Introductions & Presenters

- **Peter Sheydayi**, Deputy Director, Design and Construction, Watershed Protection District

- **Ike Pace**, Project Manager, Tetra Tech

- **Jason Geneau**, Emergency Planner, Tetra Tech
Agenda

- **Introduction** – Peter Sheydayi
- **Project Setting and History** – Ike Pace
- **FEMA Levee Certification Efforts and Levee Upgrade Project** – Ike Pace
- **Interim Risk Reduction Measures Plan** – Ike Pace and Jason Geneau
- **Funding and Look Forward** – Peter Sheydayi
- **Questions and Answers** – All
Project Setting
Santa Clara River Levee (SCR-1)
Santa Clara River Levee (SCR-1)
Historical Timeline
Santa Clara River Levee (SCR-1)

Originally designed and constructed by U.S. Army Corps of Engineers

Completed in 1961, 4.72 miles of levee with 40 groins.

After the 1969 floods the Corps:
- Repaired 7 of the original 40 groins,
- Restored 2,100 linear feet of levee embankment with deeper rock revetment,
- Added 34 additional groins, completed in 1971.
Santa Clara River Levee (SCR-1)

Timeline

1960
1970
1980
1990
2000
2010

1969 Flood Damage
1983 Flood Damage
2009 PAL Response
2011 Periodic Inspection
2012 Feasibility Studies

Pursue Partnership with USACE

USACE Periodic Inspection

Public Works Agency
Santa Clara River Levee (SCR-1)

Timeline (cont.)

- **2013**
  - Initiate Technical Studies
  - Initiate IRRM Plan

- **2014**
  - New Start Request for USACE FY16 Budget

- **2015**
  - New Start Requested for USACE FY17 Budget
  - Complete Technical Studies and IRRM Plan

- **March 2015**
  - DWR LLAP Grant Package

- **Apr 2015**
  - New Start for FY16
  - Not in Budget

- **Sep 2015**
  - New Start Requested for USACE FY17 Budget
FEMA Levee Certification Efforts
Santa Clara River Levee (SCR-1)
Santa Clara River Levee (SCR-1)

FEMA Levee Requirements

- CFR 44 Section 65.10

**SANTA CLARA RIVER LEVEE (SCR-1)**

<table>
<thead>
<tr>
<th>CRITERIA</th>
<th>Category 1</th>
<th>Category 2</th>
<th>Category 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freeboard</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Closures</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Embankment Protection</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foundation/Stability</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Settlement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interior Drainage</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operation Plan</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maintenance Plan</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maintenance/Vegetation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Encroachments</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maintenance/Structural</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>As-Built Plans</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Santa Clara River Levee (SCR-1)

Critical Items
USACE
Periodic Inspection
Santa Clara River Levee (SCR-1)

2011, USACE – Periodic Inspection Rating
• Unacceptable

Non-Critical Items
Critical Items
**Santa Clara River Levee (SCR-1)**

Non-Critical Items

Deficiencies Corrected by VCWPD

- Clearing of vegetation free zone
- Repair of access ramps
- Repair of embankment erosion
- Removal of sediment/obstructions
- Repair of grate inlets and flap gates
- Video inspections of side-drain pipes

Periodic Inspection

County working to correct Unacceptable rated items
Santa Clara River Levee (SCR-1)

Critical Items

- Inadequate Toe-Down Protection Depth
- Inadequate Riprap Revetment Size and Durability
- Inadequate Weighted Stone Toe Volume and Rock Size
- Inadequate Rock Groin Depth and Rock Size
Technical Studies and Alternatives
Santa Clara River Levee (SCR-1)

Technical Studies

- Data Collection
- Topographic Mapping
- Hydrologic Review
- Hydraulic Analysis
- Sediment Transport and Scour Analyses
- Risk and Uncertainty
- Alternatives Analysis
- Economic Analysis
Santa Clara River Levee (SCR-1)

Alternatives

Initial Screened 12 Alternatives

- Erosion Protection Type
  - Alternative 1 – Soil Cement
  - Alternative 2 – Loose Riprap
  - Alternative 3 – Grouted Riprap

- Alignment Based on Current Levee Location
- Design Flow (250,000 cfs); 200-Yr (303,970 cfs)
- Environ Impacts a Significant Factor (mit costs)
# Santa Clara River Levee (SCR-1)

## Alternatives/Economics

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Design Option</th>
<th>Cost Excluding Mitigation</th>
<th>Total Cost</th>
<th>Benefit Cost Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternative 1</td>
<td>Design flow</td>
<td>$66,741,000</td>
<td>$98,841,000</td>
<td>0.57</td>
</tr>
<tr>
<td>Alternative 2</td>
<td>Design flow</td>
<td>$104,936,000</td>
<td>$151,736,000</td>
<td>0.36</td>
</tr>
<tr>
<td>Alternative 3</td>
<td>Design flow</td>
<td>$97,320,000</td>
<td>$138,270,000</td>
<td>0.40</td>
</tr>
<tr>
<td>Alternative 1</td>
<td>Corps 200-yr flow</td>
<td>$68,794,000</td>
<td>$101,644,000</td>
<td>0.56</td>
</tr>
<tr>
<td>Alternative 2</td>
<td>Corps 200-yr flow</td>
<td>$109,060,000</td>
<td>$156,910,000</td>
<td>0.35</td>
</tr>
<tr>
<td>Alternative 3</td>
<td>Corps 200-yr flow</td>
<td>$105,431,000</td>
<td>$147,285,000</td>
<td>0.38</td>
</tr>
</tbody>
</table>
**Santa Clara River Levee (SCR-1)**

