



**Lower Squaw Creek Restoration  
Preliminary Phase 2.2  
PRELIMINARY DRAFT  
Scope of Work v1.2**

*for  
The Friends of Squaw Creek  
Truckee River Watershed Council*

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# Lower Squaw Creek Restoration

## Preliminary Draft Scope of Work v1.2

### Phase 2.2

May 19, 2009

Sound Watershed Consulting (SWC) is pleased to provide this preliminary draft proposal for the next phase of the Squaw Creek Restoration Project. While current State funding for the project is frozen, this preliminary draft scope identifies a series of tasks that can be accommodated under a range of funding scenarios.

Phase 1 of the project consisted of a conceptual restoration design report compiled by Philip Williams and Associates. Phase 2.1 consisted of a series of 3 workshops that included discussions with the general public, floodplain experts, and creek restoration experts. The conclusion of these workshops is summarized by a series of documents available at [www.soundwatershed.com/Squaw.htm](http://www.soundwatershed.com/Squaw.htm)

SWC will work closely with the Friends of Squaw Creek (FOSC), the Truckee River Watershed Council (TRWC), and appropriate sub-consultants in the course of moving this project forward. The specific consulting team will be identified as funding is released. We will continue to draw sub-consultants from the talented pool of scientists, engineers and consultants who participated in the Phase 2.1 workshops.

## **PHASE 2.2 – REVISED CONCEPTUAL DESIGN PHASE TASKS**

The following section describes the current scope of work necessary to move the project forward as discussed in relevant Technical Workshops and meetings with key stakeholders. These project tasks were developed with the assumption of full funding from the Sierra Nevada Conservancy grant. However, this grant has been frozen since December 2008 due to the fiscal challenges of the State of California.

### ***Alternative Components***

The preferred alternative involves reconnecting Squaw Creek with its relict channel system, and developing a similar design channel along the western portion of the meadow downstream of the golf course. The existing channel in the areas that will be evacuated by the new channel will be partially to completely filled and/or converted into swales,

wetlands or localized pond features. A number of other features will be added to remove failed rip-rap, stabilize banks, create inset floodplain features, reconnect wetlands and provide localized grade controls. Finally, strategies to address high bedload supply rates and the effects of the Trapezoidal Channel will be developed.



Figure 1) Project Reach Breaks

To achieve this design, several tasks have been identified as appropriate at this phase of the project given the scale of available funding, as described below. These tasks are

### CONCEPTUAL STREAMFLOW IMPROVEMENT ALTERNATIVES

In previous phases of this project, we identified that restoration actions alone may not provide sufficient late-season water flows. To promote late seasonal flows in the upper meadow, we've recommended the development of on-channel and off-channel storage sites and associated discharge mechanisms including channels and associated constructed wetland systems. Several preliminary sites have been identified, and include:

- Searchlight Pond
- Upwelling near Well 18-3R
- Confluence Delta
- North Fork Storage Sites
- Trapezoidal Channel Storage
- Lost Lake
- Hidden Lake

- Others?

This task will evaluate the feasibility and develop conceptual alternatives for these sites. We will review existing reports, drawings, surveys, and plans; perform field investigations of each site; develop calculations based on site configurations; and will engage appropriate landowners, regulators and other stakeholders.

For each site, we will identify and describe the opportunities, constraints, potential features, and benefits associated with developing the site as a summer water storage facility. These descriptions will include planform maps, site drawings, schematics, and typical cross-sections. Base drawings will be modified from existing documents to the extent they are available.

### **CONCEPTUAL REFINEMENTS & PRELIMINARY RESTORATION DESIGN**

In previous phases of this project, we identified broad support for a full restoration strategy similar to Alternative 2, but amended to address the trapezoidal channel. There was consistent concern that the work done to date has not sufficiently addressed the Trapezoidal Channel effects and potential solutions. There is also broad agreement that additional detail is appropriate to describe this alternative.

The project area will be extended to include the confluence of the North Fork and South Fork, and sufficiently upstream to accommodate processes that directly impact the delta at the confluence.

There are also significant long-term risks in leaving the lower (incised) channel in its existing alignment. The lower meadow controls hydraulic and storage conditions that affect the upper reaches.

Thus our development of Alternative 2-Plus will:

- Expand the project footprint to include the trapezoidal channel (Reach 7) and confluence delta (Reach 8)
- Develop additional detail to mitigate for the effects of the Trapezoidal Channel in Reaches 5 & 6
- Develop Preliminary Designs for bank stabilization projects in Reaches 3, 4 & 5 that are in alignment with the full restoration design but can be implemented independently if desired
- Identify a preferred alignment for restoration of relict secondary channels in Reaches 1-4, including structural elements that will

support restoration of these features (e.g. plugs, ponds, grade controls, etc).

