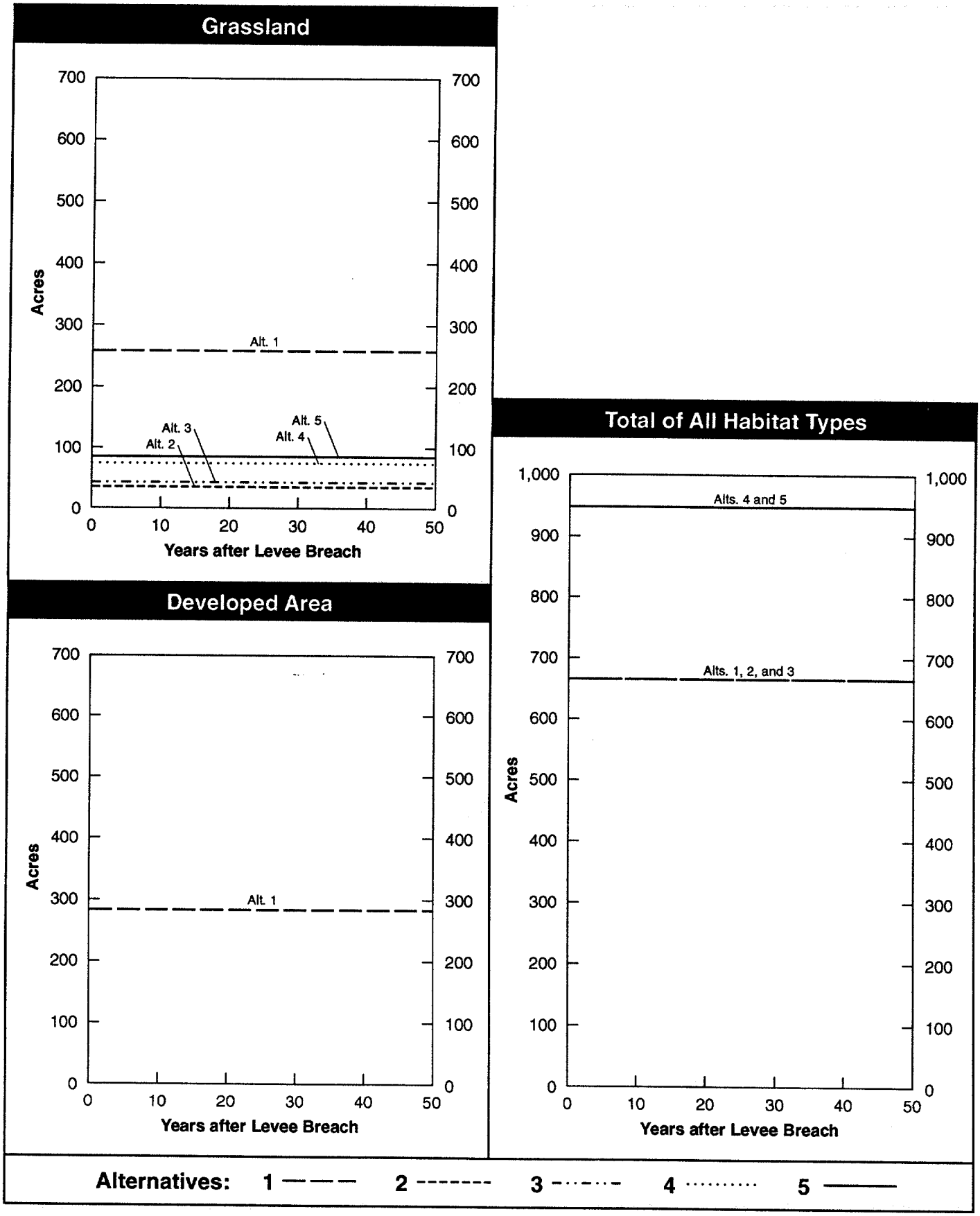

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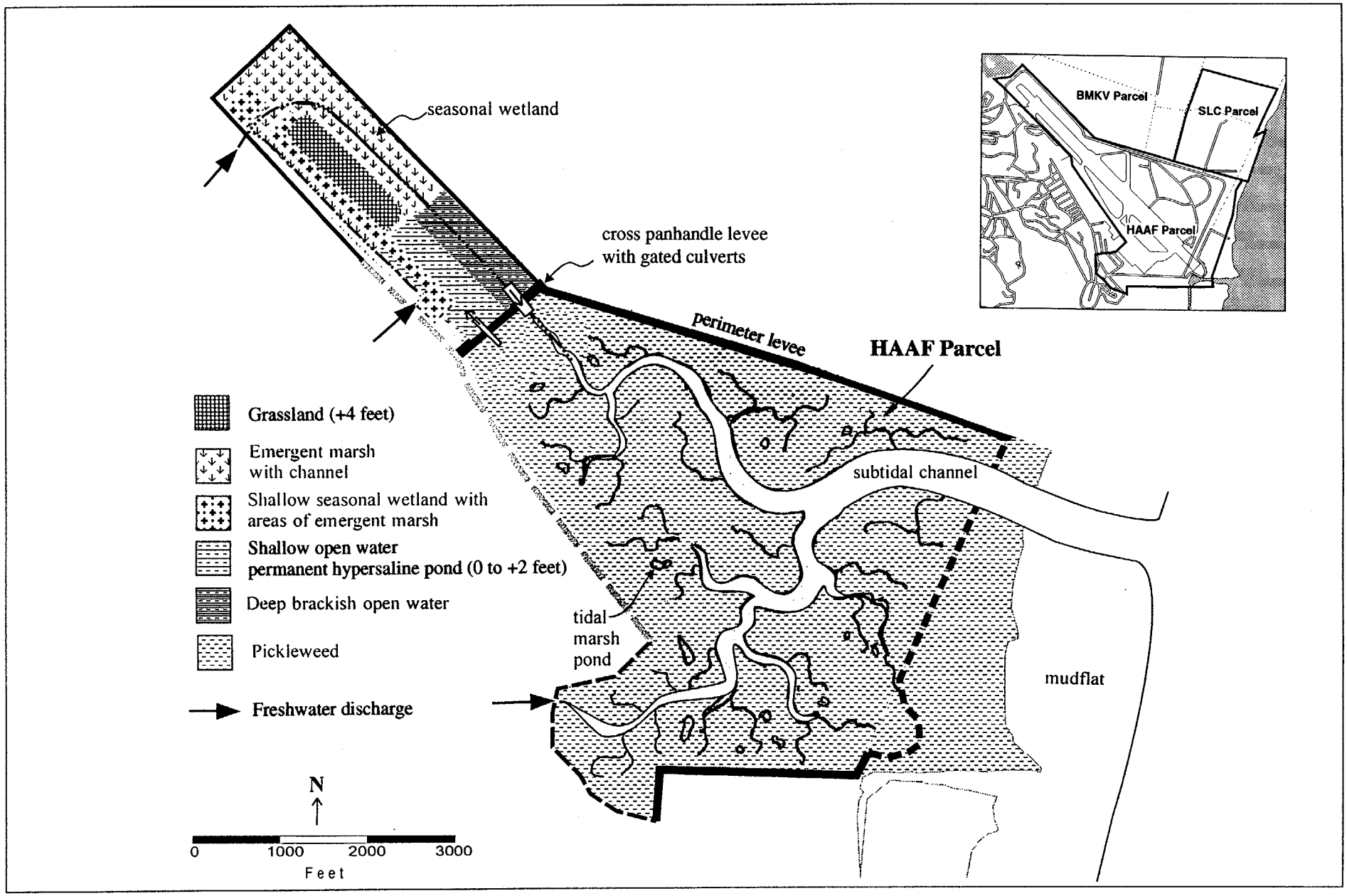
Figure 3-5c
Habitat Acreages at Levee Breach and 50 Years after Levee Breach



Source: Woodward-Clyde 1998.

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Figure 3-6
Alternative 2: Restoration of Wetlands in the HAAF Parcel through Natural Sedimentation at Maturity

- development of mean higher high water marsh plain (year 18 through year 42), and
- development of mean higher high water marsh plain in back marsh (year 23 through year 48).

Site Preparation

Site preparation activities that would occur before the bayward levee is breached include removing remaining buildings and structures; providing temporary drainage; providing drainage from the SLC parcel; constructing perimeter levees, the cross-panhandle levee, and internal peninsulas; lowering the bayward levee; and breaching the bayward levee. The site preparation phase of the project is assumed to extend over a 2-year period.

Removing Buildings and Structures

The Army ~~may remove some of the remaining buildings and structures~~ has removed building 86 on the HAAF parcel ~~if necessary to complete the remediation of contaminated areas~~. The remaining buildings and structures ~~that may be removed by the Army have not yet been identified. The buildings and structures not removed by the Army would~~ will be removed by the Coastal Conservancy before the bayward levee is breached.

Providing Temporary Drainage

To provide temporary drainage from the HAAF parcel, drainage weirs would be installed through the outboard levee (Figure 3-7). These weirs would be removed when the bayward levee is lowered.

SLC Parcel Drainage

Drainage from the SLC parcel can enter the HAAF parcel through two 24-inch culverts located near the NSD dechlorination plant. Under Alternative 2, drainage from the SLC parcel would be blocked by the perimeter levee constructed around the HAAF parcel. The Coastal Conservancy will ensure that drainage of the SLC parcel is provided at preproject levels before the perimeter levee is constructed. Drainage from the SLC parcel could be redirected to the BMKV parcel's drainage system, or a pumping facility could be constructed that would discharge drainage water directly to San Pablo Bay.

Constructing Levees and Internal Peninsulas

Under Alternative 2, ~~7,500~~ 8,600 feet of perimeter levee would be constructed (Figure 3-8). An internal levee, ~~1,070~~ 1,100 feet long, would be constructed to separate seasonal wetlands, uplands, brackish open water, and hypersaline ponds from the tidal marsh. The cross-sectional dimensions of the perimeter and internal levees are shown in Figure 3-9. To achieve a long-term levee crest elevation of +8 feet NGVD, perimeter levees would be constructed to an elevation of +12 feet initially, to offset an estimated 4 feet of long-term settlement.

Perimeter levees would separate the HAAF parcel from the BMKV parcel, the SLC parcel, and the St. Vincent's Silveira Landholdings property. The cross-panhandle levee would protect Pacheco Pond and Landfill 26. The levee between the New Hamilton Partnership development and the HAAF parcel provides adequate flood protection to the development and would not be modified for flood control purposes. However, fill would be placed along 4,800 feet of the wetland side of the New Hamilton Partnership levee to create a wildlife corridor (Figure 3-8).

Before levee construction, a project levee and fill placement plan would be prepared. The plan would address levee and fill placement with respect to site settlement, stability of slopes, soil constraints, and potential for earthquake-induced ground failure. In addition, a ~~monitoring and inspection program~~ maintenance, monitoring, and adaptive management plan would be implemented to evaluate settlement and its effects (Appendix C).

Levee construction techniques would provide adequate stability with regard to the potential for earthquake-induced ground failure. End-of-construction conditions necessary to satisfy the stability factor of safety would be met by constructing levees with side slopes of 3:1 (horizontal to vertical) or flatter and by constructing toe berms on both sides of the perimeter levees averaging 6 feet high and 50 feet wide. The perimeter levees would have a ~~200-foot-wide~~ footprint 200 feet wide. Over time, as the levee settles and the underlying bay mud consolidates and gains strength, the stability factor of safety would increase to a level well in excess of the required stability criteria.

Internal peninsulas would be constructed with the primary objective of reducing fetch and the potential for erosion of perimeter levees from wave action. The cross-sectional dimensions of the internal peninsulas are shown in Figure 3-9.

Construction of the levees and internal peninsulas could be completed within 6-8 months. A sufficient amount of suitable material is likely to be available from the HAAF parcel for use in constructing levees and internal peninsulas; however, some material may be brought in from offsite. A specific source for this material has not been identified.

