Attachment B

Sewerage Agency of Southern Marin
Supplemental Environmental Project (SEP) Proposals

On August 11, 2008, the San Francisco Bay region of the California Regional Water Quality Control Board (Regional Water Board) issued an Administrative Civil Liability (ACL) Complaint the Sewerage Agency of Southern Marin (SASM) for violations of California Water Code section 13385. Pursuant to a settlement agreement and subsequent order of the Regional Water Board, the fine was set at $1,600,000 with $800,000 to be paid in cash to the Cleanup and Abatement Account (CAA) and $800,000 to be satisfied through the development and expense of one or more Supplemental Environmental Projects (SEPs). SASM will pay the cash portion of the fine consistent with the settlement agreement once it is finalized. Because of the amount of funds that will be available, two SEPs are proposed by SASM, each of which are subject to approval by the Regional Water Board.

Following are the proposed SEPs that will share and benefit from the $800,000 earmarked for SEPs.

- Private Lateral Replacement Project - $600,000
- Richardson Bay Aramburu Island Restoration Project - $200,000

Each proposed SEP is described in greater detail.

SASM understands that based upon the State Water Resources Control Board's Enforcement Policy criteria that SEPs should be an extension of SASM's commitment to improving the quality of the waters of the State, benefit the public or environment in which the alleged violations occurred, and that any SEP should represent a program that is not otherwise required of SASM in its NPDES permit. We believe that these proposed SEPs would accomplish that goal.

Project Name:	Private Lateral Replacement Project (PLRP)
Location:	City of Mill Valley, Richardson Bay Sanitary District, Almonte, Alto and Homestead Valley Sanitary Districts and the Kay Park area of Tamalpais Community Services District.
Name of Contact:	Stephen Danehy (415) 288-2402 Sewerage Agency of Southern Marin
Category:	Pollution Prevention and Reduction and Public Awareness
General Cost:	$200,000.00 for grant program $400,000.00 for loan program
Duration:	5 years from approval, with provisions for extension for another 5 years if necessary.

Background

In 2005, the Regional Water Board adopted Resolution No. R2-2005-0059 - "In Support of Programs for Inspection and Rehabilitation of Private Sewer Lateral," which officially recognized that sewer laterals in poor condition may cause surcharging of public sewers, overload pump stations and wastewater treatment plants, and potentially pose localized human health and environmental risks. Local programs for inspection and rehabilitation of private laterals represent one means of assuring that laterals are not a source of unreasonable amounts of inflow and infiltration or blockages. The Resolution states that the Regional Water Board supports and encourages local communities and sanitary sewer collection system agencies, especially those experiencing significant infiltration and inflow from private sewer laterals, to have a program that requires inspection and rehabilitation of private sewer laterals.

Wastewater flow is comprised of mostly residential wastewater. The geography of the area lends to high infiltration rates in damaged or deteriorating lines. Flow to the SASM Wastewater Treatment Plant can increase on a scale of 10 to 1 or more. This means that possibly several million gallons per day may enter the system from infiltration or inflow.

Once the initial loan program is completed, SASM intends to continue the loan program at a rate of $50,000 per year.

SEP Requirements

SEP proposals must conform to the requirements specified by the State Water Resources Control Board in the Water Quality Enforcement Policy (WQEP) and the Regional Water Board's Standard Criteria and Reporting Requirement for SEPs.

Section IX.E of the WQEP states that a SEP(s) must have an appropriate nexus between the alleged violations and the SEP. The proposed SEP should be related both

geographically and in violation type. Excessive infiltration and inflow into the collection system may contribute to sanitary sewer overflows (SSOs) and wet weather sewage discharges to Richardson Bay. The proposed SEP addresses this problem in the SASM service area in the collection systems owned and operated by satellite agencies.

The Private Lateral Replacement Project (PLRP) is designed to reduce the amount of inflow and infiltration (I&I) in the SASM sanitary sewer systems. This PLRP will benefit the people and water quality in the watershed by reducing SSOs and wet weather sewage discharges to Richardson Bay through incentivizing and enabling the replacement of privately owned sewer laterals. The SASM service area consists of approximately 160 miles of collector lines owned and operated by the member agencies of SASM and approximately 150 miles of private laterals that connect to the main collector lines. Studies have shown that as much as 50% of I&I can be attributed to private laterals. Excessive I&I have led to overflows at the SASM wastewater treatment plant and may contribute to sanitary sewer overflows. Defective private laterals may also allow exfiltration of sewage to groundwater.

SASM and the member agencies do not own the lateral lines that connect private properties to the sanitary sewer system, so this SEP will not directly benefit SASM or its member agencies.

This PLRP fits the categories of pollution prevention and public awareness. In addition to funds directed at replacing, or assisting in the replacement, of private laterals, there will be educational material created and disseminated about the connections between private laterals and the public sewer system, and the problems that arise from defects in either.

The PLRP will consist of two programs: a grant program for low income property owners and a low interest loan program. The details of each of these program elements of the PLRP are described in more detail below.

Description: Studies have shown that many SSOs reported in the past years have been traced to poor lateral maintenance and repair by residents. Old pipes may be cracked, have open joints, or become misaligned resulting in I&I. Left unrepaired, tree roots or materials traveling through the pipe can get caught and back up the system. If this happens past the sewer cleanout, if one exists, a backup will occur and potentially allow for spills into the street through the clean out. The cost to repair laterals is expensive and many residents opt to pay for regular cleaning or live with slow drains rather than replace lateral lines that have opened to root intrusion and alignment problems.

As an incentive, the PLRP would provide grants and low interest loans to video inspect and replace the lateral. SASM will place and retain the money for the lateral programs in a separate account to be used solely for grants and low interest loans under the PLRP. For the grant program, matching funds of 50% per lateral will be provided to property owners meeting the criteria until the set budget (about $200,000) for this program

is expended. At an estimated $250 for video inspection and $6,000 for replacement or rehabilitation per connection at 50% grant funded, it is anticipated that this grant program would impact approximately 64 homes below 70% of the median income level.

For the loan program, low interest loans of 2 percentage points below the prime rate will be made available to home owners, for a term of between 1 and 3 years at each homeowner's option. As this program progresses, the maximum term of new loans must be shortened accordingly to ensure full payment of loaned funds within the 5-year term of the PLRP. In addition, up to $150 per lateral will be provided as a grant to incentivize the video inspection of private laterals. Some homeowners may choose to replace their defective laterals without further financial aid. Other homeowner's may finance the balance of the cost of video. Loan payments received will be returned to the program to fund additional loans and video inspection grants until the set budget (about $400,000) for this program is expended. For loans in default, SASM shall make every effort to recover the funds, and if it fails to do so, shall make up for half of the defaulted amount. At an approximate cost of $250 for video inspection and $6,000 for rehabilitation per lateral and an estimated average loan term of 2 years, this loan program would enable the replacement of about 150 private laterals. This estimate will be lower if more laterals receive video inspections that are partially funded by grants.

