Tualatin Basin Water Supply Project

Scoggins Dam Raise Appraisal Study

Water Managers Group Meeting

August 19, 2009
Presentation Overview

1. Reclamation’s Safety of Dams Program
2. Dam Raise Appraisal Study Information
3. Costs Review
4. Program Issues
Reclamation’s Safety of Dams Program

Key points

- Scoggins Dam is federally owned
- Reclamation’s schedule differs from Partner’s
- Dam raise appraisal study provides key information
- Reclamation continuing Risk Evaluation Process – only for the existing Dam
- Good coordination with Reclamation
Reclamation’s Safety of Dams Program

- **Major Program elements**
  - **Safety Evaluation of Existing Dams (SEED)**
    - 100% Reclamation Cost
    - Risk Analysis Process – Expedited actions
  - **Corrective Action Study (CAS)**
    - 85% - Federal and 15% Local cost share
    - Design and Construction of Modification/Repairs
Safety of Dams – SEED Process

- **Risk Evaluation Steps and Schedule**
  - **Seismic Review Board and Risk Analysis**
    - Risk Analysis Workshop
    - July - October 2009
  - **Dam Safety Assessment Team**
    - Decision Document
    - December 2009
  - **Interim measures to mitigate the risks**
    - January – March 2010
  - **Corrective Action Study (CAS)**
    - Scope, Budget and Schedule
    - January – March 2010
Safety of Dams – Corrective Action Study (CAS)

- CAS Program Steps and Schedule
  - CAS Scope, Schedule and Budget - Spring 2010
  - CAS Work Tasks and Schedule
    - Alternatives, Mod. Report, and NEPA – Summer 2010
    - Congressional Approval for Design– March 2012
    - Final Design, Construction Procurement – 2013 -14
    - Congressional Approval for Construction – 2014
    - Construction and Startup – 2014 - 2019
Safety of Dams Program

Partnership Involvement

- Participation in Risk evaluation process and Dam Safety assessment team for existing Dam
- Develop information on economic and other impacts for interim measures to mitigate risks, such as reservoir restriction this winter
- Continue collaboration with Reclamation management and staff on project elements
Partnership Issues

- **Concerns of schedule**
  - Safety of Dam Program actions have taken up to 12 years from beginning of corrective action to start-up of construction (Folsom)
  - Reclamation has not determined the schedule – our estimate for dam repairs – no sooner than Spring 2019

- **Congressional appropriations delays**
Scoggins Dam Design

- U.S. Bureau of Reclamation - Designed and Constructed 1970’s
- 151-foot-high zoned earth fill embankment
- 53,316 acre-feet active storage capacity
- 2,600 acres area for lake and lands
- 1,100 acres of water at full pool
Dam Raise Appraisal Study
Scoggins Dam Assessment

- Existing Dam Structure is Safe
  - Does not meet current earthquake guidelines
- Doing nothing is not an option
- Required Seismic Improvements for the Current Reservoir Operation
  - SEED - Reclamation Risk Analysis
  - Seismic Review Board Recommendations
  - May be more cost-effective to replace than to repair the existing Dam
Scoggins Dam Replacement
(No Raise)

New access road

Replacement Dam Area

Hagg Lake

Stimson Mill
Plan of Replacement Dam

Scoggins Dam

Hagg Lake

Stimson Mill
Section of Replacement Dam

**Dam Height** – 151 ft  **Capacity** – 52,600 ac-ft
**Base length** – 3100 feet  **Base width** – 700 feet
**Side Slope** – 3H:1V  **Core fill material** – Clay
Dam Raise Appraisal Study

Design Alternatives

- **Existing Dam Raise**
  - Zoned Earthfill
- **Downstream Dam Raise**
  - Zoned Earthfill
- **Downstream Dam Raise – Composite**
  - Rock Fill/Roller Compacted Concrete
SUSTAINING OUR ECONOMY, WATERSHED, AND COMMUNITY

Dam Design Alternatives

- Existing Dam Area
- Raised Dam Area - Composite
- Replace Existing Dam
- Downstream Dam Raise

Hagg Lake
Stimson Mill
Plan of Existing Dam Raise

Dam Area

Scoggins Dam

Hagg Lake

SUSTAINING OUR ECONOMY, WATERSHED, AND COMMUNITY
**Section of Existing Dam Raise**

**Scoggins Dam**

- Dam Height – 220 ft
- Capacity – 110,000 ac-ft
- Base length – 3800 feet
- Base width – 1200 feet (includes existing dam foundation – 500 ft)
- Side Slope – 3H:1V
- Core Fill Material - Clay
Plan of Downstream Raised Dam

Hagg Lake

Scoggins Dam

SUSTAINING OUR ECONOMY, WATERSHED, AND COMMUNITY
Section of Downstream Raised Dam

- Dam Height – 220 ft
- Capacity – 110,000 ac-ft
- Base length – 3500 ft
- Base width – 850 ft
- Side Slope – 3H:1V