- Identify conceptual strategies for mitigating current bedload delivery to Reaches 4, 5 & 6

To develop these additional conceptual design elements, SWC will perform a series of analytical and survey tasks that will include:

- 1) **Hydrologic Analysis** – review and analysis of streamflow data for the three stations maintained by SVPSD within Squaw Valley, and comparison to USGS Blackwood Creek station, the Tahoe City climate station, and other data sources that can be used to extend the record and validate preliminary estimates developed during Phase 1. Analysis will develop flood frequency estimates, identify peak flow regimes, and evaluate historic flow duration patterns.
- 2) **Extend Topographic Survey**– SWC will identify and review existing survey data for the trapezoidal channel to extend our existing ground survey data into Reaches 7 and 8. Sources will include Squaw Valley Ski Corp and Carl Gustafson. If data is not compatible with existing data and current conditions, SWC will augment the existing survey with a preliminary field topographic survey to identify elevations for the bed and banks through the trapezoidal channel and confluence delta (contingent on sufficient funding).
- 3) **Preliminary Sediment Supply Evaluation** – coordinating with Squaw Valley Ski Corp, Lahontan RWQCB, SVPSD and others, SWC will compile and review existing data on sediment supply for sand, gravel and cobbles. Where data is incomplete, SWC will characterize sediment sizes, sources and supply volumes through a) field reconnaissance of sediment sources, b) sediment transport calculations, c) hydraulic entrainment thresholds, d) empirical comparison to other local studies, and e) grain size analysis of existing gravel bar deposits
- 4) **Revised Conceptual Drawings** – using existing GIS data, historical maps, survey data, and existing conceptual designs, SWC will revise conceptual planform maps and drawings to incorporate additional detail developed in Phases 2.1 and 2.2.
- 5) **Phase Implementation Plan** – we will articulate a phased implementation plan that will identify for each restoration component the additional design requirements, permitting requirements, cost estimates, and approximate phasing.

To the extent funding and data are available, we will extend these design tasks beyond conceptual-level designs toward preliminary designs at the 10-25% design level.

## **PROJECT MANAGEMENT & REPORTING**

In addition to these technical tasks, funding will also support various other tasks including (but not limited to) meetings, grant writing, strategic development, stakeholder outreach, facilitation, document preparation, etc.

The general deliverable for funded tasks will be compiled into one or more technical reports that will contain the technical data, calculations, maps, tables, photos, sketches and restoration component descriptions.

## **ADDITIONAL TASKS**

Several additional tasks have been identified that extend beyond the available funding. These include (but are not limited to):

- A Floodplain Routing Model and Water Budget
- Hydraulic Modeling – to support the detailed design of the new channel alignment.
- Permitting – for the major restoration actions
- Updated stream cross-sections
- Comprehensive bedload supply & transport study
- Botanical & Biological surveys for permitting and wetland design

The actual studies and additional tasks that will be required will depend on the results of preliminary design work, perceptions of permitting agencies, and the risk tolerance of landowners.

## **SCOPE ALTERNATIVES**

We consider three possible funding scenarios for 2009, given the current fiscal condition of the State and the existing freeze of Sierra Nevada Conservancy grant funds:

- A \$20,000 funding level, supported primarily by funds from the Lahontan Regional Water Quality Control Board, associated with the Red-Dog Diesel Spill.

- A \$45,000 funding level that also includes \$25,000 from Placer County.
- A \$68,000 funding level should the remaining SNC grant funds become available.

We are also working to identify additional near-term funds from several sources, including:

- An additional \$50,000 from Lahontan RWQCB associated with the Red-Dog Diesel Spill.
- National Fish & Wildlife Foundation Sierra Nevada Meadow Restoration Keystone grant
- Others (to be developed)

Given the uncertainty in funding, we've outlined three scenarios for how to spend the available monies. The objective here is to move smaller projects toward implementation in the short-term to the extent that available funding will allow.

**The selection of projects carefully considered the existing information, critical data needs, and the sequencing of components required to meet certain objectives.**

### ***\$20,000 Alternative***

The focus of this alternative will be to move forward with design and (to the extent funding is available) implementation of one of the Potential Streamflow Improvement projects. The two candidates for streamflow improvement at this budget scale include:

- Upwelling Near Well 18-3R
- Searchlight Pond

In either case, the scope will include feasibility evaluation, site design, permitting and implementation. Initial efforts will develop and evaluate alternatives for each site, identified costs, facilitate landowner cooperation, develop permits, and support construction activities. It's unlikely that both projects can be fully funded at this level, so a preferred project will need to be selected after initial investigation of each site is complete.

This Alternative will also require hydrologic analysis to remain compliant with the funding requirements identified by Lahontan RWQCB.

### **\$45,000 Alternative**

The focus of this alternative will be to address the items described above, as well as several additional objectives:

- Additional conceptual-level designs for 2 additional streamflow improvement sites (Confluence Delta & NF sites)
- Conceptual-level design refinements for Reaches 5-8, and a restored channel alignment
- One or more construction-ready, high-priority bank stabilization projects along selected banks (most likely within Reaches 5 and 6)
- A preliminary implementation plan that will identify potential project phasing

### **\$68,000 Alternative**

This alternative would accomplish most of the tasks as described in the Revised Conceptual Design Phase Tasks section above.



	\$20K Alt	\$45K Alt	\$68K Alt
<b>Potential Streamflow Improvements</b>			
Searchlight Pond			
Upwelling Near Well 18-3R			
Confluence Delta			
North Fork Storage Sites			
Trapezoidal Channel Storage			
Lost Lake			
Hidden Lake			
<b>Alt 2-Plus Refinements</b>			
Hydrologic Analysis			
Extend Topographic Survey			
Preliminary Sediment Supply Evaluation			
Bedload Freedom Zone Strategies			
Revised Conceptual Drawings			
Reach 8			
Reach 7			
Reach 6			
Reach 5			
Reach 4			
Reach 3			
Reach 2			
Selected Priority Bank Stabilization			
Channel Alignment Lower Section			
Channel Alignment Upper Section			
<b>Phased Implementation Plan</b>			
<b>Additional Funding Grant Opportunities</b>			

<b>Level of Effort (Goal)</b>	
Construction-Ready Project(s)	
Preliminary Design Level (10-25%)	
Conceptual Design Level (10%)	