



Lower Squaw Creek Restoration Public Workshop

for

*The Friends of Squaw Creek
Truckee River Watershed Council
Sierra Nevada Conservancy*

Prepared by:

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May 15, 2008

Funding for this project has been provided by the Sierra Nevada Conservancy, an agency of the State of California

Sound Watershed Consulting

Creating Functional Water Environments

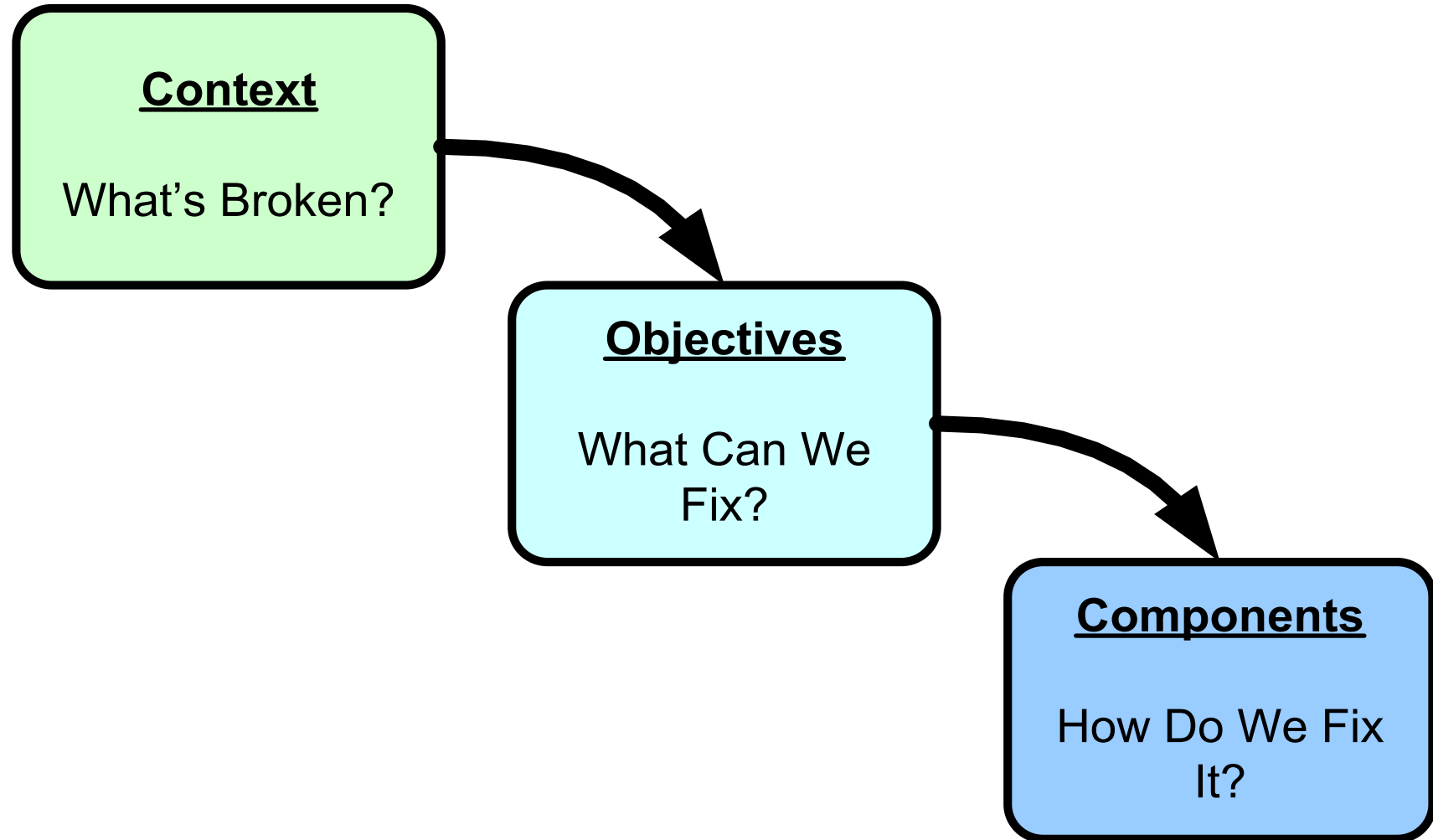


*Reach-Specific
Recommendations*

May 15, 2008

