Upland Soil for Marsh Restoration in the Don Edwards National Wildlife Refuge

South Bay Salt Pond Science
Brown Bag Lunch Series
October 8, 2024

Gavin Archbald, M.S.
Associate
Senior Restoration Ecologist
H. T. Harvey & Associates
Ecological Consultants

Outline

Why upland soil is needed

Ways to get it

Quality Assurance Project Plan (QAPP)

Ways QAPP is being modified

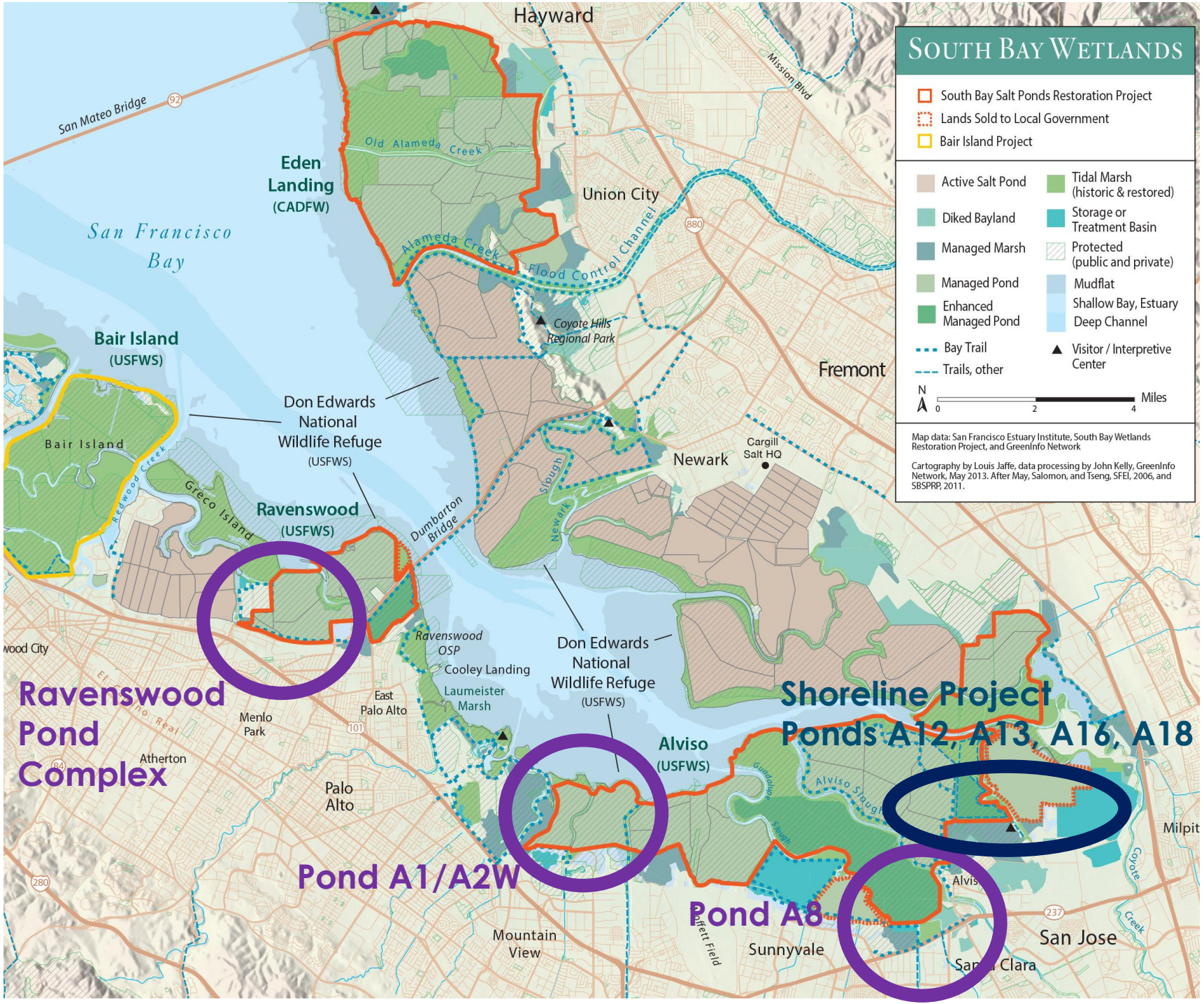
Examples

Upland soil is needed:

- South Bay Salt Pond Restoration Project
- Shoreline Project

Fill for tidal marsh-terrestrial zones (t-zones)

Coastal flood protection

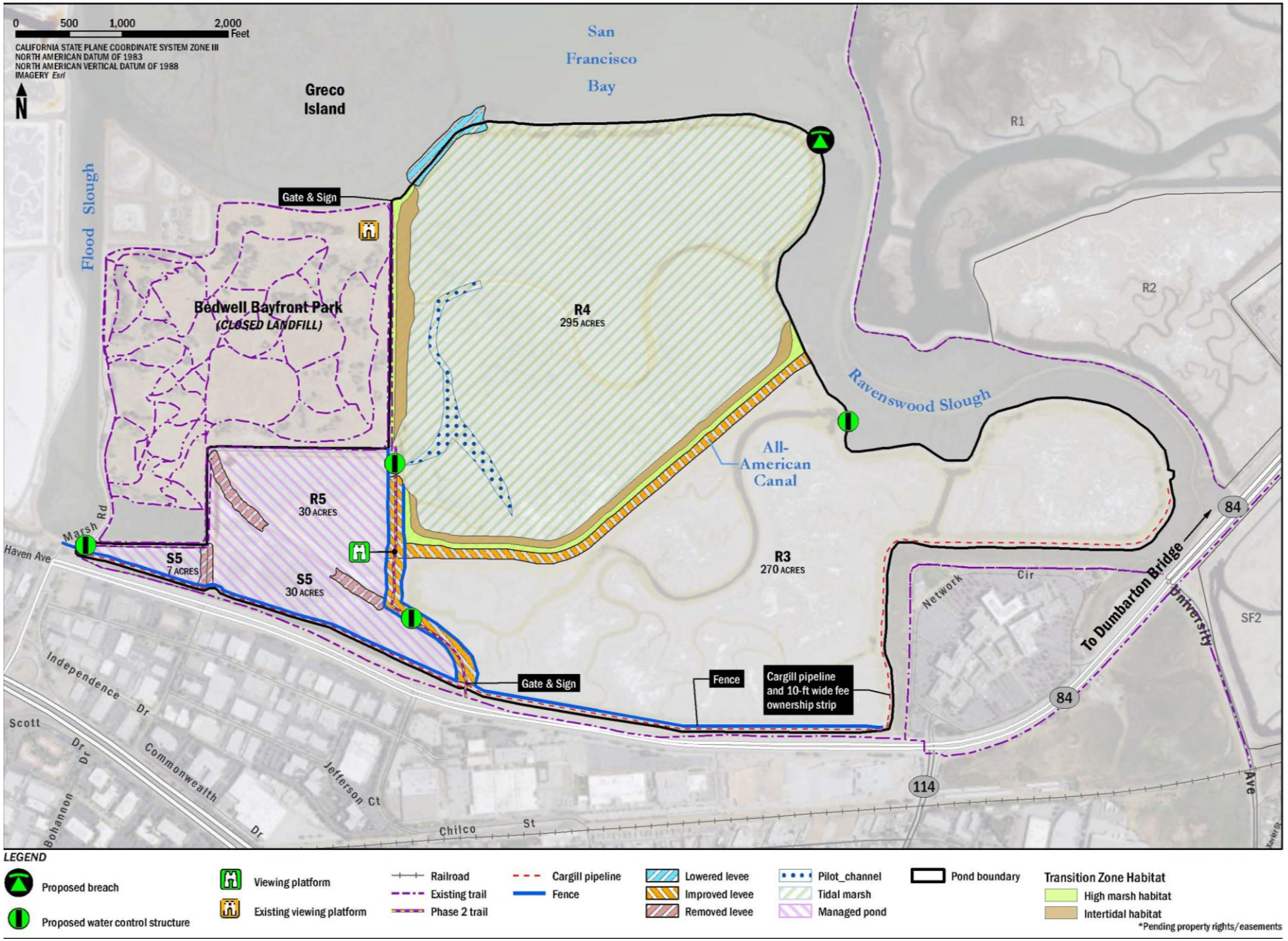


At Ravenswood fill was needed to:

Create t-zones

Improve internal berms

R4 breached Dec 2023



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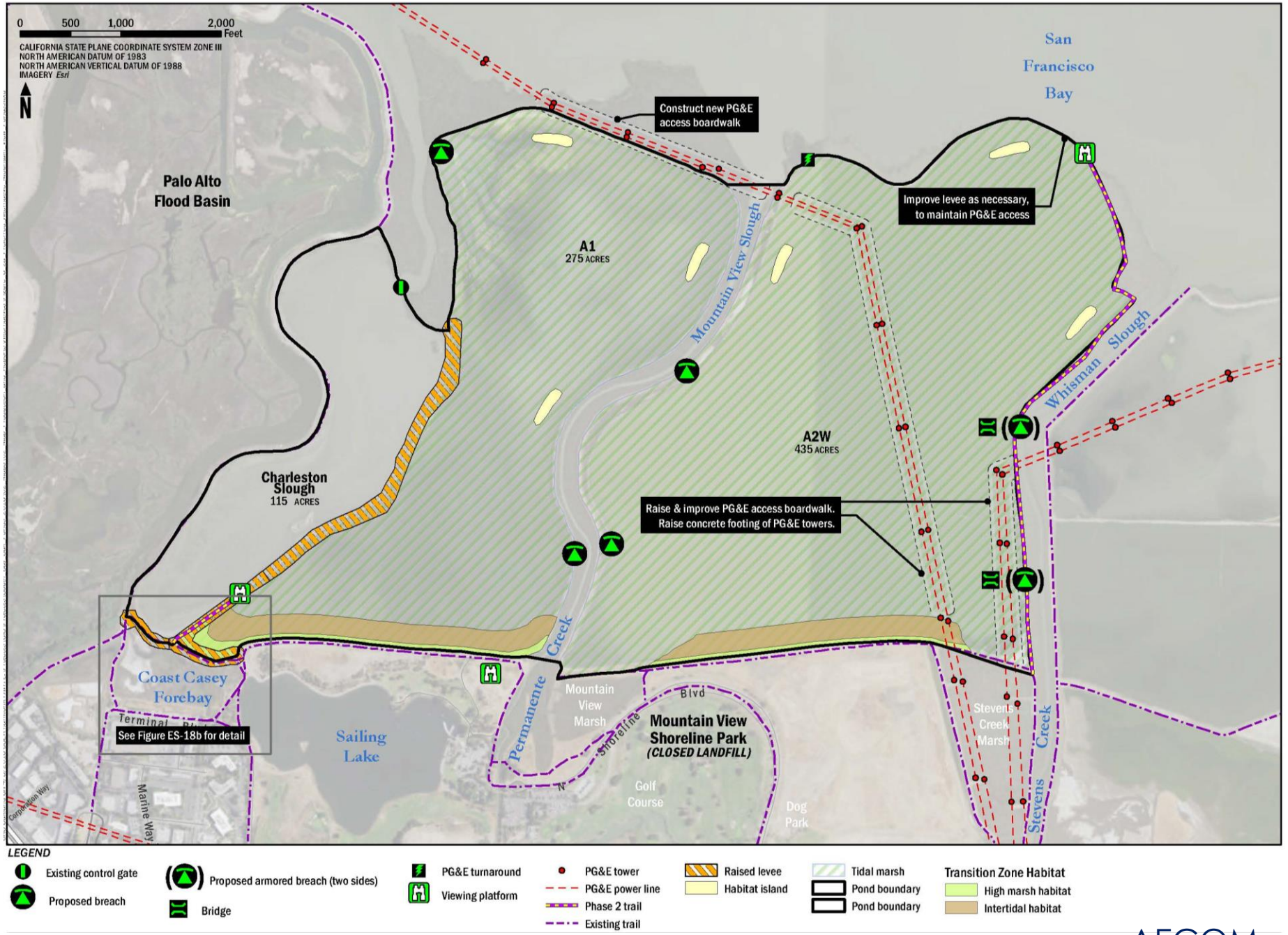
AECOM

At Ponds A1/A2W fill is needed to:

- Create t-zones
- Raise levee between A1 and Charleston Slough
- A2W import completed in Sept 2024



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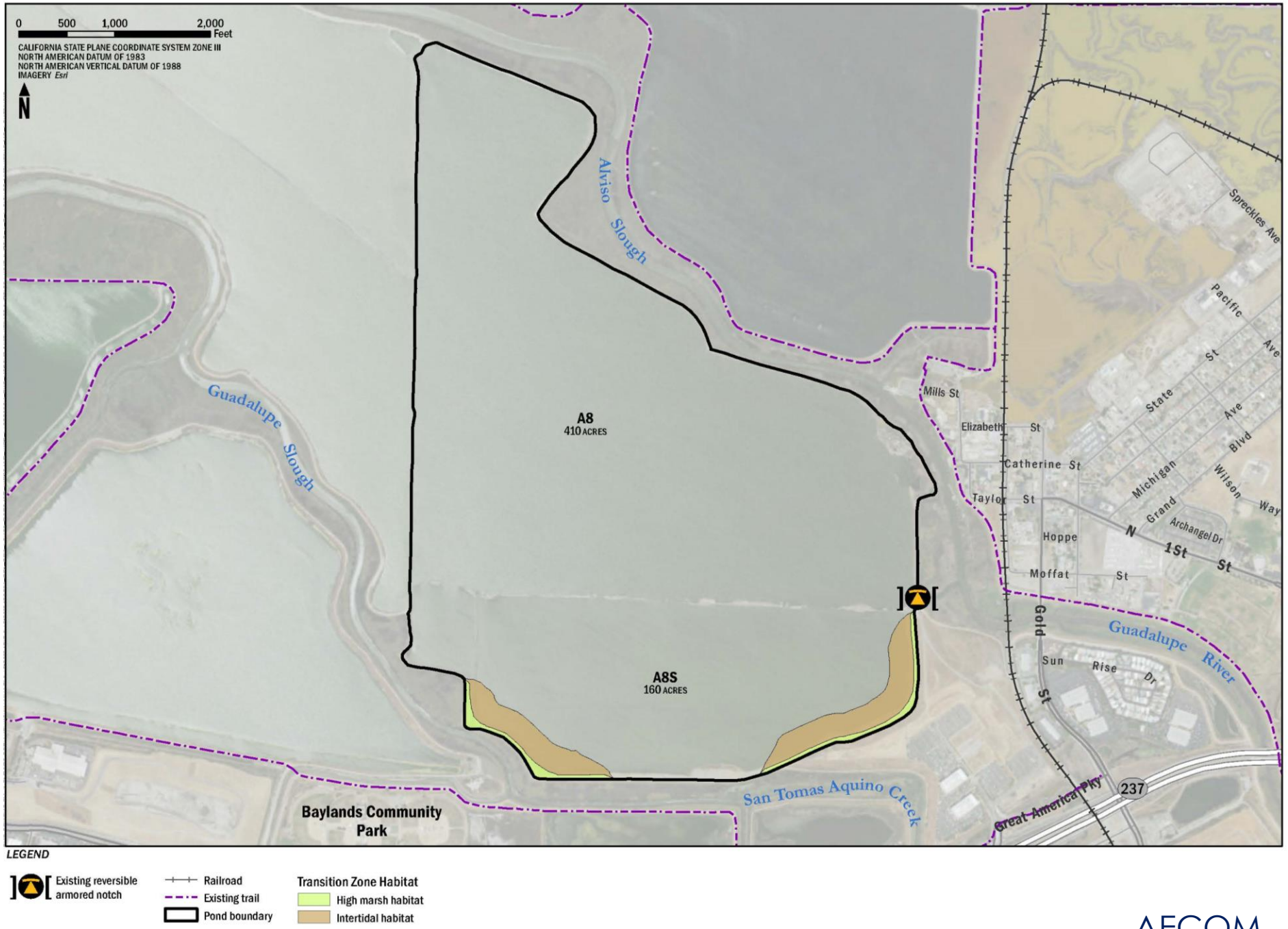
At Pond A8 fill was needed to:

Create transition zones

Import complete in 2022



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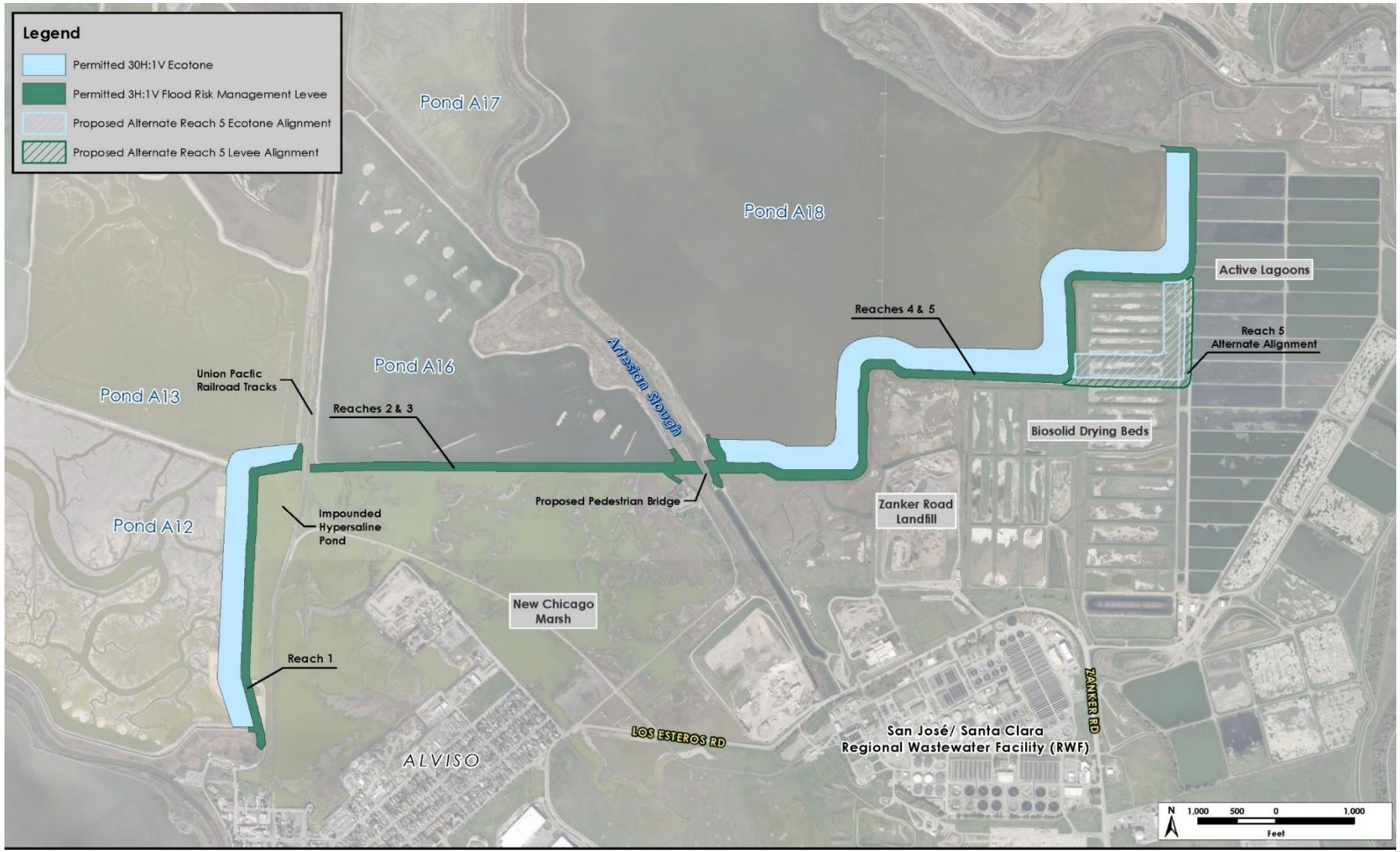
At Pond A12, A13, A16, A18 Shoreline Project

Build 5 miles of flood risk management levee

Create ~90 acres of transition zones



T-zone provides:

Habitat diversity

Buffer from uplands

High-tide refuge

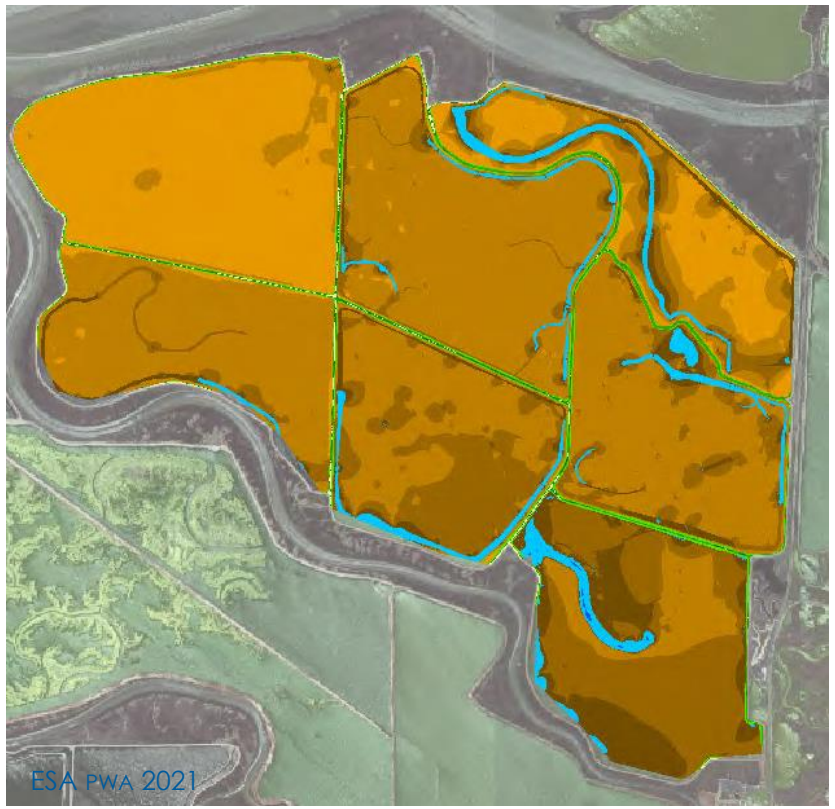
Sea level rise(SLR) accommodation

Fill needed before outboard pond breaching occurs

- Breach timing, sediment supply and SLR affects outcome

Availability of fill affects mash restoration trajectory

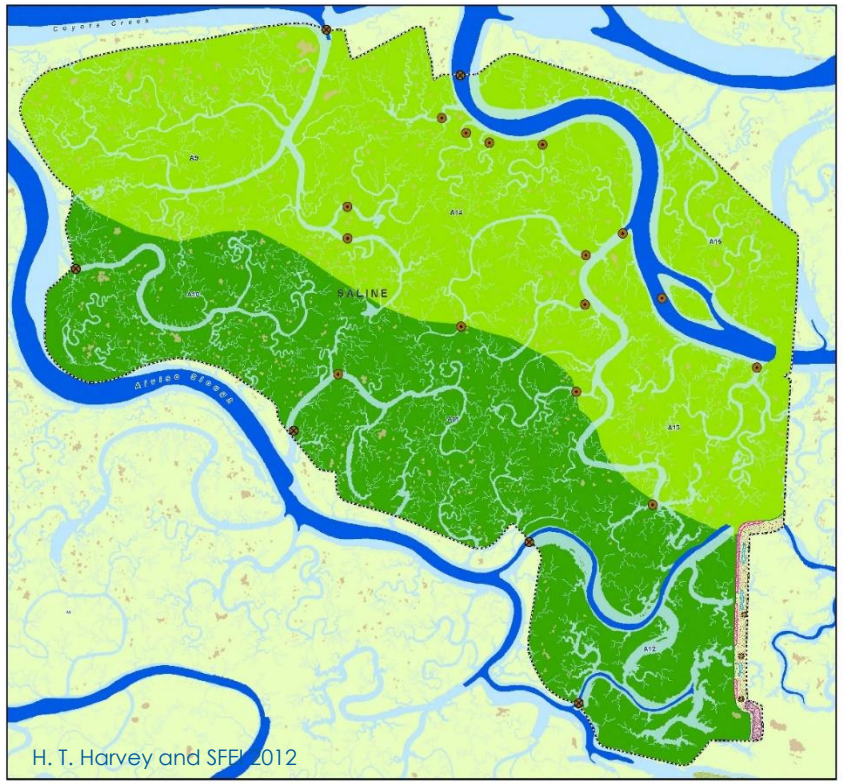
Mudflat



Ponds A9-A15: possible outcome

Shoreline study alternatives
2067 Marsh elevations with
C0=100mg/L and 2017 start

Marsh



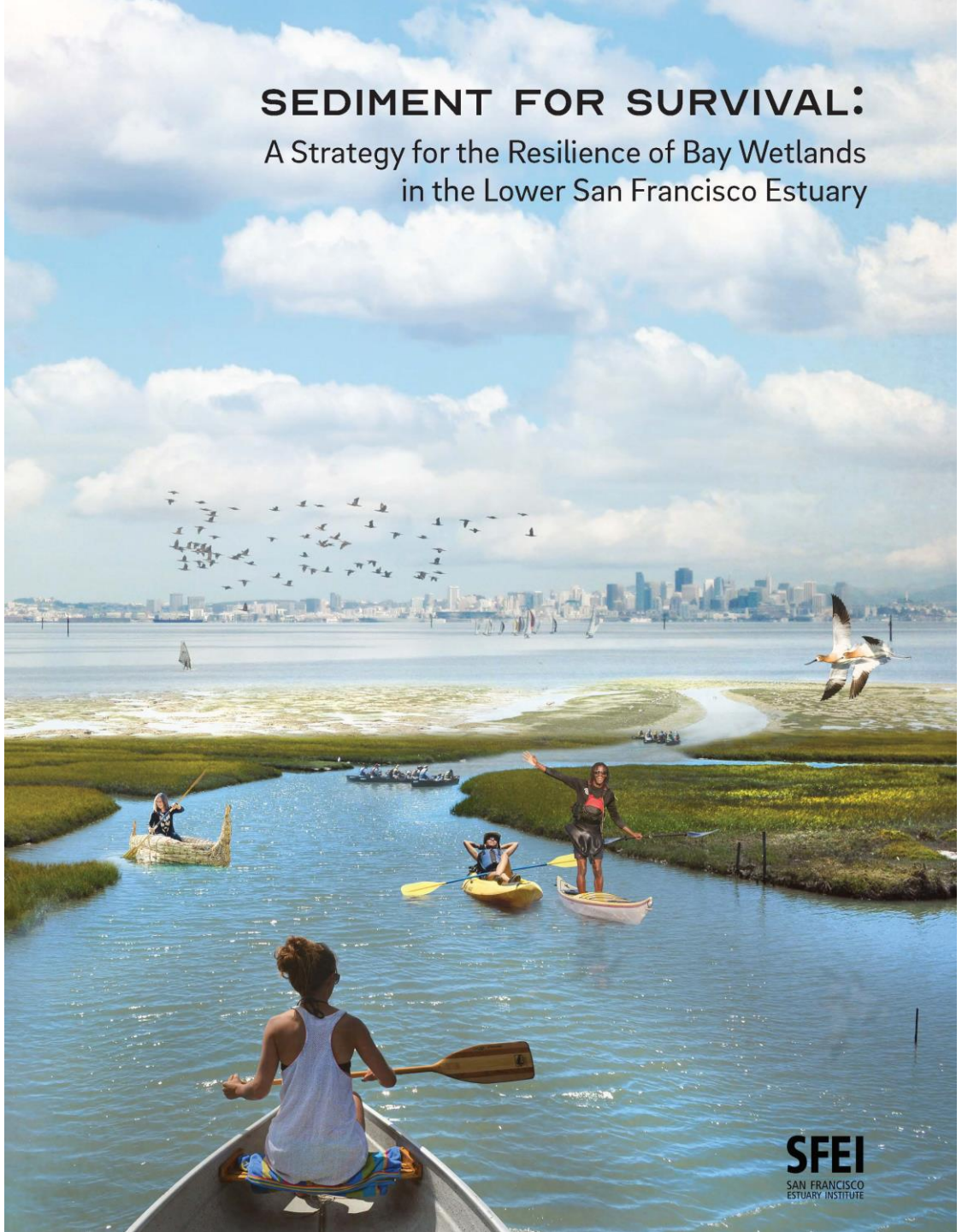
Ponds A9-A15 target habitat

Fill also needed to maintain 70 miles of berms in the Refuge, e.g., around Pond R1

Sediment needed to help restore and sustain marshes with SLR:

53 million CY needed (2010–2050) to restore subsided ponds and for marshes to keep up with SLR

Only 4.9–6.5 million CY of sediment expected from natural processes



Where does the upland fill come from?