The perimeter levees for the Hamilton wetland restoration project will be designed and constructed by the Corps. Generally, the engineering and design of the levees will be in accordance with the Corps levee engineering and design manual (U.S. Army Corps of Engineers 1978). The levees will be designed for seismic stability in accordance with the levee engineering and design manual and other applicable guidelines (Hynes-Griffin and Franklin 1984, California Department of Mines and Geology 1977). The levees will be designed to withstand earthquake ground motions that have an exceedance probability of 10% in 50 years (primarily the mean peak horizontal acceleration).

Lowering the Bayward Levee

Before it is breached, most of the HAAF parcel bayward levee would be lowered to an elevation similar to the elevation of the marsh plain adjacent to the levee. Portions of the levee would remain at higher elevations to provide high tide refugia. Material removed from the levee would be used for construction of the perimeter levees. Approximately 3,900 feet of levee would be modified.

Breaching the Bayward Levee

After site preparation activities are completed, the levee separating the HAAF parcel from San Pablo Bay would be breached and a pilot channel would be excavated between the levee breach and San Pablo Bay (Figure 3-6). The initial size of the levee breach and pilot channel would be 280 feet wide and 200 feet long and 165 feet wide and 800 feet long, respectively.

The combined amount of material removed to breach the levee and excavate the pilot channel would be 50,500 cubic yards. The excavated material would be deposited on the HAAF parcel.

The surface area disturbed by the levee breach and pilot channel would total 4.3 acres. Excavating the levee breach and pilot channel would affect 1.3 acres of grassland and 3 acres of coastal salt marsh.

Track-mounted excavators would be used to excavate the levee breach. A 6- to 10-inch suction dredge mounted on a small barge would be used to excavate the pilot channel. Material excavated by the dredge would be pumped directly to the HAAF parcel. This method would limit the amount of coastal salt marsh disturbed during the dredging process.

Public Access

Public access to the wetland restoration site would be provided by ~~the proposed Bay Trail and spur trails. In addition to the Bay Trail proposals, HRG is proposing an alignment that would provide enhanced public access to the western side of the wetland restoration project, generally along the New Hamilton Partnership levee.~~ trails on the western side of the wetland restoration site, generally along the New Hamilton Partnership levee. In addition, the City of Novato will provide a scenic overlook on the top of Reservoir Hill. ~~Formal~~ Public access to the wetland restoration site would be limited to these points, generally located on the western edge of the site. To protect resource values, public access would not be allowed to the entire site.

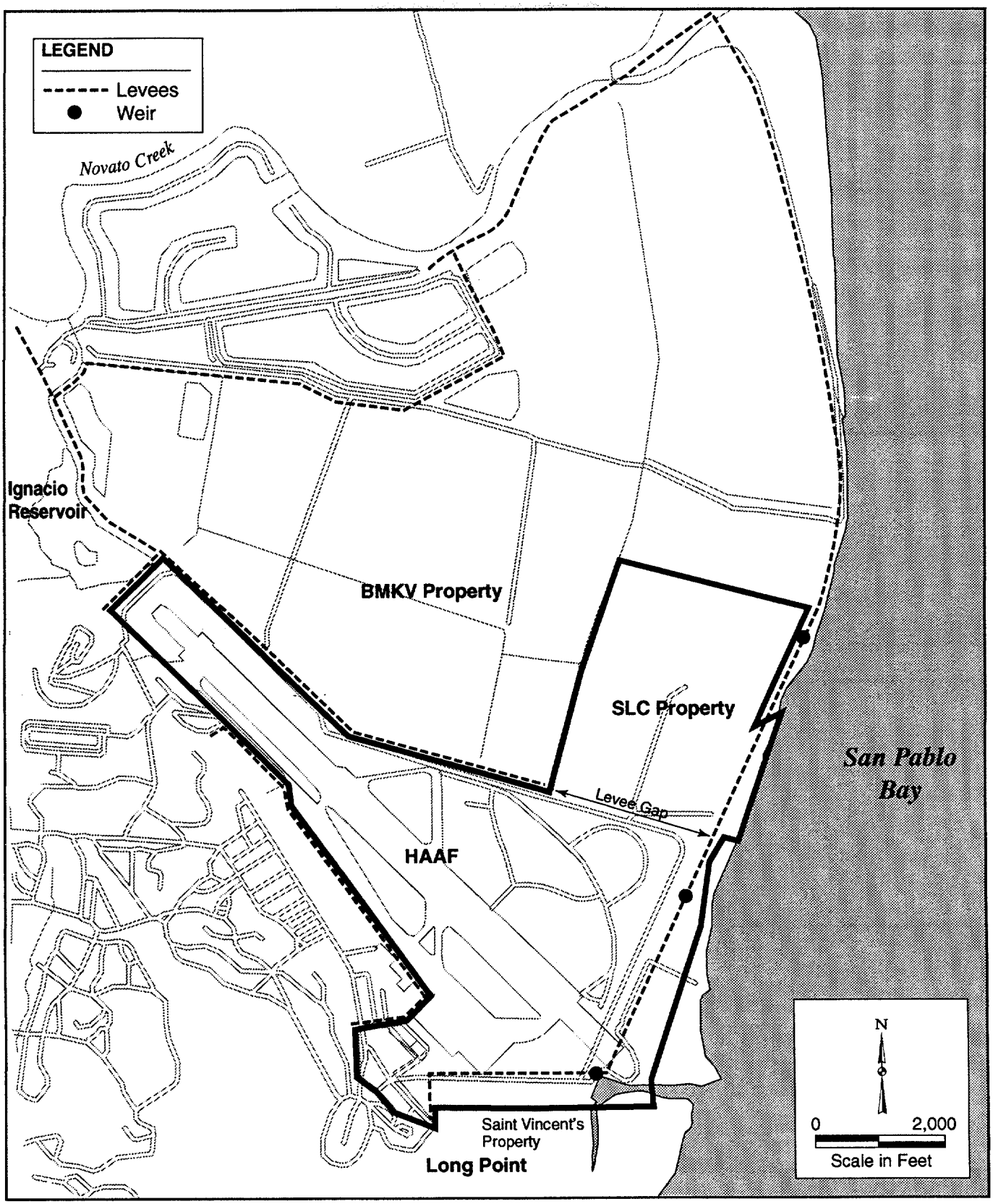

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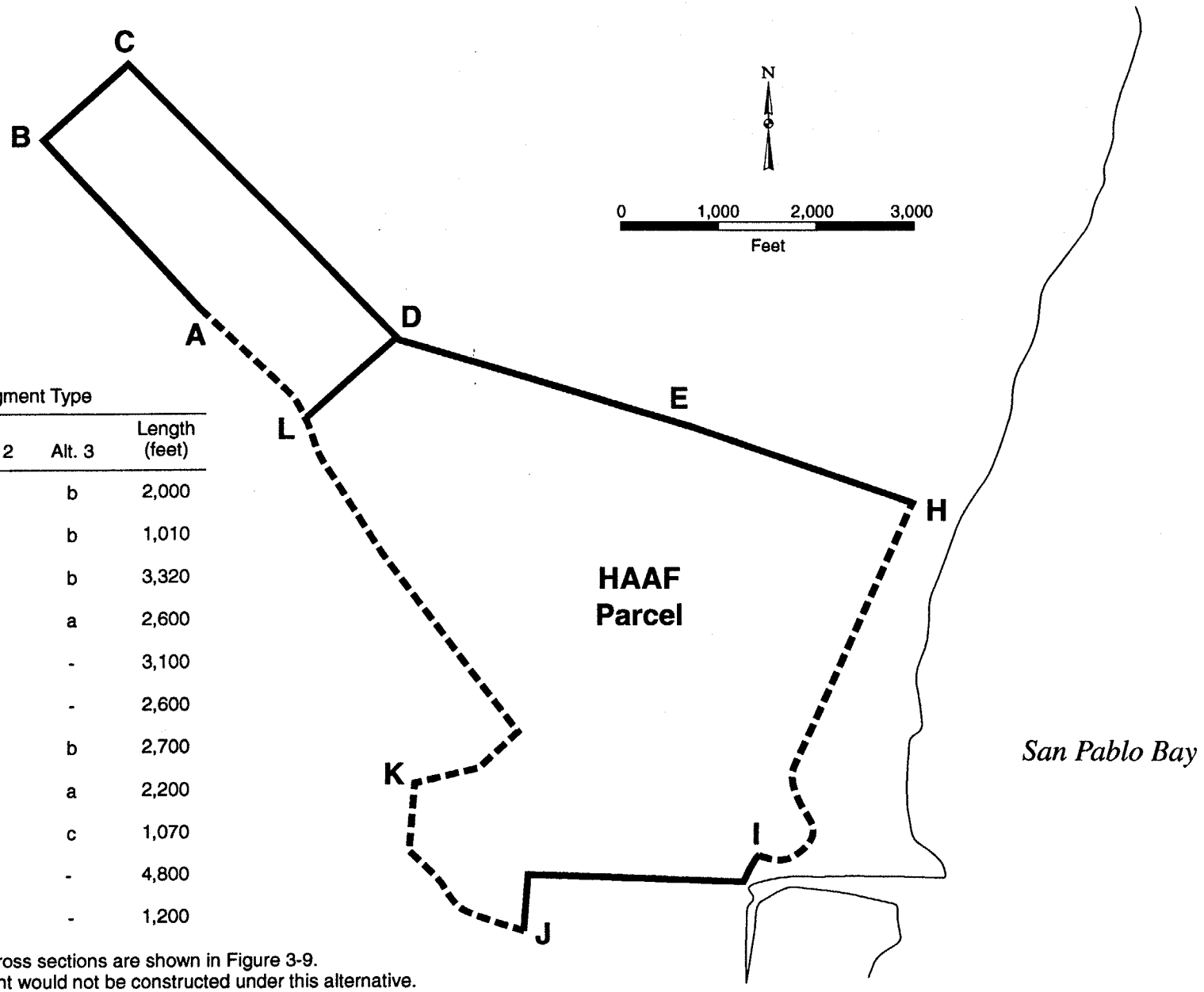
Figure 3-7
Temporary Drainage Weirs



Levee Segment	Segment Type Alt. 2	Segment Type Alt. 3	Length (feet)
A-B	-	b	2,000
B-C	-	b	1,010
C-D	-	b	3,320
D-E	a	a	2,600
E-F	-	-	3,100
F-G	-	-	2,600
I-J	b	b	2,700
E-H	a	a	2,200
K-L	c	c	1,070
L-A	-	-	4,800
L-D	b	-	1,200

Notes: Levee segment cross sections are shown in Figure 3-9.
- = Levee segment would not be constructed under this alternative.

