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CONCEPTUAL ALTERNATIVES REPORT FOR CALABAZAS/SAN TOMAS AQUINO CREEK–MARSH CONNECTION PROJECT

PREPARED FOR

Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118

PREPARED BY

Stillwater Sciences
2855 Telegraph Ave., Suite 400
Berkeley, CA 94705

Stillwater Sciences
Schaaf & Wheeler Consulting Civil Engineers
SFEI | Aquatic Science Center
rincon
Kearns & West
pathways Climate Institute
Cinquini & Passarino, Inc. Geospatial Solutions

Valley Water staff and the following subcontractors provided technical contributions during Conceptual Alternatives development:

Anchor QEA
Pathways Climate Institute
Rincon Consultants
San Francisco Estuary Institute
Schaaf & Wheeler

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Cover photo: Areal view of Coyote Creek, San José, California (Dick Lyons 2017)

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Appendix A. Agendas and Notes from Stakeholder and Community Outreach Workshops and Meetings

List of Acronyms, Abbreviations and Common Terms

Acronym / Abbreviation / Term*	Definition
A8 Ponds	interconnected Ponds A5, A7, A8N, A8S, owned and managed by the U.S. Fish and Wildlife Service
ADCP	acoustic doppler current profiler
ALERT	Automated Local Evaluation in Real Time
ALSL	Alviso Slough
AMP	Adaptive Management Plan
APE	Area of Potential Effects
ASCII	American Standard Code for Information Interchange
ASV	Automatous Surface Vessel
AWOIS	Automated Wreck and Obstruction Information System
BA	Biological Assessment
BACI	Before After Control Impact
backwater habitat	side channels that provide slack water aquatic habitat and dead-end and off-channel habitat used by aquatic organisms
BAF	Bioaccumulation Factors
Bay Trail	San Francisco Bay Trail
BCDC	San Francisco Bay Conservation and Development Commission
berm	constructed feature to control flow of water
berm degrade	removal of a segment of pond berm to a particular elevation to allow greater water flow
berm removal	complete excavation of a portion of an existing pond berm down to natural channel bed or pond bottom elevation
BMP	best management practice
BO	Biological Opinion
Board	Valley Water Board of Directors
BOEM	Bureau of Ocean Energy Management
BPAC	Bicycle and Pedestrian Advisory Commission

Acronym / Abbreviation / Term*	Definition
BRE	Biological Resources Evaluation
breach	removal of section of berm or levee to allow water flow
ºC	degrees Celsius
CAD	Computer-aided Design and Drafting
CAL FIRE	California Department of Forestry and Fire Prevention
Caltrans	California Department of Transportation
CARB	California Air Resources Board
CCMA	Climate Change Mitigation and Adaptation
CCR	California Code of Regulation
CDFW	California Department of Fish and Wildlife
CDPH	California Department of Public Health
CDPR	California Department of Pesticide Regulation
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFGC	California Department of Fish and Game Code
CFR	Code of Federal Regulations
cfs	cubic feet per second
CGS	California Geological Survey
CHRIS	California Historical Resources Information System
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
coastal flood scenario	hydraulic modeling scenario to be used for evaluating extreme high tide events with a likelihood of occurring once in a 100-year period
CRAM	California Rapid Assessment Method
creek re-alignment / re-route	changing the existing course of a waterway
CRHR	California Register of Historical Resources
CSCC	California State Coastal Conservancy
CSLC	California State Lands Commission

Acronym / Abbreviation / Term*	Definition
CSM	Conceptual Site Model
culvert	subterranean structure that channels water past an obstacle such as a berm or road; typically embedded and surrounded by soil; may be made from a pipe, reinforced concrete, or other material
CWA	Clean Water Act
CWMW	California Wetlands Monitoring Workgroup
DEM	digital elevation model
ditch block	placement of material within an active waterway to block natural flow
DO	dissolved oxygen
DOC	dissolved organic carbon
DPM	Deputy Project Manager
DPR	Department of Parks and Recreation
DPS	distinct population segment
DTSC	Department of Toxic Substances Control
EC	electrical conductivity
ecotone	a gradually sloping surface transitioning from tidal aquatic to upland habitats
EFH	Essential Fish Habitat
EIA	economic impact area
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
ESU	Evolutionarily Significant Unit
°F	Degrees Fahrenheit
FAC	Facultative
FACW	Facultative Wetland
FEMA	Federal Emergency Management Agency

Acronym / Abbreviation / Term*	Definition
FESA	Federal Endangered Species Act
FGC	Fish and Game Code
FHWA	Federal Highway Administration
flashboard	removable boards to adjust height of dam or overflow weir
flood protection element	constructed or natural berm, levee, wall, or other structure used to prevent flooding
fluvial flood scenario	hydraulic modeling scenario assuming riverine discharges of variable return periods between 10 and 100 years
fps	foot or feet per second
freeboard	difference between crest elevation of flood protection structure and level of service water level
FRM	flood risk management
GHG	greenhouse gas
GIS	Geographical Information System
Guadalupe River flood scenario	hydraulic modeling scenario to be used for evaluating flood risk to the lower Guadalupe River project with a likelihood of occurring once in a 100-year period
GUSL	Guadalupe Slough
habitat islands	natural or human-made topographic features with sediment surfaces at high intertidal and upland elevations
HEC-RAS	Hydrologic Engineering Center River Analysis System
horizontal levee	a sloped subsurface treatment built between uplands and tidal marshes used to provide a treatment zone for reclaimed wastewater and a habitat transition zone that would migrate landward under projected sea level rise (similar in function to an ecotone slope)
HSC	Health and Safety Code
HU	hydrogeologic unit
HTL	high tide line

Acronym / Abbreviation / Term*	Definition
Hwy	highway
IPCC	Intergovernmental Panel on Climate Change
LEDPA	Least Environmentally Damaging Practicable Alternative
levee	engineered earthen feature designed to control flow of water between rivers, ponds, and sloughs and adjacent lands
LiDAR	Light Detection and Ranging
MBTA	Migratory Bird Treaty Act
MCL	maximum contaminant level
MCV	Manual of California Vegetation
MHW	mean high water
MHHW	mean higher high water
MLW	mean low water
MLLW	mean lower low water
mph	miles per hour
MQO	Measurement Quality Objective
MRP	Municipal Regional Stormwater Permit
MSDS	material safety data sheets
MTL	mean tide level
NAHC	Native American Heritage Commission
NAVD88	North American Vertical Datum of 1988
NEPA	National Environmental Policy Act
NETR	National Environmental Title Research, LLC
NFP	Natural Flood Protection
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NMS	nutrient management strategy
NOAA	National Oceanic and Atmospheric Administration
NOP	Notice of Preparation

Acronym / Abbreviation / Term*	Definition
NPDES	National Pollution Discharge Elimination System
NPPA	Native Plant Protection Act
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NTU	Nephelometric Turbidity Units
NWIC	Northwest Information Center
NWR	National Wildlife Refuge
OHP	Office of Historic Preservation
OHWM	ordinary high-water mark
OPR	Office of Planning and Research
ORP	Oxidation/Reduction Potential
OSHA	Occupational Safety and Health Administration
Pond A4	former salt production pond currently owned and operated by Valley Water
PCB	polychlorinated biphenyl
PCE	primary constituent element
PDR	Problem Definition and Refined Objectives Report
PG&E	Pacific Gas and Electric Company
pH	potential of hydrogen, measure of acidity
pilot channel	subaqueous channel excavated within a water body to direct water flow
PM	Project Manager
PMT	Project Management Team
POST	Peninsula Open Space Trust
ppt	parts per thousand
PRC	Public Resources Code
Project	Calabazas/San Tomas Aquino Creek–Marsh Connection Project

Acronym / Abbreviation / Term*	Definition
PSR	Planning Study and Staff-Recommended Alternative Report
QA/QC	quality assurance and quality control
RCRA	Resource Conservation and Recovery Act
Regional Board	San Francisco Bay Area Regional Water Quality Control Board
RHA	Rivers and Harbors Act
RM	river mile
RMP	Regional Monitoring Program
RV	recreational vehicle
RTK-GPS	Real Time Kinematics Global Positioning System
ROC	reverse osmosis concentrate
RPA	Registered Professional Archaeologist
RPD	Relative Percent Difference
SBSPRP	South Bay Salt Pond Restoration Project
SCC	Santa Clara County
SCC Parks	Santa Clara County Department of Parks and Recreation
SCVURPPP	Santa Clara Valley Urban Runoff Pollution Prevention Program
SDWA	Safe Drinking Water Act
SEC	Sunnyvale East Channel
SET	Surface Elevation Tables
SF	San Francisco
SFBJV	San Francisco Bay Joint Venture
SFBRA	San Francisco Bay Restoration Authority
SFBWQIF	San Francisco Bay Water Quality Improvement Fund
SFEI	San Francisco Estuary Institute
SFEI–ASC	San Francisco Estuary Institute–Aquatic Science Center

Acronym / Abbreviation / Term*	Definition
Shoreline Project	South San Francisco Bay Shoreline Project
SHPO	State Historic Preservation Officer
SLF	Sacred Lands File
SMaRT Station	Sunnyvale-Mountain View Recovery and Transfer Station
SMHM	Salt Marsh Harvest Mouse
SMP	Stream Maintenance Program
SOW	Scope of Work
SR	state route
SSC	suspended sediment concentration
STA	San Tomas Aquino Creek
State Water Board	State Water Resources Control Board
SWA	State Wildlife Area
SWC	Sunnyvale West Channel
SWP	State Water Project
SWPPP	Stormwater Pollution Prevention Plan
TBD	to be determined
TDS	total dissolved solids
tide gate	engineered structure used to control water levels in tidally influenced water bodies
TMDL	Total Maximum Daily Load
TSCA	Toxic Substances Control Act of 1976
UPRR	Union Pacific Railroad
USACE	U.S. Army Corps of Engineers
USBR	U.S. Bureau of Reclamation
USC	United States Code
USCS	United Soil Classification System
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

Acronym / Abbreviation / Term*	Definition
Valley Water	Santa Clara Valley Water District
Vision Report	San Francisco Estuary Institute Landscape Visioning effort
VTA	Valley Transportation Agency
VWPM	Valley Water Project Manager
WARMER	Wetland Accretion Rate Model for Ecosystem Resilience
WBS	Work Breakdown Structure
WCS	water control structure (see also *tide gate* above)
WDM	Watershed Dynamic Model
wetland benches	submerged natural or human-made features at shallow subtidal elevations to promote marsh vegetation establishment and sediment trapping
WPCP	Water Pollution Control Plant
WSEL	water surface elevation level

1 INTRODUCTION

1.1 Purpose and Report Organization

This Conceptual Alternatives Report has been prepared in accordance with Task 2.2 of Consultant Agreement A649A between Santa Clara Valley Water District (Valley Water) and Stillwater Sciences for the Calabazas/San Tomas Aquino Creek–Marsh Connection Project (Project). The purpose of the Report is to describe the development of and selection methodology for Project Conceptual Alternatives. The goal of Task 2.2 is to develop and analyze alternatives within a comprehensive decision-making framework that considers a wide range of factors in determining the degree to which combinations of restoration elements meet the identified Project objectives. Following this analysis, under Task 3 of the Project, a limited set of Conceptual Alternatives will be re-evaluated following planned hydrodynamic and sediment transport modeling.

This Report and overall Project development follow a specific process outlined by Valley Water's Planning Phase Work Breakdown Structure Item Descriptions Document (VW W-730-124 Rev P), which guides all efforts and processes described herein. This Report documents milestones 12-A through 12-D of VW W-730-124 Rev P, including the Project's problem definition, development and evaluation of Conceptual Alternatives, and related outreach efforts to stakeholders to date. As described further in Section 3.3, the Draft Report was circulated to outside reviewers in May in partial fulfilment of milestone 12-D and provides additional details of information presented at a public meeting held on May 16, 2023, to help meet milestone 12-E.

The Report is organized as follows:

Section 1: Introduction
Section 2: Existing Information
Section 3: Conceptual Alternative Development Process
Section 4: Conceptual Alternative Descriptions
Section 5: Conceptual Alternatives Evaluation
Section 6: References

1.2 Project Overview and Previous Restoration Planning Efforts

Over the past 150 years, Calabazas and San Tomas Aquino (STA) creeks and nearby tidal marshes along the margins of South San Francisco Bay (SF) Bay were heavily modified to facilitate commercial salt production and reduce flood risks to residential and commercial development, disrupting the connection of the creeks to historic tidal marshes. To improve functioning of the interconnected Calabazas and STA creeks-marsh system, Valley Water evaluated options for realigning the lower portions of Calabazas and STA creeks to create a new connection to the A8 Ponds (Valley Water 2021a).

Conceptually, the Project involves disconnecting Calabazas and STA creeks from the head of Guadalupe Slough and rerouting the lower reaches of the Calabazas and STA creeks to flow into the A8 Ponds through a new breach in the existing pond berm. In addition, the A8 Ponds perimeter berms may be breached at several spots along the adjacent reaches of Guadalupe and Alviso sloughs to achieve increased tidal connectivity and facilitate sediment accretion within the ponds. The Project will solve several challenges currently occurring within the Calabazas and STA creeks and the adjacent South Bay Salt Ponds, including reestablishment of tidal habitats within former salt ponds, redirecting natural sediment flows into the A8 Ponds to support tidal marsh establishment, and reducing excessive sediment accumulation in the Calabazas and STA creeks to reduce creek dredging and maintenance costs.

The Project will also evaluate various tidal habitat restoration opportunities and strategies for managing tidal flows within Pond A4, as the current management strategies to address ongoing water quality issues in the pond may not be viable in the future. Pond A4 restoration will also explore potential nature-based solution for wastewater, stormwater, and/or reverse osmosis concentrate using a horizontal levee[1] concept (Valley Water 2022). In total, the Project will restore approximately 1,800 acres of tidal marsh, enhance 50 acres of fresh and brackish marsh habitat, and improve over 4 miles of riverine habitat in Lower San Francisco Bay (Valley Water 2022).

[1] The terms habitat or upland transition zone, ecotone, habitat slope, and horizontal levee are variously used to describe a gradually sloping surface at the intersection of aquatic and terrestrial habitats, designed to provide intertidal and high marsh habitats under a range of water surface elevations, including under extreme high tides or projected sea level rise. The term “ecotone slope” is used to describe these constructed wetlands, and the term “horizontal levee” is reserved for circumstances when treated wastewater is applied to these features for either habitat or water quality benefits.

1.2.1 Project Location

The Project Area is shown in Figure 1-1 and is located at the southern boundary of the SF Bay and includes restoration actions within the Alviso Complex of former evaporative salt ponds, the A8 Ponds (interconnected ponds A5, A7, A8N, and A8S), and Pond A4, which are owned and managed by Valley Water. Lying adjacent to the underserved community of Alviso, the A8 Ponds are within the Don Edwards San Francisco Bay National Wildlife Refuge (NWR), owned and managed by the U.S. Fish and Wildlife Service (USFWS), and are part of the South Bay Salt Pond Restoration Project (SBSPRP), discussed in the next section. The Project Area also includes brackish marsh habitats within California Department of Transportation's (Caltrans) Harvey Marsh, as well as tidal portions of five creeks/channels (Guadalupe River, STA Creek, Calabazas Creek, Sunnyvale East Channel [SEC], and Sunnyvale West Channel [SWC]); and two sloughs (Alviso Slough and Guadalupe Slough) that flow into the ponds and/or SF Bay.

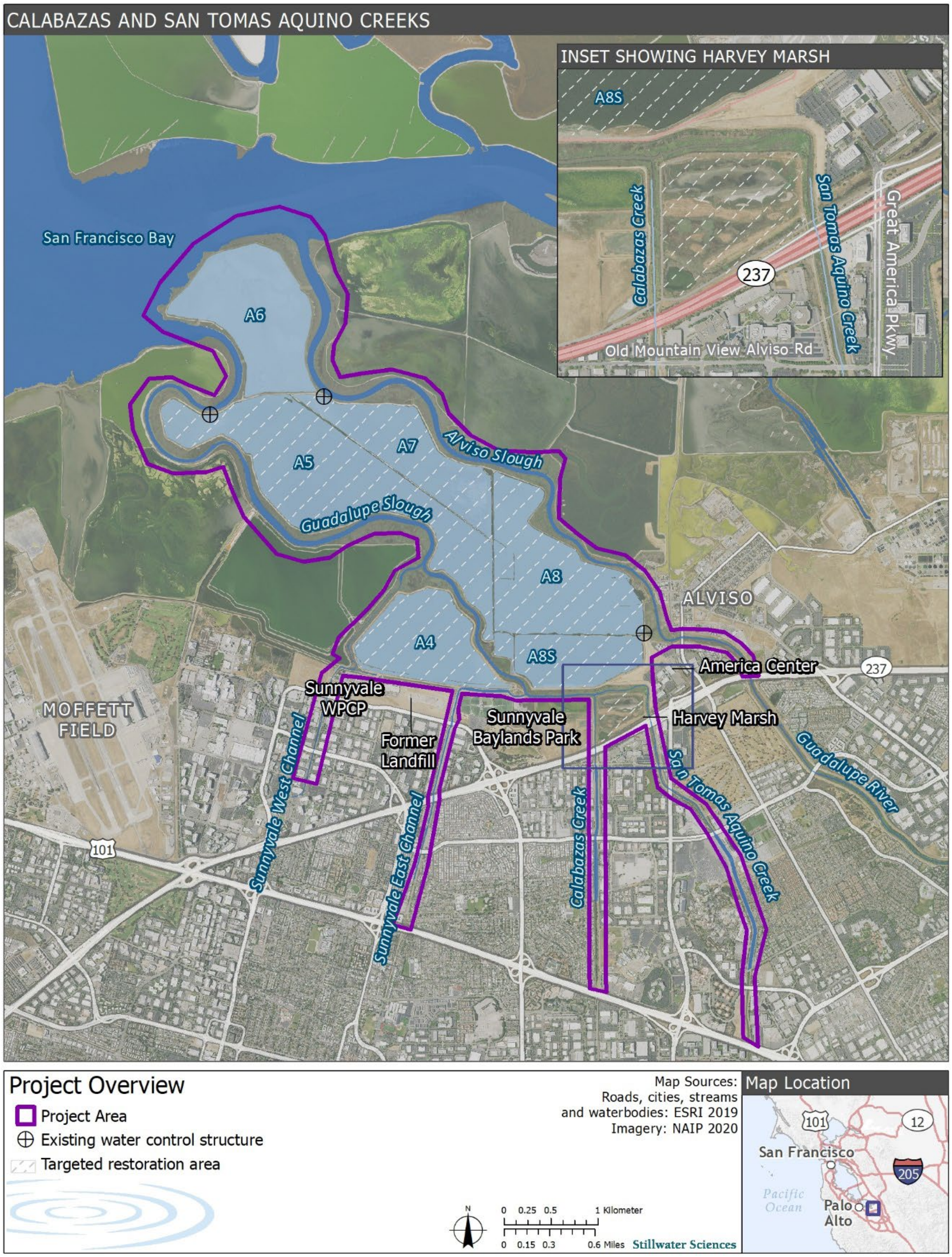


Figure 1-1. Calabazas/San Tomas Aquino Creek–Marsh Connection Project Area.

1.2.2 South Bay Salt Pond Restoration Project Phases I and II

Beginning with the sale and transfers of former salt ponds from Cargill to California Department of Fish and Wildlife (CDFW) and USFWS in 2003, the SBSPRP is a collaboration between federal, state, and local agencies to implement the largest tidal wetland restoration project on the U.S. West Coast. Although the SBSPRP and the Project are separate projects with different sponsors and funding agreements, they include complementary restoration actions. The SBSPRP aims to restore over 15,000 acres of former salt ponds to a combination of tidal wetlands and managed ponds (USFWS and California State Coastal Conservancy [CSCC] 2016). The goals of the restoration are to restore and enhance a mix of wetland habitats, provide wildlife-oriented public access and recreation, and maintain flood protection for adjacent inland communities in the SF Bay. SBSPRP implementation was split into a series of implementation phases to manage uncertainties through adaptive management, and to maintain inland flood protection. Phase 1 (completed in 2016) restored more than 3,700 acres of tidal wetland and newly managed ponds. Phase 2 planning is currently underway, and future phases will follow as uncertainties are reduced and funding is available.

The roughly 1,400-acre A8 Ponds are among the former salt ponds scheduled for future phases of tidal wetlands restoration by the SBSPRP. Although tidal habitat restoration actions are part of both the SBSPRP and the Project, the Phase 2 Environmental Impact Report for the SBSPRP (USFWS and CSCC 2016) proposes constructing a habitat transition zone (i.e., ecotone) extending landward from the southern edge of the A8 Ponds. In recent years, Valley Water Stream Maintenance Program (SMP) has worked with the CSCC and USFWS to support ecotone construction by providing sediments generated by the SMP. Sediments meeting re-use screening criteria were trucked to the A8 Ponds, stockpiled, and placed along the southern edge of Pond A8S for ecotone construction to help restore tidal marsh. The ecotone slope and other details are brought forward into this Report, expanding upon the original vision of the Phase 2 Environmental Impact Report and including some of the specific features detailed in the initial Conceptual Alternatives (such as habitat transition zones).

1.2.3 San Francisco Estuary Institute Landscape Visioning Effort

The San Francisco Estuary Institute (SFEI) Landscape Visioning effort (Vision Report) enlarged the restoration area of the A8 Ponds by Calabazas and STA creeks in the restoration planning (SFEI-ASC 2018). The Vision Report considered the historical landscape and how landscape modifications from development and flood protection efforts have resulted in critical habitat loss and decreased resilience to climate change. The Vision Report details potential steps to realign Calabazas and STA creeks through Harvey Marsh and into the A8 Ponds. The Vision Report indicates multiple benefits that could be achieved by the creek-pond reconnection, including:

- Promoting channel scour and potentially increasing flood conveyance capacity,
- Facilitating natural sediment delivery to A8 ponds that will help with tidal marsh restoration,
- Creating a pathway for marsh migration adjacent to the lower reaches of the creeks as sea level rises, and
- Improving ecosystem functioning and resilience through the creation of estuarine-terrestrial transition zones.

The Vision Report represents an initial step in moving from concept to implementation and includes some modeled results of different connection scenarios as well as a clear strategy for connecting the two creeks to the A8 Ponds. Restoration concepts in the Vision Report inspired for SBSPRP's Phase 2 constructed habitat transition zone (see Section 1.2.2) and were considered in the development of Conceptual Alternatives (see Section 3).

1.2.4 Valley Water Feasibility Assessment

The Valley Water Feasibility Report (Valley Water 2021a) considered the impact of connecting Calabazas and STA creeks to the A8 Ponds. Valley Water (2021a) took a more quantitative step towards creek marsh reconnection based on the SFEI Vision Report recommendations, and defined three alternatives that provide the basis for some of the Conceptual Alternatives evaluated in Section 5 of this Report:

- **Alternative A** details a simple reconnection approach via berm breach, without habitat enhancement or significant alteration to the flow regime. The feasibility assessment recognized a potential increased risk of flooding along Guadalupe River and Alviso Slough under Alternative A, which could be decreased through additional breaches of the A8 Ponds perimeter berms.
- **Alternative B** fully realizes the SFEI Vision Report and is described as a moderate cost increase relative to Alternative A. In addition to creek reconnection to the A8 Ponds, Alternative B removes the unnatural 90-degree bends of the creek channels around Harvey Marsh. By rerouting

the creeks across Harvey Marsh, creek sediment could more effectively be conveyed into the A8 Ponds. The same flooding risks exist in the Guadalupe River and Alviso Slough relative to Alternative A.

- **Alternative C** is more complex than Alternatives A and B. It would create the largest amount of new habitats, including new habitat in the A8 Ponds and Harvey Marsh. It incorporates all the elements of Alternative B, with the addition of specific habitat enhancements, and includes A8 Ponds berm breaches to prevent increased flood risk.

The Feasibility Report (Valley Water 2021a) did not indicate a preferred alternative, but highlighted Alternative C as the most complex, with the highest potential benefits and highest estimated costs. The Feasibility Report did not address Pond A4.

1.3 Valley Water Problem Definition and Refined Objectives Report

The Problem Definition Report (Valley Water 2023) is the first formal milestone in the Valley Water Planning Process (VW W-730-124 Rev P; see Section 3.1) for the Project. The Report details existing conditions, states the problem definition, describes community outreach efforts, and identifies changes in scope, as well as opportunities and constraints associated with the Project. Key project issues covered in the Problem Definition Report are summarized below.

1.3.1 Key Project Issues

Historical Habitat Loss/Degradation. As discussed in the SFEI Vision Report, lower Calabazas and STA creeks and their attending Baylands are heavily modified from their historical (i.e., late 1800s) conditions. The area downstream of the present-day CA 237, which includes the A8 Ponds, Pond A4, and Harvey Marsh, was once predominantly tidal marsh. Guadalupe and Alviso Sloughs were the primary drainage channels for the tidal marsh. Calabazas Creek flowed into an alkali meadow near the present-day US 101 and lacked a defined channel downstream of this point. Historically, STA Creek flowed in a defined channel upstream of present-day CA 237, transitioning from alkali meadows to tidal marsh habitats. Since pre-settlement time, the former tidal marsh downstream of CA 237 has been converted primarily to open water habitat. As detailed further in Section 2.9, small areas of uplands occur along the berms surrounding the ponds and a relatively small amount of freshwater/brackish marsh is present at Harvey Marsh. Upstream of CA 237, the former alkali and wet meadows have become urbanized. The defined channels of Calabazas and STA creeks no longer terminate shoreward of the tidal marshes but now directly flow into Guadalupe Slough. The overall change is a considerable increase in open water habitat and smaller increases in upland, riverine, and brackish/freshwater habitat. Tidal marsh, alkali meadow, and wet meadow habits have greatly decreased within the Project Area (Valley Water 2023).

Sediment Deposition and Removal for Maintenance of Channel Capacity. As discussed in the SFEI Vision Report, the unnatural alignments, and low gradients of lower Calabazas and STA creeks result in reduced transport of sediment, and resultant high rates of sedimentation within the creek channels, which also promotes in-channel vegetation growth. Valley Water's SMP removed about 310,000 cubic yards of sediment from the two creeks to maintain flood conveyance capacity in the reaches downstream of Highway 101 at a cost of roughly $11 million over the last roughly 20 years. As discussed in Section 1.2.2, a portion of the sediment has been used by SBSPRP to construct the A8 Ponds ecotone, which is ongoing. Sediment removal and associated vegetation management actions result in significant and frequent disruption of aquatic and riparian habitat of the creek corridors. Additional environmental impacts include temporary generation of noise and dust and emissions of air pollutants, including greenhouse gas emissions from haul trucks and equipment.

Increased Flood Risks due to Sea Level Rise. As discussed further in Section 2.6, sea level is expected to increase over the next 50 years and will result in higher water elevations in the Project Area during coastal, fluvial and Guadalupe River flood events. To prevent increased flood risks from the expected higher water levels, flood risk reduction measures may be needed. In keeping with Valley Water Ends Policy E-3 (see Section 1.4.2.2), nature-based solutions are preferential to engineered solutions, although hybrid measures that combine nature-based solutions with engineered solutions may be required. Additional analysis is needed to assess the degree to which nature-based solutions can provide flood risk reduction for both coastal and riverine flood events and sea level rise. In some locations, traditional engineered structural flood risk reduction measures, such as levees and floodwalls, may be necessary. The South San Francisco Bay Shoreline Project (Shoreline Project) is a flood risk reduction/flood protection project currently in planning. The Shoreline Project and is considering flood risk management (FRM) levees parallel to the southern shorelines of the Sunnyvale Water Pollution Control Plant's (WPCP's) oxidation ponds, Pond A4, and the A8 Ponds (see Section 2.4.7). Changes to Pond A4 tide levels, depths, and vegetation could affect the design (i.e., height, size, and/or location) of the flood risk reduction levees(Valley Water 2023).

Public Access. Within the Project Area, there are currently opportunities for biking, hiking, and walking along the existing San Francisco Bay Trail (Bay Trail) system, as discussed further in Section 2.10. In alignment with the Metropolitan Transportation Commission's Bay Trail Gap Closure Implementation Plan, the City of San José has proposed a new section of Bay Trail adjacent to the southeastern portion of the A8 Ponds. The Project will maintain existing public access and trail connections] and assess if improvements to public access are feasible. Evaluations will include the impacts of increased public access to trails within restored wildlife habitats (Valley Water 2023).

Addition of Pond A4. Pond A4 is a roughly 320-acre former salt pond now owned by Valley Water. It is primarily open water habitat with no tidal exchange. Adding Pond A4 to the Project would increase the area available for restoration of tidal marsh and transitional habitats and enhanced public access. The Problem Definition Report recommended addition of Pond A4 to the Project (Valley Water 2023).

1.3.2 Opportunities and Constraints

As detailed in Section 1.4, the Project proposes to address habitat loss, increase flow conveyance, reduce future flood risks, and enhance public access by realigning the lower Calabazas and STA creeks and constructing a breach to direct creek flow into the A8 Ponds while maintaining and improving access to the Bay Trail. To address anticipated sea level rise, the Project could also incorporate low-gradient, vegetated ecotone slopes at the landward edge of the A8 Ponds, Pond A4, and Harvey Marsh, which would be constructed with consideration of existing and future flood protection needs (see Section 2.4.7).

Opportunities associated with the Project include the following:

- Expanded continuous tidal marsh habitat,
- Increased habitat complexity and diversity for fish, endangered, endemic, and rare wildlife species dependent on tidal marsh habitats, and rare plants,
- Improved flow conveyance and sediment transport capacity of Calabazas and STA Creeks and SEC and SWC,
- Improved water quality conditions in Pond A4 and the A8 Ponds from increased tidal exchange,

- Reduced fluvial and coastal flood risk associated with Calabazas and STA creeks given future predicted sea level rise,
- Improved public access and recreation,
- Reduced environmental impacts from recurring creek maintenance, and
- Potential for nature-based treatment of wastewater at Pond A4.[2]

Constraints associated with the Project include the following:

- Displacement risk for species reliant on current conditions in the A8 Ponds, Harvey Marsh, and Calabazas and STA creeks,
- Potential mobilization of legacy mercury contaminants and other aspects of water quality,
- Erosion risk to the landfill located east of Harvey Marsh,
- Increased flood risk at Guadalupe River/Alviso Slough, A8 Ponds, and Pond A4,
- Increased risk of fish stranding,
- Impacts to Pacific Gas and Electric Company's (PG&E's) power transmission towers and natural gas lines in the Project Area,
- Temporary impacts to Bay Trail and any long-term changes to recreational access due to planned channel re-alignment and pond breaches,
- Impacts to wildlife due to increased public access, and
- Coordination with existing landowners, regulatory approvals and logistical challenges.

1.3.3 Pond A4 Restoration

As described under Section 2.4.6, Pond A4 water levels and water quality are managed by a combination of pumps and siphons that draw water from the nearby Pond A3W owned by USFWS. Changes in the future operations of the Pond A3W diversion to Pond A4 are under consideration by USFWS to mitigate potential adverse effects to wildlife habitat and recreational uses as sea levels rise. Potential changes may restrict the amount of water that can be drawn from A3W and pumped into Pond A4, reducing the effectiveness of current Pond A4

[2] The expansion of the original project area beyond the A8 Ponds to include planning studies for Pond A4 lowers planning costs and capitalizes on opportunities to reduce operating costs and the Project's ability to achieve water quality benefits. As described in Section 1.3.3, current Pond A4 operations are considered unsustainable in the long term.

operations designed to address water quality concerns as described in Section 2.8.2. Inclusion of Pond A4 in the Project provides opportunities for enhanced of beneficial uses of Pond A4 (e.g., ecological restoration, nature-based solutions for reclaimed wastewater or reverse osmosis concentrate) while maintaining current levels of flood protection. It also generates opportunities to enhance the user experience for the existing segment of the Bay Trail running along the southern boundary of Pond A4 (Valley Water 2023).

1.4 Project Objectives

1.4.1 Project Objectives

The overarching goal of the Calabazas/STA Creek-Marsh Connection Project is ecological enhancement of the Project Area (Valley Water 2023). Detailed objectives are listed below:

1. Support the ecological restoration/enhancement of tidal marsh, freshwater marsh, transitional and riverine habitat within the Project Area.
2. Ensure resilient flood protection that will adapt to projected sea level rise.
3. Reduce maintenance needs for lower Calabazas and STA creeks.
4. Provide enhanced public access and improved trails.

1.4.2 Consistency with Valley Water Policies

The Project objectives are consistent with the Ends Policies adopted by the Valley Water Board of Directors (Board). Under Valley Water's form of Policy Governance, Ends Policies describe the mission, outcomes, or results to be achieved by Valley Water staff. The Project supports Water Resources Stewardship Goal 4.2.1 by providing multiple benefits including habitat restoration and coastal and fluvial flood protection in coordination with the Shoreline Project and the Sunnyvale East and West Channels Flood Protection Project (see Sections 2.4.7 and 2.4.3, respectively). In addition to the Ends Policies, several relevant Board policies also guide this Project, including the General Principles, the Water Resources Stewardship Policy, the Climate Change Mitigation and Adaptation Policy, and the Public Trails Criteria and Guidance. Other relevant Board policies are presented in the sections below.

1.4.2.1 General Principles (Policy No. E-1)

The Board adopted a set of general principles that guide how staff implement the Board directions. The general principles have a focus on equity, environmental justice, collaboration, and natural flood protection and include the following:

1.1. An integrated, socially equitable, and balanced approach in managing a sustainable water supply, effective natural flood protection, and healthy watersheds is essential to the future of all communities served.

1.2. Effective public engagement by Valley Water is achieved through transparent, open communication that informs and generates participation among all communities, including disadvantaged communities, communities of color, and communities with limited English proficiency, as well as other key stakeholders.

1.3. Collaboration with government, academic, private, non-governmental, and non-profit organizations, as well as diverse and disadvantaged communities is integral to accomplishing the Valley Water mission.

1.4. A net positive impact on the environment and providing benefits equitably across all communities is required in order to accomplish the Valley Water mission.

1.5. Recognize that Valley Water operations and services are critical to the economic vitality of Silicon Valley, ensuring that economic benefits are equitable for all communities that we serve.

1.6. As standard practice, all work products shall be visually pleasing, sustainable, cost-effective, culturally appropriate, equitable across all communities, and reflect the characteristics of the surrounding urban setting and natural habitat using appropriate materials, colors, shapes, art works, vegetation, and surface treatments. This includes the naming of facilities in a manner that is respectful of all diverse communities.

1.7. Valley Water is committed to environmental justice and shall provide for the fair treatment and meaningful engagement of all people regardless of race, color, gender identity, disability status, national origin, tribe, culture, income, immigration status, or English language proficiency, with respect to the planning, projects, policies, services, and operations of Valley Water. Environmental Justice is achieved when all people receive:

- Equitable consideration in the planning and execution of flood protection, water supply, safe drinking water, water resources stewardship projects, and protection from environmental and health hazards, and
- Equal access to Valley Water's decision-making process (Valley Water 2021b).

1.4.2.2 Natural Flood Protection (Policy No. E-3)

The Natural Flood Protection (NFP) policy outlines the following goals and objectives for staff to achieve related to natural flood protection.

NFP GOAL

3.1. Maintain flood protection facilities to design levels of protection.

NFP Objective

3.1.1. Prioritize maintenance of existing facilities over construction of new capital projects.

3.1.2. Inspect and maintain facilities on a regular basis.

3.1.3. Perform maintenance using maintenance guidelines updated on a regular basis.

NFP GOAL

3.2. Assist people, businesses, schools, and communities to prepare for, respond to, and recover from flooding through equitable and effective engagement.

NFP Objective

3.2.1. Develop, maintain, and communicate emergency action plans.

3.2.2. Develop, maintain, and communicate flood information to the community.

3.2.3. Provide expertise in flood forecasting and flood warning systems to municipalities.

3.2.4. Provide expertise to encourage public agencies to reduce flood risk and protect floodplain benefits.

NFP GOAL
3.3. Increase the health and safety of residents countywide by reducing community flood risk.

NFP Objective
3.3.1. Provide equitable, timely, and achievable flood protection for health and safety.

3.3.2. Protect people and property from flooding by applying a comprehensive, integrated watershed management approach that balances environmental quality, sustainability, and cost (Valley Water 2021b).

1.4.2.3 Water Resources Stewardship (Policy No. E-4)

The Water Resources Stewardship policy directs staff to achieve the following goals:

4.1. Use a science-based, inclusive approach to protect Santa Clara County's (SCC's) watersheds and aquatic ecosystems for current and future generations.

4.2. Sustain ecosystem health while managing local water resources for flood protection and water supply.

4.3. Encourage inclusive, sustainable management of water resources in the Bay-Delta and its watersheds to protect imported water supply.

4.5. Engage the community to promote watershed stewardship by providing meaningful engagement in Valley Water programs for all people regardless of race, color, gender identity, disability status, national origin, tribe, culture, income, immigration status, or English language proficiency.

4.4. Prevent and address pollution of local streams, reservoirs, and the SF Bay, equitably across all communities. Protect waterbodies from pollution and degradation (Valley Water 2022).

1.4.2.4 Climate Change Mitigation and Adaptation (Policy No. E-5)

Valley Water is carbon neutral and provides equitable, climate-resilient water supply, flood protection, and water resource stewardship to all communities in SCC. This policy includes the following goal and objectives related to climate adaptation.

CCMA GOAL 5.2. Adapt Valley Water's assets and operations to reduce climate change impacts.

CCMA Objective
5.2.1. Improve the resiliency of SCC's water supply to drought and other climate change impacts.

5.2.2. Provide equitable protection from sea level rise and flooding, prioritizing disadvantaged communities.

5.2.3. Improve ecosystem resiliency through water resources stewardship.

5.2.4. Prepare for climate-related emergencies and provide equal access to information and services, particularly to disadvantaged communities (Valley Water 2021b).

1.4.2.5 Policy and Criteria Guidance for Public Trails on Valley Water Lands

In December 2021, the Board approved the Policy Criteria and Guidance for Public Trails on Valley Water Lands. The Trail Policy Criteria clarify that partner agencies are responsible for leading all aspects of trails from start to finish from planning, public, stakeholder, and community outreach; through the design and environmental review process; and finally, operations, maintenance, and patrol of the trail. The criteria also set objective requirements for trail projects to ensure that Valley Water's flood protection, water quality, channel stability, habitat protection, and operational needs are met.

These requirements are explained in detail in the Guidance to Meet Trail Policy Criteria, which compiles information from existing Valley Water administrative policy (such as Water Resources Protection Manual and the Guidelines and Standards for Land Use Near Streams); provides additional detailed requirements for biological resources protection and environmental review; and clarifies the steps in the Joint Use Agreement and Water Resources Protection Ordinance encroachment permit process (Valley Water 2021c).

1.5 Project Funding

The Project is managed by Valley Water and partially funded by Measure AA grant funding from the San Francisco Bay Restoration Authority (SFBRA), Proposition 1 grant funding from CDFW, and San Francisco Bay Water Quality Improvement Fund grant funding from U.S. Environmental Protection Agency (EPA). It builds on many years of studies, including a visioning effort led by SFEI (SFEI-ASC 2018), funded by EPA, a Feasibility Report completed by Valley Water (2021a), and Project Definition and Refined Objectives Report prepared by Valley Water (2023). The Project includes close coordination and collaboration with many different agencies, including USFWS, who owns and manages the A8 Ponds, the California Coastal Conservancy, County of Santa Clara, City of Sunnyvale, City of San José, SCC, and others.

