

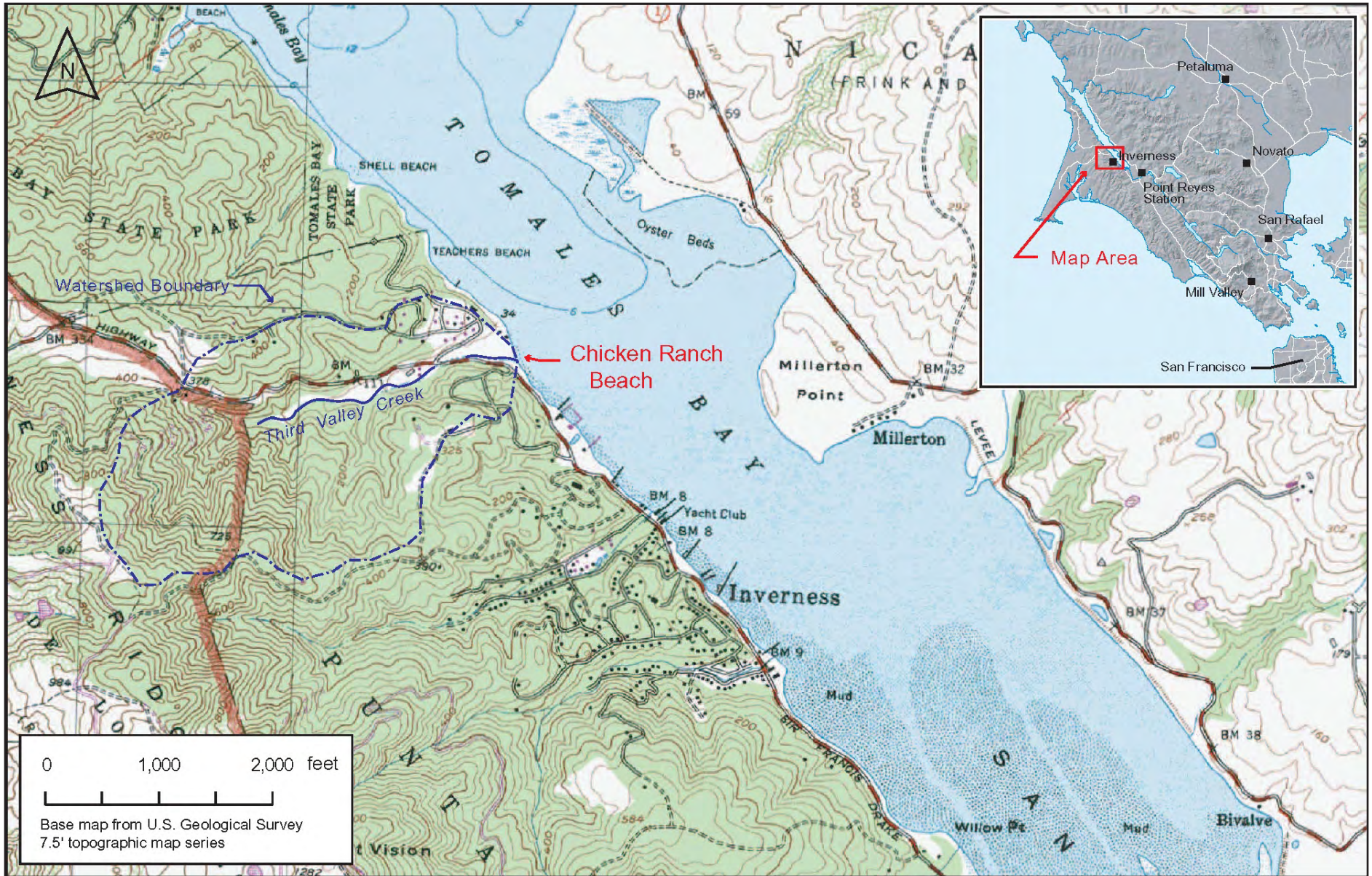
**Project Area**

Chicken Ranch Beach and lower Third Valley Creek are located along the west shore of Tomales Bay near the town of Inverness in Marin County, California (Fig. 1-1). The beach, located at the east end of the project area, is a three acre county-owned park and a popular destination for locals and visitors. It is used for swimming, nature observation, and as a kayaking access site. Third Valley Creek flows into Tomales Bay at the beach. Upstream of the County-owned beach, the project area consists of a State Lands Commission parcel and additional privately owned lands.