Loan funds not spent by the 5-year deadline of the program shall be paid to the State's Cleanup and Abatement Account or, alternatively, SASM may make a request to the Regional Water Board's Executive Officer that the term of the project be extended. The extension must identify the amount of funds remaining, specify the term of the extension requested, which shall not go beyond 10 years from the initiation of the project, and must provide for additional third party oversight/audit costs.

To maximize the effectiveness of the grant and loan programs, the PLRP will include

- identification of target areas with high I&I,
- smoke testing of homes in those areas,
- community outreach, and
- identification of qualified contractors who will perform video inspection and rehabilitation work at pre-set prices

Currently, SASM is studying the "sewersheds" that make up the SASM service area. Analysis will better determine the area in most need of repair. SASM will identify from 2 to 5 such areas. These areas will be targeted for the PLRP. At SASM's cost, smoke testing will be conducted at homes in these areas as a preliminarily assessment of the defective laterals.

The community outreach and education will inform the homeowners in the targeted areas about I&I problems, how they can help resolve those issues, identify the grants and loans programs available to assist them, and list pre-qualified contractors with pre-set prices that are available to do the work This component would start before and would continue during the time of the PLRP and may extend beyond the target areas though priority for grants will be given to those from the target areas.

SASM, at its own cost, will identify a short list of pre-qualified contractors that will agree to do work at a pre-set price. This will serve two purposes: ensure that the work will be done correctly, and relieve the homeowners of the burden of finding his/her own contractor. This task will also provide an opportunity for SASM to negotiate pre-set prices for the work, which can be more competitive than market prices because of economies-of-scale. In other words, pre-qualified contractors can expect more work in a particular area because they will be identified in SASM's outreach material, and can thus save costs for mobilization to that area to perform work for multiple homes.

An ordinance will be developed for the inspection, maintenance and replacement of lateral sewer lines that will be presented to the SASM member agencies for adoption. SASM is currently participating in the North Bay Watershed Association "Clean Green Lateral Program," which is supported by wastewater agencies throughout Marin County.

At its own cost, SASM will compile information as to the length of pipe replaced, rehabbed, conditions found during replacement, and other conditions as appropriate. Additionally, SASM will continue flow monitoring to assess the success of lateral repairs/replacements in a targeted area.

Grant Criteria: The intent of the grant program is to provide funds to owner occupied single family homeowners in the SASM sewer service area that are 70% below the median individual income for Marin County. For homes with joint ownership, this criterion will be met using the arithmetic average of the incomes of all the owners. Also, at least one of the owners must use the house as his or her primary residence. The California Franchise Tax Board most recent report states that the median individual income of Marin County in 2006 was $116,626.

Loan Criteria: The intent of the loan program is to provide low interest loans to owner occupied single family homeowners in the SASM sewer service area. The loan program would not be available for commercial or multi-residential units (apartment buildings).

Education: As noted previously, SASM will establish a public education program regarding private laterals, problems that can be encountered, routine maintenance, and the homeowners' responsibilities. At the same time, this

program will make the public aware of information through SASM's website posting and individual mailers that SASM will be providing grants and loans to repair/replace lateral lines. Educational informational about the grant and loan programs shall indicate that these programs are being performed in fulfillment of a settlement of an enforcement action with the Regional Water Board. SASM will also continue to participate in the North Bay Watershed Association public outreach programs as well as to develop localized (service area) public education programs.

Budget/Cost:

Task	Budget
Development and Implementation of Education and Promotion for PLRP	$ 2,000
Grants to low income homeowners*	$190,000
Low Interest Loans and video inspection grants to homeowners*	$397,000
Project Administration by SASM	$ 0
Third Party Oversight by San Francisco Estuary Project	$ 11,000
Total for PLRP	$600,000

* 2 years after project initiation, SASM may request shifting of funds from the grant program into the loan program or visa versa, depending on the level of use of one program over the other. Additional third party oversight costs will be determined by the Executive Officer for the remainder of the project at that time and shall not be from the original project budget, but shall be in addition to the budget and paid for by SASM.

Project Timetable and Milestones:

Task	Timeline
Identify 2-5 target areas from flow monitoring	Within 2 months of project initiation*
Develop outreach material and strategy for implementation, and model lateral ordinance, and submit a copy of outreach material to Regional Water Board	Within 3 months of project initiation
Complete smoke testing in target areas, and provide ordinance to SASM member agencies for adoption	Within 4 months of project initiation
Complete list of pre-qualified contractors for video inspection and rehabilitation of private laterals at pre-fixed prices	Within 5 months of project initiation
Begin public education and outreach, and begin to accept and evaluate grant/loan applications	Within 5 months of project initiation
Begin PLRP to provide grants/loans	Within 6 months of project initiation
Begin video inspections of suspect laterals and repair/rehabilitation of defective laterals	Within 6 months of project initiation
Determine if budget for grants and loans need adjustment and request Regional Water Board approval as appropriate	2 years after project initiation
Complete PLRP or pay Cleanup and Abatement the balance of unspent grant or loan funds	Within 5 years of project initiation**

* *Project initiation shall begin within 40 days after approval of the project by the Regional Water Board or its Executive Officer.*

** *This 5-year term may be extended for up to 5 years for a total project term of 10 years if approved by the Regional Water Board's Executive Officer based on a request by SASM as described above.*

Reporting: Progress reporting will be made to the Regional Water Board and the oversight/audit organization identified below on a quarterly basis from the start of the PLRP for 2 years (a total of eight reports). After two years,

progress reports will be made on an annual basis until project completion (for remaining 3 years). Quarterly progress reports are due on the first of each calendar quarter; annual reports are due on January 2 of each year.

A final report shall be made to the Regional Water Board and the oversight/audit organization identified below by July 1st five years after PLRP initiation. This timing is intended to allow SASM time to collect system flow data to show whether the flow reduction measure of success was achieved in the targeted areas. Records of project accounts, expenses and improvements shall be maintained by SASM.

