

Mitigation Plan Review

Site Selection

Riverine Systems



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Mitigation Plan Components

332.4 (c)

1. Objectives*
2. Site selection*
3. Site protection instrument
4. Baseline information*
5. Determination of credits
6. Mitigation work plan*
7. Maintenance plan
8. Performance standards
9. Monitoring requirements
10. Long-term management plan
11. Adaptive management plan
12. Financial assurances

Mitigation Plan - Site Selection

332.4 (c)(3)

“A description of the factors considered during the site selection process. This should include consideration of watershed needs, onsite alternatives where applicable, and practicability of accomplishing ecologically self-sustaining aquatic resource restoration... at the compensatory mitigation project site. (See 332.3(d))”

Watershed 332.2

“A land area that drains to a common waterway, such as a stream, lake, estuary, wetland or ultimately the ocean.”



Watershed Approach Overview 332.3(c)

- A general framework for better decision-making
- Goal: “maintain and improve the quality and quantity of aquatic resources within watersheds through **strategic selection** of compensatory mitigation sites”
- Use of preservation, riparian areas, uplands (buffers)
- *Must be used to the extent appropriate and practicable*
- *Information and analysis must be commensurate with the scope of mitigation site (size and type of resource)*

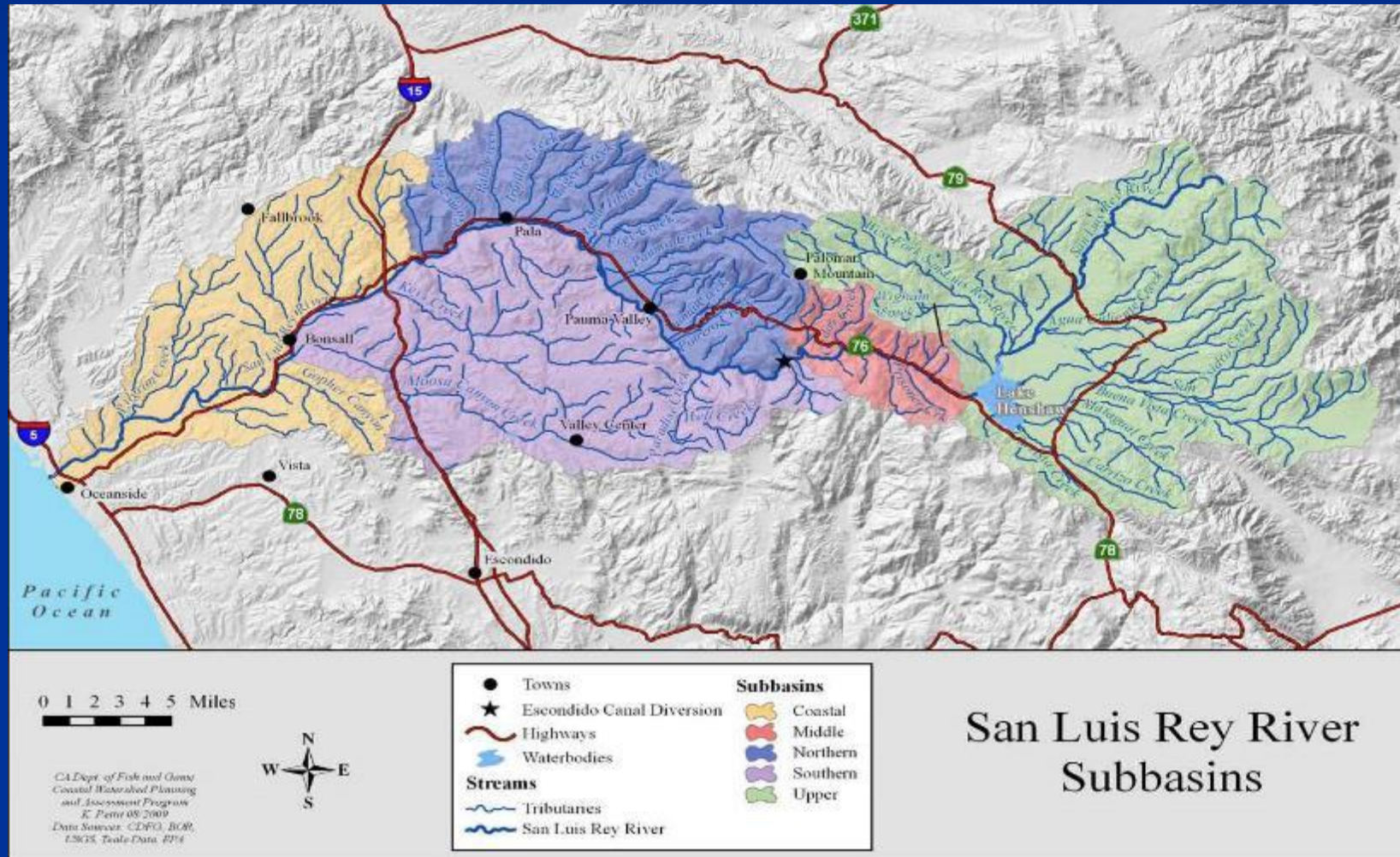


Type and Location of Mitigation 332.3 (b)

Should be within same watershed as impact AND
where most likely to replace lost functions

Watershed Approach

- Considerations:
 - Habitat diversity
 - Connectivity
 - Land use trends
 - Adjacent uses
- Marine resources
- Coastal watersheds
- Risks to aviation



General Compensatory Mitigation Requirements - Site Selection ^{332.3 (d)}

- Ecological Suitability
 - **Landscape Setting** → **Aquatic Resource Processes**
 - physical, chemical, & biological characteristics of the site
 - hydrology, soils, geology, plants and special status species
- Proposal is “natural” for the landscape position
 - Appropriate **Landscape Connections** are required for success
 - Wetland or stream class or “typology” can be naturally sustained
 - Hydrology sources and hydrodynamics are achievable
 - Soils support target plant communities
- Watershed Approach?

Site Selection Review – Riverine Focus

"Hot Button" Questions

Q1. Would the site naturally support the type of wetland or riverine system proposed?

Q2. Does the site location meet the watershed needs?

Q3. Does the condition of the watershed and drainage sub-basin allow for a restored wetland or stream?

Q4. Is the post-restoration condition self-sustainable?

Q1: Naturally Support Target Resource?