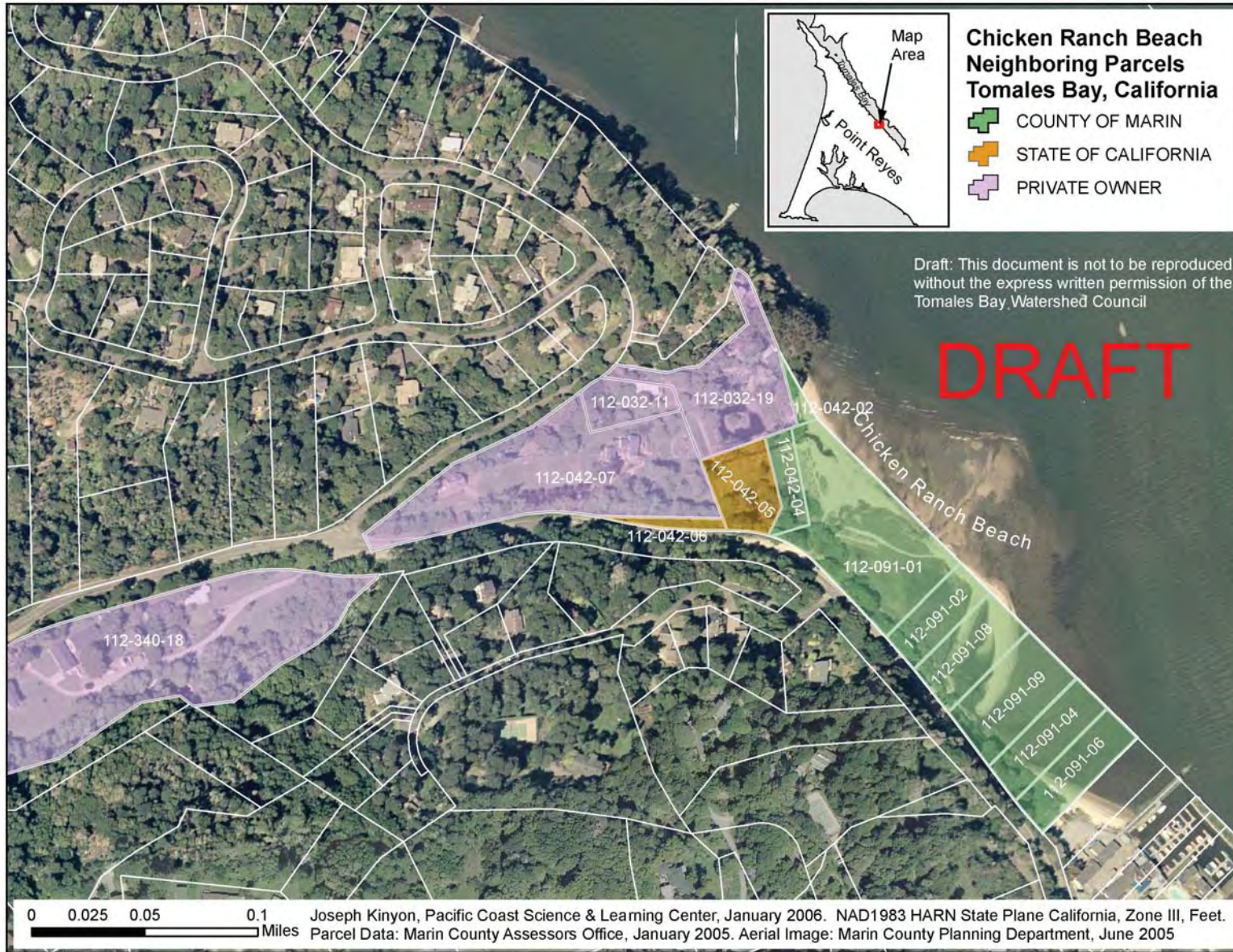
The proposed restoration project area includes Chicken Ranch Beach and the lower reach of Third Valley Creek extending approximately 1,500 feet upstream from the beach. For purposes of this investigation and report, the proposed project area is depicted by the shaded parcels on Figure 1-2, including: County of Marin parcels (shaded green); parcels owned by the state of California and managed by the State Land Commission (shaded orange); and privately owned parcels (shaded purple). Table 1-1 tabulates the proposed project area parcels by parcel number, general location and owner.

<b>Parcel Number</b>	<b>Owner</b>	<b>General Location</b>
112-042-02	County of Marin	Beach
112-042-04	County of Marin	Beach
112-091-01	County of Marin	Beach
112-091-02	County of Marin	Beach
112-091-04	County of Marin	Back Beach
112-091-06	County of Marin	Beach
112-091-08	County of Marin	Beach
112-091-09	County of Marin	Beach
112-042-05	State of California	Back Beach
112-042-06	State of California	Creek Side
112-032-19	Whitney	Back Beach – N. Valley
112-032-11	Williams	N. Valley Slope
112-042-07	Keller	Central Valley Bottom
112-340-18	Adkins (Inverness V. Inn)	Upper Valley Bottom

**Table 1-1. Parcels that constitute the proposed project area.**



**Site Location Map**  
*Third Valley Creek and Chicken Ranch Beach Restoration*



KAMMAN HYDROLOGY  
& ENGINEERING, INC.

### Project Site Parcels and Ownership

*Third Valley Creek and Chicken Ranch Beach Restoration*

FIGURE

1-2

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The County owns and maintains a three acre community park including approximately 1,200 feet of the shore from the north end of Chicken Ranch Beach to a small marina south of the project area. The SLC covers an area of about 0.7 acres to the west of the beach and is bounded to the south by Sir Francis Drake Boulevard and to the north and west by privately owned lands (the Whitney parcel and Keller parcel, respectively). The Keller parcel encompasses approximately 3.13 acres of the valley bottom and is bounded by Sir Francis Drake Boulevard to the south and Camino Del Mar to the north. The property across Sir Francis Drake Boulevard and immediately west of the Keller Parcel is owned by the Inverness Valley Inn. The County maintains a drainage easement along Third Valley Creek at the south end of the Keller parcel and an access easement through the SLC parcel.

