



Comprehensive
Flood and
Stormwater
Master Plan



Comprehensive Flood & Stormwater Master Plan Update

Boulder Creek, Boulder Slough, Sunshine Canyon Creek & Gregory Canyon Creek Meeting

October 25, 2021

A group of about a dozen people are sitting on a large, green grassy field, having a picnic. They are dressed in casual summer clothing. In the background, there are large, leafy trees and a range of mountains under a cloudy sky. The scene is dimly lit, suggesting late afternoon or dusk.

Welcome

Poll Questions:

- How long have you lived in Boulder?
- What was your experience with flooding in 2013?

Agenda

- Master Plan Overview
- Creek Overview
- Discussions on Equity
- Project Prioritization Framework
 - Overview
 - Breakout polling and discussions
- Wrap Up and Next Steps
- Comment Form

CFS Master Plan Update



Key Tasks

- Review policies
- Evaluate progress
- Develop program and process recommendations
- Provide a framework for evaluating priorities and projects

PURPOSE STATEMENT

The purpose of the plan is to improve the management of stormwater to help protect people, places, property, and ecosystems in the City of Boulder in a way that builds resilience and is consistent with community values.



Completed Community Engagement

- January: Formation of CWG
- January - March: Be Heard Boulder Launch
- July 21st: Boulder Shelter for the Homeless Visit
- August 3rd: National Night Out
- August 29th: Duck Race
- September 4th: Hometown Festival
- September 22nd & October 16th: Farmer's Market
- Oct / Nov: Virtual Community Meetings



How to Participate

Regional Meetings

Future engagement opportunities

Fall Outreach Schedule

Creek Meetings (all meetings 5:30-7:30 p.m.):

Wednesday, Oct. 20 | Fourmile & Wonderland

Thursday, Oct. 21 | Goose, Twomile & Elmer's Twomile

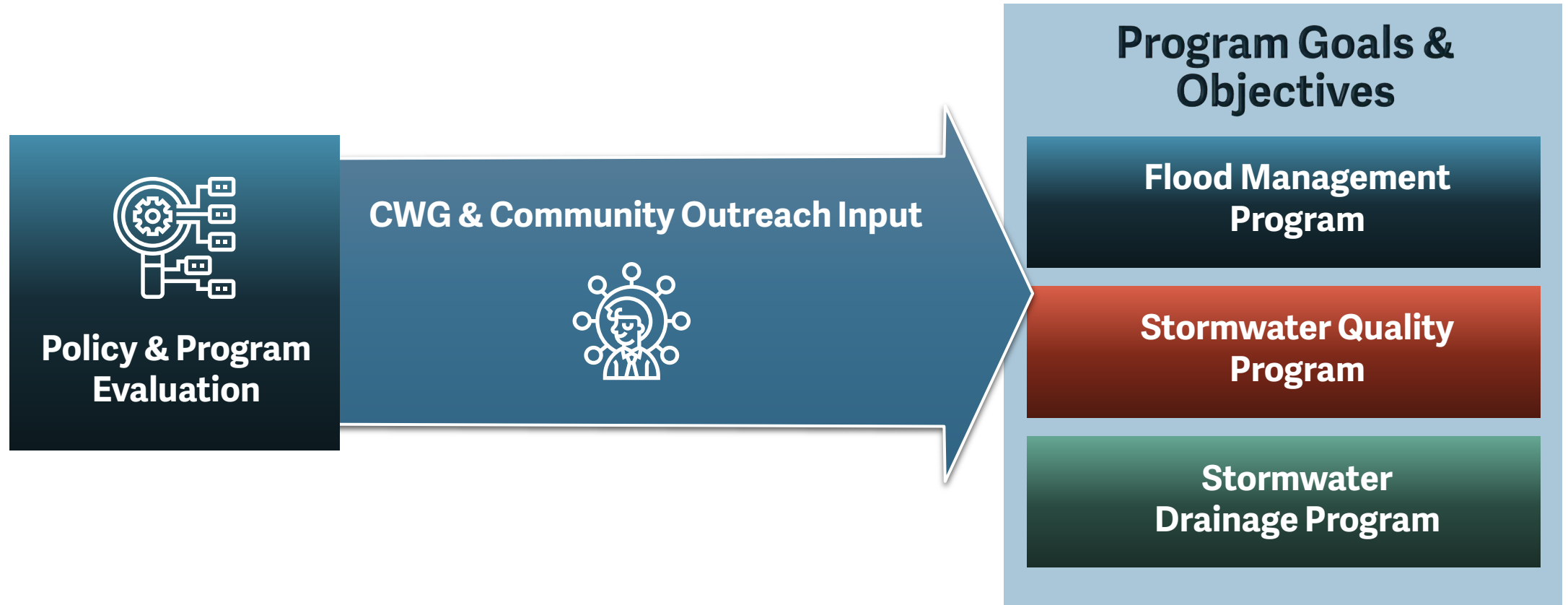
Monday, Oct. 25 | Boulder Creek/Boulder Slough, Sunshine & Gregory

