September 8, 2016

Southern Eden Landing
Hydrodynamic Modeling
1. Project Background
2. Modeling Overview
   a. Purpose
   b. Input Parameters
   c. Layout Configurations
3. Modeling Results
   a. Restoration
   b. Flood

Hydrodynamic Modeling

Southern Eden Landing Alternatives Analysis
Conceptual Design 2016
EIS/R 2017
30-60% Design
Construction by Design-Builder

Cris Benton
Project Background

Project Goals:
1. Habitat restoration
2. Maintain or improve existing flood protection
3. Provide public access and recreation
Project Background
Modeling Overview
Modeling Overview

Purpose

Modeling Purpose:

• Determine levee improvement heights
• Size and locate:
  - Levee breaches
  - Channels
  - Water control structures
• From these, locate public trails

Pre-design Process:

• Historical slough network
• Breach sizes
  – Empirical geometries of SF Bay historic marshes
  – Short-term & long-term tidal prisms
Modeling Overview
Input Parameters

Model:
- MIKE21 Flexible Mesh

Combined LiDAR & Bathymetry
- Ponds between MSL & MHW

Triangular Mesh Elements:
- 10 m² - Narrow levee crests
- 200 m² - Southern ponds
- 1,250 m² - Large flat ponds
- 5,000 m² - Bay

Connected Element Paths:
- Levee crests and channels

Variable Time Step:
- Max: 60 sec
- Computed Avg.: 0.25 sec
# Modeling Overview

## Input Parameters

<table>
<thead>
<tr>
<th>Restoration</th>
<th>Flood Control</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objectives:</strong></td>
<td>• Maintain or minimize max. water surface elevations</td>
</tr>
<tr>
<td>• Maximize tidal prism for habitat enhancement</td>
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<tr>
<td><strong>Hydrologic Scenarios:</strong></td>
<td>• 100-year tide with 10-year riverine discharge</td>
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<tr>
<td>• Typical Tide (3-4 weeks)</td>
<td>• 10-year tide with 100-year riverine discharge</td>
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</tbody>
</table>

![Elevation Chart]

<table>
<thead>
<tr>
<th>Layout Configurations:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Existing Conditions (Alt. A)</td>
<td></td>
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<td>• Tidal Restoration (Alt. B)</td>
<td></td>
</tr>
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<td>• Tidal Restoration &amp; Managed Ponds (Alt. C)</td>
<td></td>
</tr>
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Modeling Overview
Layout Configurations

Tidal Restoration (Alt. B)
Modeling Overview
Layout Configurations

Tidal Restoration & Managed Ponds (Alt. C)
Restoration Results
Restoration Results

Tidal Restoration (Alt. B)

Objective:
- Maximize tidal prism for habitat enhancement

Tidal Propagation Results:
- Optimized breach & channel size
- Tidal exchange sufficient with connections to Old Alameda Creek
Restoration Results

- Old Alameda Creek restricts flow; may erode in future
- C-Ponds will become less muted with additional water control structures
Flood Results
Flood Results

FEMA FIRM:
- Project is within the coastal floodplain
- Unaccredited levees
- Modeled both Coastal and Riverine flooding combinations

Hydrologic Scenarios:
- 100-year tide with 10-year riverine discharge
- 10-year tide with 100-year riverine discharge

ACFCC: Alameda Creek Flood Control Channel
OAC: Old Alameda Creek

Effective 2009 (pending update)
Flood Results
Existing Conditions (Alt. A)

10-yr Tide & 100-yr Discharge

100-yr Tide & 10-yr Discharge

Maximum Water Surface Elevation
Elevations in Feet, NAVD88
Flood Results
Tidal Restoration (Alt. B)

10-yr Tide & **100-yr Discharge**

<table>
<thead>
<tr>
<th>Elevation in Feet, NAVD88</th>
<th>-0.8</th>
<th>-0.5</th>
<th>+0.2</th>
<th>+0.4</th>
</tr>
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</table>

100-yr Tide & 10-yr Discharge

Maximum Water Surface Elevation
Elevations in Feet, NAVD88

Landside Levee Max. WSL : 9.9 feet NAVD88
Flood Results
Tidal Restoration & Managed Ponds (Alt. C)

10-yr Tide & 100-yr Discharge

100-yr Tide & 10-yr Discharge

Maximum Water Surface Elevation
Elevations in Feet, NAVD88

Mid-complex Levee Max. WSL: 10.4 feet NAVD88
Flood Results

• Improve levees to 12 feet NAVD88, creating 1.5 to 2.5 feet of freeboard
• Upstream water surface elevations in Creeks maintained or improved
• Flood protection goals were balanced with restoration goals (and recreation)
Questions?