Each progress report shall describe the tasks completed along with their results (i.e., target areas identified, number of laterals videoed, etc.), monies expended for each task since the last report, and progress of compliance with the project timetable and milestones. The final report shall describe the tasks completed, an accounting of funds expended, and describe whether the measures of success detailed below were met, and if not met, identify possible reasons for why they were not met and suggestions for changes to project elements and strategies to guide future efforts by SASM or others.

If SASM requests and is granted an extension of the project, a final report for the first 5 years is still due on the date specified above, and the conditions of the extension will specify reporting requirements for the term of the extension.

Measures of Success:

The measures of success of this project include the following:

- The replacement or rehabilitation of approximately 200 defective private sewer laterals in the SASM service area that were financially assisted with either the grant or loan program.
- An average of 25% reduction in peak wet weather flows from service areas targeted by the PLRP
- Video inspections of 400 laterals
- Mailers of educational material on PLRP to 500 homeowners
- Posting of educational material on SASM website

Project Oversight/Audit:

To ensure completion of commitments and appropriate expenditure of funds, oversight and audit of the project will be conducted by the San Francisco Estuary Project. All reports must be sent to the following:

Carol Thornton
Contractor to San Francisco Estuary Project
1515 Clay Street, Suite 1400
Oakland, CA 94612
(510) 622-2419
cthornton@waterboards.ca.gov

SUPPLEMENTAL ENVIRONMENTAL PROJECT
ARAMBURU ISLAND

Project Name: Aramburu Island Restoration and Enhancement Project

Location: Richardson Bay, Marin County

Name of Contact: Brooke Langston, 415-388-2524
Richardson Bay Audubon Center

Category: Environmental Restoration and Protection

General Cost: $200,000.00

Duration: 2 years from approval

1.0 Introduction

On August 11, 2008, the San Francisco Bay region of the California Regional Water Quality Control Board (Regional Water Board) issued an Administrative Civil Liability (ACL) Complaint the Sewerage Agency of Southern Marin (SASM) for violations of California Water Code section 13385. Pursuant to a settlement agreement and subsequent order of the Regional Water Board, the fine was set at $1,600,000 with $800,000 to be paid in cash to the Cleanup and Abatement Account (CAA) and $800,000 to be satisfied through the development and expense of one or more Supplemental Environmental Projects (SEPs). The purpose of this document is to describe the Aramburu Island Restoration and Enhancement Project (the project) in Richardson Bay, Marin County, California. This project meets the qualifications as an SEP in that considerable, tangible progress toward completing the restoration goals of the project will be made with use of the SEP funds.

1.1 Requirements for SEPs

SEP proposals must conform to the requirements specified by the State Water Resources Control Board in the Water Quality Enforcement Policy (WQEP) and the Regional Board Water Board's Standard Criteria and Reporting Requirement for SEP's. Section IX.E of the WQEP state that the SEP(s) must have an appropriate nexus between the alleged violations and the SEP. The proposed Aramburu Island project is related geographically

(Figure 1). Overflows from the Equalization Ponds flowed directly into Pickleweed Inlet, a tributary to Richardson Bay and may have negatively impacted Aramburu Island. The fact that the proposed restoration site is an island makes it a highly desirable target for habitat restoration in the heavily urbanized Richardson Bay area as it is relatively isolated from surrounding human disturbances and terrestrial predators. The unique position of the island within Richardson Bay, and its topographic and substrate variability, offer a rare opportunity to restore a variety of habitats that will have great biological value while maintaining resiliency to rising sea levels.

1.2 Project Environmental Benefits

The primary goals of this project are to:

1. **Rehabilitate existing tidal marsh, tidal flat, shoreline, and grassland habitats and establish gradual transition zones (ecotones) that support diverse native vegetation types and optimum wildlife habitats** for shorebirds, waterfowl, marine mammals, and special-status native plant species.

2. **Expand existing sand and gravel spit shorebird roosting habitats, and reduce wave erosion and shoreline retreat**, by selective placement (replenishment) of bay sand and gravel beach sediments with appropriate grain sizes for incident wave energy.

3. **Maintain topographic heterogeneity on the island** to facilitate gradual transgression of resilient tidal wetlands during sea level rise (submergence of uplands)

4. **Establish additional roost habitat** for herons and egrets by placement of persistent large woody debris in storm drift-lines, and creating snags on the island.

The Aramburu Island SEP will improve habitat for resident and migratory birds, such as the San Pablo song sparrow, the salt marsh yellowthroat, shorebirds and terns, as well as mammals such as the harbor seal. The replacement of eroded, steep, rubble-dominated retreating, artificial shorelines by gradually sloping sand beaches, sand flats, and gravel/shell/sand berms, would be likely to provide high tide roosts for shorebirds, terns, and gulls, and may potentially facilitate re-use of the island as a seal haul-out. The island's terrestrial sediments exposed in the high salt marsh edge provide highly suitable conditions for the regionally rare salt marsh annuals, Point Reyes bird's-beak, salt marsh owl's-clover, and smooth goldfields. In addition, erosion reduction measures may have indirect benefits for adjacent subtidal habitats, including native eelgrass that is likely to be limited by turbidity due to locally resuspended fine sediment.

The project will contribute to the regional restoration effort presented in the Baylands Ecosystem Habitat Goals Report, which specifically identified the following recommended restoration and management actions for "Strawberry Spit" (of which Aramburu Island was formerly a part) and Richardson Bay (Goals Report, p. 117 and Appendix D) that are incorporated in the preliminary conceptual project design:

- Protect and enhance harbor seal haul-out sites at Strawberry Spit
- In Richardson Bay, restore and enhance fringing marsh along northwest edge for Point Reyes bird's-beak
- Restore and enhance tidal marsh
- Restore high marsh near populations of rare and uncommon salt marsh plants to enable their expansion

2.0 Project Description

This section describes the preliminary conceptual restoration alternative that is currently preferred. Its ecological engineering design concepts are based on initial qualitative assessments of field conditions of the site and its setting within Richardson Bay, and preliminary evaluation of opportunities and constraints. These concepts will be developed in further detail in a subsequent Conceptual Restoration and Enhancement Plan, incorporating the results of data collection and community outreach activities. This description however, should provide basic descriptive information on the proposed restoration/enhancement components, planning and construction timelines, and overall project budget to allow the funding and regulatory agencies to make an informed decision on the suitability of this project for funding as an SEP.

2.1 Site Description

Richardson Bay is a sensitive water body that historically provided a rich assortment of ecological benefits to wildlife and human communities. Intense urbanization of the surrounding area has significantly degraded these benefits. Native fish, waterfowl, shorebird and plant populations have declined precipitously over several decades. Urbanization has also increased flooding of developed areas and degraded human recreation opportunities by polluting the waters and privatizing the shoreline. Historic U.S. Coast Survey maps of Richardson Bay prepared in the 1850s represented fringing salt marshes, small pockets of bay-head salt marsh and tidal creek systems, wide tidal flats, and pockets of barrier beaches.