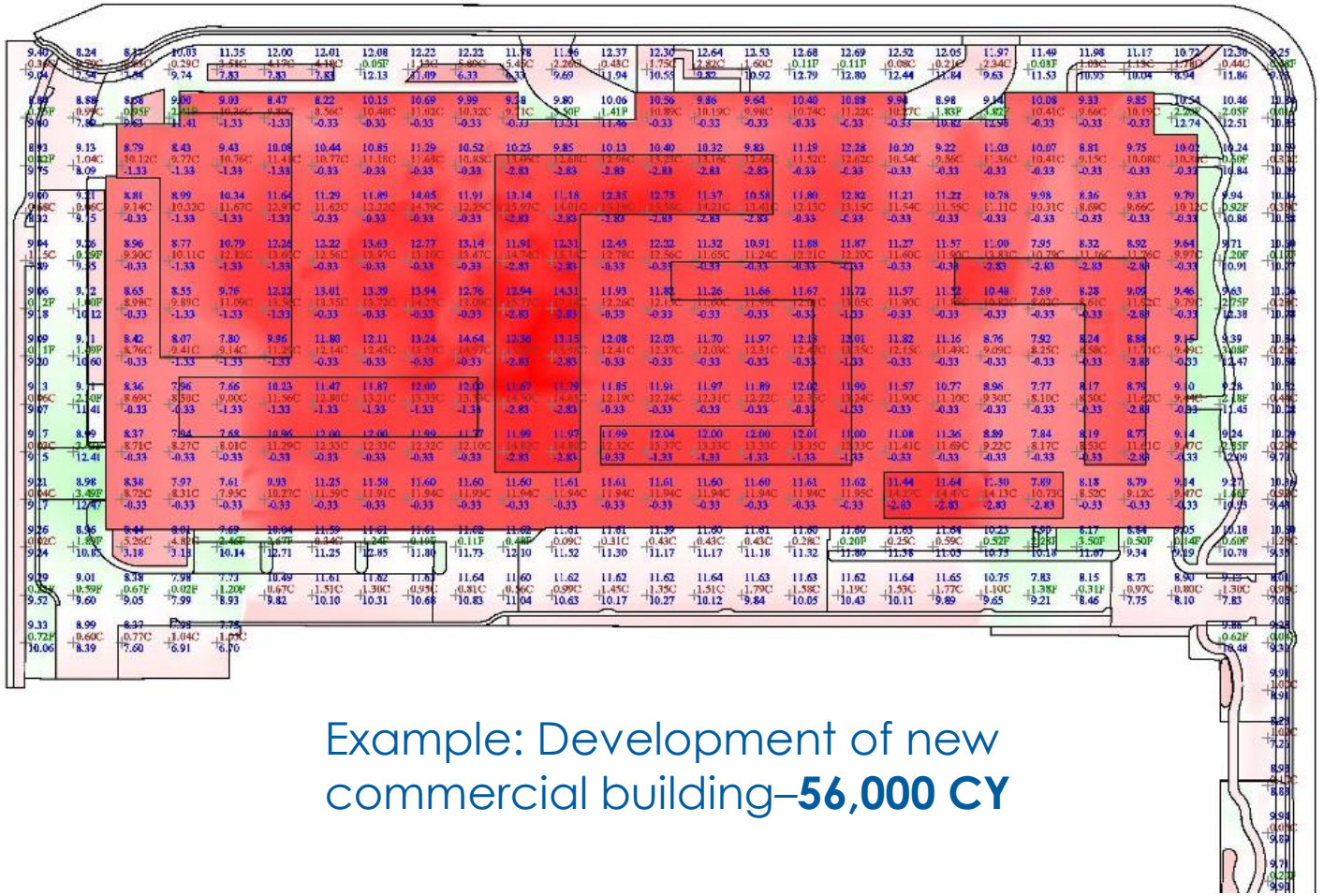
Private construction projects

Public projects

Quarries

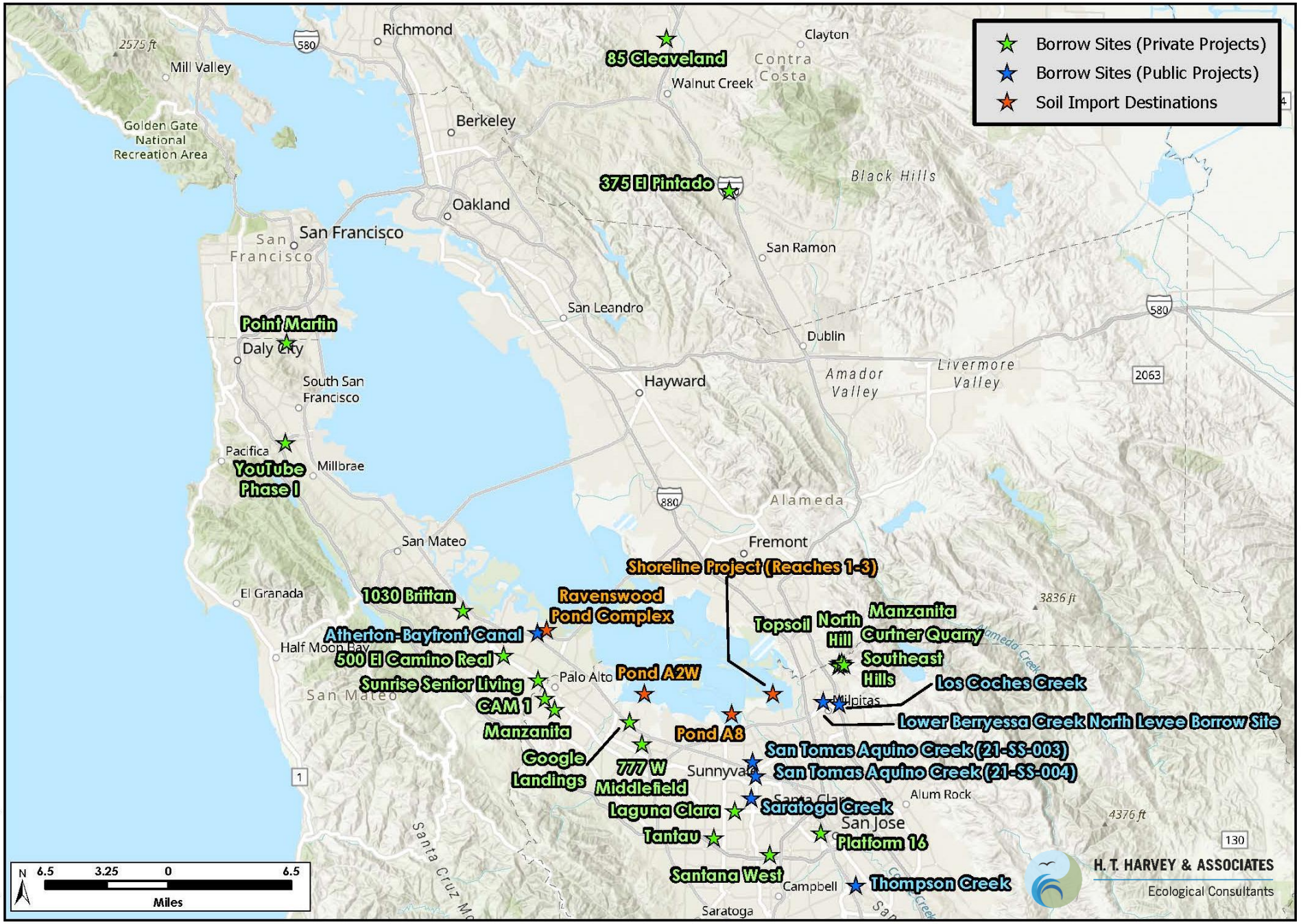
Brought in using

- "Free dirt market"
- Pay for import



Example: Development of new commercial building–**56,000 CY**

Upland Soil Sources and Destinations



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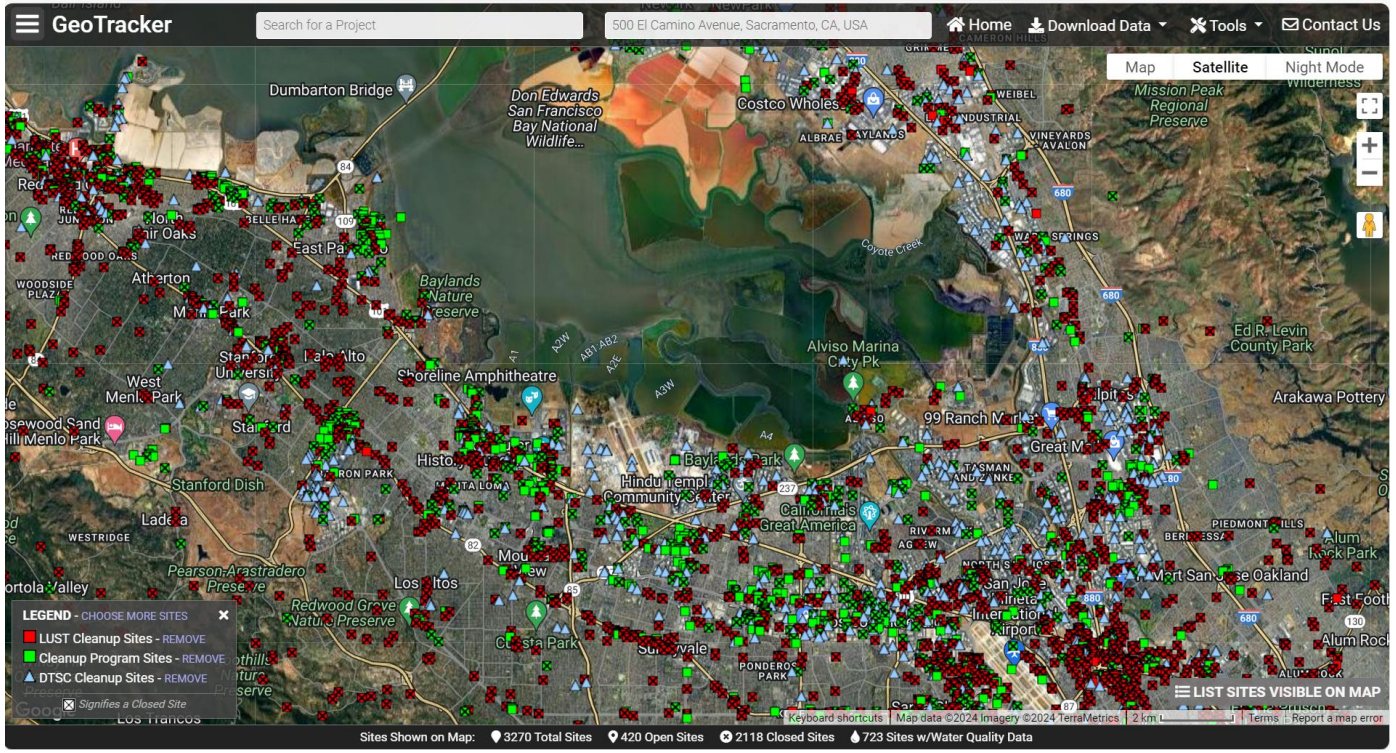
Good upland soil is hard to find

Dirt brokers review and reject most potential borrow sites

- Legacy contamination
- Local geology (Cadmium, Selenium, Nickel)
- Transport/scale not cost effective

Most promising sites sent to project to verify suitability for beneficial reuse



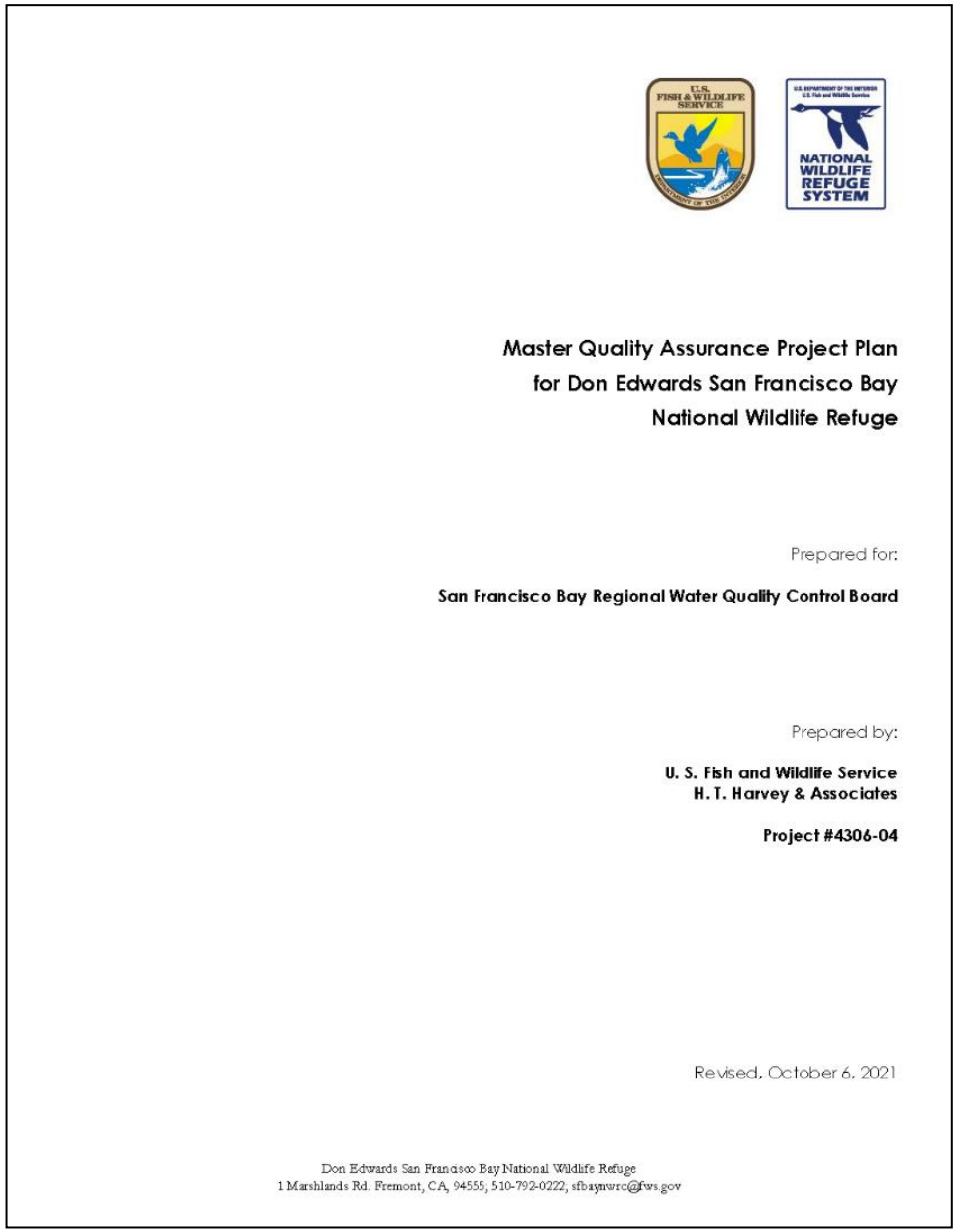
RWQCB's GeoTracker Website

Quality Assurance Project Plan—Purpose

Process to evaluate, approve and oversee import of fill

Ensure fill is protective of aquatic life

Required by RWQCB and BCDC



Master Quality Assurance Project Plan
for Don Edwards San Francisco Bay
National Wildlife Refuge

Prepared for:

San Francisco Bay Regional Water Quality Control Board

Prepared by:

U. S. Fish and Wildlife Service
H. T. Harvey & Associates

Project #4306-04

Revised, October 6, 2021

Don Edwards San Francisco Bay National Wildlife Refuge
1 Marshlands Rd. Fremont, CA, 94555, 510-792-0222, sfbaynwrc@fws.gov

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QAPP—Origins

Inner Bair Island Restoration Project QAPP: 1,000,000 CY[1]

Master QAPP: Versions in 2017, 2018, 2021 (2024 forthcoming)

- H. T. Harvey & Associates
- TRC Solutions
- The Refuge
- SBSPRP/Coastal Conservancy
- Pacific States Environmental
- RWQCB and BCDC
- USACE, Valley Water

[1] *U. S. Fish & Wildlife Service. 2008. Quality Assurance Project Plan for Inner Bair Island Fill and Placement.*

QAPP—How It Works

Contaminant screening criteria [1]