#### Project Objectives

Historical disturbances and environmental impacts, primarily caused by human activities, have altered the natural characteristics of the site. The Tomales Bay Watershed Council (TBWC) is leading an effort to restore a self-sustaining riparian and wetland system in the lower reaches of Third Valley Creek and adjacent areas. Objectives of the proposed project include improving water quality conditions and enhancing wetland, riparian and aquatic habitats. More specifically, project objectives include:

- Reduce sedimentation and bacteria to Tomales Bay;
- Improve wetland habitats in the project area, expanding the patchwork of wetlands along the Tomales Bay shoreline;
- Restore a functional floodplain along the bottom reaches of Third Valley Creek with no increase in flooding potential on adjacent lands; and
- Improve aquatic and riparian habitat in the system.

The restoration planning effort is being managed by the Chicken Ranch beach Committee of the TBWC, with participation from the Coastal Conservancy, the County of Marin, private landowners and public stakeholders. The TBWC retained Kamman Hydrology & Engineering, Inc. (KHE) to develop a restoration plan for the Third Valley Creek and Chicken Ranch Beach project area with assistance from May & Associates, Inc. (wetland ecology) and Avocet Research Associates (wildlife and sensitive species assessments). The KHE team assessed the

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existing and historical conditions of the project site, evaluated restoration opportunities and constraints, and developed a suite of conceptual restoration design alternatives.

This report documents the approach and findings from the KHE team's assessments and describes the proposed restoration alternatives. The report consists of six chapters. Chapter 1- Introduction, summarizes the background, purpose and need for this study and report. Chapter 2 (Existing Physical and Water Quality Conditions) presents the results of hydrologic and geomorphic analyses completed by Kamman Hydrology and Engineering, Inc. and also addresses creek diversions, groundwater hydrology, flood hydrology and coastal landforms and processes. A characterization of site vegetation and wetland conditions is presented in Chapter 3 (Existing Vegetation and Wetland Conditions) as prepared by May & Associates, Inc. Chapter 4 (Existing Wildlife Conditions) presents the results of Avocet Research Associate's assessment of biological site conditions, with emphasis on sensitive and endangered species. A summary of historical impacts and changes in site conditions is presented in Chapter 5, while Chapter 6 presents a description of site environmental conditions at the reference study site Indian Beach. Chapter 7 presents the opportunities and constraints to restoration actions within the project study area and Chapter 8 presents a suite of conceptual restoration Alternatives. Finally, Chapter 9 presents conceptual cost estimates for each of the conceptual restoration alternatives as well as a summary of the next steps necessary in implementing restoration actions at the project site.

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## **Opportunities**

- **Geomorphic Opportunities** – The Keller, Whitney and SLC parcels are much lower in elevation than the existing creek channel bed elevation, providing desirable conditions for restoring the creek to the middle of the valley bottom with an expanded floodplain.
- **Reduced Maintenance Requirements** – Acquisition of the Keller parcel would eliminate the conditions and long-term maintenance requirements stipulated in the Settlement Agreement with litigation tied to the Keller parcel and described in Section 6.2, below.
- **Beach Wetland Enhancement** - The evolution and trend of barrier beach (sand spit) development along the southern half of the project beach has lead to the formation of a back barrier wetland system, which suffers from poor water quality conditions during the dry season. Redirecting the creek into this wetland system will improve circulation and water quality. Redirecting the creek channel into this marsh would also maintain a better developed internal channel network and connection to Tomales Bay, improving tidal exchange and water quality. The introduction of freshwater would also reduce marsh salinity and help develop more rare and desirable brackish marsh conditions.
- **Barrier Beach Enhancement** – As part of redirecting the creek channel into the back barrier wetland, sand will need to be excavated, especially through artificial berms that currently serve as primary trails across the beach. This material can be reused locally to buildup and enhance the barrier beach to the north of the realigned creek.

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- Increased Sediment Storage Area and Reduced Sediment Inputs– A benefit of floodplain expansion is an increased area for sediment storage that would otherwise be transported downstream. Reducing the sediment load to the lower reaches of the creek and beach wetlands will contribute to the long-term benefits and sustainability of restoration actions proposed in these areas. The creation of new floodplains would eliminate sediment loads that would otherwise eventually be deposited into beach wetlands (SLC and barrier beach marshes).
  
  - Improved Instream Aquatic Habitat – Currently, the creek channel through the project reach displays signs of being straightened and channelized in an effort to control flooding and drainage. Restoring more sinuosity and topographic diversity in the channel through excavation and placement of instream wood structures will increase the amount and quality of cover and rearing habitat for salmonids and other aquatic organisms per recommendations discussed in Section 4.3.2 of this report.
  
  - Floodplain Restoration - Floodplain enhancements that introduce topographic diversity will generate greater sustainable habitat diversity as well as improve aquatic organism habitat and high flow refugia for fish. One specific opportunity includes restoring the old pond at the Inverness Valley Inn to floodplain.
  
  - Riparian Vegetation Enhancements - Revegetation efforts along the creek corridor and floodplain will provide a source of large wood recruitment and in channel/floodplain structures that will improve and sustain diverse and better quality aquatic habitat.
  
  - Improved Avian Habitat – Restoring the floodplain and riparian corridor will improve nesting and resting habitat for avian species.
  
  - Shallow Groundwater Conditions – The shallow groundwater conditions that occur year-round beneath the project site will provide a reliable water supply for riparian species as well as freshwater supply to receiving wetlands, both seasonal freshwater and tidal. This

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will be an important condition give the reduced summer creek flow due to upstream water diversions.