Thursday, Oct. 28 | Spanish Language Meeting

Monday, Nov. 1 | Skunk, Bluebell & King's Gulch

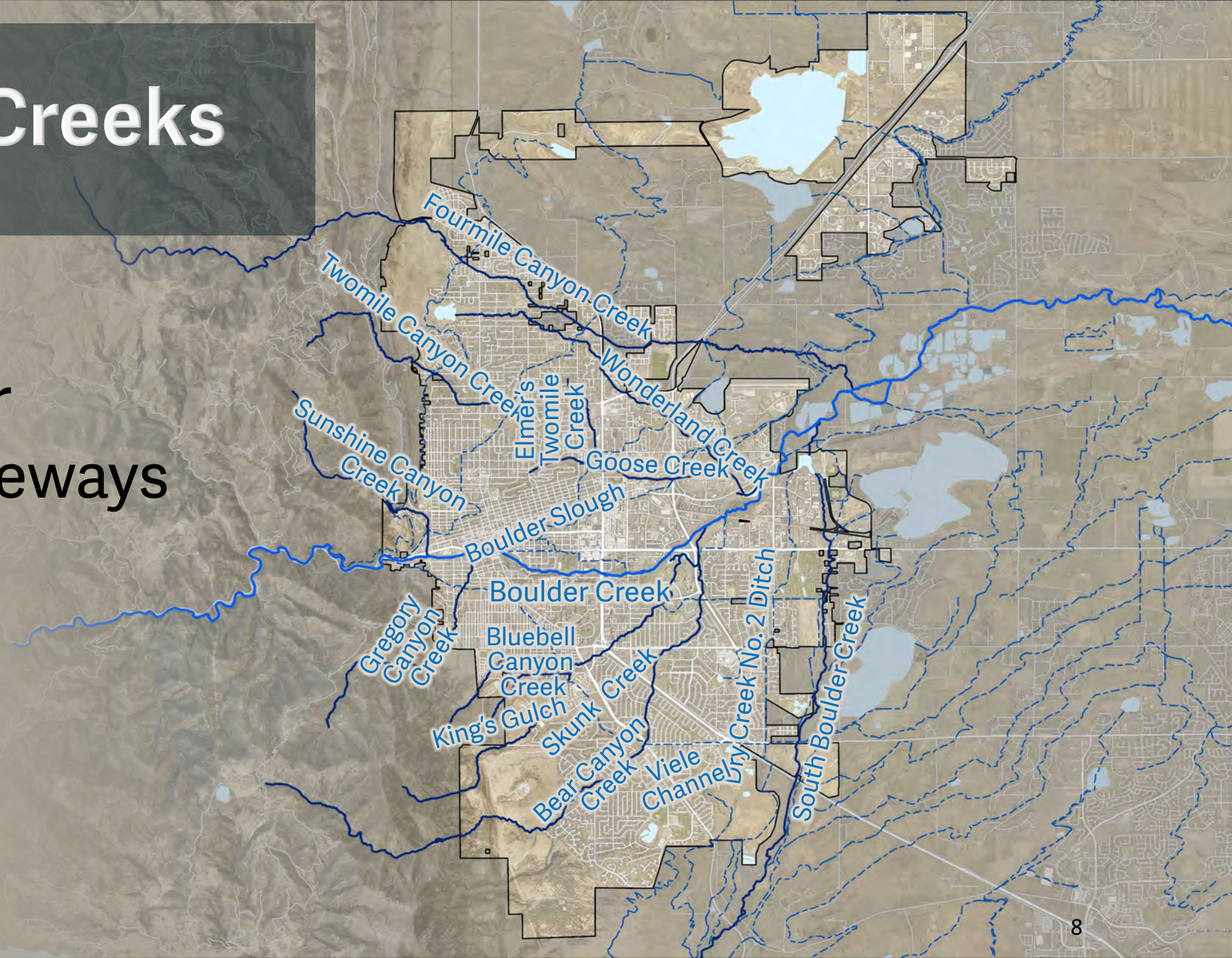
Wednesday, Nov. 3 | S. Boulder Creek, Bear, Viele & Dry Creek Ditch #2

