

# South St. Vrain / Hall Meadows Restoration Planning August 20, 2015



# Agenda

- Introductions
- Purpose & Goals of Meeting
- Planning Area
- Master Plan
- Restoration Planning: Cost Estimates, Grants, Scope, Timeline
- Design Considerations

# Purpose & Goal

- **Purpose:** to discuss creek restoration along South St. Vrain Creek with neighbors and other stakeholders
- **Goals**
  - to get up-to-speed on the planning area, grants, scope, timeline, and next steps
  - to listen to opportunities and constraints

# Watershed Recovery



Emergency  
Response



Immediate  
Threat  
Assessment and  
Mitigation



Long-Term  
Vision  
  
Watershed  
Master Plans



Future Creek  
Projects  
  
Funding and  
Implementation

# South St. Vrain / Hall Meadows Planning Area

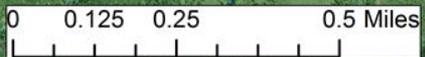
**Legend**

**Public Lands**

- County Open Space
- County Conservation Easement
- Town of Lyons Parks & Recreation
- USFS Land
- BLM Land

Headgate

Post-Flood Channel Alignment4





# **South St. Vrain / Hall Meadows Management Plans and Assessments**

# County Assessments & Plans

- Boulder County Comprehensive Plan – Environmental Resource Element (2014)
- Hall Ranch Meadows Natural Resource Assessment (2005)
- St. Vrain Creek Open Space Management Plan (2004)
- Environmental Assessment – South St. Vrain Creek (2000)
- Resource Assessment Report – Custode Property (2000)
- North Foothills Management Plan (1996)

# Management

- ***Boulder County Comprehensive Plan – Environmental Resources Element (2014)***
  - Critical Wildlife Habitat #7, St. Vrain Corridor
  - Significant Natural Communities
  - Riparian and Wetland Areas
  - Riparian Habitat Connectors
  - Preble's Meadow Jumping Mouse (PMJM) Habitat Conservation Area

# Management

## St. Vrain Creek Corridor Open Space Management Plan

- Corridor designated as “Natural” and “Agriculture”
- The vision for the county open space properties along St. Vrain Creek is:

Boulder County Parks and Open Space (BCPOS) responsibly and innovatively manages the County's water resources for diverse purposes. These resources are managed in an effective, sustainable, and efficient manner to support agriculture, provide quality visitor use opportunities, maintain viable riparian corridors, and for other environmental benefits. Stakeholders, government agencies, and BCPOS staff work together as stewards to ensure the protection and optimum utilization of these resources. (BCPOS 2004, p. 9)

# Management

## North Foothills Management Plan

- Corridor designated as important bird habitat
- Some of the management goals include:
  - Protect and properly manage Conservation Areas, Significant Plant Communities, and rare plants.
  - Manage vegetative communities by maintaining and encouraging desirable native species, restoring degraded areas, and eliminating or controlling undesirable exotic species.
  - Manage for ecosystem integrity by encouraging and planning for naturally occurring processes, or the simulation of those processes, so they will remain vital components of the ecosystem.
  - The management direction is toward protecting critical resources, encouraging native species over exotic, and maintaining natural processes. Where feasible, a passive approach of letting nature take its course will be utilized (p. 19)

# Post-Flood Work





Hall Ranch

Bridge Repair  
(FEMA)

Carl Holcomb  
Ditch

Road Repair  
(FEMA)

SH 17

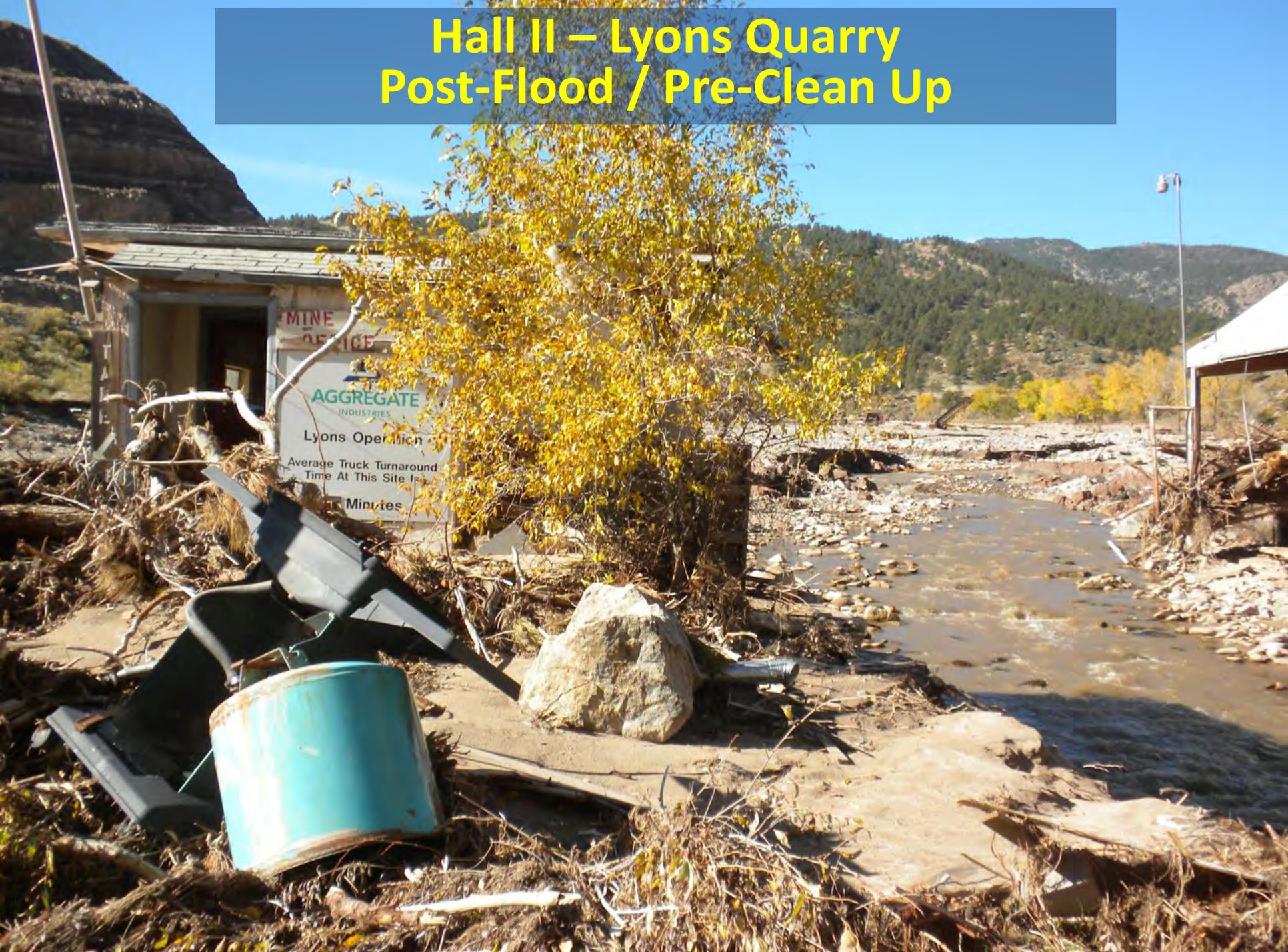
Otto  
Ditch

Mine Reclamation to be  
Completed by Mining Company  
(Temporary Cessation)  
  