- Improved Groundwater Recharge – Redirecting some of the surrounding tributary drainages onto a created floodplain in lieu of expressing water through ditches and pipes to the creek, will allow the water to disperse more widely and pond in depressions – actions that will benefit ecological habitats directly or indirectly by increasing the net volume of recharge to the underlying shallow aquifer. Increased recharge may translate into increased supply/storage, shallower water table depths, and improved water supply to riparian plants and other reliant habitats. This may help ameliorate losses in summer creek flow due to upstream diversions.
  
- Improved Public Access – Retaining the Keller parcel driveway and service road berm provides an opportunity to accommodate trails and public access to the project site. If extended along the entire length of the southern project boundary adjacent to Sir Francis Drake Blvd., a project trail could alleviate hazards to pedestrians traveling along the boulevard.

### **Constraints**

- Property Ownership - Implementation of any aspect of the project requires approval and participation by public land owners (County of Marin and State Lands Commission) and private landowners (Whitney and Keller parcels).
  
- There has been a long history of litigation between the SLC, County, former Keller parcel owners (Cirincione-Coles) and California Coastal Commission regarding parcel ownership and site drainage, which has resulted in a Settlement Agreement that places a number of restrictions and conditions on properties that constrain restoration (Litigation Settlement Agreement, 1990<sup>10</sup>). The main conditions stipulated in the Settlement Agreement include: a) at the request of the Keller parcel owner, SLC shall complete vegetation clearing on the SLC parcel to preserve a bay

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<sup>10</sup> The Settlement Agreement involved the prior owners of the Keller parcel, Kathryn and Gerald Cirincione-Coles.

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- view from the Keller house; b) SLC shall maintain the drainage that enters the SLC parcel on the north and passes through the SLC parcel (Channel B) without the need for permits; c) the County is required to maintain the southerly drainage easement (creek channel) but the owner of the Keller parcel has the option to maintain the drainage at their own expense, including removal of up to 250 cubic yards of material per year without a permit<sup>11</sup>; d) owners of the Keller parcel may maintain the northern drainage in a manner consistent with County code; e) the SLC may remove pampas grass and scotch broom from their property so it does not spread off-site; f) the SLC agreed that marsh restoration on their parcel would be conducted in a manner that does not unreasonably impact the Keller parcel; g) SLC agrees to lease their parcel lying south of the creek to the County for use as a public pathway; h) the SLC must grant and maintain the Keller parcel owner an 10-foot wide easement along the berm that presently exists on the north side of the creek through the SLC parcel, providing the Keller parcel owner a pedestrian and bicycle access to the beach, which shall not be withheld or relocated in the event the SLC parcel undergoes marsh restoration (page 33 of Settlement Agreement); i) the County shall maintain fencing and screening vegetation along Sir Francis Drake Blvd. to protect the Keller parcel privacy.
- Creek Water Diversions – Currently, the Inverness Public Utility District is diverting considerable amounts of water from the upper Third Valley Creek watershed, at two diversion points. Diversions occur on average from July through December, but year-round during dry year types. The loss of water during this period likely adversely impacts downstream aquatic habitat.
  - Existing Flooding Conditions – The low elevations of the project site leave it susceptible to flooding by creek flows or tidal waters that are introduced into the lower elevation portions of the site.

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<sup>11</sup> As of January 2010, the County has issued plans to remove approximately 35 cubic yards of sediment from a 270-foot reach downstream of the Sir Francis Drake Blvd. culvert, with an estimated future excavation of 7 cubic yards annually.

- Existing Private Infrastructure – Some excavation and grading activities may require relocating large volumes of earth if filled areas are reclaimed to natural grades. There may also be utility poles and a water supply system that would need to be abandoned and removed.
- Existing Public Infrastructure – The current creek crossing beneath Sir Francis Drake Blvd. is a pair of 42”-diameter 320-foot long culverts that likely inhibit fish passage. Restoring anadromous fish to the upper watershed may require replacing this crossing with a shorter and more fish-friendly crossing. Realizing the full opportunity for creek and floodplain restoration through the Keller parcel requires redirecting Third Valley Creek to the far west end of the parcel.
- Leveed and Constrained Creek Channel – Third Valley Creek through all portions of the site has been redirected to the south side of the valley and constrained by either excavation and/or levee creation. As a result, the current creek channel bed is significantly elevated higher than the low-lying central portions of the valley bottom. Redirecting the channel or lowering the adjacent levees would increase flood hazards to all parcels.
- Restricted Tidal Exchange – Because of the elevated channel bed and constrained nature of the creek channel, it does not permit significant tidal exchange upstream of the existing beach foot bridge, restricting the development or maintenance of tidal wetlands.
- The steep and narrow condition of the creek corridor upstream of the stipulated project area precludes any significant or realistic restoration actions upstream of road crossing culvert adjacent to the Inverness Valley Inn office building.