Aramburu Island is located in the northwest region of Richardson Bay on the east side of the Strawberry Point (Figure 1). The island was initially a peninsula off the mainland created by deposition of dredge spoils and hillslope fill in the early 1960s during the

construction of residential housing on Strawberry Point/Spit. The undeveloped portion of the peninsula offered attractive habitats for shorebirds, waterfowl, and harbor seals and these species began using the area shortly after its construction. In 1987 a channel was cut between the developed and undeveloped portions of the peninsula, forming what is now the 17-acre Aramburu Island (Figure 2). This cut was made to provide a buffer between the wildlife that had begun using the island and the human community on Strawberry Point. In addition, a new beach area was constructed on the north end of the island to improve harbor seal haul-out habitat. Despite these improvements, the island was slowly abandoned by the seals. The island is currently owned by Marin County and managed as part of the Richardson Bay Audubon Sanctuary. In its current configuration, the island offers marginal habitat for wildlife, but presents several distinct opportunities for enhancing these habitat values.

An overview of current conditions on Aramburu Island is displayed in Figure 3. The island currently supports mostly weedy upland plant communities (primarily non-native grassland) on artificial fill soils. A large swath of this upland habitat is heavily goose-grazed to a low turf (Photo 1), while other areas are dominated by bunch grasses and invasive species such as French broom and Italian thistle, which are unpalatable to geese (Photo 2). Small oak groves also exist on the northern end of the island (Photo 3). Fringing tidal marsh is present along some of the island's margin.

The eastern shore of the island is subject to high wave energy and a steep, wave-cut erosional shoreline has developed (Photo 4). As the compacted upland fill shorelines facing the bay retreat, a rough, rocky intertidal shelf expands in the footprint of the original fill. The fill contains insufficient sand and gravel sediments to form substantial bay beaches in response to waves. Two coves partially sheltered by gravel point bars (Photo 5)were constructed as harbor seal haul-out sites (subsequently abandoned by the seals) along the eastern shoreline and support back-barrier tidal marshes and mudflats. A steep engineered boulder (rock rip-rap) revetment stabilizes the banks facing the channel that isolates the island from Strawberry Spit.

2.2 Restoration/Enhancement Design Opportunities

The artificial terrestrial fill substrates of Aramburu Island, and its exposure to episodes of high wave energy during storms, are currently liabilities for its unmanaged habitat structure and geomorphic evolution: they have resulted in dominance by weeds, erosional scarps with poor access for harbor seals, and poor development of salt marsh and mudflats. The same physical characteristics, however, can potentially be modified to become assets and opportunities to rehabilitate distinctive shoreline and wetland habitats representing lost habitat types and ecological functions in Richardson Bay. Based on preliminary field assessments of the site, as well as reference sites in Richardson Bay and

comparable sites in San Francisco Bay, the following habitat types and ecological functions appear to be feasible and appropriate for rehabilitation on the island:

2.2.1 Bay beach and sand flat

Richardson Bay formerly supported estuarine (bay) beaches associated with sheltered flats and marshes (including historic barrier beaches linking Belvedere to the mainland). Bay beaches form naturally where wind-waves from the open bay are supplied with erosional sources of sand or gravel, and a receptive shoreline for deposition. Such settings are mostly eliminated from Richardson Bay today. Modification of the wave-cut scarp (low cliff) shoreline configuration on the eastern (Bay) shore of Aramburu Island, combined with nourishment of imported natural bay sand, shell fragments, and gravels, has the potential to establish a beach shore profile over the existing erosional fill shelf.

Physically, beach nourishment would buffer wave erosion of the scarp, mantle the erosional shelf with upper intertidal sand flats, and naturally form emergent beach ridges and spits. With sufficient sediment supply, bay beaches can migrate landward and adjust in elevation to rising sea level. Naturally graded sands, shell, and gravel would esthetically replace eroded, rocky upland fill (Photo 6).

Ecologically, extensive beach and sandy foreshore habitats at Aramburu Island – especially elongated sand and gravel spits – would be likely to function as high tide roosts for migratory shorebirds, intertidal foraging habitat for shorebirds, and roosts for terns (Forster's, Caspian, and possibly also endangered California Least Terns, which recently have opportunistically colonized artificial island-like sand deposits at Montezuma Wetlands in Suisun Marsh, Solano County). Western snowy plovers have also been observed at isolated bay beaches, and could potentially exploit extensive, isolated new beach habitats at Aramburu Island. The relatively high, unvegetated intertidal elevations of sandy foreshores (in the elevation range of tidal marsh) may provide valuable shorebird foraging habitat during higher tidal stages. In addition, the smooth, ramp-like profile of beaches at Aramburu Island may approximate other isolated bay beach shorelines that are attractive as haul-outs for seals, particularly where beach slopes are near deep water channels for rapid escape.

Beach ridges formed by the highest tides and waves would support scarce elements of San Francisco Bay's native estuarine beach flora, including beach-bur, western ragweed, cressa, poverty-weed, and Pacific dunegrass.

2.2.2 High tidal marsh

Richardson Bay supports some of the largest remaining populations of the northern

subspecies of salt marsh bird's-beak (a.k.a. Point Reyes bird's-beak). This species has found refuge in sparse, short cover of pickleweed and sea-lavender growing on eroded artificial terrestrial sediments in the high tide lines north of Sausalito. Very similar soil and vegetation conditions exist at Aramburu Island. With suitable shallow grading and moderated exposure to wave erosion, substantial populations of salt marsh bird's-beak and associated regionally rare salt marsh annuals (such as salt marsh owl's-clover and smooth goldfields) could potentially be established at Aramburu Island, consistent with the Goals Project recommendations (Photo 7).

2.2.3 High tidal marsh-terrestrial grassland transition zones

There are few places in San Francisco Bay where natural slopes support transitions between native lowland grasslands, sedge-rush meadows, and thickets of native perennial forbs (Photo 8). One large colony of a creeping sedge native to salt marsh edges has established spontaneously in a clay soil pocket depression on the island, indicating the potential for the rest of its associated plant community to be established as well. Re-grading the soils, and redistributing a surface soil layer rich in clay and organic matter could support native perennial colonial grasses, sedges, rushes, and forbs that naturally form transition zones with salt marshes. These colonial species also provide relatively high long-term resistance to invasion by weeds. As sea level rises, this community could form a sloping platform for future tidal marsh, resulting in ecosystem resilience rather than tidal marsh drowning.

