Meeting with St. Vrain Coalition

Flood Planning & Preliminary Design Services for South St. Vrain Creek Restoration at Hall Ranch

St. Vrain Coalition Meeting: Design Alternatives

June 30, 2016
Introduction

- Purpose of meeting: Design Alternatives

Project website
- www.BoulderCountyOpenSpace.org/ssv
Project Area

South St. Vrain Creek Restoration Planning Area

Hall Ranch Open Space

Hall II Open Space

Guru Ged Open Space

Hall Valley Ranch Open Space
Design schedule

- Notice to Proceed: May 2016
- Alternatives Compiled: June 2016
- Preferred Alternative: July 2016
- 30% Draft Design: August 2016
- Final Deliverable: September 2016
Work to Date

- Riparian and Wetland Assessment
- Aquatics and Terrestrial Concerns
- Sediment Sampling
- Homeowner Meetings
- Existing/Ongoing Project Coordination
Project Goals Statement

Provide a conceptual design for the entire South Saint Vrain Creek project area that restores and improves the channel and surrounding floodplain areas to a safe, natural, resilient, functioning, and ecologically rich habitat. This project will use qualitative research, quantitative data, and community input to inform resilient design that shall utilize natural system principles and onsite materials to expedite recovery from the 2013 floods and set up for better performance in future flood events. Components to meet goals include incorporating natural channel diversity and character, re-establishing floodplain benches for lateral connectivity, reducing longitudinal connectivity constraints, improving flow conveyance and sediment transport to maintain environmental values, promote naturally functioning stream processes, protect public and private infrastructure, improve public safety, repair unstable erosion scars in high-risk areas, and revegetate denuded areas.
Decision Making Process

**Parks & Open Space**

Provide a conceptual design for the entire South St Vrain Creek project area that restores and improves the channel and surrounding floodplain areas to a safe, natural, resilient, functionally, and ecologically rich habitat. Provide a preliminary design for the EWP project reach. This project will use qualitative research, quantitative data, and community input to inform resilient design that shall utilize natural system principles and onsite materials to expedite recovery from the 2013 floods and set up for better performance in future flood events. Components to meet goals include incorporating natural channel diversity and character, re-establishing floodplain benches for lateral connectivity, reducing longitudinal connectivity constraints, improving flow conveyance and sediment transport to maintain environmental values, promote naturally functioning stream processes, protect public and private infrastructure, improve public safety, repair unstable erosion scars in high-risk areas, and revegetate denuded areas.

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### South St. Vrain Creek Restoration at Hall Ranch Decision Making Process:

<table>
<thead>
<tr>
<th>Project Goals</th>
<th>Core Values</th>
<th>Critical Issues Paraphrased from Stakeholder Comments</th>
<th>Prioritization Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Community</td>
<td>- Communicates with the residents</td>
<td>1. Protect critical public and private infrastructure?</td>
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<td>- Incorporate residents needs in alternative analysis</td>
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<td>- Be mindful of impact of property value</td>
<td>2. Avoids negative impacts to downstream infrastructure, channel and stormwater systems?</td>
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<td>- Consider the affects work will have downstream</td>
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<td>- Consider recreational opportunities</td>
<td>3. Improves aesthetics to the creek corridor?</td>
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<td></td>
<td>Resiliency</td>
<td>- Increase aesthetic appeal</td>
<td>4. Consider recreation where allowed?</td>
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<td></td>
<td></td>
<td>- Consider existing water rights</td>
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<td>- Minimize impact to cultural and historic features</td>
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<td></td>
<td>Safety</td>
<td>- Improve “Creek Conveyance”</td>
<td>5. Benefits larger area of creek corridor?</td>
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<td></td>
<td></td>
<td>- Improve creek stability</td>
<td>6. Re-establish floodplain connectivity?</td>
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<td>- Reduce risk to critical infrastructure</td>
<td>7. Restores affected areas of the South St Vrain Creek channel and surrounding areas to stable, resilient and ecologically rich habitats?</td>
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<td></td>
<td>Environment</td>
<td>- Restore natural ecosystem process</td>
<td>8. Reduces future recovery time?</td>
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<td></td>
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<td>- Reconnect the floodplain</td>
<td>9. Improves conveyance of sediment?</td>
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<td></td>
<td>Implementation</td>
<td>- Assess existing environmental conditions</td>
<td>10. Reduce flood risk to the public and residents by providing long term solutions that increase resiliency?</td>
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<td></td>
<td></td>
<td>- Reduce sedimentation in general</td>
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<td>- Improve wildlife habitat (banking opportunities)</td>
<td>11. Natural ecosystem processes restored?</td>
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<td>- Increase channel capacity to accommodate future flooding</td>
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<td></td>
<td>- Work with natural systems</td>
<td>12. Protects or improves existing habitat and significant ecological resources?</td>
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<td></td>
<td>- Improve fish passage and habitat</td>
<td>13. Incorporates locally available materials and environmentally friendly processes?</td>
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<td></td>
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<td>- Remove and recycle onsite materials</td>
<td>14. Protects and improves water quality and the geomorphology of the creek?</td>
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<td></td>
<td></td>
<td>- Avoid highly-engineered solutions</td>
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<td>- Re-establish natural conditions of the channel and adjacent stream bank</td>
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<td>- Increase riparian forests</td>
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<td></td>
<td>- Concerned about movement of potential debris both short and long term</td>
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<td>- Concerned about ground water and the rise in the creek bed elevation</td>
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<td>- Concerned about interim term condition along creek</td>
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<td></td>
<td></td>
<td>- Consider new 160 year hydrologic volumes</td>
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<td></td>
<td>Schedule</td>
<td>- Work with existing project initiatives and ongoing projects</td>
<td>15. Creates infrastructure investments that are reasonable to construct and provide the best value for their life-cycle, function and purpose?</td>
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<td></td>
<td></td>
<td>- Final funding for future implementation</td>
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<td>- Include locally responsible costs</td>
<td>16. Can be supported by current land use regulations or revised land use regulations?</td>
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<td></td>
<td></td>
<td>- Continue long-term planning for future projects</td>
<td>17. Provides funding, partnering and collaboration opportunities by meeting multiple stakeholder objectives?</td>
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<td></td>
<td></td>
<td>- Meet the goals for SFP funding</td>
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<td></td>
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<td>- Consider elements of the master plan</td>
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<td>- Be consistent with land use regulations and management</td>
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<td>- Consider planning</td>
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<td></td>
<td></td>
<td>- Prioritize strategies as critical, necessary or desired</td>
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### Prioritization Criteria

#### South St. Vrain Creek Restoration at Hall Ranch Decision Matrix

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<th>Criteria</th>
<th>Alternatives Evaluation</th>
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<td>1</td>
<td>Community</td>
<td>Protect critical public and private infrastructure?</td>
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<td>Avoids negative impacts to downstream infrastructure, channel and storm water systems?</td>
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<td>Community</td>
<td>Improves aesthetics to the creek corridor?</td>
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<td>Community</td>
<td>Consider recreation where allowed?</td>
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<td>Resiliency</td>
<td>Benefits larger area of creek corridor?</td>
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<td>Resiliency</td>
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<td>Resiliency</td>
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#### Issue Specific Criteria

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<td>4</td>
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#### Identification of Preferred Option:
Alternatives: Issue & Reach Based

Alternatives and Strategies:
- Floodplain Connectivity
- Channel Complexity
- Revegetation
- Infrastructure Protection

Master Plan: The purpose of this alternative is to implement a channel alignment that will optimize the interaction with completed, ongoing, and funded projects while being sensitive to the constraints presented by the presence of numerous private residences throughout this river corridor. The implementation of this alternative will expedite the maturation of this reach by re-establishing a natural channel, repairing erosion scars, re-establishing floodplain benches, building point-bars and excavating pools, revegetating denuded areas, and stabilizing channel banks.
Floodplain connectivity involves activating the floodplain at frequent intervals to enable critical floodplain functions, including:

- Sediment storage
- Reduction of erosive forces in main channel
- Nutrient transfer
- Healthy riparian/wetland ecosystem

Strategies to establish floodplain connectivity include:

- Activating overflow channels
- Incorporating channel/floodplain benching (sediment removal)
Alternative: Floodplain Connectivity
Channel complexity refers to channel features that contribute to geomorphically effective bedforms, as well as habitat quality and diversity.