Subsurface hydrology observations

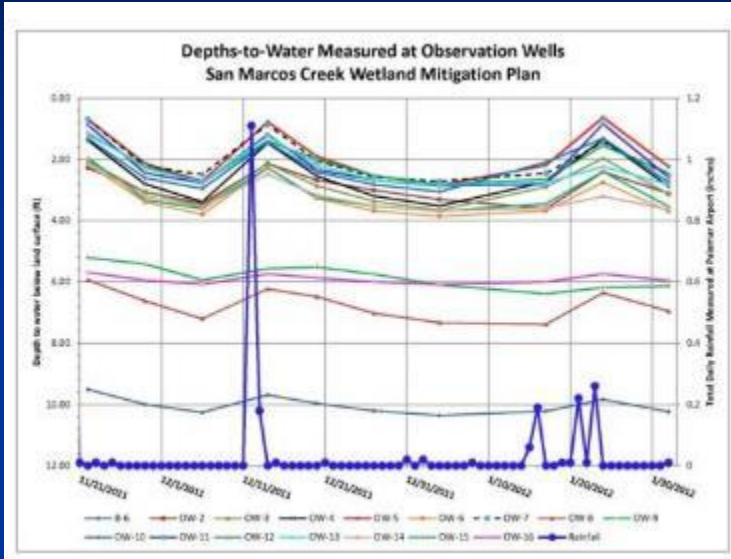
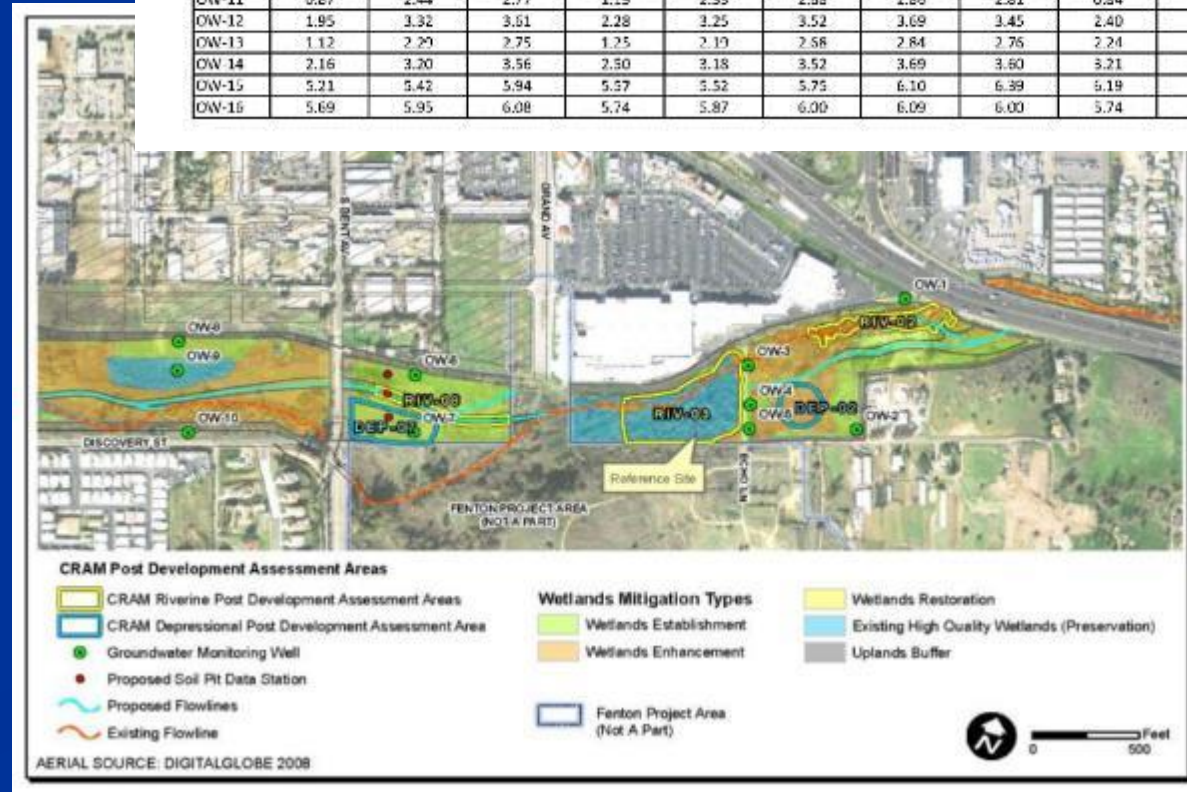


TABLE 1 - Depth of Water Below Ground Surface (feet)

| Well ID | 11/22/2011 | 11/29/2011 | 12/6/2011 | 12/14/2011 | 12/20/2011 | 12/27/2011 | 1/4/2012 | 1/17/2012 | 1/24/2012 | 2/1/2012 |
|---------|------------|------------|-----------|------------|------------|------------|----------|-----------|-----------|----------|
| B-E | 9.51 | 10.01 | 10.26 | 9.69 | 9.97 | 10.21 | 10.36 | 10.22 | 9.84 | 10.24 |
| OW-2 | 2.28 | 3.05 | 3.44 | 2.14 | 2.68 | 3.01 | 3.31 | 3.61 | 2.41 | 3.11 |
| OW-3 | 2.07 | 3.07 | 3.53 | 2.15 | 2.87 | 3.37 | 3.66 | 2.90 | 1.97 | 3.14 |
| OW-4 | 1.18 | 2.81 | 3.39 | 1.47 | 2.55 | 3.20 | 3.57 | 2.74 | 1.36 | 2.88 |
| OW-5 | 0.70 | 2.14 | 2.72 | 0.78 | 1.91 | 2.54 | 2.85 | 2.20 | 0.64 | 2.24 |
| OW-6 | 2.16 | 3.39 | 3.79 | 2.28 | 3.27 | 3.58 | 3.86 | 3.68 | 2.75 | 3.69 |
| OW-7 | 0.69 | 2.22 | 2.50 | 0.87 | 2.05 | 2.59 | 2.72 | 2.46 | 1.45 | 2.52 |
| OW-8 | 5.93 | 6.62 | 7.20 | 6.23 | 6.48 | 7.02 | 7.33 | 7.38 | 5.35 | 6.95 |
| OW-9 | 1.18 | 2.21 | 2.75 | 1.40 | 2.00 | 2.53 | 2.81 | 2.65 | 1.55 | 2.44 |
| OW-10 | 1.32 | 2.61 | 2.96 | 1.44 | 2.42 | 2.83 | 3.06 | 2.10 | 1.32 | 2.75 |
| OW-11 | 0.87 | 2.44 | 2.77 | 1.19 | 2.33 | 2.68 | 2.86 | 2.81 | 0.84 | 2.58 |
| OW-12 | 1.95 | 3.32 | 3.61 | 2.28 | 3.25 | 3.52 | 3.69 | 3.45 | 2.40 | 3.54 |
| OW-13 | 1.12 | 2.20 | 2.75 | 1.25 | 2.10 | 2.58 | 2.84 | 2.76 | 2.24 | 2.82 |
| OW-14 | 2.16 | 3.20 | 3.56 | 2.50 | 3.18 | 3.52 | 3.69 | 3.50 | 3.21 | 3.64 |
| OW-15 | 5.21 | 6.42 | 5.94 | 5.37 | 5.52 | 5.75 | 6.10 | 6.39 | 5.19 | 6.14 |
| OW-16 | 5.69 | 5.95 | 6.08 | 5.74 | 5.87 | 6.00 | 6.09 | 6.00 | 5.74 | 5.95 |

Example: Proposed mitigation is establishment of floodplain alkali marsh wetlands primarily supported by shallow groundwater. We need groundwater monitoring data to determine grading elevations.