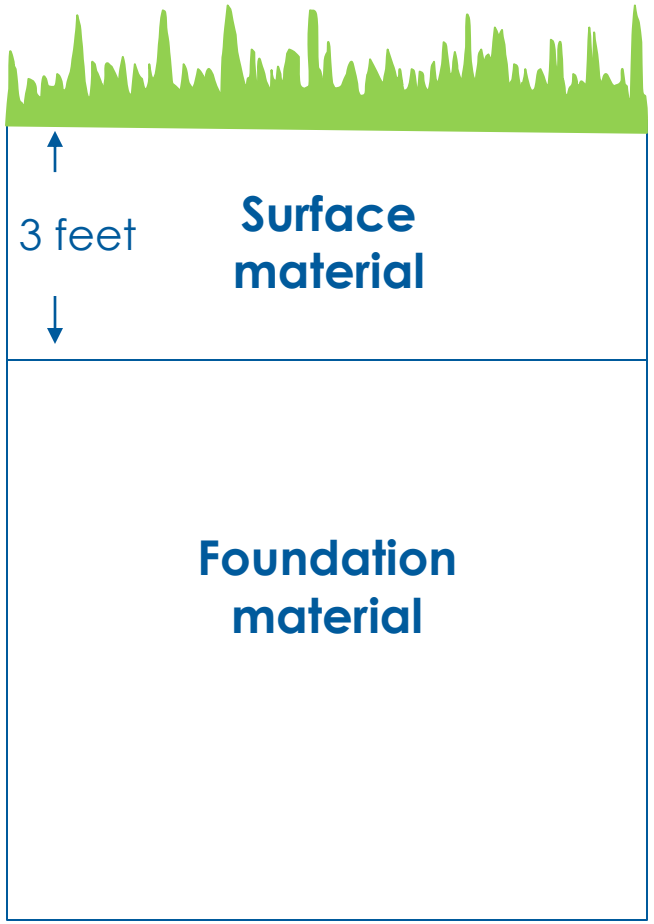
Metals, pesticides, PCBs, TPHs, PAHs, and VOCs

Wetland surface – upper 3 feet

Wetland foundation – easier to find

Largely based on RWQCB 2000

- Biotic effects studies



[1] San Francisco Bay Regional Water Quality Control Board Draft staff report. 2000, Beneficial Reuse of Dredged Material: Sediment Screening and Testing Guidelines

QAPP—How It Works

Roles:

- Contractor
- Quality Assurance Officer (QAO)
- Peer reviewer

QAPP—Quality Assurance Role

Borrow site history

Sample plan

Analytic testing

Data review

Approval

- Peer Review
- RWQCB + BCDC

Import Oversight

Reporting

Import Oversight

Borrow site
Truck manifests
Site visits

Stockpile location
Collect manifests
Gatekeeper log
Truck manifests
Site visits and photos

Project site
Collect manifests
Gatekeeper log
Site visits


Truck manifest


Gatekeeper log

Ravenswood

Foundation into All American Canal

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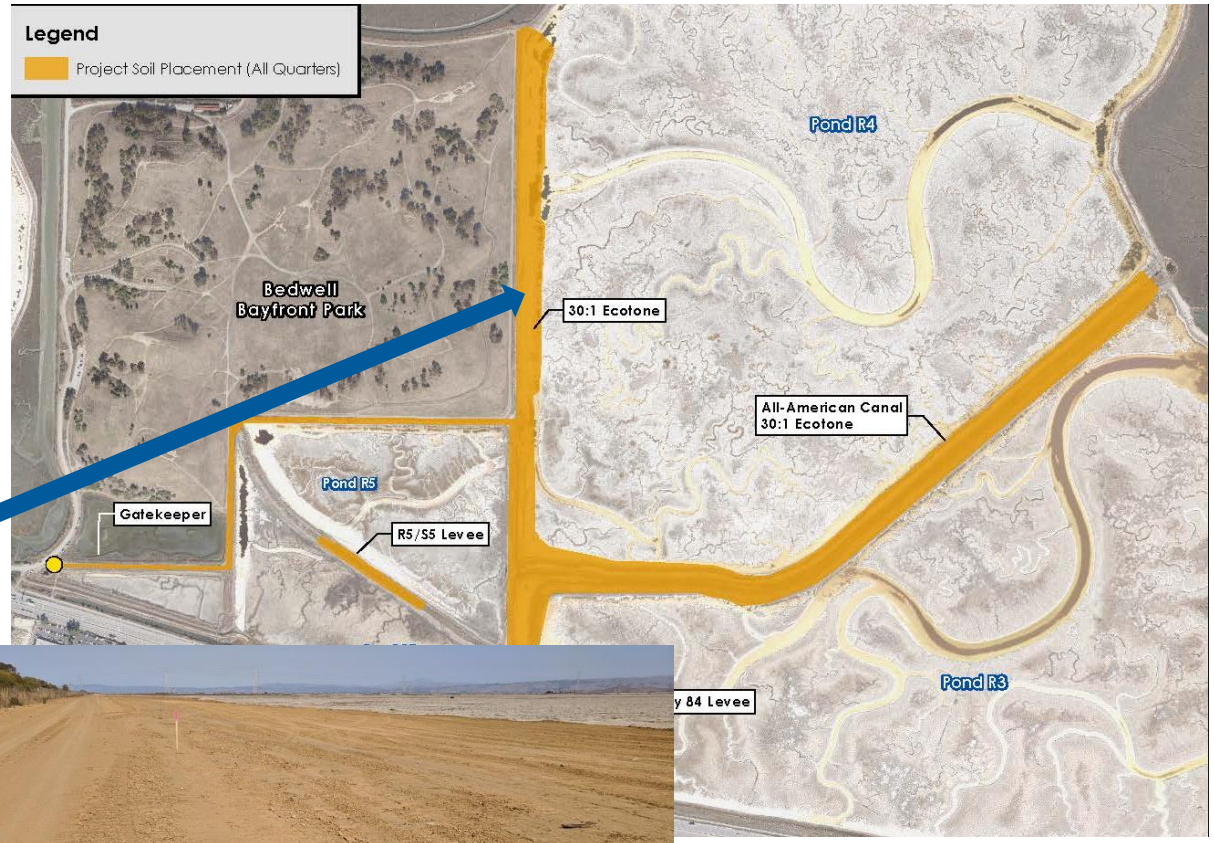
Ravenswood

Wetland surface for t-zone



Ecotone construction completed, R4 breached Dec 2023!

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Ravenswood

Soil from 19 private construction projects

Over 1.6 million cubic yards approved

318,000 cubic yards imported over 3-4 years

“Free dirt market”