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## Alternatives

KHE worked closely with the TBWC Chicken Ranch Beach Committee to develop a range of conceptual alternatives that maximize site opportunities to enhance natural hydrologic, geomorphic and ecologic processes that are limited due to current land use and constraints discussed above. Restoration design alternatives will be developed based on project objectives, the physical and ecological site conditions, public input, and restoration constraints and opportunities. In addition, the alternatives reflect careful consideration of special status species in terms of both modifications to existing habitats and enhancements designed to protect existing habitats and foster development of new or expanded habits. The conceptual alternatives reflect several design iterations and encompass assessments of biotic response to existing and anticipated hydrologic and geomorphic conditions on site. Detailed field investigations and numerical modeling assessments serve as the basis for KHE's assessment of site hydrologic and water quality conditions and the supported habitats described below.

### **No Action**

Figures 2-1 and 2-2 summarize the existing conditions associated with this alternative. No modifications to the project site are proposed under this alternative. Proposed actions are designed to maintain existing levels of flood protection and drainage from surrounding properties and public streets.

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## **Alternative 1**

Figure 7-1 summarizes the conceptual restoration features associated with Alternative A. This alternative restricts enhancements to the County and Inverness Valley Inn parcels. The key elements of this conceptual alternative include the following.

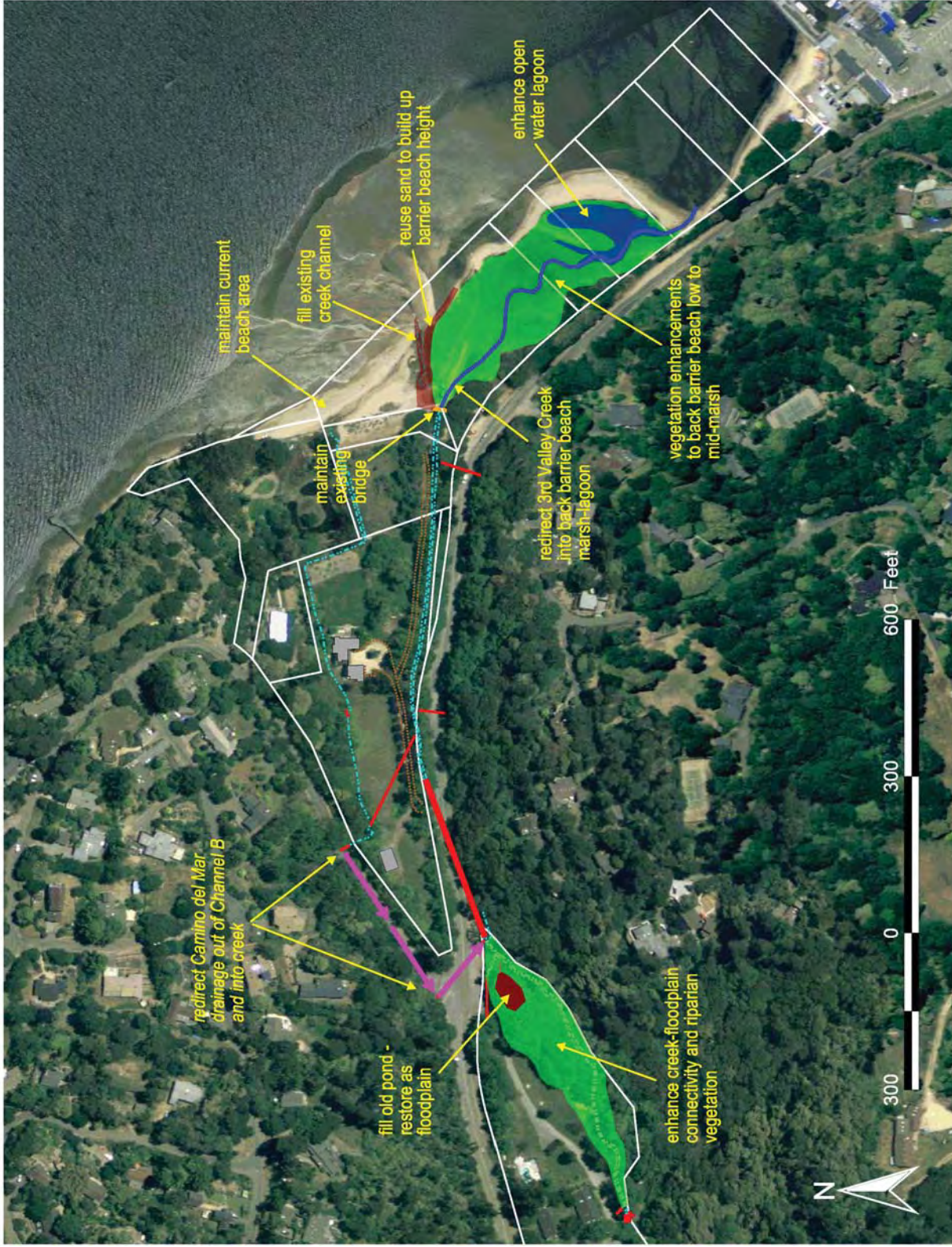
- Maintain drainage through Channel B and across the beach to Tomales Bay.
- On the County parcels, immediately downstream of the existing foot bridge, redirect Third Valley Creek to the south into the back barrier beach wetland to enhance this marsh-lagoon system. This action would require excavating a new channel through some elevated paths on the beach and through the northern half of the marsh to the approximate location of the existing open water lagoon. Sand supporting the elevated foot-paths would be pushed to the north to assist in redirecting and retaining the realigned creek flow and build up the outboard barrier beach. Some excavation could also occur to enhance the open-water lagoon and work would be done to remove invasive species and revegetate with native high- to low-marsh species. The existing foot bridge would be protected and retained.
- On the Inverness Valley Inn parcel, restoration actions would consist of removing/filling the existing pond and reclaiming this area to natural floodplain grades. Actions would also include invasive species removal and revegetation with native species. Other potential actions include: a) lowering creek banks in selected locations to increase the frequency of overbank flooding onto the adjoining floodplain; b) installing instream wood structures to increase pool formation and improve aquatic habitat; and c) realigning the creek to increase channel length (decrease) slope in an effort to promote sediment aggradation and increase overbank flooding.
- As discussed above, a constraint to restoration actions on the SLC parcel includes the maintenance and continued function of drainage from Channel B to Tomales Bay. Although Channel B will not be altered under Alternative 1, redirecting runoff to Channel B is anticipated to reduce the volume of poor quality water introduced in the beach recreation area. In order to address and alleviate the water quality and drainage constraint, an important