BCPOS will have a future  
public planning process

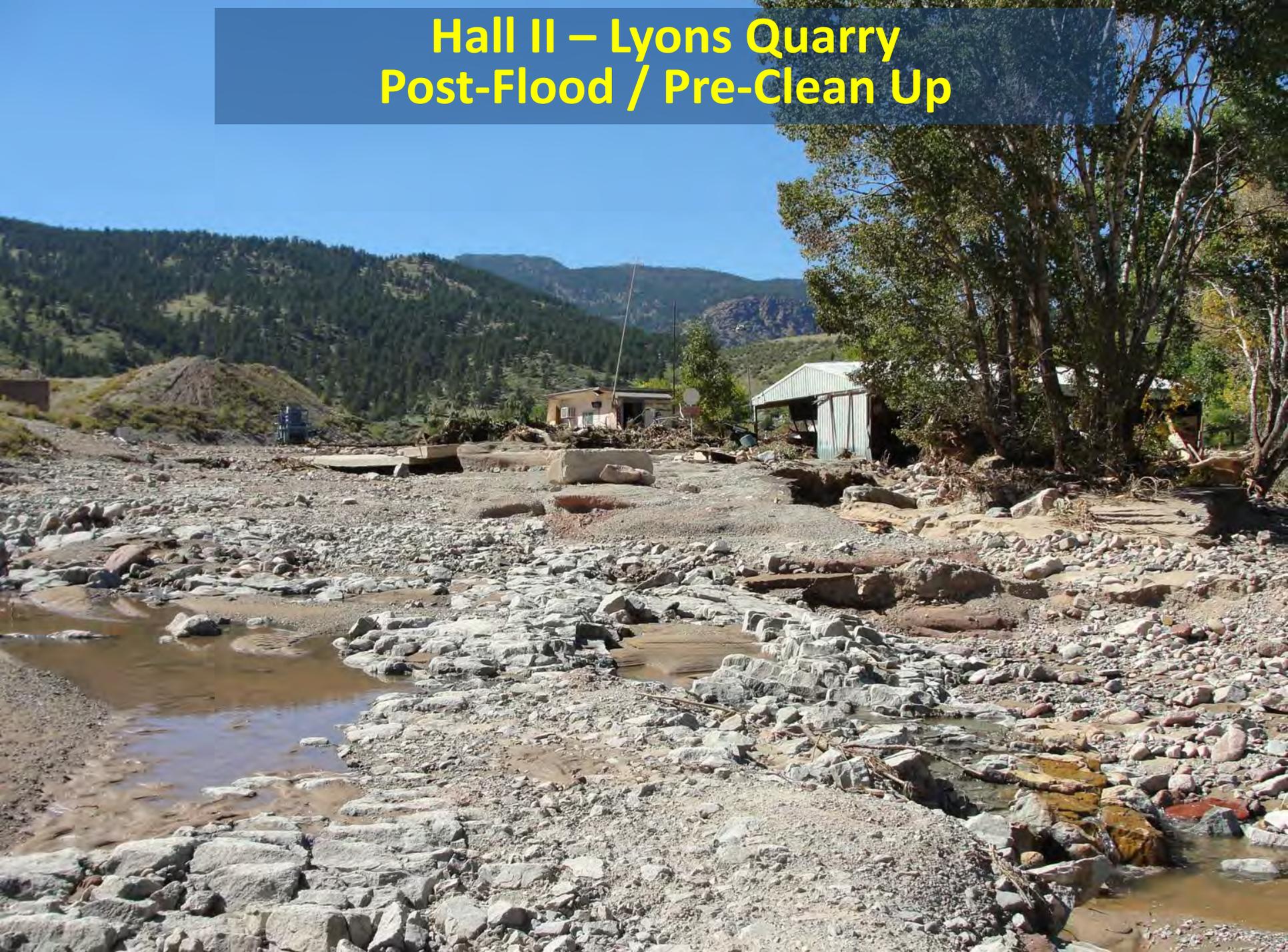
Hall II



# Hall II – Lyons Quarry Post-Flood / Pre-Clean Up



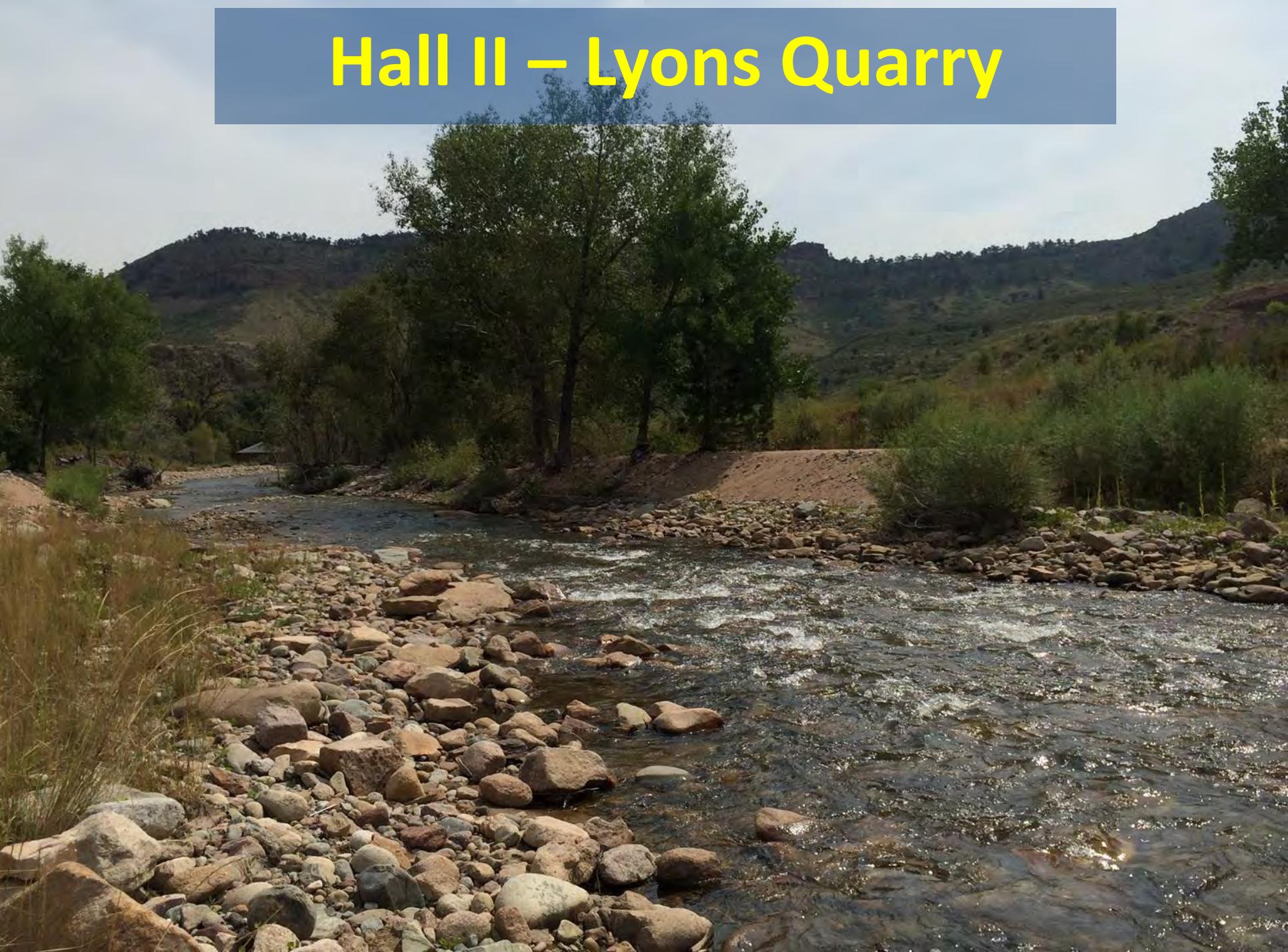
# Hall II – Lyons Quarry Post-Flood / Pre-Clean Up