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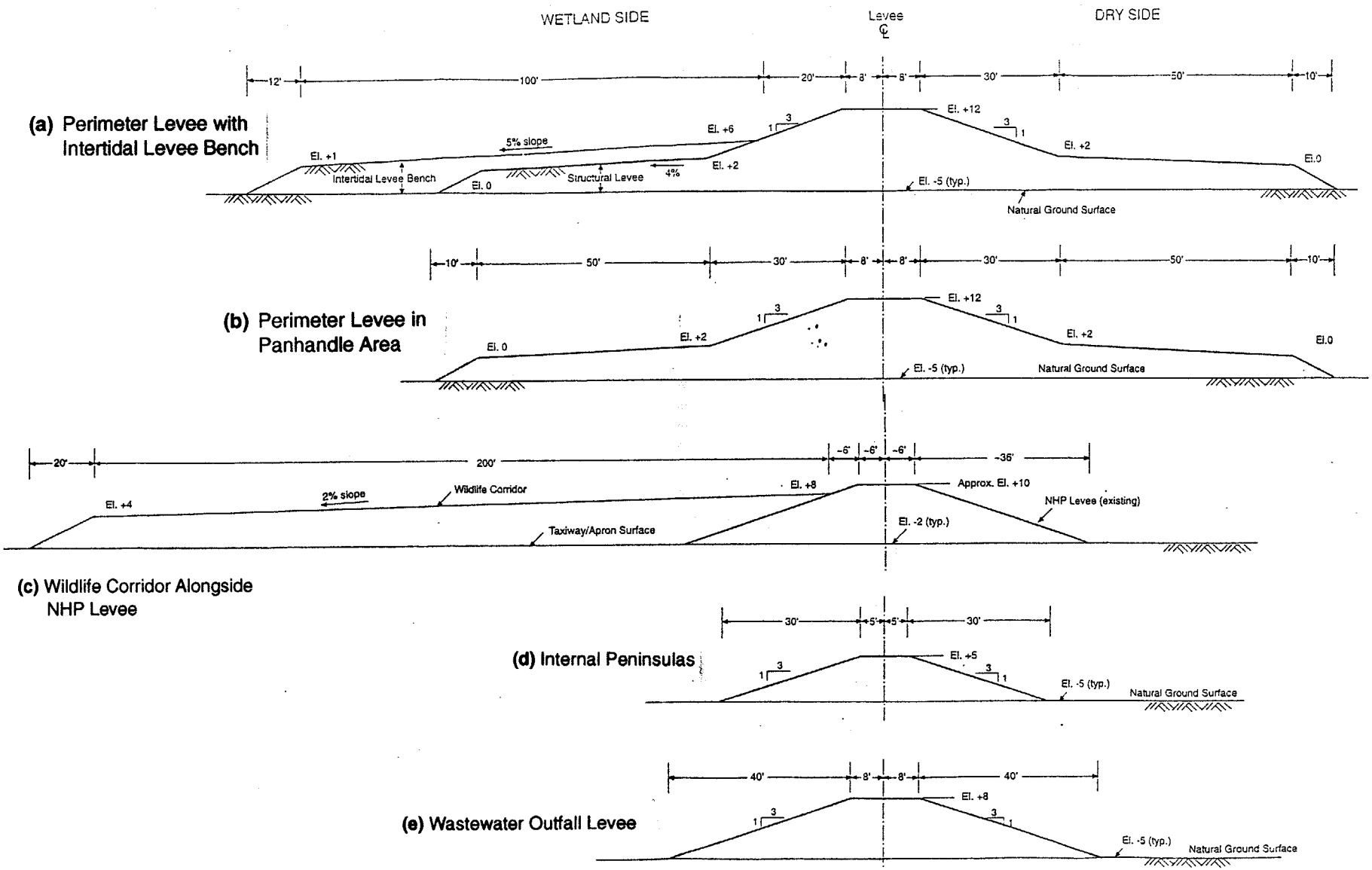
Figure 3-8
Levee Segments for Alternatives 2 and 3



Note: End-of-construction elevations shown; final evevations will be lower.

Source: Woodward - Clyde 1998.

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Figure 3-9
Typical Levee Cross Sections

Alternative 3: Restoration of Wetlands in the HAAF Parcel Using Dredged Material

Under Alternative 3, seasonal and tidal wetlands would be restored in the HAAF parcel using dredged material in combination with natural sedimentation. Before dredged material is placed in the area, perimeter levees would be constructed; the bayward levee would be breached after dredged material is placed.

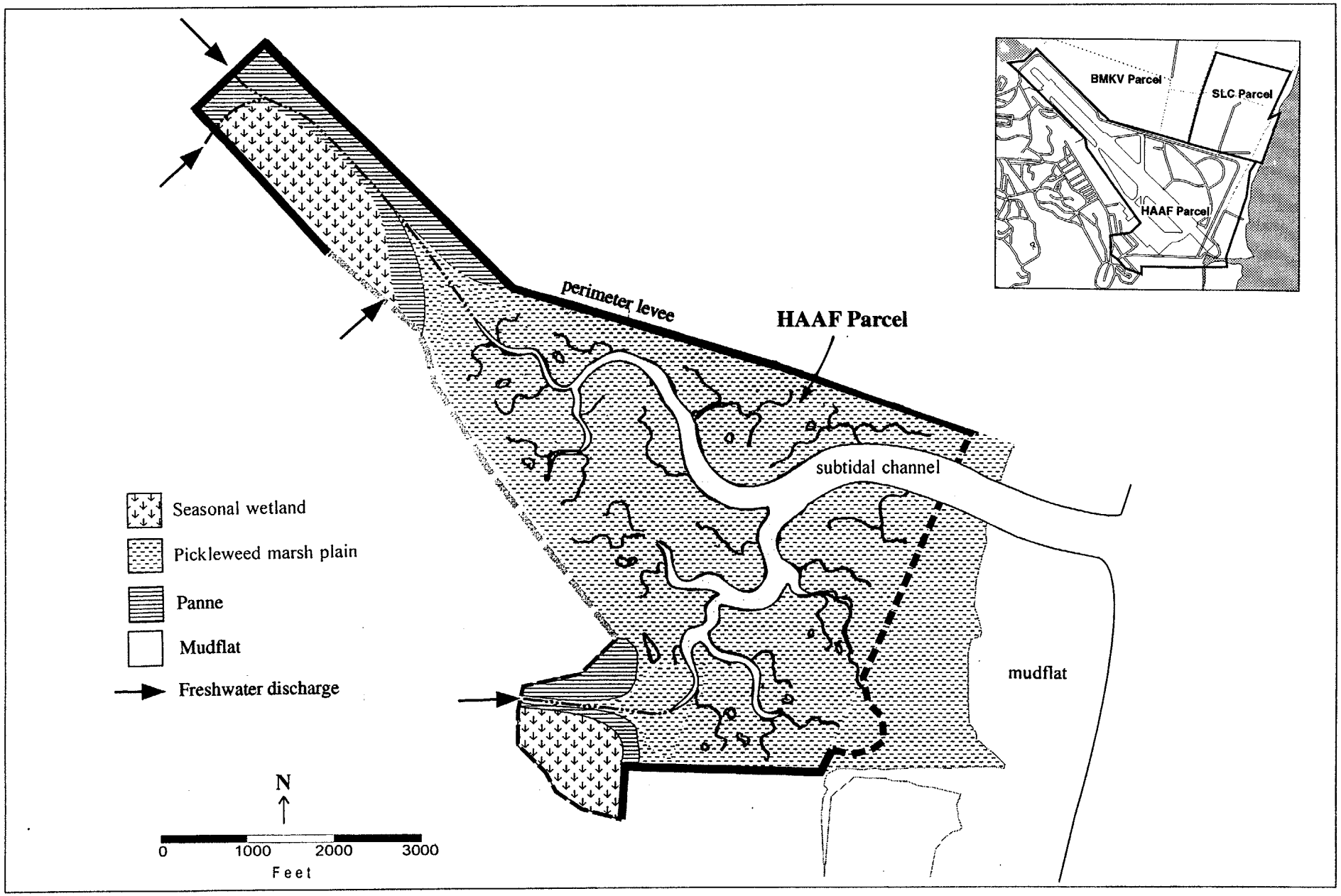
Restoration Targets

The ultimate objective for a fully functioning wetland restoration project under Alternative 3 is to create tidal coastal salt marsh, seasonal wetlands, tidal pannes, and grasslands. The acreage of each habitat type that would be created or enhanced under Alternative 3 is shown in Table 3-1. The estimated rates at which these habitat types are expected to form under Alternative 3 are shown in Figures 3-5a, 3-5b, and 3-5c. As under Alternative 2, the predominant habitat types would be tidal coastal salt marsh and seasonal wetland. Establishment of tidal pannes (a particular subtype of marsh pond) in the HAAF parcel is an additional objective of Alternative 3 not included in Alternative 2. The distribution of habitat types in the HAAF parcel is shown in Figure 3-10.

Restoration of these habitats under Alternative 3 is expected to provide benefits for special-status species that use San Pablo Bay similar to those described under Alternative 2 when the restoration has evolved to maturity. The restored coastal marsh community under Alternative 3, however, would more closely resemble the coastal salt marsh communities historically present in San Pablo Bay than under Alternative 2 because tidal pannes would be created under Alternative 3. Coastal salt marsh habitat areas are also expected to establish more rapidly under Alternative 3; consequently, more habitat area would be available for species dependent on coastal salt marsh and less habitat area would be available for species dependent on subtidal and intertidal aquatic habitats during the period when the restoration is evolving than would be available under Alternative 2. As described for Alternative 2, the total area of tidal marsh and aquatic habitats restored under Alternative 3 would be less than the area that would be restored under Alternatives 4 and 5.

Although the total acreage of the restoration project would be the same under Alternative 3 as under Alternative 2, the habitat types restored under Alternative 3 would be more diverse than those restored under Alternative 2 because of the addition of tidal pannes. When compared to Alternative 2, the use of dredged material under Alternative 3 would shorten the period needed for these habitats to become fully functional and hence would enable the project to begin providing benefits for wildlife sooner. Similar to Alternative 2, the total acreage of habitat created under Alternative 3 would be less than that created under Alternative 4 or 5.

Construction and Restoration Timing



Source: Woodward-Clyde 1998.

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Figure 3-10
Alternative 3: Restoration of Wetlands in the HAAF Parcel Using Dredged Material at Maturity

Complete restoration of wetlands under Alternative 3 is estimated to take 30 years. Site construction is estimated to take 5 years to complete and would end with the breaching of the bayward levee. This period would include the following activities:

- 2 years for site preparation,
- 1 year to place dredged material for restoration of seasonal wetland, and
- 3 years to place dredged material for restoration of tidal wetlands.

The proposed restoration of wetlands in the HAAF parcel is characterized by the following steps, including the estimated time necessary for the restored wetlands to become fully functional:

- sediment accretion to mean high water level (year 7 through year 10),
- development of mean high water marsh plain (year 12 through year 21), and
- development of mean higher high water marsh plain (year 17 through year 31).

An important advantage in the use of dredged material is the reduction in the time necessary for restored wetlands to become fully functional. For example, the period over which the mean high water marsh plain is expected to be completely developed would be 6 years shorter under Alternative 3 than under Alternative 2, and the period over which the mean higher high water marsh plain is expected to develop would be 10 years shorter.

Site Preparation and Placement of Dredged Material

Site preparation activities that would occur under Alternative 3 include removing remaining buildings and structures, providing temporary drainage, providing drainage from the SLC parcel, installing ~~a~~ hydraulic off-loaders and piping to transport dredged materials, constructing perimeter levees and internal peninsulas, lowering the bayward levee, and breaching the bayward levee. Site preparation activities would extend over a 2-year period.

Removing Buildings and Structures

The Army ~~may remove some of the remaining buildings and structures~~ has removed building 86 on the HAAF parcel ~~if necessary to complete the remediation of contaminated areas~~. The remaining buildings and structures ~~that may be removed by the Army have not yet been identified. The buildings and structures not removed by the Army would~~ will be removed by the Coastal Conservancy before the bayward levee is breached.

Providing Temporary Drainage

To provide temporary drainage for rainfall and process water from the HAAF parcel, drainage weirs would be installed through the outboard levee (Figure 3-7). These weirs would be removed when the bayward levee is lowered.

SLC Parcel Drainage

Drainage from the SLC parcel can enter the HAAF parcel through two 24-inch culverts located near the NSD dechlorination plant. Under Alternative 3, drainage from the SLC parcel would be blocked by the perimeter levee constructed around the HAAF parcel. The Coastal Conservancy will ensure that drainage of the SLC parcel is provided at preproject levels before the perimeter levee is constructed. Drainage from the SLC parcel could be redirected to the BMKV parcel's drainage system, or a pumping facility could be constructed that would discharge drainage water directly to San Pablo Bay.

