Flood Protection Provided by the Salt Ponds and Slough Geometry Response to the Pond A8 Notch

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Flood Protection Benefits

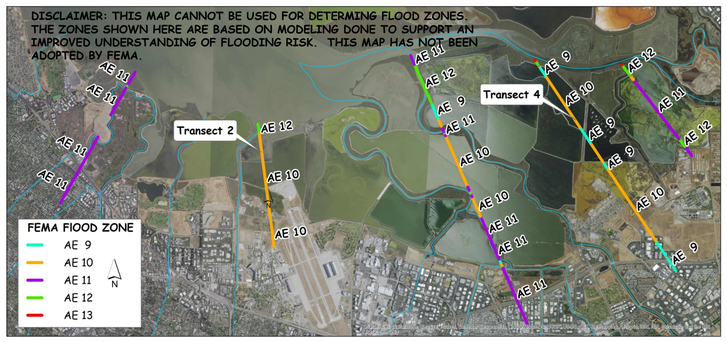
INTRODUCTION

The existing salt ponds provide flood protection during large storm events in two ways: 1. they break waves offshore, sometimes multiple times, which limits the wind fetch and wave size, and, 2. they restrict the flow of water into the ponds, reducing the pond surface elevation relative to that in the bay. The Santa Clara Valley Water District has directed DHI Water & Environment to conduct hydrodynamic modeling of the South Bay to investigate these effects. The two-dimensional Mike 21 FM model was used for determination of the 1% still water level. Wave propagation was computed with the 1D WHAFIS model along transects, given still water elevations from the 2D model. The modeling scenario was for a 1% storm tide and 5 year flow hydrographs on every creek entering the bay. This scenario was applied to two different south bay geometry conditions to estimate the protection afforded by the ponds: 1. The no-levees case (where only the levee lining the shoreline was included), and 2. The Breached case, in which each edge of every salt pond was breached with a fixed 100 ft breach to provide a restricted flow path into the ponds. In addition, simulations of sea level rise were conducted to show how the flood protection benefits change as sea level rise occurs. The benefits are significantly diminished with 3 feet of sea level rise.

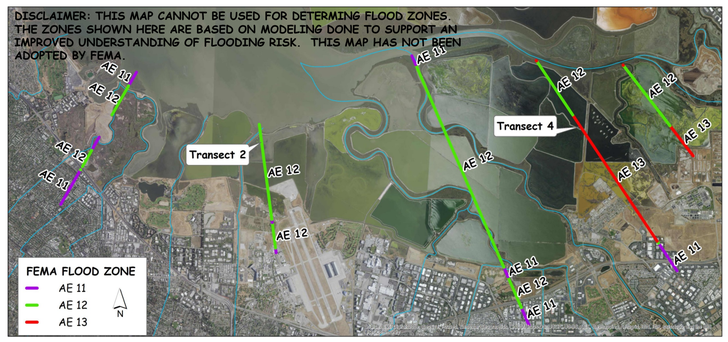
1. SPATIALLY-VARIABLE STILL WATER LEVEL + WAVE BREAKING EFFECTS

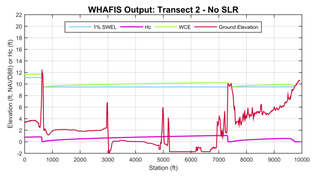
= LOWER BASE FLOOD ELEVATIONS & SMALLER FLOODPLAIN

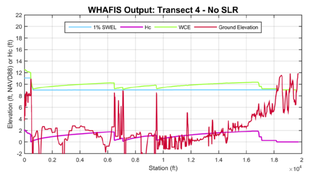
Case 1: SALT POND LEVEES INTACT (with breaches)

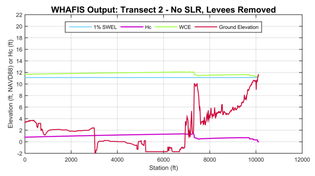


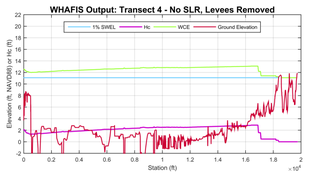
Case 2: ONLY SHORELINE LEVEES INTACT ("No" Levees Case)











2. FLOOD PROTECTION PROVIDED BY SALT PONDS DIMINISHES AS SEA LEVEL RISE OCCURS:

WHY?