Q2: Meets Watershed Needs?

San Luis Rey Mitigation Bank



Figure 7. Location of groundwater monitoring wells on the SLRMB, and Figures 3-6. Photo source: Wildlands, 8/1/11

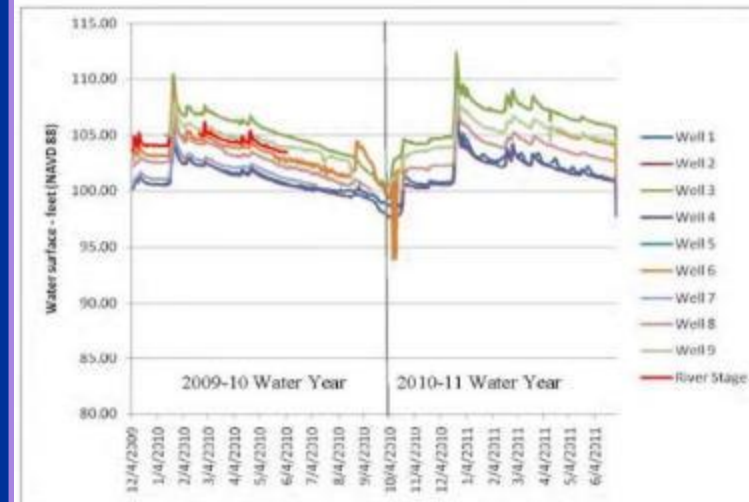
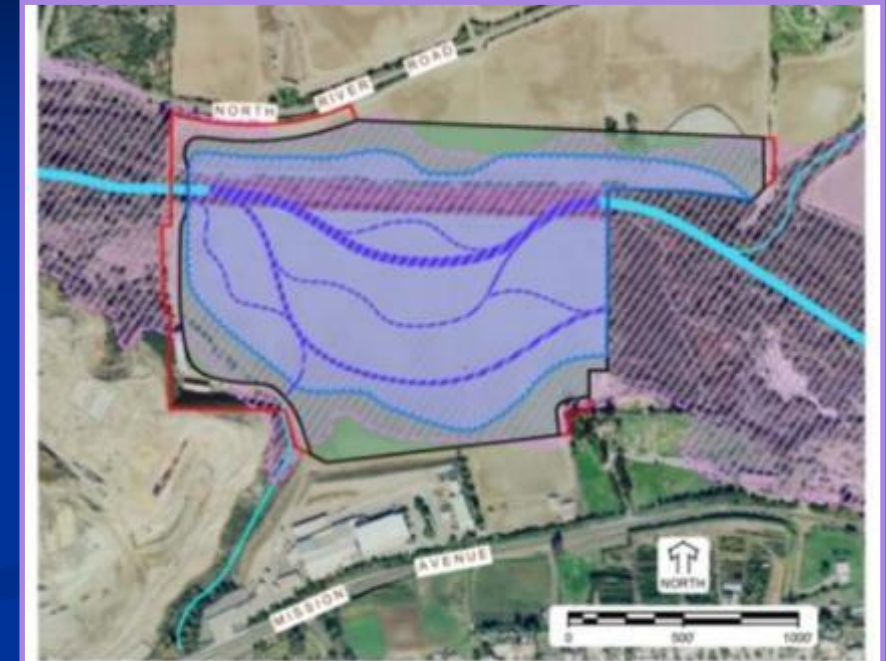


Figure 8. Groundwater elevation and river stage for the SLRMB (river stage is taken for eastern and not adjusted for gradient across the site). Data source: Wildlands, 1/8/11.



WILDLANDS

San Luis Rey Mitigation Bank
Prospectus

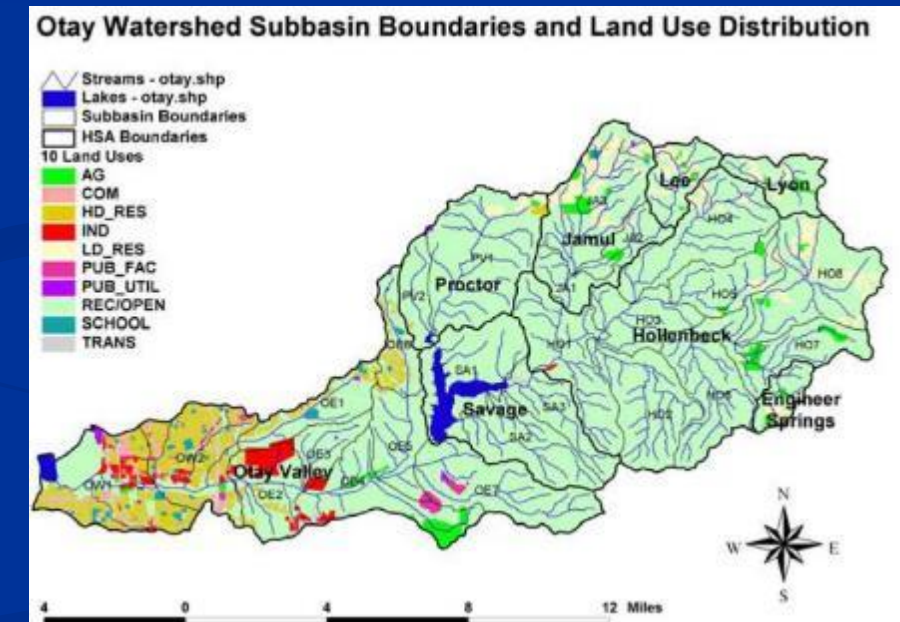
August 2, 2011 - Figure 18
Preliminary Concept Plan



Q3: Condition of Watershed?



