Anticipated Future Flows – Seepage Projects

Restoration Goal Technical Feedback Group Meeting
July 17, 2014
Agenda

• Flowage
• Seepage Management
• Seepage Project Approach

For Discussion Purposes; Subject to Change
Area

- 150 miles of River
- Historically Disconnected Reaches
- Water Supply Infrastructure
- Flood Control Bypasses
- Urban Areas
- Agriculture

For Discussion Purposes; Subject to Change
Restoration Flows

[Diagram showing restoration flows with specific flow rates for different seasons and categories such as Wet, Normal Wet, Normal Dry, Dry, Critical High, Critical Low, Fall Base and Spring Run Incubation Flow, Winter Base Flows, Spring Rise and Pulse Flows, Summer Base Flows, and Spring-Run Spawning Flows.]
Current Flow Route

• San Joaquin River through Reach 4A
• Eastside Bypass
• Reach 5
Flowage Easements

• Eastside Bypass contains some private property
• Current flood flowage easements with the State of California
• Flowage easements with landowners who own property in the Eastside Bypass
• Reconnect the San Joaquin River
• By 2015
Friant Release Schedule with Fisheries Migration Timing

- All flows released up to “then current” channel capacities

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<table>
<thead>
<tr>
<th>Restoration Year Type</th>
<th>Wet</th>
<th>First Wet</th>
<th>Second Wet</th>
<th>Third Wet</th>
<th>Fourth Wet</th>
<th>Dry</th>
<th>Critical High</th>
<th>Critical Low</th>
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<td></td>
<td>20% of</td>
<td>30% of</td>
<td>30% of</td>
<td>15% of</td>
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For Discussion Purposes; Subject to Change
Capacity Limitations

• Groundwater Seepage
  – Seepage Management Plan groundwater level thresholds
  – Seepage Projects

• Levee Stability
  – Hydraulic Analysis in Channel Capacity Advisory Group Report
  – Levee Stability Projects
Seepage Management

• Reduce or avoid material adverse impacts
  – Waterlogging (disease, anoxia, temperature)
  – Root zone salinity
• Goal 1: Keep flows low to avoid impacts
• Goal 2: Build projects to allow higher flows
Seepage Management Goal 1

• Limit Restoration Flow releases to avoid impacts based on groundwater seepage thresholds
  – Seepage Management Plan (SMP)
  – December 2010 through March 2011: 5 public meetings
  – Peer Review in 2012
  – Peer Review findings in February 2013
  – Revisions to SMP per peer review findings in April 2013
Seepage Management Plan

- Seepage impacts
- Locations of known risks
- Operations conceptual model
- Monitoring program
- Thresholds
- Triggers, site visit, and response
- Site evaluation and projects
Over 200 shallow groundwater monitoring wells installed by the SJRRP since 2009

Field Ground Surface (lowest point within 750 feet)

Root Zone

Irrigation Buffer

Capillary Rise
Operations Conceptual Model

- Thresholds identify potential problems so that Reclamation can establish operating criteria to manage flows

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Seepage Approach

1. Find Limit of Flows without Impacts
2. Identify Potential Increases
3. Monitor Response
4. Estimate Friant Releases
5. Establish Field Threshold
7. Evaluate Projects to Avoid Impacts

For Discussion Purposes; Subject to Change
Current Flow Restrictions

• 4.7 foot threshold in MW-10-90 is approximately 70 cfs in the Eastside Bypass
Seepage Management Goal 2

• Identify locations and mitigate to allow increased flows without groundwater impacts
  – Areas vulnerable to seepage; Seepage Project Handbook (SPH)
  – March 2011 through December 2011: 6 public meetings
  – Periodic updates on seepage projects since April 2012
  – Currently updating SPH based on new information
Seepage Project Handbook

• Introduction
• Site Evaluation
• Environmental Compliance
• Design
• Plan Formulation
• Design Data Collection
• Construction
• Financial Assistance