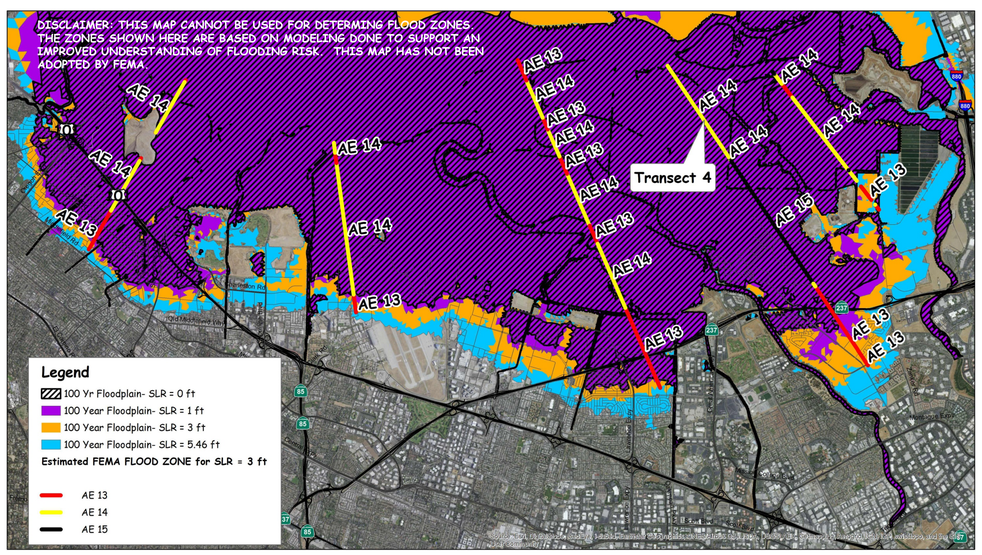
- -Pond levees can overtop allowing ponds to fill more quickly
- -Water inundates many of the levees, reducing or eliminating wave breaking effects

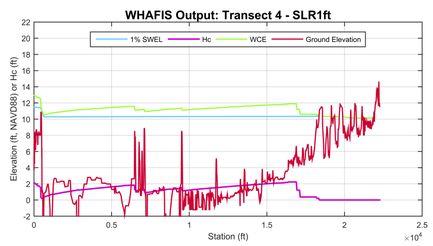
CONCLUSIONS

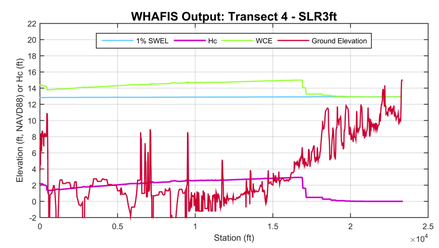
- -At SLR = 1 ft (King Tide or NRC year 2050 Intermediate Curve), salt ponds still provide significant protection
- -At SLR = 3 ft (NRC year 2100 Intermediate curve), benefits of Ponds are minimal
- -At SLR = 5.46 ft (NRC year 2100 High curve/upper bound), benefits of Ponds are negligible

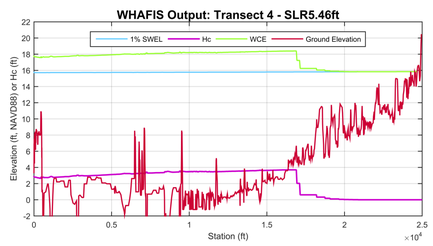
WHAFIS PLOTS - LEGEND

1% SWL = 1% Still Water Elevation
Hc = Crest Height
WCE = Wave Crest Elevation









Slough Geometry Response to Pond A8 NOTCH

OPEN WATER WIDTHS AT ALVISO SLOUGH

Information Source	Date	Average Open Water Width (feet)
SCVWD aerials	12/28/1982	214
Google Earth (USGS)	6/15/1993	146
SCVWD - GIS	4/10/2001	64
USGS	2/27/2004	62
SCVWD - Lower Guadalupe River Project	7/6/2005	53
SCVWD - field transects (10)	11/15/2005	52
SCVWD - GIS	4/30/2006	55
SCVWD - field transects (10)	2/1/2007	50
SCVWD - Lower Guadalupe River Project	4/1/2009	51
HT Harvey & Assoc., Inc.	5/28/2010	47
SCVWD - Alviso Slough Project	5/1/2011	52
City of San Jose	5/8/2012	59
field visual estimates	1/30/2014	60
SCVWD- field transects (10)	9/22/2015	89

HISTORY OF ALVISO SLOUGH

1850s- Canal constructed to connect Guadalupe River to Alviso Slough

1940's – Salt Ponds Constructed; Guadalupe Slough forced to flow though Alviso Slough

1960's/1970's – Guadalupe River was realigned

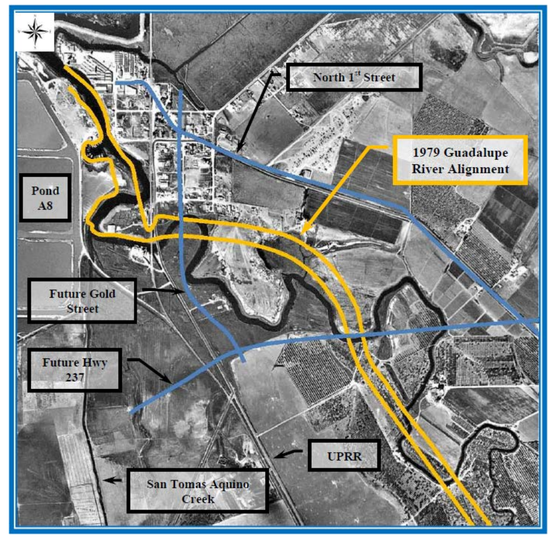
2003/2004 – Lower Guadalupe River Project Constructed

2010- Pond A8 Notch Constructed: Eight 5'-wide gates

1 gate opened: June – December, 2011

3 gates opened: June – December in 2012 & 2013, and March – September in 2015

5 gates opened: September 2014 to Present



Realignment of Guadalupe River – 1970's. Aerial Photo ca 1940