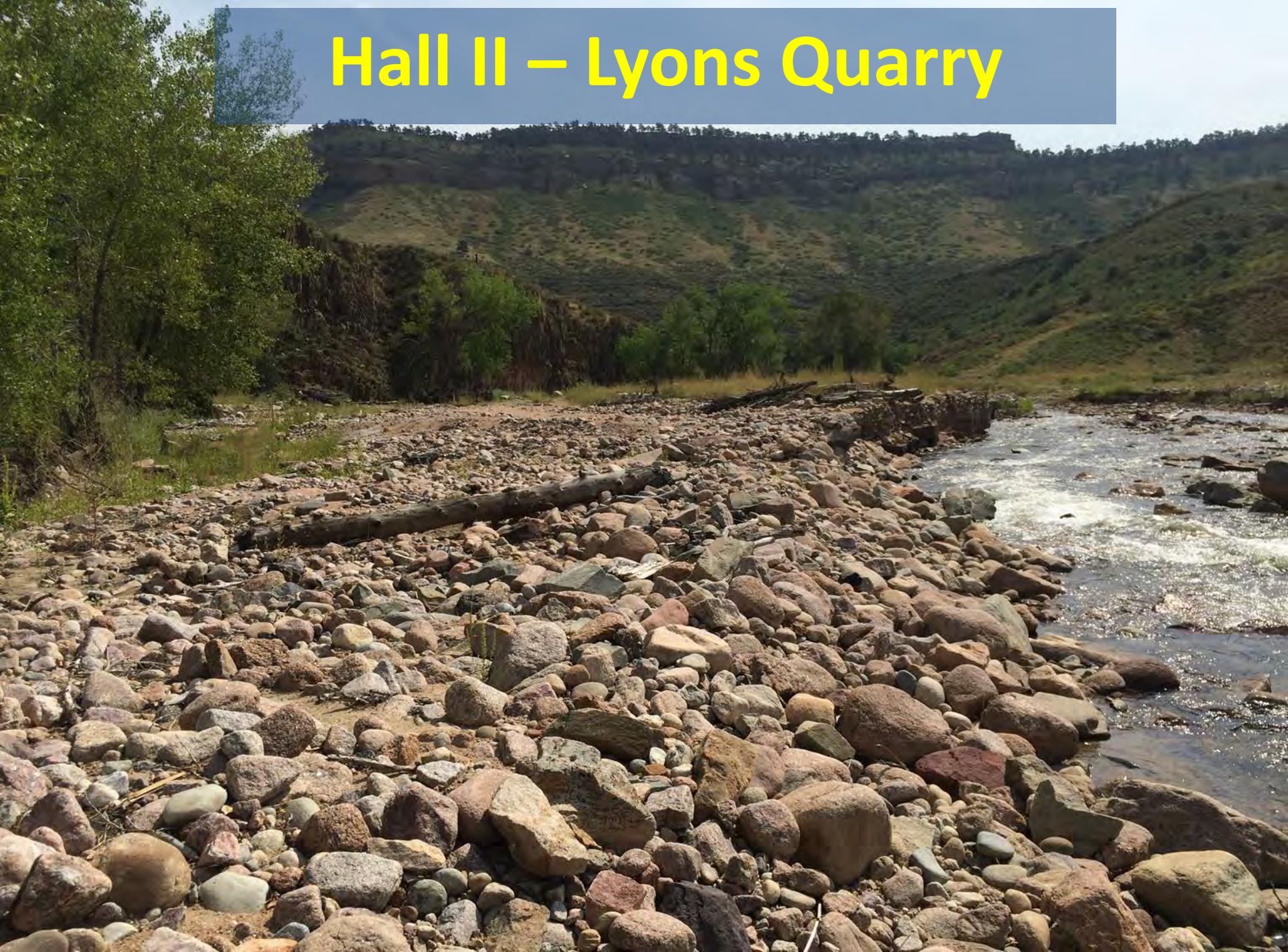
# Hall II – Lyons Quarry



# Hall II – Lyons Quarry



# Hall II – Lyons Quarry



# Hall II – Lyons Quarry



# Hall II – Access Road (FEMA)



# Andesite Bridge (FEMA – BC Transportation)



# Andesite Bridge (FEMA – BC Transportation)





Hall Ranch

City of Longmont

South Ledge and  
Meadows Ditches

Secondary Channel

SH 7

Olson

Matthews  
Ditch

Old St. Vrain Rd

0 175 350 700 Feet



2012

# Secondary Channel – Spring 2014



Approximate location of proposed overflow channel

2013 - November



Approximate channel for overflow

Approximate location of proposed overflow channel

A small gravel "plug" will be removed.  
No other grading or excavation  
of the overflow channel will occur.