2.2.4 Seasonal nontidal pools and marsh

Within constructed lowland grasslands, depressions could be sculpted and capped with relatively impermeable clay soils to form rain-fed pools with a seasonal marsh flora including many vernal pool species of Marin County, including water-starwort, toad rush, spikerush, flowering-quillwort, and popcorn-flower (Photo 9). Other wet depressions could form seasonal marshes covered with low-growing creeping sedges. Seasonal wetlands can provide high tide roosts and foraging opportunities for migratory shorebirds and dabbling ducks, and may potentially support tree frogs (prey base for egrets, herons) and mallard nesting habitat.

2.2.5 Snag and large woody debris sub-habitats

San Francisco Bay's tributary streams and rivers have lost their supply of large decadent riparian trees that would have supplied tidal marshes with large woody debris. Egrets, herons, and tidal marsh subspecies of song sparrows use large woody debris (decaying persistent logs and limbs) in tidal marshes as perches and roosts (Photo 10). Importing large woody debris to the island would increase its structural habitat diversity and replace lost or deficient subhabitat elements of tidal marsh.

2.3 Preliminary Conceptual Enhancement Design

The preliminary conceptual enhancement design for Aramburu Island is displayed in Figure 4. We emphasize that the landscape configuration displayed in this figure is a preliminary draft based on our early site reconnaissance and data collection activities and input from various stakeholders. The locations, quantities, and dimensions of all enhancement elements may be changed based on the outcome of future investigations and deliberations.

The landscape and habitat design compresses several related marsh shoreline and terrestrial ecotone types (transition zones) known from modern and historic Marin County bayshores, with emphasis on Richardson Bay. They are adapted to the steep environmental gradients of the artificial island's setting in contemporary Richardson Bay. The individual enhancement elements are described below.

2.3.1 Bay beach and sand flat

As described above, the east-facing shore of the island is currently erosional and highly exposed to infrequent but energetic southerly storm waves from the Central Bay. Waves have eroded scarps (low cliffs) and a shelf of rock and mud in artificial terrestrial fill on the east shore.

We propose to address ongoing eastern shore erosion by nourishing the shoreline with natural sand and gravels from San Francisco Bay. Sand, shell, and gravel material will be imported to the site via barge and deposited in three beach enrichment locations along the eastern shoreline. Waves will rework coarser sand and gravel into narrow, steep beach ridges and spits at the high tide line, while the gentler gradient of the low tide terrace will form protective intertidal sand flats.

Low retention barriers to longshore drift (rock micro-groins not exceeding beach height) will be constructed at intervals along the shoreline to aid in the development of beach cells and increase residence time. In addition, a high beach terrace will be constructed at the updrift (southern) end of the island. This feature will provide a re-nourishment (sand and gravel discharge) point for the fringing beach system. This feature is located near the position of historic seal haul-outs adjacent to deep water escape habitat in the navigational channel and therefore may encourage seal use.

This beach and sand flat matrix will reduce the rate of shoreline erosion and add significant habitat benefits for shorebirds and potentially harbor seals. We consider beach nourishment an environmentally superior and more sustainable approach compared to conventionally engineered armoring and stabilization of the shoreline.

2.3.2 Tidal marsh

Along the eastern shoreline, where the new beach ridges partially shelter areas behind them, fill will be excavated to appropriate elevations to form new high salt marsh. This area is proposed as a refuge for native salt marsh plant species diversity and recovery of rare plants. The exposure of dense, infertile rocky terrestrial soil to occasional wave scour would result in a relatively sparse, low, turf-like salt marsh vegetation types that typically support a high diversity of native plants, including rare salt marsh annuals such as Point Reyes bird's-beak.

The sheltered northwestern cove on the island has a pocket of salt marsh where bay mud settles, away from storm wave influence. This salt marsh, which supports more typical pickleweed and cordgrass vegetation, would be expanded by excavating surrounding upland soils, facilitating deposition of bay mud. Topsoil excavated from the southern end of the island during grassland and seasonal wetland enhancement activities may be deposited in this area to support productive salt marsh vegetation. Small tidal creeks would be excavated in resistant substrate to initiate tidal drainage patterns and marsh channel habitat structure for birds and fish.

Large woody debris structures (large tree trunks and branches) will be placed in random clusters along the high tide line of these new tidal marsh areas to offer high tide roosting habitat for shorebirds and other tidal marsh dependent avian species.

2.3.3 Sedge/rush meadow and seasonal wetland matrix

The central "upland" areas of the island would be mostly converted to a particular type of native grassland vegetation found along tidal marsh edges in alluvial, clayey soils in eastern Marin County. This area would consist of a mix of colonial, creeping, sod-forming perennial grasses, sedges, and rushes, that would form dense and continuous cover over years. Accomplishing this goal will involve a process of vegetation removal, substrate re-conditioning to remove existing non-native seed banks and enhance suitability for target species, and replanting with native species.

Seasonal pond and wetland complexes will be constructed within the sedge/rush meadow. Depressions will be excavated and the underlying substrate compacted to reduce drainage. These wetland complexes will support variable wetland vegetation, ranging from uncommon local types of vernal marsh (spikerush, meadow sedge) and vernal pool species (dominated by native annuals).

3.0 Project Phasing

The Aramburu Island Restoration and Enhancement Project will be broken into two phases, which will be funded under separate contracts. In this SEP, we are requesting

funds to complete Phase 1. We anticipate that funding for Phase 2 will be awarded in time so that both phases can be implemented simultaneously. However, should funding for Phase 2 be delayed, Phase 1 will still produce tangible environmental enhancement benefits in addition to completing the Conceptual Enhancement Plan and navigating the regulatory process.

3.1 Phase 1

The following tasks will be completed in Phase 1:

1. Perform a feasibility analysis for the proposed restoration and enhancement design
2. Create the Final Conceptual Enhancement Plan for the entire project
3. Complete CEQA analysis and obtain permits for the entire project
4. Complete the final design plans for bay beach and sand flat enhancement (see section 2.3.1 above)
5. Perform bay beach and sand flat enhancement activities

3.2 Phase 2

The following tasks will be completed in Phase 2:

1. Final design plans for tidal marsh, sedge/rush meadow, seasonal wetland enhancements (see sections 2.3.2 and 2.3.3 above)
2. Perform tidal marsh, sedge/rush meadow, and seasonal wetland enhancements
3. Post-construction habitat monitoring (3 years)

4.0 Project Budget

The budget detail is shown in Table 1. The total project budget, which in addition to all of the above mentioned restoration activities, includes final design, planning, permitting, oversight, and monitoring, is estimated to be **$970,750.** We are requesting **$200,000** to carry out Phase 1 of the project. By performing Phase 1, the SEP will produce tangible habitat restoration benefits with the initial sum of money.