For Discussion Purposes; Subject to Change
Seepage Project Approach

• Split impacted areas into seepage parcel groups
• Prioritize parcel groups
• Initiate first tier of priority parcel groups

For Discussion Purposes; Subject to Change
Seepage Project Process

1. Site Evaluation (6-9 mo.)
   - Reclamation
     - Site Visit
     - Prepare Methods Report
     - Review Methods Report
     - Land owner Provides Site Data
     - Install Site-Specific Wells
     - Perform Hydraulic Conductivity Testing
     - Collect Groundwater Level Data
     - Prepare Site Evaluation Report
   - Land Owner
     - Review Site Evaluation Report
     - Final Site Evaluation Report
   - If necessary, add 6+ mo.

2. Project Design (9+ mo.)
   - Reclamation
     - Preliminary Design and Costing
     - Plan Formulation Meeting
     - Design Data Collection (if necessary)
     - Environmental Compliance
     - Prepare Project Report (60% Design)
   - Land Owner
     - Review Project Report
     - Final Project Report

   - Reclamation
     - Bid, Award
     - Final Design
     - Review of Final Design
     - Pre-Construction Meeting
     - Pre-Construction Survey
     - Construction
     - Construction Inspection
     - Project Completion
   - Land Owner, 3rd Party
     - Opt.
     - Financial Assistance
     - Initial Meeting, Objectives
     - Supply DUNS Number
     - Completed SF-424
     - Reclamation Contracting
     - Signed Financial Agreement
     - Invoicing
     - Reporting
     - Close-Out

Contact
Contact the Seepage Hotline to schedule further discussion or a site visit.
Phone: 916-978-4398
Email: interimflows@restoresjr.net

For Discussion Purposes; Subject to Change
## Priority Locations

<table>
<thead>
<tr>
<th>Flow</th>
<th># Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>300 cfs</td>
<td>3</td>
</tr>
<tr>
<td>700 cfs</td>
<td>2</td>
</tr>
<tr>
<td>1,300 cfs</td>
<td>6</td>
</tr>
<tr>
<td>2,000 cfs</td>
<td>11</td>
</tr>
<tr>
<td>4,500 cfs</td>
<td>70</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>92</strong></td>
</tr>
</tbody>
</table>

For Discussion Purposes; Subject to Change

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*Map showing parcel groups prioritized by flow threshold.*
Site Evaluation Conceptual Model

For Discussion Purposes; Subject to Change
Seepage Project Alternatives

• Physical
  – Cut-off wall (e.g., slurry walls, sheet piles)
  – Seepage Plug
  – Drainage ditch
  – Interceptor lines
  – Shallow groundwater pumps
  – Buildup of low lying areas

• Non-Physical
  – Seepage easements
  – Acquisition
  – License Agreements
Project Alternative Screening

• Alternatives reviewed, but typically not selected
  – Sheet piles
    • Expensive compared to slurry walls
  – Seepage plug
    • Needs site dewatering, expensive, could harm levees
  – Buildup of low lying areas
    • Need proper borrow material, ag soil suitability, expensive
  – Shallow groundwater pumps
    • Expensive

For Discussion Purposes; Subject to Change
Project Alternative Screening

• Alternatives typically not screened out
  – Slurry walls
  – Drainage ditch
  – Interceptor Ines
  – Pumping of existing wells to supplement other options
  – Realty Actions