Master Plan Content Informed by Public Outreach



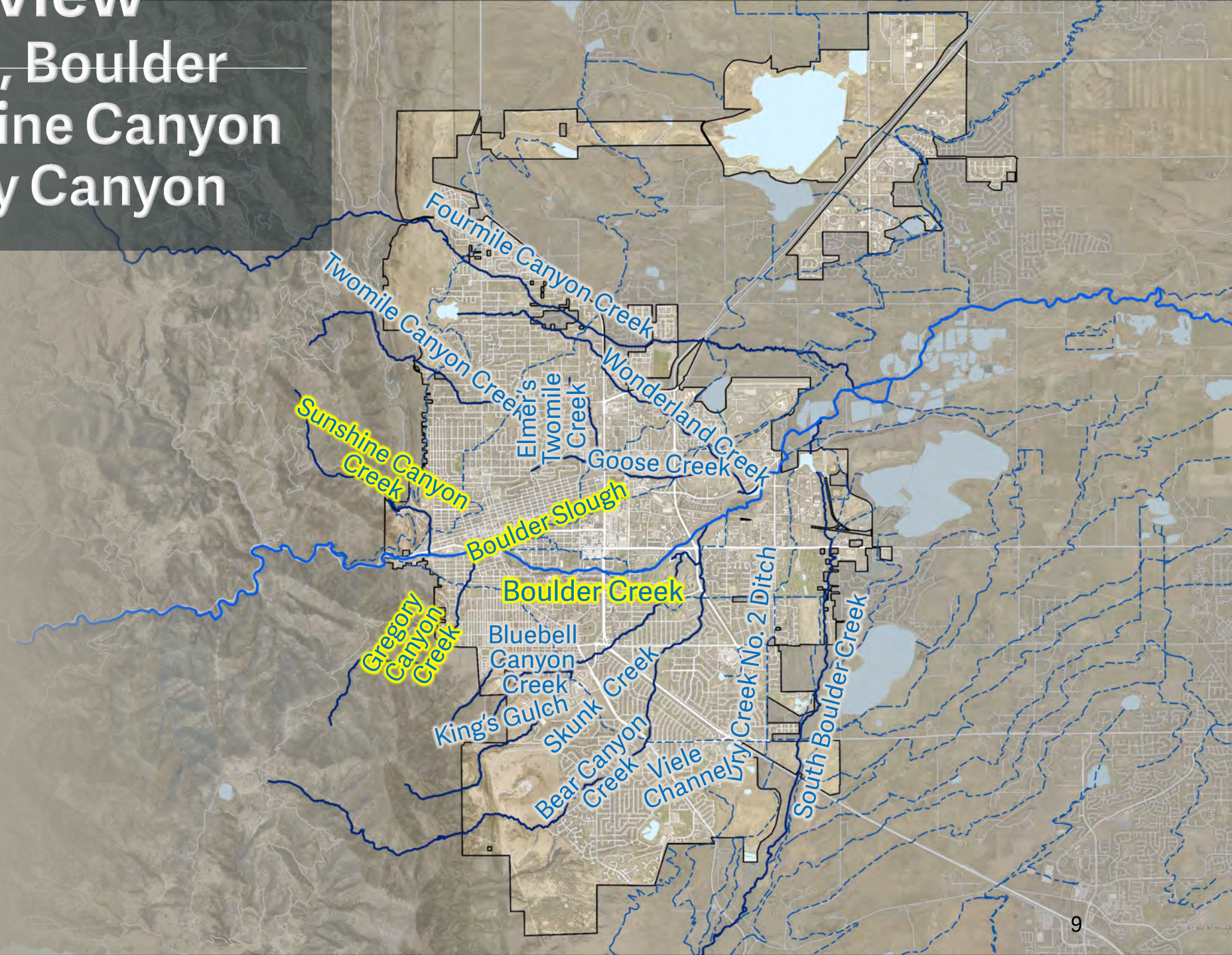
Boulder's Creeks

16 Major
Drainageways



Creek Overview

Boulder Creek, Boulder