# Secondary Channel – October 2014



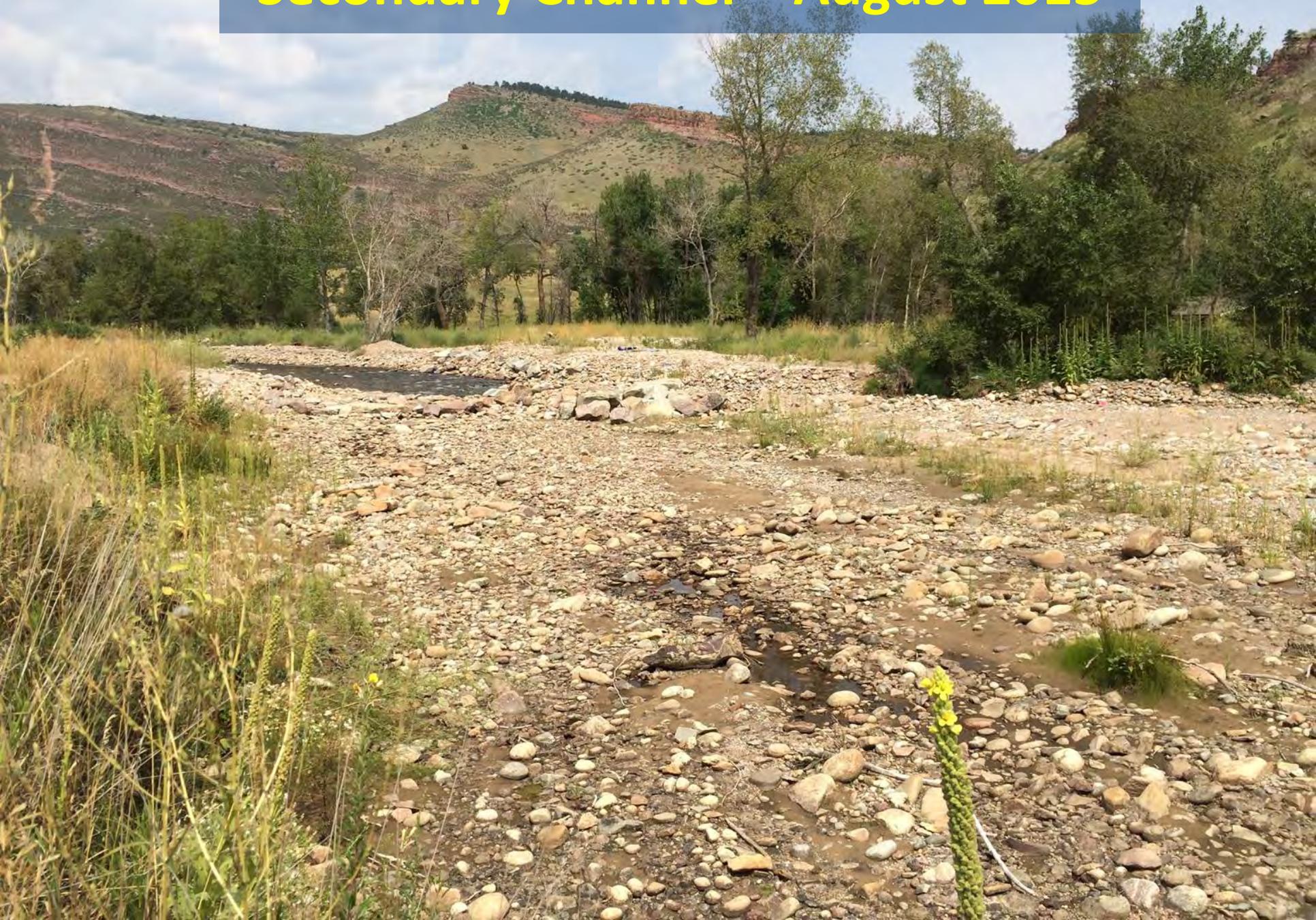
© 2015 Google

GOO

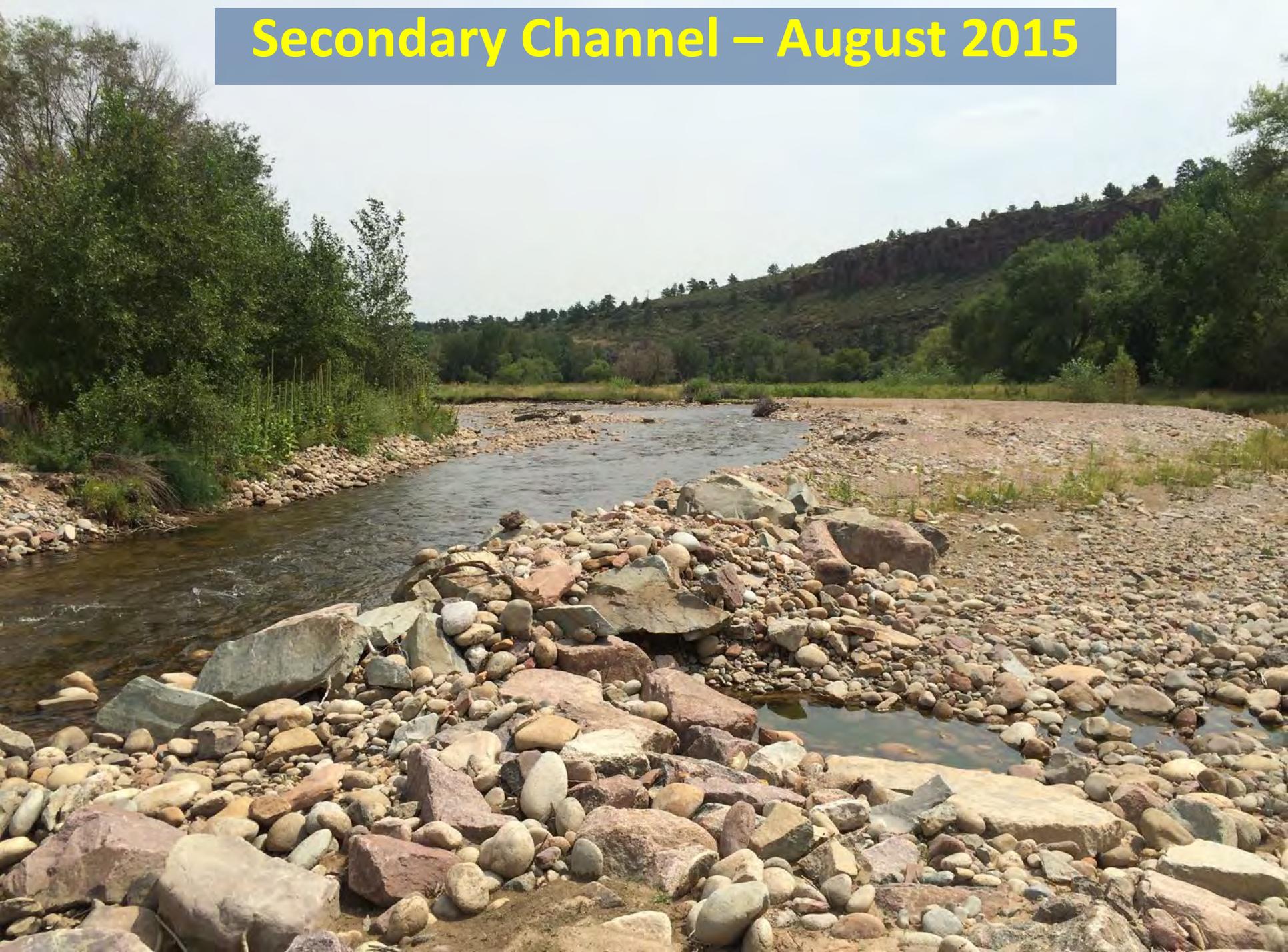
1999

Imagery Date: 10/6/2014 40°12'35.30" N 105°17'01.01" W elev 5426 ft

# Secondary Channel – August 2015



# Secondary Channel – August 2015



# South Ledge & Meadows Diversion





# St. Vrain Creek Watershed Master Plan

PREPARED BY

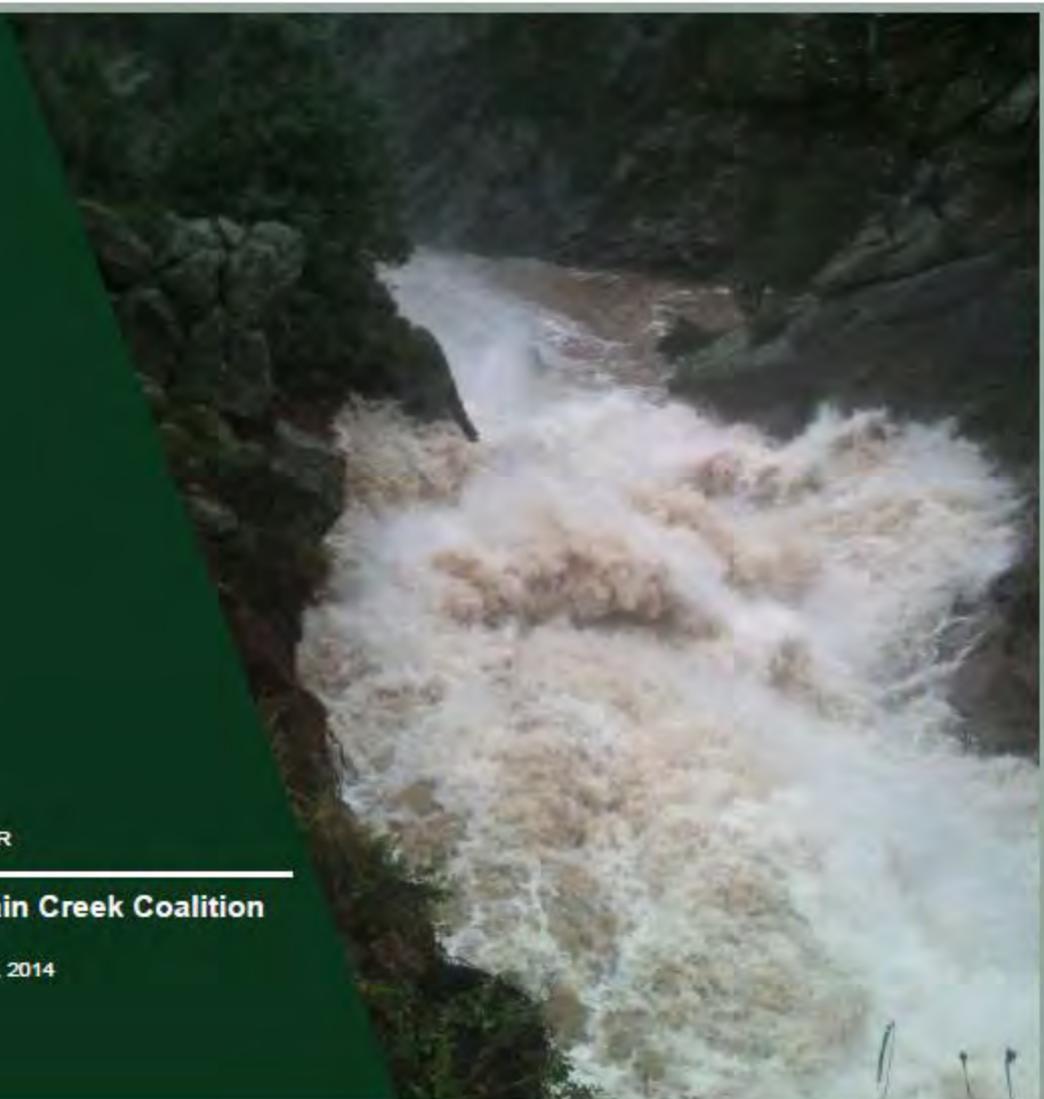
**Baker**



PREPARED FOR

**The St. Vrain Creek Coalition**

NOVEMBER 25, 2014



# St. Vrain Creek Watershed Master Plan

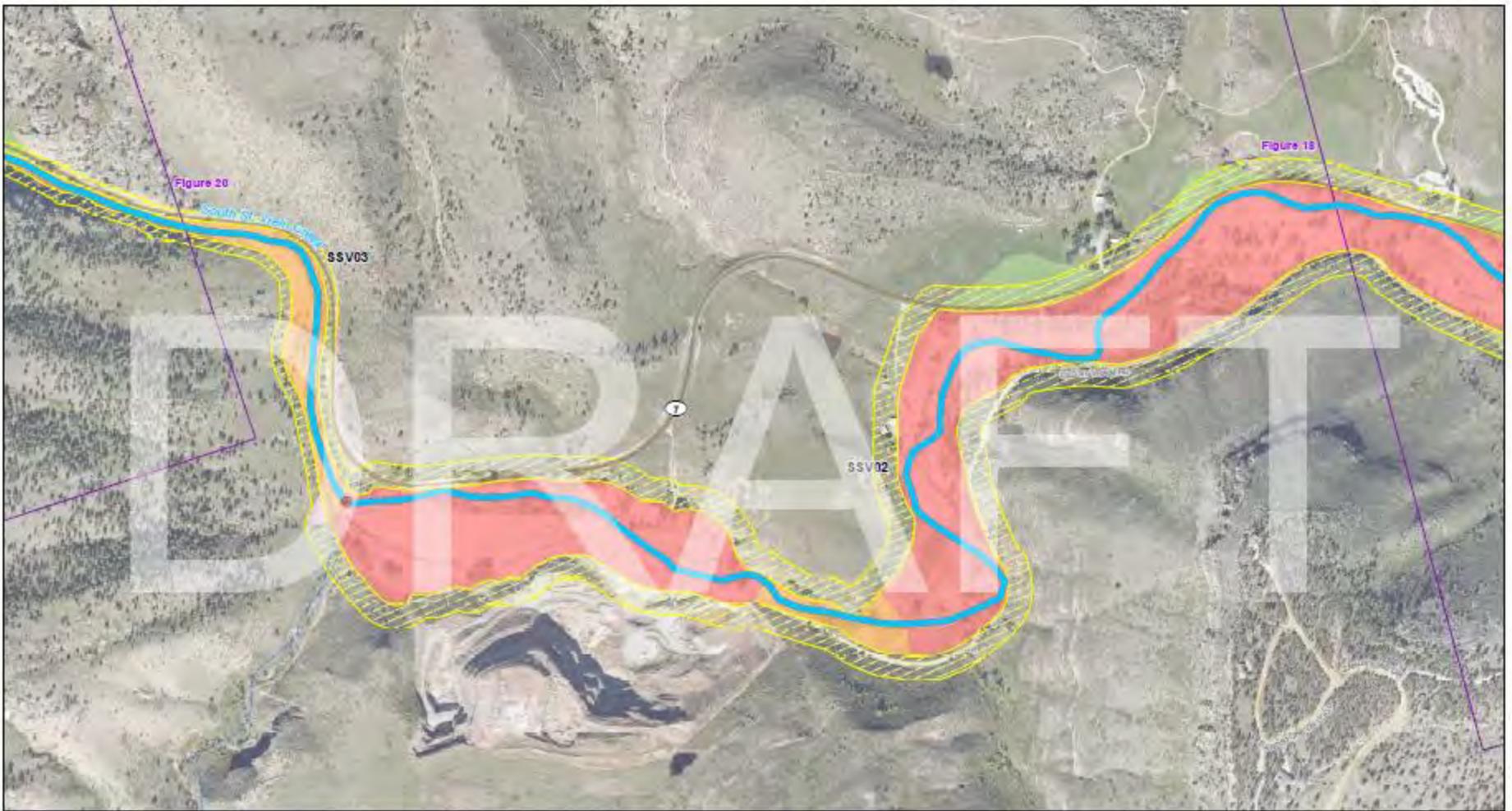
- Prepared through the St. Vrain Creek Coalition
- Adopted by Board of County Commissioners on February 26, 2015
- “Roadmap for long-term recovery”
  - Geomorphic Assessments
  - Ecological Assessments
  - Conceptual-level Designs
  - Prioritization