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element of Alternatives 1 through 3 includes redirecting drainage (Watershed A, Fig. 2-4) that crosses and enters the site from Camino del Mar along the northern boundary of the Keller parcel away from Channel A and B drainage ditch network. Under Alternatives 1 through 3, this will be accomplished by constructing the proper drainage infrastructure to redirect runoff down Camino del Mar to a storm drain inlet that feeds an existing or improved line under Sir Francis Drake Blvd., with an outfall to Third Valley Creek. This action will effectively eliminate a substantial portion of runoff from entering the Channel B network. Results of our storm flow analysis suggest that the majority of peak flow runoff to Channel A will be reduced. The western portion of Channel B not filled as part of SLC marsh creation will be directed into the marsh. Under Alternatives 1 through 3, Channel A will only carry local storm runoff and flows originating as groundwater seepage, with very little if any flow anticipated in the summer.

## **Alternative 2**

Figure 7-2 summarizes the conceptual restoration features associated with Alternative 2. The proposed restoration actions build on those activities presented under Alternative 1. This alternative expands enhancements on the State Lands Commission (SLC) parcel in addition to those already discussed on the County and Inverness Valley Inn parcels. The key additional elements of this conceptual alternative include filling Channel B and lowering the grade over a large portion of the SLC parcel by 1- to 2-feet in order to establish tidal-marsh habitat. In order to accomplish this objective, the downstream creek channel will need to be deepened and extended into the newly created SLC marsh in order to enhance tidal exchange. In order to maximize brackish water salinity in the SLC marsh, Third Valley Creek will be directed into the SLC marsh after it enters the parcel from the west. In order to adhere to the Settlement Agreement condition that requires maintenance of beach access from the Keller parcel, pedestrian bridges will need to be constructed across the new channels between Third Valley Creek and the created wetlands on the SLC parcel. The existing creek channel corridor through the SLC parcel will be retained in order to accommodate drainage from an existing culvert directed from Sir Francis Drake Blvd. and also to act as a high flow bypass channel during storms.