Installing and Operating Hydraulic Off-Loaders and Piping

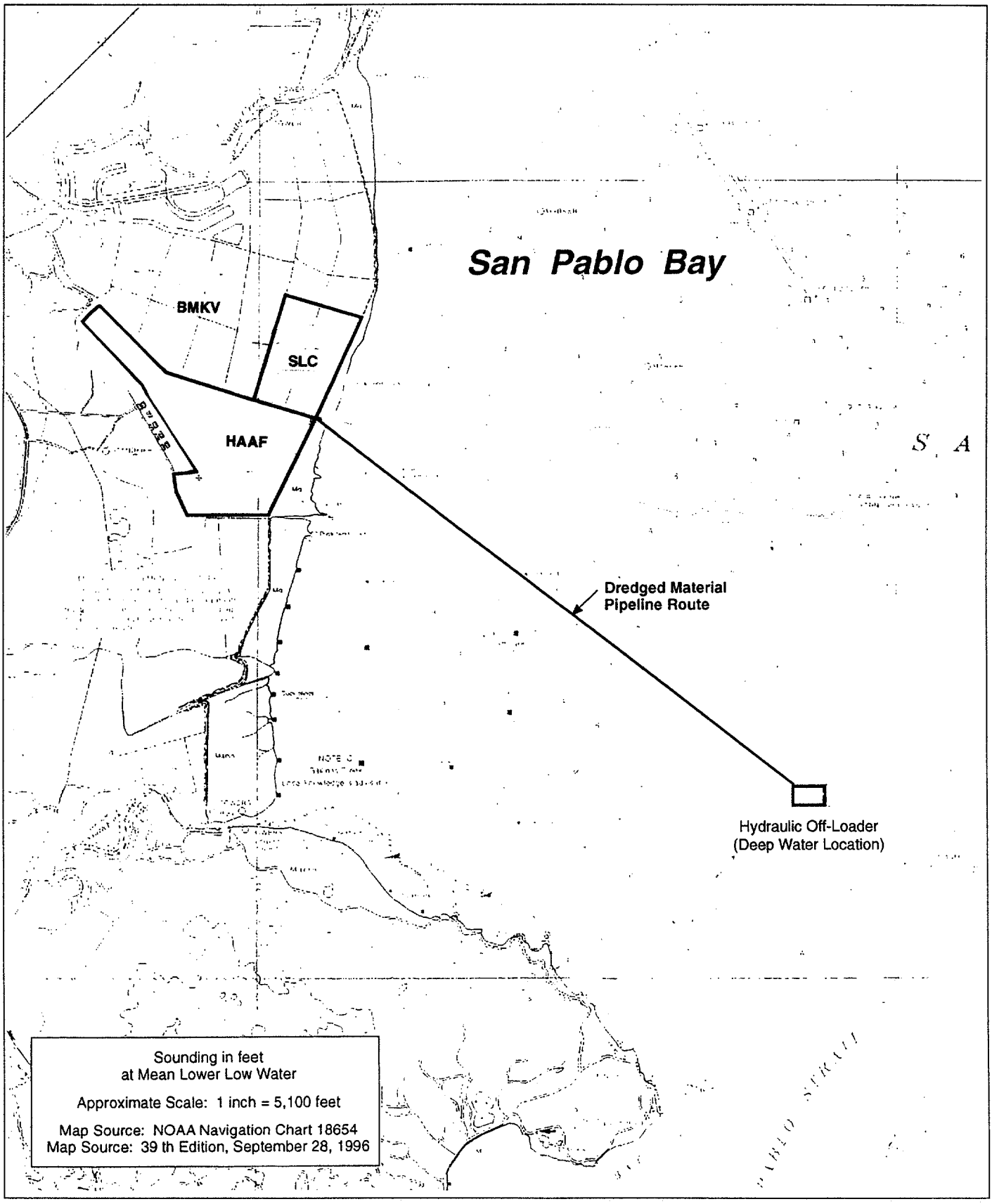
~~To allow the use of dredged material under Alternative 3, a hydraulic off-loader would be placed in San Pablo Bay and piping would be installed to connect the off-loader to the HAAF parcel. The off-loader would be located as much as 34,000 feet offshore but away from major shipping routes (Figure 3-11). The off-loader would be powered by electricity and could be in operation as long as 4 years. Although the exact timing of delivery of dredged material to the off-loader is not known, off-loading could occur at any time during the construction period.~~

~~The off-loader and piping would be properly marked and lighted, consistent with U.S. Coast Guard regulations, to prevent navigational hazards to watercraft using the area at all times of the day and night. The U.S. Coast Guard would be notified to include an update on project activities in its Information Notice to Mariners.~~

To allow the use of dredged material under Alternative 3, two hydraulic off-loaders would be placed in San Pablo Bay, and piping would be installed to connect the off-loaders to the HAAF parcel. One off-loader would be placed in a deep water location and one in a shallow water location. Both off-loaders would be located in western San Pablo Bay but away from major shipping routes (Figure 3-11). The deep water off-loader would be located from 24,000 to 34,000 feet from the project site. The shallow water off-loader site would be located from 15,000 to 25,000 feet from the project site. The off-loaders would be powered by electricity and could be in operation for as long as 4 years. Electricity would be provided by a submerged 12.5-kilovolt power cable via either Point San Pablo or San Rafael Rock Quarry. The cable would be laid and marked in a manner to prevent any land, shore, or navigation hazards. This type of power supply is standard in the dredging industry. Although the exact timing of delivery of dredged material to the off-loaders is unknown, off-loading could occur at any time during the construction period.

The off-loaders and piping would be properly marked and lighted, consistent with U.S. Coast Guard regulations, to prevent navigational hazards to watercraft using the area at all times of the day and night. The U.S. Coast Guard would be notified to include an update on project activities in its Information Notice to Mariners.

Constructing Levees and Internal Peninsulas



Source: Woodward-Clyde 1998.

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Figure 3-11
Location of Hydraulic Off-Loader and Pipeline Routes

Under Alternative 3, ~~13,800~~ 16,600 feet of perimeter levee would be constructed (Figure 3-8). The cross-sectional dimensions of the perimeter and internal levees are shown in Figure 3-9. Perimeter levees would separate the HAAF parcel from Landfill 26, the BMKV parcel, the SLC parcel, and the St. Vincent's and Las Gallinas Sanitary District properties. The levee between the New Hamilton Partnership development and the HAAF parcel provides adequate flood protection to the development and would not be modified for flood control purposes. However, fill would be placed on the wetland side of the New Hamilton Partnership levee to create a wildlife corridor (Figure 3-9). To achieve a long-term levee crest elevation of +8 feet NGVD, perimeter levees would be constructed to an elevation of +12 feet initially, to accommodate an estimated 4 feet of long-term settlement.

Before levee construction, a project levee and fill placement plan would be prepared. The plan would address levee and fill placement with respect to site settlement, stability of slopes, soil constraints, and potential for earthquake-induced ground failure. In addition, a ~~monitoring and inspection program~~ maintenance, monitoring, and adaptive management plan would be implemented to evaluate settlement and its effects (Appendix C).

Levee construction techniques would provide adequate stability with regard to the potential for earthquake-induced ground failure. End-of-construction conditions necessary to satisfy the stability factor of safety would be met by constructing levees with side slopes of 3:1 (horizontal to vertical) or flatter and by constructing toe berms on both sides of the perimeter levees averaging 6 feet high and 50 feet wide. The perimeter levees would have a ~~200-foot-wide~~ footprint 200 feet wide. Over time, as the levee settles and the underlying bay mud consolidates and gains strength, the stability factor of safety would increase to a level well in excess of the required stability criteria.

Internal peninsulas would be constructed with the primary objective of reducing fetch and the potential for erosion of perimeter levees from wave action. The cross-sectional dimensions of the internal peninsulas are shown in Figure 3-9.

Construction of the levees and internal peninsulas could be completed within 6-8 months. A sufficient amount of suitable material is likely to be available from the HAAF parcel for use in constructing levees and internal peninsulas; however, some material may be brought in from offsite. A specific source for this material has not been identified.

The perimeter levees for the Hamilton wetland restoration project will be designed and constructed by the Corps. Generally, the engineering and design of the levees will be in accordance with the Corps levee engineering and design manual (U.S. Army Corps of Engineers 1978). The levees will be designed for seismic stability in accordance with the levee engineering and design manual and other applicable guidelines (Hynes-Griffin and Franklin 1984, California Department of Mines and Geology 1977). The levees will be designed to withstand earthquake ground motions that have an exceedance probability of 10% in 50 years (primarily the mean peak horizontal acceleration).

Lowering the Bayward Levee

Before it is breached, most of the HAAF parcel bayward levee would be lowered to an elevation similar to the elevation of the marsh plain adjacent to the levee. Portions of the levee would remain at higher elevations to provide high tide refugia. Material removed from the levee would be used for construction of the perimeter levees. Approximately 3,900 feet of levee would be modified.

Breaching the Bayward Levee

After construction of perimeter levees and placement of dredged material is completed, the levee separating the HAAF parcel from San Pablo Bay would be breached and a pilot channel would be excavated between the levee breach and San Pablo Bay (Figure 3-9). The levee breach would be 280 feet wide and 200 feet long. The pilot channel would be 165 feet wide and 800 feet long.

The combined amount of material removed to breach the levee and excavate the pilot channel would be 50,500 cubic yards. Excavated material would be deposited on the HAAF parcel.

The surface area disturbed by the levee breach and pilot channel would total 4.3 acres. Excavating the levee breach and pilot channel would affect 1.3 acres of grassland and 3 acres of coastal salt marsh.

Track-mounted excavators would be used to excavate the levee breach. A 6- to 10-inch suction dredge mounted on a small barge would be used to excavate the pilot channel. Material excavated by the dredge would be pumped directly to the HAAF parcel. This method would limit the amount of coastal salt marsh disturbed during the dredging process. Regardless of the availability of sediments, the levee breach would be completed no later than 6 years after site preparation begins.

Source of Dredged Material

Dredged material for the wetland restoration project could originate from many sources. One of the most likely sources is the Oakland Harbor navigation improvement project. Other potential sources of material are the Concord Naval Weapons Station, Southampton Shoal, Richmond Harbor, Port Sonoma, Bel Marin Keys, and Bahia Lagoon. Evaluating impacts associated with dredging and transporting material to the off-loaders is assumed to be the responsibility of the sponsor of each dredging project. An EIR/EIS was recently completed on the Oakland Harbor navigation improvement project (U.S. Army Corps of Engineers and Port of Oakland 1998a, 1998b, 1998c, and 1998d). That document addressed impacts associated with transporting dredged material to the HAAF parcel and concluded that transporting material on barges would not result in significant impacts on the environment.

Suitability of Dredged Material

The suitability of dredged material for the project site will be determined through the existing testing and suitability framework used by the state and federal agencies charged with approving disposal of material dredged from San Francisco Bay: the RWQCB, BCDC, EPA, and the Corps.

These agencies have established a cooperative DMMO, which makes joint recommendations on the suitability of dredged material for proposed disposal sites. The agencies require dredging project applicants to sample and test sediments proposed to be dredged for chemical constituents of concern and for toxicity, using protocols acceptable to the agencies. The adequacy of the sampling and testing is evaluated by the DMMO, which then reviews the test results to evaluate the acceptability of the dredged material for disposal at proposed sites in the bay, ocean, wetland, or upland environments.

To aid in determining the suitability of dredged material for use in wetland environments, the RWQCB has developed guidelines, known as the Wolfenden and Carlin guidelines (Wolfenden and Carlin 1992), that identify acceptable contaminant levels for use in wetlands projects. The DMMO will use these or updated guidelines and other pertinent information to assess any dredged material proposed for use at the project site. Although the Wolfenden and Carlin document specifies slightly differing guidelines for "cover" material (which can be used anywhere in a wetland) and "noncover" material (which needs to be properly buried), only material appropriate for "cover" as determined by the DMMO will be accepted for use at the project site. Separate tests for contaminant leaching are used to evaluate the acceptability of material for upland disposal. Only material found suitable by the DMMO will be used as part of the upland components of the project.