# Geomorphic Assessment

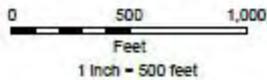
Due to the nature of the South St. Vrain Creek...(slope, channel characteristics, bed material, etc.) the channel will tend to migrate and avulse for a range of hydrologic conditions. Absent of large flow events, the channel plan form for these reaches will likely remain reasonably stable once stream bank vegetation has re-established. However, beyond some threshold discharge the channel plan form can be expected to change, and in some instances change significantly due to avulsion and migration. Consequently, it is recommended that in most instances along...South St. Vrain Creek that the channel be left in the current (post-flood) alignment...In areas where it may be necessary to reclaim limited amounts of private property or protect infrastructure (including bridges, roadways and utilities), minor realignment of the main channel may be necessary. In addition, the use of localized rock riprap bank protection is recommended to stabilize local sections of the channel where necessary. However, it should be recognized that in these reaches it will not likely be possible to stabilize the channel plan form over long reaches, for a range of high flow conditions. (pp. 4-5)

# Geomorphic Assessment

At the mouth (near the gravel quarry upstream of Lyons) the valley slope significantly flattens, the channel becomes unconfined and the South St Vrain becomes a highly depositional riffle-pool gravel dominated C-type channel with a propensity for braiding and meandering. (p. 6)

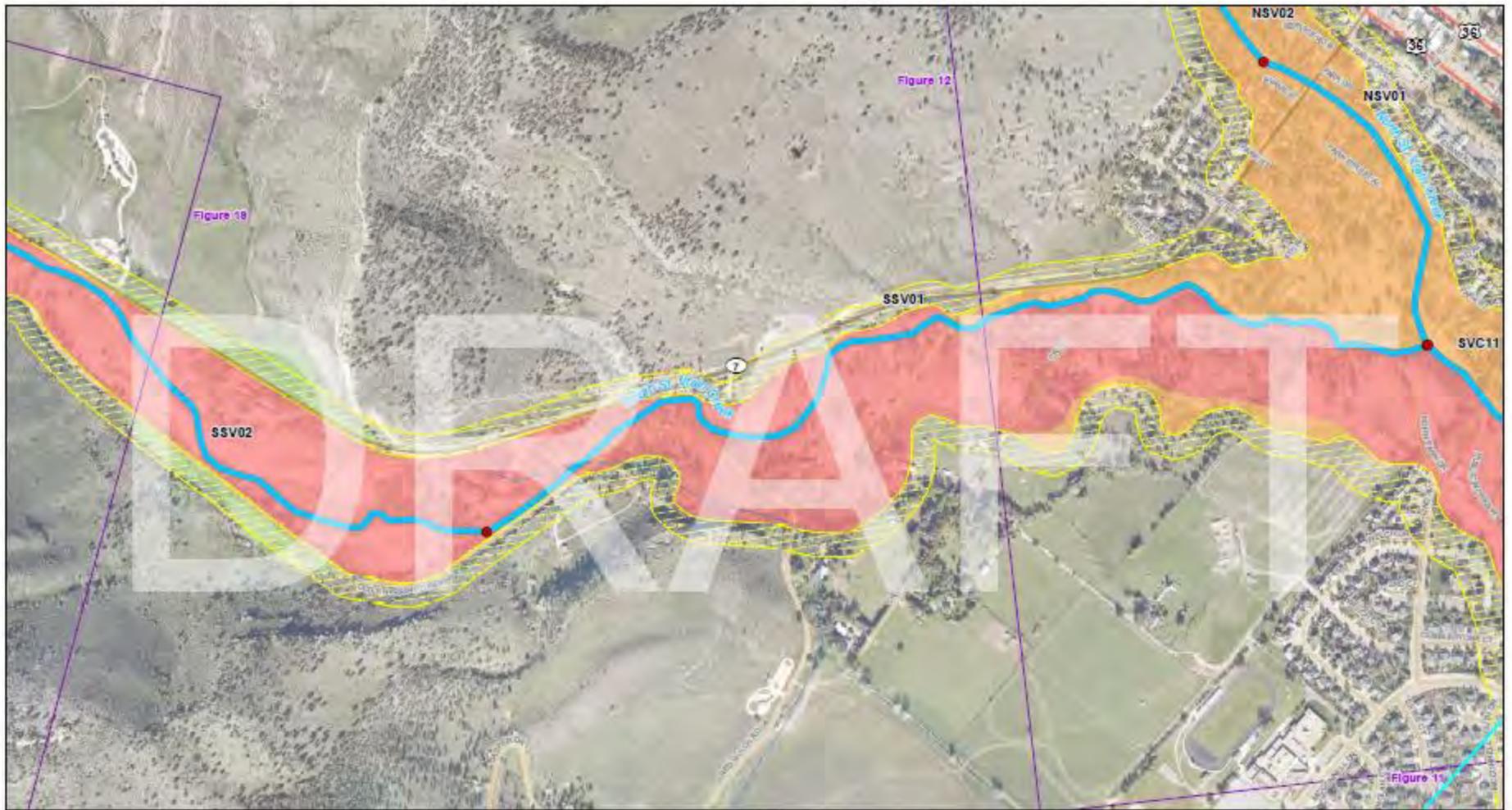


NAD 1983 HARN StatePlane Colorado North FIPS 0901 Feet

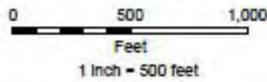


	Reach Break		Active Channel		Modern Valley Bottom
	Adjacent Map		Erosion Hazard Area		Avulsion Hazard Zone
			Alluvial Fan		Disconnected Migration Area
			No Data		

**Figure 19**  
**Draft Geomorphic Hazard Zones**  
 St. Vrain Creek System - South St. Vrain  
 Boulder County, Colorado



NAD 1983 HARN StatePlane Colorado North FIPS 0801 Feet



	Reach Break		Active Channel		Modern Valley Bottom
	Adjacent Map		Avulsion Hazard Zone		Erosion Hazard Area
			Alluvial Fan		Disconnected Migration Area
			No Data		

**Figure 18**  
**Draft Geomorphic Hazard Zones**  
 St. Vrain Creek System - North-South St. Vrain Confluence  
 Boulder County, Colorado

# Geomorphic Assessment

Channelization (straightening) and stream bank armoring occurs throughout the St. Vrain Creek system. The response of the stream system to these modifications typically occurs within and beyond the modified reach and frequently begins with a bed incision process. As channels incise or berms are constructed, channels are disconnected from their floodplains, and in turn, the excess energy in the system causes an increase in erosion laterally and/or vertically. The increased erosion leads to an increase in sediment load transferred downstream of the channelized reach, where the channel may not have the capacity to continue to move the sediment through, ultimately leading to bed aggradation. (p. 14)

*Geomorphic Assessment of St. Vrain Creek System, Walsh Environmental, July 28, 2014*

# Geomorphic Assessment

When possible the St. Vrain Coalition should seek to maintain a naturally meandering stream with frequent opportunities for floodplain access. (p. 14)