In 2022, the SFBRA awarded a Measure AA grant to Valley Water in the amount of $3.37 million for planning, data collection, design, and environmental documentation. CDFW awarded a Proposition 1 grant in the amount of $500,000 to Valley Water to fund modeling services to support the Project. In May 2023, EPA awarded $3.8 million in grant funding to Valley Water to support Project design, California Environmental Quality Act/National Environmental Policy Act compliance and permitting. Using the SFBRA grant funds, Valley Water contracted with Stillwater Sciences to provide Planning services for the Project, including preparing a Conceptual Alternatives Report, Feasibility Alternatives Report, Planning Study Report, and an Adaptive Management Plan.

2 EXISTING INFORMATION

2.1 Historical and Present Land Uses

> "*Historical accounts of the Santa Clara Valley from the early 1800s describe the region as having fertile soils, artesian water, sheltering oaks, and a temperate climate, making it what was considered to be one of the most beautiful and productive places in California (Beller et al. 2010). Within the lower reaches of Calabazas and San Tomas Aquino creeks and the adjacent baylands, dramatic alterations to the landscape over the past 150 years have caused considerable changes to tidal and fluvial process and the resulting landscape features and habitat conditions"* (SFEI-ACS 2018).

The history of the Project Area includes a transition from tidal marsh and surrounding habitat to a landscape that is heavily modified for flood control and development. In the late eighteenth century, Europeans settled in the Santa Clara Valley, and subsequently heavily altered the landscape. During the late nineteenth century or early twentieth century, berms were constructed in the tidal marshes which were converted to salt ponds, with flood control levees built on the banks of the Calabazas and STA to contain flood waters. Prior to human modification for flood risk reduction, the Calabazas and STA creeks lacked a direct connection to the open water of the SF Bay; instead, Calabazas Creek dissipated into marshlands several miles short of the SF Bay, while STA Creek most years flowed to tidal marshes along the southern border of the Bay (Valley Water 2021a).

Between the mid-1950s and 1960s, the two creeks were realigned to bypass the former salt production ponds and discharge directly into Guadalupe Slough and the SF Bay. Additionally, Guadalupe River was disconnected from Guadalupe Slough and was rerouted to discharge into Alviso Slough. The creek realignments resulted in channels with unnaturally acute angle bends that reduced hydraulic conveyance capacity which, when combined with the decrease in tidal prism caused by the salt pond berm network, resulted in the deposition of a large amount of sediment in the creek channels, as well as growth of vegetation, reducing flood conveyance (Valley Water 2021a). In addition, water that would have recharged groundwater or supported seasonal wetlands now was transported to the Bay, which led to subsidence and loss of habitat.

The historical habitats of the valley floor were converted to agricultural, residential, and industrial uses. For example, the area surrounding SEC and SWC was primarily used for agriculture, including row crops and orchards. The valley floor contained alkali and freshwater meadows. Most of these were drained and converted to agricultural and industrial uses, or housing. The area upland from the Baylands included oaklands and savannas and were also cleared for agriculture and development (SFEI-ASC 2018).

In 2003, state and federal agencies and private foundations acquired 16,500 acres of salt ponds from Cargill Inc. for $100,000,000 (SBSPRP), and shortly thereafter planning began for eventual restoration of the ponds.

Current Land Uses: The Project Area has a variety of different uses today, ranging from recreation to wastewater treatment (Figure 2-1). In addition to providing habitats for a variety of plants and animals as described in Section 2.9, the area provides the following uses:

- **Recreation.** The Ponds provide different types of recreational activities, including biking, hiking, walking along the trail systems, birdwatching, picnicking, kayaking, waterfowl hunting, and fishing. The intent of the Project is to accommodate all existing, authorized public recreational uses in the Project Area. USFWS permits waterfowl hunting on portions of the A8 Ponds, including access to Pond A6 seven days per week, and access to ponds A5, A7, A8, and A8S three days per week (Wednesday/Saturday/Sunday). Sunnyvale Baylands Park, located adjacent to the Ponds A4 and A8S and connected to the Bay Trail, provides opportunities for picnics, active recreation, and walking along pathways. The Twin Creeks Athletic Complex is located north of Sunnyvale Baylands Park and provides playing fields and amenities for softball, football, and soccer league play and tournaments. Other recreational uses within the Project Area include hiking along the Bay Trail and informal trails along the Harvey Marsh perimeter, as described in Section 2.10.
- **Infrastructure.** Industrial uses within the Project Area include the Sunnyvale WPCP, located adjacent to the Project Area, provides treatment for wastewater from Sunnyvale, Rancho Rinconada, and Moffett Field. The area around the treatment facility is used for industrial and recreation purposes, including a materials recovery and transfer station known as the SMaRT Station, and for trails on the now-closed Sunnyvale Landfill (ESA 2017). Also adjacent to the Project Area is the 22-acre storage basin that SCC owns and uses to store clean fill.
- **Commercial.** The America Center provides office space for several businesses, including Flex LTD, Hewlett Packard Enterprise, BILL, and Glassbeam Inc.

- **Open Space.** Open space land uses within the Project Area include Harvey Marsh, described in Section 2.2. The Baylands Wetlands Preserve is open space adjacent to the Project Area between the County storage basin and Highway 237.
- **Industrial.** Stevens Creek Quarry is located adjacent to the Project Area and next to the Sunnyvale WPCP.

2.2 Land Ownership

Current land ownership within the Project Area is complex, and close coordination with landowners will be needed throughout the Project. There are various easements in place throughout the Project Area for utility and trail access and maintenance. Current land ownership includes the following:

- **U.S. Fish and Wildlife Service:** A8 Ponds, owned and managed by USFWS, is a roughly 1,400-acre pond complex consisting of Ponds A5, A7, A8 and A8S. A8 Ponds are located within the Don Edwards San Francisco Bay NWR and are being ecologically restored and enhanced by the SBSPRP.
- **Valley Water:** Pond A4, owned by Valley Water, is a 320-acre former salt pond located adjacent to Guadalupe Slough. The SEC and Moffett channel flank the periphery of Pond A4 before flowing into Guadalupe Slough. Valley Water also owns most of the Calabazas and STA creeks and Guadalupe River channels in the Project Area.
- **Caltrans:** Harvey Marsh is owned by Caltrans and is a wetlands mitigation site, originally established in 1992 for impacts related to widening of Highway 237 (Caltrans 2009).
- **Santa Clara County:** SCC owns a 230-acre parcel that is adjacent to A8 Ponds and the Harvey Marsh and includes the Sunnyvale Baylands Park, Sunnyvale Baylands Seasonal Wetlands Preserve, Twin Creeks Athletic Complex, and the SCC-owned storage basin (Figure 2-1). SCC uses the storage basins to store clean fill. Santa Clara County Department of Parks and Recreation (SCC Parks) owns the publicly accessible Bay Trail which crosses the Project Area. The Bay Trail is a paved pedestrian and bicycle trail located on the west bank of Calabazas Creek north of Highway 237 (Valley Water 2021a). SCC Parks has an easement for trail access along an unpaved horseshoe-shaped path on the east, north, and west margins of Harvey Marsh that connects to the Bay Trail at either end. However, breaches along the perimeter berm have damaged the trail and make it difficult to use.

- **City of Sunnyvale:** The City of Sunnyvale owns land adjacent to Baylands Park and Pond A4 containing the Sunnyvale WPCP and SMaRT Station. The City of Sunnyvale operates Bayland Pump Station No. 2, located south of Guadalupe Slough and west of Calabazas Creek. The Pump Station pumps storm drainage that collects in a detention basin into Calabazas Creek. The City of Sunnyvale manages Baylands Park and the 105-acre Wetlands Preserve under a lease from the SCC (Valley Water 2021a).
- **Private/Commercial Land:** To the east of Harvey Marsh is a privately owned commercial area known as the America Center, which is located on a closed landfill, as shown in Figure 1-1.

In addition, a PG&E power transmission line traverses the study area from east to west, with transmission towers located just south of the A8 Ponds and Pond A4. PG&E acquired an access easement along the southern boundary of STA Creek in 1940. However, due to changes to the STA Creek channel, the easement no longer connects to the powerline towers, and PG&E accesses the towers by foot. There is also a PG&E underground natural-gas pipeline located that crosses the Project Area from east to west. PG&E has an easement to access the pipeline (Valley Water 2021a).

Further, the Project Team[3] acknowledges that the Project site is the aboriginal homeland of the Native American tribes and bands and recognizes the continued persistence and resilience of culture and community despite the adverse impacts of settler colonialism. Native Americans continue to have a relationship with the land; one of deep respect, agreement, and reciprocity collaborating to help maintain balance. The Project Team is committed to working in partnership with Native Americans to create a more equitable and inclusive future.

[3] Project Team is defined in the Project Work Plan (Stillwater Sciences 2023a) as Valley Water Key Staff and consultant team including Stillwater Sciences, Anchor QEA, Cinquini & Passarino, Kearns & West, Pathways Climate Institute, Rincon Consultants, San Francisco Estuary Institute, and Schaaf & Wheeler.

Figure 2-1. Land use in Project Area.

2.3 Geology

The Coast Range in California is dominated by a series of sedimentary formations. Theses ranges were formed by uplift and mountain-making processes as the Farallon plate subducted underneath the North American Plate during the late Mesozoic (approximately 100 million years). As the tectonic activity shifted from subduction to transform faulting, a series of new faults began to form, including the San Andreas Fault, Hayward Fault, and Calaveras Fault. This period saw extensive folding, faulting, and uplifting which shaped the landscape of the Santa Clara Valley. Because the Valley is located in a downthrust section of crust bounded by major fault zones, marine and freshwater sedimentary deposits accumulated in the valley, creating the modern landscape.

Excessive groundwater pumping in the early to mid-twentieth century caused significant land subsidence within SCC, lowering 17 square miles of former uplands below the high-tide level below high tide level. Subsidence ceased due to Valley Water importing water from the State Water Project and the Central Valley Project for managed aquifer recharge (Valley Water 2016).

2.4 Hydrology and Flooding

The Project Area lies within the West Valley watershed which covers approximately 73 square miles of northwest SCC. Five sub-watershed tributaries terminate in the Project Area: SWC, SEC, Calabazas Creek, STA Creek, and the Guadalupe River. Calabazas and STA creeks and the Guadalupe River originate in the Santa Cruz Mountains and generally drain north to SF Bay. The creeks and river flow through the cities of Campbell, Cupertino, Saratoga, Santa Clara, San José, and Sunnyvale before entering Guadalupe Slough just west of the community of Alviso in San José. The lower reaches of the four creeks/channels are tidal and discharge into Guadalupe Slough while the Guadalupe River discharges into Alviso Slough (Table 2-1). Alviso and Guadalupe sloughs convey flows around and past the A8 Ponds and Pond A4 into the SF Bay.

Table 2-1. Drainage areas and flood flows for Project streams at 10-, 50-, and 100-year recurrence intervals.

Stream	Location	Drainage area (sq. mi.)	10-year event (cfs)	50-year event (cfs)	100-year event (cfs)
West Valley Watersheds					
Sunnyvale West Channel	CA 237	2.8	320	360	380
Sunnyvale East Channel	CA 237	7.1	880	1,000	1,100
Calabazas Creek	CA 237	21.1	2,650	3,600	3,900
Saratoga/STA Creek	US 101	42.1	5,170	8,340	9,660
Guadalupe River Watershed					
Guadalupe River	CA 237	171.45	8,280	15,320	19,020

Source: Valley Water 2023

Historically, Calabazas and STA creeks were prone to significant floods, which damaged infrastructure in the twentieth century. Specifically, flooding occurred along Calabazas Creek (1978, 1980, 1983, 1986, 1998), SEC (1986, 1998), and Guadalupe River (1956, 1982, 1983, 1986, 1995, 1998). Many of the areas that have flooded historically have reduced flood risk today due to the construction of flood protection projects, as described in the sections below.

2.4.1 San Tomas Aquino Creek

The STA Creek watershed covers a total area of 45.7 square miles and a wide range of land uses. The upper watershed is highly forested with steeper channel slopes. Once the creek reaches the valley floor, over half the area is classified as highly urbanized. Average annual rainfall ranges from 13.5 inches near the outlet to more than 50 inches in the headwaters. Historically, STA Creek was intermittent, flowing through meadows during the wet season. In the 1870s, STA Creek was diverted from Alviso Slough into Guadalupe Slough to accommodate changes in flow structure to the Guadalupe River. Typical wintertime flows in the creek reach 2,000 cubic feet per second (cfs) and the 100-year event is estimated to be near 10,000 cfs at the confluence with Guadalupe Slough (Table 2-1).

Within the Project Area, STA Creek is bounded by Federal Emergency Management Agency (FEMA) accredited levees with design capacity to convey the 100-year flow between CA State Route 237 and US 101 (Valley Water 2023). Downstream of CA State Route 237, the levee on the west bank of STA Creek is in relatively poor condition and is not FEMA certified. During high flows creek waters overtop this levee and flow into Harvey Marsh. The levee on the east bank is in better condition and sufficient to convey the 100-year flow but lacks FEMA certification. Flood waters flowing over the west bank levee of STA Creek help to support freshwater wetlands in the interior of Harvey Marsh. Residual riverine flood risks remain along STA Creek.

2.4.2 Calabazas Creek

Calabazas Creek watershed covers 22.7 square miles and is over 90% urbanized, which reflects land cover significantly different than STA creek. Average annual rainfall ranges from 13.5 inches near the SF Bay to 39 inches in the headwaters. Notably, there are no significant reservoirs within this watershed. Previous Valley Water projects on Calabazas Creek have provided flood protection to FEMA standards for the 100-year flood event from the SF Bay upstream to Miller Avenue. Typical flows in the creek reach 1,600 cfs and the 100-year event is estimated to be 3,900 cfs at the confluence with Guadalupe Slough (Table 2-1).

Within the Project Area, Calabazas Creek is bounded by earthen levees and has FEMA-accredited 100-year flow capacity (Valley Water 2023). The conveyance capacity of Calabazas Creek at the Project Area and upstream to Waddell Drive was increased by constructing levees and floodwalls along the creek. Currently Calabazas Creek in the Project Area has capacity to convey the 100-year flow without overtopping its banks. The levee on the west bank of the creek downstream of CA State Route 237 is FEMA accredited.

2.4.3 Sunnyvale East and West Channels

The SEC and SWC were constructed by Valley Water in the 1960s to convey stormwater from increasingly urbanized areas to SF Bay. The SWC and SEC are approximately 3 and 6.4 miles long, respectively (Figure 1-1). The SEC originates 200 feet above mean sea level and travels through confined pipes before transitioning into an open channel. The SWC is mainly an earthen-bed and is roughly 3 miles in length. Both channels lack a significant upstream undeveloped watershed and produce relatively little sediment. The 100-year flows of the SEC and SWC are 1,100 cfs and 380 cfs, respectively(Table 2-1).

The SEC and SWC can convey only 10-year recurrence interval events (SCVWD 2013). Under flood conditions, outflows from Calabazas and STA creeks are much larger than flows in SEC, and the combined creek flows can back up into SEC. During larger flows, overtopping of channel banks and roadways occurs. The potential for flooding is increased by backwater flows from Calabazas and STA creeks which, like the SEC and SWC, connect to Guadalupe Slough, and by tidal influence on the channel reaches downstream of CA 237. Due to the inadequate flow conveyance capacity and accumulation of sediment, the two channels flooded in 1963, 1968, 1983, 1986, and 1998. To reduce flood risks along the channels, Valley Water included the Sunnyvale East and West Channel Flood Protection Project as part of the Safe, Clean Water and Natural Flood Protection Program. Planned floodwalls and levees would increase the flood conveyance capacity of the two channels to convey the 100-year flow to efficiently move water downstream into Guadalupe and Alviso Slough. After construction of this project is complete, residual flooding risks will still be present within the West Valley and Guadalupe River watersheds. Project construction is expected to occur in 2024 through 2026, assuming Valley Water receives the necessary permitting approvals prior to the start of the projected construction schedule.

2.4.4 Guadalupe and Alviso Sloughs

Guadalupe Slough is a 5-mile sinuous tidal channel that connects SF Bay to Calabazas Creek, STA Creek, SEC, and SWC. All four channels meet the slough within the Project Area. The slough varies from 120 to 250 feet in width and flows between Pond A4 and the A8 Ponds. The slough channel is bounded by earthen berms and includes large areas of tidal marsh that are inundated during high tide. During dry weather conditions, flow from the channels is low and the slough is dominated by tidal action.

About 4.7 miles long, Alviso Slough runs roughly parallel to Guadalupe Slough along the east side of the A8 Ponds. Currently, this slough is connected to the A8 Ponds via a 40-foot-wide concrete water control structure (called the “A8 Notch”) (USFWS and CSCC 2016). The A8 Notch was used to evaluate uncertainties associated with restoring tidal flows in Pond A8 and legacy mercury remobilization from the pond and within Guadalupe Slough. The results of the monitoring provide confidence that additional tidal restoration of Pond A8 is feasible. Based on preliminary modeling, direct hydraulic connections between Alviso Slough and Calabazas and STA creeks through the A8 Ponds would reduce backwater effects in Guadalupe Slough and SEC from Calabazas and STA creeks (MacWilliams 2018). Alviso Slough increases in width from 90 feet near the A8 Notch to more than 300 feet near the outlet to the Bay and connects to tidal marsh along the length of the slough. Downstream of the A8 Notch, an overflow weir also connects the A8 Ponds to Alviso Slough. This structure limits downstream surface water elevations during large events on the Guadalupe River and was constructed as part of a larger set of Guadalupe River flood protection projects. Upstream of Alviso Slough, the Guadalupe River is also bounded by FEMA accredited levees and floodwalls within the Project Area and has the capacity to convey the 100-year flow.

2.4.5 A8 Ponds

During Phase 1 of the SBSPRP, internal berms in the A8 Ponds were breached to interconnect Ponds A5, A7, A8 and A8S, creating a roughly 1,440-acre complex called the A8 Ponds. The gradual opening of A8 Ponds to tidal action began in 2011 with construction of the Notch, a 40-ft wide concrete water control structure connecting the A8 Ponds to Alviso Slough. Since 2017, the A8 Notch has been fully open, creating a muted tidal regime in the A8 Ponds.

2.4.6 Pond A4

Situated southwest of the A8 Ponds, Pond A4 spans approximately 320 acres. Valley Water operates Pond A4 as an artificial open water body under a 2005 memorandum of understanding with USFWS. Water quality within the pond is maintained by drawing in water from nearby Pond A3W owned by USFWS. Pond A4 is hydraulically linked to the A8 Ponds via an existing siphon beneath Guadalupe Slough that discharges into the A8 Ponds as shown in Figure 2-2 (CH2M-Hill 2005). A pump located in the southeast corner Pond A4 lifts water into an isolated basin to supply the siphon while lowering the water level in Pond A4, which draws water into A4 from Pond A3W.

Prior to implementation of this siphon system, Pond A4 experienced poor water quality characterized by elevated salinity and low dissolved oxygen during summer. Under current conditions, Valley Water operates the pumps and siphons from July to October, reducing salinity and increasing dissolved oxygen concentrations. From October to July, rainfall and stormwater pumped from the nearby stormwater detention basin to the south serves as the sole source of water for Pond A4. Biweekly monitoring of Pond A4 water quality determines the need for pump operations or other actions to address deteriorating water quality conditions (see Section 2.8.2).

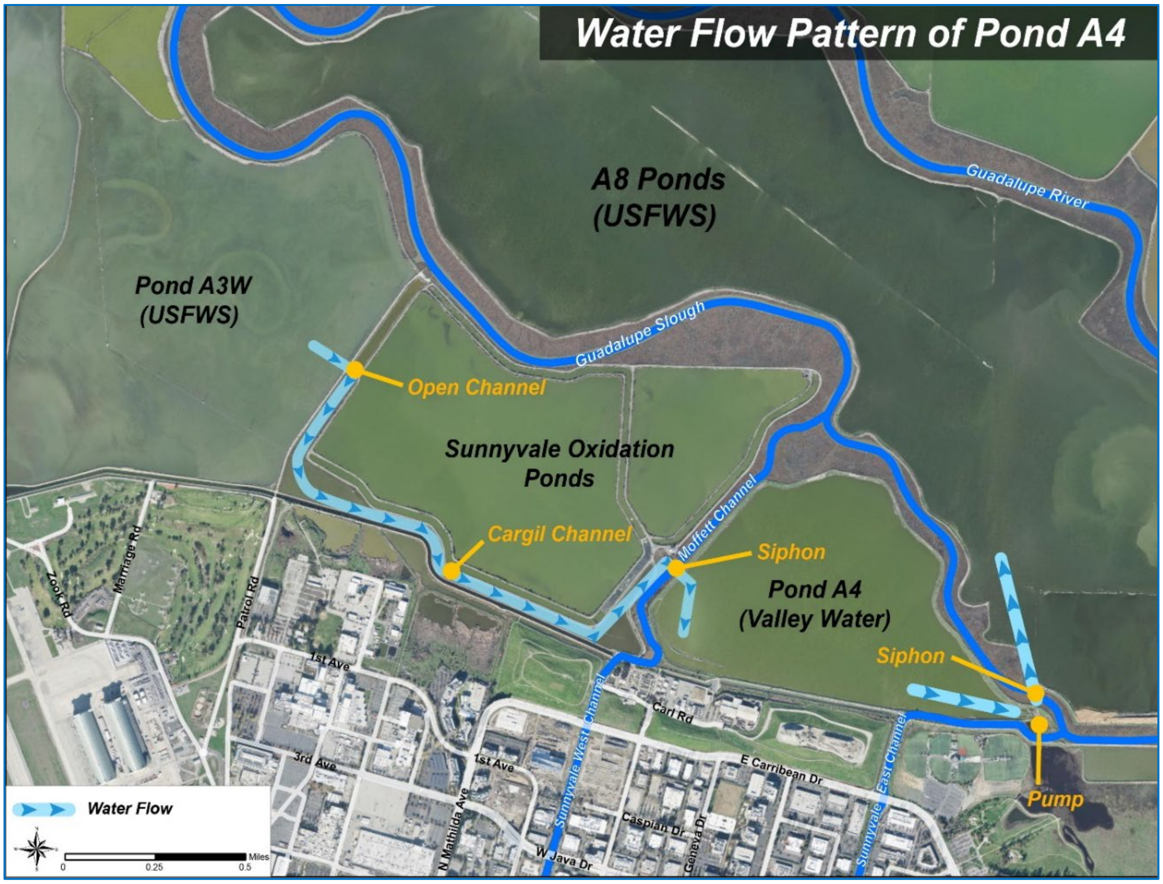


Figure 2-2. Flow circulation pattern of Pond A3W, Cargill Channel, and Pond A4.

2.4.7 South San Francisco Bay Shoreline Project

The Shoreline Project is a partnership among the CSCC, the U.S. Army Corps of Engineers (USACE), Valley Water, and regional stakeholders, including USFWS, to provide coastal flood protection, restore and enhance tidal marsh and related habitats, and provide recreational and public access opportunities along SCC's shoreline. The Shoreline Project aims to provide coastal flood protection that considers sea level rise and enhances tidal marsh by using a combination of levees, wetlands, and transitional zone habitats also known as ecotones.

The Shoreline Project Area is divided into multiple phases considering economic impact areas (EIAs) located between San Francisquito Creek and the Lower Guadalupe River, including potentially affected areas extending westwards from North San José and the community of Alviso to include the City of Santa Clara, the City of Sunnyvale, the NASA Ames Research Center at Moffett Field, as well as the cities of Mountain View and Palo Alto (USACE 2015). The Phase I project area includes EIA 11 and extends from Coyote Creek to Guadalupe River in San José. The project focused on the Alviso community, which is below sea level and at risk from coastal flooding. Improvements in the Alviso area consisting of an engineered FRM levee, restored tidal marsh in Ponds A9-15 and A18, and recreation features, are currently under construction. The Shoreline Project will advance the SBSPRP in the Alviso area by providing necessary flood protection to offset increased flooding risks that could result when existing pond berms are breached to restore tidal flows. Portions of the engineered FRM levee will include an extended ecotone slope to provide ecological benefits, including enhanced wildlife habitat and space for inland marsh migration in response to projected sea level rise. The ecotone will also reduce wave run-up during extreme coastal events. The Shoreline Project is anticipated to provide coastal flood projection for inland communities under existing and future projected sea level rise through 2067 (Valley Water 2017).

Phase II of the Shoreline Project includes the shoreline area from San Francisquito Creek in Palo Alto to Permanente Creek in Mountain View (EIA 1–4). Phase III includes the Calabazas/STA Creek-Marsh Connection Project Area and extends from Permanente Creek to Guadalupe River in San José (EIA 5–10). Feasibility studies, partially funded by Valley Water's Measure B, the Safe, Clean Water and Natural Flood Protection Program, are in progress for both Phase II and III. Phase III includes the Calabazas/STA Creek-Marsh Connection Project Area.

2.5 Tidal Dynamics

Because the Project Area is at the intersection of riverine and tidal processes, proposed changes in marsh, creek, ponds, and slough habitat connectivity are expected to result in changes to hydrodynamics, sediment transport, and flood risks. The tides that move water in and out of the ponds are a key driver of habitats and sedimentation patterns. Astronomical tides result from the changing influences of the gravitational attraction between the rotating earth, moon, and sun upon water levels in the ocean and SF Bay waters (May et al. 2016). Every day, the SF Bay has two high and two low tides that each reach a different elevation. This pattern is known as a mixed semidiurnal tide. In contrast, extreme tides are temporary, short- to medium-term events when local water level is above the astronomical tide level. The increase is generally caused by weather conditions rather than astronomical influences.

2.5.1 Tidal Datums

Tidal datums describe the elevations of the tides relative to a geodetic (earth surface) datum, affecting establishment of tidal marsh and associated habitats. The National Oceanic and Atmospheric Administration's (NOAA) National Ocean Service updates tidal datums about every 25 years nationally to adjust for long-term sea level rise. Recognizing the hydrodynamics of sloughs and creeks in the Project Area can affect local tide ranges at particular locations throughout the Project Area, the generalized tidal datums included in Table 2-2 are based upon average conditions over the 18.6-year tidal epoch cycle at the Coyote Creek Tide Gage (NOAA 2023) with an adjustment to the local mean lower low water (MLLW) datum based upon the average of recent benchmark (F555, H555) surveys by NOAA.

Table 2-2. Estimated local tidal datums for the Valley Water Calabazas San Tomas Aquino Creek–Marsh Connection Project based upon the Coyote Creek Tide Gage (Station ID: 9414575).

Tidal datum	Elevation (feet North American Vertical Datum of 1988)
Mean Higher High Water (MHHW)	8.43
Mean High Water (MHW)	7.84
Mean Tide Level (MTL)	4.30
Mean Low Water (MLW)	0.76
Mean Lower Low Water (MLLW)[1]	-0.42

[1] NOAA (2023) MLLW datum adjusted to North American Vertical Datum of 1988 based upon the average of two local benchmark surveys.

Changes in tide range due to tidal habitat restoration will also contribute to future differences in tidal datum calculations. Additionally, the relationship between local tidal datums and the topography of a site proposed for tidal restoration will influence selection of restoration design elements such as the dimensions and excavated depths of tidal channels, berm breach locations, channel and breach geometry, as well as grading of features designed to be exposed or submerged at various tidal elevations. Local tidal datums will interact with local hydrology, site topography, and restoration design elements to drive the resulting habitat evolution.

2.5.2 Extreme Tide Levels/Coastal Flood

Extreme tides occur whenever water levels are elevated above the predicted astronomical tide level (i.e., tide level due to the astronomical forces of the sun and moon). Extreme tides can result from storm surge caused by wind and low atmospheric pressure, El Niño events, wind set up, freshwater inflows, or a mix of these factors.

Table 2-3 contains estimates of both astronomical and extreme tide/coastal flood elevations at a model output point (from the FEMA's San Francisco Bay Area Coastal Study) located in the Bay about 1,000 feet due north of Pond A6 (May et al. 2016).

Table 2-3. Estimated maximum water surface elevations for a range of extreme tide/coastal flood event recurrence intervals.

Event description	Estimated water surface elevation at index point 710 (feet North American Vertical Datum of 1988)
1-Year (close to astronomical king tide)	8.7
2-Year	9.1
5-Year	9.5
10-Year	9.8
25-Year	10.3
50-Year	10.8
100-Year	11.4
500-Year	13.4

Source: May et al. 2016

2.6 Sea Level Rise and Climate Change

Between 1900 and 2000, sea level rose about eight inches as measured at the Presidio Tide Gauge, and the rate of sea level rise has accelerated in the most recent decades. An increase in the amount of greenhouse gas emissions in the Earth's atmosphere has led to an increase in global air and water temperatures. Warmer temperatures cause ice sheets and glaciers to melt and ocean waters to expand as they warm, leading to rising sea levels. Annual average air temperatures have increased by about 2.5 degrees Fahrenheit (°F) (~1.25 degrees Celsius [°C]) since pre-industrial conditions in 1895 (OEHHA 2022). Warming has occurred in every month of the year with the most pronounced warming occurring in the late summer and autumn months (Mooney and

Zavaleta 2019). At present, there is optimism that global commitments and actions may limit global warming to 2 to 3°C by 2100 compared to pre-industrial conditions (Intergovernmental Panel on Climate Change [IPCC] 2023), which is generally similar to RCP 4.5 / SSP2-4.5. However, global greenhouse gas emissions continue to increase, and global temperatures have already risen by 1.1 to 1.3 °C compared to pre-industrial conditions (1850–1900) (IPCC 2023).

As temperatures warm, extreme precipitation will increase since warmer air can carry more moisture (Lavers et al. 2015). Climate models do not show a significant change in the annual average amount of precipitation that may fall in the Bay Area (Swain et al. 2018); however, the Bay Area is likely to see greater shifts between periods of extreme drought with below average rainfall, and extremely wet years with above average rainfall. Atmospheric rivers and extratropical cyclones, the two storm types that impact the Bay Area, are projected to bring up to 37% more rainfall by 2100, with more intense rainfall falling during shorter durations (Patricola et al. 2022).

2.6.1 Sea Level Rise Projections

Climate change and sea level projections are regularly updated by the Intergovernmental Panel on Climate Change (IPCC), refined for use along U.S. coasts by the federal government, with recommendations and guidance provided at the state and local level for sea level rise adaptation and flood risk reduction projects. The IPCC released updated climate projections in August 2021 (IPCC 2021), and the Federal Sea Level Rise Task Force released updated sea level rise projections for the U.S. in February 2022 (Sweet et al. 2022). The latest sea level rise guidance for California is from 2018 and California state agencies are in the process of updating the guidance to reflect the latest science. Based on the 2018 California state sea level rise guidance, sea levels in the Bay are projected to rise between 0.5 to 2 feet by 2050 and 1 to 6.9 feet by 2100, with a high end of 10.2 feet if extreme ice melt occurs (H++ scenario) (Ocean Protection Council 2018). The range in projections is due to uncertainty on future greenhouse gas emissions and how fast ice sheets will melt in response to increases in emissions.

The latest sea level rise science based on Sweet et al. (2022) includes very similar projections to the California state projections, but excludes the extreme ice melt scenario (i.e., H++). The uncertain physical processes such as ice sheet loss that could lead to much higher sea level rise increases, such as 10.2 feet (H++) by 2100, are considered less plausible in the coming decades. However, the High scenario could reach this threshold in the decades following 2100 (and continue rising). The five 2022 scenarios from Sweet et al. (2022) for the contiguous U.S. are shown below in Figure 2-3, along with tide gauge observations, and observation extrapolations. The ranges within and between the five scenarios represent different sources of uncertainty. Average annual tide-gauge observations and the observation-based extrapolation are overlaid for context (Collini et al. 2022, Sweet et al. 2022).

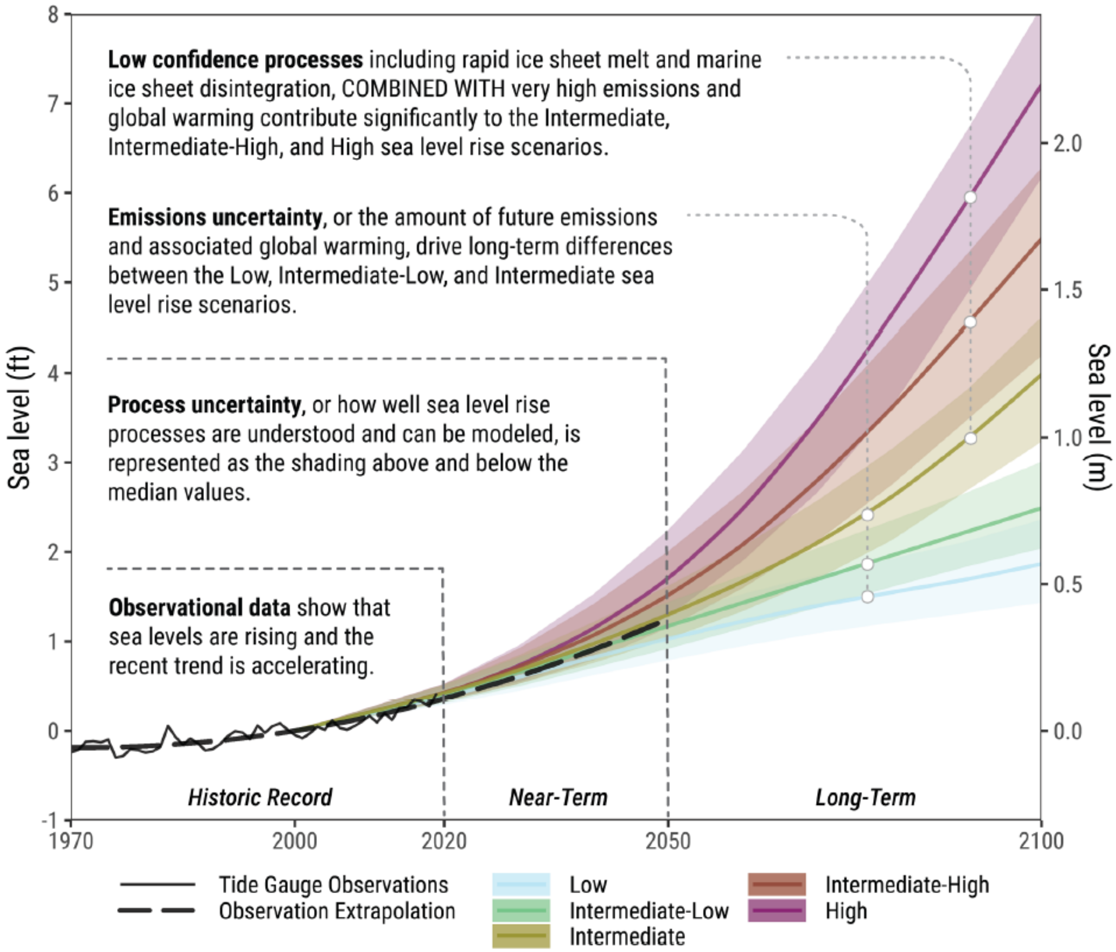


Figure 2-3. Sea level rise scenarios for the contiguous United States relative to a year 2000 baseline (Collini et al. 2022, Sweet et al. 2022).

The regional scenarios for California and southern Oregon are shown in Figure 2-4. Sweet et al. (2022) developed an extrapolation of tide gage and satellite observations from 2020 to 2050, which provide enhanced insight on regional sea level rise trends. This extrapolation is made possible due to the increased number and length of available tide gauge and satellite altimetry records. Extrapolations beyond 2050 were not developed, as it is assumed that processes not fully represented in the observations from 1970–2020 could become dominant, thus alternating the projections (Sweet et al. 2022). This analysis highlights that sea level rise along the California coastline and in the Bay is currently tracking with the intermediate sea level rise scenario, which could lead to 3.5 feet of sea level rise by 2100. The current trajectory is recommended as a reasonable lower-bound for project-based analysis (Collini et al. 2022). If greenhouse gas emissions continue to increase and/or more rapid ice sheet melt and disintegration occurs, sea level rise would likely exceed 3.5 feet by 2100.

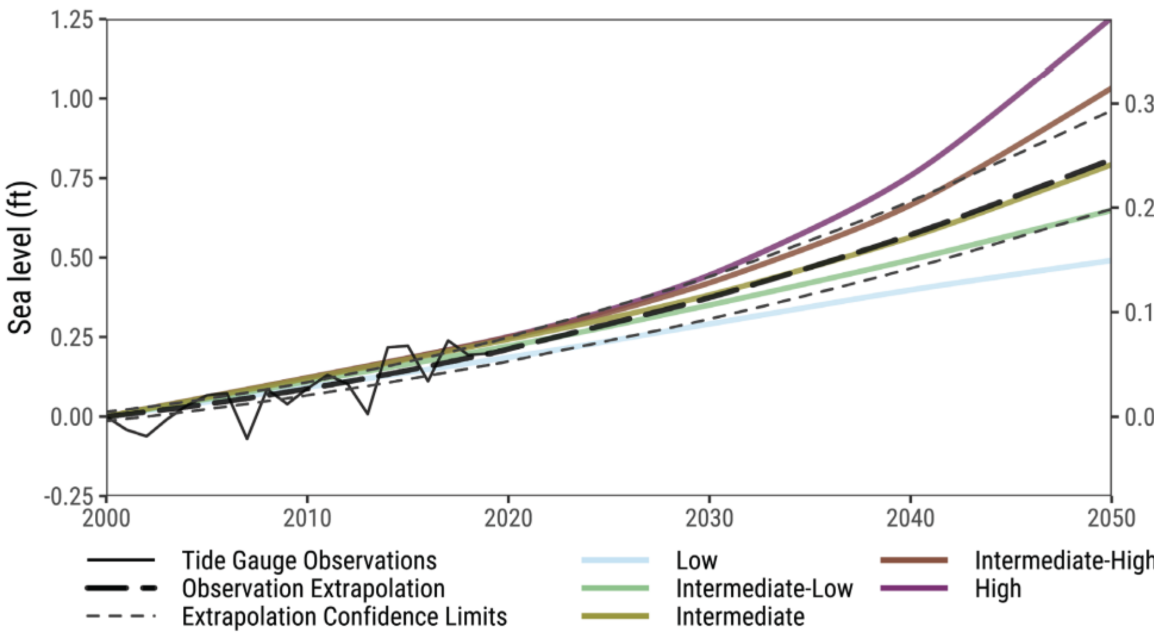
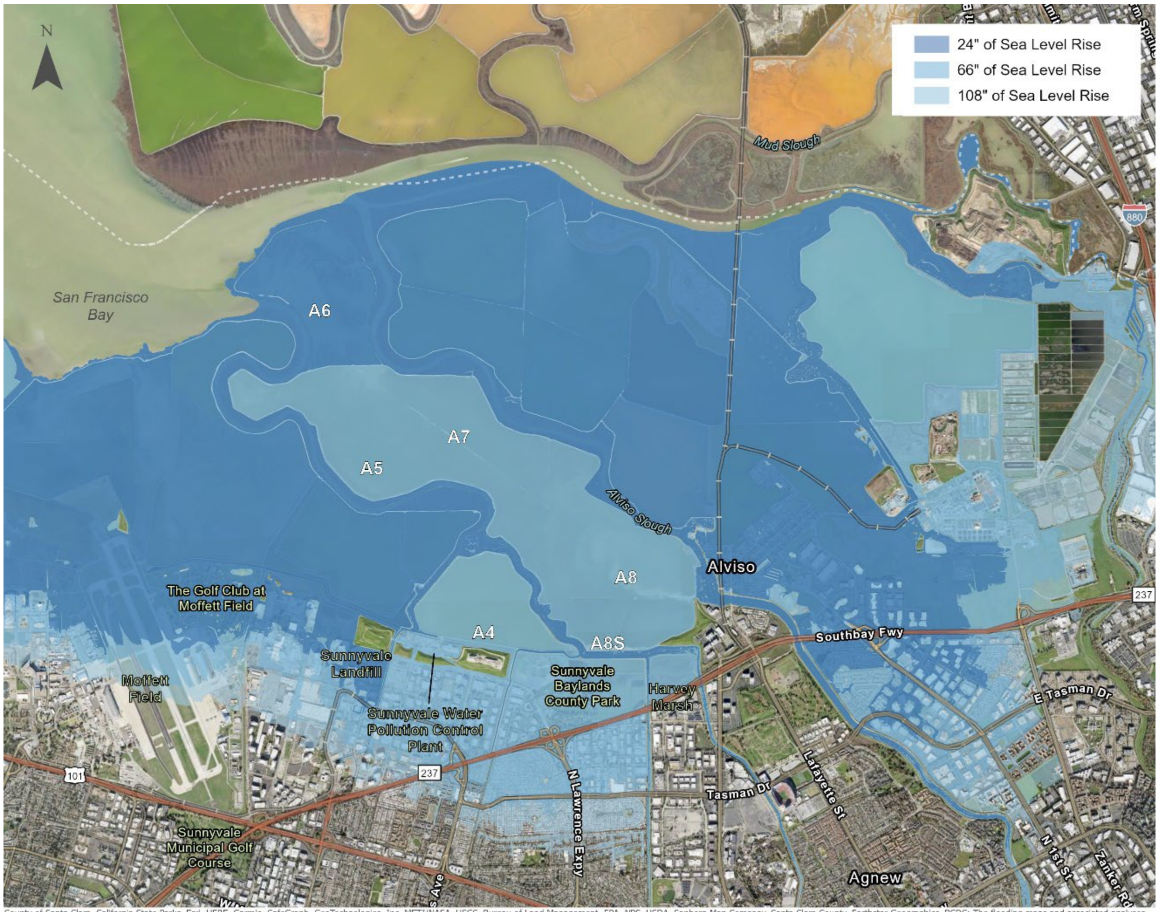


Figure 2-4. Regional Sea Level Rise Scenarios and Observations for California and southern Oregon (Collini et al. 2022, Sweet et al. 2022).