- Low Flow Channel
- Pools, riffles, steps
- Bars (point, lateral, mid-channel)
- Large woody material (bank protection/habitat enhancement)
- Roughened channels/boulder clusters
Alternative: Channel Complexity

Pool-Riffle

PROFILE

EXISTING BED MATERIAL

FLOW

ROUGHENED CHANNEL

PROFILE

RIFLE INVERT / CREST ROCK

PROFILING MATERIAL

ROUGHENED CHANNEL

RIFLE SECTION

POOL SECTION

ROUGHENED CHANNEL & Boulder Clusters

SECTION

PLAN VIEW

BOULDER CLUSTERS

Matrix Design Group

otak

THK Associates, Inc.
Alternative: Channel Complexity

Type A Large Wood Structure Detail

Type B Large Wood Structure Detail

[Images of construction sites and wood structures]
Alternative: Revegetation

Revegetation will provide the framework for increased ecosystem function and aesthetic appeal along the corridor. Our team will:

- Protect and preserve existing stands of vegetation
- Incorporate bioengineering measures to increase habitat maturation and resiliency
- Plant a diverse palette of native plant species
  - Willow clusters
  - Cottonwood galleries
  - Wetlands (perennials)
  - Riparian benches (perennials and woody plants)
  - Upland meadows (grasses, wildflowers and trees)
Alternative: Revegetation

- Cotton Wood Gallery
- Wetland/Riparian Bench
- Grassland Meadow

Diagram showing different vegetation types and terraces:
- Residual Terrace
- Third Terrace
- Second Terrace
- Floodplain Bench
- Floodplain Bench
- First Terrace
- Second Terrace
- Third Terrace

Key types:
- Shrub/Grassland
- Cottonwood Gallery
- Riparian Woodlands/Fringe Wetlands
- Open Water Channel
- Riparian/Fringe Wetlands
- Cottonwood Gallery
- Shrub/Grassland

100 Year Floodplain
Alternative: Infrastructure

- Infrastructure: Roads, Bridges, Houses, Ditches
- Bank Stabilization
  - Bioengineering
  - Buried Rootwads
- Offset Buried Natural/Structural Aspects
  - Buried Riprap Revetment
  - Buried Boulders
  - Structural Walls
- Channel Alignment: In-depth Analysis Required
  - Slope, Sinuosity, Wavelength, Belt Width
- Detention
- Cost
Alternative: Infrastructure Protection

Utility Armoring

Root Wad Stabilization

Boulder Toe Protection

Vegetated Geogrid
Emergency Watershed Protection (EWP)

Colorado Emergency Watershed Protection (EWP) Program, Phase II
Purpose: Implement emergency recovery measures to protect life and property in watersheds impaired by a natural disaster

Funding: $63.2 mil. total/ $47.4 mil. federal

State Sponsor: Colorado Water Conservation Board

Local Sponsors: Counties, cities/towns, watershed coalitions, others

Timeline: April 1, 2018 technical assistance agreement ends
**EWP: Benefits Landowners**

- **Safety** - Purpose of projects: protect life safety and property from future flooding and erosion

- **No Cost to Landowner** - Projects funded through federal, state, and local sponsors without capital cost to landowners, can opt out at any time before final design

- **Holistic Approach** - Opportunity to:
  - Design projects as a system and minimize impacts to downstream properties
  - Address some reach-wide water and sediment management issues

- **Stream and Habitat Health** - Improve overall ecological health and resiliency of your property

- **Opportunities for Multiple Benefits:**
  - Stabilize stream channels
  - Reconnect floodplains with streams
  -Manage sediment
  - Reduce hazards and improve flood conveyance
  - Improve habitat
  - Enhance recreational opportunities
Key Topics for Collaboration and Agreement

- Channel Location
- Vegetation Planting
- Landscape Features
Preferred Alternative

- Combination of Alternatives
- Decision Matrix
- Engineering/Science Based Judgements
- Consensus and Buyoff from Stakeholders
- Understanding Construction Project Goals and Funding
Site Visit with Stakeholders

- Opportunity to walk sites with team to understand alternatives and preferred alternative
- Week of July 18th
What’s Next?

- Evaluate Alternatives with Decision Making Matrix
- Prioritize Alternatives
- Sediment Transport Analysis
- Geomorphic Site Survey
- Draft 30% Designs
- Final 30% Designs