Slough, Sunshine Canyon Creek, Gregory Canyon Creek



Creek Overview

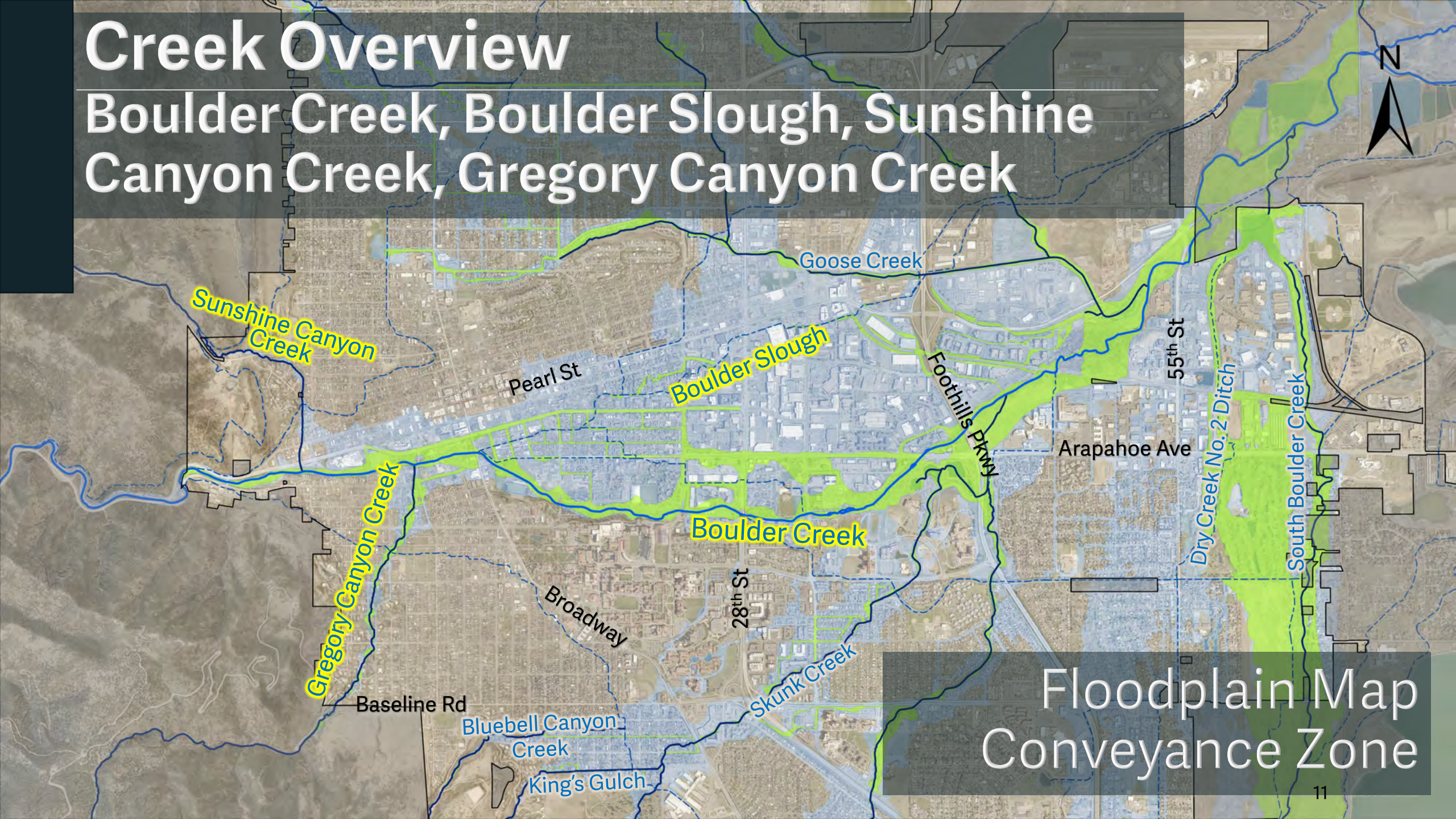
Boulder Creek, Boulder Slough, Sunshine Canyon Creek, Gregory Canyon Creek