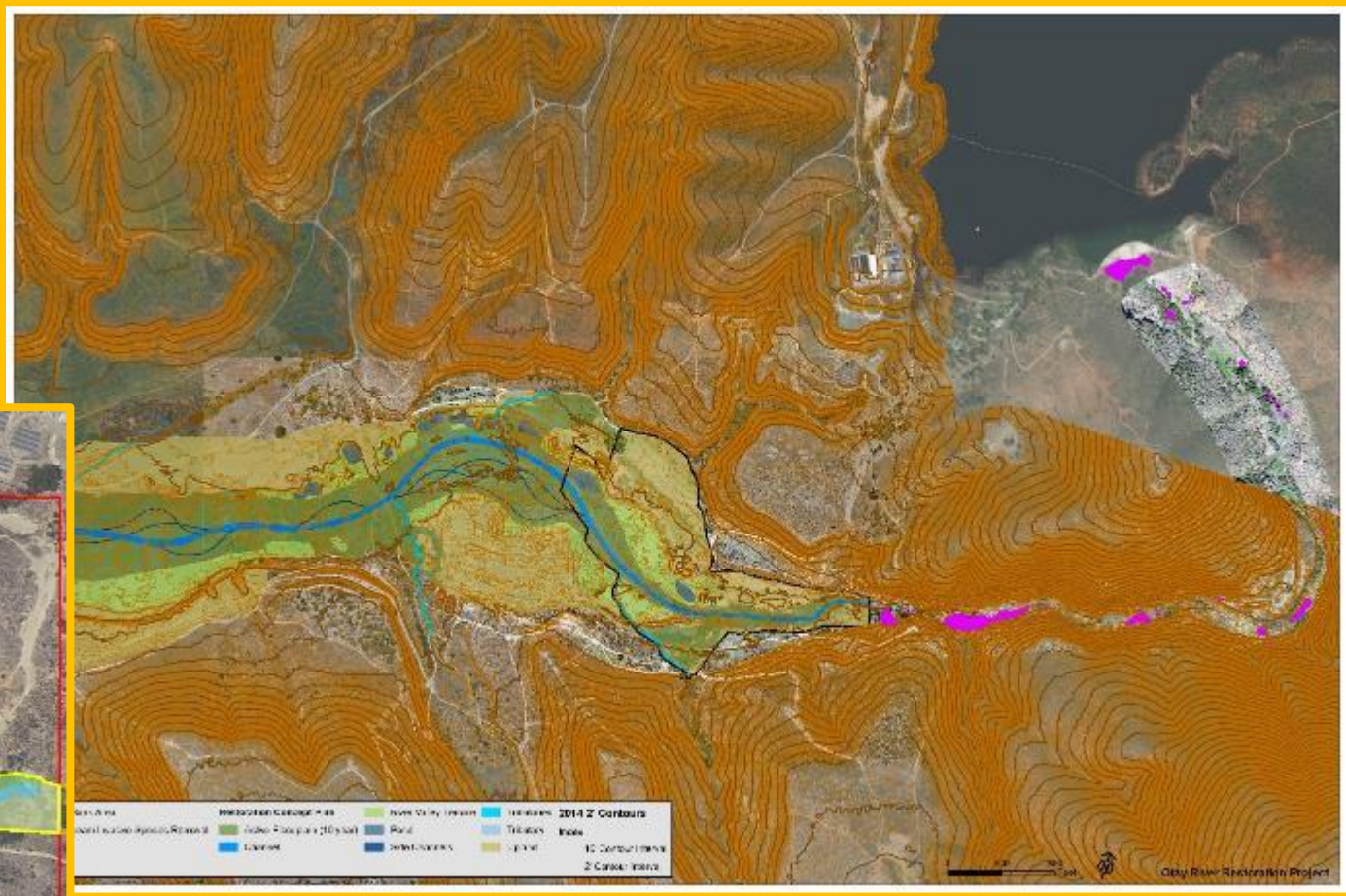
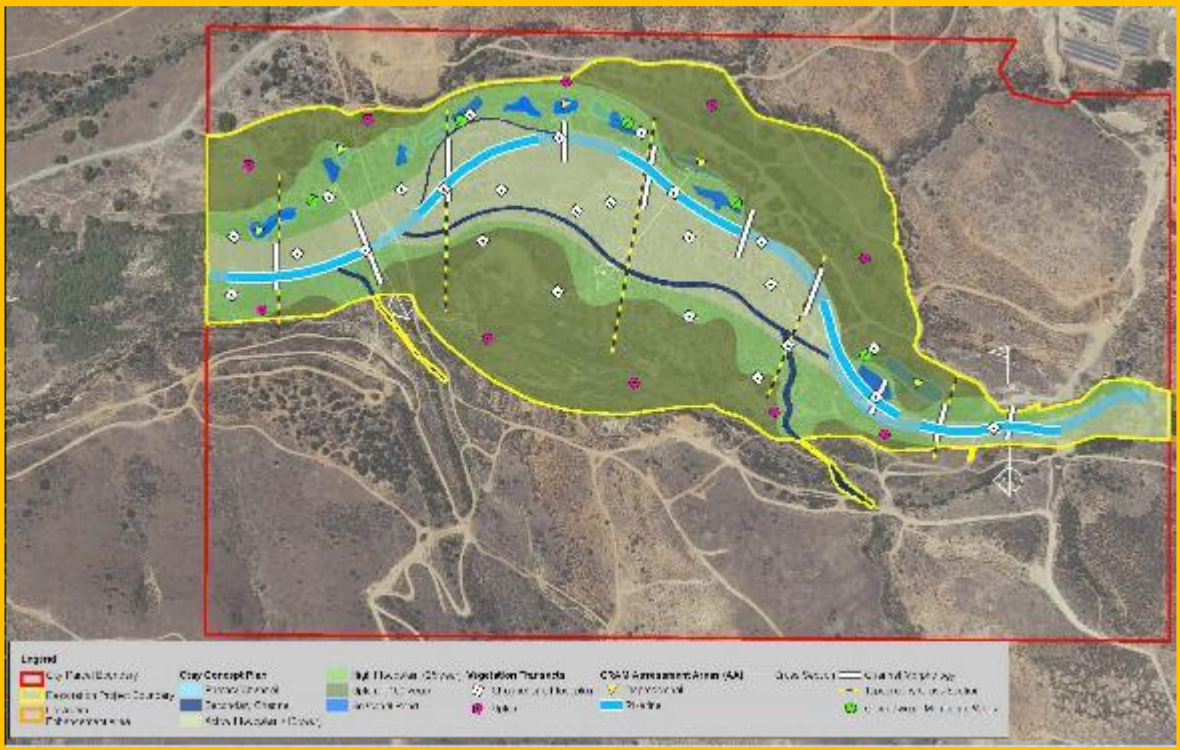
- Existing and Anticipated land use changes



Q3, Cont.