Floodplains play an important role in dissipating stream energy and provide low-risk locations for natural sediment deposition in addition to providing ecological complexity and good riparian habitat. (p. 14)

# Geomorphic Assessment

Overflow channels and flood chutes carved through the floodplains during the 2013 flood provide opportunities for seasonal floodplain access. It is recommended that the St. Vrain Coalition prioritize protecting and restoring these locations as well as the wider channel corridor from the impacts of development, in order to reap the multiple benefits of increased flood protection and improved stream health provided by floodplain access and seasonal side channels. (p. 14)

# Ecological Assessment

## SSV02 = Old St. Vrain Road bridge to quarry

- Channel Condition = 3
- Hydrologic Alteration = 7
- Bank Condition = 2
- Riparian Quantity = 3
- Riparian Quality = 1
- Canopy Cover = 1
- Nutrient Enrichment = 10
- Manure or Septic = 10
- Pools = 1
- Barriers to Movement = 10
- Fish Habitat Complexity = 4
- Aquatic Invertebrate Habitat = 5

## • **Total = 4.8 (POOR)**

Table 3, Page 8, *Rapid Ecological Assessment of St. Vrain Creek Corridor*, Walsh Environmental, July 15, 2014

# Ecological Assessment

**Recommendation SSV02: Develop sediment transport/channel alignment plan through this reach; regrade floodplain while keeping floodplain access; protect as depositional reach**

Table 4, Page 9, *Rapid Ecological Assessment of St. Vrain Creek Corridor*, Walsh Environmental, July 15, 2014

# St. Vrain Creek Watershed Master Plan

- *Tier 1 - Projects reducing flood risk due to post-flood conditions*
  - Natural channel design
  - Provide protection of infrastructure including ditches, homes, roads, and the town of Lyons
  - Ecological restoration

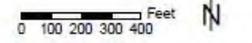
# St. Vrain Creek Watershed Master Plan

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, re-vegetating denuded areas, and stabilizing channel banks. (p. 7-18).

# REACH 4b RECOMMENDED ALTERNATIVE: CHANNEL REALIGNMENT & SITE-SPECIFIC PROJ. MAP 3 OF 3

## LEGEND

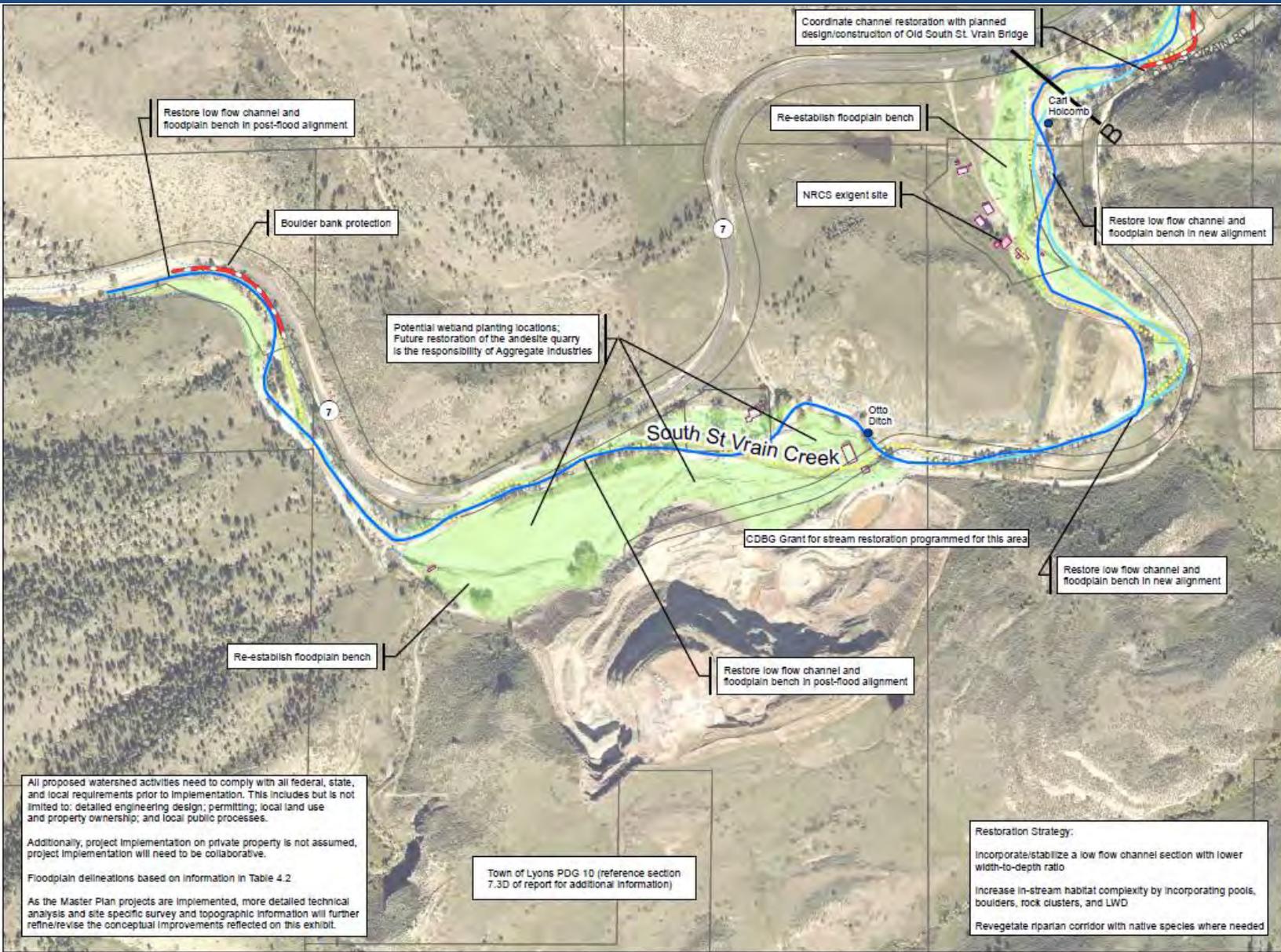
-  Headgates
-  Post Flood Channel Alignment
-  Pre-Flood Channel Alignment
-  Proposed Channel Alignment
-  Bank Protection
-  Fill & Revegetation
-  Floodplain
-  Matchlines



**Baker** 186 S. UNION BLVD.  
SUITE 200  
LAKEWOOD, CO 80228  
PHONE: 720-514-1190



## ST. VRAIN CREEK CONCEPTUAL PLAN



All proposed watershed activities need to comply with all federal, state, and local requirements prior to implementation. This includes but is not limited to: detailed engineering design; permitting; local land use and property ownership; and local public processes.

Additionally, project implementation on private property is not assumed, project implementation will need to be collaborative.

Floodplain delineations based on information in Table 4.2

As the Master Plan projects are implemented, more detailed technical analysis and site specific survey and topographic information will further refine/revise the conceptual improvements reflected on this exhibit.

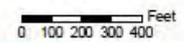
Town of Lyons PDG 10 (reference section 7.3D of report for additional information)

**Restoration Strategy:**  
 Incorporate/stabilize a low flow channel section with lower width-to-depth ratio  
 Increase in-stream habitat complexity by incorporating pools, boulders, rock clusters, and LWD  
 Revegetate riparian corridor with native species where needed

**REACH 4b  
RECOMMENDED  
ALTERNATIVE:  
CHANNEL  
REALIGNMENT &  
SITE-SPECIFIC PROJ.  
MAP 2 OF 3**

**LEGEND**

- Headgates
- Post Flood Channel Alignment
- Pre-Flood Channel Alignment
- Proposed Channel Alignment
- Bank Protection
- Fill & Revegetation
- Floodplain
- Matchlines



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**LOCATOR MAP**



**ST. VRAIN CREEK  
CONCEPTUAL PLAN**

**Restoration Strategy:**  
 Incorporate/stabilize a low flow channel section with lower width-to-depth ratio  
 Increase in-stream habitat complexity by incorporating pools, boulders, rock clusters, and LWD  
 Revegetate riparian corridor with native species where needed

Restore low flow channel and floodplain bench in post-flood alignment

Restore low flow channel and floodplain bench in new alignment

Consider realigning SH7 to be outside of channel migration area Refer to geomorphic assessment for this area for more information

Boulder bank protection

Log Crib Bank Stabilization completed by CDOT

Consider realigning SH7 to be outside of channel migration area Refer to geomorphic assessment for this area for more information

Coordinate channel restoration with planned design/construction of Old South St. Vrain Bridge

Consider realigning SH7 to be outside of channel migration area Refer to geomorphic assessment for this area for more information

Consider realigning Old St. Vrain Road to be outside of channel migration area Refer to geomorphic assessment for this area for more information