Placement of Dredged Material

The time elapsed between the initiation of site preparation activities to place dredged material and breaching of the levee on the HAAF parcel is expected to be 5 years and could extend to a maximum of 6 years. Placement of dredged material on the HAAF parcel could be divided between nontidal areas and the remaining portion of the parcel, with sediment placement occurring either sequentially or concurrently. The specific sediment timing and locations of levee breaches would depend on the availability of dredged material and the feasibility of constructing the two areas in separate phases. However, the wetland restoration project could begin to accept dredged material during the site preparation phase.

Routine maintenance dredging could provide, on average, as much as 2.2 million cubic yards of dredged sediment per year. However, the schedule for placement of material assumes that 1.4 million cubic yards per year of sediment are actually dredged. The actual annual dredging volumes are dependent on many factors. For example, dredged sediment may be available from new channel and harbor deepening projects, which would shorten the overall construction schedule. Placement of dredged material in the seasonal wetland will be engineered to ensure impermeability of the surface for seasonal ponding and to minimize cracking during the dry season.

Control of Process Water

The off-loading of dredged material would involve mixing the material with water to allow pumping. After the dredged material slurry is placed, the water would separate from the material and would eventually be discharged to San Pablo Bay. Certain options have been proposed that would ensure that the process water does not violate water quality standards when discharged to the bay. The most viable option is to hold the water in a confined basin within the restoration site for subsequent discharge.

Water quality standards will be specified in the waste discharge requirement stipulated by the RWQCB. The discharge standards for the process water will meet RWQCB standards before water is discharged to the bay.

Public Access

Public access to the wetland restoration site would be provided by ~~the proposed Bay Trail and spur trails. In addition to the Bay Trail proposals, HRG is proposing an alignment that would provide enhanced public access to the western side of the wetland restoration project, generally along the New Hamilton Partnership levee.~~ trails on the western side of the wetland restoration site, generally along the New Hamilton Partnership levee. In addition, the City of Novato will provide a scenic overlook at the top of Reservoir Hill. ~~Formal~~ Public access to the wetland restoration site would be limited to these points, generally located on the western edge of the site. To protect resource values, public access would not be allowed to the entire site.

Alternative 4: Restoration of Wetlands in the HAAF and SLC Parcels through Natural Sedimentation

Under Alternative 4, wetlands would be restored in the HAAF and SLC parcels by the process of natural sedimentation. A cross-panhandle levee on the HAAF parcel and perimeter levees separating the tidal wetlands on the HAAF and SLC parcels from the BMKV parcel would be constructed and the bayward levee would be breached. Although wetlands in both the HAAF and SLC parcels would be restored, the two parcels would not be hydrologically connected because of the need to maintain operation of and access to the NSD outfall pipeline. Dredged material would not be used to restore wetlands under this alternative. Internal peninsulas designed to reduce wave erosion would be constructed on the HAAF parcel only. On the SLC parcel, additional material would be placed along perimeter levees to offset wave erosion.

Restoration Targets

The ultimate objective of a fully functioning wetland restoration project under Alternative 4 is to create tidal coastal salt marsh, seasonal wetlands, and grasslands. The acreage of each habitat type created or enhanced under Alternative 4 is shown in Table 3-1. The estimated rates at which these habitat types are expected to form under Alternative 4 are shown in Figures 3-5a, 3-5b and 3-5c. The predominant habitat type would be tidal coastal salt marsh, followed by seasonal wetland. The distribution of habitat types across the restored wetlands is shown in Figure 3-12.

Habitats restored under Alternative 4 are expected to provide benefits for special-status species that use San Pablo Bay similar to those described under Alternatives 2 and 3. Because a substantially larger area

of tidal coastal salt marsh would be restored, however, the magnitude of benefits for these species is also expected to be substantially greater. The area of tidal marsh and aquatic habitats that would be restored under Alternative 4 is similar to that expected to be restored under Alternative 5 once the restoration has evolved to maturity. Coastal salt marsh habitat areas, however, are expected to establish more slowly under Alternative 4; consequently, less habitat area would be available for species dependent on coastal salt marsh and more habitat area would be available for species dependent on subtidal and intertidal aquatic habitats during the period when the restoration is evolving than would be available under Alternative 5. The total area of tidal marsh and aquatic habitats restored under Alternative 4 is greater than the area that would be restored under Alternatives 2 and 3.

Although the total acreage of the restoration project would be the same under Alternative 4 as under Alternative 5, the habitat types restored under Alternative 4 would be less diverse because tidal pannes would not be created. In addition, the period necessary for habitat to become functional and begin to benefit wildlife would be longer because dredged material would not be used. However, similar to Alternative 5, the total acreage of habitat created would be greater when compared to Alternatives 2 and 3.

Construction and Restoration Timing

Complete restoration of wetlands under Alternative 4 is estimated to take up to 50 years. Site preparation is estimated to take 2 years to complete and would end with the breaching of the bayward levee. The proposed restoration of wetlands in the HAAF and SLC parcels is characterized by the following steps, including the estimated time necessary for the restored wetlands to become fully functional:

- sediment accretion to mean high water level (HAAF and SLC parcels: year 3 through year 26),
- development of mean high water marsh plain (HAAF parcel: year 13 through year 27; SLC parcel: year 18 through year 32),
- development of mean high water marsh plain in back marsh (HAAF and SLC parcels: year 18 through year 32),
- development of mean higher high water marsh plain (HAAF parcel: year 18 through year 42; SLC parcel: year 23 through year 48), and
- development of mean higher high water marsh plain in back marsh (HAAF parcel: year 23 through year 48).

Site Preparation

Site preparation activities that would occur under Alternative 4 include removing remaining buildings and structures, providing temporary drainage, relocating the NSD dechlorination plant; modifying the NSD outfall pipeline; constructing perimeter levees, berms, the cross-panhandle levee, and internal peninsulas; lowering the bayward levees; and breaching the bayward levees. The site preparation phase of the project is assumed to extend over a 2-year period.

Removing Buildings and Structures

The Army ~~may remove some of the remaining buildings and structures~~ has removed building 86 on the HAAF parcel ~~if necessary to complete the remediation of contaminated areas~~. The remaining buildings and structures ~~that may be removed by the Army have not yet been identified. The buildings and structures not removed by the Army would~~ will be removed by the Coastal Conservancy before the bayward levee is breached.

Providing Temporary Drainage

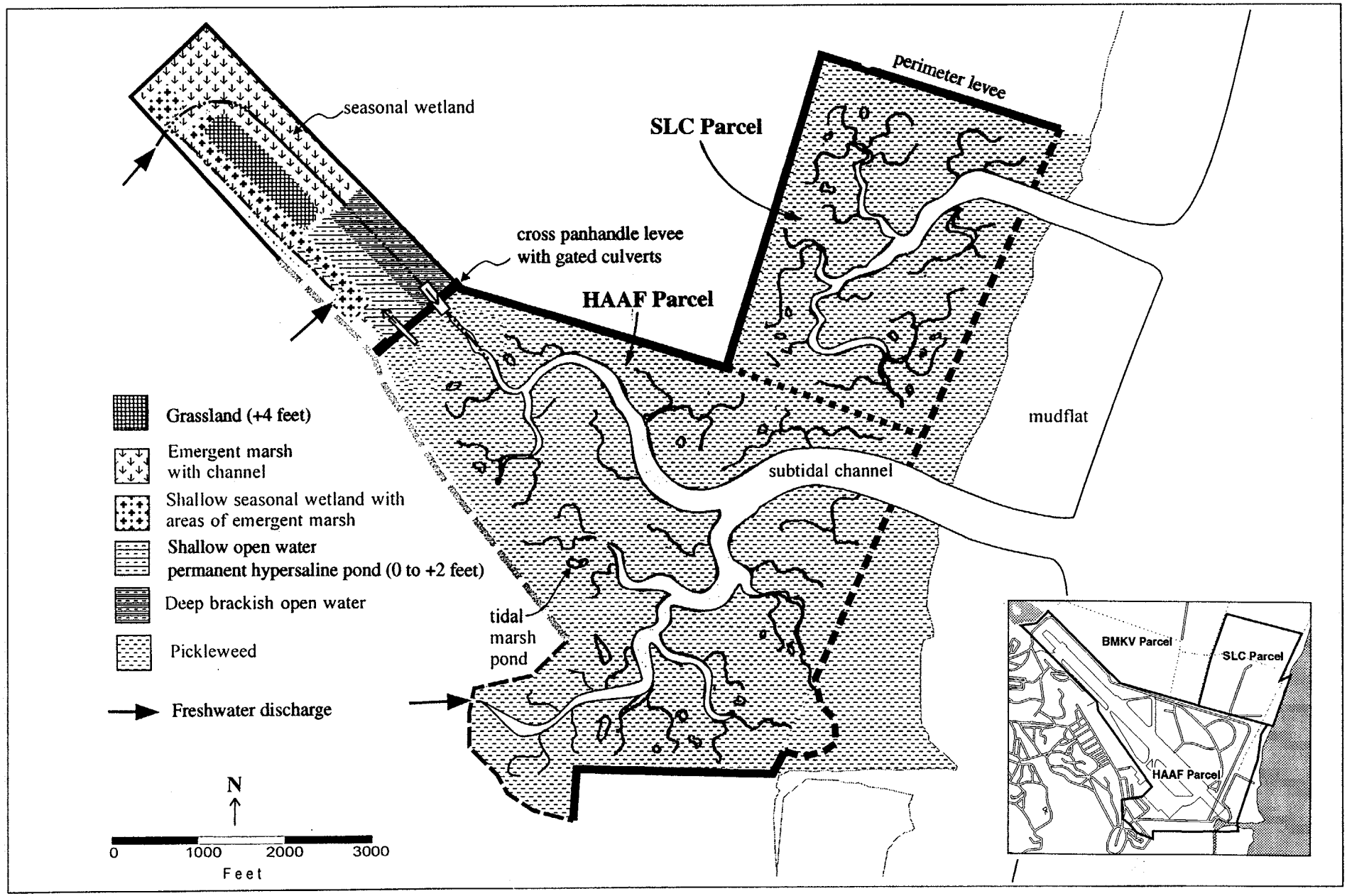
To provide temporary drainage from the HAAF parcel, drainage weirs would be installed through the outboard levee (Figure 3-7). These weirs would be removed when the bayward levee is lowered.

Relocating and Modifying NSD Facilities

Before the levees are constructed between the HAAF parcel and the BMKV and SLC parcels, the NSD dechlorination plant would be relocated and the outfall pipeline would be modified.

The NSD dechlorination plant would be relocated to NSD's Ignacio Treatment Plant, Novato Treatment Plant, or another suitable location. Relocating the dechlorination plant would avoid the need to provide an alternative power supply to the plant and would make the plant more easily accessible to NSD personnel for ~~operational~~ operation and maintenance ~~purposes~~.

The portion of the outfall pipeline that crosses the SLC parcel would be modified to avoid damage that could be caused by placing fill over the pipeline during construction of the perimeter levee between the SLC and BMKV parcels and the levee between the HAAF and SLC parcels. Depths of new fill placed over the pipeline would be 17 feet where the pipeline crosses under the new levee between the SLC and BMKV parcels and 8-10 feet where the pipeline runs parallel to the new levee between the SLC and HAAF parcels. Damage to the pipeline would be avoided by using site-specific soil treatments to avoid settling and sliplining or by constructing the pipeline with flexible couplings.



Source: Woodward-Clyde 1998.

Jones & Stokes Associates, Inc.