2.6.2 Potential Impacts to the Project Area from Sea Level Rise

Depending upon the magnitude of sea level rise that may occur in the future, higher tidal datums and more frequent extreme high tide events could increase the likelihood of pond berms overtopping, leading to flooding of the surrounding areas. Not accounting for increases in wind-wave erosion of the berms at higher tides, the berms surrounding Pond A4 and the A8 Ponds could be overtopped with 3–4 feet of sea level rise as shown by the Adapting to Rising Tides flood mapping tool (https://explorer.adaptingtorisingtides.org/explorer) (Figure 2-5). This amount of sea level rise is equivalent to a 1% annual chance extreme SF Bay water level with no sea level rise, meaning the berms could be overtopped in a large storm event today. Figure 2-5 shows the Project Area with 24, 66 and 108 inches of sea level rise. These scenarios show what the area looks like with permanent inundation as well as a combination of sea level rise and storm events. For example, the 24-inch scenario is equivalent to a 20% annual chance

SF Bay water level (5-year event) and no sea level rise, the 66-inch scenario is equivalent to 24-inches of sea level rise and a 2% annual chance storm (50-year event), and 108-inches is equivalent to 60-inches of sea level rise and a 1% annual chance Bay water level (100-year event).



County of Santa Clara, California State Parks, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, Bureau of Land Management, EPA, NPS, USDA, Sanborn Map Company, Santa Clara County, Earthstar Geographics, BCDC: The flooding maps and associated analyses provide a regional-scale illustration of coastal flooding due to specific sea level rise and storm surge scenarios, and are intended to improve sea level rise awareness and preparedness. The maps are not detailed to the parcel-scale and should not be used for navigation, permitting, regulation, project review, mitigation, actuarial estimations, or other legal uses. Flooding due to sea level rise and storm surges is possible in areas outside of those predicted in these maps, and the maps do not guarantee the safety of an individual or structure. While the maps use the best data available at its time of publication to capture topographic features (e.g., berms, tide gates), they may not capture other infrastructure improvements (e.g., pumps) designed to reduce future flood extent. The maps do not model flooding from other sources, such as riverine, groundwater, or surface water flooding from rainfall-runoff events, nor do they model erosion, subsidence, or local wind and wave effects. https://explorer.adaptingtorisingtides.org/about#a-disclaimer

Figure 2-5. Project Area with 24, 66, and 108 inches of sea level rise (San Francisco Bay Conservation and Development Commission 2023).

Without consideration of regional flood protection efforts, tidal waters will extend farther inland during high tides under projected sea level rise. In the Project Area, this could cause tidal waters to migrate inland in both Calabazas and STA creeks, causing shifts in sediment deposition patterns because of increased landward excursion of the tides (SFEI-ASC 2018). The supply of contributing watershed and tidal sediment delivered to the lower reaches of Calabazas and STA creeks will also likely be different as a result of a changing climate. A future with more extreme precipitation events could result in higher average annual watershed sediment loads over the long term. A combination of high watershed and tidal sediment supply in the future could cause increased sediment deposition in the lower reaches of Calabazas and STA creeks, which would add to future flooding concerns (SFEI-ASC 2018).

Lastly, sea level rise could increase the salinity in the lower reaches of Calabazas and STA creeks during dry periods, as well as other tributaries to Guadalupe and Alviso Sloughs. In addition to changes in surface water salinity, which may result in changes of riparian vegetation assemblages, sea level rise may also result in changes to local groundwater elevations and gradients, which could affect groundwater salinity of the shallow aquifer underlying the Project Area (Valley Water 2023).

2.7 Sediment Sources and Management

Widespread landscape modification within the Santa Clara Valley and adjacent Baylands over the past 150 years has had a considerable impact on sediment dynamics within the Project Area. Historically, sediment-laden stormflows in Calabazas and STA creeks would frequently spread out onto the Santa Clara Valley and downstream marshes, supplying fine and coarse sediment that helped maintain a wide array of habitats over time. The straightening, lengthening, rerouting, and leveeing of Calabazas and STA creeks for flood management in the late nineteenth and early twentieth centuries resulted in stormflows remaining in the channel and bypassing the Santa Clara Valley and historical marshes that were leveed and cut off from the tide to establish commercial salt ponds. In addition, the leveeing of the tidal reaches of both creeks combined with channel rerouting has resulted in decreased tidal prism and excess fine sediment accumulation compared to historical conditions. This accumulation of sediment requires the Valley Water SMP to regularly desilt these channels to meet flood management goals at a considerable cost.

Looking to the future, the sediment supply from Calabazas and STA creeks will be vital to the success of the local marsh restoration efforts. As sea level continues to rise, the amount of sediment needed to support marsh restoration will only increase. The recent study by Dusterhoff et al. (2021) examining the future of Bayland sediment demand and supply under a changing climate suggests the restored Pond A8 will likely not get all the sediment it will need from tidal sources alone. Therefore, management actions aimed at directing the creeks' sediment supply into Pond A8 appear essential for supporting restored marshes over the long term.

2.7.1 Calabazas and STA Creeks

Few field-based studies have been conducted to assess the sediment transport rate in Calabazas and STA creeks. Some modeled results (e.g., Röbke and van der Wegen 2018, Dusterhoff et al. 2021, Zi et al. 2022) are available for the Project Area; these models predict annual yields typical of the region at less than 5,000 metric tons per year. Bed material of the channels is characterized by sand and gravel upstream then fine-grained material as the channels approach tidally influenced areas. Calabazas Creek samples collected from between the channel outlet and Tasman Drive (approximately 1 mile upstream) were composed of 90–100% fine particles; samples collected near US 101 were coarser and composed of 60% gravel. Samples from downstream in STA Creek were 80% sand, but the sediment samples further upstream (near US 101) were composed of 80% fine particles (Valley Water 2022). As discussed below, sediment accumulation estimates through Valley Water's SMP add additional context.

Under the SMP, Valley Water periodically removes accumulated sediment and encroaching vegetation in the Calabazas and STA channels to maintain channel capacity and reduce risks associated with flooding. Records between 2000 and 2020 indicate more than 310,000 cubic yards of sediment were removed from the two creeks at an average annual cost of roughly $550,000. Taken in total, the data available suggest that these channels are generally aggrading sediment between removal efforts (Valley Water 2021a).

Modeling from Deltares, incorporated into the SFEI Vision Report, suggests if Calabazas and STA creeks were realigned, a portion of the creek sediments would be transported to the A8 Ponds, which would reduce the need to periodically remove sediment from the lower channels of the two creeks under the SMP (Röbke and van der Wegen 2018). This has the potential to reduce future costs and the environmental impacts associated with sediment removal and transport (Valley Water 2021a).

2.7.2 Sunnyvale East and West Channels

The SEC and SWC were constructed by Valley Water in the 1960s to convey storm runoff from urbanized portions of Sunnyvale to the Bay. Because these creeks do not originate in rural watersheds subject to surface erosion, sediment sources are limited to storm runoff and tidally transported sediments originating in Guadalupe Slough.

2.7.3 A8 Ponds and Pond A4

Sediment dynamics in the A8 Ponds are generally understood. Prior to Phase 1 of the SBSPRP, these channels had limited interaction with the adjacent channels and the SF Bay. Today, these ponds have a muted tidal signal due to the implementation of water control structures at Ponds A5 and A7 as well as tide gates at the A8 Notch. Repeat topographic surveys (Cinquini & Passarino, Inc. 2020) indicate a dynamic system with a net change observed in most locations within the A8 Ponds. If the A8 Ponds are breached, Valoppi (2018) suggests relatively high rates of sediment deposition based on the successes observed in Pond A6. Modeling results from Deltares, incorporated into the SFEI Vision Report, suggest that if Calabazas and STA creeks were realigned, much of the sediment would be deposited in localized deltas near the confluence with the A8 Ponds (SFEI-ASC 2018, Röbke and van der Wegen 2018). The relative contributions of accumulated sediments arriving from the re-aligned creeks and SF Bay sources will be examined through planned hydrodynamic modeling of selected Conceptual Alternatives developed as part of the Project (see Section 4.2.15).

Limited data exist for Pond A4; the most recent survey was published in 2005 CH2M-Hill 2005). This was identified as a data gap in the Monitoring Work Plan (Stillwater Sciences 2023b). The available data suggest that 64% of the pond bottom is lower than MLLW. Given this, the pond bottom must be raised before marsh restoration efforts can be initiated. Raising the entire pond to the mean higher high water (MHHW) mark would require roughly 4.1 million cubic yards of sediment (CH2M-Hill 2005, Valley Water 2023).

2.8 Water Quality

Water and sediment quality in Calabazas and STA creeks and the adjoining Baylands have been characterized through studies conducted in support of Phase I (2010–2018) of the SBSPRP, as well as monitoring by Valley Water in and around Pond A4 and monitoring related to the SFEI Nutrient Management Strategy (NMS). Prior to 2010, the State Water Resources Control Board and the San Francisco Bay Regional Water Quality Control Board (Regional Board) conducted assessments in the Guadalupe River for mercury and the pesticide diazinon under Section 303(d) of the Federal Clean Water Act. Mercury is a contaminant of concern in the Project Area due to the legacy of deposition of sediment containing mercury from the former New Almaden Mining District (active 1847 to 1976) located in the upstream Guadalupe River watershed (Marvin-DiPasquale et al. 2022). Remediation of the former mining sites was initiated in 1990 and measures to limit ongoing mercury loading to SF Bay are monitored under the completed Guadalupe River watershed mercury Total Maximum Daily Load(Austin 2006).

2.8.1 A8 Pond Investigations

Because of the legacy mercury contamination discussed above, numerous reports and peer-reviewed publications have characterized water quality conditions prior to and during a series of SBSPRP Phase I restoration activities in the Project vicinity, which began in 2010 with internal berm breaches between Ponds A5, A7, A8, and A8S, followed by four breaches from Pond A6 to Alviso and Guadalupe sloughs. In 2011, a progressive opening of multiple tide gates began using a control structure constructed at the far southeastern corner of the A8 Ponds (i.e., “A8 Notch”), connecting the pond complex to upper Alviso Slough. The 5-foot-wide tide gates gradually opened the A8 Ponds to muted tidal action over a 6-year period (2011–2017), which resulted in the mobilization of legacy sediment-associated mercury and dramatic changes in water quality over time, relatively large reductions in salinity and dissolved organic carbon, and measurable increases in dissolved mercury and methylmercury in the A8 Ponds after all eight tide gates were opened in June of 2017 (Foxgrover et al. 2019, Marvin-DiPasquale et al. 2022).

Based on results reported in Marvin-DiPasquale et al. (2022), construction activities associated with Project creeks realignment and breaching of the A8 Ponds berms could result in short-term increases in mercury and methylmercury levels in the ponds and connected waterways and biota (e.g., prey and non-prey fish, waterbird eggs). Increased mercury and methylmercury water and tissue levels are expected to return to baseline levels within one to two years, although the number and location of berm breaches ultimately included in the Project may affect the magnitude and duration of any short-term mercury increases.

Since the completion of the A8 Ponds investigations, the tide gates of the A8 Ponds have been left open to maintain support muted tidal circulation in the ponds and discharge of highly saline water to the Bay. Salinity in the ponds consistently meets the Regional Board maximum limit of 40 parts per thousand. The A8 Ponds are eutrophic and become highly oxygenated during peak photosynthesis. Oxygen levels are generally lower in the Bay and surrounding creeks and sloughs than in the A8 Ponds, due to high suspended sediment concentrations that limit algal photosynthesis (Valley Water 2023).

2.8.2 Pond A4 Water Quality

Pond A4 historically exhibited hypersaline conditions with low dissolved oxygen during summer. To offset these conditions, Valley Water pumps water from Pond A4 to A8 Ponds, lowering the Pond A4 water surface elevation and drawing water from Pond A3W (Figure 2-2). The pump is operated based on a maximum salinity of 40 parts per thousand and a minimum dissolved oxygen concentration threshold of 5 parts per million (Valley Water 2023).

A 2010 study (Calhoun and Drury 2010) of sediment and water quality at the western bank and center of Pond A4, as well as Guadalupe Slough and other sites in the vicinity, found measurable quantities of pyrethroids and metals in sediment. The study determined that the metals in sediment, particularly copper, could result in toxic effects on biota. Both Calhoun and Drury (2010) and Johnson (2011) found methylmercury in Pond A4 sediment at greater than average concentrations relative to SF Bay sediment (Valley Water 2023).

2.8.3 Calabazas and STA Creeks

The Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) conducts creek status monitoring in compliance with the Municipal Regional Stormwater Permit. In water year 2017, monitoring at Saratoga Creek (in the STA Creek watershed) and Calabazas Creek included bioassessment, nutrients, general water quality (probabilistic), and chlorine (targeted), as well as separate targeted monitoring for pathogen indicators. One station on STA Creek was sampled for toxicity/sediment chemistry. Statistically significant toxicity to water flea (*Ceriodaphnia dubia,* a species used for standard toxicity tests) reproduction, was observed in water samples, but the magnitude of toxicity did not exceed the Municipal Regional Stormwater Permit trigger threshold.

Mercury levels observed in Calabazas and STA creeks are typical of those in urban creeks, and sediment from these two watersheds is lower in mercury than the legacy sediment in the Guadalupe River. The creeks are connected to Guadalupe Slough, which may contain mercury-contaminated sediment deposited when the Guadalupe River flowed through its original watercourse to Guadalupe Slough. The river was subsequently redirected into what is now Alviso Slough. While there are no known deep sediment core sample data from Guadalupe Slough, U.S. Geological Survey (USGS) sediment cores collected between 2006 and 2016 in Alviso Slough, to which the river is currently connected, showed elevated total mercury concentrations in deeper sediments in the mid to upper slough (Valley Water 2023, Marvin-DiPasquale et al. 2022).

Long-term effects of creek realignment on mercury and methylmercury levels will depend on the degree to which scour of the pond bottom exposes mercury-bearing sediments. If the realignment primarily results in deposition of sediment within the A8 Ponds and does not cause substantial long-term bed scour in the pond bottom, mercury and methylmercury levels in water, sediment, and biota would likely not increase.

2.8.4 Sunnyvale East and West Channels

Although the SEC and SWC do not receive upstream sediment sources associated with mercury contamination such as those found in the Guadalupe River watershed, past land uses have contributed to low levels of contamination in creek sediments. Legacy soil contamination from pesticides is present along the entire length of channels and within channel levees and berms, probably from past agricultural practices (TRC Solutions 2007). Elevated concentrations of polychlorinated biphenyls (PCBs) in sediments and stormwater collected adjacent to and downstream of a former industrial property located in the SEC watershed have been observed during source investigations conducted since the early 2000s (SCVURPPP 2018).

2.8.5 Guadalupe and Alviso Sloughs

Guadalupe Slough receives effluent from the Sunnyvale WPCP via the WPCP ponds. Depending upon the number and locations of breaches in the perimeter berm of the A8 Ponds that is selected, the Project may change the amount of freshwater flowing to Guadalupe Slough by disconnecting Calabazas and STA creeks from the slough. This may affect water quality in Guadalupe Slough and thereby affect operations of the Sunnyvale WPCP (Valley Water 2021a). Planned breaches between the A8 Ponds and Alviso and Guadalupe sloughs will result in construction disturbance of sediments and is expected to increase short-term mercury levels in the A8 Ponds (see Section 2.8.1 above). Modeling studies being undertaken as part of the Project will evaluate the potential for channel bed scour in the sloughs as well as at breach locations.

2.8.6 Saltwater Intrusion and Groundwater Salinity

Saltwater intrusion associated with groundwater overdraft and lowering of groundwater levels has occurred in many of the coastal aquifers of the United States (Barlow and Reichard 2010). Valley Water has monitored groundwater quality in the Santa Clara Subbasin for decades. Prior to 1960, land subsidence in the Santa Clara Valley due to historical overdraft allowed SF Bay waters to move inland and increased salinity (measured by chloride levels) in the shallow aquifer of the Baylands. Managed aquifer recharge using imported water starting in the 1960s reversed this trend and the area of saltwater retreated towards SF Bay. Chloride data from wells screened in the shallow aquifer zone of the Santa Clara Subbasin are presented in Valley Water's Annual Groundwater Reports. More recently the area of saltwater in the shallow aquifer has moved bayward although the 100 milligrams per liter contour is still landward of its 1960 location (Valley Water 2021d). While shallow groundwater in the Project Area is not used for water supply purposes, many wells in northern SCC tap the deep aquifer for water supply. To date, elevated chloride levels have not been observed in the deep (i.e., water supply) aquifer (Valley Water 2021d).

2.9 Habitat

The SF Bay contains areas of urban development as well as diverse natural tidal and non-tidal wetland habitats including tidal salt marsh, brackish marsh, freshwater marsh, intertidal mudflats, active and former salt evaporation ponds, and open water.

Tidal salt marsh occurs on the SF Bay side of salt pond berms and generally consists of halophytic (salt-tolerant) species adapted to regular inundation by tidal saltwater. The frequency of tidal inundation dictates the dominant vegetation supported at various elevations along the tidal salt marsh gradient. Low marsh areas (i.e., below the mean high water [MHW] mark) are dominated by cord-grass species (*Spartina* spp.); middle marsh areas (i.e., inundated and exposed with regular tides) are dominated by pickleweed species (*Salicornia* spp.); and high marsh areas (i.e., inundated only occasionally) feature a mixture of pickleweed and other moderately halophytic native species such as heath (*Frankenia salina*), saltgrass (*Distichlis spicata*), fleshy jaumea (*Jaumea carnosa*), marsh gumplant (*Grindelia stricta* var. *angustifolia*), and saltmarsh dodder (*Cuscuta salina*), as well as non-native species such as small flowered iceplant (*Mesembryanthemum nodiflorum*), spearscale (*Atriplex prostrata*), perennial pepperweed (*Lepidium latifolium*), and New Zealand spinach (*Tetragonia tetragonioides*) (USFWS and CSCC 2016).

Tidal salt marsh provides habitat for the federally endangered salt marsh harvest mouse (*Reithrodontomys raviventris*) and the California Ridgway's rail (*Rallus obsoletus obsoletus*), as well as the endemic Alameda song sparrow (*Melospiza melodia pusillula*), savannah sparrow (*Passerculus sandwichensis*), saltmarsh common yellowthroat (*Geothlypis trichas sinuosa*), Virginia rails (*Rallus limicola*), soras (*Porzana carolina*), black-necked stilts (*Himantopus mexicanus*), northern harriers (*Circus cyaneus*), and herons and egrets. California black rails (*Laterallus jamaicensis coturniculus*) breed in small numbers in tidal salt marshes (Liu et al. 2005, as cited by USFWS and CSCC 2016). Additionally, larger shorebirds, swallows, blackbirds, and other species will roost in the tidal marsh, occasionally in large numbers. Tidal marshes (and mudflats) in several SF Bay locations are also used as haul-out and pupping sites by harbor seals (USFWS and CSCC 2016).

Brackish marsh occurs where salinities are lower due to freshwater input. They are located along the intertidal reaches of the creeks and sloughs that drain to the SF Bay, specifically in areas where freshwater channels experience periodic tidal inundation and groundwater emerges into tidal marshlands. The brackish habitat is dominated by short bulrushes such as seacoast bulrush (*Bolboschoenus robustus*) and saltmarsh bulrush (*Bolboschoenus maritimus* ssp. paludosus). Sediment deposits form terraced floodplains along low-flow channels, and these areas support dense populations of the invasive perennial pepperweed (*Lepidium latifolium*), which can quickly develop into monotypic stands with increasing levels of disturbance. Other moderately halophytic plants such as brass buttons (*Cotula coronopifolia*) and taller bulrushes, including California bulrush (*Schoenoplectus californicus*) and hard stemmed tule *(S. acutus* var. *occidentalis*), occur in areas of lower soil salinity (e.g., toward the upland edges of brackish marsh). Tidal salt marsh species, including pickleweed, alkali heath, saltgrass, and spearscale, may also colonize brackish habitat (USFWS and CSCC 2016).

Brackish marshes support many of the wildlife species that use salt marsh and freshwater marsh habitats. Species composition and abundance varies spatially within brackish marshes depending on water salinity, vegetation type, and habitat structure. Brackish marshes are particularly important for anadromous fish (migrating from saline to fresh water to spawn), catadromous fish (migrating from fresh to saline water to spawn), and invertebrates such as shrimp, which use brackish marshes while physiologically acclimating to changing salinity on their migrations between saline and freshwater habitats (USFWS and CSCC 2016).

Freshwater marsh occurs in limited areas in the SF Bay. Although the soil salinity remains relatively low due to the flow of fresh water, freshwater marshes may experience tidal influence and periodic saltwater inundation. Emergent vegetation consists of dense stands of California bulrush and hard-stemmed tule interspersed with perennial pepperweed or curly dock (*Rumex crispus*). Areas with occasional saltwater inundation may also host halophytic species such as marsh gumplant and pickleweed. Inland margins of freshwater habitat, areas without tidal influence, contain freshwater amphibians including Pacific treefrog (*Pseudacris regilla*), bullfrog (*Rana catesbeiana*), and western toad (*Bufo boreas*). A federally threatened species, California tiger salamanders (*Ambystoma californiense*) occurs in vernal pool habitats at the Warm Springs Unit of the NWR, located about 4 miles northeast of the Project Area (USFWS and CSCC 2016).

Most wetland-associated birds respond to food availability and habitat structure, and therefore may occur in abundance in freshwater, brackish, or salt marsh habitats depending on suitability. Red-winged blackbirds (*Agelaius phoeniceus*), American coots (*Fulica americana*), common moorhens (*Gallinula chloropus*), pied-billed grebes (*Podilymbus podiceps*), song sparrows, saltmarsh common yellowthroats, and marsh wrens (*Cistothorus cabanis*) breed commonly in freshwater marsh habitats in the SF Bay. Muskrat (*Ondatra zibethica*) are associated primarily with this habitat type and a variety of other mammals use freshwater marsh for cover or foraging habitat (USFWS and CSCC 2016).

Intertidal mudflats occur naturally on the outboard side of many of the ponds, narrowly within slough and creek channels, and at the mouths of major sloughs. Mudflats also occur at low intertidal elevations within former salt ponds that have been breached and re-exposed to SF Bay waters and tides. Eventually, as sediment accretes, tidal marsh habitat is expected to replace mudflat habitat within the ponds. Mudflats are characterized as intertidal and are covered by shallow water during high tide and exposed during low tide. These intertidal habitats are inhospitable to most vascular emergent vegetation, typically supporting 0 to 10% cover of cordgrass or pickleweed. Mudflats are key foraging areas for water birds. Shorebirds, gulls, American white pelicans (*Pelecanus erythrorynchos*), dabbling ducks, and larger waders (e.g., herons and egrets) feed on exposed mudflats during receding or rising tideline, and they often use exposed mudflats as roosting or loafing areas when available, as do Pacific harbor seals (*Phoca vitulina richardsi*). When the tides rise, most birds return to roosting areas in salt ponds or other alternate habitats, and the seals move to open waters (USFWS and CSCC 2016).

Open water includes a variety of habitat types such as the subtidal bay waters, tidal sloughs and channels, and areas of standing or flowing water within the salt ponds and tidal marshes. Open water habitats do not support emergent vegetation, but they provide important habitat for aquatic invertebrates, fishes, waterbirds, and harbor seals. Though most of the dominant invertebrates are non-native species, open water habitats support native oyster populations, large fish populations representing several different trophic levels, including Pacific herring (*Clupea pallasi*), northern anchovy (*Engraulis mordax*), Pacific sardine (*Sardinops sagax caeruleus*), staghorn sculpin (*Leptocottus armatus*), several species of perch (*Embiotocidae* family), English sole (*Parophrys vetulus*), and California halibut (*Paralichthys californicus*). Many of the open water fish species support harbor seals and piscivorous birds such as the Forster's tern (*Sterna forsteri*), California least tern (*Sterna antillarum browni*), American white pelican, brown pelican (*P. occidentalis*), and double-crested cormorant (*Phalacrocorax auratus*). Waterfowl such as greater scaup (*Aythya marila*), lesser scaup (*Aythya affinis*), canvasbacks (*Aythya valisineria*), and surf scoters (*Melanitta perspicillata*) dive for bivalves, crustaceans, and other invertebrates in shallower subtidal areas. Bird diversity in the open waters is low, as the species of birds that can exploit the subtidal areas are limited to those that can forage from the air (e.g., terns), underwater (e.g., scoters), and those that can swim. However, large densities of diving ducks (e.g., bufflehead [*Bucephala albeola*] and greater scaup) occur in some areas where appropriate depths and concentrations of benthic invertebrates, particularly bivalves, provide a rich food source. Some species, such as gulls, also roost on the open waters of SF Bay, especially at night (USFWS and CSCC 2016).

Special-Status Species: The South Bay supports several special-status species that could occur in or near the Project Area. The California Ridgway's rail and salt marsh harvest mouse are both federally and California State endangered species known to occur in the Project Area. The bald eagle (*Haliaeetus leucocephalus*), a state endangered species, is present year-round and could potentially forage in areas around Harvey Marsh, A8 Ponds, and Pond A4 (Valley Water 2023; USFWS, pers. comm. June 21, 2023). The federally listed western snowy plover (*Charadrius alexandrines*) was historically documented in the A8 Ponds. However, due to conversion of the ponds to muted tidal regime in 2011, the A8 Ponds no longer provide suitable western snowy plover habitat (R. Tertes, USFWS biologist, pers. comm., December 11, 2020). The federally threatened Central California coast steelhead (*Oncorhynchus mykiss*) are known to occur in the Guadalupe River, Coyote Creek, Stevens Creek, and San Francisquito Creek watersheds, and the occupied rivers and creeks as well as Alviso Slough are USFWS-designated Critical Habitat (Valley Water 2023).

The state listed California black rail (*Laterallus jamaicensis coturniculus*) was recently observed in Alviso Marina County Park to the east of the Project Area, and this species is regularly observed in marshes in the Alviso Complex (Triangle, Coyote Creek, and Drawbridge Marsh; USFWS, pers. comm., June 21, 2023) Although not documented in the Project Area, federally and state endangered California least tern (*Sternula antillarum browni*), federally threatened California red-legged frog (*Rana draytonii*), state threatened tricolored blackbird (*Agelaius tricolor*), and the burrowing owl (*Athene cunicularia*), California Species of Special Concern, may be present near the Project Area. The longfin smelt (*Spirinchus thaleichthys*), a candidate species for listing, has been observed in Alviso Slough and are known to breed in South SF Bay, although distribution varies from year to year (Moyle 2002, as cited by Valley Water 2023; USFWS, pers. comm., June 21, 2023). The special status plant, *Eleocharis parvula,* was found near the Project Area in Pond A19 (USFWS, pers. comm., June 21, 2023). Additionally, three special-status plant species are presumed to be present within a two-mile radius: arcuate bush-mallow (*Malacothamnus arcuatus*), Congdon's tarplant (*Centromadia parryi ssp. Congdonii*), and saline clover (*Trifolium hydrophilum*; Valley Water 2023).

2.10 Existing and Planned Trails

As shown in Figure 1-1, the Project Area includes several public access and recreation amenities including the Bay Trail. The larger Bay Trail is a planned regional trail that, when complete, will encircle San Francisco and San Pablo bays with a continuous 500-mile network of bicycling and hiking trails. In the Project Area, the existing Bay Trail circles the Sunnyvale Oxidation Ponds (where it is known as the Spur Trail) and extends eastward along the southern portion of Pond A4 to the southeastern corner of Sunnyvale Baylands Park; these segments are maintained by the City of Sunnyvale Parks and Recreation Department.

Several other trails in the Project Area connect to the Bay Trail. USFWS maintains the Alviso Slough Trail on the east bank of Alviso Slough within Don Edwards San Franscisco Bay NWR. As shown in greater detail in Figure 2-6, the City of Sunnyvale maintains the Calabazas Creek Trail located on the west bank of Calabazas Creek between CA 237 and Pond A4. Along CA 237, the Bay Trail continues eastward via a pedestrian/bicycle bridge over Calabazas Creek and crosses the southern margin of Harvey Marsh, where it is maintained by SCC Parks. Farther east, an existing segment of the Bay Trail was developed along the frontage of the Marriott Hotel, at the northern section of America Center. It was developed in coordination with the City of San José and the hotel as a publicly accessible recreational amenity as part of the San José Trail Network.

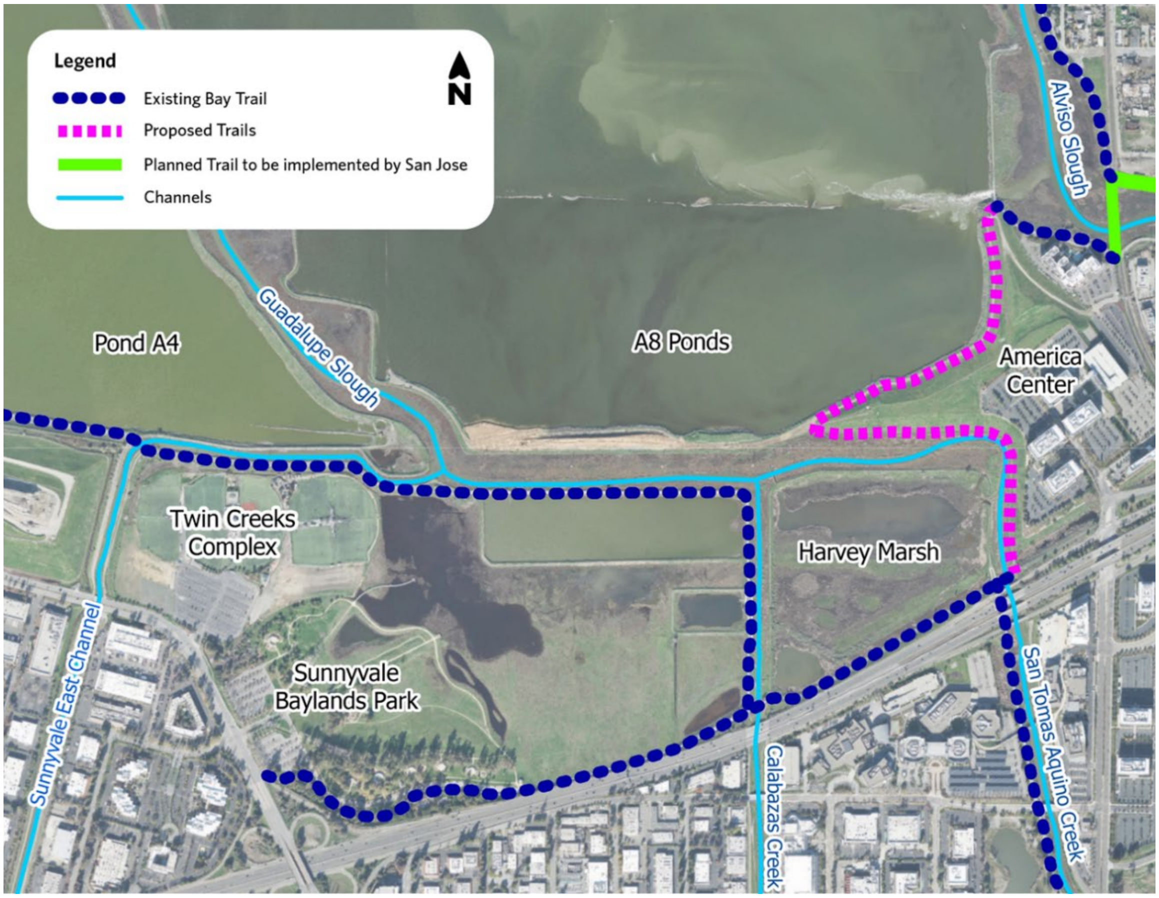


Figure 2-6. Existing trails in the Project Area local to Calabazas and STA creeks.

As shown in Figure 2-6, a new section of the Bay Trail (known as Reach 9) has been proposed by the San José Parks, Recreation and Neighborhood Services north of Highway 237 on the western margin of the America Center (closed landfill) from Harvey Marsh to the Guadalupe River. If built, the new trail segment would be aligned along existing access roads on the east bank of STA creek and the south shore of Pond A8S and would cross the Guadalupe River via a new bridge located between the confluence with Alviso Slough and the existing Gold Street bridge (City of San José 2023). Not shown is an unpaved horseshoe-shaped path that follows perimeter levees along the east, north, and west margins of Harvey Marsh, and connecting to the Bay Trail at either end. However, spontaneous, unplanned breaches at several locations along the perimeter levees have damaged the trail and make it difficult to use.

2.11 Utilities and Easements

A PG&E power transmission line traverses the study area from east to west (Figure 2-7). The transmission line is mounted on steel-lattice towers spaced at 700-foot intervals. PG&E acquired an access easement along the southern boundary of STA Creek in 1940. However, the STA Creek channel has since been relocated and the access easement no longer connects to the powerline towers which are mostly located north of STA Creek. The four transmission line towers are located just south of Pond A8 boundary road but lack direct road access. PG&E currently accesses these on foot from Guadalupe Slough/Calabazas Creek berm south of the towers. The power transmission tower located south of Pond A4 is accessible via existing roads on the SEC levee and roads serving the Sunnyvale WPCP and SMaRT station. Additionally, a PG&E easement for an underground natural gas pipeline located south of STA Creek crosses the study area from east to west. The existing pipeline alignment may cross the realigned channel of STA Creek (Valley Water 2021a).

Figure 2-7. PG&E Right of Way and Utilities in the Project Area (Valley Water 2023).

3 CONCEPTUAL ALTERNATIVE DEVELOPMENT PROCESS

3.1 Valley Water Planning Process

The Valley Water Planning Process (VW W-730-124 Rev P) generally includes three phases illustrated in Figure 3-1: (Phase 1) development of Conceptual Alternatives (includes background information collection, problem definition, alternatives development, analysis, and outreach; Items 12-A through 12-E covered in this Report); (Phase 2) development and evaluation of Feasible Alternatives (Items 12-F and 12-G); and (Phase 3) identification of the Staff-Recommended Alternative (Item 12-H). In Phase 1, the set of Conceptual Alternatives were developed (see Section 4) and ranked using methodologies and criteria developed during Project Workshops (see Section 5). During Phase 2, the highest-ranking Conceptual Alternatives will be evaluated for feasibility and refined, including development of preliminary designs in sufficient detail to assess Project costs, to identify the highest ranked Feasible Alternative. In the final step (Phase 3), the highest ranked Feasible Alternative will be refined further and documented in a Staff-Recommended Alternative Report. Throughout the process, outreach activities will ensure the development and evaluation of alternatives will be informed by input from key Project Partners, including representatives from the cities of San José, Santa Clara, and Sunnyvale, SCC, CSCC, Caltrans, USFWS, SBSPRP, private landowners, and the public.

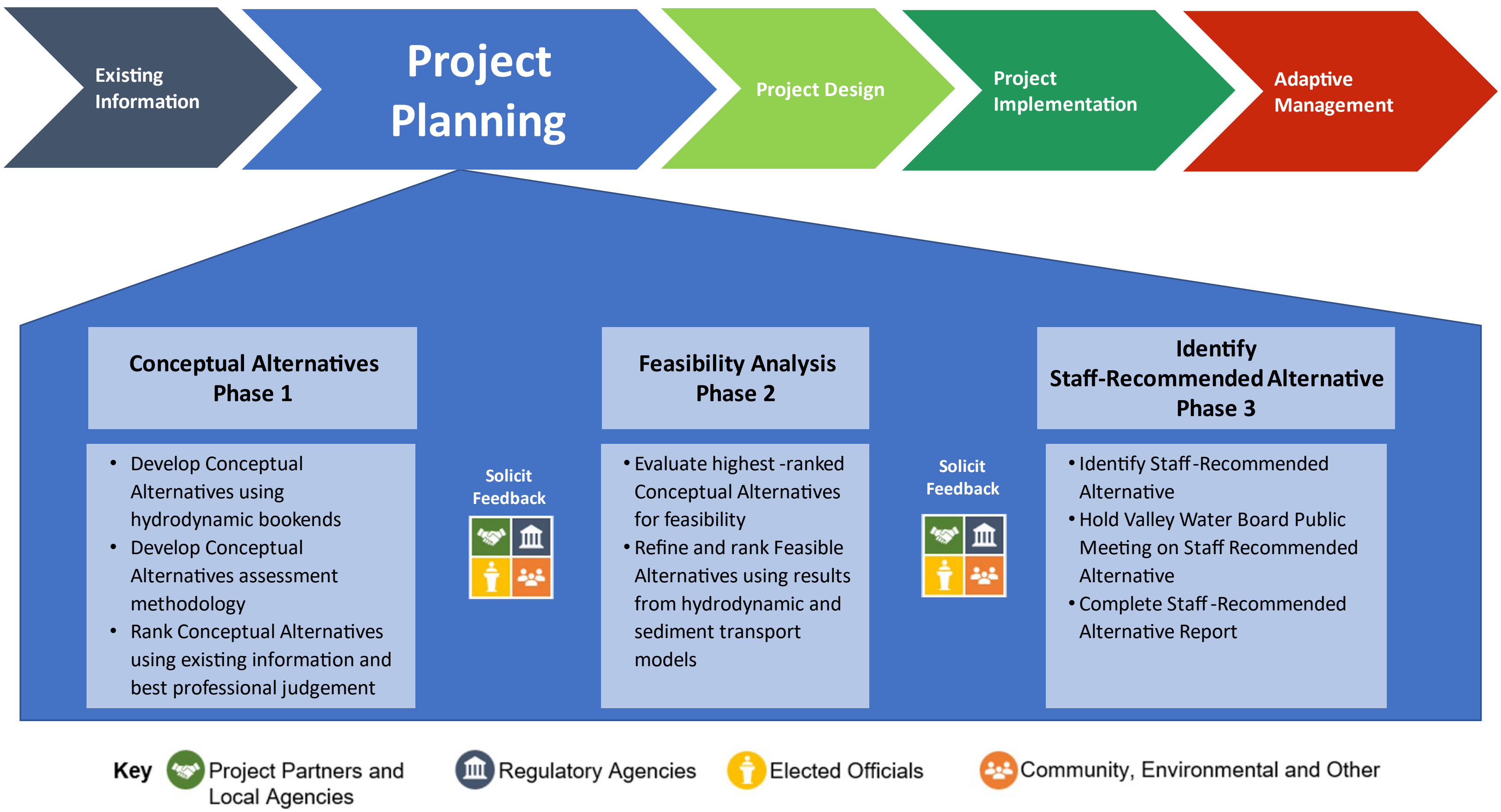


Figure 3-1. Planning Process for the Calabazas/San Tomas Aquino Creek–Marsh Connection Project.