For Discussion Purposes; Subject to Change
## Seepage Project Costs

<table>
<thead>
<tr>
<th>Seepage Project Alternative</th>
<th>Unit</th>
<th>Estimated Initial Cost Range ($/unit)**</th>
<th>Present Worth Cost Range ($/unit)**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slurry Walls</td>
<td>foot</td>
<td>$1,100 - $1,300</td>
<td>$1,100 - $1,300</td>
</tr>
<tr>
<td>Sheet Piles</td>
<td>foot</td>
<td>$2,300 - $2,600</td>
<td>$2,300 - $2,600</td>
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<tr>
<td>Seepage Plug</td>
<td>foot</td>
<td>$1,900 - $2,200</td>
<td>$1,900 - $2,200</td>
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<tr>
<td>Drainage Ditch</td>
<td>foot</td>
<td>$190 - $450</td>
<td>$390 - $760</td>
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<tr>
<td>Interceptor Lines</td>
<td>foot</td>
<td>$180 - $250</td>
<td>$390 - $490</td>
</tr>
<tr>
<td>Shallow Groundwater Pumps</td>
<td>foot</td>
<td>$640 - $840</td>
<td>$1,300 - $1,600</td>
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<tr>
<td>Seepage Easements</td>
<td>acre</td>
<td>Based upon appraisal</td>
<td>Based upon appraisal</td>
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<tr>
<td>Buildup of Low Lying Areas (4-foot)*</td>
<td>acre</td>
<td>$31,000</td>
<td>$31,000</td>
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<tr>
<td>Buildup of Low Lying Areas (7-foot)*</td>
<td>acre</td>
<td>$58,000</td>
<td>$58,000</td>
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</tbody>
</table>

**Notes:**
*Approximately 3,000 cubic yard/acre for 4-foot buildup, and 7,900 cubic yard/acre for 7-foot buildup

**Costs from preliminary designs prepared

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Interceptor Line – Photos

Drain Sump, Submersible Pump

Drain Installation

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Next Flow Constraint – 300 cfs

- Anticipated 300 cfs maximum release below Sack Dam until 2016

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Seepage Project Approach

• Prioritize parcel groups based on most at-risk properties

• Initiated first tier of priority parcel groups — 300 cfs in 2015

• Next 2 projects — 700 cfs in 2017

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<td><strong>Total</strong></td>
<td><strong>92</strong></td>
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## Seepage Projects Summary

<table>
<thead>
<tr>
<th>Flow</th>
<th># Projects*</th>
<th>Site Visits Performed</th>
<th>Targeted Monitoring Begun</th>
<th>Site Evaluations Begun</th>
<th>Preliminary Designs Begun</th>
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<tr>
<td>300 - 700 cfs</td>
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<td>1</td>
<td>1</td>
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<tr>
<td>700 - 1,300 cfs</td>
<td>6</td>
<td>5</td>
<td>3</td>
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<tr>
<td>1,300 - 2,000 cfs</td>
<td>11</td>
<td>4</td>
<td>3</td>
<td>1</td>
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<tr>
<td>2,000 - 4,500 cfs</td>
<td>70</td>
<td>1</td>
<td>1</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>92</strong></td>
<td><strong>14</strong></td>
<td><strong>11</strong></td>
<td><strong>6</strong></td>
<td><strong>6</strong></td>
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*Based on initial parcel prioritization.
QUESTIONS
Purpose and Objective

• Variety of options available for groundwater seepage mitigation

• Realty Actions include:
  – Seepage License Agreements (Rentals)
  – Seepage Easements (Permanent)
  – Acquisition

• Compensate for higher groundwater levels under the property
Realty Process

• Goal: Maintain “arms-length” relationship with appraiser

• Solution: Office of Valuation Services (OVS)

• Reclamation contracts with OVS to:
  – Write a scope of work
  – Hire an appraiser
  – Review and revise the appraisal
  – Approve the appraisal for government use
Land Acquisition Process

Contracting (1 – 1.5 years)
- IVIS Scope Review
- Interagency Agreement with OVS
- OVS contracting for appraiser

Planning (concurrent)
- NEPA
- Phase 1 Environmental Site Assessment
- Title Reports
- Legal Descriptions

Appraisal (9-10 months)
- Site Visit
- Valuation
- OVS Review of Appraisal
- OVS 2nd Level Review of Appraisal

Acquisition (1-6 months)
- Negotiation
- Purchase Contract (if applicable)
- Obligation Letter
- Payment Voucher
- Escrow Account

For Discussion Purposes, Subject to Change
Schedule Optimization

• Others pay for appraisals
  – Risky – OVS may not approve

• Landowner Relationships

• Address SJRRP longevity