Figure 3-12

Alternative 4: Restoration of Wetlands in the HAAF and SLC Parcels through Natural Sedimentation at Maturity

Constructing Levees and Internal Peninsulas

Under Alternative 4, ~~11,000~~ 12,400 feet of perimeter levee would be constructed (Figure 3-13). An internal levee, ~~1,070~~ 1,100 feet long, would be constructed to separate seasonal wetlands, uplands, brackish open water, and hypersaline ponds from the tidal marsh. The cross-sectional dimensions of the perimeter and internal levees are shown in Figure 3-9. To achieve a long-term levee crest elevation of +8 feet NGVD, perimeter levees would be constructed to an elevation of +12 feet initially, to accommodate an estimated 4 feet of long-term settlement.

Perimeter levees would separate the HAAF parcel from the BMKV parcel and the St. Vincent's and Las Gallinas Sanitary District properties. The internal levee would protect Pacheco Pond and Landfill 26. The levee between the New Hamilton Partnership development and the HAAF parcel provides adequate flood protection to the development and would not be modified for flood control purposes. However, fill would be placed along 4,800 feet of the wetland side of the New Hamilton Partnership levee to create a wildlife corridor (Figure 3-9).

Before levee construction, a project levee and fill placement plan would be prepared. The plan would address levee and fill placement with respect to site settlement, stability of slopes, soil constraints, and potential for earthquake-induced ground failure. In addition, a ~~monitoring and inspection program~~ maintenance, monitoring, and adaptive management plan would be implemented to evaluate settlement and its effects (Appendix C).

Levee construction techniques would provide adequate stability with regard to the potential for earthquake-induced ground failure. End-of-construction conditions necessary to satisfy the stability factor of safety would be met by constructing levees with side slopes of 3:1 (horizontal to vertical) or flatter and by constructing toe berms on both sides of the perimeter levees averaging 6 feet high and 50 feet wide. The perimeter levees would have a ~~200-foot-wide~~ footprint 200 feet wide. Over time, as the levee settles and the underlying bay mud consolidates and gains strength, the stability ~~factor of safety~~ would increase to a level well in excess of ~~the~~ required stability criteria.

Internal peninsulas would be constructed in the HAAF parcel only. The primary objective of the peninsulas is to reduce fetch and the potential for erosion of perimeter levees from wave action. The cross-sectional dimensions of the internal peninsulas are shown in Figure 3-9.

Internal peninsulas would not be constructed on the SLC parcel. As an alternative to constructing internal peninsulas, additional material would be added to the SLC parcel perimeter levees. By design, the additional material would erode and protect the integrity of the perimeter levee. Use of the two erosion control methods would allow a comparative assessment of the costs and benefits of each method.

Construction of the levees and internal peninsulas could be completed within 6-8 months. A sufficient amount of suitable material is likely to be available from the HAAF and SLC parcels for use in constructing levees and internal peninsulas; however, some material may be brought in from offsite. A specific source for this material has not been identified.

The perimeter levees for the Hamilton wetland restoration project will be designed and constructed by the Corps. Generally, the engineering and design of the levees will be in accordance with the Corps levee engineering and design manual (U.S. Army Corps of Engineers 1978). The levees will be designed for

seismic stability in accordance with the levee engineering and design manual and other applicable guidelines (Hynes-Griffin and Franklin 1984, California Department of Mines and Geology 1977). The levees will be designed to withstand earthquake ground motions that have an exceedance probability of 10% in 50 years (primarily the mean peak horizontal acceleration).

Lowering the Bayward Levees

Before they are breached, most of the bayward levees on the HAAF and SLC parcels would be lowered to an elevation similar to the elevation of the marsh plain adjacent to the levee. Portions of the levees would remain at higher elevations to provide high tide refugia. Material removed from the levees would be used for construction of the perimeter levees. A total of 3,900 feet of levee on the HAAF parcel and 3,350 feet of levee on the SLC parcel would be modified.

Breaching the Bayward Levees

After site preparation activities are completed, the levees separating the HAAF and SLC parcels from San Pablo Bay would be breached and pilot channels would be excavated (Figure 3-12). The levee breach on the HAAF parcel would be 280 feet wide and 200 feet long and the pilot channel would be 165 feet wide and 800 feet long. The levee breach on the SLC parcel would be 220 feet wide and 50 feet long and the pilot channel would be 100 feet wide and 200 feet long.

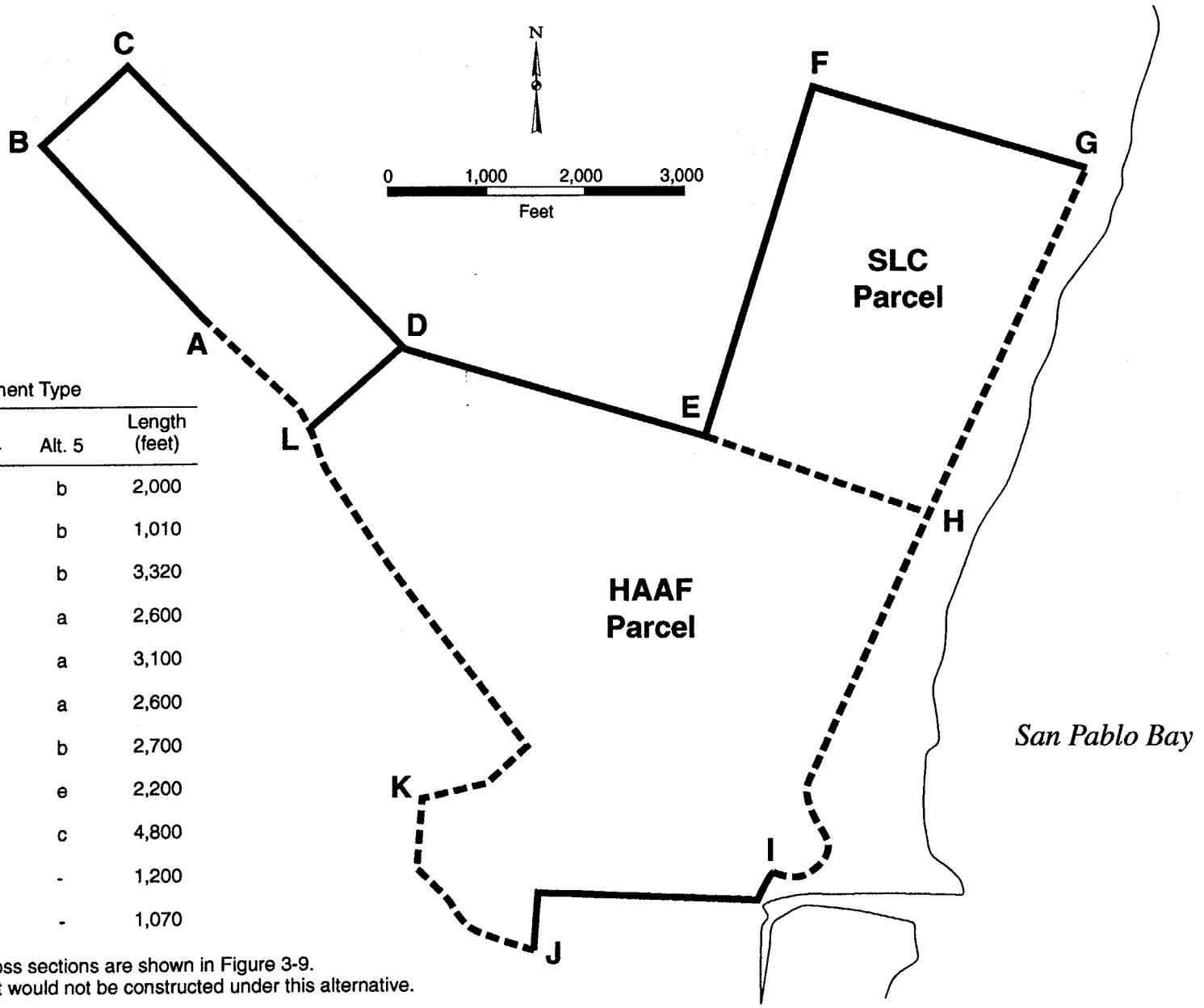
The combined amount of material removed to breach the levees and excavate the pilot channels would be 61,800 cubic yards. Excavated material would be deposited on the HAAF and SLC parcels.

The surface area disturbed by the levee breaches and pilot channels would total 5.4 acres. Excavating the levee breaches and pilot channels would affect 1.8 acres of grassland and 3.6 acres of coastal salt marsh.

Track-mounted excavators would be used to excavate the levee breaches. A 6- to 10-inch suction dredge mounted on a small barge would be used to excavate the pilot channels. Material excavated by the dredge would be pumping directly to the HAAF and SLC parcels. This method would limit the amount of coastal salt marsh disturbed during the dredging process.

Public Access

Public access to the wetland restoration site would be provided by ~~the proposed Bay Trail and spur trails. In addition to the Bay Trail proposals, HRG is proposing an alignment that would provide enhanced public access to the western side of the wetland restoration project, generally along the New Hamilton Partnership levee.~~ trails on the western side of the wetland restoration site, generally along the New Hamilton Partnership levee. In addition, the City of Novato will provide a scenic overlook at the top of Reservoir Hill. ~~Formal~~ Public access to the wetland restoration site would be limited to these points, generally located on the western edge of the site. To protect resource values, public access would not be allowed to the entire site.



Levee Segment	Segment Type Alt. 4	Segment Type Alt. 5	Length (feet)
A-B	-	b	2,000
B-C	-	b	1,010
C-D	-	b	3,320
D-E	a	a	2,600
E-F	a	a	3,100
F-G	a	a	2,600
I-J	b	b	2,700
E-H	e	e	2,200
K-L	c	c	4,800
L-A	-	-	1,200
L-D	b	-	1,070

Notes: Levee segment cross sections are shown in Figure 3-9.
- = Levee segment would not be constructed under this alternative.

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Figure 3-13
Levee Segments for Alternatives 4 and 5

Alternative 5: Restoration of Wetlands in the HAAF and SLC Parcels Using Dredged Material

Under Alternative 5, wetlands would be restored in the HAAF and SLC parcels using dredged material and natural sedimentation. Before dredged material is placed in the area, perimeter levees would be constructed and the bayward levee would be breached. Although wetlands on both parcels would be restored, the parcels would not be hydrologically connected because of the need to maintain operation of and access to the NSD outfall pipeline. Internal peninsulas designed to reduce wave erosion would be constructed on the HAAF parcel only. On the SLC parcel, additional material would be placed along perimeter levees to offset wave erosion.

Restoration Targets

Since publication of the draft EIR/EIS, the Army has indicated that the transfer of the HAAF parcel could be modified to include a portion of the area between Landfill 26 and the present western boundary of the wetland restoration site. This area occupies approximately 14 acres and would be restored as seasonal wetlands. Because the area is currently disturbed, the Coastal Conservancy and the Corps have concluded that expanding the project to include this site is not expected to result in significant adverse environmental impacts beyond those evaluated in the following chapters. Moving the boundary of the wetland restoration project east is not expected to affect the Army's plans for addressing the issue of drainage from Landfill 26.

Including this area in the project could increase the benefits associated with the wetland restoration project and decrease site preparation costs. Wildlife dependent on seasonal wetland habitat also would benefit because the acreage of this habitat type would increase. Levee construction costs would be expected to decrease because an existing levee would form the western boundary of the restoration project. For the purposes of the following impact evaluation, the project size, habitat types and acreage, and the length of new and reconstructed levees have not changed from those evaluated in the draft EIR/EIS.

The ultimate objective of a fully functioning wetland restoration project under Alternative 5 is to create tidal coastal salt marsh, seasonal wetlands, tidal pannes, and grasslands. The acreage of each habitat type created or enhanced under Alternative 5 is shown in Table 3-1. The estimated rates at which these habitat types are expected to form under Alternative 5 are shown in Figures 3-5a, 3-5b, and 3-5c. As under Alternative 4, the predominant habitat types would be tidal coastal salt marsh and seasonal wetland. In addition, establishment of tidal pannes in the HAAF parcel is an objective of Alternative 5, similar to Alternative 3. The distribution of habitat types in the restored wetlands is shown in Figure 3-14.