Physical characteristics

- Soils – Disturbed/Absent from Mining
- Hydrology – 30% of Historic Watershed Drains to Site



City River Restoration Project

Q3, Cont.

Enclosure 2: CRAM - Success criteria for Riverine and Depressional Assessment Areas

| DEPRESSIONAL | | | | | | | | | | | | | | | | | | | |
|---------------|----------------------------|--------------------------------|----------------------|------------------|-----------------------------|--------------|----------------------------------|-------------------------|-----------------------------|---------------------------|------------------------|-----------------------------|-------------------|--------------------------|------------|---------------------------------------|-----------------------------|------------------|---------------------------|
| AA | Buffer & Landscape Context | | | | Attribute Score (Raw/Final) | Hydrology | | | Attribute Score (Raw/Final) | Physical Structure | | Attribute Score (Raw/Final) | Biotic Structure | | | | Attribute Score (Raw/Final) | Overall AA Score | |
| | Landscape Connectivity | Buffer | | | | Water Source | Hydroperiod or Channel Stability | Hydrologic Connectivity | | Structural Patch Richness | Topographic Complexity | | Plant Community | | | Horizontal Interspersion and Zonation | | | Vertical Biotic Structure |
| | | % of Assessment Area in Buffer | Average Buffer Width | Buffer Condition | | | | | | | | | # of Plant Layers | # of Co-dominant species | % Invasion | | | | |
| DEP-02 | | | | | | | | | | | | | | | | | | | |
| Pre | D/3 | A/12 | D/3 | C/6 | 9.0/37.5 | B/9 | A/12 | B/9 | 30.0/83.4 | C/6 | C/6 | 12.0/50.0 | A/12 | B/9 | C/6 | A/12 | A/12 | 33.0/91.7 | 70 |
| Post | C/6 | A/12 | C/6 | A/12 | 16.1/67.1 | B/9 | A/12 | B/9 | 30.0/83.4 | C/6 | C/6 | 12.0/50.0 | A/12 | B/9 | A/12 | A/12 | A/12 | 35.0/97.3 | 78 |
| Year 1 | D/3 | A/12 | D/3 | C/6 | 9.0/37.5 | B/9 | A/12 | B/9 | 30.0/83.4 | C/6 | C/6 | 12.0/50.0 | A/12 | B/9 | C/6 | A/12 | A/12 | 33.0/91.7 | 70 |
| Year 3 | C/6 | A/12 | C/6 | B/9 | 14.7/61.5 | B/9 | A/12 | B/9 | 30.0/83.4 | C/6 | C/6 | 12.0/50.0 | A/12 | B/9 | B/9 | A/12 | A/12 | 34.0/94.5 | 76 |
| Year 5 | C/6 | A/12 | C/6 | A/12 | 16.1/67.1 | B/9 | A/12 | B/9 | 30.0/83.4 | C/6 | C/6 | 12.0/50.0 | A/12 | B/9 | A/12 | A/12 | A/12 | 35.0/97.3 | 78 |
| DEP-06 | | | | | | | | | | | | | | | | | | | |
| Pre | D/3 | B/9 | C/6 | C/6 | 9.6/40.2 | B/9 | A/12 | B/9 | 30.0/83.4 | C/6 | C/6 | 12.0/50.0 | B/9 | C/6 | D/3 | A/12 | A/12 | 24.0/66.7 | 64 |
| Post | D/3 | C/6 | C/6 | B/9 | 10.3/43.2 | B/9 | A/12 | B/9 | 30.0/83.4 | C/6 | C/6 | 12.0/50.0 | B/9 | C/6 | A/12 | A/12 | A/12 | 27.5/75.0 | 67 |
| Year 1 | D/3 | C/6 | C/6 | C/6 | 9.0/37.5 | B/9 | A/12 | B/9 | 30.0/83.4 | C/6 | C/6 | 12.0/50.0 | B/9 | C/6 | C/6 | A/12 | A/12 | 25.0/69.5 | 64 |
| Year 3 | D/3 | C/6 | C/6 | B/9 | 10.3/43.2 | B/9 | A/12 | B/9 | 30.0/83.4 | C/6 | C/6 | 12.0/50.0 | B/9 | C/6 | B/9 | A/12 | A/12 | 26.0/72.3 | 66 |
| Year 5 | D/3 | C/6 | C/6 | B/9 | 10.3/43.2 | B/9 | A/12 | B/9 | 30.0/83.4 | C/6 | C/6 | 12.0/50.0 | B/9 | C/6 | A/12 | A/12 | A/12 | 27.0/75.0 | 67 |
| DEP-07 | | | | | | | | | | | | | | | | | | | |
| Pre | C/6 | C/6 | C/6 | C/6 | 12.0/50.0 | B/9 | B/9 | C/6 | 24.0/66.7 | C/6 | B/9 | 15.0/62.5 | A/12 | C/6 | D/3 | C/6 | B/9 | 22.0/61.2 | 61 |
| Post | C/6 | B/9 | C/6 | B/9 | 14.1/58.9 | B/9 | A/12 | B/9 | 30.0/83.4 | C/6 | B/9 | 15.0/62.5 | B/9 | C/6 | A/12 | B/9 | B/9 | 27.0/75.0 | 72 |
| Year 1 | C/6 | C/6 | C/6 | C/6 | 12.0/50.0 | B/9 | B/9 | C/6 | 24.0/66.7 | C/6 | B/9 | 15.0/62.5 | D/3 | D/3 | C/6 | C/6 | D/3 | 13.0/36.2 | 54 |
| Year 3 | C/6 | B/9 | C/6 | B/9 | 14.1/58.9 | B/9 | A/12 | B/9 | 30.0/83.4 | C/6 | B/9 | 15.0/62.5 | C/6 | C/6 | B/9 | B/9 | C/6 | 22.0/61.2 | 68 |
| Year 5 | C/6 | B/9 | C/6 | B/9 | 14.1/58.9 | B/9 | A/12 | B/9 | 30.0/83.4 | C/6 | B/9 | 15.0/62.5 | B/9 | C/6 | A/12 | B/9 | B/9 | 27.0/75.0 | 72 |

What's Attainable?

HGM or CRAM

Example: CRAM

Pre-Project Baseline Scores
(impact and mitigation sites)

Post-Project Baseline Scores

Year 1, 3, 5 Projections (or Year 1, 5, 10)
(long-term requirement every 5 years)

Q4: Self-Sustainable?