5.0 Project Milestones

Project initiation shall begin within 40 days after approval of the project by the Regional Water Board or its Executive Officer. The project milestones and their anticipated dates of completion are as follows:

Phase 1:

- Complete feasibility analysis and Draft Conceptual Enhancement Plan for entire project: **Spring 2009 or within 3 months of project initiation**
- Complete Final Conceptual Enhancement Plan for entire project: **Summer 2009 or within six months of project initiation**

- Complete CEQA analysis: **Fall 2009 or within twelve months of project initiation**
- Submit permits: **Winter 2010 or within 12 months of project initiation**
- Complete the final design plans for bay beach and sand flat enhancement: **Spring 2010 or within 15 months of project initiation**
- Bay beach and sand flat enhancement construction*: **July – September 2010 or completion within 24 months of project initiation**
- Phase 1 final Project Report submitted by Audubon: **December 2010 or within or within 24 months of project initiation**

Phase 2:**

- Complete Phase 2 final design: **Spring 2010**
- Phase 2 construction*: **July – September 2010**
- Phase 2 final Project Report submitted by Audubon: **December 2010**
- Post-construction habitat monitoring: **December 2010 – January 2013**

* construction schedule accommodates avoidance windows for harbor seals and nesting birds

** timeline assumes that funding through RWQCB CAA program is secured in spring-summer 2009

6.0 Project Management and Oversight

Richardson Bay Audubon Center, a program of the National Audubon Society, will serve as Project Manager. Richardson Bay Audubon Center has retained the services of Wetlands and Water Resources Inc. to design the project and to assist with regulatory compliance.

To ensure completion of commitments and appropriate expenditure of funds, oversight and audit of the project will be conducted by the San Francisco Estuary Project. SASM would file a final report to the Regional Water Board and the oversight/audit entity identified below. The report shall describe the work completed under this project no later than one month after the completion of the portion of the project funded by this SEP.

All reports must be sent to the following:

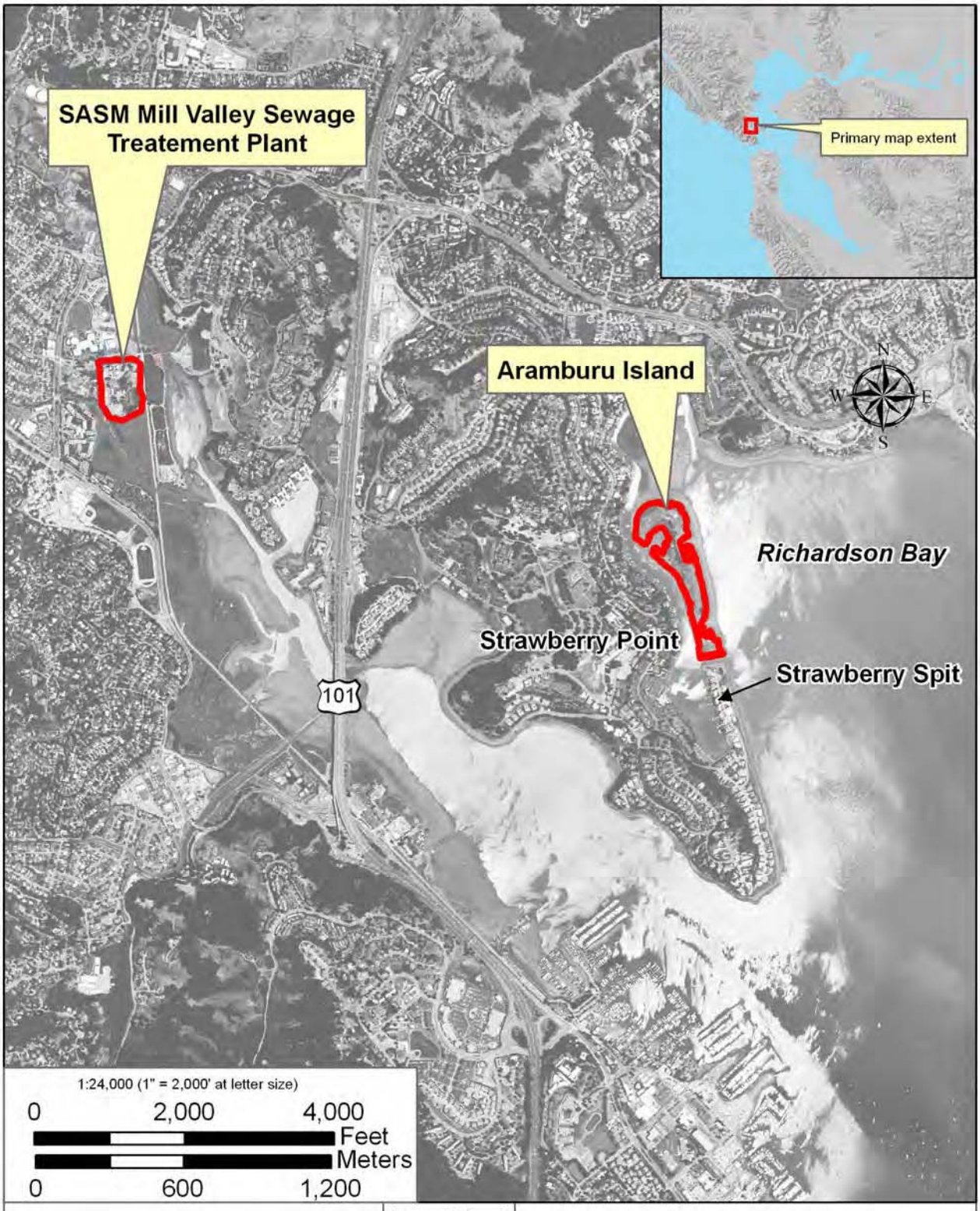
Marc Holmes, Restoration Consultant
San Francisco Estuary Project
1515 Clay Street, Suite 1400
Oakland, CA 94612
(510) 622-2419