Restoration of these habitats under Alternative 5 is expected to provide benefits for special-status species that use San Pablo Bay similar to those described under Alternatives 2 and 3 when the restoration has evolved to maturity. Because a substantially larger area of tidal coastal salt marsh would be restored, however, the magnitude of benefits to these species is also expected to be substantially greater. Like Alternative 3, the restored coastal marsh community under Alternative 5, however, would more closely resemble the coastal salt marsh communities historically present in San Pablo Bay than under Alternative 4 because tidal pannes would be created under Alternative 5. The area of tidal marsh and aquatic habitats that would be restored under Alternative 5 is similar to that expected to be restored under Alternative 4 once the restoration has evolved to maturity. Coastal salt marsh habitat areas, however, are also expected to establish more rapidly under Alternative 5; consequently, more habitat area would be available for species dependent on coastal salt marsh and less habitat area would be available for species dependent on subtidal and intertidal aquatic habitats during the period when the restoration is evolving than under Alternative 5. As described for Alternative 4, the total area of tidal marsh and aquatic habitats restored under Alternative 5 would be more than the area that would be restored under Alternatives 2 and 3.

Although the total acreage of the restoration project would be the same under Alternative 5 as under Alternative 4, the habitat types restored under Alternative 5 would be more diverse because of the addition of tidal pannes. When compared to Alternative 4, the use of dredged material would shorten the period needed for these habitats to become fully functional and hence would enable the project to begin providing benefits for wildlife sooner. Similar to Alternative 4, the total acreage of habitat created under Alternative 5 would be greater when compared to Alternatives 2 and 3.

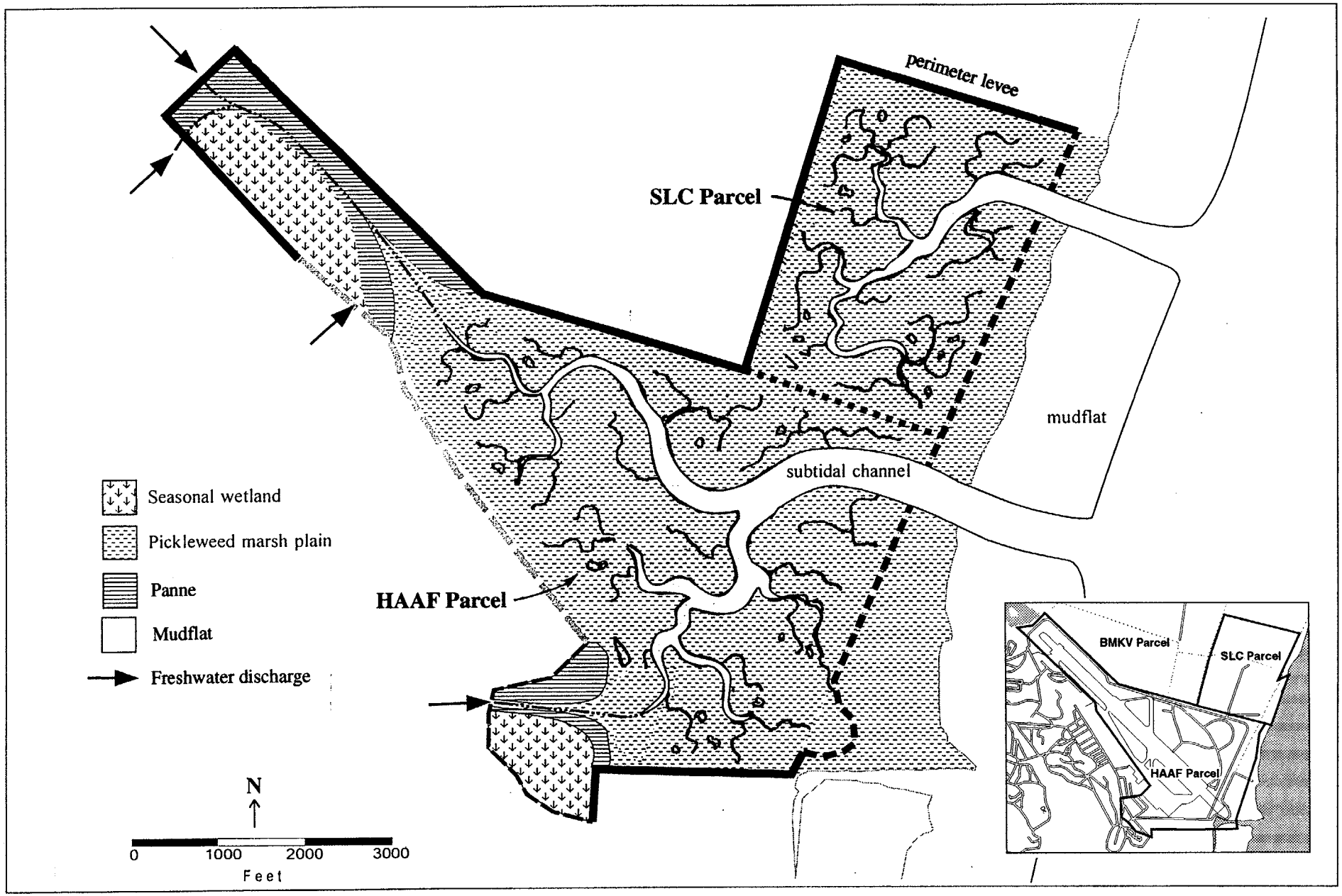
Construction and Restoration Timing

Complete restoration of wetlands under Alternative 5 is estimated to take 30 years. Site construction is estimated to take 6 years to complete and would end with the breaching of the bayward levee. This period would include the following activities:

- 2 years for site preparation,
- 1 year to place 2.1 million cubic yards of dredged material for restoration of seasonal wetlands, and
- 3 years to place 8.5 million cubic yards of dredged material for restoration of tidal wetlands.

The proposed restoration of wetlands in the area is characterized by the following steps, including the estimated time necessary for the restored wetlands to become fully functional:

- sediment accretion to mean high water level (year 7 through year 21),
- development of mean high water marsh plain (year 12 through year 21), and
- development of mean higher high water marsh plain (year 17 through year 31).



Source: Woodward-Clyde 1998.

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Figure 3-14
Alternative 5: Restoration of Wetlands in the HAAF and SLC Parcels Using Dredged Material at Maturity

An important advantage in the use of dredged material is the substantial decrease in the time necessary for restored wetlands to become fully functional. For example, the mean high water marsh plain is expected to be completely developed 6 years sooner under Alternative 5 than under Alternative 4, and the mean higher high water marsh plain is expected to develop 10 years sooner.

Site Preparation and Placement of Dredged Material

Site preparation activities under Alternative 5 include removing remaining buildings and structures; providing temporary drainage; relocating the NSD dechlorination plant; modifying the NSD outfall pipeline; installing and operating the hydraulic off-loaders and piping to transport dredged materials to the HAAF and SLC parcels; constructing perimeter levees, berms, and internal peninsulas; lowering the bayward levee; and breaching the bayward levee.

Removing Buildings and Structures

The Army ~~may remove some of the remaining buildings and structures~~ has removed building 86 on the HAAF parcel ~~if necessary to complete the remediation of contaminated areas~~. The remaining buildings and structures ~~that may be removed by the Army have not yet been identified. The buildings and structures not removed by the Army would~~ will be removed by the Coastal Conservancy before the bayward levee is breached.

Providing Temporary Drainage

To provide temporary drainage for rainfall and process water from the HAAF and SLC parcels, drainage weirs would be installed through the outboard levee (Figure 3-7). These weirs would be removed when the bayward levee is lowered.

Relocating and Modifying NSD Facilities

Before the levees are constructed between the HAAF parcel and the BMKV and SLC parcels, the NSD dechlorination plant would be relocated and the outfall pipeline would be modified.

The NSD dechlorination plant would be relocated to NSD's Ignacio Treatment Plant, Novato Treatment Plant, or another suitable location. Relocating the dechlorination plant would avoid the need to provide an alternative power supply to the plant and would make the plant more easily accessible to NSD personnel for ~~operational~~ operation and maintenance ~~purposes~~.

The portion of the outfall pipeline that crosses the SLC parcel would be modified to avoid damage that could be caused by placing fill over the pipeline during construction of the perimeter levee between the SLC and BMKV parcels and the levee between the HAAF and SLC parcels. Depths of new fill placed over the pipeline would be 17 feet where the pipeline crosses under the new levee between the SLC and

BMKV parcels and 8-10 feet where the pipeline runs parallel to the new levee between the SLC and HAAF parcels. Damage to the pipeline would be avoided by using site-specific soil treatments to avoid settling and sliplining or by constructing the pipeline with flexible couplings.

Installing and Operating Hydraulic Off-Loaders and Piping

~~To allow the use of dredged material under Alternative 3, a hydraulic off-loader would be placed in San Pablo Bay and piping would be installed to connect the off-loader to the HAAF parcel. The off-loader would be located as much as 34,000 feet offshore but away from major shipping routes (Figure 3-11). The off-loader would be powered by electricity and could be in operation as long as 6 years. Although the exact timing of delivery of dredged material to the off-loader is not known, off-loading could occur at any time during the construction period.~~

~~The off-loader and piping would be properly marked and lighted, consistent with U.S. Coast Guard regulations, to prevent navigational hazards to watercraft using the area at all times of the day and night. The U.S. Coast Guard would be notified to include an update on project activities in its Information Notice to Mariners.~~

To allow the use of dredged material under Alternative 5, two hydraulic off-loaders would be placed in San Pablo Bay, and piping would be installed to connect the off-loaders to the HAAF parcel. One off-loader would be placed in a deep water location and one in a shallow water location. Both off-loaders would be located in western San Pablo Bay but away from major shipping routes (Figure 3-11). The deep water off-loader would be located from 24,000 to 34,000 feet from the project site. The shallow water off-loader site would be located from 15,000 to 25,000 feet from the project site. The off-loaders would be powered by electricity and could be in operation for as long as 4 years. Electricity would be provided by a submerged 12.5-kilovolt power cable via either Point San Pablo or San Rafael Rock Quarry. The cable would be laid and marked in a manner to prevent any land, shore, or navigation hazards. This type of power supply is standard in the dredging industry. Although the exact timing of delivery of dredged material to the off-loaders is unknown, off-loading could occur at any time during the construction period.

The off-loaders and piping would be properly marked and lighted, consistent with U.S. Coast Guard regulations, to prevent navigational hazards to watercraft using the area at all times of the day and night. The U.S. Coast Guard would be notified to include an update on project activities in its Information Notice to Mariners.

Constructing Levees and Internal Peninsulas

Under Alternative 5, ~~17,330~~ 20,400 feet of perimeter levee would be constructed (Figure 3-13). Perimeter levees would separate the HAAF parcel from Landfill 26, the BMKV parcel, and the St. Vincent's and Las Gallinas Sanitary District properties. An additional 2,200 feet of levee would be constructed to protect and allow access to the NSD wastewater pipeline. The levee between the New Hamilton Partnership development and the HAAF parcel provides adequate flood protection to the development and would not be modified for flood control purposes. However, fill would be placed on ~~6,000~~ 4,800 feet on the wetland side of the New Hamilton Partnership levee to create a wildlife corridor (Figure 3-13). To achieve a long-term levee crest elevation of +8 feet NGVD, perimeter levees would be constructed to an elevation of +12 feet initially, to accommodate an estimated 4 feet of long-term settlement.

Before levee construction, a project levee and fill placement plan would be prepared. The plan would address levee and fill placement with respect to site settlement, stability of slopes, soil constraints, and potential for earthquake-induced ground failure. In addition, a ~~monitoring and inspection program~~ maintenance, monitoring, and adaptive management plan would be implemented to evaluate settlement and its effects (Appendix C).