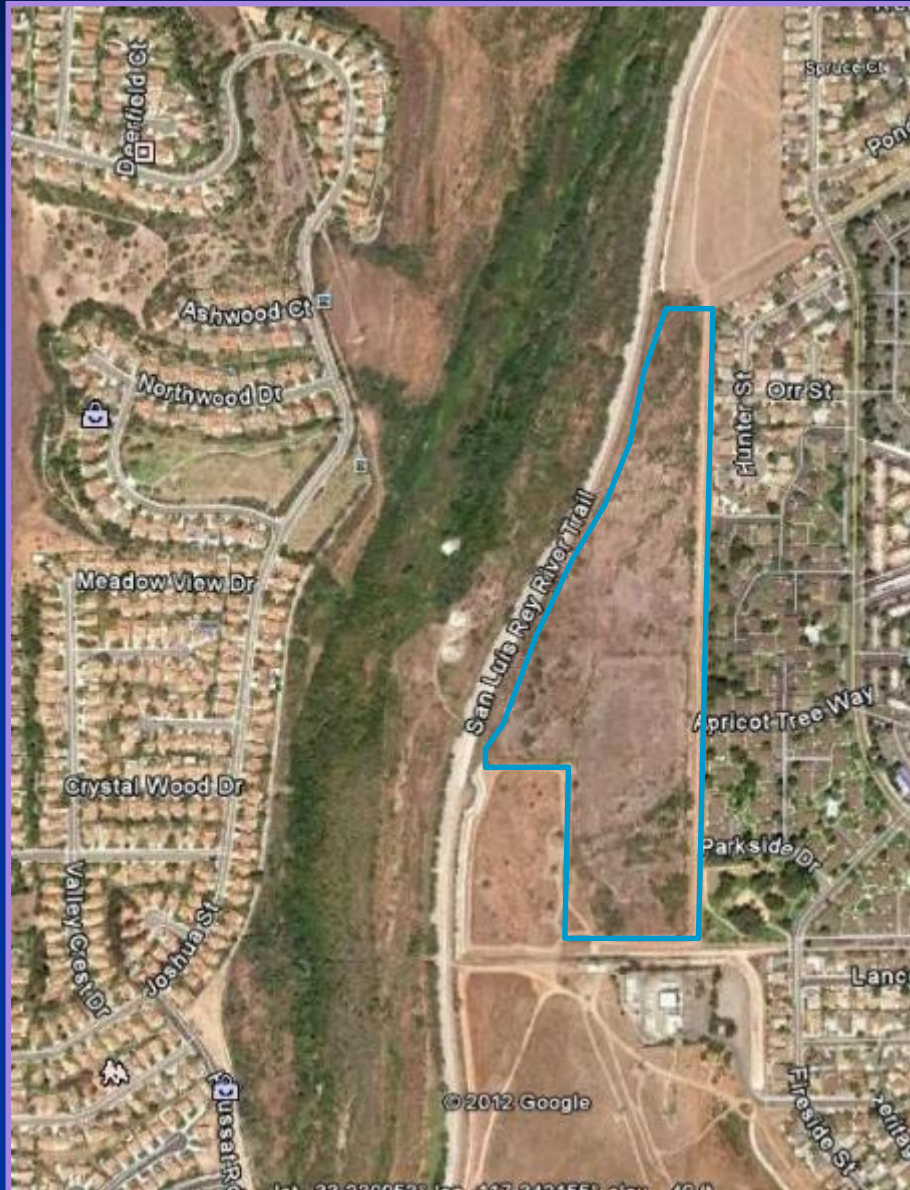
- Water source is disconnected or can be diverted or depleted
- Water source needs are engineered maintained (water rights.)
- Adjacent land uses (weeds, encroachment/trespassing/new trails, dumping, vandalism)



Q4, cont.: Poor Site Selection and Design

Corps San Luis Rey Mitigation Site:

No hydrologic connection to river



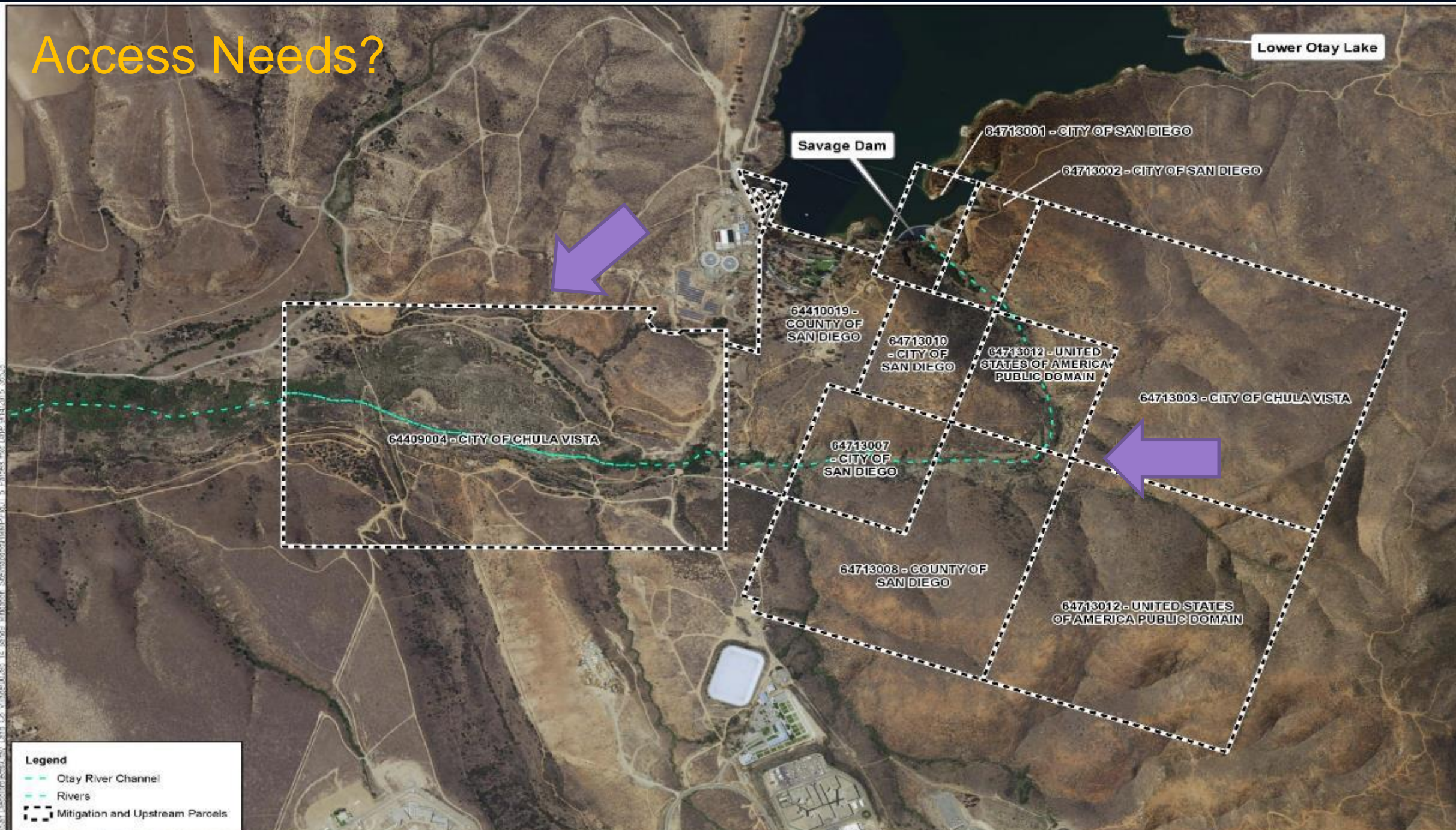
Q4: Self- Sustainable?

