Interlake Tunnel Project

February 26, 2015
Updated 3/19/15

Presentation at the Heritage Ranch Rec Barn
Agenda

• Introductions
• Project description and background
• Feasibility and hydraulic modeling
• San Antonio spillway modification description
• Environmental clearance and permitting
• Development schedule
• Cost and financing plan
• Questions and Answers
PROJECT BACKGROUND,
DESCRIPTION AND FUNCTION
Existing Surface Water Supply for Salinas Valley properties

2 reservoirs, Salinas River, and Salinas River Diversion Facility

<table>
<thead>
<tr>
<th>Description</th>
<th>Average Annual Amounts (AFY)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average annual controlled release from reservoirs (baseline)</td>
<td>200,000</td>
</tr>
<tr>
<td>Less Evapotranspiration &amp; Conveyance losses</td>
<td>-40,000</td>
</tr>
<tr>
<td>SRDF deliveries</td>
<td>-6,000</td>
</tr>
<tr>
<td>Ground water recharge</td>
<td>154,000</td>
</tr>
</tbody>
</table>

Provides flood control, minimum flows, and conservation releases
Tunnel has 37 year history from 1978
1991 Analysis
1991 tunnel studies
Reservoirs Features

Nacimiento fills 3X faster than San Antonio

<table>
<thead>
<tr>
<th>Item</th>
<th>Nacimiento Reservoir</th>
<th>San Antonio Reservoir</th>
</tr>
</thead>
<tbody>
<tr>
<td>Watershed Area (square miles)</td>
<td>322</td>
<td>353</td>
</tr>
<tr>
<td>Normal Maximum Storage (acre-feet)</td>
<td>377,900</td>
<td>335,000</td>
</tr>
<tr>
<td>Spillway</td>
<td>Overflow Weir and Chute, Obermeyer Gate Control</td>
<td>Fixed Crest Overflow Weir and Chute</td>
</tr>
<tr>
<td>Spillway Crest Elevation (ft)</td>
<td>800.00 Gate “closed” 787.75 Gate “opened”</td>
<td>780.00</td>
</tr>
</tbody>
</table>
Current Situation at Reservoirs

- Nacimiento fills 3 x faster than San Antonio
- San Antonio has unused storage
- Excess water spilled to ocean
Ratio of Calculated Annual Inflow - Nacimiento over San Antonio
(Water Years 1967-2013)

Inflow ratios from WY 1977 and WY 1990 were omitted from the average ratio as outliers due to inconsistency with the long term trend. WY 1977 and WY 1990 were the lowest inflow years on record at San Antonio and do not represent typical inflow ratios.
Tunnel Project Fundamentals

- 60,000 AF additional storage by raising San Antonio spillway 10’
- Increased net storage

Increases net storage of reservoirs provides flood control and reduces flood spills
Water supply sustainability

Release water at opportune timing to:
1) Recharge groundwater aquifers
2) Supply suite of future projects
3) Augment deliveries to SRDF

Tunnel transfers water from Nacimiento to San Antonio

Additional water available for:
- Supply to future projects
- Recharge groundwater

Natural inflow to Nacimiento
Natural inflow to San Antonio

SRDF
Salinas River
Aquifers
Tunnel transfers water from Nacimiento to San Antonio

Graphs showing storage over time for Nacimiento and San Antonio.
Interlake Tunnel

- Monterey County
- San Luis Obispo County
- Lake San Antonio
- Proposed tunnel alignment
- ~12,000 feet
- 10’ diameter
- Concrete lined
- Gravity flow tunnel

Lake Nacimiento
Portals and Tunnel Profile

(Conceptual)

Ground surface

- Nacimiento portal
  - Portal Invert Elevation (~745’)
  - Spillway elevation ~ 800’

- San Antonio portal
  - Portal Invert Elevation (~695’)
  - Spillway elevation ~ 780’

Tunnel

600’
Nacimiento proposed intake

Proposed Site for Nacimiento Intake Facility

North Shore Access Ramp & Parking

Nacimiento Lake

Nacimiento Water Project Intake Facility

Spillway

Dam

Road G14
Nacimiento intake structure concept
San Antonio Hydraulic Structures
San Antonio outlet concept
Tunnel rating curve