3.2 Conceptual Alternatives Development

Beginning in fall 2022, the Project Team began development of the Project Conceptual Alternatives. The Project Team worked with Valley Water and Project Partners to develop an initial set of Conceptual Alternatives. As described further in Section 4.1, restoration elements considered in the Conceptual Alternatives development process included breaches to the A8 Ponds and Pond A4 berms as well as a variety of other elements (e.g., creek channel realignment, excavated channels, berm degrades, planted berms, submerged benches, habitat islands, tide gates, overflow weirs, ditch blocks).

Opportunities and constraints included in the Valley Water Feasibility Study (Valley Water 2021a; see also Section 1.2.3 for complete list), were used to develop a range of assessment factors and eventually helped to rank and narrow the alternatives to a set of five alternatives for hydrodynamic modeling. Following modeling and refinement of the Conceptual Alternatives, additional analyses and preliminary designs will be undertaken as part of a Feasibility Analysis included in the Valley Water Planning Process (Figure 3-1 and Section 5.3.4).

3.3 Stakeholder Outreach

Stakeholder outreach is an integral component of Valley Water's Planning Process (VW W-730-124 Rev P). In the sections below, we describe agency and public outreach efforts that have guided Project formulation and development of Conceptual Alternatives to date.

3.3.1 Pre-Project Planning and Coordination

In 2017, SFEI, in coordination with Valley Water, hosted a landscape vision workshop to develop an integrative conceptual plan for the Calabazas and STA creeks. The goal of the workshop was to conceptualize the reconnection of the creeks to the A8 Ponds in a manner that could support FRM and tidal wetland habitat restoration while maintaining other key land uses (e.g., recreation and transportation). An advisory team consisting of scientists and engineers with expertise in hydrology, ecology, geomorphology, water quality, sediment dynamics, and fluvial and tidal engineering was recruited to identify opportunities for improving the delivery of freshwater and sediment from the creeks to the A8 Ponds, and to discuss how directly connecting the creeks to the A8 Ponds could affect flood management and habitat conditions. The workshop also included organizations involved in local FRM, Baylands management, public space management, private land management, recreation, transportation, and permitting (SFEI-ASC 2018). The landscape vision workshop Project Partners included the San Francisco Bay Conservation and Development Commission (BCDC), San Francisco Bay Joint Venture, San Francisco Estuary Partnership, Santa Clara Valley Open Space Authority, SBSPRP, Peninsula Open Space Trust, the Regional Monitoring Program for San Francisco Bay, Regional Board, and USGS. In addition, the team acknowledged contributions by the City of Sunnyvale, City of San José, EPA, and USACE. The ideas developed through interactions with Project Partners and contributors were synthesized into the high-level landscape vision for the Project. The vision aims to restore and support long-term natural processes and ecosystem functions while concurrently reducing maintenance needs, providing resilient flood protection, improving water quality, and enhancing tidal marsh conditions to promote adaptation to sea level rise (SFEI-ASC 2018).

Following the 2017 workshop, Valley Water, with the help of SFEI, developed a Feasibility Study exploring the proposed re-connection of Calabazas and STA creeks to tidal habitats within the A8 Ponds (Valley Water 2021a). The Feasibility Study was developed in coordination with Project Partners including city, county, state, and federal agencies and regulators, environmental organizations, scientists, and subject matter experts. The study found that the proposed project to connect the Calabazas and STA creeks to the A8 Ponds was technically feasible (Valley Water 2021a).

3.3.2 Conceptual Alternatives Consultation

Beginning in Fall 2022, Valley Water, in partnership with the Project Team, began the development of Conceptual Alternatives for the Project and engaged with a wide range of stakeholders and interest groups (see workshop/meeting agenda and notes in Appendix A. During workshops held on October 21 and October 27, 2022, the Project Team worked with Valley Water and Project Partners, including representatives from the cities of San José, Santa Clara, and Sunnyvale; SCC; CSCC; Caltrans; USFWS; and the SBSPRP, to develop an initial set of Conceptual Alternatives. Following the workshops, the Project Team used the feedback received to describe a total of 21 Conceptual Alternatives (see Section 4). An additional workshop was held on December 15, 2022, to identify and rank factors to be used to assess the feasibility of Conceptual Alternatives (see Section 5.1).

Following the December 15, 2022, Conceptual Alternative Assessment Methodology Workshop, refinements to the five Conceptual Alternatives selected for modeling analysis were presented to Project Partners on January 26, 2023, who were asked to provide comments on the alternatives to be selected for hydrodynamic and hydraulic modeling. By February 24, 2023, comments were received from the BCDC, NMFS, Regional Board, and USFWS. Additional comments were received from EPA, USACE, CDFW, Caltrans, City of San José, City of Santa Clara, City of Sunnyvale, SCC Parks, PG&E, and CSCC.

As part of the Valley Water Planning Process (Item 12-E), a Public Meeting was held on May 16, 2023, to invite customers, Project Partners, and stakeholders to provide feedback on alternatives to carry forward (see meeting notes in Appendix A. Public comments received were used to obtain input from the public on alternative assessment factors and ranking, restoration elements, and public. As discussed in Section 5.3, initial hydrodynamic modeling, agency and public input will be used to define two additional alternatives for modeling and Feasibility Analysis. Additional outreach activities related to trails and recreational access are discussed in Section 5.3.2.

4 CONCEPTUAL ALTERNATIVE DESCRIPTIONS

Beginning with alternatives identified in the Valley Water Feasibility Study (Valley Water 2021a), Conceptual Alternatives were developed (see Section 3.2) to meet Project objectives.

4.1 Project Elements

At the Conceptual Alternative development stage, alternatives included a range of potential Project elements to meet Project objectives but were primarily focused upon those elements that can be evaluated using planned hydraulic, hydrodynamic, and sediment transport modeling. Restoration elements considered during initial brainstorming of the Conceptual Alternatives include human-made and tidally maintained channels and berm breaches to facilitate exchange of materials and organisms between emergent marsh and open water habitats; tide gates to control water levels within the Project Area; gradually sloping vegetated ecotone berms at strategic locations; intertidal benches and other topographic features contoured to take advantage of appropriate tidal datums to provide surfaces for wildlife habitat use (e.g., nesting), marsh, and upland vegetation establishment and to promote sediment trapping and flood control benefits.

The following linkages to Project objectives were considered in selecting individual project elements included in the Conceptual Alternatives. In general, restoration elements that could be evaluated with planned hydrodynamic modeling included changes in creek alignments, construction of ecotones and other topographic features, berm breaches, tide gates, ditch blocks, and berm removal options. Elements that would not, or that were considered less likely to, result in significant hydrodynamic changes in tidal range, local velocity gradients, tidal exchange and hydraulic retention time, included berm degrades, island features, intertidal wetland benches, planted buffers, and changes in trail alignments.

4.1.1 Habitat Restoration

To meet Objective 1 and partially address Objective 2 (see Section 1.4), the following habitat restoration elements were considered during development of the Conceptual Alternatives (Phase 1):

- Excavated channels, berm breaches, tide gates, and pond berm degrades to facilitate tidal exchange of materials and organisms between emergent marsh and muted tidal open water habitats in A8 Ponds, Pond A4, and Harvey Marsh.

- Berm breaches to promote sediment trapping and accretion to keep pace with anticipated sea level rise by:
  - Routing riverine sediment sources directly to the A8 Ponds;
  - Routing riverine sediment sources directly to Pond A4;
  - Connecting Guadalupe and Alviso sloughs to the A8 Ponds to increase entrapment of suspended sediment sources from SF Bay; and,
  - Connecting Pond A6 to Pond A8.

Consideration of the following habitat restoration elements was deferred to the Feasible Alternatives Analysis (Phase 2): planting benches, ecotones, and other topographic features at intertidal elevations (MLLW to MHHW) for tidal marsh establishment; nesting islands/habitat islands constructed at intertidal and upland tidal elevations (MHHW +2 feet); trail segments, as well as other public access features to promote recreational opportunities while maintaining visual isolation and reducing human disturbance to wildlife.

4.1.2 Resilient Flood Protection, Sediment Transport, and Channel Maintenance

To address Objectives 2 and 3 (see Section 1.4), the following resilient flood protection, sediment transport, and channel maintenance features were considered during development of the Conceptual Alternatives (Phase 1):

- Establishment of tidal marsh at A8 Ponds using berm breaches into Alviso and Guadalupe sloughs which would reduce water surface elevation levels (WSELs) during flood events by allowing flood waters to spread within the ponds;
- Degrading portions of the perimeter berms around the A8 Ponds to mean tide level (MTL) elevations, providing overflow relief from Guadalupe River flood events;
- Modification of interior pond berms to improve sediment transport and limit wave run-up;
- Straightening and realigning STA and Calabazas creeks to improve hydraulic conveyance;
- Connecting Calabazas and STA Creeks to the A8 Ponds to reduce backwater effects during high flow events; and,

- Routing the SEC into Pond A4 combined with hydraulic connection of Pond A4 with Guadalupe Slough through a breach, a pond berm degrade, or a tide gate as a means of maintaining current levels of flood protection.

Consideration of the following resilient flood protection, sediment transport, and channel maintenance features were deferred to the analysis and refinement of Feasible Alternatives (Phase 2): increased levee heights to maintain current levels of flood protection along the southern boundary of Pond A4 and increased levee heights or new levees to meet flood protection requirements expected under the future USACE Phase 3 Shoreline Project.

4.1.3 Water Quality Enhancement and Protection

To address water quality related considerations under Objective 1 (e.g., suitability for aquatic species, mercury mobilization and bioaccumulation, and support of other beneficial uses), and aesthetic considerations of recreational users under Objective 4 (see Section 1.4), the following water quality enhancement and protection elements were considered during development of the Conceptual Alternatives (Phase 1):

- Increasing number of berm breaches and berm degrades to 1) prevent buildup of algae and oxygen demanding substances by improving tidal exchange and to 2) reduce potential scour and mobilization of legacy mercury deposits.

Consideration of the following water quality enhancement and protection elements were deferred to the development of Feasible Alternatives (Phase 2): intertidal and subtidal fill in areas not subjected to scour to promote wind-driven surface water mixing and re-aeration; excavated pilot channels to prevent excess scour at breach locations as well as isolation/ponding of subtidal habitats; and vegetated horizontal levees allowing nature-based treatment of reclaimed wastewater effluent along the south shore on Pond A4.

4.1.4 Public Access Considerations

To address the enhancement of public recreation and access under Objective 4 (see Section 1.4), during the development of Feasible Alternatives (Phase 2), we will consider existing and proposed trail alignment plans, and will recommend additional features including:

- Trail alignments and public amenities that
  - Maintain or increase connections to existing walking/biking trails;

  - Decrease susceptibility to erosion and maintenance;
  - Avoid impacts to sensitive habitats;
  - Maintain access to existing recreational uses, including waterfowl hunting in the A8 Ponds; and,
  - Expand or enhance existing public recreational opportunities (see section 1.4).
- Provide other potential new public recreational opportunities where appropriate and compatible with existing use, such as:
  - Platforms, and other viewing enhancements to support increased visitor access to wildlife viewing areas; and,
  - Outdoor education and environmental awareness through signage and interpretive placards.

4.2 Description of Conceptual Alternatives

Drawing upon the potential restoration elements (see Section 4.1), the following 21 Conceptual Alternatives were defined and are titled to describe their hydrodynamic connectivity or linkages to previous alternatives developed and evaluated in the Feasibility Report (Valley Water 2021a) and the SFEI Vision Report (SFEI-ASC 2018). Four conceptual alternatives were considered from these reports: three from the Feasibility Report (Conceptual Alternatives 1, 2, and 3) and one from the SFEI Vision Report (Conceptual Alternative 4).

As noted in Section 4.1, consideration of restoration elements unlikely to result in significant hydrodynamic changes were deferred to the Feasibility Analysis including berm degrades, intertidal wetland benches, island features, and planted buffers. Based upon discussions following the October 21 and October 27, 2022, Conceptual Alternatives Workshops, participants agreed that combinations of restoration elements included in the A8 Ponds and Pond A4 can be modeled and examined independently. In other words, there is potential to select the optimal scenario for the A8 Ponds, channel configurations within Harvey Marsh, and tidal connections with Pond A4 independently, which then could be compiled into a refined Feasible Alternative after modeling. With this understanding, a matrix was developed to help guide alternative development across the range of features (Table 4-1). Design features considered for the A8 Ponds area and the Pond A4 area are listed on the axes.

Table 4-1. Conceptual Alternative Matrix of Restoration Elements in Pond A4 and the A8 Ponds.

	A8 Ponds Restoration Elements:				
Pond A4 Restoration Elements:	**Alviso Slough Breach**	**Guadalupe Slough Breach**	**Alviso and Guadalupe Slough Breaches**	**Berm degrade along Alviso or Gudalupe Slough**	**Remove Pond A5 and A7 WCS**
No Action	NA	1, 2, 4	3	NA	3, 19, 20
Guadalupe Slough Breach	8	14	16	12, 13A 13B	6, 12, 14, 16
Sunnyvale East Channel Breach	10	15	17	10	9, 15, 17
Berm Degrade	7	18	NA	NA	18
Tide Gate	5	11	NA	11	5, 11

Numbers refer to 21 Conceptual Alternatives detailed below.
Abbreviations: WCS = Water Control Structure

Combined with the four previously generated alternatives from the Feasibility Report (Valley Water 2021a) and SFEI Vision Report (SFEI-ASC 2018), the matrix above produced an initial set of 21 alternatives described in this Report. In the sections below, we describe each of the Conceptual Alternatives and assess their alignment with Project objectives.

4.2.1 Conceptual Alternative 1 (Feasibility Report Option A)

4.2.1.1 Description

Conceptual Alternative 1 includes one breach through the berm at the southern boundary of Pond A8S to direct Calabazas and STA creek flows and transported sediment into the A8 Ponds (Figure 4-1).

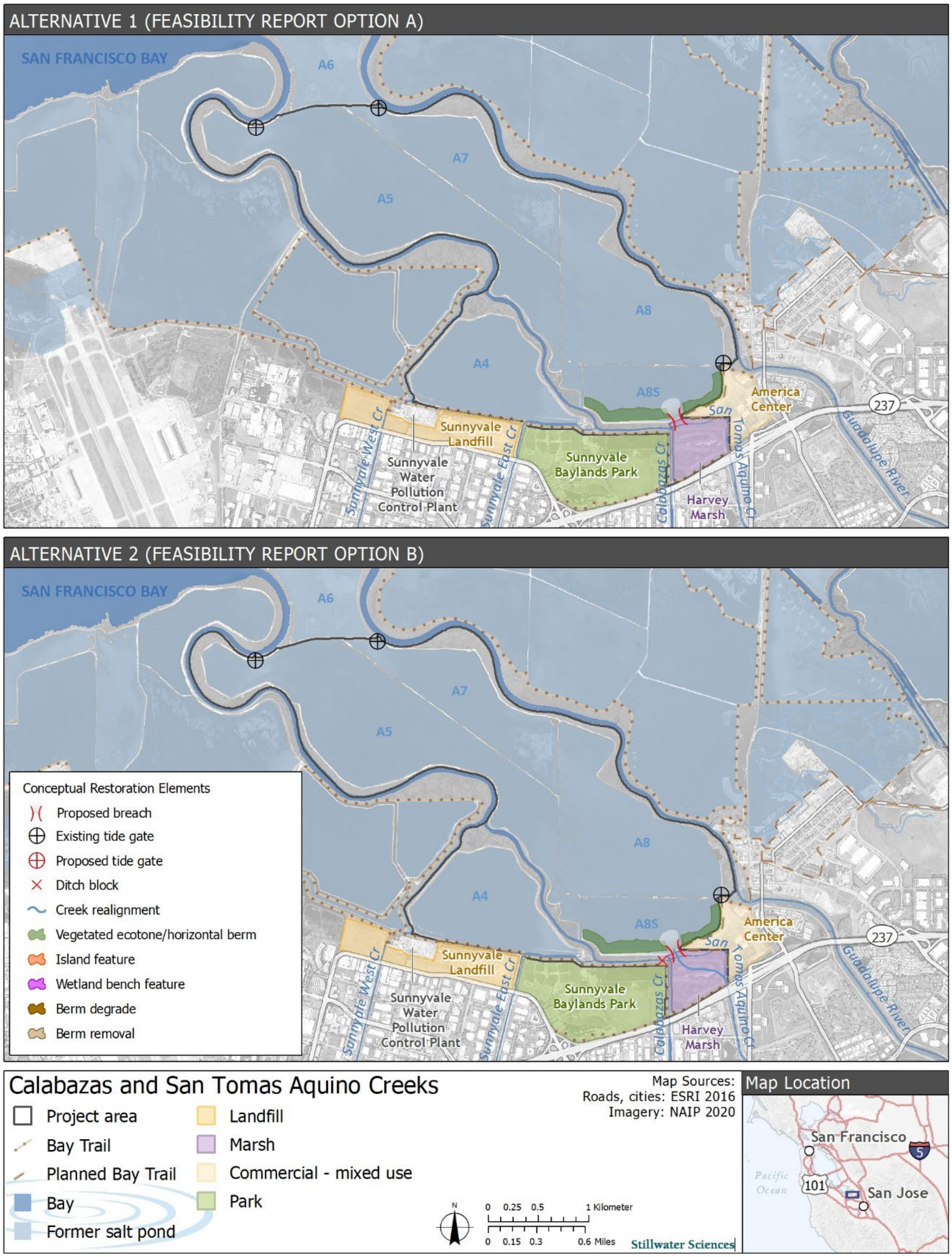


Figure 4-1. Conceptual Alternatives 1 and 2.

4.2.1.2 Alignment with Project Objectives

Objective 1 (ecological restoration/enhancement of habitats). Although Conceptual Alternative 1 would not include restoration elements to enhance Harvey Marsh, it is expected that re-establishment of tidal action within the marsh would result in more consistent conditions for supporting tidal marsh evolution.

Objective 2 (resilient flood protection against sea level rise). While breaching the pond berm between Pond A8S and Harvey Marsh is expected to increase flow capacity into the A8 Ponds, preliminary modeling indicated that the existing number of breaches in the A8 Ponds perimeter berms are insufficient to prevent higher WSELs in the A8 ponds (Valley Water 2021a). Increased tidal exchange in the A8 Ponds may increase water levels and could result in increased risks of wind-wave erosion of soil covering the closed landfill at the eastern edge of Pond A8S. Further, a breach between Harvey Marsh and the A8 Ponds has the potential to increase future flood risks during the coastal flood event and may require flood protection elements along Highway (Hwy) 237 to maintain existing levels of flood protection.

Objective 3 (reduced maintenance needs). Based upon preliminary modeling, improved flow conveyance into Pond A8S is expected to increase sediment transport from the lower reaches of Calabazas and STA creeks (Valley Water 2021a), thereby reducing the frequency and potential volume of future sediment removal activities.

Objective 4 (enhanced public access). Conceptual Alternative 1 includes no changes in existing public access and therefore would not meet this objective.

4.2.2 Conceptual Alternative 2 (Feasibility Report Option B)

4.2.2.1 Description

Conceptual Alternative 2 includes one breach through the berm at the southern boundary of Pond A8S, disconnects Calabazas and STA creeks from SEC using a ditch block in Guadalupe Slough at the Calabazas Creek confluence, and realigns the Calabazas Creek and STA Creek channel to direct flows and transported sediments into the A8 Ponds (Figure 4-1).

4.2.2.2 Alignment with Project Objectives

Objective 1 (ecological restoration/enhancement of habitats). In addition to re-established tidal connectivity between Calabazas and STA creeks and the A8

Ponds, Conceptual Alternative 2 includes re-alignment of lower STA Creek, creating an opportunity for replanting native plant species (e.g., pickleweed and cordgrass) as well as creation of off-channel and marsh edge habitats that may be used by native fish and bird species.

Objective 2 (resilient flood protection against sea level rise). With no additional breaches from the A8 Ponds into Alviso and Guadalupe sloughs, preliminary modeling indicated that Conceptual Alternative 2 would result in increased water levels in the ponds during simulated coastal, fluvial and Guadalupe River extreme flow events (Valley Water 2021a). Increased tidal exchanges in the A8 Ponds may increase water levels and possible risks of increased wind-wave erosion of the protective soil covering the closed landfill at the eastern edge of Pond A8S. Further, a breach between Harvey Marsh and the A8 Ponds has the potential to increase future flood risks during the coastal flood event and may require flood protection elements along Hwy 237 to maintain existing levels of flood protection.

Objective 3 (reduced maintenance needs). Based upon preliminary modeling, improved flow conveyance into Pond A8S is expected to increase sediment transport from the lower reaches of Calabazas and STA creeks (Valley Water 2021a), thereby reducing the frequency and potential volume of future sediment removal activities.

Objective 4 (enhanced public access). Because Conceptual Alternative 2 involves re-alignment of the lower portions of STA Creek, opportunities exist for enhancement of public access. Discussions between Valley Water, City of San José, SCC, and other agencies regarding future trail access options to meet this objective are ongoing.

4.2.3 Conceptual Alternative 3 (Feasibility Report Option C)

4.2.3.1 Description

Conceptual Alternative 3 includes one breach through the southern berm of Pond A8S, re-routing STA Creek to direct creek flows and any transported sediments into the A8 Ponds. In addition, this alternative includes removal of Pond A5 and A7 water control structures (WCSs) and construction of levee breaches at the former WCSs locations, and excavation of three breaches between A8 Ponds and Guadalupe Slough and two breaches between A8 Ponds and Alviso Slough (Figure 4-2).

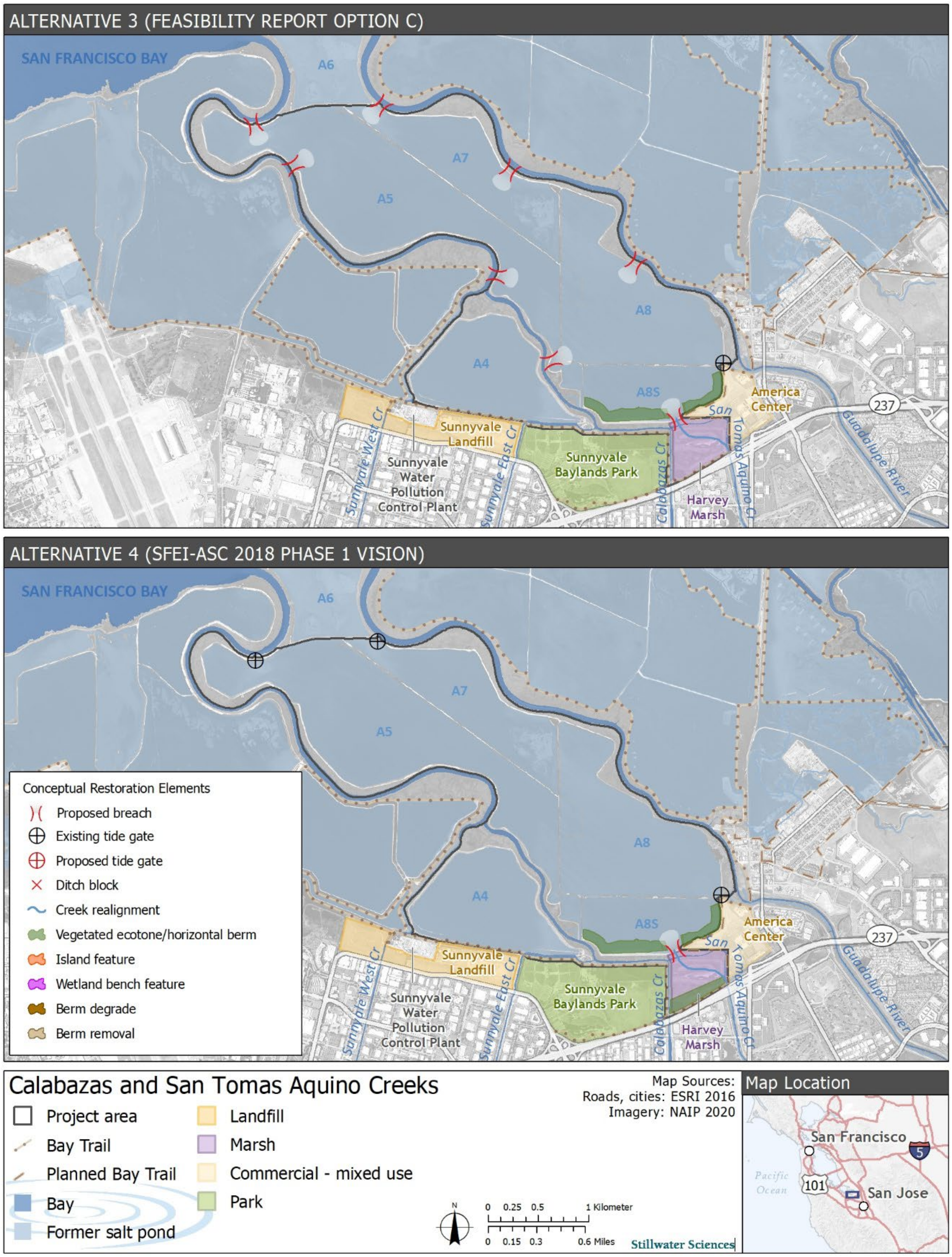


Figure 4-2. Conceptual Alternatives 3 and 4.

4.2.3.2 Alignment with Project Objectives

Objective 1 (ecological restoration/enhancement of habitats). Conceptual Alternative 3 would re-establish full tidal connectivity within Pond A8S and include re-alignment of lower STA Creek to create an opportunity for native plant species plantings (e.g., pickleweed and cordgrass), as well as creation of off-channel and marsh edge habitats that may be used by native fish and bird species.

Objective 2 (resilient flood protection against sea level rise). Due to the large number of breaches from the A8 Ponds into Alviso Slough, preliminary modeling indicated that Conceptual Alternative 3 would result in decreased water levels in the ponds during simulated Guadalupe River flood conditions, but small increases during other fluvial and coastal flood modeling scenarios (Valley Water 2021a). Increased tidal exchanges in the A8 Ponds may increase water levels and possible risks of increased wind-wave erosion of the protective soil covering the closed landfill at the eastern edge of Pond A8S. Further, a breach between Harvey Marsh and the A8 Ponds has the potential to increase future flood risks during the coastal flood event and may require flood protection elements along Hwy 237 to maintain existing levels of flood protection.

Objective 3 (reduced maintenance needs). Based upon preliminary modeling, improved flow conveyance into Pond A8S is expected to increase sediment transport from the lower reaches of Calabazas and STA creeks (Valley Water 2021a), thereby reducing the frequency and potential volume of future sediment removal activities.

Objective 4 (enhanced public access). Because Conceptual Alternative 3 involves re-alignment of the lower portions of STA Creek, opportunities exist for enhancement of public access. Discussions between Valley Water, City of San José, SCC, and other agencies regarding future trail access options to meet this objective are ongoing.

4.2.4 Conceptual Alternative 4 (SFEI-ASC 2018 Phase 1 Vision Report)

4.2.4.1 Description

Drawing from the Phase 1 alternative in the SFEI-ASC (2018) Vision Report, Conceptual Alternative 4 is similar to Conceptual Alternative 2 and includes one breach through the berm at the southern boundary of Pond A8S and realignment of STA Creek to flow into the A8 Ponds. Conceptual Alternative 4 also includes a vegetated ecotone slope along the southern margin of Harvey Marsh (Figure 4-2).

4.2.4.2 Alignment with Project Objectives

Objective 1 (ecological restoration/enhancement of habitats). In addition to re-established tidal connectivity with Pond A8S, Conceptual Alternative 4 includes re-alignment of lower STA Creek, creating an opportunity for replanting native plant species (e.g., pickleweed and cordgrass) as well as creation of off-channel and marsh edge habitats that may be used by native fish and bird species.

Objective 2 (resilient flood protection against sea level rise). With no additional breaches from the A8 Ponds into Alviso and Guadalupe sloughs, preliminary modeling indicated that Conceptual Alternative 4 would result in increased water levels in the ponds during simulated flood conditions (Valley Water 2021a). Increased tidal exchanges in the A8 Ponds may increase water levels and possible risks of increased wind-wave erosion of the protective soil covering the closed landfill at the eastern edge of Pond A8S. Further, a breach between Harvey Marsh and the A8 Ponds has the potential to increase future flood risks during the coastal flood event and may require flood protection elements along Hwy 237 to maintain existing levels of flood protection.

Objective 3 (reduced maintenance needs). Based upon preliminary modeling, improved flow conveyance into Pond A8S is expected to increase sediment transport from the lower reaches of Calabazas and STA creeks (Valley Water 2021a), thereby reducing the frequency and potential volume of future sediment removal activities.

Objective 4 (enhanced public access). Because Conceptual Alternative 4 involves re-alignment of the lower portions of STA Creek, opportunities exist for enhancement of public access. Discussions between Valley Water, City of San José, SCC, and other agencies regarding future trail access options to meet this objective are ongoing.

4.2.5 Conceptual Alternative 5 (Alviso Slough High Connectivity and Managed Pond A4)

4.2.5.1 Description

Conceptual Alternative 5 proposes the same two Alviso Slough breaches to the A8 Ponds as Conceptual Alternative 3, while introducing a muted tidal action within Pond A4 by replacing the existing siphon with a tide gate to Guadalupe

Slough. Additional actions include the removal of Pond A5 and A7 water control structures, a breach through the southern berm of Pond A8S, and a strategically placed ditch block across the abandoned STA channel to re-route STA Creek through Harvey Marsh to direct creek flows and any transported sediments into the A8 Ponds. This scenario also includes a vegetated ecotone slope along the southern margin of Harvey Marsh, as well as strategic placement of excavated sediments to create island features in the A8 Ponds (Figure 4-3).

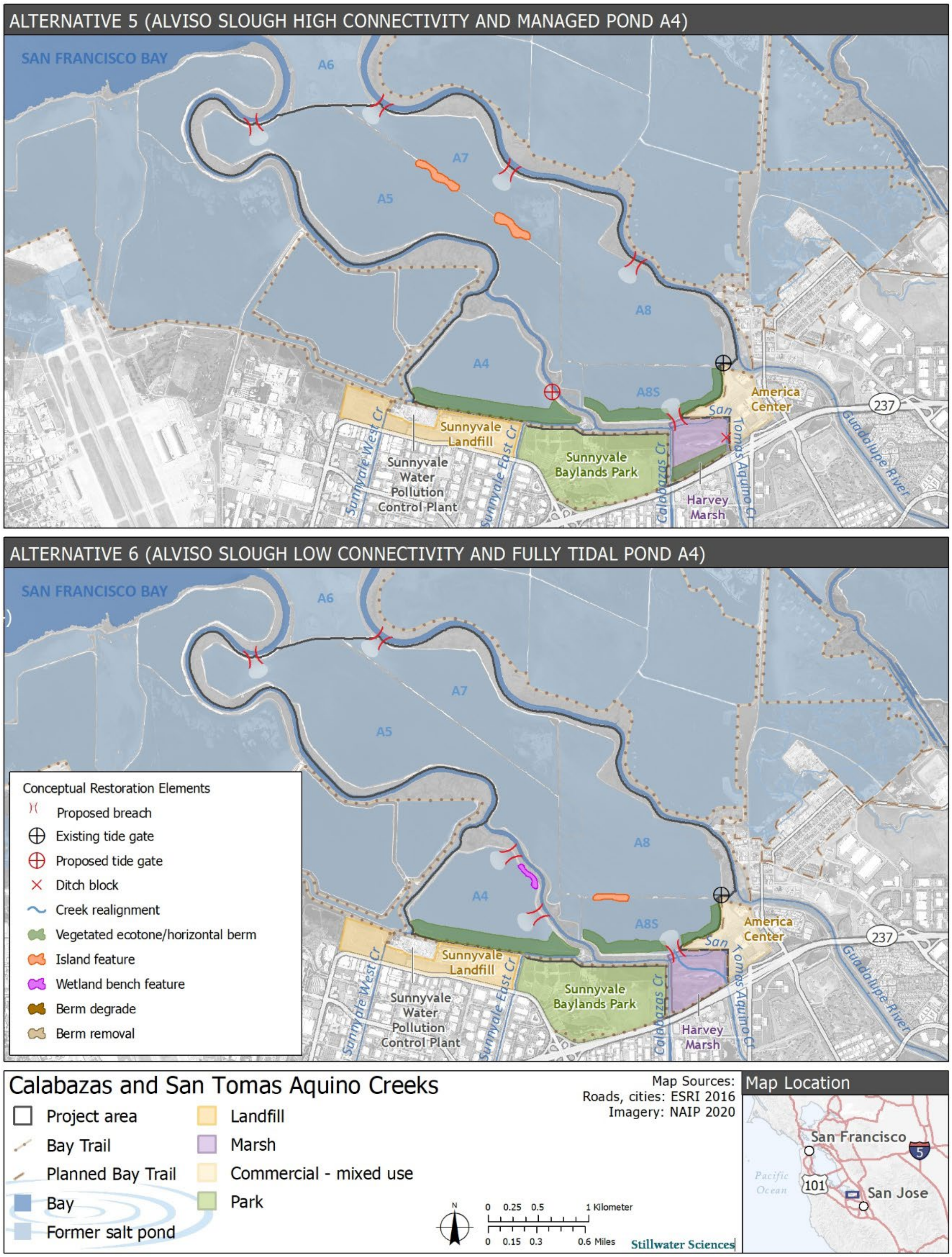


Figure 4-3. Conceptual Alternatives 5 and 6.

4.2.5.2 Alignment with Project Objectives

Objective 1 (ecological restoration/enhancement of habitats). In addition to re-established tidal connectivity with Pond A8S, Conceptual Alternative 5 includes re-alignment of lower STA Creek, creating an opportunity for replanting native plant species (e.g., pickleweed and cordgrass) as well as creation of off-channel, marsh edge, and island feature habitats that may be used by native fish and bird species. The tide gate within Pond A4 will enable optimization of desired managed pond habitat and is expected to benefit dabbling duck and other open water species.

Objective 2 (resilient flood protection against sea level rise). The increased number of Alviso Slough breaches under Conceptual Alternative 5 is expected to result in decreased water levels in the A8 Ponds during simulated Guadalupe River flood conditions (as seen in preliminary modeling of Conceptual Alternative 3, which proposes the same breaches to Alviso Slough). Small increases in water levels in the A8 Ponds are also expected during other fluvial and coast flood modeling scenarios (Valley Water 2021a). Increased tidal exchanges in the A8 Ponds may also increase water levels and possible risks of increased wind-wave erosion of the protective soil covering the closed landfill at the eastern edge of Pond A8S. Further, a breach between Harvey Marsh and the A8 Ponds has the potential to increase future flood risks during the coastal flood event and may require flood protection elements along Hwy 237 to maintain existing levels of flood protection.
The proposed tide gate would increase management capacity in Pond A4, providing an opportunity to reduce flood risk without the requirement of a pump or siphon.

Objective 3 (reduced maintenance needs). Although no modeling has been conducted on this alternative, preliminary modeling conducted for the Valley Water Feasibility Study (2021a) suggests that Conceptual Alternative 5 will increase sediment transport from the lower reaches of Calabazas and STA creeks, thereby reducing the frequency and potential volume of future sediment removal activities.

Objective 4 (enhanced public access). Because Conceptual Alternative 5 involves re-alignment of the lower portions of STA Creek, opportunities exist for enhancement of public access. Discussions between Valley Water, City of San José, SCC, and other agencies regarding future trail access options to meet this objective are ongoing.

4.2.6 Conceptual Alternative 6 (Alviso Slough Low Connectivity and Fully Tidal Pond A4)

4.2.6.1 Description

Conceptual Alternative 6 combines minimal A8 Ponds connectivity with a fully tidal Pond A4 option. A8 Ponds actions include the removal of Pond A5 and A7 water control structures, a breach through the southern berm of Pond A8S, and a strategically placed ditch block across the abandoned STA channel to re-route STA Creek through Harvey Marsh to direct creek flows and any transported sediments into the A8 Ponds. Pond A4 actions include two breaches between Pond A4 and Guadalupe Slough, with strategic placement of excavated sediments to create an island feature in the A8 Ponds and a wetland bench in Pond A4 (Figure 4-3).

4.2.6.2 Alignment with Project Objectives

Objective 1 (ecological restoration/enhancement of habitats). Although Conceptual Alternative 6 only slightly increases tidally influenced habitat through minimal breaches in the A8 Ponds, the combination of a sloped vegetated ecotone levee and minimal breaching should provide a greater opportunity for increased upland habitat availability. Additionally, the re-alignment of lower STA Creek creates an opportunity to reestablish native plant species (e.g., pickleweed and cordgrass) as well as creation of off-channel and marsh edge habitats that may be used by native fish and bird species.

Objective 2 (resilient flood protection against sea level rise). The minimal number of breaches to the A8 Ponds under Conceptual Alternative 6 will likely cause a small decrease in flood risk during Guadalupe River high flow events but may require more coastal flood protection since both A8 Ponds and Pond A4 will be tidally activated under this alternative. Breaches between Guadalupe Slough and Pond A4, as well as from Pond A8S into Harvey Marsh, have the potential to increase future flood risks during the coastal flood event and may require flood protection elements along Hwy 237 to maintain existing levels of flood protection.

Objective 3 (reduced maintenance needs). Although no modeling has been conducted on this alternative, preliminary modeling conducted for the Valley Water Feasibility Study (2021a) suggests that Conceptual Alternative 6 will increase sediment transport from the lower reaches of Calabazas and STA creeks, thereby reducing the frequency and potential volume of future sediment removal activities. Additionally, the substitution of the tide gate for the Pond A4 siphon will decrease pump operation costs.