Tables and Figures

Table 1: Budget Summary

Task	Total Budget	Budget Phasing		Secured or Requested Funding					
		Phase 1	Phase 2	**Request SEP**	Request CU&A [1]	Secured Bechtel	Secured Toyota	Request Toyota	Total secured or requested
Conceptual Planning and Design									
1 Data collection/analysis and planning	**35,000**	35,000				35,000			35,000
2 Feasibility analysis and draft/final Conceptual Enhancement Plan	**31,000**	31,000		**31,000**					31,000
Permitting/environmental compliance	**35,000**	35,000		**35,000**					35,000
Audubon Project Planning, Management, Implementation	**210,000**	50,000	160,000		120,000		50,000	40,000	210,000
Final Design for Phase 1 construction	**9,000**	9,000		**9,000**					9,000
Final Design for Phase 2 construction	**31,000**		31,000		31,000				31,000
Construction, Phase 1									
1 Bay beach and sand flat enhancement									
Transport and deposit beach material	90,000	90,000		**90,000**					90,000
Construct beach micro groins	10,000	10,000		**10,000**					10,000
2 Construction Monitoring	5,000	5,000		**5,000**					5,000
Construction, Phase 2									
3 Earthwork									
Equipment mobilization	70,000		70,000		70,000				70,000
Tidal marsh enhancement	65,000		65,000		65,000				65,000
Seasonal wetland creation	20,000		20,000		20,000				20,000
Grassland enhancement	75,000		75,000		75,000				75,000
4 Woody debris placement	10,000		10,000		10,000				10,000
5 Vegetation re-establishment	20,000		20,000		20,000				20,000
6 Construction monitoring	20,000		20,000		20,000				20,000
Construction Contingency (35%)	**134,750**		134,750		134,750				134,750
Post-construction habitat monitoring (3 years)	**60,000**		60,000		60,000				60,000
Audubon Education/outreach programs	**20,000**		20,000		20,000				20,000
SFEP Oversight	**20,000**	20,000		**20,000**					20,000
Total project budget	**970,750**	285,000	685,750	**200,000**	645,750	35,000	50,000	40,000	970,750

Notes
1) RWQCB Clean Up & Abatement



Data sources: Photo (NAIP, 2005)
Produced by WWR, Feb 2009
Map file: vicinity-map_2009-0204dag.mxd

WETLANDS AND WATER RESOURCES

VICINITY MAP

Aramburu Island Enhancement Project
Richardson Bay Audubon Sanctuary

February 2009	Project 1145	Figure 1

1:3,600 (1" = 300' at letter size)

0 150 300 600 Feet

0 45 90 180 Meters

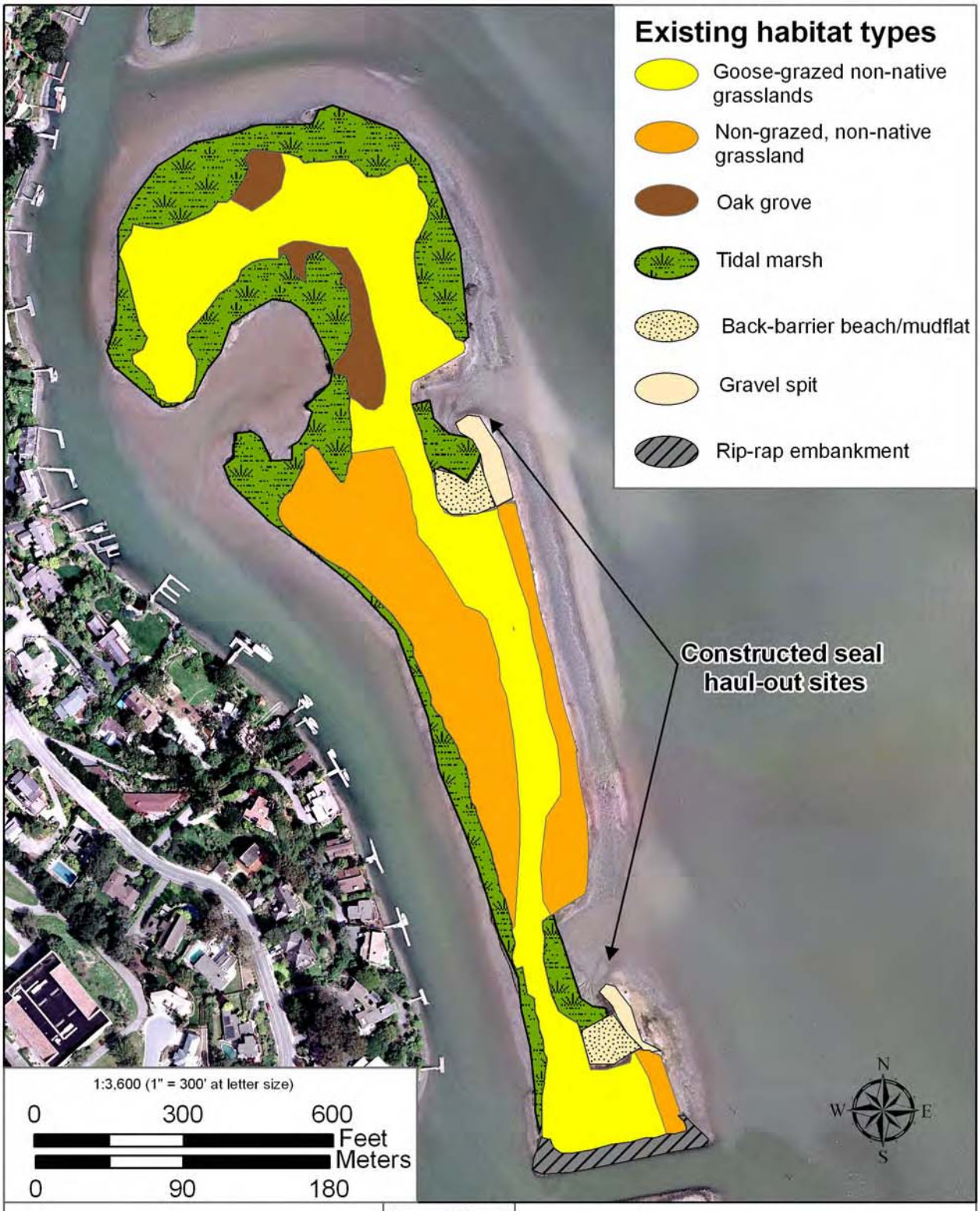
Air photo source: Marin County (2004)
Map file: aramburu-air-photo_2009-0205dag.mxd