Technical Memorandum HC.02, REV00 (DRAFT)

Figure 13. Revised Interlake Tunnel Rating Curve

Tunnel Hydraulics and Rating Curve Analysis - REV02
Tunnel concept

- Nacimiento Reservoir
- Tunnel
- San Antonio Reservoir
- Nacimiento Intake Structure
- San Antonio Valve Facility
- San Antonio Energy Dissipator

Tunnel maximum flow capacity ~ 1,700 CFS
Hydraulics Operation Criteria & Assumptions

• Slope: 0.004 ft/ft
  – Selected at initial stage of evaluation to parallel the friction slope, $S_f$; thus, Slope is about parallel to the water surface profile slope (hydraulic grade line)
  – Slope greater than minimum slope of 0.001ft/ft
  – Slope within range of other water tunnels

• Friction Loss Function: Darcy-Weisbach
  – Accounts for sidewall roughness, water viscosity, diameter, and length
Hydraulics Operation Criteria & Assumptions

- Invert EL: 745.0 ft-NGVD29
  - Selected to correspond with water transfer trigger elevation of 760 ft in Lake Nacimiento
  - Crown of Intake Submerged
  - Tunnel will flow full if water surface profile is greater than tunnel crown
  - Final Designer to perform detailed water surface profile (HGL) computation to verify hydraulics, including slopes and elevations
Hydraulics Operation Criteria & Assumptions

• Flow Control: Downstream Spherical Valve
  – d/s control allows tunnel to flow full
Why is Flowing Full Important?

• Technical Life of Tunnel > 100 years
• Steady Flow Streamlines Improve Longevity
• Partial Flow Jeopardizes Longevity
• Partial Flow: Severe Dynamic Transitions
Why is Flowing Full Important?

This Condition is Acceptable When Tailwater Never Submerges Outlet

This Condition Is Problematic in Long High Capacity Tunnel Configurations
Hydraulic Jump inside Stilling Basin
- Designed for Hyd. Jumps
- Tailwater Promotes Jump Stability Within Confines of Basin

Hydraulic Jump Inside Tunnel
- Not Designed for Hyd. Jump
- Tailwater Not Consistent
- Trapped Air Restricts Flow
- Jump Moves Around
Hydraulics Operation Criteria & Assumptions

• Flow Control
  • **Spherical Valve**: Allows for sealing with head on both sides of valve, allows for partial open operation (can throttle flow), can tolerate high velocities, full-port opening.
FEASIBILITY AND HYDRAULIC MODELING
Hydrologic model fundamentals

Water rights limitations:
• Each reservoir is operated within its water rights.
• Nacimiento has 17,500 afy consumptive demands

Water supply requirements:
• Block flows are released when called for
• Minimum Flow Requirements are met from each reservoir.
• Reservoir Balancing to meet Salinas River Diversion Facility (SRDF) demands is achieved through:
  • releases from Nacimiento up to capacity of hydroelectric plant
  • remaining releases, if required, are made from San Antonio Reservoir.
Proposed tunnel operating concepts

• Operate on head relationships between inflow and outflow in a pressure flow mode.
• Water conveyance through tunnel when the Nacimiento surface water elevation is above 760 feet.
• No water conveyance through the tunnel when San Antonio is spilling.
Hydrologic Modeling

OASIS Computer Operational Simulation Model Schematic
Nacimiento Lake elevation (annual average)

Nacimiento Lake Level

Baseline
760'
Tunnel Transfers Storage from Nacimiento to San Antonio

Without tunnel, spill occurs at Nacimiento.
Hydrograph Explanation
Flow/Storage Over Time

Nacimiento maximum capacity (AF)
Volume of storage in Nacimiento (AF)
Release of water from Nacimiento (AF)
Nacimiento lake elevation

Flow, cfs

Storage, Acre-Feet

1000
900
800
700
600
500
400
300
200
100
0

10/1/2009
11/1/2009
12/1/2009
1/1/2010
2/1/2010
3/1/2010
4/1/2010
5/1/2010
6/1/2010
7/1/2010
8/1/2010
9/1/2010
10/1/2010
11/1/2010
12/1/2010
1/1/2011