**Plan View of Alternative 1**

*Third Valley Creek and Chicken Ranch Beach Restoration*

FIGURE  
7 - 1

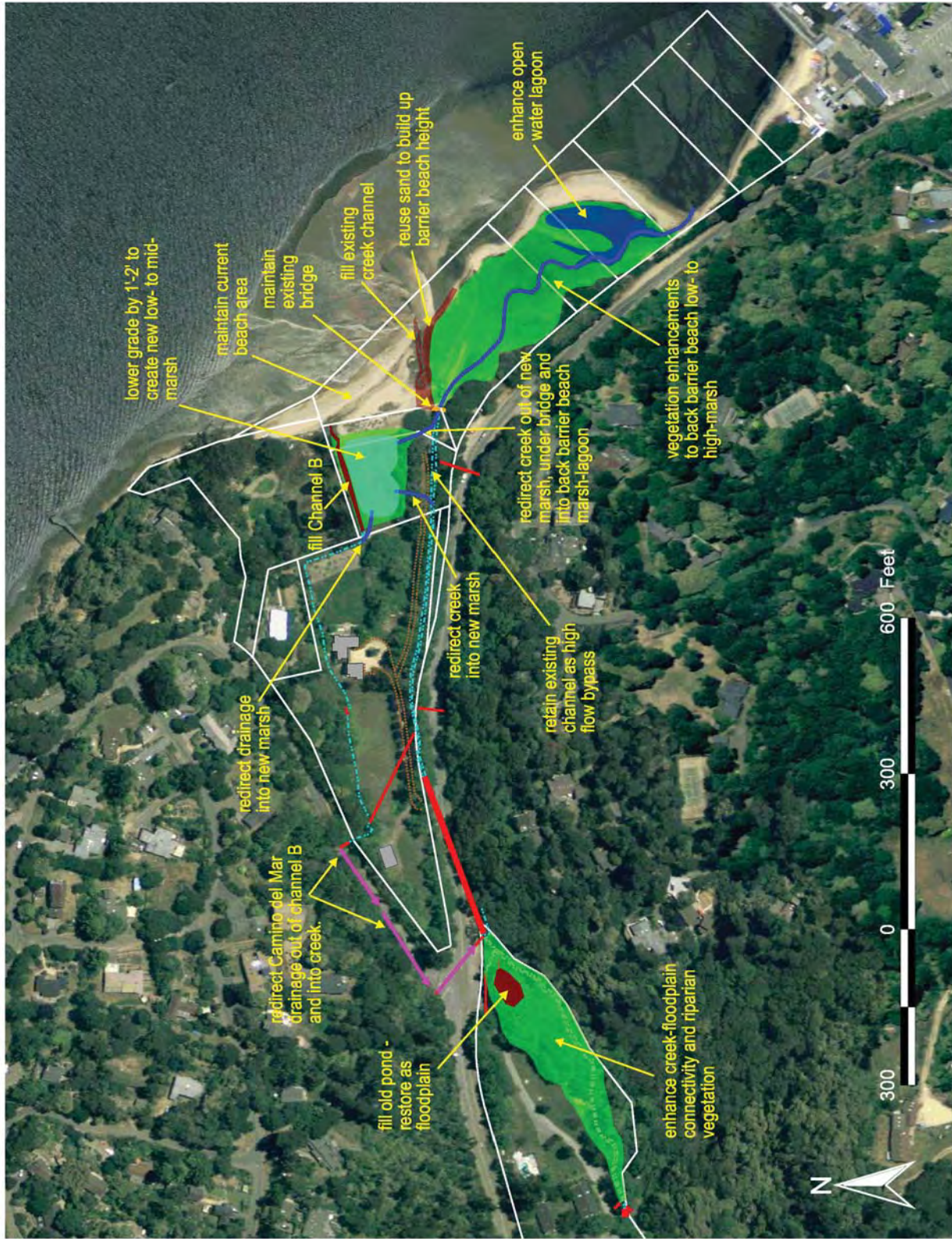


FIGURE  
7-2

Plan View of Alternative 2  
Third Valley Creek and Chicken Ranch Beach Restoration

### **Alternative 3**

Figure 7-3 summarizes the conceptual restoration features associated with Alternative 3. The proposed restoration actions build on those activities presented under Alternative 1 and 2.

This alternative expands enhancements onto the Whitney parcel in addition to those already discussed on the County, Inverness Valley Inn and SLC parcels. The key additional elements of this conceptual alternative include expanding the SLC marsh northward to include the Turtle Pond on the Whitney parcel. This alternative also includes filling an additional \_\_\_-foot segment of the Channel A drainage ditch immediately west of the SLC parcel<sup>12</sup> and redirecting the upstream segment of the ditch directly into northwest corner of the SLC marsh. In order to reduce backwater flooding from the SLC marsh onto the Keller parcel, a low earthen berms is proposed for construction along the western boundary of the SLC parcel. This berm would tie-in to the existing Whitney parcel berm (currently surrounding Turtle pond) at its north end and the Third Valley Creek levee-berm to the south. The Whitney's have requested that in return for use of their property for ecosystem enhancement, the project include fill placement to elevate their driveway cul-de-sac and alleviate current nuisance flooding during winter months.

### **Alternative 4**

Figure 7-4 summarizes the conceptual restoration features associated with Alternative 4. The proposed restoration actions build on those activities presented under Alternatives 1 through 3. This alternative expands enhancements on the Keller parcel in addition to those already discussed on the County, Inverness Valley Inn, SLC and Whitney parcels. The key additional elements of this conceptual alternative include the following (from upstream to downstream).

- Realignment of Third Valley Creek into the improved riparian/floodplain corridor on the Inverness Valley Inn parcel. This realignment would be completed in order to effectively lengthen the channel in order to promote sediment aggradation and channel shallowing –

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<sup>12</sup> Filling the Channel A drainage ditch in Alternative 3 will require permission and cooperation with the Keller property owner.



FIGURE  
7-3

Plan View of Alternative 3  
Third Valley Creek and Chicken Ranch Beach Restoration