WETLANDS AND WATER RESOURCES

AERIAL PHOTOGRAPH

Aramburu Island Enhancement Project
Richardson Bay Audubon Sanctuary

February 2009	Project No. 1145	Figure 2



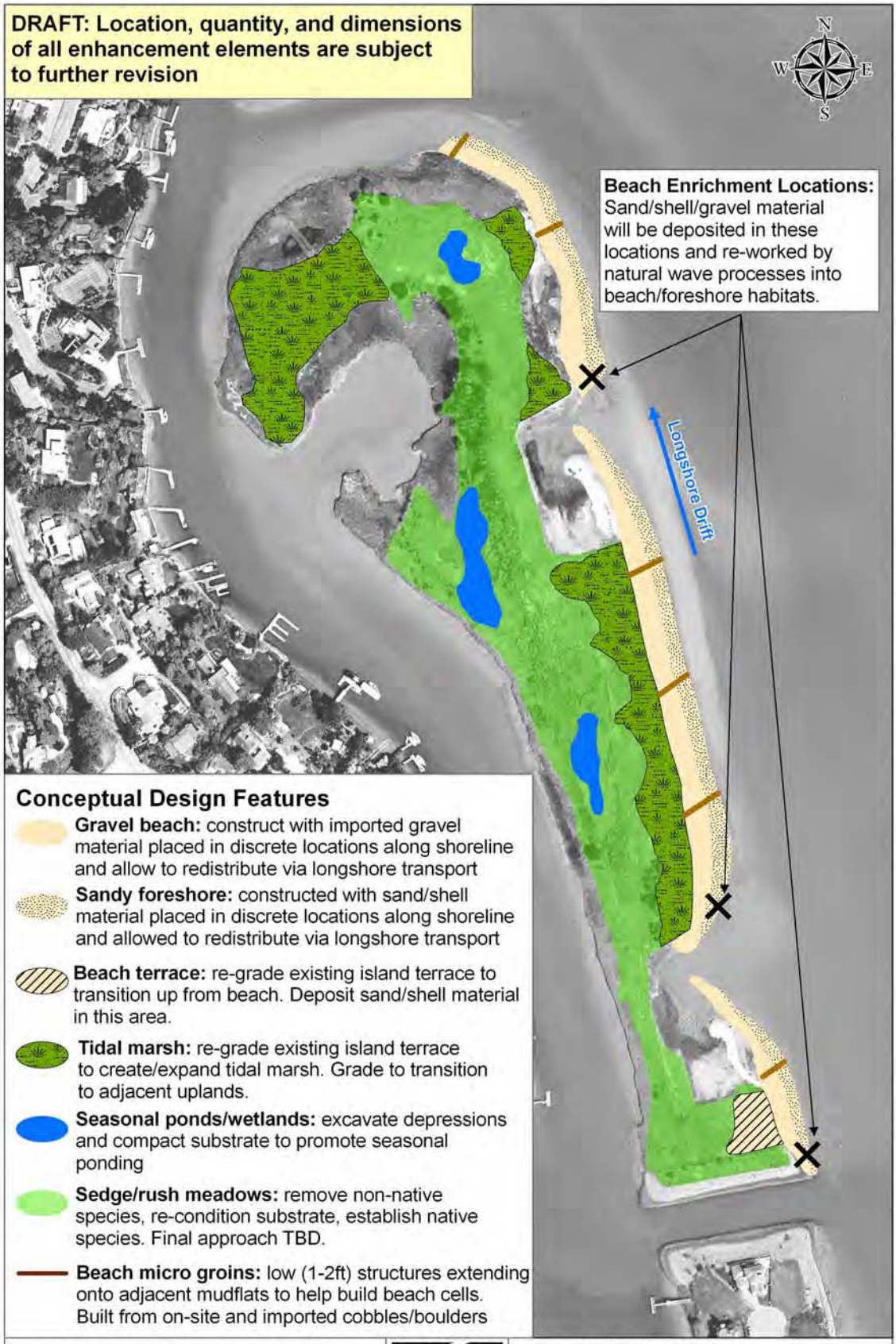
Data sources: habitats (WWR, 2009);
Photo (Marin County, 2004)
Produced by WWR, Feb2009
Map file: current-habitats_2009-0205dag.mxd

WETLANDS AND WATER RESOURCES

EXISTING HABITAT TYPES

Aramburu Island Enhancement Project
Richardson Bay Audubon Sanctuary

February 2009	Project 1145	Figure 3



1:2,400 (1" = 200' at tabloid size)

0 100 200 400 Feet

0 30 60 120 Meters

Air photo source: Marin County (2004)
Map file: aramburu-concept-design-draft_2009-0204dag.mxd

WETLANDS AND WATER RESOURCES

PRELIMINARY CONCEPTUAL ENHANCEMNT DESIGN ELEMENTS

Aramburu Island
Richardson Bay Audubon Sanctuary

February 2009	Project No. 1145	Figure 4

Photographs of Existing and Proposed Conditions

Section 1: Existing Site Conditions

Photo 1: heavily goose-grazed grasslands (photo by Dan Gillenwater, 1/12/2009)

Photo 2: non-grazed grasslands (photo by Christina Toms, 1/29/2009)

Photo 3: oak grove at north end of island (photo by Dan Gillenwater, 1/12/2009)

Photo 4: wave-cut, erosional eastern shoreline (photo by Peter Baye, 1/12/2009)

Photo 5: gravel point-bar and back barrier tidal marsh (photo by Peter Baye, 1/12/2009)

Section 2: Reference Sites for Proposed Conditions

Photo 6: small barrier beach composed of coarse-grained shell fragments and gravels eroded from artificial fill sources along the Bayshore Freeway. Location: Brisbane/Candlestick spit, San Mateo County. (photo by Peter Baye)

Photo 7: eroded, compacted, wave-scoured upland fill in the high tide line, exposing rubble and gravel embedded in heavy sandy clay, supports sparse pickleweed and abundant salt marsh bird's-beak. Location: Pohono St. Marsh, North Sausalito, Marin County. (photo by Peter Baye)

Photo 8: meadow sedge forms pure stands that grade down to tidal marsh edges of Point Pinole. One large colony has spontaneously established at Arumburu Island, indicating high feasibility of active establishment. Location: Point Pinole, Contra Costa County. (photo by Peter Baye)

Photo 9: seasonally flooded shallow pools form in depressions in consolidated, desalinized Bay Mud. Dabbling ducks, shorebirds, and egrets forage in them during flood periods when they produce many prey items, including tree frogs tadpoles, and other aquatic invertebrates. Location: Bahia wetlands, Novato. (photo by Peter Baye)

Photo 10: heron perched on large woody debris in tidal marsh. Location: Pickleweed Island (adjacent to Aramburu Island). (photo by Peter Baye)