Nacimiento Hydro Release
Nacimiento Storage
Nacimiento Max Storage
Nacimiento lake elevation

795
786
775
764
750
733
710

750
775
786
795

50,000
100,000
150,000
200,000
250,000
300,000
350,000
400,000
Hydrograph Explanation
Flow/Storage Over Time

San Antonio maximum capacity (AF)

Volume of storage in San Antonio (AF)

Release of water from San Antonio (AF)
Hydrograph Explanation
Combined Flow/Storage Over Time

- Nacimiento maximum capacity (AF)
- San Antonio maximum capacity (AF)
- Volume of storage in Nacimiento (AF)
- Volume of storage in San Antonio (AF)
- Release of water from Nacimiento (AF)
- Release of water from San Antonio (AF)
- Total volume of released water

Baseline Operations – 2010

Flow, cfs

Storage, Acre-Feet

Nacimiento lake elevation
2011 – Baseline Operations

Baseline Operations – 2011

Nacimiento spills

Nacimiento lake elevation

Flow, cfs

Storage, Acre-Feet

- Nacimiento Hydro Release
- Nacimiento Spillway
- Combined Release
- Release Target
- Tunnel Flow
- Nacimiento Storage
- Nacimiento Max Storage
- San Antonio Release
- San Antonio Spillway
- San Antonio Storage
- San Antonio Max Storage
2011 – Tunnel Operations

Tunnel transfers water to San Antonio

Baseline Operations with Tunnel – 2011

Project Operations - 2011

Nacimiento lake elevation

Flow, cfs

Storage, Acre-Feet

- Nacimiento Hydro Release
- Nacimiento Spillway
- Combined Release
- Release Target
- Tunnel Flow
- Nacimiento Storage
- San Antonio Release
- San Antonio Spillway
- Nacimiento lake elevation

- Nacimiento Max Storage
- San Antonio Storage
- San Antonio Max Storage
2012 – Tunnel Operations

Baseline Operations with Tunnel – 2012

Flows, cfs

Storage, Acre Feet

Nacimiento Hydro Release
Nacimiento Spillway
Combined Release
Release Target
San Antonio Release
San Antonio Spillway
Tunnel Flow
Nacimiento Storage
Nacimiento Max Storage
San Antonio Storage
San Antonio Max Storage

Nacimiento lake elevation
2013 – Baseline Operations

Baseline Operations – 2013

Flow, cfs

Storage, Acre-Feet

Nacimiento lake elevation
2013 Tunnel Operations

Baseline Operations with Tunnel – 2013

Tunnel extended SRDF operation by one month

~ Nacimiento lake elevation
## Flood Control Benefit

<table>
<thead>
<tr>
<th>Flood Spills</th>
<th>Number of years flood spill occurs</th>
<th>Average flood volume (AFY)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>15</td>
<td>46,000</td>
</tr>
<tr>
<td>Tunnel</td>
<td>6</td>
<td>25,000</td>
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<tr>
<td>Tunnel &amp; SA Raise</td>
<td>6</td>
<td>22,000</td>
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</tbody>
</table>

- **60% reduction**
- **46% reduction**
- **52% reduction**

### Graph:
- **Acre Feet of spill from both reservoirs**
- **Reservoir spills**
- **Spills with tunnel project**

### Table:

<table>
<thead>
<tr>
<th>Year</th>
<th>Baseline</th>
<th>Tunnel</th>
<th>Tunnel &amp; SA Raise</th>
</tr>
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<tbody>
<tr>
<td>1967</td>
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<tr>
<td>2013</td>
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</tbody>
</table>
Additional Storage Opportunity

Opportunity to increase storage capacity in San Antonio reservoir 59,000 acre feet (18%)
Additional Reservoir Storage

Modifying the spillway with a crest control device provides the effect of “raising the dam” up 10 feet.