Restore low flow channel and floodplain bench in pre-flood alignment

Boulder bank protection

Restore low flow channel and floodplain bench in new alignment

NRCS exigent site

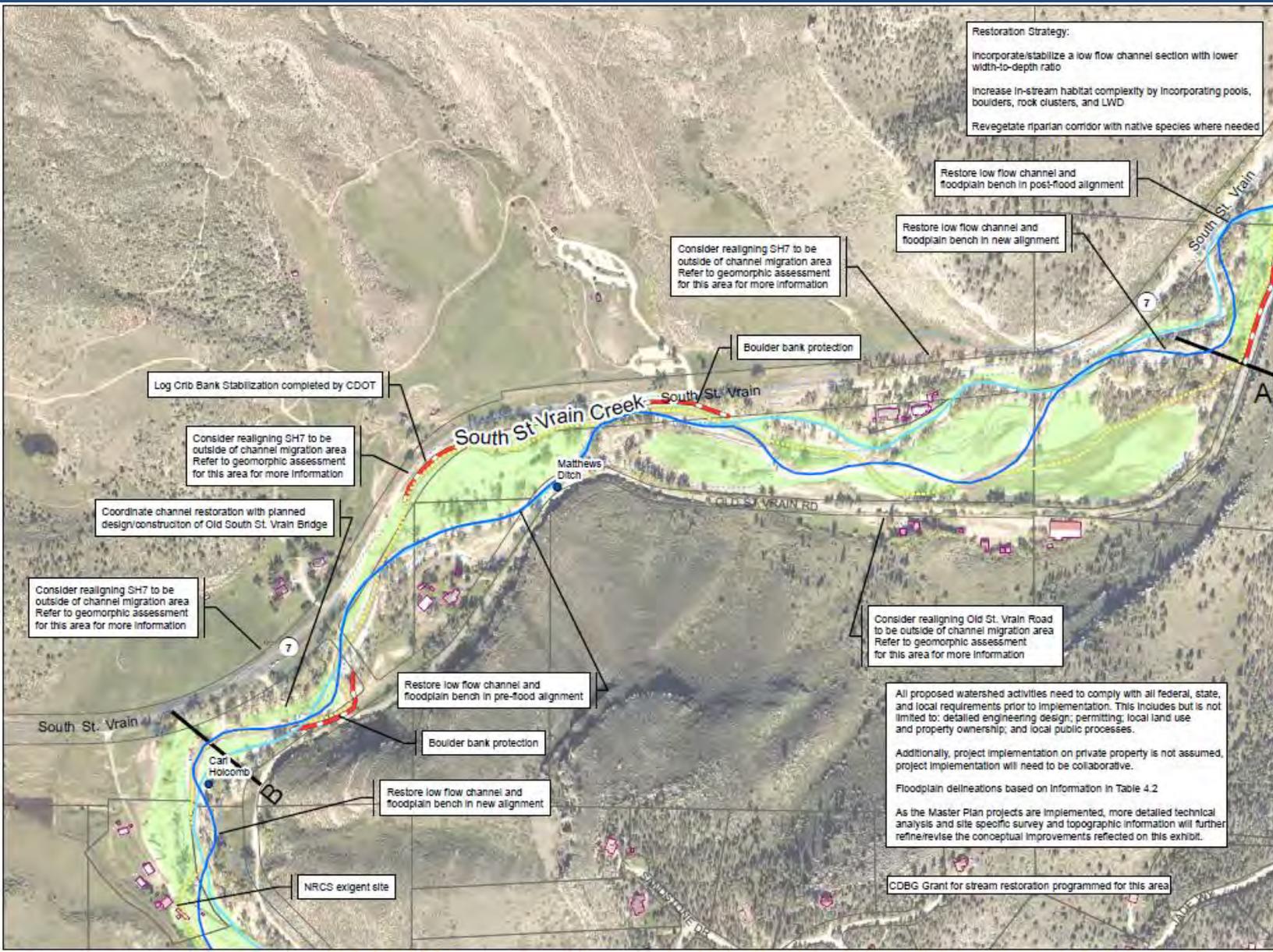
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Floodplain delineations based on Information in Table 4.2

As the Master Plan projects are implemented, more detailed technical analysis and site specific survey and topographic information will further refine/revise the conceptual improvements reflected on this exhibit.

CDBG Grant for stream restoration programmed for this area



All proposed watershed activities need to comply with all federal, state, and local requirements prior to implementation. This includes but is not limited to: detailed engineering design; permitting; local land use and property ownership; and local public processes.

Additionally, project implementation on private property is not assumed, project implementation will need to be collaborative.

Floodplain delineations based on information in Table 4.2

As the Master Plan projects are implemented, more detailed technical analysis and site specific survey and topographic information will further refine/revise the conceptual improvements reflected on this exhibit.

CDBG Grant for stream restoration programmed for this area

# REACH 4b RECOMMENDED ALTERNATIVE: CHANNEL REALIGNMENT & SITE-SPECIFIC PROJ. MAP 1 OF 3

## LEGEND

- Headgates
- Post Flood Channel Alignment
- Pre-Flood Channel Alignment
- Proposed Channel Alignment
- CDBG Projects
- Bank Protection
- Fill & Revegetation
- Evaluate Crossing Capacity
- Municipalities
- Floodplain
- Matchlines

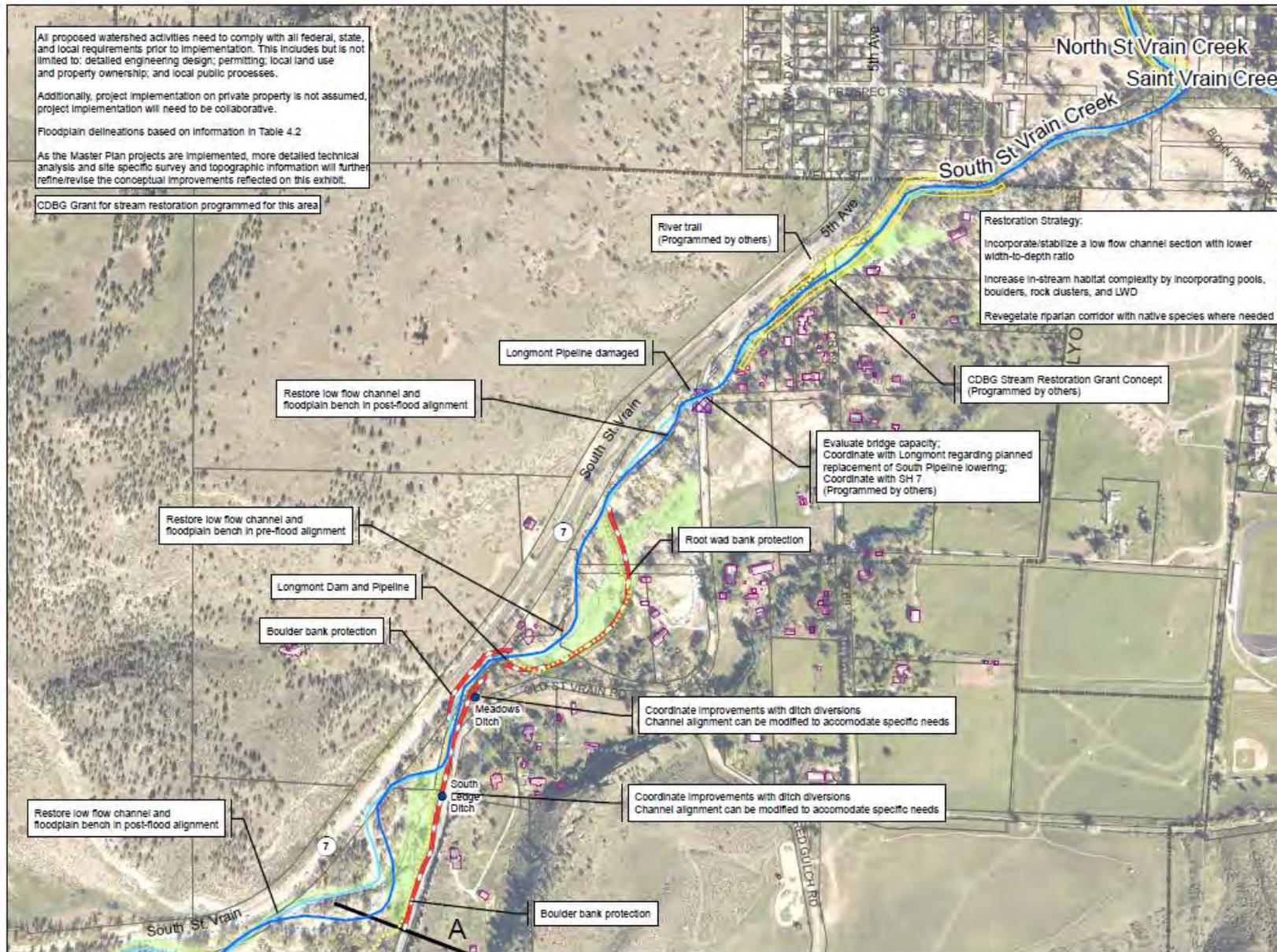
0 100 200 300 400 Feet

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SUITE 200  
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### LOCATOR MAP