Existing ground surface

Bedrock
Plan of Downstream Dam Raise Composite

Rock Fill

RCC

Rock Fill

Scoggins Dam

Hagg Lake

SUSTAINING OUR ECONOMY, WATERSHED, AND COMMUNITY
Section of Downstream Dam Raise - Composite Roller Compacted Concrete (RCC) with Rockfill/Earth Core

Total Dam Height – 230 ft   Capacity – 110,000 ac-ft
Base length – 3500 ft   Base width – 1280 ft
Side Slope – 3H:1V   Core fill Material – RCC/Clay
Dam Raise Project

- Issues
  - Construction Cost Estimates – 15% Level
  - Construction Impacts
    - Reduced Reservoir Level
    - Water Supply/Recreation
  - Existing Dam Structure - Liability
  - Private Property Impacts
  - Dam Access Roads
  - New dam features – Tunnel, Spillway and Outlet Works
  - Environmental Impacts
  - Community impacts
Decision Model for Dam Designs Evaluation Process

- Multi-Level Screening Criteria with Weighted Factors
  - Community Impacts
  - Institutional Issues
  - Environmental Impacts
  - Operational Impacts
  - Design Performance
## DRAS-Dam Replacement Cost

<table>
<thead>
<tr>
<th>Cost Element</th>
<th>Existing Dam Replacement – Downstream ($Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site work, Dewatering, access Roads</td>
<td>11</td>
</tr>
<tr>
<td>Foundation Excavation (3 million yards)</td>
<td>43</td>
</tr>
<tr>
<td>Embankment (7 Million yards)</td>
<td>194</td>
</tr>
<tr>
<td>Spillway and Outlet Works</td>
<td>30</td>
</tr>
<tr>
<td>Base Construction Cost (BCS)</td>
<td>278</td>
</tr>
<tr>
<td>Contingencies, Unscheduled items, Eng., Legal, Admin.</td>
<td>111</td>
</tr>
<tr>
<td>Total Construction Cost</td>
<td>$389</td>
</tr>
<tr>
<td><strong>Federal Share – 85%</strong> = $331</td>
<td><strong>Local Share – 15%</strong> = $58</td>
</tr>
</tbody>
</table>
## Dam Safety Program – Local Share

<table>
<thead>
<tr>
<th>Repayment Contractor</th>
<th>Total Contracted Volume (AF)</th>
<th>% share*</th>
<th>Cost Share ($Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tualatin Valley Irrigation District (27,020 af-stored)</td>
<td>37,000*</td>
<td>54.5</td>
<td>31.61</td>
</tr>
<tr>
<td>CleanWater Services (12,618 af storage)</td>
<td>16,900*</td>
<td>24.9</td>
<td>14.43</td>
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<tr>
<td>City of Hillsboro</td>
<td>5000</td>
<td>7.4</td>
<td>4.27</td>
</tr>
<tr>
<td>City of Forest Grove</td>
<td>4500</td>
<td>6.6</td>
<td>3.84</td>
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<tr>
<td>City of Beaverton</td>
<td>4000</td>
<td>5.9</td>
<td>3.42</td>
</tr>
<tr>
<td>Lake Oswego Corp.</td>
<td>500</td>
<td>0.74</td>
<td>0.43</td>
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<tr>
<td><strong>Totals</strong></td>
<td><strong>67,900</strong></td>
<td></td>
<td><strong>$58</strong></td>
</tr>
</tbody>
</table>

(* includes Natural Flow volume)
## Dam Raise Cost Comparison

<table>
<thead>
<tr>
<th>Cost Element</th>
<th>Existing Dam Raise – Earthfill ($Millions)</th>
<th>Downstream Dam Raise – Earthfill ($Millions)</th>
<th>Downstream Dam Raise- Composite ($Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site Work, dewatering, access roads</td>
<td>12</td>
<td>12</td>
<td>11</td>
</tr>
<tr>
<td>Foundation Excavation</td>
<td>42</td>
<td>59</td>
<td>67</td>
</tr>
<tr>
<td>Embankment</td>
<td>234</td>
<td>295</td>
<td>232</td>
</tr>
<tr>
<td>Roller Compacted Concrete - RCC</td>
<td>--</td>
<td>--</td>
<td>273</td>
</tr>
<tr>
<td>Spillway and Outlet works - Tunnels</td>
<td>47</td>
<td>31</td>
<td>11</td>
</tr>
<tr>
<td><strong>Base Construction Cost</strong></td>
<td>335</td>
<td>397</td>
<td>594</td>
</tr>
<tr>
<td>Contingencies, Unscheduled items, Eng, Legal, Admin</td>
<td>251</td>
<td>245</td>
<td>274</td>
</tr>
<tr>
<td><strong>Total Construction Cost</strong></td>
<td>586</td>
<td>642</td>
<td>868</td>
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</table>
## Dam Construction Options