Potential added storage increases the benefits of the tunnel by providing additional storage for flood control and conservation releases.
San Antonio Spillway Modification steps to evaluate

- Conceptual design of spillway modification structures
- Probable Maximum Flood (PMF) and Hydrologic Model analysis (HMR58)
- Stability analysis
- Hydraulic capacity analysis
- Evaluation of modifications by DSOD
Interlake Tunnel and Spillway Modification Operational Modeling Results
(for water years 1967 - 2013)
(Average Acre Feet/Year)

<table>
<thead>
<tr>
<th></th>
<th>Reduction in Spills</th>
<th>Increase in Total Controlled Releases</th>
<th>Tunnel Transfers</th>
</tr>
</thead>
<tbody>
<tr>
<td>10’ Tunnel</td>
<td>7,736</td>
<td>16,327</td>
<td>50,493</td>
</tr>
<tr>
<td>10’ Tunnel &amp; SA spillway mod*</td>
<td>11,857</td>
<td>20,686</td>
<td>53,840</td>
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</table>

<table>
<thead>
<tr>
<th>Flood Spills</th>
<th>Number of years flood spill occurs</th>
<th>Average flood volume (AFY)</th>
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</thead>
<tbody>
<tr>
<td>Tunnel</td>
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<td>46% reduction</td>
</tr>
<tr>
<td>Tunnel &amp; SA spillway mod</td>
<td>60% reduction</td>
<td>52% reduction</td>
</tr>
</tbody>
</table>

* (adds 59,000 AF of reservoir storage to San Antonio)
Tunnel Project Benefits
Water Supply Sustainability

• Significant increase in flood control storage, thus a reduction in flood damage downstream
• Additional surface water available to serve current and future suite of infrastructure projects
• Provides a supply of surface water to help sustain ground water supply by offsetting pumping
• Provides environmental benefits through increased flows in the Salinas River
Plan for additional public collaboration on model specifics

As requested by Salinas Valley Water Coalition:

1. Conduct technical evaluation of tunnel and reservoir simulation model to confirm reasonableness of downstream demands.

2. Evaluate model to accommodate SRDF full design capacity demands.

3. Agree on implementation of the tunnel and spillway modification project and operation of the new infrastructure.
ENVIRONMENTAL CLEARANCE AND PERMITTING
Preliminary environmental impacts

- **Surface impacts:** minimal grading at portal sites, intake structure at Lake Nacimiento, and headwall tunnel portal structure at Lake San Antonio. Tunnel muck disposed at site near San Antonio Dam.
- **Noise impacts:** Minimal at receptors adjacent to the tunnel construction portal at San Antonio and the intake structure at Lake Nacimiento.
- **Biological impacts:** TBD. Related to water diversion from Lake Nacimiento to Lake San Antonio.
- **Paleontological impacts:** TBD. Impact zone at tunnel portals only.
- **Geologic/Seismic Hazards:** TBD
- **Water resources/Flooding impacts:** TBD. All water rights and water discharge agreements will not be affected. Project assists with flood control.
- **Recreational /Public Facilities impacts:** TBD
No impacts expected relative to:

• Aesthetics/visual resources
• Agricultural resources
• Air Quality
• Cultural resources
• Energy
• Fire Protection
• Hazardous materials
• Historic resources
Preliminary biological impacts

• White bass – predator sport fish prohibited from export (alive) from Lake Nacimiento
• Quagga and Zebra Mussels transfer from Nacimiento to San Antonio
• Mercury in Lake Nacimiento sediment
• Downstream releases to maintain steelhead migration (NOAA Fisheries)
DEVELOPMENT SCHEDULE
Project Development Schedule

- **Phase 1 - preliminary development / feasibility assessment**
  - 7/1/14 to 6/19/15

- **Conceptual engineering / feasibility**
  - 7/1/14 to 8/2/14

- **Conceptual Engineering - tunnel project**
  - 9/15/14 to 1/22/15

- **Spillway Mod Conceptual Engineering**
  - 2/2/15 to 6/19/15

- **Obtain environmental and final design consulting services**
  - 3/13/15 to 6/9/15

- **Phase 2 - EIR and Permitting**
  - 12/19/16

- **Phase 3 - geotechnical and final design**
  - 4/10/17

- **Phase 4 - ROW acquisition and water rights permit application**
  - 3/4/15 to 1/15/16