Floodplain Map
100-Year (1% Chance)
500-Year (0.2% Chance)

Creek Overview

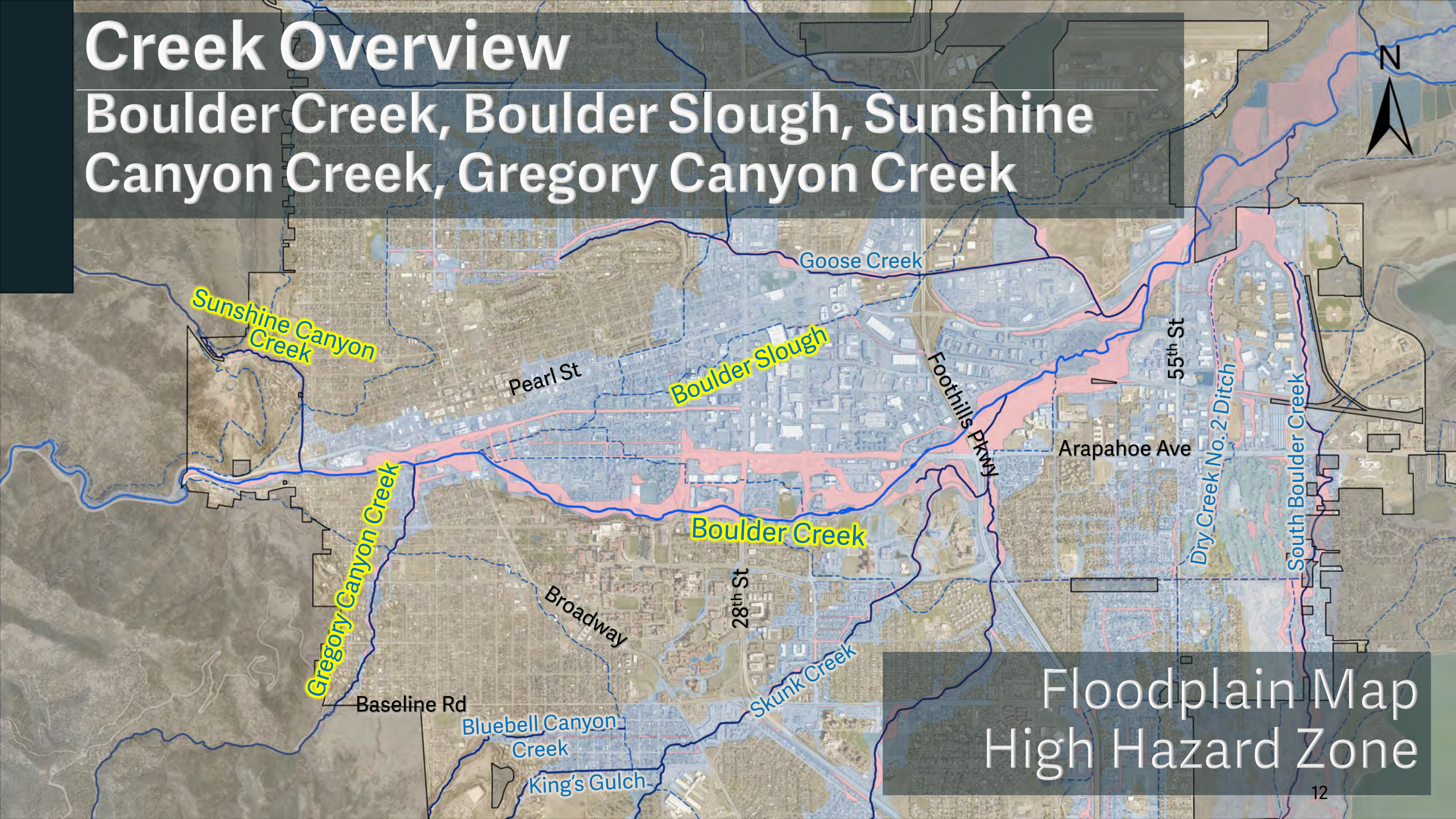
Boulder Creek, Boulder Slough, Sunshine Canyon Creek, Gregory Canyon Creek