<table>
<thead>
<tr>
<th>Dam Raise Options</th>
<th>Cost ($ M) (2009 dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Replacement Dam (No Raise)*</td>
<td><strong>$389</strong></td>
</tr>
<tr>
<td>*Federal Share – 85% = $331 M</td>
<td></td>
</tr>
<tr>
<td>Local Share – 15% = $58 M</td>
<td></td>
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<tr>
<td>Existing Dam Raise</td>
<td><strong>$586</strong></td>
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<tr>
<td>Downstream Embankment Dam Raise</td>
<td><strong>$642</strong></td>
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<tr>
<td>Downstream Composite Dam Raise</td>
<td><strong>$868</strong></td>
</tr>
</tbody>
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## Updated Program Costs

<table>
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<tr>
<th>Program Elements</th>
<th>Existing Dam Raise – Earthfill ($Millions)</th>
<th>Downstream Dam Raise – Earthfill ($Millions)</th>
<th>Downstream Dam Raise-Composite ($Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dam Raise and Related projects (roads, Rec.)</td>
<td>650</td>
<td>706</td>
<td>932</td>
</tr>
<tr>
<td>Less Safety of Dam – Federal Cost share</td>
<td>-331</td>
<td>-331</td>
<td>-331</td>
</tr>
<tr>
<td>Less Local Cost share</td>
<td>-58</td>
<td>-58</td>
<td>-58</td>
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<tr>
<td>Raw Water Pipeline</td>
<td>123</td>
<td>123</td>
<td>123</td>
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<tr>
<td>Intake/Pump Station</td>
<td>52</td>
<td>52</td>
<td>52</td>
</tr>
<tr>
<td>JWC WTP</td>
<td>195</td>
<td>195</td>
<td>195</td>
</tr>
<tr>
<td>Title Transfer/EIS</td>
<td>13</td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td><strong>Total Local Program Cost</strong></td>
<td><strong>654</strong></td>
<td><strong>700</strong></td>
<td><strong>926</strong></td>
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</table>
## Water Supply Program
### Local Share Only

<table>
<thead>
<tr>
<th>Partners</th>
<th>Future Allocation Volume (AF)</th>
<th>% share (Expansion Only)</th>
<th>Estimated Cost Share ($Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tualatin Valley Water District</td>
<td>23,000</td>
<td>43.4</td>
<td>342</td>
</tr>
<tr>
<td>CleanWater Services</td>
<td>16,500</td>
<td>31.1</td>
<td>156</td>
</tr>
<tr>
<td>City of Hillsboro</td>
<td>11,500</td>
<td>21.7</td>
<td>171</td>
</tr>
<tr>
<td>City of Beaverton</td>
<td>2,000</td>
<td>3.8</td>
<td>24</td>
</tr>
<tr>
<td>City of Forest Grove (WTP and RWP)</td>
<td>----</td>
<td>----</td>
<td>6.9</td>
</tr>
<tr>
<td><strong>Totals</strong> (<em>based on Downstream raised Dam and does not include Dam safety local share</em>)</td>
<td><strong>53,000</strong></td>
<td><strong>100</strong></td>
<td><strong>$700</strong></td>
</tr>
</tbody>
</table>

*Estimated Cost Share ($Millions) calculated based on Downstream raised Dam and does not include Dam safety local share.*
Program Issues

• Program will be focusing on these main issues:
  ▪ Program Costs Analysis
    ▪ Federal Funding - Safety of Dams Program
      ▪ How much and when?
  ▪ Financial Plan - Partners
    • Finance Capacity
    • Rates and SDC Revenue
    • Operational Costs
  ▪ Project Schedule Review of 2016 Deadline
  ▪ Scenario Planning
    ▪ Review of Issues and Options for Regional Solutions
    ▪ Public/Stakeholder Review Process
Federal Funding Elements

• Assess how much Safety of Dams funding is needed and by when to support decision-making

• Program costs amplify importance of Federal participation

• Strategic plan for federal funding considering both Reclamation and Congressional Delegation

• Collaborate with Reclamation on the Safety of Dams review to improve the priority and schedule

• Assess risk of moving ahead without full information on federal funding and local financing
Financial Plan – Local

- Financial Plan
  - Finance Team development
  - Review of update costs
  - Assess Program phasing and schedule adjustments
  - Impacts on Partners financial forecasts
  - Operational costs analysis
  - Cash flow requirements
  - Financing Capacity – Bond Market Issues
Impacts of Extending 2016 Deadline

- **Pros**
  - Allow more time to develop finance plan
  - Certainty on Federal funding $$$
  - Align with Reclamation review process
  - Improves matching new supply with future demand for some partners

- **Cons**
  - Risk of lack of meeting demands when needed
  - Issue of reservoir restrictions
  - Impact to project momentum
  - Escalation of program costs
  - Higher costs for certain partners
Scenario Planning

Re-evaluating Water Supply Alternatives

1. Review of Issues and Options for regional water supply solutions
2. Partnership Opportunities
3. Optimize Resource opportunities
4. Public/Stakeholder information process
5. Strategic action and public information plans to manage potential of a reservoir restriction as a risk reduction mitigation measure
Public Communication Strategy

• Stakeholder Meetings
  ▪ Tualatin River Watershed Council - Sept. 2
  ▪ CWS Advisory Commission – Sept. 16
  ▪ Policy Steering Committee – Sept 15
  ▪ Other Public forums –
    ▪ August through October 2009