Levee construction techniques would provide adequate stability with regard to the potential for earthquake-induced ground failure. End-of-construction conditions necessary to satisfy the stability factor of safety would be met by constructing levees with side slopes of 3:1 (horizontal to vertical) or flatter and by constructing toe berms on both sides of the perimeter levees averaging 6 feet high and 50 feet wide. The perimeter levees would have a ~~200-foot-wide~~ footprint 200 feet wide. Over time, as the levee settles and the underlying bay mud consolidates and gains strength, the stability ~~factor of safety~~ would increase to a level well in excess of ~~the~~ required stability criteria.

Internal peninsulas would be constructed within the HAAF parcel only. The primary objective of the peninsulas is to reduce fetch and the potential for erosion of perimeter levees from wave action. The cross-sectional dimensions of the internal peninsulas are shown in Figure 3-9.

Internal peninsulas would not be constructed on the SLC parcel. As an alternative to constructing the internal peninsulas, additional material would be added to the SLC parcel perimeter levees. By design, the additional material would erode and protect the integrity of the levee. Use of the two erosion control methods would allow a comparative assessment of the costs and benefits of each method.

Construction of the levees and internal peninsulas could be completed within 6-8 months. A sufficient amount of suitable material is likely to be available from the HAAF and SLC parcels for use in constructing levees and internal peninsulas; however, some material may be brought in from offsite. A specific source for this material has not been identified.

The perimeter levees for the Hamilton wetland restoration project will be designed and constructed by the Corps. Generally, the engineering and design of the levees will be in accordance with the Corps levee engineering and design manual (U.S. Army Corps of Engineers 1978). The levees will be designed for seismic stability in accordance with the levee engineering and design manual and other applicable guidelines (Hynes-Griffin and Franklin 1984, California Department of Mines and Geology 1977). The levees will be designed to withstand earthquake ground motions that have an exceedance probability of 10% in 50 years (primarily the mean peak horizontal acceleration).

Lowering the Bayward Levees

Before it is breached, most of the bayward levee on the HAAF and SLC parcels would be lowered to an elevation similar to the elevation of the marsh plain adjacent to the levee. Portions of the levees would remain at higher elevations to provide high tide refugia. Material removed from the levees would be used for construction of the perimeter levees. A total of 3,900 feet of levee on the HAAF parcel and 3,350 feet of levee on the SLC parcel would be modified.

Breaching the Bayward Levees

After site preparation activities are completed, the levees separating the HAAF and SLC parcels from San Pablo Bay would be breached and pilot channels excavated (Figure 3-13). The levee breach on the HAAF parcel would be 280 feet wide and 200 feet long and the pilot channel would be 165 feet wide and 800 feet long. The levee breach on the SLC parcel would be 220 feet wide and 50 feet long and the pilot channel would be 100 feet wide and 200 feet long.

The combined amount of material removed to breach the levees and excavate the pilot channels would be 61,800 cubic yards. Excavated material would be deposited on the HAAF and SLC parcels.

The surface area disturbed by the levee breaches and pilot channels would total 5.4 acres. Excavating the levee breaches and pilot channels would affect 1.8 acres of grassland and 3.6 acres of coastal salt marsh.

Track-mounted excavators would be used to excavate the levee breaches. A 6- to 10-inch suction dredge mounted on a small barge would be used to excavate the pilot channels. Material excavated by the dredge would be pumping directly to the HAAF and SLC parcels. This method would limit the amount of coastal salt marsh disturbed during the dredging process. Regardless of the availability of sediments, levee breaches would be completed no later than 8 years after site preparation begins.

Source of Dredged Material

Dredged material for the wetland restoration project could originate from many sources. One of the most likely sources is the Oakland Harbor navigation improvement project. Other potential sources of material are the Concord Naval Weapons Station, Southhampton Shoal, Richmond Harbor, Port Sonoma, Bel Marin Keys, and Bahia Lagoon. Evaluating impacts associated with dredging and transporting material to the off-loaders is assumed to be the responsibility of the sponsor of each project. An EIR/EIS was recently completed on the Oakland Harbor navigation improvement project (U.S. Army Corps of Engineers and Port of Oakland 1998a, 1998b, 1998c, and 1998d). That document addressed impacts associated with transporting dredged material to the HAAF parcel and concluded that transporting material on barges would not result in significant impacts on the environment.

Suitability of Dredged Material

The suitability of dredged material for the project site will be determined through the existing testing and suitability framework used by the state and federal agencies charged with approving disposal of material dredged from San Francisco Bay: the RWQCB, BCDC, EPA, and the Corps.

These agencies have established a cooperative DMMO, which makes joint recommendations on the suitability of dredged material for proposed disposal sites. The agencies require dredging project applicants to sample and test sediments proposed to be dredged for chemical constituents of concern and for toxicity, using protocols acceptable to the agencies. The adequacy of the sampling and testing is evaluated by the DMMO, which then reviews the test results to evaluate the acceptability of the dredged material for disposal at proposed sites in the bay, ocean, wetland, or upland environments.

To aid in determining the suitability of dredged material for use in wetland environments, the RWQCB has developed guidelines, known as the Wolfenden and Carlin guidelines (Wolfenden and Carlin 1992), that identify acceptable contaminant levels for use in wetlands projects. The DMMO will use these or updated guidelines and other pertinent information to assess any dredged material proposed for use at the project site. Although the Wolfenden and Carlin document specifies slightly differing guidelines for "cover" material (which can be used anywhere in a wetland) and "noncover" material (which needs to be properly buried), only material appropriate for "cover" as determined by the DMMO will be accepted for use at the project site. Separate tests for contaminant leaching are used to evaluate the acceptability of material for upland disposal. Only material found suitable by the DMMO will be used as part of the upland components of the project.

Placement of Dredged Material

The time elapsed between the initiation of site preparation activities to place dredged material and breaching of the levees on the HAAF and SLC parcels is expected to be 6 years and could extend to a maximum of 8 years. Placement of dredged material could be divided by location, including nontidal areas, the SLC parcel, and the remaining portion of the HAAF parcel, with sediment placement occurring either sequentially or concurrently. The specific sediment timing and locations of levee breaches would depend on the availability of dredged material and the feasibility of constructing the three areas in separate phases. However, the wetland restoration project could begin to accept dredged material during the site preparation phase.

Routine maintenance dredging could provide, on average, as much as 2.2 million cubic yards of dredged sediment per year. However, the schedule for placement of material assumes that 1.4 million cubic yards of sediment per year are actually dredged. The actual annual dredging volumes are dependent on many factors. For example, dredged sediment may be available from new channel and harbor deepening projects, which would shorten the overall construction schedule. Placement of dredged material in the seasonal wetland will be engineered to ensure impermeability of the surface for seasonal ponding and to minimize cracking during the dry season.

Control of Process Water

The off-loading of dredged material would involve mixing the material with water to allow pumping. After the dredged material slurry is placed, the water would separate from the material and would eventually be discharged to San Pablo Bay. Certain options been proposed that would ensure that the process water does not violate water quality standards when discharged to the bay. The most viable option is to hold the water in a confined basin within the restoration site for subsequent discharge.

Water quality standards will be specified in the waste discharge requirement stipulated by the RWQCB. The discharge standards for the process water will meet RWQCB standards before water is discharged to the bay.

Public Access

Public access to the wetland restoration site would be provided by ~~the proposed Bay Trail and spur trails. In addition to the Bay Trail proposals, HRG is proposing an alignment that would provide enhanced public access to the western side of the wetland restoration project, generally along the New Hamilton Partnership levee.~~ trails on the western side of the wetland restoration site, generally along the New Hamilton Partnership levee. In addition, the City of Novato will provide a scenic overlook at the top of Reservoir Hill. ~~Formal~~ Public access to the wetland restoration site would be limited to these points, generally located on the western edge of the site. To protect resource values, public access would not be allowed to the entire site.

Bel Marin Keys V Restoration Scenario: Restoration of Wetlands in the HAAF, SLC, and BMKV Parcels Using Dredged Material

In addition to the four project alternatives, a wetland restoration scenario that includes the BMKV parcel, located northeast of the HAAF parcel, has also been evaluated. Impacts of expanding the wetland restoration project to include the BMKV parcel have been evaluated at the program level and are included for informational purposes. Expanding the wetland restoration project to include the BMKV parcel would substantially increase the amount of wetlands that would be restored, increase the amount of area that could be used for disposal of dredged material, and reduce the number of levees that would need to be constructed. Including the BMKV parcel as part of the wetland restoration project would require separate project-specific documentation under CEQA and/or NEPA.

The BMKV parcel is located north of the HAAF and SLC parcels and is privately owned (Figure 3-2). The owners are proposing a water-oriented residential community and golf course on an approximately 1,610-acre site. The residential component would consist of 801 units on 146 acres. The proposed project is currently being reviewed by the County of Marin. Because development plans for the parcel have not been approved, this analysis assumes that the use of the parcel for production of hay would continue under future without-project conditions.

Under the BMKV Scenario, wetlands would be restored in the HAAF, SLC, and BMKV parcels through the use of dredged material and natural sedimentation. Before dredged material is placed in the area, perimeter levees would ~~not~~ be constructed as needed and the bayward levee would be breached. The three parcels would not be hydrologically connected because of the need to protect the NSD outfall pipeline.

Restoration Targets

The ultimate objective of a fully functioning wetland restoration project under the BMKV scenario is to create tidal coastal salt marsh, seasonal wetlands, tidal pannes, and grasslands. An estimate of the acreage of each habitat type that would be created or enhanced under this scenario is shown in Table 3-2. This estimate is based on habitat ratios developed for Alternative 5. The predominant habitat types would be tidal coastal salt marsh and seasonal wetland.

Table 3-2.
Estimated Acreage of Each Habitat Type for the Bel Marin Keys V Scenario

Habitat Type	Acres
Subtidal channels	13
Coastal salt marsh (tidal)	1,696
Tidal pannes	80
Seasonal wetland	314
Grassland	204

Construction and Restoration Timing

Complete restoration of wetlands under this scenario would involve a process similar to that proposed for Alternative 5 (30 years) but would probably take longer because of the substantial increase in the number of acres to be restored and the increased volume of dredged material that would be deposited on the project site. The estimated dredged material capacity of the combined BMKV, HAAF, and SLC parcels would total 33 million cubic yards of material.

Site Preparation

Site preparation activities under this scenario would include constructing the perimeter levees, lowering the bayward levee, moving the NSD dechlorination plant, and installing and operating the hydraulic off-loaders. The process for installing and operating the hydraulic off-loaders would be the same as described under Alternative 3.

Constructing Perimeter and Internal Levees

Under this scenario, 23,800 feet of perimeter levee would be constructed. These levees would separate the project site from Landfill 26, Pacheco Pond, the existing Bel Marin Keys development, and the St. Vincent's and Las Gallinas Sanitary District properties. The levee separating the HAAF parcel from the BMKV and SLC parcels would remain to protect and provide access to the NSD outfall pipeline.

Construction of the levees could be completed within 6-8 months. An adequate volume of source material to construct these levees is probably available from the three parcels.

Lowering the Bayward Levee

Before it is breached, most of the bayward levee on the HAAF, SLC, and BMKV parcels would be lowered to an elevation similar to the elevation of the marsh plain adjacent to the levee. Portions of the levees would remain at higher elevations to provide high tide refugia. Material removed from the levees would be used for construction of the perimeter levees.

Breaching the Bayward Levee

After construction of the perimeter levees and placement of dredged material are completed, the levee separating the HAAF, SLC, and BMKV parcels from San Pablo Bay would be breached. Two or more channels of the same or similar configuration as described under Alternative 5 would be constructed. Material from the excavation would be deposited within the HAAF, SLC, and BMKV parcels. The direct loss of pickleweed marsh would be limited to the width and length of the channel.