- **Phase 5 - financing**
  - 3/13/17

- **Phase 6 - construction**
  - 4/11/17 to 6/14/18

**Consultant contract award**
Critical Development Path

- Phase 2 - permit applications (75% environmental complete)
- Phase 3 - geotechnical and final design (75% design)
- Phase 5 - financing
## Procurement of professional services

<table>
<thead>
<tr>
<th>Procurement</th>
<th>Schedule</th>
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<tbody>
<tr>
<td>Environmental consultants</td>
<td>March – May 2015</td>
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<tr>
<td>Engineering design consultants</td>
<td>March - May 2015</td>
</tr>
<tr>
<td>Tunnel Contractor Design-Build in accordance with AB 155 with mandatory Project Labor Agreement (PLA)</td>
<td>Oct 2016 – Jan 2017</td>
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<tr>
<td>Spillway Modification Contractor Design-Bid-Build procurement</td>
<td>Oct 2016 – Jan 2017</td>
</tr>
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</table>
COST AND FINANCING PLAN
# Interim financing

**MCWRA and Monterey County financing agreement**

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
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<tbody>
<tr>
<td>Final design &amp; geotechnical engineering (75%)</td>
<td>$900,000</td>
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<tr>
<td>Permitting and environmental approval (75%)</td>
<td>$800,000</td>
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<tr>
<td>Financing plan implementation</td>
<td>$350,000</td>
</tr>
<tr>
<td><strong>Program Management</strong></td>
<td>$250,000</td>
</tr>
<tr>
<td>Subtotal – Interlake Tunnel</td>
<td>$2,300,000</td>
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<tr>
<td>Spillway Modification Engineering</td>
<td>$200,000</td>
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<tr>
<td><strong>Total Interim Financing request</strong></td>
<td><strong>$2,500,000</strong></td>
</tr>
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## Interlake Tunnel & San Antonio Spillway Modification

### Cost Estimate (Dec 2014) ($000)

<table>
<thead>
<tr>
<th>Phase</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase 1 - preliminary engineering</td>
<td>$315</td>
</tr>
<tr>
<td>Phase 2 - permit applications</td>
<td>$1,198</td>
</tr>
<tr>
<td>Phase 3 - geotechnical and final design</td>
<td>$1,311</td>
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<tr>
<td>Phase 4 - ROW acquisition and water rights verification</td>
<td>$244</td>
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<td>Phase 5 - financing</td>
<td>$342</td>
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<tr>
<td>Phase 6 - construction</td>
<td>$32,206</td>
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<td>Program Management</td>
<td>$1,387</td>
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<td>Construction Management</td>
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<td>Expenses</td>
<td>$300</td>
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<tr>
<td>Contingency</td>
<td>$9,500</td>
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<tr>
<td><strong>Subtotal Tunnel</strong></td>
<td><strong>$48,003</strong></td>
</tr>
</tbody>
</table>

| San Antonio Spillway Modification*                | $15,000 |

| **Total**                                         | **$63,003** |

*- placeholder estimate. Costs have not been calculated
Financing options

1. **Proposition 218 tax assessment on beneficiaries**
   
   To service the operating costs and debt service on long-term bonds. This is the most viable option with a proven history of success in financing the Salinas Valley Water Project in 2008.

2. **California Infrastructure Financing Act – California Government Code Section 5956 (Public Private Partnership).**
   
   Provides the means to develop an infrastructure project involving private financing if a revenue stream can be identified to pay the debt service.

3. **Water Quality, Supply, and Infrastructure Improvement Act of 2014 (Water Bond).**
   
   Grant funding for water projects that qualify for State funds.

4. **Proposition 84 (IRWM) grant funds**
Proposed Financing Plan

• 218 Proposition – tax levy on beneficiaries

• Similar in plan and structure to 218 financing for the Salinas Valley Water Project – Zone 2C

• Assessment formulas based on proportional weighting of:
  – Active / Passive land use factors
  – Special benefits from project
QUESTIONS AND ANSWERS