Additional Considerations

- Maintenance needs and costs?
- Engineered Hydrology (i.e., pumps, weirs, sluice gates)?
- Public access/vandalism/Trails (i.e., ATVs)?
- Intensive invasive species control?

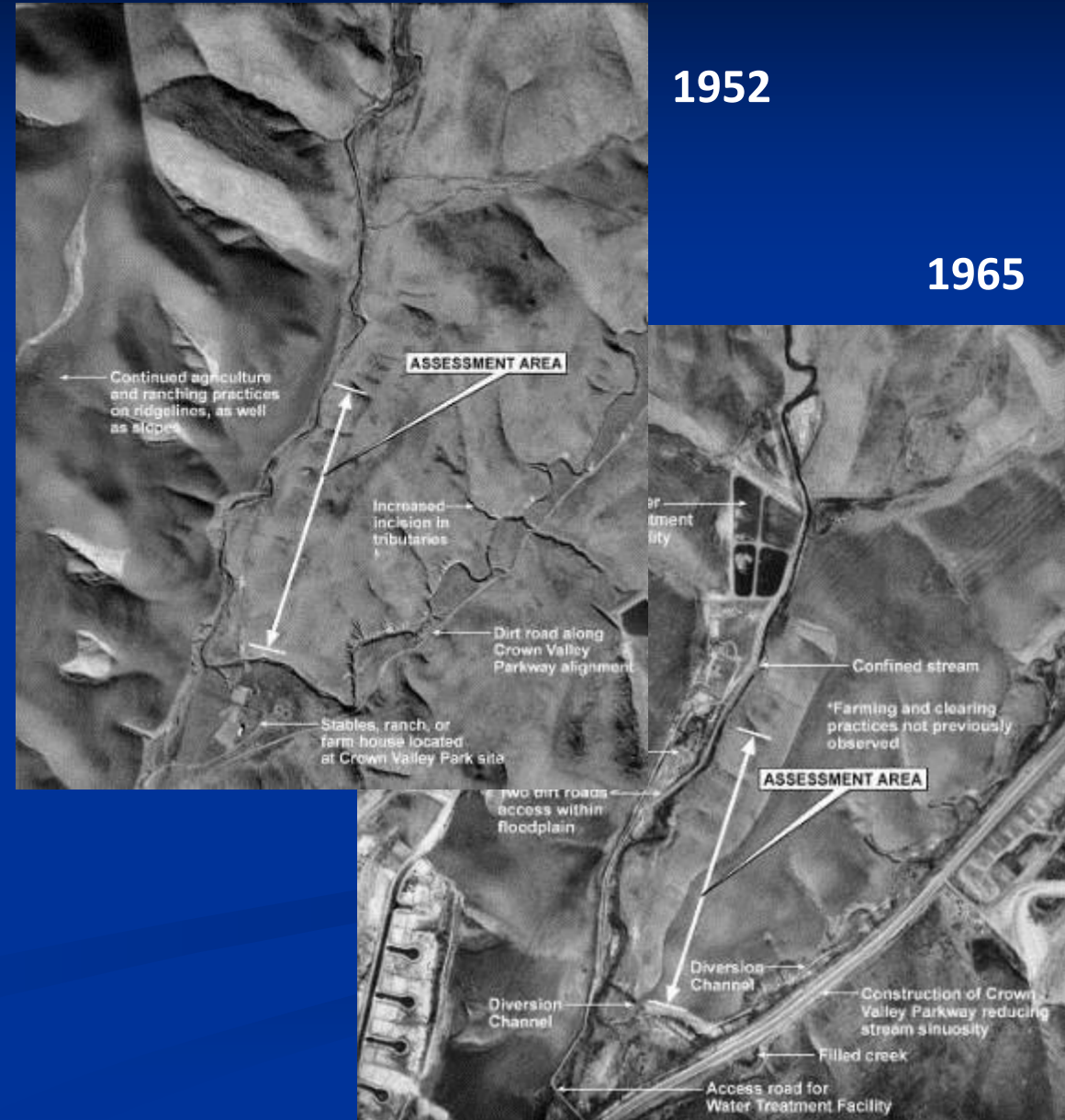


Access Needs?



Summary of Information Needs

- Historic and Current Ecological Conditions
- Classification (Cowardin, HGM, etc.)
- Existing and Target
 - Hydrology
 - Vegetation
 - Functions and Services (HGM/CRAM, etc.)
- Soils and Geology
- Topography
- Jurisdictional Boundaries
- Other constraints:
 - Property lines, utilities, easements
 - Existing structures



Work Plan Components

- Detailed written specs & descriptions including:
 - Geographic boundaries
 - Construction methods
 - Phasing schedule
 - Sources of water
 - Methods for establishing plant community
 - Control of invasive species
 - Soil management and Erosion control (BMPs)*
 - Grading Plan, Planting Plan, Irrigation Plan*