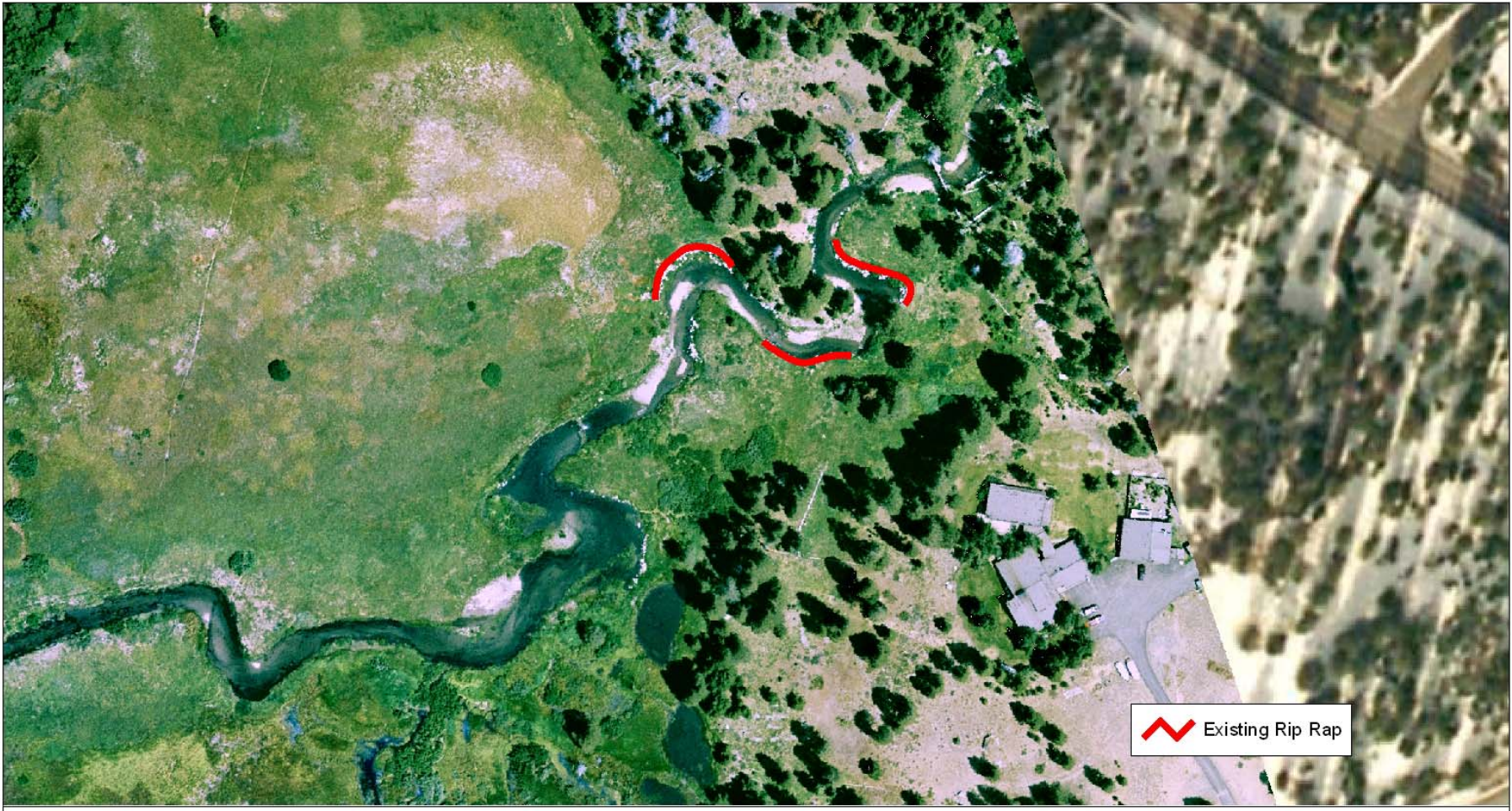


Reach Discussion Outline





Reach 1





Reach 1 - Objectives

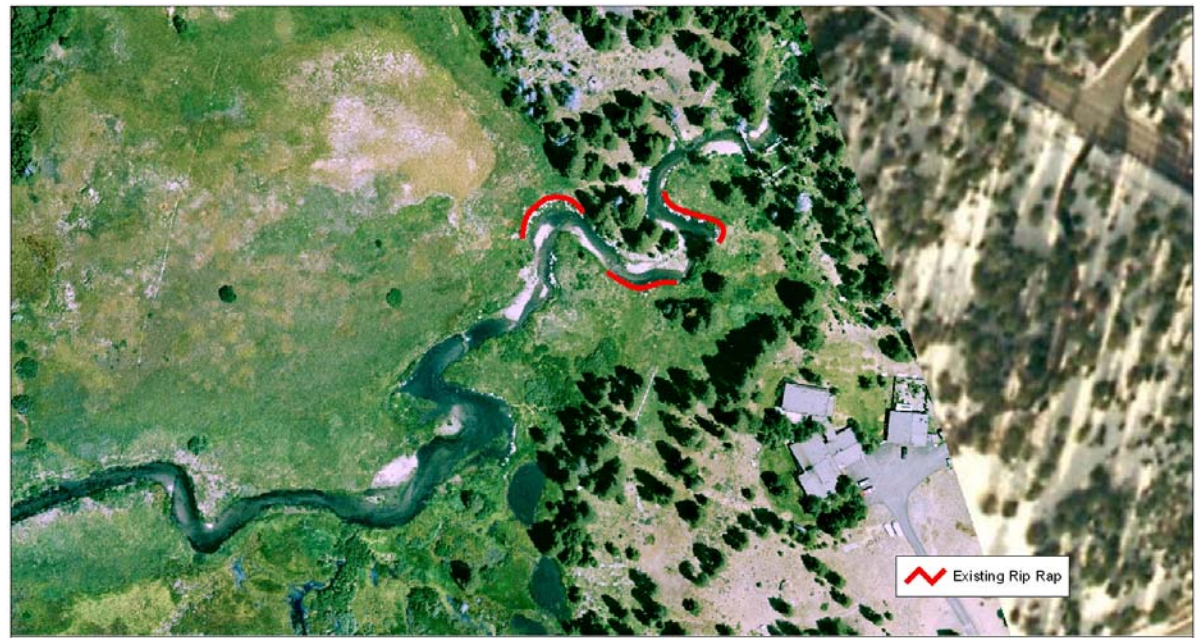
- Maintain Existing Integrity of Channel
- Address Existing Rip-Rap Condition
- Integrate Habitat Enhancements





Reach 1 – Potential Components

- Biotechnical bank stabilization
- Habitat enhancements
 - LWD, lunkers, etc





Reach 2





Reach 2 - Context

- Incised
- Straightened
- Imbalance with sediment load
- Lack of sediment storage
- Low gradient backwater





Reach 2 - Objectives

- Maintain/Improve Connection with Floodplain
- Improve Channel Complexity & Habitat-Forming Dynamics
- Reverse Channel Incision





Reach 2 – Potential Components

- Raise Channel Bed Using Aggradation Strategies
- Widen Active Channel Zone
- Reconnect Relict Floodplain Channels (protect channel re-entry points)
- Regulate Floodplain Flowpaths??
- Promote Sinuosity
- Add Habitat Elements to Channel
- Integrate Appropriate Bank Stabilization Strategies
- Integrate Appropriate Riparian Habitat Improvements