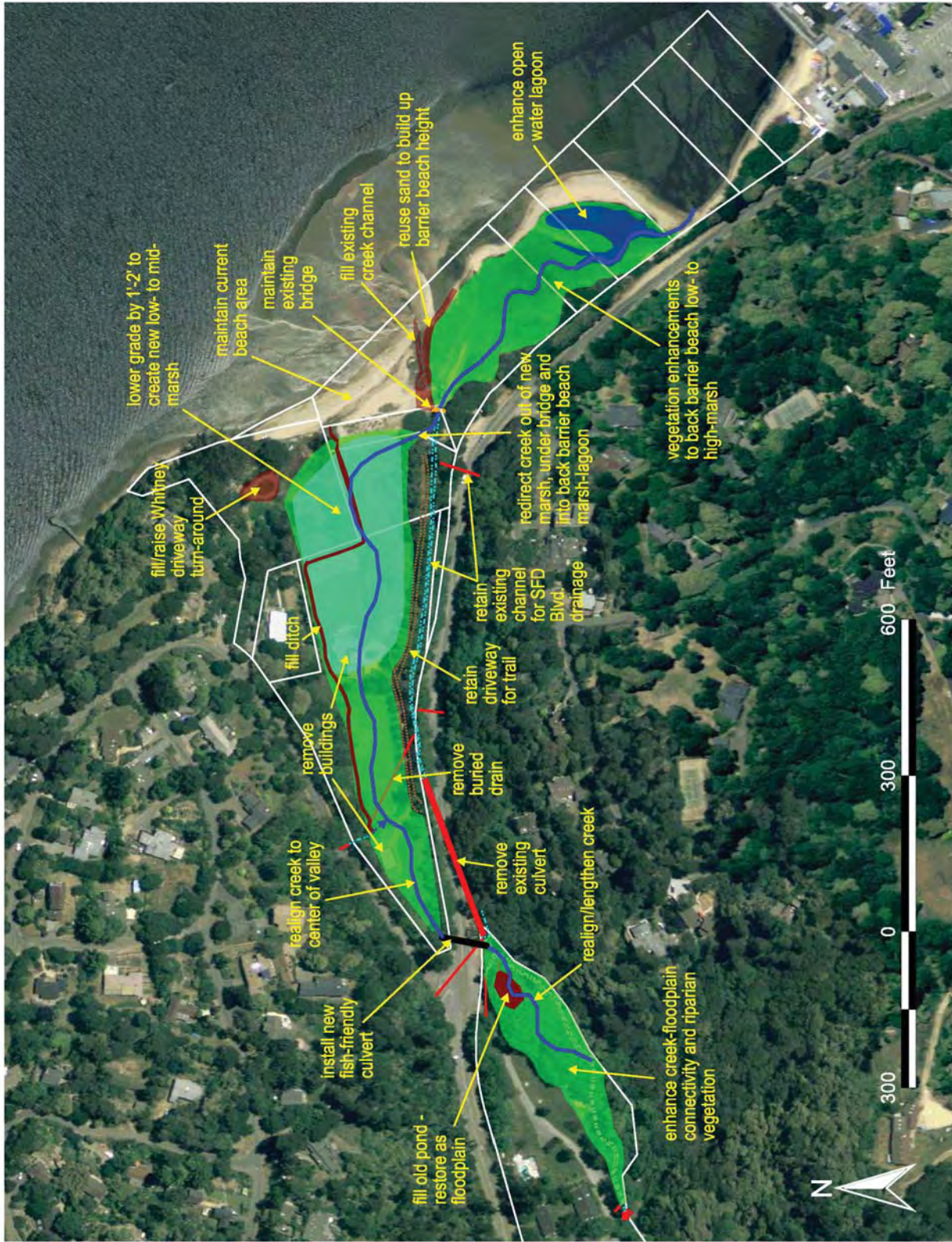


FIGURE  
7 - 4

**Plan View of Alternative 4**  
*Third Valley Creek and Chicken Ranch Beach Restoration*

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changes that will increase the frequency of overbank flooding and improve floodplain and riparian corridor habitat.

- Removal of the existing culvert under Sir Francis Drake Blvd. and replacement with a shorter, fish-friendly culvert to improve salmonid passage. An objective from this change is to direct the creek into the far west end of the Keller parcel and provide a longer earthen and riparian channel corridor as opposed to one that would be shorter if the creek remains directed through the existing culvert.
- Acquisition of the Keller Parcel in order to expand ecosystem enhancements into the valley bottom. The primary infrastructural changes that would be made on the property include: removing the site house and barn; removing the buried drain that crosses the central portion of the site; and filling the remainder of the drainage ditch that feeds former Channel B.
- Drainage from Camino del Mar would not need to be redirected down the road as described for Alternatives 2 and 3. Acquisition of the Keller parcel would relieve the conditions of the Settlement Agreement and need to maintain the Channel B drainage. Therefore, the Camino del Mar drainage would be directed to the valley bottom and into the realigned Third Valley Creek just downstream of the current barn location.
- In concert with creek realignment, riparian vegetation plantings would be completed within the entire western valley bottom of the Keller parcel. Invasives and non-native species would be removed. Instream wood structures would be installed to optimize aquatic habitat and some floodplain depressions and backwaters would be excavated to enhance seasonal freshwater wetlands and high flow refugia for fish.
- The eastern half of the Keller parcel would be excavated to optimize creation of brackish and salt marsh habitat. Associated revegetation would be completed as part of this work.

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- The Keller's current creek levee that serves as a site driveway and beach easement through the SLC parcel would be retained and used to accommodate a public access trail.
  - The existing creek channel running along the southern property boundary of the Keller and SLC parcels would also be retained to service the two storm drains that originate from Sir Francis Drake Blvd.

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## **Alternative Cost Estimates**

Preliminary cost estimates for construction of proposed conceptual restoration alternatives are provided below. The level of detail and order of magnitude of costs used to develop these estimates is consistent with the conceptual nature of the proposed alternatives. Table 8-1 below summarizes the total cost of each conceptual alternative. Individual alternative cost estimates are presented in Appendix H of the full report.

<b>Item</b>	<b>Total Cost</b>
Alternative 1	\$ 212,000
Alternative 2	\$ 274,000
Alternative 3	\$ 285,000
Alternative 4	\$2,919,000

**Table 8-1. Summary of Preliminary Cost Estimates for Alternatives 1 through 4.**

Predicting material and equipment fuel costs and the bidding climate when the project is bid is difficult and therefore the unit costs were not inflated. The estimated costs are based on the primary alternative elements as described above. Where actual units, such as cubic yards of cut or fill material were available or quantified, they were used.

The list below provides items that were not included in preliminary cost estimates, but should be considered and included as part of the overall project budget.

1. Permit preparation and agency consultation
2. Special studies that may be required to support design and permitting efforts
3. Mitigation plans and design
4. Demolition or rehabilitation of existing house and barn on Keller property.
5. Temporary exclusion fencing