**Preferred Alternative**
- Erosion Protection – Soil Cement
- Reduced Length - Alignment Turns at Central Ave Drain
- Environ Impacts Significantly Reduced (mitigation costs)
- Additional Benefits/Opportunities

<table>
<thead>
<tr>
<th>Design Flow</th>
<th>250,000 cfs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost Excluding Mitigation</td>
<td>$35,097,000</td>
</tr>
<tr>
<td>Total Cost</td>
<td>$40,767,000</td>
</tr>
<tr>
<td>Benefit Cost Ratio</td>
<td>1.33</td>
</tr>
</tbody>
</table>
**Santa Clara River Levee (SCR-1)**

**Additional Benefits/Opportunities**

- Non-Native Plant Species Removal
- Plantings in or adjacent to the river
- Off-channel water storage/groundwater recharge
- Trail access
- Recreation connectivity
- Educational interpretive
Interim Risk Reduction Measures (IRRM) Plan
Santa Clara River Levee (SCR-1)

Interim Risk Reduction Measures (IRRM) Plan

- USACE Guidance
- Failure Scenarios

US Army Corps of Engineers
ENGINEERING AND CONSTRUCTION BULLETIN
Santa Clara River Levee (SCR-1)

Interim Risk Reduction Measures (IRRM) Plan

- Structural Measures
  - Visual Markers
  - Stockpile Materials
- Non-Structural Measures
  - Flood Warning Emergency Evac Plan (FWEEP)
  - Update Hydrologic/Hydraulic Study
  - Update Scour Study
  - Develop Local NLD
  - GIS Performance Database
  - Develop Supplemental O&M Manual

<table>
<thead>
<tr>
<th>Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. FWEEP</td>
</tr>
<tr>
<td>2. Update Hydrologic/Hydraulic Study</td>
</tr>
<tr>
<td>3. Update Scour Study</td>
</tr>
<tr>
<td>4. Develop Local NLD</td>
</tr>
<tr>
<td>5. GIS Performance Database</td>
</tr>
<tr>
<td>7. Visual Markers</td>
</tr>
<tr>
<td>8. Stockpile Materials</td>
</tr>
<tr>
<td>9. Diversion to Gravel Pit</td>
</tr>
<tr>
<td>10. Diversion to Upstream Reservoir</td>
</tr>
<tr>
<td>11. Launchable Rock</td>
</tr>
<tr>
<td>12. Improve Groins</td>
</tr>
<tr>
<td>13. Full Bank Protection</td>
</tr>
<tr>
<td>14. Landside Protection</td>
</tr>
<tr>
<td>15. Levee Raising</td>
</tr>
</tbody>
</table>
Santa Clara River Levee (SCR-1)

IRRM # 8 - Stockpile Materials

- Rock
- Gravel
- Lighting
- Sheeting

Scheduled for Implementation this Fall
Santa Clara River Levee (SCR-1)

IRRM # 7 – Visual Markers

- During Storm Event
  - Gage River Erosion
  - Viewed from Levee Top

Scheduled for Implementation this Fall
**Santa Clara River Levee (SCR-1)**

**IRRM # 1 – FWEEP**

Flood Warning Emergency Evacuation Plan

- Monitoring Activities
- Command and Control
- Public Warning
- Evacuation

**Validation Exercises**

**Exercise Planning this Fall**

---

**Flood Monitoring & Response Continuum**

<table>
<thead>
<tr>
<th>Monitoring</th>
<th>Elevated Threat</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activities:</td>
<td>VCWP will continuously monitor stream data and weather forecasts.</td>
<td>Activities:</td>
</tr>
<tr>
<td></td>
<td>Computer simulations will be run to model potential risk.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Increased risk will be communicated to alert County agencies and the City of Oxnard.</td>
<td></td>
</tr>
</tbody>
</table>

- Stakeholder agencies that provide ISC staffing will be alerted to a potential activation.

**Exercise Planning this Fall**
Santa Clara River Levee (SCR-1)

IRRM # 1 – FWEENP Stakeholders

- County of Ventura
  - Watershed Protection District
  - Sheriff's Office – OES
  - Fire Department
- City of Oxnard
  - Fire Department – Emergency Management
- U.S. Army Corps of Engineers
Funding and Look Forward
Santa Clara River Levee (SCR-1)

USACE New Start Planning Documents

- Initial Appraisal Report
- Reconnaissance Report 905(b)
- Project Management Plan
Local Levee Assistance Program (LLAP)

- Local Levee Critical Repair (LLCR) Track
  - Reimbursement for on-going Studies
  - Funding for CEQA and Final Design

Submitted March 17th

Local Share = $1.33M
State Share = $1.62M
Santa Clara River Levee (SCR-1)

Funding

- Federal USACE
- State Grants
- VCWPД
- City of Oxnard
- Local Assessments
Santa Clara River Levee (SCR-1)

Timeline

- **Sep 2015**
  - Complete Technical Studies and IRRM Plan

- **Jan 2016**
  - Start CEQA and Final Design

Local and State Grant Funded Path

- **Aug 2015**
  - DWR LLAP Grant Decision

Local, State Grant, and Federal Funded Path

- **Apr 2016**
  - USACE FY17 New Start Budget Request Workplans Comes Out

US Army Corps of Engineers® Los Angeles District
Santa Clara River Levee (SCR-1)

Questions and Answers