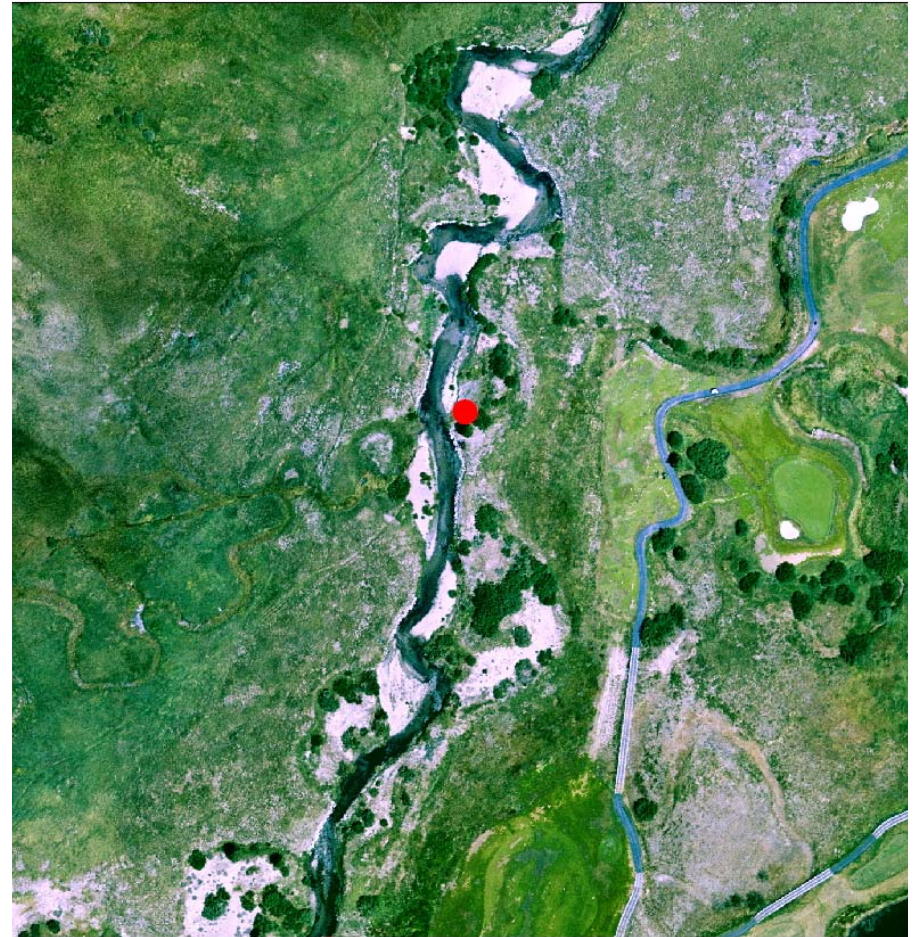
Reach 3





Reach 3 - Context

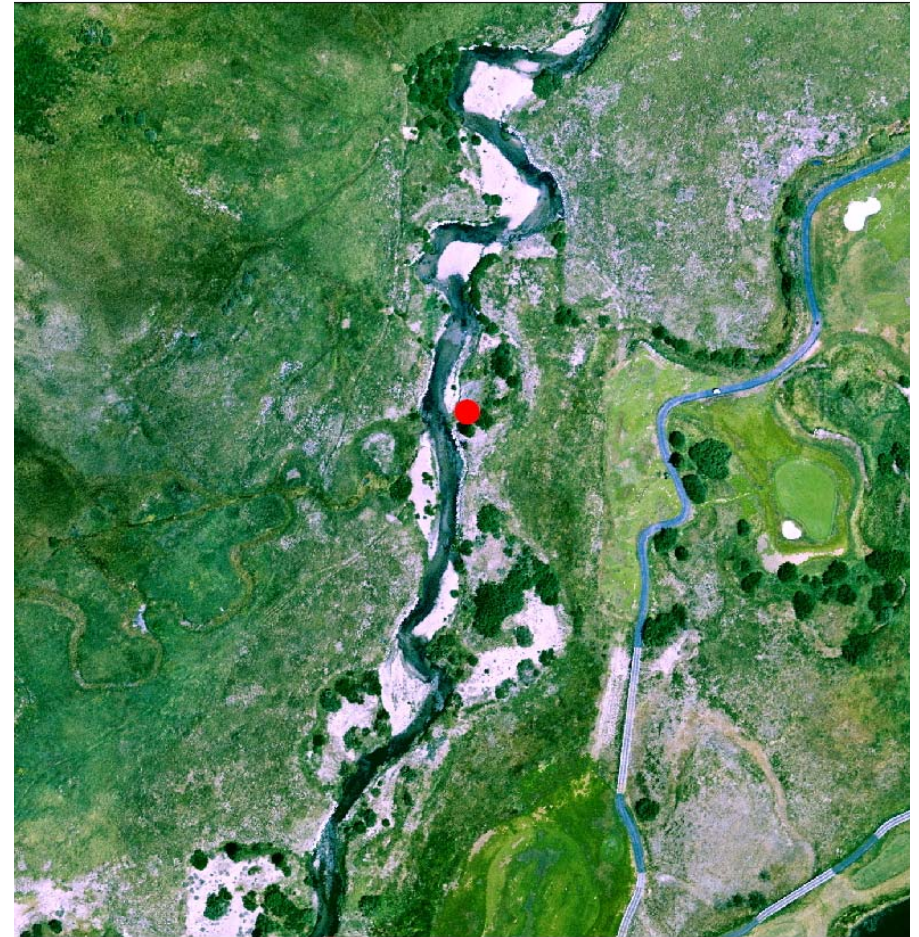
- Availability of adjacent floodplain
- Loss of sinuosity
- Increased grade
- Channel incision
- Limited bedload supply/storage





Reach 3 - Objectives

- Reconnect Channel with Adjacent Wetland
- Reconnect Floodplain Channels
- Restore Large Meadow Area
- Integrate Bank Stabilization Strategies as Appropriate