Enclosure 3
Construction Phasing, Schedule, Impacts and Mitigation Table

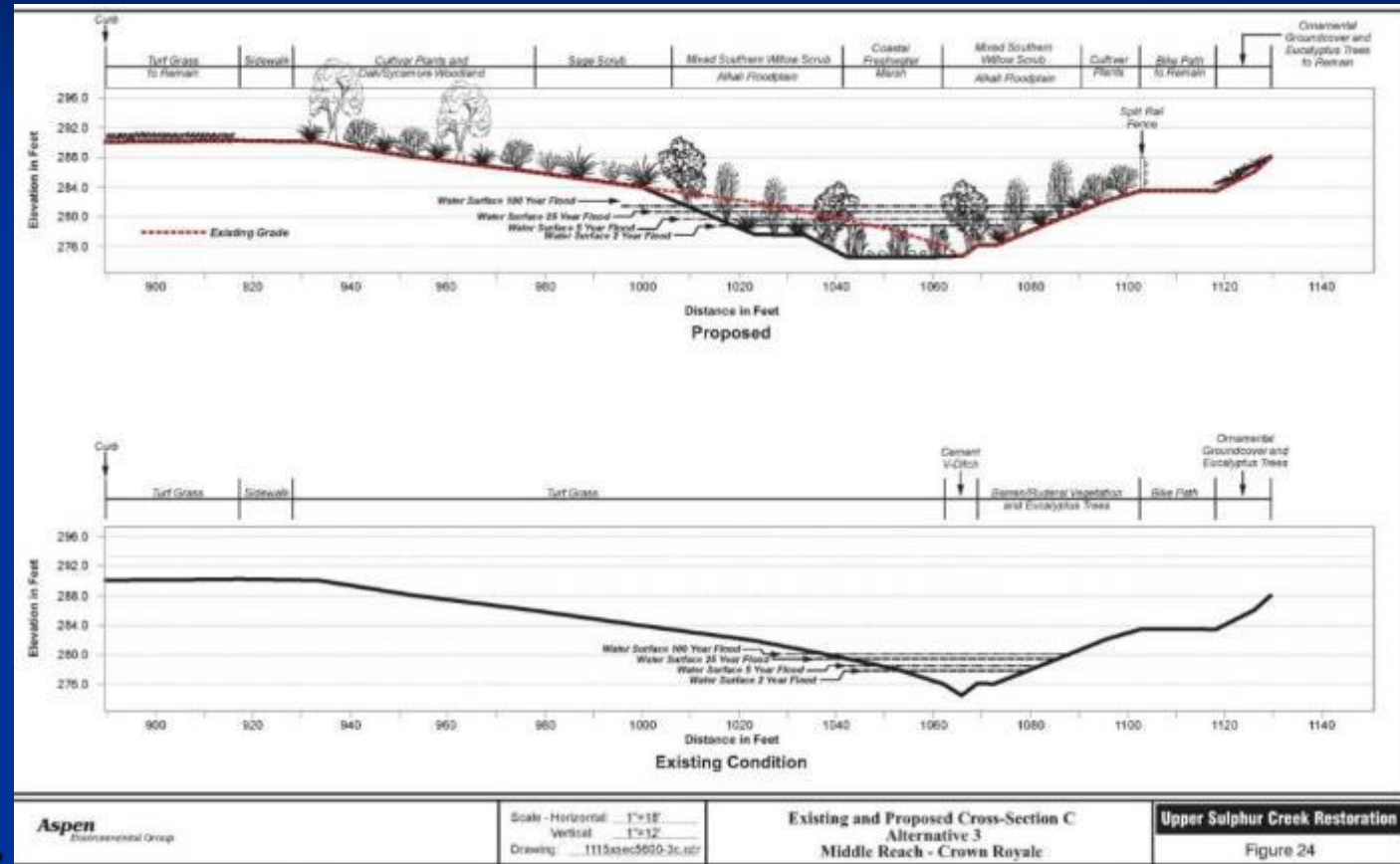
| Phase | Description | Estimated Schedule Pending Funding | Impacts/Mitigation |
|-------|---|------------------------------------|---|
| 1A | Discovery Street Widening and Floodwall between Bent and Via Vera Cruz | Fall 2012–Fall 2013 | 0.73 acres of permanent impact 0.08 acres of temp impact |
| 1B | Enhancement and Preservation from C/E Eastern Boundary to Discovery Road (C/E Western Boundary) | Fall 2012–Fall 2013 | 30.11 acres of enhancement 9.92 of preservation |
| 2A | Caltrans SR-78 Culvert Maintenance | Sept 2012 or with Phase 7 | 0.51 acres of temp impact |
| 2B | Restoration of SR-78 Culvert Maintenance Temporary Impacts and Enhancement from SR-78 to Johnston Lane (approx. 700' near fair up stream of SR-78*) | Sept 2012 or with Phase 7 | 0.51 acre restoration 0.59 acres of enhancement 0.01 acre of preservation |
| 3A | Building pad/earthen fill from Grand Ave to Las Posas Creek on north side of creek and Via Vera Cruz to McMahn on south side. | Fall 2012–Fall 2013 | 9.14 acres of permanent impact 1.26 acres of temporary impacts |
| 3B | Mitigation Implementation Between Grand Ave and McMahn | Fall 2013–Winter 2014 | 12.52 acres of establishment 1.26 acres of restoration |
| 4A | New Bridge at Bent Ave and Easement | Winter 2015–Spring 2016 | 0.24 acre of permanent impact 0.09 acre of temporary impact |
| 4B | Revegetation under Bent Ave Bridge & Easement | Winter 2016 | 7.68 acres of establishment 0.09 acre restoration 1.1 acre revegetation |
| 5A | New Bridge at Via Vera Cruz with Easement and Pedestrian Bridge at McMahn | Spring 2016–Winter 2017 | 0.43 acre of permanent impact 0.31 acre of temporary impact |
| 5B | Mitigation Implementation associated with Via Vera Cruz Bridge and Easement and McMahn Bridge | Winter 2017 | 0.83 acres of establishment |
| 6A | Construction of Embankment for widening of San Marcos Blvd. | Winter 2017– | |
| 6B | Realignment of Las Posas Creek Channel and wetland floodplain creation | Winter 2017– | |
| 7A | Caltrans Construction of SR-78 Bridge and floodplain restoration area | Fall 2017–Fa | |
| 7B | Mitigation Implementation from SR-78 project footprint east to SPA C/E boundary. (Includes fill pad removal just east of SR 78) | Fall 2017–Fa | |
| 7C | Mitigation Implementation (creation) associated with channel widening into upland/developed areas on north side of creek west of McMahn (channel widening required due to increased flood capacity from new SR-78 bridge) | Fall 2017–Fa | |

* Off-site enhancement area 700 feet upstream of SR-78 is not subject the same project requirements as the on-site compensatory mitigation from SR-78 to Discovery Road.



Riverine Work Plan Component's...

- Watershed size (drainage basin)
- Watershed land uses (% imperviousness)
- Design hydrology and sediment transport analysis
- Planform geometry (sinuosity/meander)
- Channel form (cross-sections, planned riffle-pool sequences)
- Riparian area plantings



Review of Webinar 1: Main Messages

- Landscape setting drives ecological processes
- Function reflects the integration of past and present landscape setting
- Planning successful mitigation projects begins and ends with ensuring appropriate landscape connections
 - Classification – Hydrogeomorphic (HGM) describes appropriate type based on landscape position + water source + hydrodynamics
- Resiliency of mitigation must consider current and likely future landscape processes