Objective 4 (enhanced public access). Because Conceptual Alternative 6 involves re-alignment of the lower portions of STA Creek, opportunities exist for enhancement of public access. Discussions between Valley Water, City of San José, SCC, and other agencies regarding future trail access options to meet this objective are ongoing.

4.2.7 Conceptual Alternative 7 (Alviso Slough High Connectivity and Pond A4 Berm Degrade)

4.2.7.1 Description

Conceptual Alternative 7 is characterized by a large berm degrade to MTL from Pond A4 to Guadalupe Slough, as well as high connectivity to Alviso Slough by way of the same two breaches as previous alternatives (e.g., Conceptual Alternative 3). In addition, this alternative includes the removal of the Pond A7 water control structure, a breach through the southern berm of Pond A8S, and re-routing STA Creek through Harvey Marsh to direct creek flows and any transported sediments into the A8 Pond. Strategic placement of excavated sediments in this alternative will create island features in the A8 Ponds and wetland bench in Pond A4 (Figure 4-4).

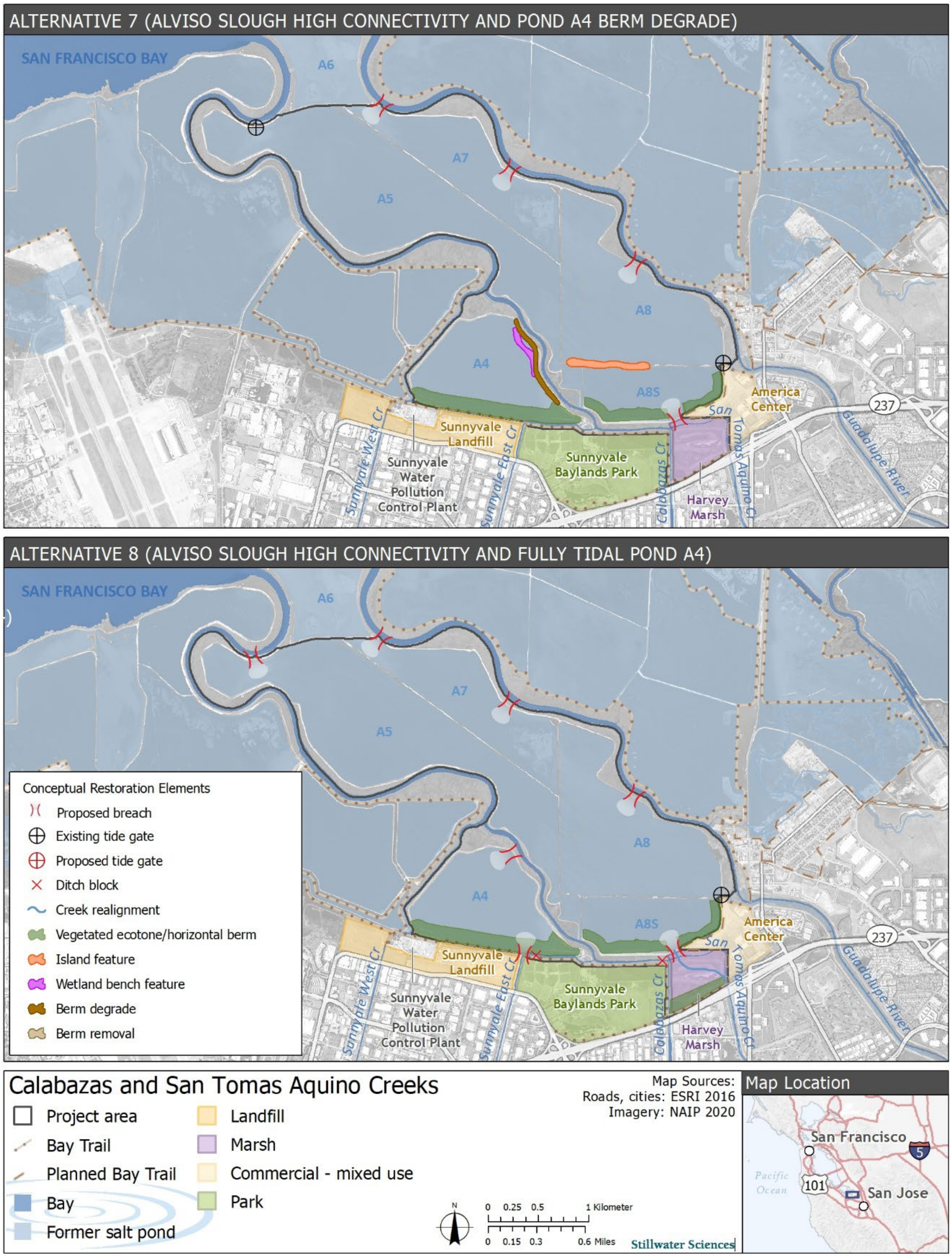


Figure 4-4. Conceptual Alternatives 7 and 8.

4.2.7.2 Alignment with Project Objectives

Objective 1 (ecological restoration/enhancement of habitats). While the large berm degrade in Pond A4 is likely to re-establish some tidal connectivity to Guadalupe Slough, the degrade to the pond berm will cause a decrease in upland habitat availability and significant displacement of wildlife species. Breaches between the A8 Ponds and Alviso Slough, as well as the re-routing of STA Creek will provide an opportunity for re-established tidal connectivity, native plant species establishment, and creation of off-channel and marsh edge habitat. Partial reconnection of Pond A4 by way of a degraded berm is expected to provide increase tidal mixing at WSELs above MTL.

Objective 2 (resilient flood protection against sea level rise. Although no modeling has been conducted for Conceptual Alternative 7, preliminary modeling for Conceptual Alternative 2 suggests the increased number of breaches to Alviso Slough will decrease flood risk during Guadalupe River events (Valley Water 2021a). However, reconnecting Guadalupe Slough to Pond A4 via a berm degrade is expected to result in a large increase in future flood risks during coastal flood events and could require significant flood protection elements along the landward edge of Pond A4 and the embankment north of Hwy 237 to maintain existing levels of flood protection.

Objective 3 (reduced maintenance needs). Although no modeling was conducted on this alternative, preliminary modeling conducted for the Valley Water Feasibility Study (2021a) suggests that Conceptual Alternative 7 will increase sediment transport from the lower reaches of Calabazas and STA creeks, thereby reducing the frequency and potential volume of future sediment removal activities. Additionally, the existing Pond A4 siphon will be removed, providing an overall decrease in operation costs.

Objective 4 (enhanced public access). Because Conceptual Alternative 7 involves re-alignment of the lower portions of STA Creek, opportunities exist for enhancement of public access. Discussions between Valley Water, City of San José, SCC, and other agencies regarding future trail access options to meet this objective are ongoing.

4.2.8 Conceptual Alternative 8 (Alviso Slough High Connectivity and Fully Tidal Pond A4)

4.2.8.1 Description

With a focus on tidal activation, Conceptual Alternative 8 includes high connectivity to Alviso Slough and a fully tidal Pond A4. This alternative includes the removal of the Pond A7 water control structure, as well as two additional breaches between A8 Ponds and Alviso Slough. Conceptual Alternative 8 also includes breaches through the southern berms of Pond A8S and Pond A4, a breach of Pond A4 to Guadalupe Slough, and re-routing of STA Creek through Harvey Marsh to direct creek flows and any transported sediments into the A8 Ponds. This alternative also includes a vegetated ecotone slope along the southern margin of Harvey Marsh, Two ditch blocks upstream of Guadalupe Slough will direct flow from SEC and from Calabazas/STA creeks into Pond A4 and A8 Ponds, respectively (Figure 4-4).

4.2.8.2 Alignment with Project Objectives

Objective 1 (ecological restoration/enhancement of habitats). In addition to re-established tidal connectivity with Pond A8S, Conceptual Alternative 8 includes re-alignment of lower STA Creek as well as two ditch blocks, creating a large area of backwater habitat. These backwater zones will create an opportunity for replanting native plant species (e.g., pickleweed and cordgrass) as well as creation of off-channel and marsh edge habitats that may be used by native fish and bird species. The two breaches into and out of Pond A4 are expected to create a fully tidal system that will create an opportunity for tidal habitat conversion and habitat succession options over time.

Objective 2 (resilient flood protection against sea level rise). Although no modeling was conducted on this alternative, preliminary modeling conducted for the Valley Water Feasibility Study (2021a) suggests that the increased number of breaches under Conceptual Alternative 8 will result in decreased water levels in the A8 Ponds during simulated Guadalupe River flood conditions (as seen in preliminary modeling of Conceptual Alternative 3). Increased tidal exchanges in the A8 Ponds may increase water levels and possible risks of increased wind-wave erosion of the protective soil covering the closed landfill at the eastern edge of Pond A8S. The breach between Guadalupe Slough and Pond A4, as well as from Pond A8S into Harvey Marsh, could increase future flood risks during coastal flood events and may require flood protection elements along the landward edge of Pond A4 and the embankment north of Hwy 237 to maintain existing levels of flood protection The ditch blocks just upstream of Guadalupe

Slough may increase the risk of flooding by limiting slough-pond fluctuations during high-flow events.

Objective 3 (reduced maintenance needs). Drawing from preliminary modeling conducted for the Valley Water Feasibility Study (2021a), Conceptual Alternative 8 is expected to increase sediment transport from the lower reaches of the SEC, Calabazas and STA creeks, thereby reducing the frequency and potential volume of future sediment removal activities.

Objective 4 (enhanced public access). The two ditch blocks along with the re-alignment of the lower portions of STA Creek present opportunities for enhancement of public access. Discussions between Valley Water, City of San José, the County, and other agencies regarding future trail access options to meet this objective are ongoing.

4.2.9 Conceptual Alternative 9 (Alviso Slough High Connectivity, Guadalupe Connectivity, and Fully Tidal Pond A4)

4.2.9.1 Description

Conceptual Alternative 9 builds on the tidal action priorities of Conceptual Alternative 8 with the addition of two breaches: the removal of Pond A5 Water Control Structure (along with the A7 Water Control Structure) and an added breach between Pond A4 and Guadalupe Slough. This alternative includes the same Conceptual Alternative 8 design elements: breaches through the southern berms of Pond A8S and Pond A4, a breach of Pond A4 to Guadalupe Slough, two breaches between A8 Ponds and Alviso Slough, and re-routing STA Creek through Harvey Marsh. Instead of two ditch blocks upstream of Guadalupe Slough, Conceptual Alternative 9 only includes one ditch block, between SEC and Guadalupe Slough, to route flow through a breach of SECI to Pond A4. This alternative includes the strategic placement of excavated material to create a wetland bench feature in Pond A4 (Figure 4-5).

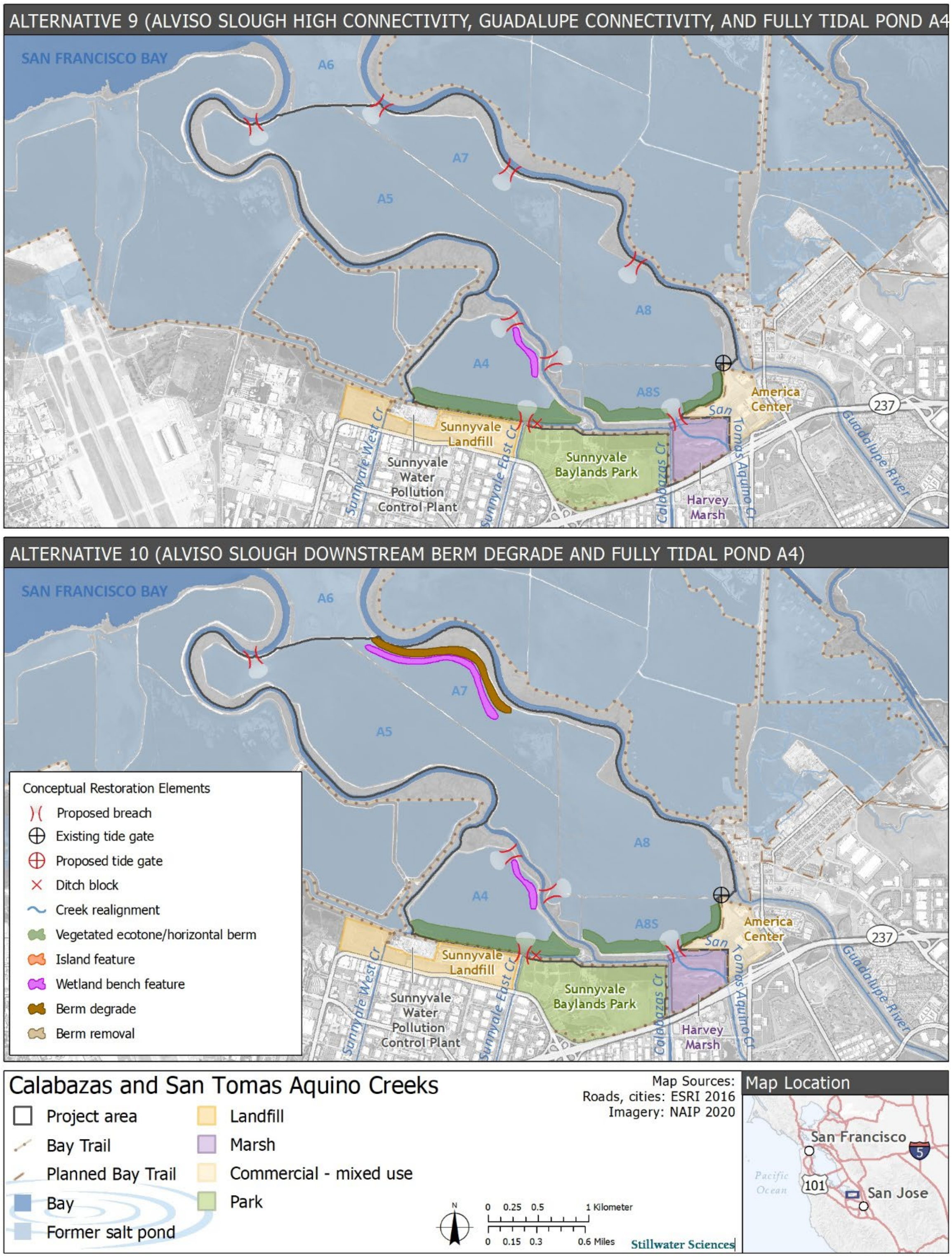


Figure 4-5. Conceptual Alternatives 9 and 10.

4.2.9.2 Alignment with Project Objectives

Objective 1 (ecological restoration/enhancement of habitats). In addition to re-established tidal connectivity throughout the A8 Ponds and Pond A4 systems, Conceptual Alternative 9 includes re-alignment of lower STA Creek and a ditch block. These design features create an opportunity for replanting native plant species (e.g., pickleweed and cordgrass) as well as a diverse range of habitats that may be used by native fish and bird species. The conversion of Pond A4 into a fully tidal system is expected to provide water exchange benefits and a unique additional opportunity for A8 Ponds connection via two nearby breaches to Guadalupe Slough (one from Pond A4 and one from Pond A8S).

Objective 2 (resilient flood protection against sea level rise). Based upon preliminary modeling of other alternatives (Valley Water 2021a), the increased number of breaches under Conceptual Alternative 9 will result in decreased water levels in the A8 Ponds during simulated Guadalupe River flood conditions (as seen in preliminary modeling of Conceptual Alternative 3). Increased tidal exchanges in the A8 Ponds may also increase water levels and possible risks of increased wind-wave erosion of the protective soil covering the closed landfill at the eastern edge of Pond A8S. Breaches between Guadalupe Slough and Pond A4, as well as from Pond A8S into Harvey Marsh, could increase future flood risks during coastal flood events and may require flood protection elements along the landward edge of Pond A4 and the embankment north of Hwy 237to maintain existing levels of flood protection. The ditch block just upstream of Guadalupe Slough may increase the risk of flooding near Sunnyvale Baylands Park during high-flow events.

Objective 3 (reduced maintenance needs). Preliminary modeling conducted for the Valley Water Feasibility Study (2021a) suggests the breach to Pond A8S in Conceptual Alternative 9 should increase sediment transport from the lower reaches of Calabazas and STA creeks, thereby reducing the frequency and potential volume of future sediment removal activities. The conversion of a managed pond system to a fully tidal system in Pond A4 will eliminate the need for pump operation.

Objective 4 (enhanced public access). The ditch block and the re-alignment of the lower portions of STA Creek in Conceptual Alternative 9 provide opportunities for enhancement of public access. Discussions between Valley Water, City of San José, SCC, and other agencies regarding future trail access options to meet this objective are ongoing.

4.2.10 Conceptual Alternative 10 (Alviso Slough Downstream Berm Degrade and Fully Tidal Pond A4)

4.2.10.1 Description

Conceptual Alternative 10 reconnects A8 Ponds to the downstream reach of Alviso Slough by way of a large berm degrade to MTL. This alternative also includes the removal of the Pond A5 water control structure (the berm degrade will include the removal of the A7 water control structure), breaches through the southern berms of Pond A8S and Pond A4, a breach of Pond A4 to Guadalupe Slough, a breach of A8 Ponds to Guadalupe Slough, and re-routing STA Creek through Harvey Marsh. A ditch block between the SEC and Guadalupe Slough is included to route the SEC flow to Pond A4. Finally, excavated sediments will be strategically placed to create wetland bench features in Pond A4, and along the entire berm degrade in the A8 Ponds (Figure 4-5).

4.2.10.2 Alignment with Project Objectives

Objective 1 (ecological restoration/enhancement of habitats). While a large berm degrade of the A8 Ponds is likely to re-establish some tidal connectivity to Alviso Slough, the degrade to the berm will cause a decrease in upland habitat availability and significant displacement of wildlife species. In addition to re-established tidal connectivity with Pond A8S, Conceptual Alternative 10 includes re-alignment of lower STA Creek, creating an opportunity to re-establish native plant species (e.g., pickleweed and cordgrass), and create off-channel, wetland bench, and marsh edge habitats that may be used by native fish and bird species. The conversion of Pond A4 into a fully tidal system is expected to provide water exchange benefits and a unique additional opportunity for A8 Ponds connection via two nearby breaches to Guadalupe Slough (one from Pond A4 and one from Pond A8S).

Objective 2 (flood protection/sea level rise). Based upon preliminary modeling of similar alternatives, the increased connectivity of the A8 Ponds under Conceptual Alternative 10 is expected to result in increased water levels in the ponds during simulated flood conditions (Valley Water 2021a). The berm degrade is expected to increase water levels in the ponds with increased tidal exchange. It is expected the tidal exchanges will increase water levels and possible risks of increased wind-wave erosion of the protective soil covering the closed landfill at the eastern edge of Pond A8S. Breaches between Guadalupe Slough and Pond A4, as well as from Pond A8S into Harvey Marsh, may increase the risk of future flooding during coastal flood events and may require consideration of flood protection elements along the landward edge of Pond A4 and the embankment north of Hwy 237, to maintain existing levels of flood protection. The ditch block just upstream of Guadalupe Slough could increase flood risk near Sunnyvale Baylands Park during high-flow events.

Objective 3 (reduced maintenance needs). Although no modeling was conducted on this alternative, preliminary modeling conducted for the Valley Water Feasibility Study (2021a) suggests that Conceptual Alternative 10 will increase sediment transport from the lower reaches of Calabazas and STA creeks, thereby reducing the frequency and potential volume of future sediment removal activities. In addition, conversion of Pond A4 from a managed system to a fully tidal system will eliminate the need for pump operation and costs.

Objective 4 (enhanced public access). Because Conceptual Alternative 10 involves re-alignment of the lower portions of STA Creek and a ditch block, opportunities exist for enhancement of public access and improved trail systems. Discussions between Valley Water, City of San José, SCC, and other agencies regarding future trail access options to meet this objective are ongoing.

4.2.11 Conceptual Alternative 11 (Alviso Slough Downstream Berm Degrade and Managed Pond A4)

4.2.11.1 Description

Like Conceptual Alternative 10, this alternative reconnects A8 Ponds to the downstream reach of Alviso Slough by way of a large berm degrade to MTL. While A8 Pond actions are similar, this alternative differs with regards to Pond A4 actions. Instead of a fully tidal Pond A4, Conceptual Alternative 11 includes a tide gate to establish muted tidal action in Pond A4. This alternative also includes the removal of the Pond A5 water control structure (the berm degrade will include the removal of A7 water control structure), a breach through the southern berm of Pond A8S, a breach of SEC to Pond A4, a breach of Pond A4 to Guadalupe Slough, two breaches from A8 Ponds to Guadalupe Slough, and re-routing STA Creek through Harvey Marsh. Finally, excavated sediments will be strategically placed to create island features in the A8 Ponds (Figure 4-6).

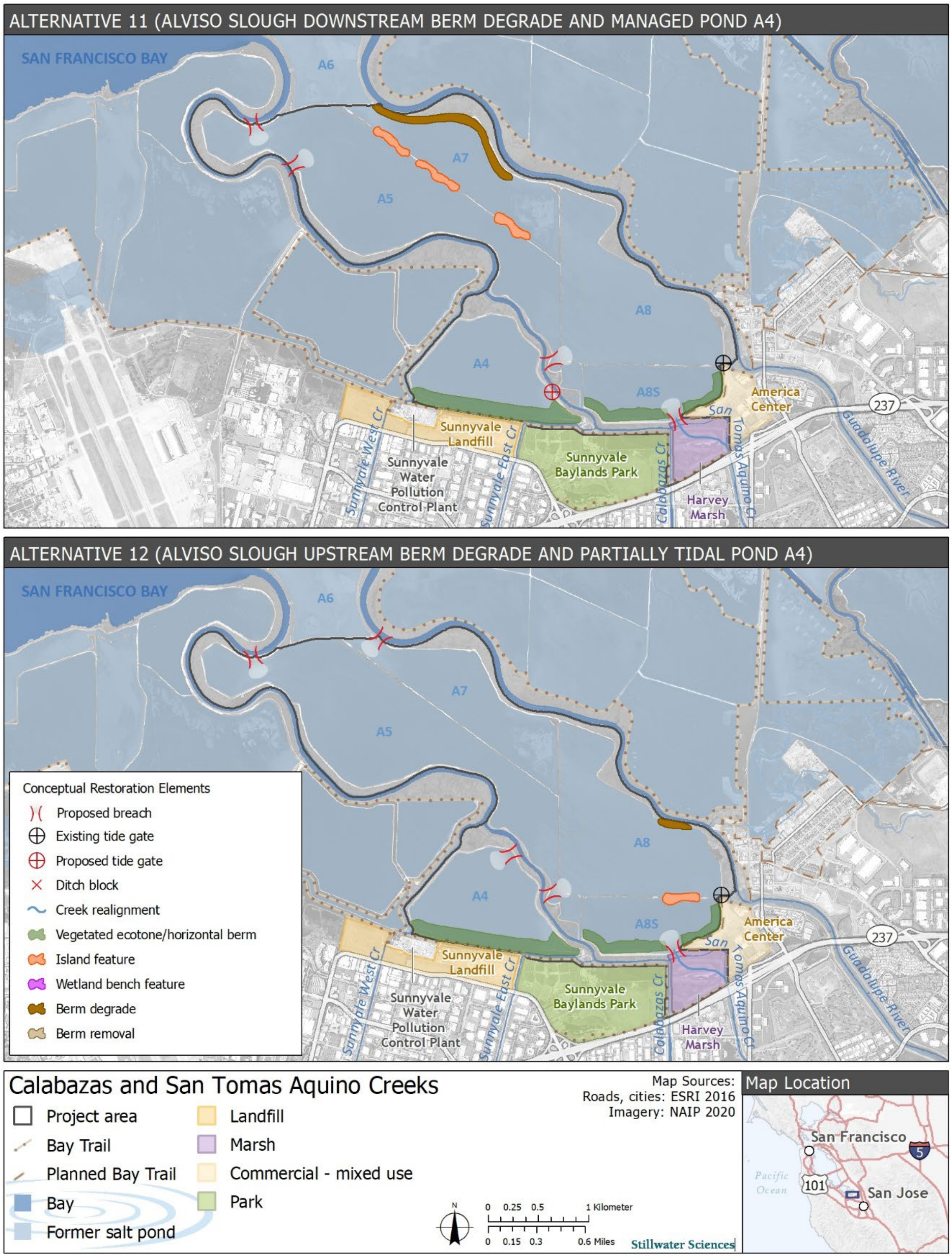


Figure 4-6. Conceptual Alternatives 11 and 12.

4.2.11.2 Alignment with Project Objectives

Objective 1 (ecological restoration/enhancement of habitats). While a large berm degrade in the A8 Ponds is likely to re-establish some tidal connectivity to Alviso Slough, the degrade to the berm will cause a major decrease in upland habitat availability and significant displacement of wildlife species. In addition to re-established tidal connectivity with Pond A8S, Conceptual Alternative 11 includes re-alignment of lower STA Creek, creating an opportunity establishing for replanting native plant species (e.g., pickleweed and cordgrass) as well as creation of off-channel and marsh edge habitats that may be used by native fish and bird species. The tide gate within Pond A4 will enable optimization of a muted tidal system, enhancing managed pond area that will provide ongoing habitat use for dabbling duck and other open water species.

Objective 2 (resilient flood protection against sea level rise. Based on preliminary modeling of similar alternatives, the increased connectivity of the A8 Ponds under Conceptual Alternative 11 is expected to result in increased water levels in the ponds during simulated flood conditions (Valley Water 2021a). The berm degrade is expected to increase water levels in the ponds with increased tidal exchange. It is expected the tidal exchanges will increase water levels and possible risks of increased wind-wave erosion of the protective soil covering the closed landfill at the eastern edge of Pond A8S. Further, a breach between Harvey Marsh and the A8 Ponds has the potential to increase future flood risks during the coastal flood event and may require consideration of flood protection elements along Hwy 237 to maintain existing levels of flood protection.

Objective 3 (reduced maintenance needs). Although no modeling was conducted on this alternative, preliminary modeling conducted for the Valley Water Feasibility Study (2021a) suggests that Conceptual Alternative 11 will increase sediment transport from the lower reaches of Calabazas and STA creeks, thereby reducing the frequency and potential volume of future sediment removal activities.

Objective 4 (enhanced public access). Because Conceptual Alternative 11 involves re-alignment of the lower portions of STA Creek, opportunities exist for enhancement of public access. Discussions between Valley Water, City of San José, SCC, and other agencies regarding future trail access options to meet this objective are ongoing.

4.2.12 Conceptual Alternative 12 (Alviso Slough Upstream Berm Degrade and Partially Tidal Pond A4)

4.2.12.1 Description

Conceptual Alternative 12 reconnects A8 Ponds to the upstream reach of Alviso Slough by way of a berm degrade to MTL. This alternative also includes the removal of Pond A5 and A7 water control structures, a breach through the southern berm of Pond A8S, a breach of Pond A4 to Guadalupe Slough, a breach of A8 Ponds to Guadalupe Slough, and re-routing STA Creek through Harvey Marsh. Finally, excavated sediments will be strategically placed to create an island feature in Pond A4 (Figure 4-6).

4.2.12.2 Alignment with Project Objectives

Objective 1 (ecological restoration/enhancement of habitats). While a large berm degrade in the A8 Ponds is likely to re-establish some tidal connectivity to Alviso Slough, the degrade to the berm will cause a major decrease in upland habitat availability and significant displacement of species. In addition to re-established tidal connectivity with Pond A8S, Conceptual Alternative 12 includes re-alignment of lower STA Creek, creating an opportunity to re-establish native plant species (e.g., pickleweed and cordgrass), and create off-channel, island, and marsh edge habitats that may be used by native fish and bird species. The conversion of Pond A4 into a tidal system is expected to provide water exchange benefits and a unique opportunity for Pond A4 and A8 Ponds connectivity via two Guadalupe Slough breaches.

Objective 2 (resilient flood protection against sea level rise). Based upon preliminary modeling of similar alternatives, the increased connectivity of the A8 Ponds under Conceptual Alternative 12 is expected to result in increased water levels in the ponds during simulated flood conditions (Valley Water 2021a). The berm degrade on the upstream reach of Alviso Slough is expected to increase water levels in the ponds with increased tidal exchange and major Guadalupe River high-flow events. It is expected the tidal exchanges will increase water levels and possible risks of increased wind-wave erosion of the protective soil covering the closed landfill at the eastern edge of Pond A8S. Breaches between Guadalupe Slough and Pond A4, as well as from Pond A8S into Harvey Marsh, could increase the risk of future flooding during coastal events and may require consideration of flood protection elements along the landward edge of Pond A4 and the embankment north of Hwy 237 to maintain existing levels of flood protection.

Objective 3 (reduced maintenance needs). Although no modeling was conducted on this alternative, preliminary modeling conducted for the Valley Water Feasibility Study (2021a) suggests that Conceptual Alternative 12 will increase sediment transport from the lower reaches of Calabazas and STA creeks, thereby reducing the frequency and potential volume of future sediment removal activities. In addition, conversion of Pond A4 from a managed system to a fully tidal system will eliminate the need for pump operation and costs.

Objective 4 (enhanced public access). Because Conceptual Alternative 12 involves re-alignment of the lower portions of STA Creek, opportunities exist for enhancement of public access. Discussions between Valley Water, City of San José, SCC, and other agencies regarding future trail access options to meet this objective are ongoing.

4.2.13 Conceptual Alternative 13A: (Guadalupe Slough Upstream Berm Degrade and Fully Tidal Pond A4)

4.2.13.1 Description

Conceptual Alternative 13.A reconnects A8 Ponds to the upstream reach of Guadalupe Slough by way of a berm degrade to MTL. This alternative also includes breaches through the southern berms of Pond A8S and Pond A4, a breach of Pond A4 to Guadalupe Slough, and re-routing STA Creek through Harvey Marsh. A ditch block between the SEC and Guadalupe Slough is included to route the SEC flow to Pond A4. Finally, excavated sediments will be strategically placed to create an island feature in the A8 Ponds (Figure 4-7).

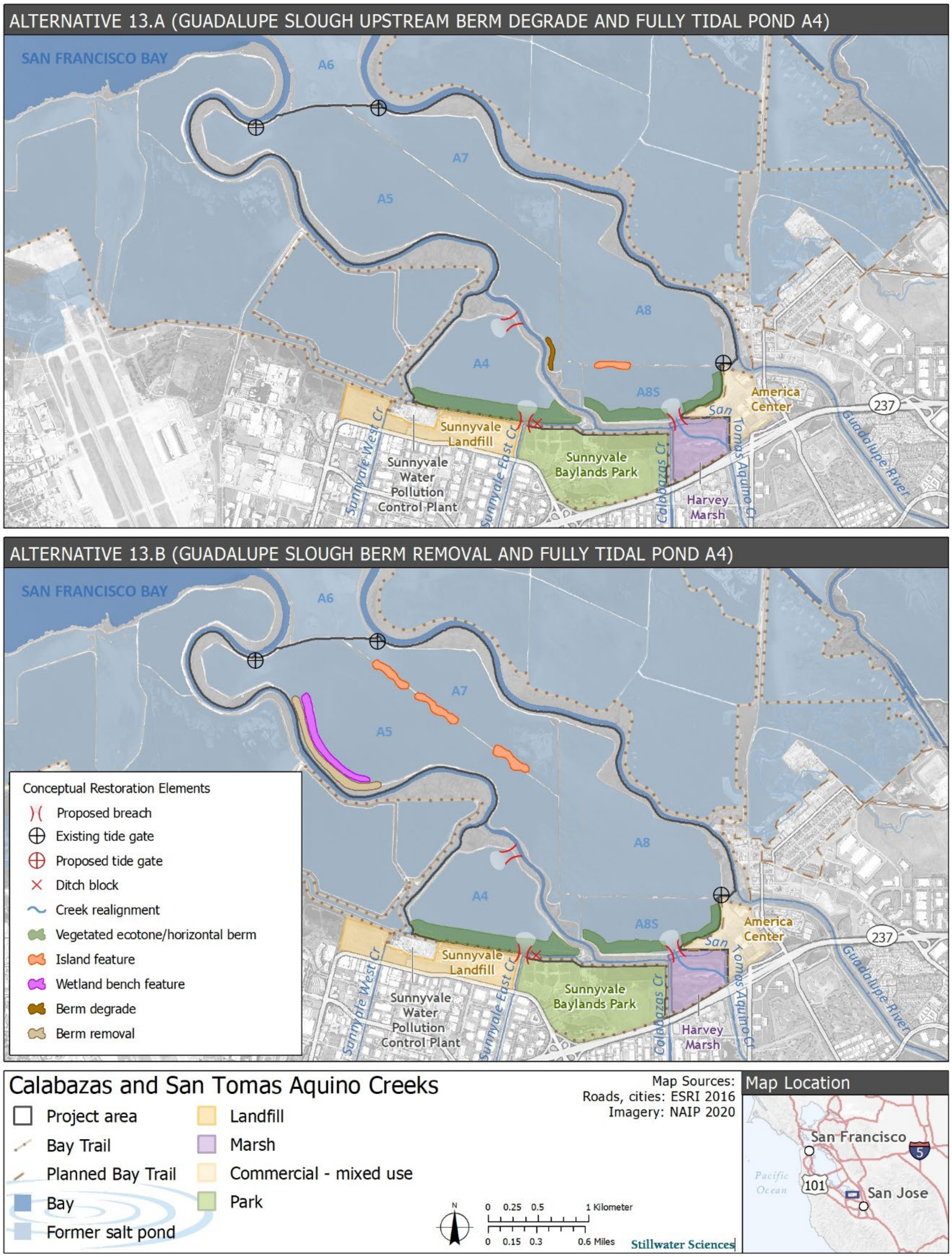


Figure 4-7. Conceptual Alternatives 13A and 13B.

4.2.13.2 Alignment with Project Objectives

Objective 1 (ecological restoration/enhancement of habitats). While a large berm degrade in the A8 Ponds is likely to re-establish some tidal connectivity to Guadalupe Slough, the berm degrade will cause a major decrease in upland habitat availability and significant displacement of species. In addition to re-established tidal connectivity with Pond A8S, Conceptual Alternative 13A includes re-alignment of lower STA Creek, creating an opportunity for replanting native plant species (e.g., pickleweed and cordgrass) as well as creation of off-channel, island, and marsh edge habitats that may be used by native fish and bird species. The conversion of Pond A4 into a fully tidal system is expected to provide water exchange benefits and a unique additional opportunity for A8 Ponds connection via Guadalupe Slough (a breach from Pond A4 and a berm degrade Pond A8S).

Objective 2 (resilient flood protection against sea level rise). Based upon preliminary modeling of similar alternatives, the increased connectivity of the A8 Ponds under Conceptual Alternative 13A is expected to result in increased water levels in the A8 Ponds during simulated flood conditions (Valley Water 2021a). The Guadalupe Slough berm degrade is expected to increase water levels in the A8 Ponds with increased tidal exchange. Increased tidal exchanges in the A8 Ponds may also increase water levels and possible risks of increased wind-wave erosion of the protective soil covering the closed landfill at the eastern edge of Pond A8S. Breaches between Guadalupe Slough and Pond A4, as well as from Pond A8S into Harvey Marsh, could increase the risk of future flooding during a coastal event and may require consideration of flood protection elements along the landward edge of Pond A4 and the embankment north of Hwy 237 to maintain existing levels of flood protection.

Objective 3 (reduced maintenance needs). Although no modeling was conducted on this alternative, preliminary modeling conducted for the Valley Water Feasibility Study (2021a) suggests that Conceptual Alternative 13A will increase sediment transport from the lower reaches of Calabazas and STA creeks, thereby reducing the frequency and potential volume of future sediment removal activities. In addition, conversion of Pond A4 from a managed system to a fully tidal system will eliminate the need for pump operation and costs.

Objective 4 (enhanced public access). Conceptual Alternative 13A involves re-alignment of the lower portions of STA Creek and a ditch block, such that opportunities exist for enhancement of public access and improved trail routes.

Discussions between Valley Water, City of San José, SCC, and other agencies regarding future trail access options to meet this objective are ongoing.

4.2.14 Conceptual Alternative 13B: (Guadalupe Slough Berm Removal and Fully Tidal Pond A4)

4.2.14.1 Description

Conceptual Alternative 13B reconnects A8 Ponds to the downstream reach of Guadalupe Slough through a berm removal to mean low water (MLW). This alternative also includes breaches through the southern berms of Pond A8S and Pond A4, a breach of Pond A4 to Guadalupe Slough, and re-routing STA Creek through Harvey Marsh. A ditch block between the SEC and Guadalupe Slough is included to route the SEC flow to Pond A4. Finally, excavated sediments will be strategically placed to create island features in the A8 Ponds and a wetland bench at MLW elevations along portions of the removal zone (Figure 4-7).

4.2.14.2 Alignment with Project Objectives

Objective 1 (ecological restoration/enhancement of habitats). While a large berm removal in the A8 Ponds is expected to drastically alter tidal connectivity to Guadalupe Slough, the berm removal will cause a major decline in upland habitat availability and significant displacement of species. In addition to re-established tidal connectivity with Pond A8S, Conceptual Alternative 13B includes re-alignment of lower STA Creek, creating an opportunity for replanting native plant species (e.g., pickleweed and cordgrass) as well as creation of off-channel, island, and marsh edge habitats that may be used by native fish and bird species. The conversion of Pond A4 into a fully tidal system is expected to provide water exchange benefits from Sunnyvale to Guadalupe Slough, through Pond A4.

Objective 2 (resilient flood protection against sea level rise). Based upon preliminary modeling for Conceptual Alternative 2, the large berm removal between Guadalupe Slough and A8 Ponds in Conceptual Alternative 13.B is expected to increase water levels in the A8 ponds during flood conditions (Valley Water 2021a); however, it is uncertain if berm removal will provide greater tidal exchange than alternatives with conventional breaches. During king tide events, the increased tidal connectivity of the A8 Ponds may also increase water levels and possible risks of increased wind-wave erosion of the protective soil covering the closed landfill at the eastern edge of Pond A8S. Breaches between Guadalupe Slough and Pond A4, as well as from Pond A8S into Harvey Marsh, could also increase the risk of future flooding during coastal flood events and may require consideration of flood protection elements along the landward edge of Pond A4 and the embankment north of Hwy 237 to maintain existing levels of flood protection.

Objective 3 (reduced maintenance needs). Although no modeling was conducted on this alternative, preliminary modeling conducted for the Valley Water Feasibility Study (2021a) suggests that Conceptual Alternative 13B will increase sediment transport from the lower reaches of Calabazas and STA creeks, thereby reducing the frequency and potential volume of future sediment removal activities.

Objective 4 (enhanced public access). Because Conceptual Alternative 13B involves re-alignment of the lower portions of STA Creek, opportunities exist for enhancement of public access. Discussions between Valley Water, City of San José, SCC, and other agencies regarding future trail access options to meet this objective are ongoing.

4.2.15 Conceptual Alternative 14 (Maximum Fluvial Sediment Transport)

4.2.15.1 Description

Conceptual Alternative 14 was modified following the October 21 and October 27, 2022, Conceptual Alternatives workshops to focus upon achieving the highest sediment transport attainable from the re-aligned Calabazas and STA creeks. This includes establishment of high elevation berms spaced 200 feet apart along the path of the re-aligned STA Creek across Harvey Marsh, and strategically placed ditch blocks across the abandoned STA channel at the east end of the Pond A8S breach, as well as a ditch block across Guadalupe Slough to route Calabazas Creek into Pond A8S (Figure 4-8). To increase tidal connectivity of the downstream ponds and reduce hydraulic backwater conditions that may limit sediment transport, this alternative includes openings of Guadalupe Slough to the A8 Ponds and Pond A4 through breaches and removal of the Pond A5 and A7 water control structures, and strategic placement of excavated sediments to create island features in the A8 Ponds.