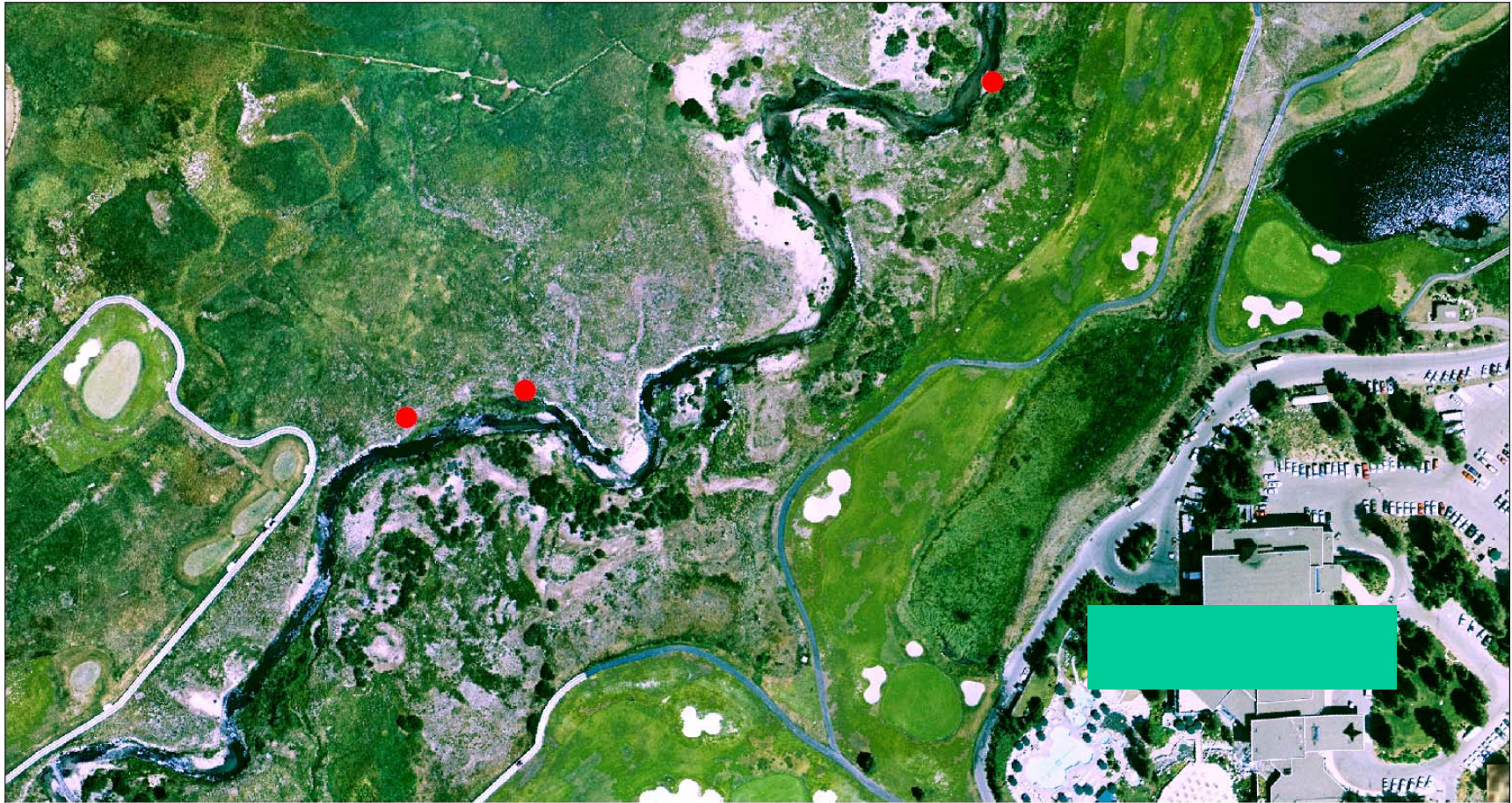


Reach 3 - Potential Components

- Raise Bed Using Aggregation Strategies
- Reconnect Relict Floodplain Channels
- Flow Diversion Strategies
- Regulate Floodplain Flowpaths? (2D modeling)
- Promote Channel Sinuosity
- Add Habitat Elements to Channel
- Add Appropriate Bank Stabilization Strategies
- Reconfigure Existing Levees
- Riparian Habitat Improvements



Reach 4



Source: Andregg (image)



0 125 250 500 Feet

figure x.x

Lower Squaw Conceptual Restoration Plan
Geomorphic Reach 4

ref. 1797





Reach 4 - Context

- Lateral transition
- Steep gradient
- Limited bedload
- Channel incised
- Unstable planform





Reach 4 - Objectives

- Control Vertical Channel Stability
- Reconnect Existing Flood Channel System
- Restore Large Meadow Area
- Increase Off-Channel Water Storage
- Increase Channel Habitat Complexity
- Regulate Bedload Distribution Patterns
- Protect existing infrastructure
- Repair banks associated with failing or ineffective rip-rap



Reach 4 - Potential Components

- Raise Bed Using Channel Aggradation Strategies
- Reconnect Relict Floodplain Channels
- Flow Diversion Strategies
- Establish Ponds & Connect Wetlands
- Regulate Floodplain Flow Paths
- Add Habitat Elements to Channel
- Promote Sinuosity
- Integrate Appropriate Bank Stabilization Features



Reach 4



Source: Andregg (image)



0 125 250 500 Feet

figure xx

Lower Squaw Conceptual Restoration Plan
Geomorphic Reach 4

ref. 1797





Reach 4



Source: Andregg (image)



0 125 250 500 Feet

figure x.x

Lower Squaw Conceptual Restoration Plan
Geomorphic Reach 4

ref. 1797





Reach 5



Source: Andregg (image)



0 125 250 500 Feet

figure x.x

Lower Squaw Conceptual Restoration Plan
Geomorphic Reach 5

ref. 1797





Reach 5 - Context

- Coarse bedload deposition
 - Limits incision
 - Channel widening
- Disconnected from Floodplain
- Constrained by existing infrastructure