## ST. VRAIN CREEK CONCEPTUAL PLAN



**Restoration Strategy:**  
 Incorporate/stabilize a low flow channel section with lower width-to-depth ratio  
 Increase in-stream habitat complexity by incorporating pools, boulders, rock clusters, and LWD  
 Revegetate riparian corridor with native species where needed

Evaluate bridge capacity;  
 Coordinate with Longmont regarding planned replacement of South Pipeline lowering;  
 Coordinate with SH 7  
 (Programmed by others)

Coordinate improvements with ditch diversions  
 Channel alignment can be modified to accommodate specific needs

Coordinate improvements with ditch diversions  
 Channel alignment can be modified to accommodate specific needs

# Master Plan Cost Estimate

Reach 4b	Qty	Unit	Unit Cost	Cost
Low flow/bankfull Channel Restoration	10851	LF	\$300	\$3,255,420
Fill	249320	CY	\$10	\$2,493,202
Revegetate	2243882	SF	\$1	\$2,243,882
Bank Protection - Boulder	3235	LF	\$275	\$889,625
Bank Protection - Root Wad	1056	LF	\$165	\$174,240
<b>Subtotal</b>				<b>\$9,056,370</b>
Land Acquisition	5%			\$452,818
Engineering	15%			\$1,358,455
Legal/Administrative	5%			\$452,818
Contract Admin/Construction Management	10%			\$905,637
Contingency	25%			\$2,264,092
<b>Total:</b>				<b>\$14,490,191</b>

**BCPOS Estimated Total Cost = \$5.6 million**  
 (removed fill, reduced revegetation, less bank protection)

# Funding to Date

- Colorado Water Conservation Board - CWCB Stream Restoration Grant = **\$110,000**
  - Planning, design, and demonstration project
- Community Development Block Grant – Disaster Relief (CDBG-DR) – Colorado Watershed Resilience Planning Grant Program = **\$295,000**
  - Planning, engineering, surveys, and up to 30% design

# CDBG-DR Project Scope

- Location:
  - 3.2 mile stretch of the South St. Vrain Creek
  - Custode to the end of the Hall Ranch property at Old St. Vrain Road bridge
  - Public and private lands
- The project will consist of:
  - engineering analysis and surveys, including hydraulics, geomorphological and sediment transport studies
  - 30% design (preliminary)

# South St. Vrain / Hall Meadows Planning Area

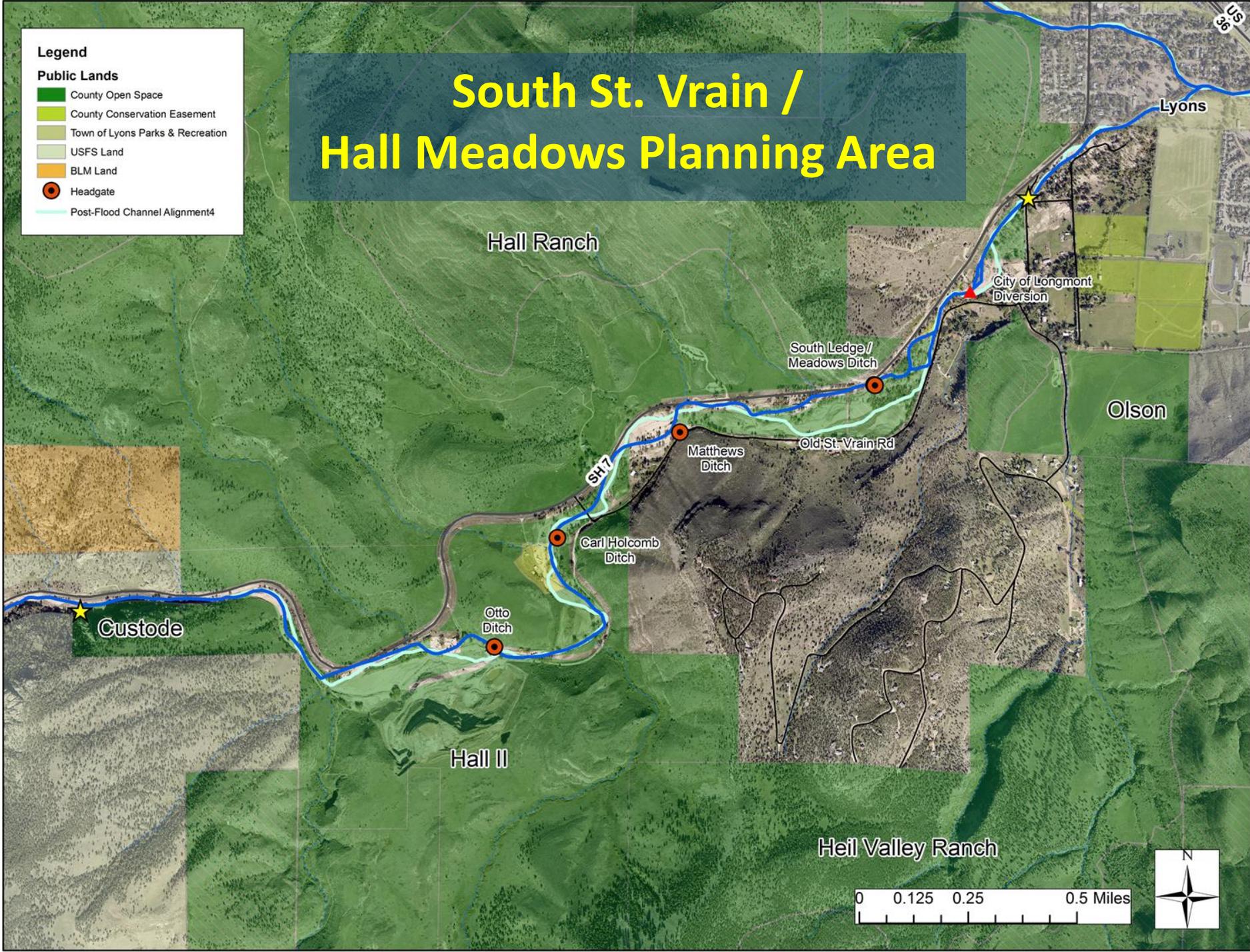
**Legend**

**Public Lands**

- County Open Space
- County Conservation Easement
- Town of Lyons Parks & Recreation
- USFS Land
- BLM Land

Headgate

Post-Flood Channel Alignment4



# Technical

- Hydrology & Hydraulics
- Sediment Transport
- Environmental Resources
- Restoration Options & Prioritization
- Permitting (local, state, and federal)
- Implementation
- Grant Management
- Public Outreach

# Stream Functions Pyramid

A Guide for Assessing & Restoring Stream Functions » FUNCTIONS & PARAMETERS



# CDBG-DR Grant Timeline

- Grant Contract (September-October '15)
  - Request for Proposal (90 days from contract)
  - Engineering and Surveys (winter – summer '16)
  - Design - Alternatives & Priorities (summer-fall 2016)
  
  - Implementation including Permitting and Construction – TBD
- \* Public, SVCC, and other stakeholder outreach and input at various points throughout project

# Future Projects

- PROJECTS DEPENDANT ON FUTURE FUNDS
- Potentially prioritize projects:
  - Protect infrastructure in the reach between the Andesite Quarry & Old St. Vrain Road bridges
  - Ecological values

# Design Considerations



# Design Considerations

- Maintain natural creek processes
- Resilience measures where appropriate:
  - natural stream design to increase bank & channel stability
  - a reduction in maximum flow velocity through increased floodplain connectivity
  - other mitigation measures as appropriate
- Restore and protect habitat
  - low flow channel with a lower width-to-depth ratio
  - increased in-stream habitat complexity
  - revegetation with native species
- Channel realignment at specific locations if necessary

# Design Considerations

- Private Homes, Property, and Infrastructure
- Downstream Impacts
- Roadways
- Bridges
- Ditches
- Conveyance
- Debris/Hazards
- Other Studies
- \$\$\$\$



# Design Considerations

- Questions, Ideas, Concerns
- What are your priority areas?
- What considerations are we missing?