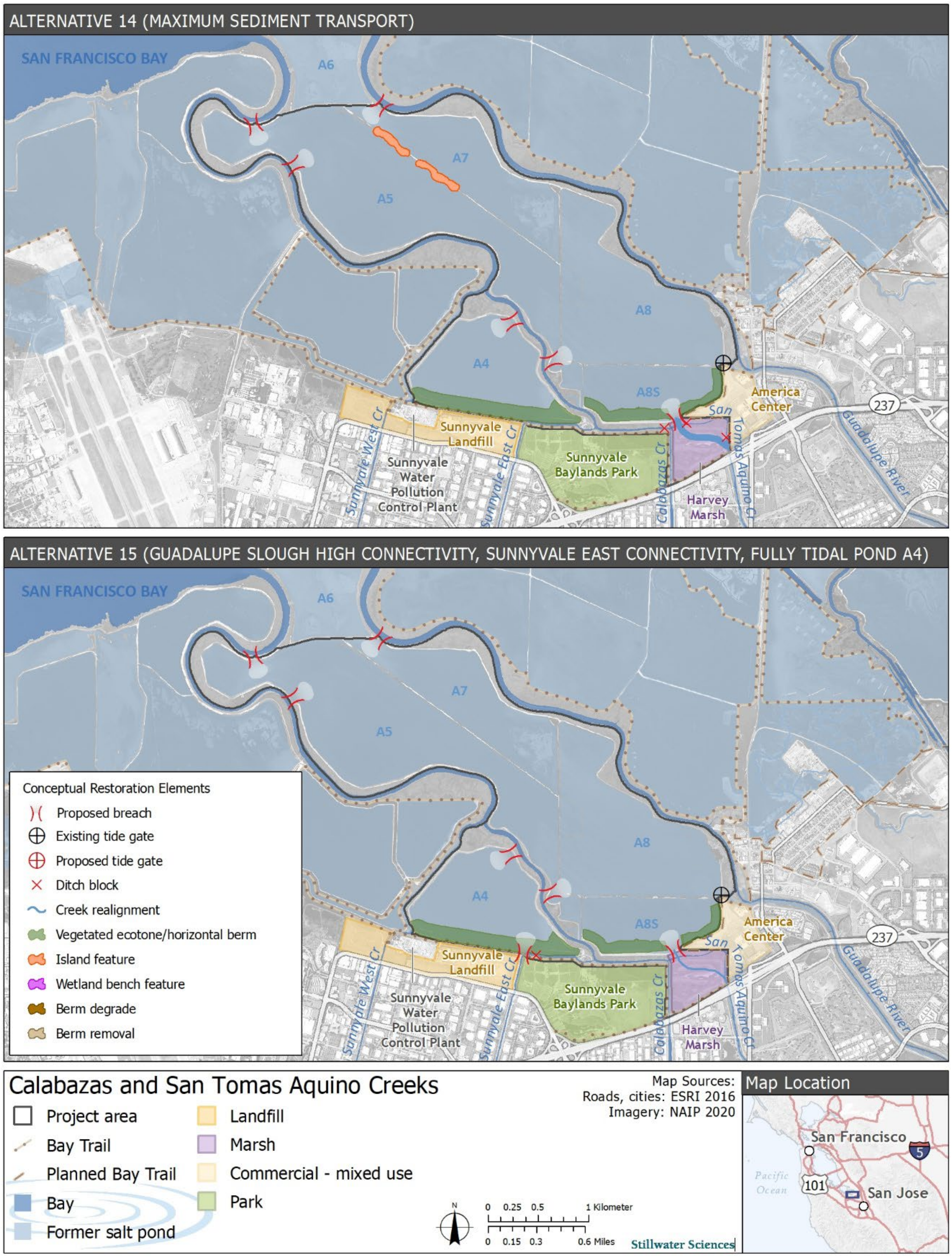


Figure 4-8. Conceptual Alternatives 14 and 15.

4.2.15.2 Alignment with Project Objectives

Objective 1 (ecological restoration/enhancement of habitats). Although this alternative re-establishes tidal connectivity with Pond A4 and A8 Ponds, Conceptual Alternative 14 is focused upon re-alignment of lower STA Creek to maximize sediment transport without consideration of tidal habitat reconnection in Harvey Marsh. Nevertheless, reconnection of Pond A4 is expected to provide water exchange benefits and a unique opportunity for increased use of tidal habitats by native fish and bird species in the A8 Ponds and Pond A4 because of the two Guadalupe Slough breaches.

Objective 2 (resilient flood protection against sea level rise. Although no modeling was conducted on this alternative, preliminary modeling conducted for the Valley Water Feasibility Study (2021a) suggests that the increased number of breaches under Conceptual Alternative 14 will result in increased water levels in the A8 Ponds during simulated Guadalupe River flood conditions (as seen in preliminary modeling of Conceptual Alternative 3). Increased tidal exchanges in the A8 Ponds via Guadalupe Slough breaches may also increase water levels and possible risks of increased wind-wave erosion of the protective soil covering the closed landfill at the eastern edge of Pond A8S. Breaches between Guadalupe Slough and Pond A4, as well as from Pond A8S into Harvey Marsh, could increase the risk of future flooding during coastal flood events and may require flood protection elements along the landward edge of Pond A4 and the embankment north of Hwy 237, respectively, to maintain existing levels of flood protection.

Objective 3 (reduced maintenance needs). Although no modeling was conducted on this alternative, preliminary modeling conducted for the Valley Water Feasibility Study (2021a) suggests that Conceptual Alternative 14 will increase sediment transport from the lower reaches of Calabazas and STA creeks, thereby reducing the frequency and potential volume of future sediment removal activities. Although there is no opportunity for sediment transport into A8 Ponds from Guadalupe River via Alviso Slough until the water control structure at Pond A7, there is high potential for sediment transport via Guadalupe Slough through breaches into A8 Ponds.

Objective 4 (enhanced public access). Because Conceptual Alternative 14 involves re-alignment of the lower portions of STA Creek, opportunities exist for enhancement of public access. Discussions between Valley Water, City of San José, SCC, and other agencies regarding future trail access options to meet this objective are ongoing.

4.2.16 Conceptual Alternative 15 (Guadalupe Slough High Connectivity, Sunnyvale East Channel Connectivity and Fully Tidal Pond A4)

4.2.16.1 Description

Conceptual Alternative 15 focuses on opening Guadalupe Slough to A8 Ponds and Pond A4 through breaches, as well as connecting the SEC to Pond A4 through a breach. This alternative includes the removal of Pond A5 and A7 water control structures, breaches through the southern berms of Pond A8S and Pond A4, a breach of Pond A4 to Guadalupe Slough, two breaches from A8 Ponds to Guadalupe Slough (one upstream and one downstream), and re-routing STA Creek through Harvey Marsh. A ditch block between the SEC and Guadalupe Slough is also included to route flow from the SEC into Pond A4. Finally, strategic placement of excavated sediments will create island features in A8 (Figure 4-8).

4.2.16.2 Alignment with Project Objectives

Objective 1 (ecological restoration/enhancement of habitats). In addition to re-established tidal connectivity with Pond A8S, Conceptual Alternative 15 includes re-alignment of lower STA Creek and a ditch block near the SEC breach, creating an opportunity for replanting native plant species (e.g., pickleweed and cordgrass) as well as creation of off-channel, island, and marsh edge habitats that may be used by native fish and bird species. The conversion of Pond A4 into a fully tidal system is expected to provide water exchange benefits and a unique additional opportunity for A8 Ponds connection via Guadalupe Slough (a breach from Pond A4 and a breach from Pond A8S).

Objective 2 (resilient flood protection against sea level rise). Based upon preliminary modeling for Conceptual Alternative 2, the increased number of breaches under Conceptual Alternative 15 is expected to result in increased water levels in the ponds during simulated flood conditions (Valley Water 2021a). Increased tidal exchanges in the A8 Ponds may also increase water levels and possible risks of increased wind-wave erosion of the protective soil covering the closed landfill at the eastern edge of Pond A8S. Breaches between Guadalupe Slough and Pond A4, as well as from Pond A8S into Harvey Marsh, could increase the risk of future flooding during coastal flood events and may require flood protection elements along the landward edge of Pond A4 and the embankment north of Hwy 237 to maintain existing levels of flood protection. While the breach at the SEC increases opportunity for Pond A4 mixing (and therefore increased water quality potential), the ditch block just upstream of

Guadalupe Slough may increase flood risk near Sunnyvale Baylands Park during high-flow events.

Objective 3 (reduced maintenance needs). Although no modeling was conducted on this alternative, preliminary modeling conducted for the Valley Water Feasibility Study (2021a) suggests that Conceptual Alternative 15 will increase sediment transport from the lower reaches of Calabazas Creek, SEC, and STA Creek, thereby reducing the frequency and potential volume of future sediment removal activities. Additionally, the substitution of breaches for the siphon in Pond A4 will decrease pump operation costs.

Objective 4 (enhanced public access). Because Conceptual Alternative 15 involves re-alignment of the lower portions of STA Creek and a ditch block, opportunities exist for enhancement of public access and re-routing trails using the ditch block. Discussions between Valley Water, City of San José, SCC, and other agencies regarding future trail access options to meet this objective are ongoing.

4.2.17 Conceptual Alternative 16 (Maximum Tidal Connectivity)

4.2.17.1 Description

Conceptual Alternative 16 contains the most tidal connectivity actions for both A8 Ponds and Pond A4. These actions include the removal of Pond A5 and A7 water control structures, two breaches between A8 Ponds and Guadalupe Slough, two breaches between A8 Ponds and Alviso Slough, replacement of the existing A8 Notch with a levee breach, re-routing STA Creek through Harvey Marsh, a breach through the southern berms of Pond A8S and Pond A4, breaches from Pond A4 to Guadalupe Slough and Moffett Channel, and a ditch block between the SEC and Guadalupe Slough to direct flow from the SEC into Pond A4. This alternative also includes a vegetated ecotone slope along the southern margin of Harvey Marsh, as well as strategically placed sediments to create island features in the A8 Ponds and wetland bench in Pond A4 (Figure 4-9).

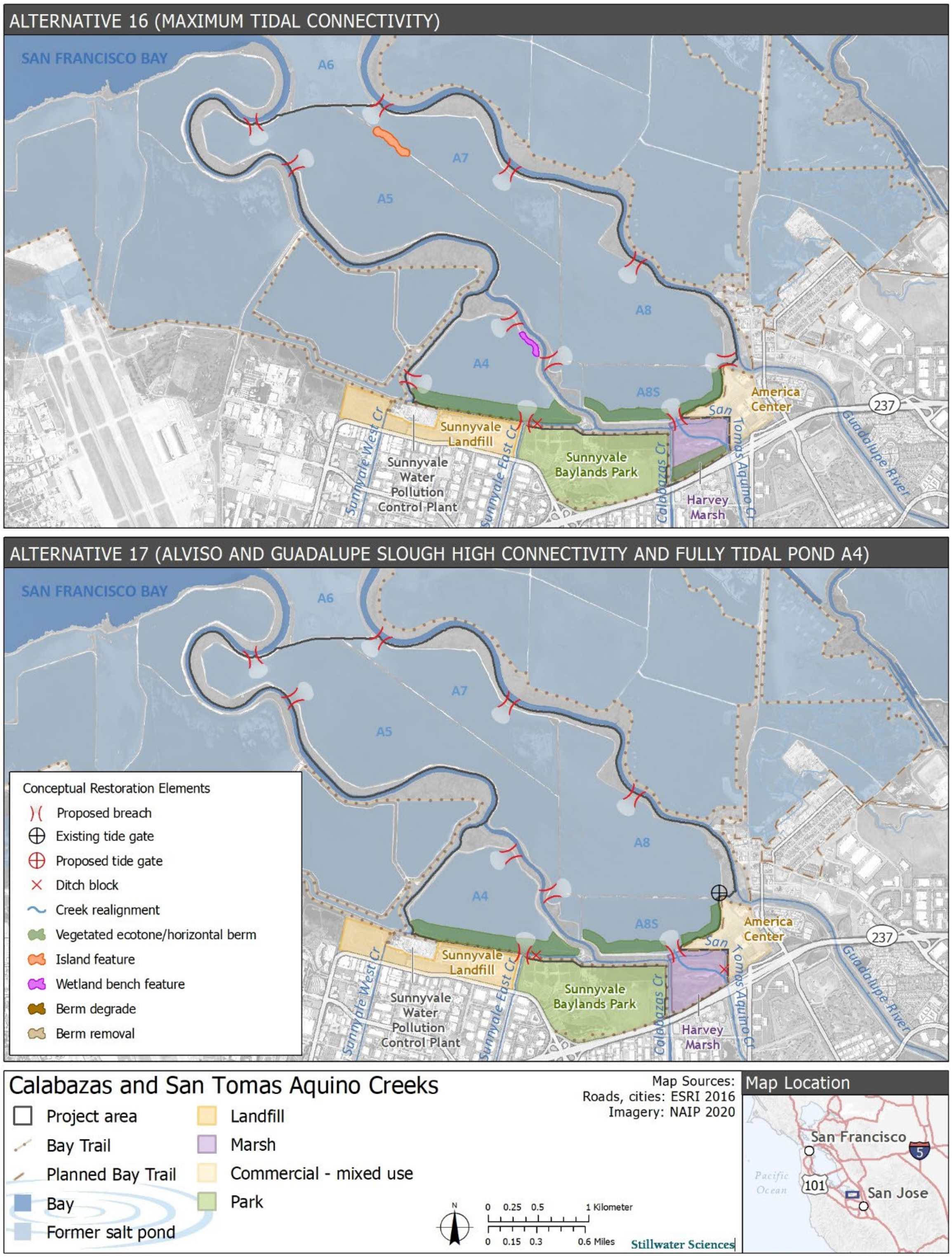


Figure 4-9. Conceptual Alternatives 16 and 17.

4.2.17.2 Alignment with Project Objectives

Objective 1 (ecological restoration/enhancement of habitats). In addition to re-established tidal connectivity with Pond A8S, Conceptual Alternative 16 includes re-alignment of lower STA Creek and a ditch block, creating an opportunity to replant native plant species (e.g., pickleweed and cordgrass) as well as creation of off-channel, island, wetland bench, and marsh edge habitats that may be used by native fish and bird species. Reconnection of Pond A4 is expected to enhance the habitat availability and diversity of the Pond A4 system, although the large number of breaches will likely decrease the amount of upland habitat area and displace a larger number of wildlife species compared to less intensive alternatives. Modeling of Moffett Channel breaches into Pond A4 will be used to assess mixing effects upon receiving water quality of the Sunnyvale WWTP discharge.

Objective 2 (resilient flood protection against sea level rise). Although no modeling was conducted on this alternative, preliminary modeling conducted for the Valley Water Feasibility Study (2021a) suggests that the increased number of breaches under Conceptual Alternative 16 will result in increased water levels in the A8 Ponds during simulated Guadalupe River flood conditions (as seen in preliminary modeling of Conceptual Alternative 3). Increased tidal exchanges in the A8 Ponds may also increase water levels and possible risks of increased wind-wave erosion of the protective soil covering the closed landfill at the eastern edge of Pond A8S. Breaches between Guadalupe Slough and Pond A4, Pond A4, and the SEC, as well as from Pond A8S into Harvey Marsh, could increase the risk of future flooding during coastal flood events and may require consideration of flood protection elements along the landward edge of Pond A4 and Sunnyvale Baylands Park and at the embankment north of Hwy 237 to maintain existing levels of flood protection.

Objective 3 (reduced maintenance needs). Although no modeling was conducted on this alternative, preliminary modeling conducted for the Valley Water Feasibility Study (2021a) suggests that Conceptual Alternative 16 will significantly increase sediment transport from the lower reaches of Calabazas, Sunnyvale, and STA creeks, thereby reducing the frequency and potential volume of future sediment removal activities. Additionally, the substitution of breaches for the siphon in Pond A4 will decrease pump operation costs.

Objective 4 (enhanced public access). Because Conceptual Alternative 16 involves re-alignment of the lower portions of STA Creek and a ditch block, opportunities exist for enhancement of public access and the opportunity to use the ditch block for the trail system. Discussions between Valley Water, City of San José, SCC, and other agencies regarding future trail access options to meet this objective are ongoing.

4.2.18 Conceptual Alternative 17 (Alviso and Guadalupe Slough High Connectivity and Fully Tidal Pond A4)

4.2.18.1 Description

Conceptual Alternative 17 is similar to Conceptual Alternative 16; however, it does not include a breach from Pond A4 to Moffett Channel, nor the replacement of the existing notch in the A8 Ponds with a breach. Also, it does not include any placement of excavated sediments to create habitat features. Conceptual Alternative 17 includes the removal of Pond A5 and A7 water control structures, two breaches between A8 Ponds and Guadalupe Slough, two breaches between A8 Ponds and Alviso Slough, re-routing STA Creek through Harvey Marsh, breaches through the southern berms of Pond A8S and Pond A4, one breach from Pond A4 to Guadalupe Slough, and a ditch block between the SEC and Guadalupe Slough to direct flow from the SEC into Pond A4 (Figure 4-9).

4.2.18.2 Alignment with Project Objectives

Objective 1 (ecological restoration/enhancement of habitats). In addition to re-established tidal connectivity with Pond A8S, Conceptual Alternative 17 includes the re-alignment of lower STA Creek and a ditch block, creating an opportunity for replanting native plant species (e.g., pickleweed and cordgrass) as well as creation of off-channel and marsh edge habitats that may be used by native fish and bird species. Reconnection of Pond A4 is expected to enhance the habitat availability and diversity of the Pond A4 system, although the large number of breaches will likely decrease the amount of upland habitat area and displace a larger number of wildlife species compared to less intensive alternatives.

Objective 2 (resilient flood protection against sea level rise). Based upon preliminary modeling of similar alternatives, the increased number of breaches under Conceptual Alternative 17 is expected to result in increased water levels in the ponds during simulated flood conditions (Valley Water 2021a). Increased tidal exchanges in the A8 Ponds may also increase water levels and possible risks of increased wind-wave erosion of the protective soil covering the closed landfill at the eastern edge of Pond A8S. Breaches between Guadalupe Slough and Pond A4, as well as from Pond A8S into Harvey Marsh, could increase the risk of future flooding during coastal flood events and may require consideration of flood protection elements along the landward edge of Pond A4 and the embankment north of Hwy 237, to maintain existing levels of flood protection.

Objective 3 (reduced maintenance needs). Although no modeling was conducted on this alternative, preliminary modeling conducted for the Valley Water Feasibility Study (2021a) suggests that Conceptual Alternative 17 will increase sediment transport from the lower reaches of Calabazas and STA creeks, thereby reducing the frequency and potential volume of future sediment removal activities.

Objective 4 (enhanced public access). Because Conceptual Alternative 17 involves re-alignment of the lower portions of STA Creek and a ditch block, opportunities exist for enhancement of public access and the opportunity to use the ditch block for the trail system. Discussions between Valley Water, City of San José, SCC, and other agencies regarding future trail access options to meet this objective are ongoing.

4.2.19 Conceptual Alternative 18 (Guadalupe Slough High Connectivity and Berm Degrade in Pond A4)

4.2.19.1 Description

Conceptual Alternative 18 focuses on converting Pond A4 into a fully tidal system by degrading the pond berm to MTL along the entire eastern berm. This alternative also includes the removal of Pond A5 and A7 water control structures, re-routing STA Creek through Harvey Marsh, a breach through the southern berm of Pond A8S, two breaches between A8 Ponds and Guadalupe Slough. Strategic placement of excavated sediments will create wetland bench features in Pond A4, mirroring the extent of the degraded berm (Figure 4-10).

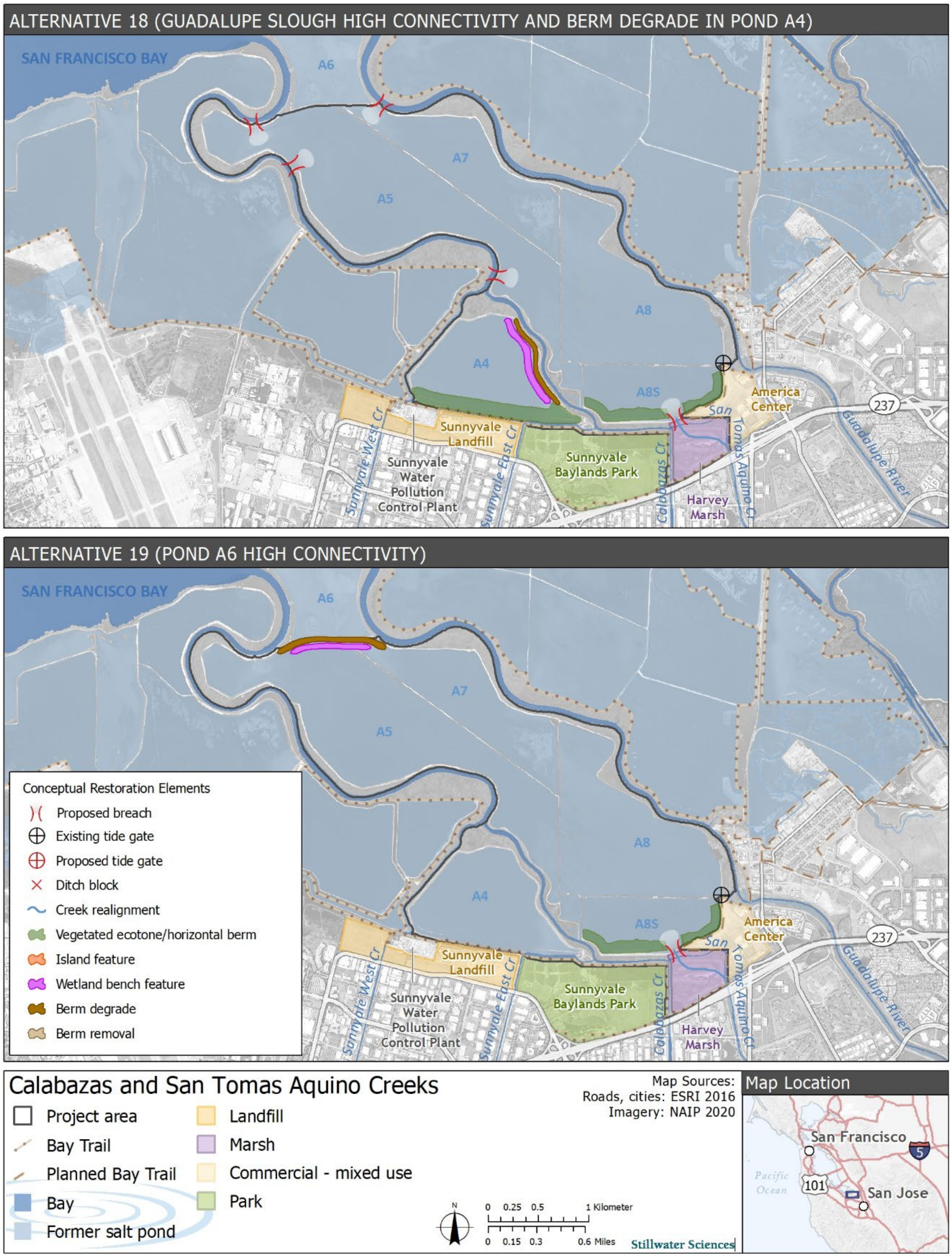


Figure 4-10. Conceptual Alternatives 18 and 19.

4.2.19.2 Alignment with Project Objectives

Objective 1 (ecological restoration/enhancement of habitats). While a large berm degrade in Pond A4 is likely to re-establish some tidal connectivity to Guadalupe Slough, the berm degrade will cause a major decrease in upland habitat availability and significant displacement of wildlife species. In addition to re-established tidal connectivity with Pond A8S, Conceptual Alternative 18 includes re-alignment of lower STA Creek, creating an opportunity for replanting native plant species (e.g., pickleweed and cordgrass) as well as creation of off-channel and marsh edge habitats that may be used by native fish and bird species. Reconnection of Pond A4 is expected to increase the area naturally inundated during higher tidal ranges, and therefore present an opportunity for ecosystem benefits, despite highly intensive construction needs.

Objective 2 (resilient flood protection against sea level rise). The berm between Guadalupe Slough and Pond A4, as well as the breach from Pond A8S into Harvey Marsh, could increase the risk of future flooding during coastal flood events and may require consideration of flood protection elements along the landward edge of Pond A4 and the embankment north of Hwy 237 to maintain existing levels of flood protection.

Objective 3 (reduced maintenance needs). Although no modeling has been conducted on this alternative, preliminary modeling conducted for the Valley Water Feasibility Study (2021a) suggests that Conceptual Alternative 18 will increase sediment transport from the lower reaches of Calabazas and STA creeks into the A8 Ponds, thereby reducing the frequency and potential volume of future sediment removal activities in the creek channels. This conceptual alternative will eliminate the existing siphon between Pond A4 and the A8 Ponds. A large berm degrade would be constructed between Pond A4 and Guadalupe Slough and would require ongoing monitoring and intermittent maintenance in order to maintain flow conveyance while achieving the desired habitat connectivity.

Objective 4 (enhanced public access). Because Conceptual Alternative 18 involves re-alignment of the lower portions of STA Creek, opportunities exist for enhancement of public access. Discussions between Valley Water, City of San José, SCC, and other agencies regarding future trail access options to meet this objective are ongoing.

4.2.20 Conceptual Alternative 19 (Pond A6 High Connectivity)

4.2.20.1 Description

Conceptual Alternative 19 builds on Conceptual Alternative 2 and includes the removal of Pond A5 and A7 water control structures and a berm degrade to MTL between A8 Ponds and Pond A6. This alternative mirrors Conceptual Alternative 2 with the re-route of STA Creek through Harvey Marsh and a breach through the southern berm of Pond A8S. Strategic placement of excavated sediments will create wetland bench features in Pond A8, mirroring the extent of the degraded berm. Conceptual Alternative 19 does not propose any actions to Pond A4 (Figure 4-10).

4.2.20.2 Alignment with Project Objectives

Objective 1 (ecological restoration/enhancement of habitats). In addition to re-established tidal connectivity with Pond A8S, Conceptual Alternative 19 includes re-alignment of lower STA Creek, creating an opportunity for replanting native plant species (e.g., pickleweed and cordgrass) as well as creation of off-channel and marsh edge habitats that may be used by native fish and bird species. Although this alternative will enhance marsh and species connectivity with Pond A6, the berm degrade will decrease upland habitat on the northern edge of the A8 Ponds. However, depending on the extent of pond berm removal, this alternative could improve high tide refugia for threatened, endangered, and special status species.

Objective 2 (resilient flood protection against sea level rise). Based upon preliminary modeling for Conceptual Alternative 2, the degraded berm under Conceptual Alternative 19 is expected to result in increased water levels in the ponds during simulated flood conditions (Valley Water 2021a). Increased tidal exchanges in the A8 Ponds may also increase water levels and possible risks of increased wind-wave erosion of the protective soil covering the closed landfill at the eastern edge of Pond A8S. Further, a breach between Harvey Marsh and the A8 Ponds has the potential to increase future flood risks during the coastal flood event and may require consideration of flood protection elements along Hwy 237 embankment to maintain existing levels of flood protection.

Objective 3 (reduced maintenance needs). Although no modeling was conducted on this alternative, preliminary modeling conducted for the Valley Water Feasibility Study (2021a) suggests that Conceptual Alternative 19 will increase sediment transport from the lower reaches of Calabazas and STA creeks, thereby reducing the frequency and potential volume of future sediment removal activities.

Objective 4 (enhanced public access). Because Conceptual Alternative 19 involves re-alignment of the lower portions of STA Creek, opportunities exist for enhancement of public access. Discussions between Valley Water, City of San José, SCC, and other agencies regarding future trail access options to meet this objective are ongoing.

4.2.21 Conceptual Alternative 20 (Minimum Tidal Connectivity)

4.2.21.1 Description

Conceptual Alternative 20 contains the minimum tidal connectivity for the A8 Ponds and Pond A4 systems. This alternative includes the removal of Pond A5 and A7 water control structures, a breach through the southern berm of Pond A8S, and a tide gate between Pond A4 and Guadalupe Slough to introduce muted tidal action within Pond A4 (Figure 4-11). In addition, this alternative also includes a vegetated ecotone slope along the southern margin of Harvey Marsh.

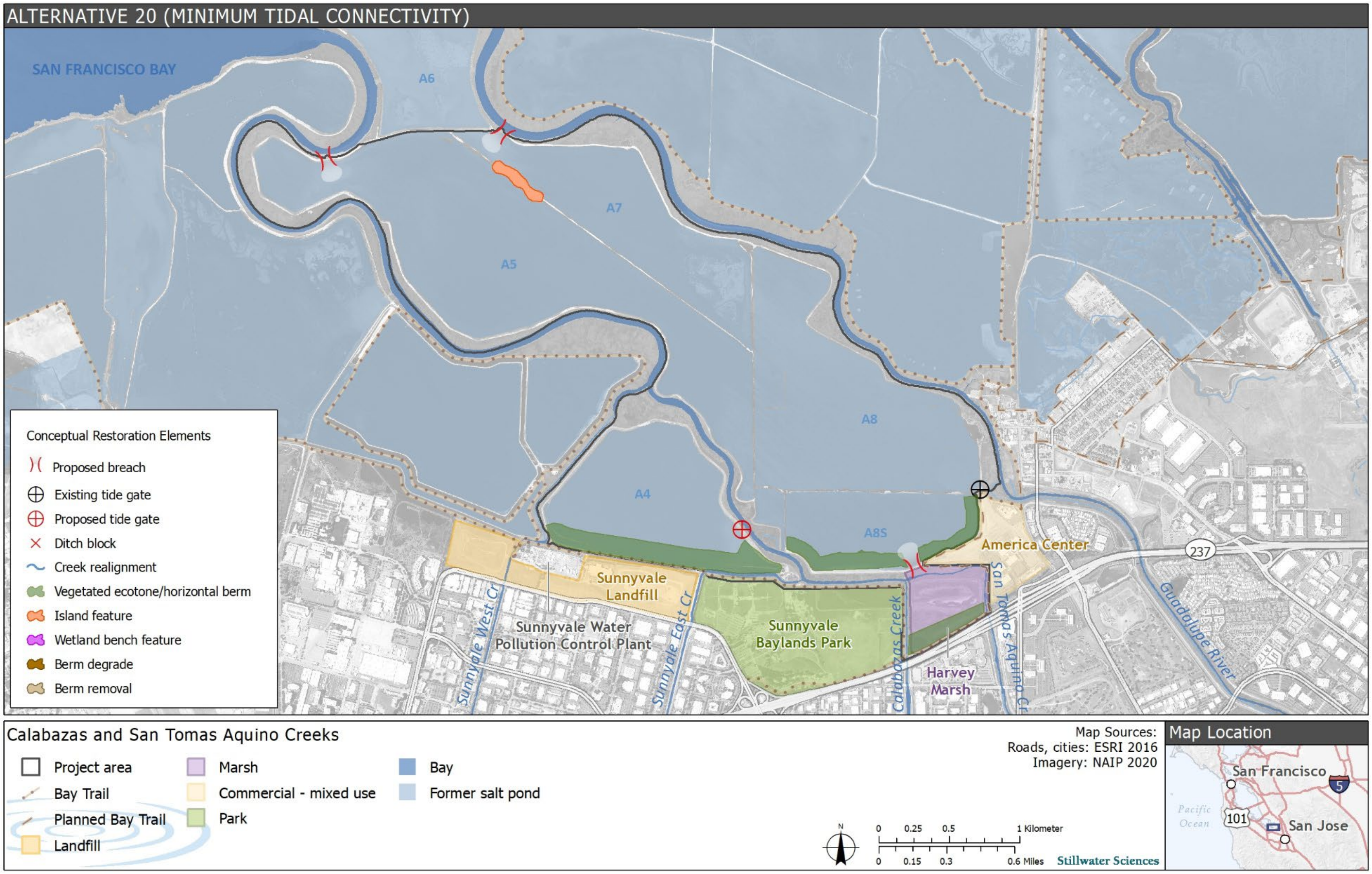


Figure 4-11. Conceptual Alternative 20.

4.2.21.2 Alignment with Project Objectives

Objective 1 (ecological restoration/enhancement of habitats). In addition to re-established tidal connectivity with Pond A8S, Conceptual Alternative 20 will cause minimum disturbance to the Project site, and therefore will cause minimal decreases to upland habitat availability. The muted tidal action through the tide gate within Pond A4 will enable optimization of desired managed pond habitat and is expected to benefit dabbling duck and other open water species.

Objective 2 (resilient flood protection against sea level rise). When compared to the preliminary modeling for Conceptual Alternative 1, the additional tidal connectivity through the Pond A5 and Pond A7 Water Control Structure removals in Conceptual Alternative 20 is expected to result in slightly increased water levels in the ponds during simulated flood conditions (Valley Water 2021a). Increased tidal exchanges in the A8 Ponds may potentially increase water levels and possible risks of increased wind-wave erosion of the protective soil covering the closed landfill at the eastern edge of Pond A8S. Further, a breach between Harvey Marsh and the A8 Ponds has the potential to increase future flood risks during the coastal flood event and may require consideration of flood protection elements along Hwy 237 to maintain existing levels of flood protection. On the Pond A4 side, a tide gate will increase management capacity, providing an opportunity to reduce flood risk without the requirement of a pump or siphon.

Objective 3 (reduced maintenance needs). Although no modeling was conducted on this alternative, preliminary modeling conducted for the Valley Water Feasibility Study (2021a) suggests that Conceptual Alternative 20 will increase sediment transport from the lower reaches of Calabazas and STA creeks, thereby reducing the frequency and potential volume of future sediment removal activities.

Objective 4 (enhanced public access). Conceptual Alternative 20 would make little to no changes in existing public access and, therefore, is not expected to meet this objective. Discussions between Valley Water, City of San José, SCC, and other agencies regarding future trail access options to meet this objective are ongoing.

5 CONCEPTUAL ALTERNATIVES EVALUATION

5.1 Assessment Methodology

5.1.1 Approach

The goal of the Assessment Methodology was to analyze alternatives within a comprehensive decision-making framework that considers a wide range of factors in determining the degree to which combinations of restoration elements meet the identified Project objectives. Consistent with Valley Water Planning Process (see Section 3.1), the Assessment Methodology development began with brainstorming sessions to develop and select factors or criteria used to differentiate between alternatives. To account for the relative importance among the selected factors, weights were assigned along with qualitative and semi-quantitative metrics and their scales to be used in alternative scoring and decision process.

To maximize information and learning opportunities provided by planned hydrodynamic modeling, it was recognized that the selected alternatives should represent the broadest range in water levels (i.e., tidal range) both within the ponds and within the adjacent tidal sloughs, salinity, velocity, sediment transport and deposition, and potential changes in water quality conditions near the Sunnyvale WPCP outfall. Capturing this range requires identifying the hydrodynamic "bookends"—the alternatives that are most likely to have the minimum and maximum changes to the hydrodynamic conditions and sediment transport that can be analyzed with the hydrodynamic modeling tools. Once the bookends are identified, the remaining Conceptual Alternatives are assured to have hydrodynamic effects within this bounding range, allowing other factors to inform the selection of the remaining Conceptual Alternatives to be modeled.

5.1.2 Assessment Factors

The Project Team considered a variety of assessment factors including indicators of ecological health and water quality, resilient flood protection and sediment management, and project feasibility constraints to evaluate the Conceptual Alternatives. Fourteen factors for Phase 1 were developed based upon the preliminary Opportunity and Constraints analysis included in the Valley Water (2021a) Feasibility Study, brainstorming sessions as part of the Conceptual Alternatives Workshops held on October 21, and October 27, 2022, with two additional factors and final factor selection made during a Conceptual Alternative Assessment Methodology Workshop held on December 15, 2022.

We have provided a complete list of all sixteen factors considered in the sections below. In general, assessment methodology factors were selected based upon best professional judgement regarding potential changes in hydrodynamics and sediment transport following re-establishment of tidal connectivity, changes in habitat distribution and ecosystem function, and consideration of Project feasibility related to impacts to existing infrastructure and land uses. Several factors were considered and omitted if the factor and associated metric could not be adequately assessed by the planned hydrodynamic modeling or other existing sources of information. Additionally, factors were also omitted if they did not differentiate between alternatives.

5.1.2.1 Factor 1. Area of tidally influenced habitat (Factor Selected)

Restoring tidally influenced habitat provides critical ecological functions (e.g., food web support) centered largely around exchange of nutrients, sediment, and other materials between the marsh and the surrounding landscape. Increases in the area of tidal marshes and tidally influenced habitat would improve habitat value by counteracting past fragmentation of marsh habitats in the larger SBSPRP area, providing migration corridors, and promoting gene flow between isolated populations. This could be beneficial to rare, threatened, or endangered species adversely affected by habitat fragmentation. It could also promote the long-term sustainability of restored tidal marsh habitat by providing sources of tidally transported sediment that would support land surface accretion, allowing the marsh to adapt and migrate in response to rising sea levels.

While it was recognized that most Conceptual Alternatives would be ranked similarly based on tidal reconnection of open water areas, Factor 1 was selected for use in the Phase 1 assessment.

5.1.2.2 Factor 2. Tidal marsh habitat under projected sea level rise (Factor Deferred to Feasibility Analysis)

Although total tidal marsh habitat in the SF Bay estuary is projected to initially increase because of projected sea level rise, modeling studies indicate long-term losses as sea level rise advances and recommend prioritization of marsh conservation planning based on site elevations, suspended sediment concentrations, and the availability of excess sediment to raise elevations at vulnerable sites before marsh loss occurs (Stralberg et al. 2011). Preliminary data from the SBSPRP indicate that former salt ponds breached to date have met or exceeded expectations for sediment accretion, and tidal marsh vegetation is successfully established in the earliest restored ponds and on its way to establishing in more recent ones.

Because it was recognized that assessment of this factor will require preliminary designs and hydrodynamic modeling to assess changes in local tidal datums, a decision was made to defer assessment of Factor 2 to the Phase 2 Feasibility Analysis.

5.1.2.3 Factor 3. Area of upland habitat (Factor Selected)

In addition to existing Pond berms, construction of vegetated slopes (ecotones) at appropriate elevations are intended to provide upland-wetland transitions and refuge during high tides and periods of inundation. Maintenance of upland habitat would be beneficial for Ridgway's rail and salt marsh harvest mouse recovery, and could benefit other species, such as salt marsh wandering shrew, California black rail, Alameda song sparrow, and salt marsh common yellowthroat (see Section 2.9). Additionally, these habitats provide long-term sustainability for upslope migration of marsh vegetation and wildlife habitat under projected sea level rise scenarios.

While it was recognized that improved estimates of changes in upland habitat would be available following preliminary designs and modeling of changes in local tidal datums, Factor 3 was selected for use in the Phase 1 assessment.