Reach 5 - Objectives

- Integrate aquatic environment into existing wetland areas
- Regulate the distribution of bedload sediment
- Protect existing infrastructure
- Repair banks associated with failing or ineffective rip-rap
- Reduce eutrophication





Reach 5 – Potential Components

- Connect Channel to Wetland & Ponds on Floodplains
- Reconfigure Existing Levees
- Flow Diversion Strategies
- Add Side Channels
- Locally Narrow Active Channel Zone
- Integrate Bank Stabilization Features
- Add In-Stream Habitat





Reach 5



Source: Andregg (image)



0 125 250 500 Feet

figure xx

Lower Squaw Conceptual Restoration Plan
Geomorphic Reach 5

ref. 1797





Reach 6





Reach 6 - Context

- Channel Incision
- Failing rip-rap
- Lack of summer storage
- Bridge hydraulic effects
- Coarse bedload transport
- Habitat benefits limited
- Trapezoidal influence
- Failing mitigation





Reach 6A – Olympic Channel

- Objectives
 - Establish off-channel Wetland or Pond
 - Restore a natural channel
 - Improve erosion control systems & features





Reach 6 - Objectives

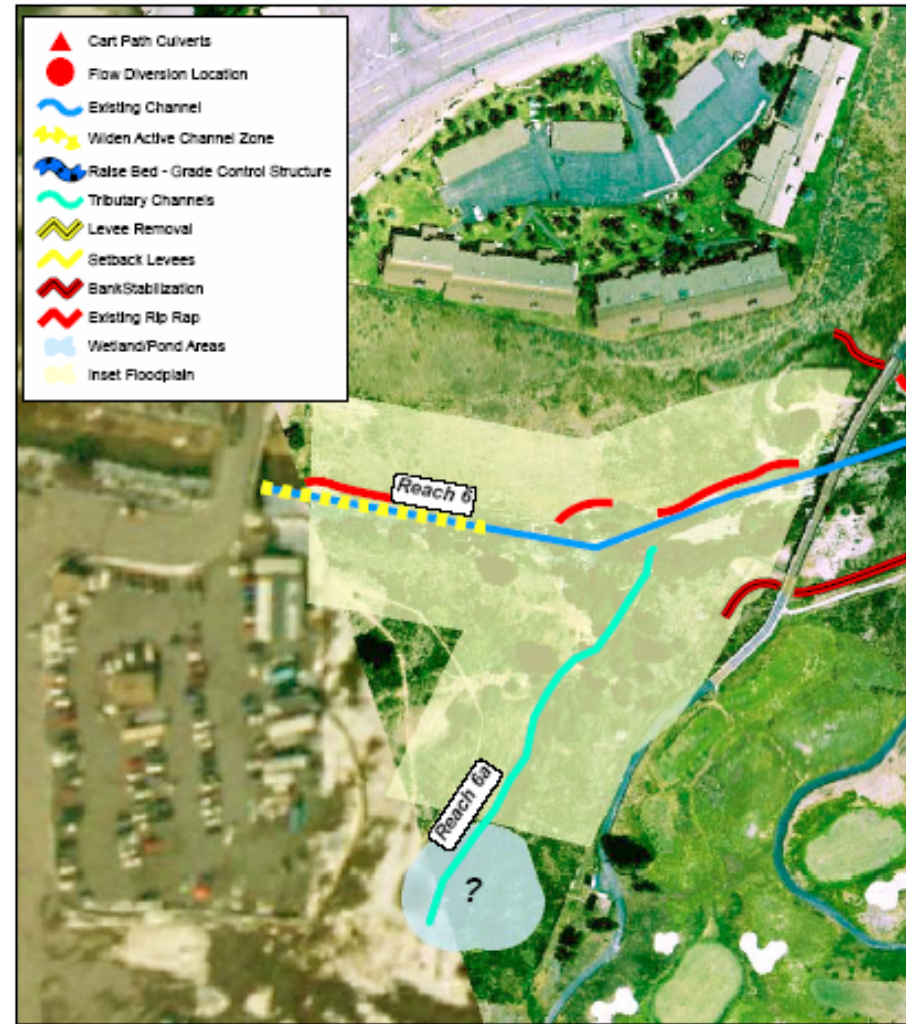
- Reduce energy from flows exiting the trapezoidal channel
- Improve floodplain connectivity while protecting existing structures
- Improve summer and fall in-stream flow conditions
- Repair failing or ineffective rip-rap
- Protect existing infrastructure