Shoreline Project

100,000 cubic yards imported and stockpiled in 2019

6 sites, 1 quarry

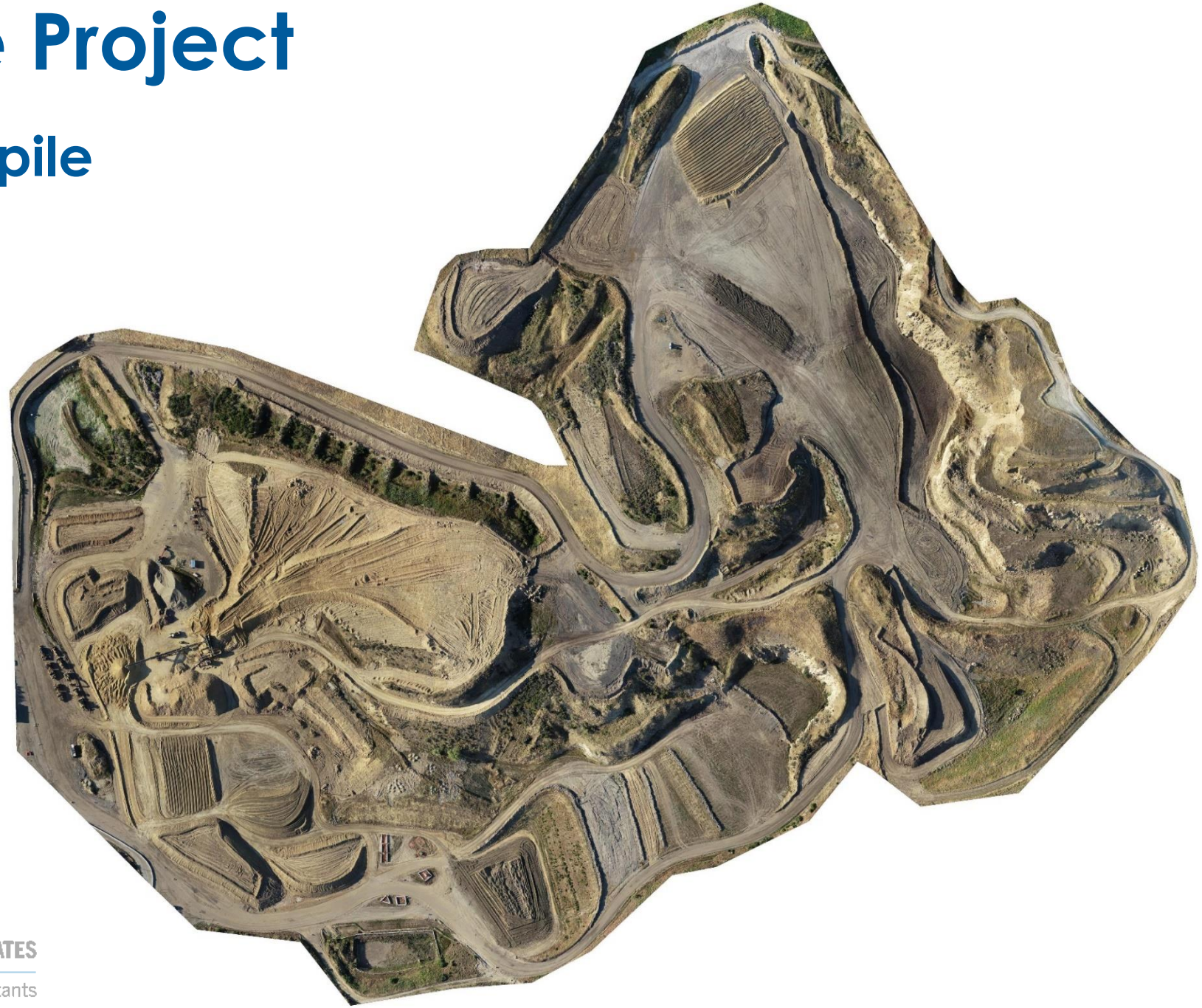
Pond A12 – April 2019

Shoreline Project

Soil mixing needed to meet levee geotechnical specifications

Shoreline Project

Offsite stockpile monitoring



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Shoreline Project

Reach 1-3 levee core constructed

~500,000 cubic yards imported over 2 years

22 burrow sites and 12 unique soil mixes

Pay for dirt market

Quarry

Shoreline Project—Reach 2/3

Ways QAPP is being modified

QAPP is a living document

RWQCB/BCDC supportive of improvements

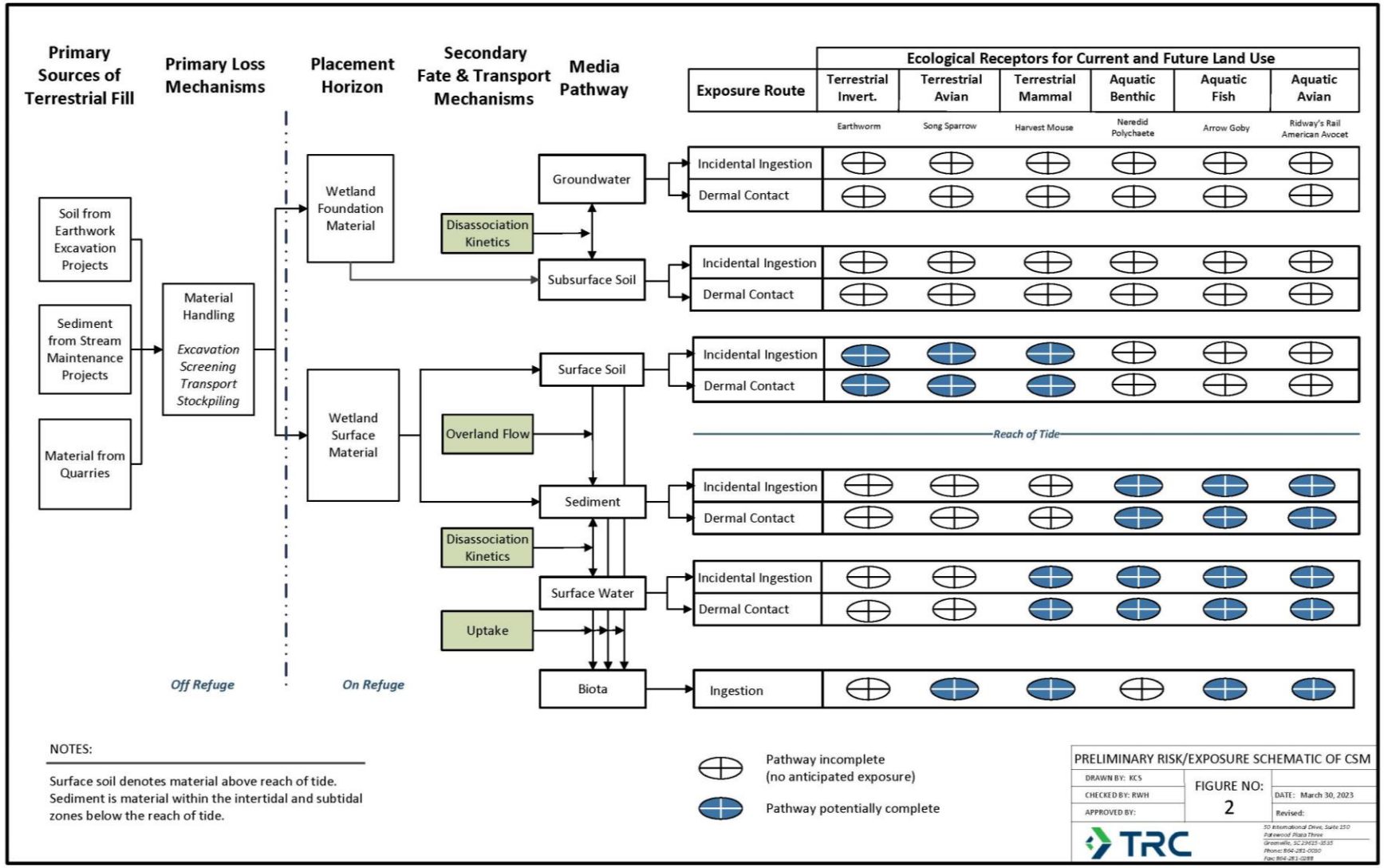
Continuous collaboration over past 7 years

- 2018: added Foundation material
- 2021: added 95%UCL, Mean Hazard Quotient
- 2022-24: More modifications

Conceptual Site Model

Framework for modifications to QAPP

Evaluates exposure pathways



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Proposed Modifications to 2024 QAPP

VOCs

- VOC volatilization sample plan
- Revised screening limits for 25 VOCs: based on marine receptors

Soil mixing to achieve surface criteria

Formalizes chain-of-custody during soil stockpiling and mixing

Takeaways on Upland Soil Quality Assurance

- Upland soil needed to build transition zones and levees
- Many potential borrow sites not chemically or economically suitable
- Basement digs, quarries, stream sediment near project good sources
- Collaboration with RWQCB/BCDC, funding by Coastal Conservancy, Valley Water and other has led to improved QAPP

Questions and Discussion

Gavin Archbald
Associate
Senior restoration ecologist
garchbald@harveyecology.com

H. T. HARVEY & ASSOCIATES
Ecological Consultants

50 years of field notes,
exploration, and excellence

www.harveyecology.com