5.1.2.4 Factor 4. Habitat diversity (Factor Deferred to Feasibility Analysis)

Additional berm breaches will restore full tidal action, and connection of creeks to the ponds will create a valuable transition habitat continuum of tidal marsh to upland habitat (i.e., subtidal to intertidal mudflat, to low, middle, and high marsh, to upland habitat). The continuum increases habitat diversity and complexity by providing essential high tide refugia for wildlife. Within aquatic habitats, bathymetric heterogeneity may promote higher fish diversity than simpler habitats, retain proportionately more fish after flood events, and can provide providing a range of forage and refuge areas throughout the tidal cycle.

Because it was recognized that assessment of this factor will require preliminary designs and hydrodynamic modeling to assess changes in local tidal datums, a decision was made to defer consideration of Factor 4 to the Phase 2 Feasibility Analysis.

5.1.2.5 Factor 5. Area of marsh edge habitat (Factor Deferred to Feasibility Analysis)

Tidal marshes with sloughs provide important rearing and foraging habitat for many fish species, including special-status species such as steelhead and longfin smelt. Although specific habitat values will depend upon vegetative cover and water quality conditions, increases in edge habitat using constructed benches, islands, and along the margins of vegetated (ecotone) slopes could benefit juvenile life stages of fish species. In addition, increases to exposed mudflat adjacent to tidally connected open water along pond berms and constructed habitat features are expected to provide more foraging opportunities for shorebirds, herons, egrets, and ducks.

Because it was recognized that assessment of this factor will require preliminary designs and hydrodynamic modeling to assess changes in local tidal datums, a decision was made to defer consideration of Factor 5 to the Phase 2 Feasibility Analysis.

5.1.2.6 Factor 6. Isolated island habitat (Factor Deferred to Feasibility Analysis)

Isolated islands with suitable substrate and vegetation will provide valuable nesting habitat for many shorebird species such as American avocets and Forster's terns. Conversion of the A8 Ponds to muted tidal regime resulted in erosion of several remnant salt pond berms. Construction of topographic features for nesting islands would facilitate renewed nesting at the A8 Ponds by bird species while limiting potential predation.

Because use of this factor will require preliminary designs and hydrodynamic modeling to assess changes in local tidal datums, a decision was made to defer consideration of Factor 6 to the Phase 2 Feasibility Analysis.

5.1.2.7 Factor 7. Potential for mobilization of legacy mercury (Factor Selected)

Based upon existing monitoring data collected by USGS and others, short-term increases in mercury levels in the A8 Ponds as well as Alviso and Guadalupe sloughs are expected due to construction activities and velocity-induced scour at newly constructed breaches (see Section 2.8). While increased breaches may impact the potential for scour of slough beds to mobilize legacy mercury, past studies associated with the gradual opening of the A8 WCS showed mercury levels temporarily increasing during and shortly after WCS construction but decreasing to baseline levels 1 to 2 years after construction. Additional baseline monitoring of mercury in sediment and biota is planned as part of this Project (Stillwater Sciences 2023b).

Because the potential for mobilization of mercury to result in adverse biological effects is a key project constraint, Factor 7 was selected for use in the Phase 1 assessment.

5.1.2.8 Factor 8. Tidal mixing (Factor Deferred to Feasibility Analysis)

Increased breaches and tidal exchanges between the A8 Ponds and surrounding sloughs are expected to increase the extent of brackish aquatic habitats, which would provide environments for rearing and salinity acclimation of anadromous fish. Additionally, changes in the residence time of water within portions of the restoration area may affect nutrient levels, primary productivity, variations in salinity, and chemical variability affecting suitability for aquatic species.

Because use of this factor will require preliminary designs and hydrodynamic modeling to assess changes in tidal mixing, a decision was made to defer consideration of Factor 8 to the Phase 2 Feasibility Analysis.

5.1.2.9 Factor 9. Calabazas-STA flow conveyance, sediment transport to A8 Ponds (Factor Deferred to Feasibility Analysis)

Increased velocities and sediment transport rates are expected in the lower reaches of the Calabazas and San Tomas Creek channels following channel realignment and reconnection with the A8 Ponds compared to current conditions (Valley Water 2021a). In addition to increasing flood flow conveyance in these creeks, improved conveyance could also promote the long-term sustainability of restored tidal marsh habitat by providing sources of fluvially transported sediment that would support land surface accretion, allowing the marsh to adapt and migrate in response to rising sea level.

Because use of this factor will require preliminary designs and hydrodynamic modeling to assess changes in tidal datums and sediment transport, a decision was made to defer consideration of Factor 9 to the Phase 2 Feasibility Analysis.

5.1.2.10 Factor 10. Flood risk during Guadalupe River Events (Factor Selected)

Implementing additional A8 Ponds breaches in Alviso Slough concurrent with creek realignment is expected to reduce flood stages in upper Alviso Slough and lower Guadalupe River during flood events.

Because increased flood risk is a critical Project concern, Factor 10 was selected for use in the (Phase 1) assessment.

5.1.2.11 Factor 11. Resilient flood protection (Factor Selected)

Elevated water levels in Pond A4 and the A8 Ponds during the coastal, fluvial, and Guadalupe River events would increase the risk of erosion and/or overtopping berms.

Although it was recognized that improved estimates of changes in flood risk due to the extreme high tide and flooding events described above will be undertaken following preliminary designs and hydrodynamic modeling, Factor 11 was selected for use in the Phase 1 assessment.

5.1.2.12 Factor 12. Impact to adjacent property or access easements (Factor Deferred to Feasibility Analysis)

In furtherance of The Project Valley Water is working closely with all existing landowners and easement right holders throughout the Planning Process to maintain ,all existing easements and access rights. Revisions to creek alignments and changes in water surface levels could affect access roads and easement, such as access roads used by PG&E for power/gas lines and by USFWS to operate and manage the NWR Access to existing recreational facilities (e.g., waterfowl hunting boat launch and check station) could also be affected. Although more detailed analysis would be needed to assess potential local impacts on the existing PG&E power transmission towers located west of the Calabazas/Guadalupe Slough confluence, this factor will be assessed based upon the amount of excavated channel or breach overlap with existing easements.

Because specific property overlaps and access requirements cannot be assessed prior to the development of conceptual alternative layouts , a decision was made to defer consideration of Factor 12 to the Phase 2 Feasibility Analysis.

5.1.2.13 Factor 13. Overlap or relocation of preferred trail route (Factor Deferred to Feasibility Analysis)

Changes in creek alignment, breaches, or construction of other Project elements may require redesign of preferred trail routes or construction of pedestrian bridges to facilitate public access. Although redesign of the trail would need to account for potential adverse habitat impacts associated with increased public use, as well as future maintenance needs, this factor will be assessed based upon excavated channel or breaches overlaps with existing or planned trail routes.

Because specific trail alignments cannot be assessed prior to the development of conceptual alternative layouts, a decision was made to defer consideration of Factor 13 to the Phase 2 Feasibility Analysis.

5.1.2.14 Factor 14. Constructability (Factor Deferred to Feasibility Analysis)

Breach locations and earthwork requirements of individual alternatives may affect constructability due to variations in access and feature locations, as well as overall excavation volumes.

Because construction methods and access requirements cannot be assessed prior to the development of conceptual alternative layouts, a decision was made to defer consideration of Factor 14 to the later (Phase 2) Feasibility Analysis.

5.1.2.15 Factor 15. Amount of active habitat management required (Factor Selected)

During group discussions at the December 15, 2022, Conceptual Alternative Assessment Methodology Workshop, participants agreed that the amount of active habitat management should be considered in ranking alternatives. For example, continued operations of any pumps needed for continued water quality management in Pond A4, tide gate operations, and maintenance could increase costs due to labor, energy, and capital replacement costs over the long term.

Recognizing that restoration designs that are self-sustaining over the long term are generally preferred , Factor 15 was selected for use in the Phase 1 assessment.

5.1.2.16 Factor 16. Area of managed ponds habitat (Factor Selected).

Participants in Group discussions during the December 15, 2022, Conceptual Alternative Assessment Methodology Workshop indicated that, Factor 1 - area of tidally influenced habitat (See Section 5.1.2.1) is not fully representative of all open water habitats. To correct this shortcoming, area of managed ponds habitat was introduced as a new factor.

Because Factor 16 allows direct assessment of the potential change in area of managed pond habitats, this factor was selected for use in the Phase 1 assessment.

5.1.2.17 Other factors considered during Conceptual Alternative Assessment Methodology Workshop

During group discussions at the December 15, 2022, Conceptual Alternative Assessment Methodology Workshop, participants considered the area of open water as well as the use of the Pond A4 for nature-based treatment of reclaimed wastewater or stormwater as possible assessment factors. These potential factors were omitted from the Phase 1 analysis because they would not vary among the conceptual alternatives.

5.1.3 Weight of Factors

Assessment factors selected for use in the Phase 1 analysis were weighted based on their applicability to Project objectives (see Section 1.4) and subject matter expert rankings. Assessment factors were reviewed and ranked independently by five groups of subject matter experts at the December 15, 2022, Conceptual Alternative Assessment Methodology Workshop. Assessment factor rankings from workshop participants were compiled and an overall group preferences ranking was determined using a ranked choice (i.e., instant runoff) process. Using a series of runoff rounds, the ranked choice process involves removing the lowest ranked factors and re-ranking based upon the group preferences of the surviving factor until the final rankings are determined.[4] To convert the final rankings to weights, a rank sum method was used. Assessment factor group rankings, overall group rankings, and rank sum weights are

[4] In practice, the ranked choice results differed from arithmetic average ranks only in the relative position of assessment factors 3 and 11 (with the arithmetic average ranks placing them in 4th and 3rd position and the ranked choice results in 3rd and 4th respectively).

summarized in Table 5-1. The factor are listed in order of group rank score from highest to lowest.

Table 5-1. Compiled rankings and weights for the Conceptual Alternative assessment factors.

Factor No.	Description	Workshop Group ranking					Overall group rank	Rank sum[a]
		Group 1	Group 2	Group 3	Group 4	Group 5		
1	Area of tidally influenced habitat	1	1	2	2	1	1	0.25
10	Flood risk during Guadalupe River Events	2	4	1	1	2	2	0.21
3	Area of upland habitat	7	3	3	3	5	3	0.18
11	Resilient Flood Protection	3	5	4	4	3	4	0.14
16	Amount of active management required	4	7	5	5	4	5	0.11
7	Potential for mobilization of legacy mercury	6	2	7	7	6	6	0.07
15	Area of managed pond habitat	5	6	6	6	7	7	0.04

[a] Rank sum is where the calculated weights are the individual ranks normalized by dividing by the sum of the ranks (Roszkowska 2013).

5.1.4 Metrics and Scoring

Each Conceptual Alternative was scored for each assessment factor based on expected changes (increases or decreases) in metrics developed to qualitatively represent each factor. Table 5-2 describes the metrics used to score each assessment factor in comparison to existing (i.e., baseline conditions). Because detailed analysis of potential changes in tidal inundation, hydrodynamics, sediment transport and deposition, or habitat evolution is unavailable at this Project phase, simplified metrics were selected based upon best professional judgement regarding potential changes in hydrodynamics, habitat distribution and ecosystem function, flood risk, and sediment transport.

Table 5-2. Assessment factor metric and metric scale criteria used to evaluate Conceptual Alternatives.

Factor No	Description	Metric/Criterion	Score	Definition
1	Area of tidally influenced habitat	Estimated increase or decrease in area	0	No change
			1	Small increase (>5 breaches or berm degrade[1] in the A8 Ponds or at least 1 breach in Pond A4)
			2	Large increase (A8 Ponds breaches or berm removals that activate both ALSL and GLSL and at least 1 breach in Pond A4)
10	Flood risk during Guadalupe River Events[2]	Estimated length of breaches or berm degrades on Alviso Slough	0	No change
			1	Small decrease (1–2 ALSL breaches[3] or downstream berm degrade on ALSL)
			2	Large decrease (>2 ALSL breaches[3] or downstream berm degrade on ALSL)
3	Upland habitat availability	Estimated increase or decrease in area	0	Large decrease (>4 breaches, any location[4], or a long berm degrade)
			0.5	Small decrease (4 breaches, any location[4], or a long berm degrade)
			1	No change
			1.5	Small increase (A8 Ponds ecotone with no breaches, or 3 breaches with A8 and A4 ecotone)
			2	Large increase (A8 and A4 ecotone with <3 breaches)

Factor No	Description	Metric/Criterion	Score	Definition
11	Resilient Flood Protection	Estimated overlap of Project features with Phase 3 Shoreline project berms	0	Large increase (both A8 and A4 Pond tidal activation)
			1	Small increase (A8 Ponds and A4 Pond tide gate)
			2	No change (A8 Ponds tidal activation only[5])
16	Amount of active management required	Anticipated change in operation and maintenance needs	0	Ongoing pump or tide gate operations as well as vegetation management (e.g., ecotone)
			1	Small decrease in management needs (substitute tide gate from Pond A4 pump)
			2	Large decrease in management needs (elimination of Pond A4 pump by breaching Pond A4 and use of Pond A4 ecotone for SMP sediment disposal)
7	Potential for mobilization of legacy mercury	Estimated length of breaches or berm degrades on Alviso or Guadalupe slough.	0	Large increase (either > 5 breaches[6] [greater surface area exposed] or <3 breaches [greater velocity at breach])
			1	Small increase (3–5 breaches)
			2	No change

Factor No	Description	Metric/Criterion	Score	Definition
15	Area of managed pond habitat	Estimated change in area of managed pond	0	Decrease (1 or more breaches to Pond A4)
			1	No change (no action in Pond A4)
			2	Increase (Pond A4 tide gate)

Abbreviations: ALSL = Alviso Slough; GUSL = Guadalupe Slough; SMP = Stream Maintenance Program; STA = San Tomas Aquino; WCS = Water Control Structure

Notes:

[1] A berm degrade does not score as full tidal activation. The Calabazas/STA breach is no change.

[2] Phase 1 will focus on potential risks from Guadalupe River events. With modeling results, Phase 2 will consider grater fluvial flooding risks associated with sea level rise.

[3] Pond A5 and A7 WCS removal scored as a breach into Guadalupe or Alviso slough.

[4] The Calabazas and STA breach, Pond A5 and A7 WCS removal, and Sunnyvale East Channel breach were scored as no change. Berm degrades will decrease upland habitat significantly.

[5] Flood protection elements assumed to be required for A8 Ponds (considered a baseline)

[6] Calabazas/STA breach and Sunnyvale East Channel breach are considered no change (score 2). A berm degrade (score 1, typically) is not likely to significantly increase scour compared to a berm removal (score 0, typically).

5.1.5 Decision Process

Assessment factor weights (Table 5-1) and scores (Table 5-2) for each Conceptual Alternative were compiled , with lowest and highest ranked alternatives representing the lowest and highest summation of metric scores(see Section 5.1.3). Selection of alternatives for modeling included the highest ranked alternative from this process with the remaining alternatives selected based upon rankings, as well as combinations of restoration elements (e.g., Pond A4 breaches, Guadalupe vs. Alviso Slough breaches, etc.) that may be expected to provide a broad range of hydrodynamic modeling results.

Conceptual Alternatives were evaluated based on how each alternative best meets the Project objectives using metrics described in Section 5.1.3 and rankings described in Section 5.1.4. The goal of the evaluation was to review and rank all Conceptual Alternatives systematically and comprehensively. Evaluation of the Conceptual Alternatives used best professional judgement as well as the best available baseline information.

A subgroup of the Project Team including Stillwater Sciences, Valley Water, and Anchor QEA (modeling expertise) met to review the suite of Conceptual Alternatives and reached consensus that the maximum and minimum hydrodynamic connectivity bookends were represented by Alternative 16 (Figure 4-9) and Alternative 20 (Figure 4-11), respectively. Evaluation of other Conceptual Alternatives between the bookends included variations in breaching the A8 Ponds to Guadalupe Slough or only breaching to Alviso Slough.

5.2 Screening Results

Based upon the decision process described above, the products of the weighting factors and scores were compiled and ranked across all alternatives, followed by consideration of the hydrodynamic modeling bookend approach discussed above. Table 5-3 provides weighted ranks of all Conceptual Alternatives and summarizes selected Conceptual Alternatives as well as weighted scores by assessment factor. Regardless of weight, Alternatives 14 (Maximum Fluvial Sediment Transport), 16 (Maximum Tidal Connectivity), and 20 (Minimum Tidal Connectivity) were selected to represent the broadest ranges in the expected results from planned hydrodynamic modeling; these alternatives are noted with shaded rows in Table 5-3. Notably, several non-selected alternatives scored higher than these hydrodynamic bookends.

Table 5-3. Weighted scores and final rankings for selected and non-selected Conceptual Alternatives.

Assessment Factors and Associated Weighted Scores								
Conceptual Alternative	**Area of tidally influenced habitat**	**Flood risk during Guadalupe River events**	**Upland habitat availability**	**Resilient Flood protection needs**	**Amount of active management required**	**Potential for mobilization of legacy mercury mobilization**	**Area of managed pond habitat**	**Weighted totals**
Selected Conceptual Alternatives								
5	0.25	0.43	0.36	0.14	0.11	0.07	0.07	1.429
8	0.25	0.43	0.27	0	0.21	0.07	0	1.232
16[a]	0.5	0.43	0	0	0.21	0	0	1.143
14[b]	0.25	0.21	0.27	0	0.21	0.07	0	1.018
20[a]	0	0.21	0.36	0.14	0.11	0	0.07	0.893
Non-Selected Conceptual Alternatives								
9	0.5	0.43	0.09	0	0.21	0	0	1.232
17	0.5	0.43	0	0	0.21	0	0	1.143
6	0.25	0.21	0.36	0	0.21	0.07	0	1.107
12	0.25	0.43	0.09	0	0.21	0.07	0	1.054
15	0.25	0.21	0.27	0	0.21	0.07	0	1.018
3	0.25	0.43	0	0.29	0	0	0.04	1

Assessment Factors and Associated Weighted Scores								
Conceptual Alternative	**Area of tidally influenced habitat**	**Flood risk during Guadalupe River events**	**Upland habitat availability**	**Resilient Flood protection needs**	**Amount of active management required**	**Potential for mobilization of legacy mercury mobilization**	**Area of managed pond habitat**	**Weighted totals**
7	0.25	0.43	0	0	0.21	0.07	0	0.964
11	0.25	0.21	0	0.14	0.11	0.07	0.07	0.857
10	0.25	0.21	0	0	0.21	0.07	0	0.75
18	0.25	0.21	0	0	0.21	0.07	0	0.75
1	0	0	0.27	0.29	0	0.14	0.04	0.732
2	0	0	0.27	0.29	0	0.14	0.04	0.74
4	0	0	0.27	0.29	0	0.14	0.04	0.74
13A	0.25	0	0.09	0	0.21	0	0	0.55
19	0	0.21	0	0.29	0	0	0.04	0.54
13B	0.25	0	0	0	0.21	0	0	0.46

[a] Alternative selected as a hydrodynamic bookend to represent either maximum or minimum tidal habitat connectivity.

[b] Alternative selected to represent maximum fluvial sediment transport conditions from Calabazas and STA creeks.

5.3 Next Steps

For ease of reference in the future, we have renamed the top-scoring five Conceptual Alternatives as shown in Table 5-4 below.

Table 5-4. Alternative numbering and description of five alternatives selected for hydrodynamic modeling.

Conceptual Alternative numbering	Numbering used for Hydrodynamic modeling	Description
Conceptual Alt 20	Modeling Alt 1	Minimum tidal connectivity
Conceptual Alt 5	Modeling Alt 2	Intermediate tidal connectivity, Pond A4 tide gate
Conceptual Alt 8	Modeling Alt 3	Intermediate tidal connectivity, Pond A4 breaches to both GUSL and Sunnyvale East Channel
Conceptual Alt 14	Modeling Alt 4	Maximum Fluvial Sediment transport,
Conceptual Alt 16	Modeling Alt 5	Maximum tidal connectivity

Before conducting the Feasibility Analysis (Phase 2 shown in Figure 3-1) it is anticipated that restoration elements and configurations from one or more of these alternatives will be considered as part of two additional modeling alternatives that will be developed following review of the initial modeling results (see Section 5.3.1). Project objectives and Assessment Factors used in Phase 1 will be revisited and updated, including additional quantitative factors informed by the hydrodynamic modeling, geospatial analyses, preliminary engineering information, as well as available pre-project/baseline monitoring data.

5.3.1 Hydrodynamic and Sediment Transport Modeling

Hydrodynamic and sediment transport modeling is important in understanding how restoration elements included in the Conceptual Alternatives may change tidal exchanges of the restored A8 Ponds, Pond A4, as well as tidal excursion and exchanges within the tributary creeks to Guadalupe and Alviso Sloughs. Modeled changes in hydrodynamics will be used to assess changes in water quality, sediment scour and deposition, topography, bathymetry, as well as types and extents of available habitat. A single simulation period will be selected for the model and will simulate normal tidal conditions as well as larger flow and tidal ranges to allow evaluation of tidal hydrodynamics, flow conveyance, as well as tidal and riverine sediment transport and deposition. The five (5) selected Conceptual Alternatives (Table 5-4) are currently undergoing hydrodynamic modeling . Following review of the results from the hydrodynamic modeling, it is anticipated that up to two (2) additional alternatives will be refined for additional modeling. The initial screening level modeling and supplemental modeling results will support the Feasibility Analysis and eventual selection of the Staff-Recommended Alternative.

Following selection of the Staff Recommended Alternative, additional hydraulic modeling will be undertaken to analyze the effect of the Staff-Recommended Alternative on FEMA accreditation of existing flood protection facilities. The analysis will quantify the effect of the Staff-Recommended Alternative on peak water surface elevations levels (WSELs) from during fluvial, coastal, and Guadalupe River flood events. The modeling will address peak WSELs, event duration, and other factors that may affect flood risk, including increased risk of erosion due to wind-waves or increased velocity.

5.3.2 Trail Concepts and Evaluation

The Project Team initiated a discussion with a range of stakeholders to coordinate with existing and/or nearby public access projects as well as identify potential opportunities for enhanced public access within the Project Area. Opportunities for public access improvements were discussed at Trail Coordination meetings on January 9, 2023, and March 7, 2023 with representatives from USFWS, City of San José, SCC Parks, CSCC, and the Bay Trail at Metropolitan Transportation Commission.

Public access and potential improvements were also discussed at the Conceptual Alternatives Public Meeting held on May 16, 2023, with the intention of engaging nearby communities through the solicitation of comments and feedback. Trail concepts will be discussed at a Recreational Use Outreach meeting planned for Fall 2023, as well as at the Fall meeting of the San Francisco Bay Waterfowl Hunters Group. Summarized feedback from the Public Meeting, the recreational outreach activities and available trail use data provided by the City of San José, County Parks, and USFWS (as appropriate) will be used to further refine alternative trails concepts and will be factored into the evaluation of the Feasible Alternatives in Phase 2.

5.3.3 Real Estate Needs

Restoration actions for the Project as well as future monitoring and maintenance will require easements and access permission from neighboring landowners. Although the specific configuration of restoration elements may overlap to greater or lesser degrees with landowners in the Project Area, common real estate needs for the Project are described below.

Because Caltrans owns Harvey Marsh (APNs 104-01-097 and 104-01-109), Valley Water would have to obtain an encroachment permit for construction of any new channels across the property for the realigned section of STA Creek and a permanent easement to maintain the channels. Additionally, the U.S. government owns the lands included in the A8 Ponds, including the perimeter berms that would need to be breached to connect the two creeks to the pond. Excavation and fill activities within the A8 Ponds as well as other potential breaches to the adjacent Alviso and Guadalupe Sloughs would similarly require encroachment permits (AKA “right-of-way permits”) for construction of these elements. Valley Water owns the lands surrounding Pond A4 as well as the right of way for the Calabazas Creek and STA Creek segments that are planned to be re-aligned for the Project.

Real estate negotiations and legal transactions represent a primary Project uncertainty that may affect Project feasibility and timing. It is expected that future maintenance of breach locations and other Project elements will require easements from the property owners discussed above. PG&E holds access easements along the existing STA Creek alignment as well as an east-to-west easement for a gas pipeline beneath Harvey Marsh. In addition, coordination will be required with SCC who holds access easements along the Calabazas Creek and STA Creek berms within Harvey Marsh.

5.3.4 Feasibility Analysis

Consistent with Valley Water Planning Process, the selected Conceptual Alternatives will be evaluated using data from developed hydrodynamic and sediment transport modeling, geospatial and engineering analyses, and preliminary environmental data collection and monitoring. Each Feasible Alternative will be ranked using weighted assessment factors using methods similar to the Assessment Methodology described above. Potential assessment factors may include: the extent of habitat types, effects of projected sea level rise, tidal mixing, flow conveyance and sediment transport, overlap or impacts to adjacent property or access easements, changes in recreation access, and constructability. The Feasibility Analysis will be used to select the Staff-Recommended Alternative (Figure 3-1).

5.3.5 Monitoring and Data Collection

Monitoring efforts are being undertaken to establish baseline conditions for use in validating planned hydrodynamic modeling, and to inform future California Environmental Quality Act/National Environmental Policy Act and other regulatory agency review processes. The following monitoring activities detailed in the Monitoring Work Plan (Stillwater Sciences 2023b) will be undertaken during 2023 and 2024:

1. Biological Resource Evaluation
2. Topographic and Bathymetric Surveys
3. Sediment Accumulation
4. Suspended Sediment Monitoring
5. Vegetation Mapping
6. Cultural Resource Surveys
7. Special-Status Wildlife Habitat Surveys
8. Soil and Sediment Testing
9. Recreational Use and Data Collection
10. Mercury and Water Quality Monitoring
11. Aquatic Resource Delineation
12. California Rapid Assessment Method
13. Water Surface Elevation Measurements

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Appendices

Appendix A

Agendas and Notes from Stakeholder and Community Outreach Workshops and Meetings

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Agenda from Conceptual Alternatives Workshop No. 1, October 21, 2022

Valley Water Calabazas/STA Creeks–Marsh Connection Project

Conceptual Alternatives Workshop No. 1

October 21, 2022, 10:00 am – 2:00 pm

LOCATION: MS Teams Meeting ID: 238 020 002 871 (Passcode: BLtkvw); or Call in (audio only) (415) 915-3841 (Passcode 645 639 060#)

Agenda

10:00 a.m. – 11:00 a.m. Introductions and Background

1. **Purpose of Meeting and Attendee Introductions**
2. **Project Objectives and Background**
3. **Restoration Concepts/Actions**
4. **Preliminary Conceptual Alternatives**
5. **Break (5 mins)**

11:00 a.m. – 12:15 p.m. Conceptual Alternatives Brainstorming

1. **MS Teams Breakout Session #1**
2. **Conceptual Alternatives Presentations from Breakout Groups**
3. **Group Discussion**

12:15 p.m. – 12:45 p.m. Lunch

12:45 p.m. – 1:45 p.m. Conceptual Alternatives Screening and Selection Factors

1. **Review of 2021 Feasibility Study Screening Factors**
2. **MS Teams Breakout Session #2**
3. **Screening and Selection Factor Discussions from Breakout Groups**

1:45 p.m. – 2:00 p.m. Next Steps

Notes from Conceptual Alternatives Workshop No. 1, October 21, 2022

Calabazas/San Tomas Aquino Creeks–Marsh Connection Conceptual Alternative Workshop

DRAFT Meeting Notes

DATE/TIME: Friday, October 21, 2022; 10 AM – 2 PM

MEETING LOCATION: MS Teams Meeting (not recorded)

ATTACHMENTS: PowerPoint Slides (included as attachment to notes in PDF)

ATTENDEES:

Organization	Name
Anchor QEA	Michael MacWilliams
CalTrans	Rebecca Carson, Theresa Engel
City of Santa Clara	Falguni Amin
City of Sunnyvale	Emma Hinojosa, Melody Tovar
Pathways Climate Institute	Hilary Papendick, Katie Riles, Kris May, Mike Mak
Rincon	Kelsey Bennett
Santa Clara County Parks and Rec.	Rebecca Coates-Maldoon, Will Geiken
Schaaf & Wheeler	Chuck Anderson, Sandy Carroll
SFEI	Jeremy Lowe,
South Bay Salt Pond Restoration Project	Donna Ball
State Coastal Conservancy	David Halsing, Laura Cholodenko
Stillwater Sciences	Hattie Greydanus, Maia Singer, Melissa Lane, Noah Hume
USFWS	Matthew Brown, Rachel Tertes
Valley Water (VW)	Emily Zedler, James Manitakos, John Bourgeois, Judy Nam, Lisa Bankosh, Sarah Gidre

MEETING NOTES:

Introductions:

After introductory remarks from John Bourgeois, Noah Hume reviewed the meeting purpose and Melissa Lane read the list of Project Partner and Consultant Team representatives in attendance (Slide 3). Noah provided an overview of the Project Objectives and reviewed details related to Project Background (Slides 4-5).

Concepts Evaluated to Date:

Consultant Team provided a high-level summary of the findings of the Valley Water Calabazas and San Tomas Aquino Creek Realignment Feasibility Report, May 2021 and Resilient Landscape Vision for Calabazas Creek, San Tomas Aquino Creek, and Pond A8 Area, SFEI 2018 (Slides 6-12).

The group discussed Pond A4 and its relation to the current project.

- Judy Nam noted that VW purchased Pond A4 (approximately 300 acres) in 2000.
- VW looked into additional sources of funding for recycled water, etc. efforts (USEPA water quality improvement funds), which has resulted in VW's interest in including Pond A4 in the project area.
- VW submitted a grant proposal to USEPA in September 2022 to support inclusion of Pond A4 in planning activities, including funding to support future CEQA/NEPA assessments.
- This managed pond provides expanded habitat opportunities.

Restoration Concepts/Elements:
Consultant Team, including Kris May, Chuck Anderson, and Maia Singer, presented general restoration concepts including enhancements to public access, improving hydraulics and sediment trapping, habitat restoration, and water quality improvements (Slides 13-18).

Conceptual Alternatives:
Noah provided a brief overview of ten conceptual alternatives developed by the Consultant Team during recent brainstorming meetings (Slides 20-29). The group discussed the following associated technical topics:

- Flood control
    1. Emily Zedler clarified that the flood control levee and the ecotone levee need to be considered as a distinct element. Consider raising levee adjacent to landfill for additional protection.
    2. Emily Zedler: Pond A4 south levee must protect the existing City of Sunnyvale Wastewater Treatment Plant (WWTP) infrastructure.
    3. Judy Nam: This project must provide the current level of flood protection for a 100-year event.
    4. Kris May: Suggested that degraded levees might be an extreme option since they would increase flood risk to Pond A4.
    5. Emily Zedler stated that there are existing levees on east side of San Tomas Aquino Creek (STA), south of Hwy 237 and adjacent to Bay Trail; each currently provides flood protection. However, an alternative that re-routes STA may need additional flood protection.
    6. Emily Zedler proposed an examination of the levee along West side of Harvey marsh, east of Calabazas Creek.
- Sunnyvale WWTP discharge
    1. WWTP currently outflows through the open channel west of Pond A4 (i.e., Moffett Channel).

2. Melody Tovar: Commented that one conceptual alternative proposes levee removal where the receiving water monitoring station is located.
3. Noah Hume: Stated that modeling will provide additional information
4. Kris May: For Moffett Channel breach alternatives (Slides 24-28), we will need to model potential hydrologic impacts from WWTP effluent.
5. Group discussed the need to include breach from levee at stormwater pollution control structure for the outfall into Pond A4.

- Sunnyvale Baylands Park
  1. Rebecca Coates-Maldoon: Confirmed that the Baylands Park is no longer included in the project area. Guadalupe Slough (GUSL) backwater habitat represents the extent of activity.
  2. The County Storage Pond, "saline pond" is owned by Santa Clara County.
  3. Melody Tovar: The East Channel Ditch, a city-owned conveyance, runs toward the west at the base of Pond A4 into Moffett Channel.
  4. Emily Zedler: Auxiliary channel to capture low-level drainage. Options being considered about the future of this channel.

Conceptual Alternatives Breakout Groups:

The meeting attendees broke into four virtual rooms of six to seven people each to reflect upon the set of ten existing conceptual alternatives and brainstorm additional alternatives that could meet project objectives.

- Orange Group [Emily Zedler, Falguni Amin, Rachel Tertes, Emma Hinojosa, Michael MacWilliams, Hillary Papendick, Melissa Lane]
  1. This group focused on Pond A4 alternatives that could be paired with a variety of A8 Ponds solutions.
     a. Keeping Pond A4 muted should reduce flood risk and may solve existing water quality problems without having to incorporate a pump or siphon.
     b. Aim to minimize changes at A4 while improving water quality issues by maintaining water level in A4.
     c. We may want to propose installation of flashboards that control inlet to pond (similar to Pond A18).
     d. Removal of existing siphons and decommissioning the pump station would make sense.
  2. Adding channel blocks between GUSL is of interest, although interaction of these features with existing trails may require a re-route of public access trails.
     a. If channel blocks exist, would route Sunnyvale East Channel into Pond A4
        i. If Sunnyvale East flows into Pond A4, then breaches are needed from A4 to control water level in A4.
     b. Channel blocks could be added to other alternatives as stand-alone features.
     c. Be attentive to Baylands Trail. Could channel block be a trail crossing?

3. Non-functional culverts at northwest end of A8 Ponds should be considered part of existing conditions.

- Yellow Group [Sarah Gidre, Theresa Engel, Dave Halsing, Kelsey Bennett, Michael Mak, Noah Hume]
  1. Conceptual Alternative 1
     a. This group considered abandoning the siphon in Pond A4 and replacing it with a tide gate to continue water exchange.
     b. Breach out of GUSL into A8 in 3 locations.
        i. Possibly create more hydrodynamic benefits.
        ii. Consider locating breaches at bends in slough to create more exchange.
        iii. Consider flexibility vs. long-term maintenance: more gates/phases rather than permanent breeches in all locations?
     c. Large levee degrade along Alviso Slough to MTL elevations. Sediment could be placed in other areas to make islands/topographic features.
     d. USACE is expected to receive funding for Shoreline Phase 3 work (between Stevens Creek across project area and tying into high ground under the landfill), which will be located across from Alviso Slough.
  2. Conceptual Alternative 2
     a. Be sure to recognize the distinction between a flood control levee and an ecotone.
     b. Look for ideas that utilize local material rather than importing material.
- Green Group [Donna Ball, Rebecca Coates-Maldoon, Melody Tovar, Kris May, Laura Cholodenko, Maia Singer]
  1. Consider direct Bay Trail connection across Harvey Marsh breach to improve Bay Trail connectivity and to meet goals of Bay Trail (locate adjacent to Bay if possible)
  2. Alternatives for A8 Ponds may include the following:
     a. Levee lowering to increase circulation.
     b. Evaluation of scour of levees across/adjacent to breaches to assess impacts to adjacent facilities.
     c. Elements that encourage sediment deposition.
     d. Study question regarding sediment transport to evaluate the need for starter channels or additional berm breaches to promote additional sediment deposits.
  3. Pond A4 Elements
     a. Sunnyvale East/West Channels may not contribute sediment to system due to urbanized upper watershed.
     b. Could WWTP effluent be considered for use as part of ecotone in Pond A4?

    c. Pond A4 flood protection needs may vary between breaching or levee lowering scenarios.
    d. Evaluation of water quality impacts of WWTP effluent discharge into wetlands; potentially nutrient discharge could be beneficial or could fuel algal growth
        i. Effluent may be high in freshwater algae species that cannot survive in brackish environments.
  4. Identify locations of other constraints
    a. PG&E
    b. Major pipelines
- Blue Group [James Manitakos, Lisa Bankosh, Judy Nam, Chuck Anderson, Katie Riles, Matt Brown, Hattie Greydanus]
  1. Potential Pond A4 elements:
    a. Ecotone or levee in Pond A4 requires breach in eastern side.
    b. Potentially add breach from Moffett Channel to Pond A4.
        i. Need to evaluate impacts to WWTP
  2. An alternative should consider/evaluate recreational uses such as boating, hunting, etc.
    a. Could water level changes effect hunting access.
  3. Potential elements for A8 Ponds:
    a. Lower levee between ponds A6 and A8; potentially degrade the entire stretch.

Conceptual Alternatives Screening and Selection Factors

Noah Hume provided an overview of screening factors used in 2021 Feasibility Study, and presented preliminary metrics to allow qualitative and semi-quantitative comparisons of Conceptual Alternatives based on plan view sketches, ecological principles (e.g., freshwater, muted, and tidal habitat type conversions, habitat succession over time, areal vs edge effects, etc.), engineering considerations (e.g., sediment sources, flood control levees, WPCP discharge mixing, stream maintenance program), and recreational access.

The meeting attendees returned to the same breakout rooms to discuss potential factors to be used in screening and ranking Conceptual Alternatives, with a goal of selecting five alternatives for hydrodynamic modeling and detailed feasibility assessment.

- Orange Group [Emily Zedler, Falguni Amin, Rachel Tertes, Emma Hinojosa, Michael MacWilliams, Hillary Papendick, Melissa Lane] discussed the following:
  1. Additional metric related to impacts on access to waterfowl hunting or other recreation.
  2. Additional metric of potential marsh habitat vs likely marsh habitat.

3. Metrics should capture acreage of ecotone and contiguous habitat. Islands and other isolated features may provide more habitat than one long levee.
4. Metric for connectivity since marsh edge habitat is negatively associated with some species.
5. Additional modeling needed for impacts on flood risk in all waterways.
6. Additional metrics to evaluate timing of impacts and benefits.

- Yellow Group [Sarah Gidre, Theresa Engel, Dave Halsing, Kelsey Bennett, John Bourgeois, Michael Mak, Noah Hume] discussed the following:
  1. Potential metrics to restore habitat and create/enhance wetland (tidal marsh, freshwater marsh), upland (transitional), and riparian habitats at key locations.
     a. Adequate water amount, water quality, elevation variations, and habitat species for healthy wetlands at the South Bay edges.
     b. Changes in habitat type.
     c. Changes in tidal datums, salinity, high-tide refugia.
     d. Peak velocity at breaches.
     e. Changes in sediment deposition amounts and locations.
     f. Availability of clean dirt to build ecotones/levees.
  2. Potential metrics to evaluate flood protection, sediment transport, and channel maintenance.
     a. Resilient flood protection that will adapt to projected SLR.
     b. No breaches into adjacent habitable land uses, roadways, and wastewater facilities during high tide or precipitation events, accounting for higher end of SLR modeling.
     c. Wave heights that reach ecotones.
     d. Velocity of flow.
     e. Erosion metric.
     f. Availability of clean dirt to build ecotones/levees.
     g. Potential for overlap with existing power and pipelines and ROW easements – would these be represented in the constraints analysis?
     h. Constructability.
     i. Flexibility (e.g., directional flow gates)
     j. Reduction in maintenance needs for Lower Calabazas and STA creeks
        i. Currently maintenance is completed with 10-year frequency, whereby VW crews remove sediment and vegetation blocking flows. The goal is to avoid this activity and have the project be self-maintaining.
        ii. Confirm that landfill is adequately protected.
  3. Potential metrics that capture water quality conditions.
     a. Changes in dissolved oxygen (DO).
     b. Changes in mercury mobilization.
  4. Potential metrics which measure enhanced public recreation and access

   a. Access, connection to other recreational facilities, views from public areas to the Bay and associated natural features, and public facilities themselves (e.g., trails with signage, education, viewpoints, benches, etc.).
   b. Preferred trail alignments.