Reach 6A – Olympic Channel

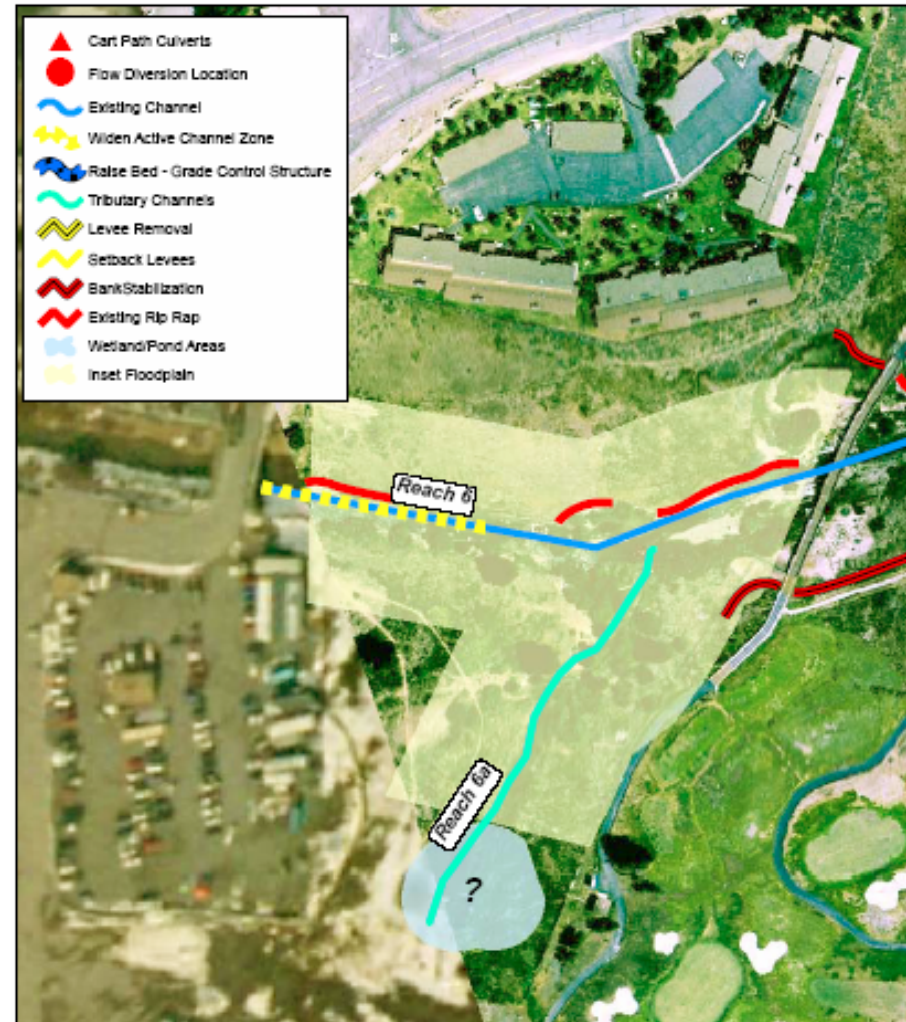
- Components
 - Off-channel storage
 - Inset floodplain
 - Remove failing erosion controls
 - Restore stable channel & banks





Reach 6 - Potential Components

- Restoration Components
 - Create Inset Floodplain
 - Widen Active Channel
 - Integrate Channel Stabilization into Banks
 - Regulate Bedload Deposition
 - Riparian Improvements





**How do we focus on
the right combination
of restoration
components?**