- Green Group [Judy Nam, Donna Ball, Rebecca Coates-Maldoon, Melody Tovar, Kris May, Laura Cholodenko, Maia Singer] discussed the following:
  1. Potential metrics to measure habitat benefits whereby habitat expands and becomes connected/continuous freshwater to brackish marsh habitat. The focus may be maximizing tidal marsh rather than open water/ponds. Pond A4 may be retained as open water/pond habitat using a tide gate if we need to include this type of habitat.
  2. Potential metrics to enhance fish habitat should be species specific.
     a. Factors should include marsh edge habitat as well as interior channel habitat
  3. Potential metric to reflect enhanced bird habitat, which should consider both open water/pond as well as tidal marsh associated birds.
  4. Habitat complexity metric should include upland to freshwater to brackish transects (in order to include rare plants).
  5. Sediment transport metric should include sediment evolution/movement through the A8 Ponds, to be informed by periodic bathymetric surveys.
  6. Flood risk metric to consider A8 Ponds water level. The flood control function may not be as effective if there are many breaches in A8 Ponds. Additional modeling will address this in combination with SLR.
  7. The constraint to displace existing species should consider that existing tidal marsh habitat could be displaced by the restoration actions/breaches themselves. Phasing of breaches (i.e., gradually increasing the number of breaches) could provide species time to adapt/relocate, although migrating waterbirds that use the site are fairly adaptable. Is keeping Pond A4 as a managed pond a good idea for dabbling duck, open water species? We should be mindful of viewing this project in the context of SBSPP for waterfowl, which is addressing habitat for these species. Adequate buffers around trails in newly restored areas will be important for reducing the displacement of existing species.
  8. The fish stranding constraint should consider that an open breach with a bridge could present increased fish stranding risk. Guadalupe River is used by steelhead, so Calabazas Creek needs to remain unobstructed.
  9. The erosion constraint should consider whether wind fetch may erode ecotone. Islands within Ponds A8 may reduce fetch and potential for erosion, while providing bird habitat.

- Blue Group [[James Manitakos, Lisa Bankosh, Chuck Anderson, Katie Riles, Matt Brown, Hattie Greydanus]] discussed the following:
  1. Is the number of breaches always positively correlated with meeting project objectives?
  2. Length of trail is not necessarily as important a metric as is connectivity and accessibility.
  3. Reduced levee maintenance, in addition to reduced creek maintenance, is desirable.
     a. Use modeling to determine the optimal number of breaches to reduce maintenance.
  4. Add a metric that quantifies the speed with which restoration benefits can be realized.
     a. Permitting
     b. Constructability
  5. Can we evaluate Pond A4 and A8 Ponds separately?

Next Steps

Noah outlined the Conceptual Alternatives development process, which will include refinements to the sketches developed during brainstorming and breakout sessions, prior to screening and ranking. Upcoming milestones and project tasks include:

- 10/27 Alternatives Follow-up Meeting with Agencies
- Refine Conceptual Alternatives and Screening Metrics (November)
- Assessment Methodology Workshop (December)
- Screen and select five (5) alternatives for modeling (January/February)
- Draft Conceptual Alternative Report and Public Meeting (April)

ACTION ITEMS:

Action Item	**Responsibility**	**Status**
NEW ACTION ITEMS FROM CURRENT MEETING		
1. Incorporate feedback on conceptual alternatives for the upcoming agency meeting on October 27th	Stillwater Team	Complete
2. Prior to the December *Assessment Methodology Workshop*, provide a refined set of 10-15 conceptual alternative schematics.	Stillwater Team	Ongoing
PENDING ACTION ITEMS FROM PREVIOUS MEETINGS		
1. Brief descriptions of Conceptual Alternatives	Noah/Melissa	Ongoing

Agenda from Alternatives Follow Up Meeting with Agencies, October 27, 2022

Valley Water Calabazas/San Tomas Aquino Creeks–Marsh Connection Project

Alternatives Follow Up Meeting with Agencies

October 27, 2022, 12:30 pm – 1:30 pm

LOCATION: MS Teams Meeting ID: 228 544 323 921 (Passcode: zaDhdB); or

Call in (audio only) (415) 915-3841 (Passcode 512 283 250#)

Agenda

1. **Purpose of Meeting and Attendee Introductions**
2. **Project Objectives**
3. **Concepts Evaluated to Date**
4. **Restoration Concepts/Elements**
5. **Review of Conceptual Alternatives**
6. **Next Steps**

Notes from Alternatives Follow Up Meeting with Agencies, October 27, 2022

Calabazas/San Tomas Aquino Creeks–Marsh Connection
External Agency Conceptual Alternative Workshop

DRAFT Meeting Notes

DATE/TIME: Thursday, October 27, 2022; 12.30 PM – 1.30 PM

MEETING LOCATION: MS Teams Meeting (not recorded)

ATTACHMENTS: PowerPoint Slides (included as attachment to notes in PDF)

ATTENDEES:

Organization	**Name**
Bay Conservation and Development Commission (BCDC)	Anniken Lydon
CalTrans	Theresa Engel
City of San Jose	Beth Tidwell, Kevin Ice, Thomas Harris, Yen Bui
City of Santa Clara	Falguni Amin
City of Sunnyvale	Emma Hinojosa, Melody Tovar
Kearns and West	Kelsey Rugani
NMFS	Page Vick
Rincon	Colby Boggs, Kelsey Bennett
South Bay Salt Pond Restoration Project	Donna Ball
Santa Clara County Parks and Rec.	Rebecca Coates-Maldoon, Will Geiken
SFEI	Scott Dusterhoff
State Coastal Conservancy	Evyan Sloane, David Halsing, Laura Cholodenko
Stillwater Sciences	Maia Singer, Melissa Lane, Noah Hume
USEPA	Luisa Valiela
USFWS	Ann Spainhower, Chris Barr, Rachel Tertes
USACE	Frances Malmud-Roam
Valley Water (VW)	Colleen Haggerty, Emily Zedler, James Manitakos, John Bourgeois, Judy Nam, Lisa Bankosh, Lisa Brancatelli, Medi Sinaki, Michael DeLeon, Nick Mascarello, Roxanne Grillo, Sarah Gidre, Stephen Ferranti, Sunshine Ventura Julian
Waterboard, San Francisco	Elizabeth Morrison, Susan Glendening, Keith Lichten

MEETING NOTES:

Introductions:
After introductory remarks from Judy Nam, Noah Hume reviewed the meeting purpose and Melissa Lane read the list of Project Partner and Consultant Team representatives in attendance (Slide 3). Noah provided an overview of the Project Objectives and reviewed details related to Project Background (Slides 4).

Concepts Evaluated to Date:
Stillwater provided a high-level summary of the findings of the Valley Water Calabazas and San Tomas Aquino Creek Realignment Feasibility Report, May 2021 and Resilient Landscape Vision for Calabazas Creek, San Tomas Aquino Creek, and Pond A8 Area, SFEI 2018 (Slides 5-6).

Restoration Concepts/Elements and Development of Conceptual Alternatives:
Stillwater presented general restoration concepts along with an applied conceptual alternative example for each concept. The restoration concepts included improving hydraulics and sediment trapping, habitat restoration and water quality improvements (Slides 7-20).

Issues/Challenges:
Stillwater presented a discussion of public access and recreation elements, future flood risk analysis, project Sea Level Rise and sediment sources/accretion, potential impacts on Sunnyvale WPCP (Slides 22-23).

Coordination with Adjacent Projects:
Following the presentation, Melody Tovar suggested that it would be helpful to provide a map showing existing and future flood protection projects as well as the proposed Calabazas STA project features. It was noted that existing berms along Sunnyvale WPCP and Pond A4 are not certified for flood protection. Other points discussed include:

- Susan Glendenning asked for active coordination with E&W Sunnyvale Flood Improvement Project
- Susan Glendenning asked project to identify/reconcile flood protection standards e.g. 100 year fluvial event vs coastal flooding event
- Melody asked that project identify alternatives that may impact the Sunnyvale WPCP
- Melody Tovar asked to provide clear list of objectives against which the conceptual alternatives will be measured,
    - Noah stated that this would be covered during the Assessment Methodology Workshop in December.
    - Anniken Lydon asked that trail and public access be examined within context of each conceptual alternative

Next Steps

Noah outlined the Conceptual Alternatives development process, which will include refinements to the sketches developed during brainstorming and breakout sessions, prior to screening and ranking. Upcoming milestones and project tasks include:

- Refine Conceptual Alternatives and Screening Metrics (November)
- Assessment Methodology Workshop (December 15, 2022)
- Screen and select five (5) alternatives for modeling (January/February)
- Draft Conceptual Alternative Report and Public Meeting (April)

ACTION ITEMS:

Action Item	Responsibility	Status
NEW ACTION ITEMS FROM CURRENT MEETING		
3. Provide a single map of adjacent future projects	Stillwater Team	In Progress
4. Provide notes and slides from 10/21 Conceptual Alternative Workshop	Stillwater Team	Complete
5. Provide notes and slides from 10/27 External Agency Meeting	Stillwater Team	Complete
6. Prior to the December *Assessment Methodology Workshop*, provide a refined set of 10-15 conceptual alternative schematics.	Stillwater Team	In Progress
7. Provide clear list of objectives against which the conceptual alternatives will be measured	Stillwater Team	In Progress

Agenda from Conceptual Alternatives Assessment Methodology Workshop,
December 15, 2022

Valley Water Calabazas/San Tomas Aquino Creeks–Marsh Connection Project

Conceptual Alternatives Assessment Methodology Workshop

December 15, 2022, 10:00 am – 2:00 pm

LOCATION: MS Teams - Click here to join the meeting
Meeting ID: 223 730 462 78 (Passcode: jvsA3M); or
Call in (audio only) (415)-915-3841 (Passcode 918 538 900#)

Agenda

10:00 a.m. – 12:30 p.m. Introductions and Background

6. **Purpose of Meeting and Attendee Introductions**
7. **Alternatives Developed to Date**
8. **Hydrodynamic Considerations**

Assessment Methodology Approach and Proposed Factors

1. **Assessment Methodology Approach**
2. **Proposed Alternative Selection Factors/Metrics**
3. **Breakout Session 1: Assessment Factors**
4. **Discussion and Assessment Factor Selection**

12:10 p.m. – 12:30 p.m. Lunch

12:30 p.m. – 2:00 p.m. Conceptual Alternative Assessment Factor Ranking

4. **Assessment Factor Ranking Approach**
5. **Breakout Session 2: Ranking factors**
6. **Discussion from Breakout Groups**

Next Steps

1. **Alternative Selection Process**
2. **Preliminary Modeling Metrics**

Notes from Conceptual Alternatives Assessment Methodology Workshop,
December 15, 2022

Valley Water Calabazas/San Tomas Aquino Creeks–Marsh Connection Project

Conceptual Alternatives Assessment Methodology Workshop

DRAFT Meeting Notes

DATE/TIME: December 15, 2022, 10:00 am – 2:00 pm

MEETING LOCATION: MS Teams Meeting (not recorded)

ATTACHMENTS: (Distribution package Noah Hume email 12/13/22 entitled "Review Materials")

1. Cal-STA_Assessment Approach.pdf
2. Proposed_Assessment_Factors.pdf
3. Preliminary Factor Weighting.xlsx
4. Conceptual Alternatives.pdf (20 Alternatives slide deck)
5. Assessment Methodology Workshop Agenda.pdf

ATTENDEES:

Organization	Name
Anchor QEA	Michael MacWilliams
Pathways Climate Institute	Kris May, Hilary Papendick, Katie Riles,
Rincon Consultants	Kelsey Bennett, Colby Boggs, Frederico Scarelli
San Francisco Estuary Institute (SFEI)	Scott Dusterhoff, Kyle Stark
Schaaf & Wheeler	Chuck Anderson
South Bay Salt Pond Restoration Project	Donna Ball (SFEI), David Halsing (State Coastal Conservancy)
Stillwater Sciences	Hattie Greydanus, Noah Hume, Colleen Kamoroff, Melissa Lane, Maia Singer
Valley Water (VW)	Lisa Bankosh, Zooey Diggory, James Manitakos, Nick Mascarello, Judy Nam, Emily Zedler

MEETING NOTES:

Introductions and Background

After introductory remarks from Judy Nam, Scott Dusterhoff reviewed the purpose of this workshop as discussion of the assessment factors to be used for selecting five (5) feasible alternatives for further evaluation and hydrodynamic modeling analysis.

Alternatives Evaluated to Date

Chuck Anderson, Schaaf and Wheeler, briefly described the twenty (20) conceptual alternatives developed to date and introduced the Conceptual Alternatives Matrix.

The group noted that Alternative 3 may make sense to include in the final five (5) alternatives because it was the only alternative involving no action in Pond A4. Michael MacWilliams presented hydrodynamic considerations and identified the following two alternatives as "bookend" alternatives within the hydraulic modeling process:

- Minimum tidal connectivity (Alt 20) – includes tide gate to maintain Pond A4 as a managed pond where a tide gate replaces the siphon, but otherwise there are minimum Pond A4 actions (Slide 9);

- Maximum tidal connectivity (Alt 16) – involves a highly connected, tidally active Pond A4, with additional shoreline protection elements (Slide 10).

The group discussed features that would be included/excluded in multiple alternatives:

- Judy Nam noted that an ecotone would be important in every alternative that includes Pond A4 actions. Although sediment disposal in Pond A4 could represent a multi-benefit solution, Emily Zedler noted that there is a berm forming the end of the Cargill Channel that is currently used for waterfowl nesting, so that should be considered.
- Judy Nam noted that the Pond A4 breach into the Moffett Channel was not currently included in any alternative. She suggested that the team add it back to analyze the full range of hydrodynamic effects.
- VW would like to see alternatives with nature-based treatment of Reverse Osmosis (RO) concentrate/wastewater/stormwater, though not necessarily directly connected to the Pond A4 ecotone feature (this could be added to Alt 20 but not part of Alt 16). Although nature-based treatment does not influence hydrodynamics, it may be worthwhile to undertake tracer modeling at the toe of the ecotone to examine mixing effects into Guadalupe Slough or other locations. **See Group 1 discussion on this factor in Breakout Session #1 (below); this as an important modeling question (using a tracer) but would not include this as a distinguishing design feature.*
- The group discussed using the hydrodynamic model to examine Pond A4 and A8 Ponds independently. There is potential to select the best scenario for A4 and A8 independently and compile a full alternative later. Modeling would need to include all five (5) feasible alternatives in Phase 1 but this compilation could occur later in the process.

Assessment Methodology Approach and Proposed Factors

Scott Dusterhoff presented the Assessment Methodology Approach and Noah Hume reviewed Proposed Factors. Group discussion is summarized below:

a. Ecological and Water Quality Indicators – These are generally focused on habitat types by elevation range and tidal connectivity as well as factors to assess water quality and mercury mobilization.

b. Flood Protection and Sediment Management Indicators – These include tidal and fluvial flood protection needs, as well as the Cal-STA sediment management indicators.

   i. The group questioned whether backwater effects on flood risk could be determined prior to modeling.

      - Michael MacWilliams confirmed that a comparison of existing conditions to proposed conditions could be used to determine water surface elevation increase. Modeling will focus on 100-year event (FEMA) but will look at maximum water levels for all baseline periods that are simulated.

   ii. The group questioned the influence of non-high flow events on sediment dynamics in the creek with proposed re-alignments. It was suggested that this should be a modeling focus. Michael MacWilliams confirmed that simulation periods will include the range of high flow and low flow events. Previous modeling was only focused on tidal modeling and did not include sediment transport due to high flow events. This new round of modeling will be able to tag sediment separately (i.e., creek vs. bay transport).

c. Project Feasibility Constraints. Feasibility constraints were generally focused on overlaps of Project features with adjacent properties, easements, and trail routes. Constructability and construction costs were also discussed, but generally assumed this would be addressed during Phase 2 Feasibility Assessment.

Breakout Session 1: Assessment Factors
Scott Dusterhoff introduced Conceptual Alternative Assessment Factors and guidance for Breakout Room Session 1. Breakout groups were instructed to discuss preliminary factors adapted from 2021 Feasibility Study and other sources, and to identify any new factors to allow qualitative and semi quantitative assessment based on ecological and engineering principles. Factors unlikely to differentiate between alternatives may be omitted, while other factors requiring modeling and quantitative metrics may be deferred.

Breakout Session 1 Results: Participants were assigned to breakout rooms in MS Teams for 30 minutes, followed by group discussion.

- **Group 1** (Kelsey Bennett, Zooey Diggory, Hattie Greydanus, Michael MacWilliams, Judy Nam, Hilary Papendick, Maia Singer)
  - Most discussion on Ecological and Water Quality section. Group 1 was not able to discuss some elements of spreadsheet in allotted time.
  - Regarding tidally influenced habitat factor, Group 1 suggested that the Phase 1 analysis would be GIS-based (ponds only, cannot distinguish between open water or marsh edge), and Phase 2 analysis would add a factor for creek area, and allow for more exact approximation by extending up into the creeks based on modeling results.
  - Group 1 questioned if tidal elevations and coarse topography could be used to estimate tidal marsh area for Phase 1, and if marsh edge habitat would be a differentiator if there is not much available. Also questioned how to consider this metric over time.
  - Group 1 acknowledged that the area of the Pond A4 ecotone with nature-based treatment of RO/wastewater/stormwater would be in every alternative and is thus not a differentiator*.
- **Group 2** Reorganized into other groups to improve discussions
- **Group 3** (Chuck Anderson, Colby Boggs, Donna Ball, Colleen Kamoroff, Kyle Stark, Emily Zedler)
  - Group focused on Ecological and Water Quality section.
  - Suggested a division between factors with areas of subtidally influenced habitat and solely tidally influenced habitat, acknowledging that these areas are essential for fish habitat, although they would be hard to quantify without modeling.
- **Group 4** (Lisa Bankosh, Scott Dusterhoff, Noah Hume, Melissa Lane, Nick Mascarello, Kris May, Katie Riles, Frederico Scarelli)
  - Most of the discussion focused on Ecological and Water Quality section. The group did not propose any new factors, but suggested that Factor 8 (tidal mixing) be deferred to Phase 2.
  - Regarding Factor 3, upland habitat availability, Group 4 suggested focusing on in-pond berms and levee elevation differences and acknowledged that the Phase 1 analysis will require a DEM resolution that will show elevation difference.
  - Regarding Factor 7, scour induced mercury mobilization, Group 4 noted that this factor is linked to the number and dimensions of breaches.
  - Regarding Factor 9, Calabazas-STA flow conveyance, Group 4 suggested rewording this metric, since it is a condition of the project and not a distinguishing factor.

- Regarding Factor 10, Flood risk during Guadalupe River Events, Group 4 noted that this factor is about causing flooding upstream and therefore is in general, a fluvial flood risk factor.
- The group generally agreed with proposal to defer several model-based factors to Phase 2, including Factor 2, Tidal marsh habitat under projected sea level rise, Factor 4, Habitat diversity, Factor 5, Marsh edge habitat, Factor 6, Isolated Island habitat, and Factor 8, Tidal Mixing.
- Noah Hume suggested the following Feasibility Constraints factors should be deferred to Phase 2 once preliminary designs had been developed: Factor 12, Encroachment with adjacent property or access easements, Factor 13, Overlap or relocation of preferred trail route, and Factor 14, Constructability.
- The group noted the overlap or relocation of the preferred trail route should be integrated with stakeholders in Phase 2.

Discussion and Assessment Factor Selection – Group 1 proposed differentiation of Factor 1) *Area of tidally influenced habitat*, meant to include Open Water into a new Factor 15) *Area of managed ponds habitat*. Another Factor was introduced: 16) *Amount of active habitat management required* (e.g., O&M, pump/gate maintenance). It was agreed that area of ecotone with nature-based treatment will be assumed in every alternative with a Pond A4 ecotone, so the nature-based treatment is not a distinguishing factor. It was proposed to change language of Factor 12 from “Encroachment with adjacent property or access easements” to “Impact to adjacent property or access easements”.

Following a Lunch Break, nine of the original fourteen factors were deferred to the Phase 2 Feasibility analysis assessment in Fall 2023, and two new factors were introduced, for a total of seven factors to be ranked for use in the Phase 1 Conceptual Alternatives assessment.

1 Area of tidally influenced habitat
3 Upland habitat availability
7 Scour induced mercury mobilization
15 Area of managed pond habitat
10 Fluvial Flood risk (during Guadalupe River events)
11 Tidal flood protection needs
15 Area of managed pond habitat
16 Amount of active habitat management required (e.g., O&M, pump/gate maintenance)

Conceptual Alternative Assessment Factor Ranking

Scott Dusterhoff introduced the Conceptual Alternative Assessment Factor Ranking Approach followed by guidance from Noah Hume for Breakout Room Session 2. Breakout groups were instructed to review the preliminary Conceptual Alternative Assessment factor weighting based upon general support of four project objectives. Next participants were asked to individually rank factors in order of relative importance in meeting Project Objectives. Final factor weighting will be based upon compiled results (e.g., 1st, 2nd, 3rd place) using a ranked choice process.

Breakout Session 2 Results: Participants were assigned to breakout rooms in MS Teams for 30 minutes, followed by group discussion of their rankings.

- **Group 1** (Zooey Diggory, Lisa Bankosh, Michael MacWilliams, Kyle Stark, Maia Singer)
    - Noted the need to consider the time signatures for each of the indictors.
    - Identified the area of tidally influenced habitat as first rank because marsh habitat formation needs to be differentiator in Phase 1.
    - Ranked the fluvial and tidal flood risks next.
    - Noted that breaching the ponds dampens the tidal range for all alternatives but can increase fluvial flood risk.
    - Also noted that breaching Pond A4 necessitates the flood protection needs along the southern end of pond.
    - Other comments included that the area of managed pond habitat would focus on migratory bird/waterfowl habitat; there are tradeoffs between short-term mobilization and long-term habitat availability when considering mercury mobilization; and there likely will not be large differences in upland habitat increases across alternatives.
- **Group 2** (Jim Manitakos, Colby Boggs, Hilary Papendick, Noah Hume)
    - Jim Manitakos suggested that mercury be ranked #2 because very difficult to address mobilization retroactively so important to consider this risk up front. Other notes:
    - Regarding managed pond habitat, Group 2 questioned what metric would be used to measure this factor, potentially open water within a tidal range. Also questioned if this factor is good or bad (allows for optimization but is managed and thus not tidally influenced).
    - Noted that it is easier to build flood protection than habitat, as a general category acknowledgement when comparing ranks of ecological and water quality indicators vs. flood protection and sediment management.
    - Noted that the flood risk during Guadalupe River Events is a greater differentiator between alternatives than tidal flood risks.
- **Group 3** (Emily Zedler, Donna Ball, Kris May, Colleen Kamoroff)
    - Flood risk is one of Project Objectives so ranked this #1.

    - Habitat availability was ranked #2, also based on Project Objectives.
    - Noted that mercury mobilization is very important in Phase 2, but more of a guess in Phase 1 (because harder to gage. Group 3 acknowledges that mercury mobilization will be an issue, but not sure how it will be assessed in Phase 1.
    - Noted that the managed pond habitat will probably only remove one alternative, and the management factor is tied to the managed pond factor.
- **Group 4** (Nick Mascarello, Dave Halsing, Chuck Anderson, Frederico Scarelli, Melissa Lane)
    - Flood risk from fluvial events ranked #1 due to importance of protecting existing infrastructure. Mercury is important but because it may not be differentiator (mercury mobilization is a given), Group 4 ranked this factor as #7.
    - Noted that managed pond habitat was not stated as a Project Goal per se.
    - Tidal flood protection is a backend assessment, and Group 4 noted length, elevation, and cost as potential related metrics.
    - Noted that the management factor should be the degree of management (intensity) not the area of managed land.
- **Group 5** (Judy Nam, Scott Dusterhoff, Kelsey Bennett, Katie Riles, Hattie Greydanus)
    - Recommended that area of tidally influenced habitat is #1.
    - Would like to see the Guadalupe River Flooding Risk renamed as Fluvial Flooding Risk, to be more inclusive or general.
    - In general, Group 5 wants to see these metrics linked back to Project Objectives, understanding that there will be Phase 1 and Phase 2 gaps in the interim.

Next Steps

- Conceptual Alternatives Selection for modeling. Noah Hume provided an overview of the Conceptual Alternatives selection process for modeling:
    - Factor rankings will be tallied for all groups and final factor weights will be distributed to workshop participants.
    - Alternatives will be scored (0, 1, 2) based on changes and relative increase in metrics in comparison to existing (Baseline) conditions. Combined scores will be weighted by the workshop ranking process.
    - Depending upon whether bookend alternatives are included in the top ranked alternatives, substitution of two to as many as four out of the five

ranked alternatives may be considered to capture the full range of modeled conditions.
    - Alternatives selected for modeling will be presented to Resource Agencies during the 3rd week of January followed by a Public Meeting in April 2023.
- Modeling of Conceptual Alternatives. Michael MacWilliams discussed modeling process during 2023.
    - Metrics will be determined in late January/early February but at a minimum will include measures of:
        - Estimates of local tidal datums and changes of tidal inundation frequency.
        - Spatial variation in peak velocities.
        - Spatial variation in sediment deposition and scour (area, volume, rate).
        - Tracer simulation and spatial variation in water quality (salinity, age/residence time).
    - Noah Hume noted that depending upon the preliminary modeling results, there is a possibility to substitute two additional alternatives to model (late spring).

Scott Dusterhoff adjourned the meeting.

Agenda from Conceptual Alternatives Public Meeting, May 16, 2023

Public Meeting

Calabazas/San Tomas Aquino Creeks–Marsh Connection Project

May 16, 2023

Webinar information: https://kearnswest.zoom.us/j/82699428027

Location Information: Alviso Branch Library, 5050 N First St, San Jose, CA 95002

Objectives:

- Provide an overview of the Project goals and actions, and anticipated timeline.
- Present a range of restoration elements and Conceptual Alternatives developed to date.
- Gather community feedback and address questions.

Program:

Time	Topic	Speaker(s)
5:30 p.m.	**Welcome and Opening Remarks**	• Kelsey Rugani, Kearns & West, Facilitator • Richard Santos, Valley Water (VW) Board of Directors, District 3
5:40 p.m.	**Project Background and Overview** • Project Background and Objectives • Project Partners • Project Team	• John Bourgeois, Valley Water • Judy Nam, Valley Water • Dave Halsing, South Bay Salt Pond Restoration Project (SBSPRP) • Noah Hume, Stillwater Sciences
5:50 p.m.	**Conceptual Alternatives Presentation** • Key Project Issues • Restoration Elements • Conceptual Alternatives • Next Steps	• Scott Dusterhoff, San Francisco Estuary Institute (SFEI) • Kris May, Pathways Climate Institute • Chuck Anderson, Schaaf & Wheeler • Maia Singer, Stillwater Sciences
6:30 p.m.	**Questions and Answers**	• Kelsey Rugani, Facilitator
7:00 p.m.	**Adjourn**	• Kelsey Rugani, Facilitator

IN PARTNERSHIP WITH AND FUNDED BY:

Notes from Conceptual Alternatives Public Meeting, May 16, 2023

Calabazas/San Tomas Aquino Creek-Marsh Connection Project
Public Meeting
Draft Meeting Notes

DATE/TIME: Tuesday, May 16, 2023; 5:30 PM - 7:00 PM

MEETING LOCATION: Alviso Public Library and Community Center

MEETING NOTES:

Opening Remarks and Project Overview:

The first public meeting of the Calabazas/San Tomas Aquino Creek-Marsh Connection Project (Project) was opened by Mike Potter, Santa Clara Valley Water District (Valley Water), who acted as meeting emcee and introduced the public to the meeting. Mike shared that the purpose of the meeting was to provide a project overview, present the five Conceptual Alternatives and preliminary trail concepts, and collect community input and questions.

Richard Santos, Valley Water Board Director, District 3, shared opening remarks and welcomed the community and elected officials present at the meeting. Director Santos also thanked staff for their commitment to the project. Director Santos provided a brief history of Alviso and shared the importance of marshes in the region.

John Bourgeois, Valley Water, then provided background and some history on how the Project came to be. John shared how the Calabazas and San Tomas Aquino creeks were once drained and the impact that had on the salt ponds. John explained that reconnecting the creeks to the bay increases resilience to potential future sea level rise and will provide protection of the shoreline. John noted that the Project location at the southern end of San Francisco Bay and the northern shoreline of Santa Clara County and will generate benefits for the cities for Sunnyvale, Santa Clara, San Jose, and the community of Alviso. John thanked project partners and the community of Alviso for their coordination and input on this Project, including the U.S Fish & Wildlife Service, the owner of A8 Ponds, part of the Don Edwards Wildlife Refuge and South Bay Salt Pond Restoration Project led by California State Coastal Conservancy, Caltrans, owner of Harvey Marsh, cities of Sunnyvale and San Jose, and the County of Santa Clara. John also thanked the San Francisco Bay Restoration Agency, California Department of Fish &Wildlife, and the U.S. EPA for providing about $8 million in funding for the Project.

Dave Halsing, South Bay Salt Pond Restoration Project, presented on the project scope, impact, and collaboration with the South Bay Salt Pond Restoration. Dave provided additional history of the Project area and the connection with the South

Bay Salt Pond Restoration Project restoration efforts. Dave shared that the Project would include careful planning to improve flood management capacity, trails, public access, and other community benefits. Valley Water will, in partnership with these local projects, conduct full tidal marsh restoration while also connecting creeks at the southern end of the San Francisco Bay and the northern shoreline of Santa Clara County.

Project Objectives:

Noah Hume, Stillwater Sciences, presented an overview of the project objectives and Conceptual Alternatives. Noah explained that the technical team would present five Conceptual Alternatives for the realignment and reconnection of the downstream portions of Calabazas and San Tomas Aquino creeks to South SF Bay Salt Ponds (A8 Ponds, Pond A4).

Noah shared that the Conceptual Alternatives will satisfy the Project objectives:

- Objective 1: Habitat Restoration
- Objective 2: Resilient Flood Protection
- Objective 3: Reduced Maintenance Needs
- Objective 4: Enhance Public Access

Scott Dusterhoff, San Francisco Estuary Institute, presented on historical habitat loss and expanded on the restoration objectives in greater detail. Scott shared that the Bay has experienced widespread loss of tidal marshes since the Gold Rush due to diking and draining for agriculture, development, and salt production. Today, the Bay has been reduced to 50,000 acres down from 150,000 acres in 1850. The following three objectives would support tidal marsh restoration efforts.

Objective 1: Habitat Restoration
Scott shared that the loss of marsh has resulted in the loss of critical habitat for endangered species, loss of natural filtration of Bay water, and loss of shoreline protection during large storms. Because of this, there is a regional call to restore thousands of acres of tidal marsh around the Bay, however, restoring all the tidal marsh will require an increase of sediment (or mud) to raise the pond bottom elevation so that marsh conditions are established once more. Scott shared that the Project would result in the increase in the flow of sediment from Calabazas and San Tomas Aquino creeks directly into A8 Ponds, which will help with restoring over 1,800 acres of tidal marsh habitat.

Objective 2: Resilient Flood Protection and Sea Level Rise
Scott shared that sea level rise, including how much and how fast the Bay water levels will rise, is a significant challenge and uncertainty for every project along the shoreline. Scott explained that increasing sea levels results in tidal habitat that is too deep for marsh plants and increases the risk of flooding. The Project

will maintain existing flood protection levels and integrate with planned flood control projects, including the US Army Corps of Engineers (USACE) Shoreline Project's construction of levees to protect the areas around Alviso from future flooding and Valley Water's efforts to upgrade existing levees along Sunnyvale to maintain current flood protection levels. Lastly, Scott shared that the Project would coordinate on planning for future flood risk map levees along the shoreline in the Project area.

Objective 3: Sediment and Creek Maintenance
Scott shared that the third objective would address the increased flood risks from sediment buildup in creeks, reduce maintenance and removal costs, and increase the sediment supply for marsh restoration. Scott explained that the current sediment accumulation in local channels resulted in reduced flow capacity and increased maintenance needs. This has led Valley Water to spend roughly $1,000,000 annually on sediment removal from the Calabazas and San Tomas Aquino Creeks. Scott shared that the conceptual alternatives' realignment of the Calabazas and San Tomas Aquino Creeks would simultaneously reduce maintenance needs and provide a long-term sediment supply for tidal marsh restoration efforts.

Presentation of Five (5) Conceptual Alternatives:

Noah then presented the five Conceptual Alternatives that the Project team will be analyzing in the coming months.

Alternative 1: Minimal Tidal Connectivity
Alternative 1 connects the Calabazas and San Tomas Aquino creeks to the A8 Ponds with a tide gate connection of Pond A4 to Guadalupe Slough (GUSL). This alternative includes three restoration elements:

- Breaches in the berms of the A8 Ponds
- Construction of a tide gate structure in Pond A4
- Construction of a vegetated ecotone slope within Harvey Marsh

Noah explained that a vegetated ecotone slope provides broad bands of marsh habitat at intertidal elevations including areas that can migrate upslope through time and continue to provide habitat benefits as sea level rise advances. Noah shared a visual representing this alternative and an example of a vegetated ecotone slope.

Alternative 2: Intermediate tidal connectivity, Alviso Slough (ALSL) breaches
Alternative 2 provides the same creek connections, breaches, Pond A4 tide gate, and Harvey Marsh ecotone as Alternative 1. This alternative includes additional breaches along ALSL, as well as the re-alignment of the lower Calabazas and San Tomas Aquino creeks to test the effects of increased connectivity upon tidal range and flow conveyance. This alternative also includes nesting habitat islands

with different elevations to promote habitat complexity. Noah explained that nesting habitats would be constructed using excess excavated materials from the Project area. These nesting habitats will include areas with intertidal wetlands, as well as upland habitats above high tide to provide suitable bird nesting habitat away from predators. Noah shared a visual representing this alternative and an example of nesting habitat islands.

Alternative 3: Intermediate tidal connect, Pond A4 breaches
Alternative 3 provides the same creek connections and ALSL breaches as Alternative 2 but introduces full tidal connectivity to Pond A4. Specifically, the Pond A4 breaches connect to GUSL and the Sunnyvale East channel. This alternative isolates GUSL from the Harvey Marsh using channel fill, or ditch blocks, to route all the Calabazas and San Tomas Aquino creek flows into A8 Ponds. Noah shared a visual representing this alternative.

Alternative 4: Max sediment transport, GUSL Breaches
Alternative 4 provides similar creek connections from the Harvey Marsh and Pond A4 connections as Alternative 3 but shifts the A8 Ponds breaches from ALSL to GUSL. Like Alternative 3, this alternative uses ditch blocks to isolate the former Calabazas and San Tomas Aquino creek channels from Harvey Marsh to maximize sediment transport into Pond A8S. In this alternative, Pond A4 does not connect to the Sunnyvale East channel. Noah shared a visual representing this alternative.

Alternative 5: Maximum Tidal Connectivity
Alternative 5 examines maximum tidal connectivity by combining the Calabazas and San Tomas Aquino creek channel realignments with all potential breach locations to ALSL and GUSL. This alternative also includes a Wetland Bench as an additional restoration element. Noah explained that a wetland bench is constructed using excess excavated materials from the Project area. This element is similar in function to the ecotone slope and provides intertidal marsh habitat adjacent to Pond berms. Noah shared a visual representing this alternative and an example of a wetland bench.

Enhancing Public Access

Kelsey Rugani, Kearns & West, presented on the fourth Project objective on enhancing public access. Kelsey shared that the Project Team, in collaboration with the local cities, Santa Clara County and stakeholder agencies, is developing preliminary trail concepts, with the goal of enhancing public access within the project area. The team is currently in the conceptual phase and is using the following considerations to inform the development:

- Improve public access/gaps in the Bay Trail shoreline access
- Protection of sensitive habitats
- Construction and maintenance costs

Kelsey shared that none of the conceptual alternatives presented in the meeting impact existing trail plans and that there will be more information shared on the trail concepts and recreational uses in the coming months.

Next Steps:

Kelsey Rugani explained that the next steps included summarizing public feedback, including any refinements in conceptual alternatives developed to date. Further, the Project Team will be conducting modeling and conducting feasibility analyses over the next six months before selecting an alternative to advance to permitting and design in the coming years. Kelsey shared that the Project Team plans to convene a public meeting on the feasible alternatives in Winter 2024.

Questions and Answers:

The following summarizes the questions asked from attendees both in the meeting room and in the virtual Zoom audience.

When Valley Water conducted the initial study, did they look at ponds A22, A23, and A19?
Valley Water shared that they did not review these ponds as part of this project's visioning. The three ponds are tidal marsh now and are doing very well, and the A22 and A23 ponds are part of a different project's visioning phase.

Is there trail access during construction or some alternative route available especially as the Bay Trail is also used for commuting?
Valley Water shared the uncertainty in predicting the impact to trails but ensured that due effort will be made to minimize the impact to current access, during construction and otherwise. When trying to accomplish large scale projects, Valley Water is careful to consider public access, sensitive species, and many other important factors.

A member of the public made a comment on the importance of wildlife refuges. There are several conservation groups that are sensitive about what happens at the refuge, especially with commuters and others that access the trails.
Valley Water was thankful for this thoughtful comment and will be mindful of this moving forward.

Is there a possibility that the east channel which takes a hard 90 degree turn will be reviewed for flood control purposes? Is that something that's put into the thinking on these projects?
Valley Water shared that this is considered and expressed in Alternatives 3 and 5 and will be analyzed further.

Which alternative will complement the Alviso saltwater slough scouring?

Maia Singer, Stillwater Sciences, shared that a lot of studies were conducted looking at scouring, water quality and mercury levels. The studies showed a short-term effect of mercury moving around and that it is possible a similar effect could occur through this Project. Mercury comes from historical sediment and will return to normal levels in a series of months. Maia shared that monitoring is built into the project to monitor effects during and after the Project to understand short-term impacts.

Where can we get a copy of the slideshow? When will the recording be available?
Valley Water shared that the presentation slides are available at Valleywater.org by searching Calabazas San Tomas Aquino creek project.

When will we know and how notified of alternatives chosen?
Valley Water shared that the conceptual alternatives will go through further analysis, including modeling, that could take several months to complete. The Valley Water team anticipates sharing the suite of feasible alternatives with the public in early 2024.

A member of the public shared that it is their understanding that the Project is grant-funded and that the project does not use tax money or capital improvement funds. The participant shared that they are grateful to Valley Water because it is something new and is not like anything done by Valley Water before, and that it is an important and necessary Project.
Valley Water shared that more than 80% of the funding comes from grants and Valley Water contributes a small portion as well.

Can anything be done about the graffiti on the concrete levees?
Valley Water makes due effort to deploy folks as quickly as possible to reduce graffiti and tagging, as well as other adverse effects to the community.

Is there financial analysis being done as part of alternative analysis?
Valley Water shared that a construction cost analysis will be part of the feasibility analysis. The analysis will also consider other factors such as ecological benefits and environmental risks.

Conclusion & Closing Remarks:

Kelsey Rugani thanked the presenters for their work this evening and to all the community members and stakeholders who have participated. Kelsey shared that a meeting summary will be available on the project website in the coming weeks and that the Project Team will continue to provide updates for other meetings and outreach activities. Kelsey introduced Director Santos for closing remarks.

Director Santos thanked the audience for being a part of the meeting. Director Santos shared that the Project Team will continue to keep the public informed with regular updates to the project web page at valleywater.org, including postings to Next-door and mailings. The meeting ended with a final recognition by Director Santos of the rich history, land, and amenities available in Alviso.