Floodplain Map
Conveyance Zone

Creek Overview

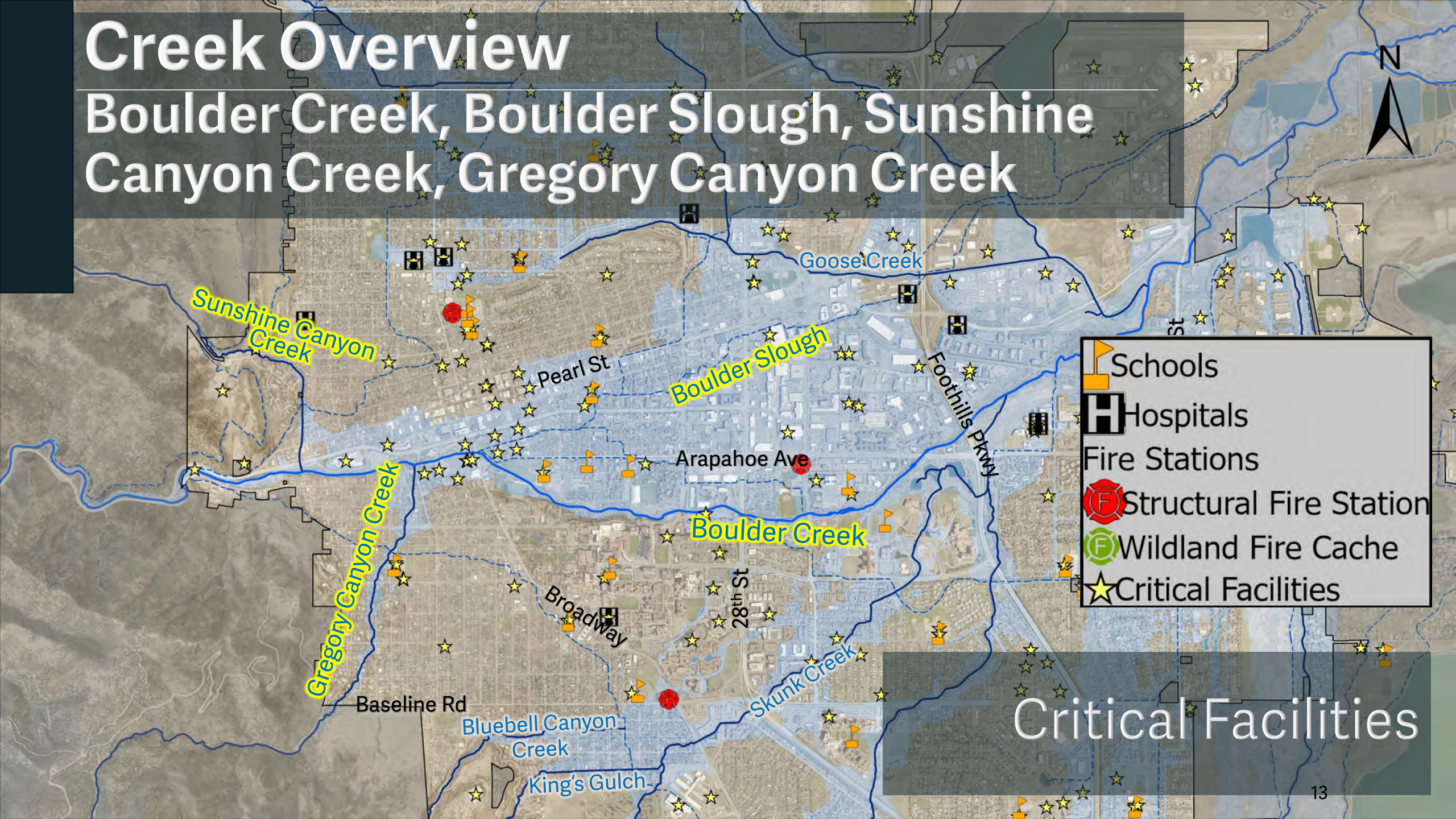
Boulder Creek, Boulder Slough, Sunshine Canyon Creek, Gregory Canyon Creek



Floodplain Map
High Hazard Zone

Creek Overview

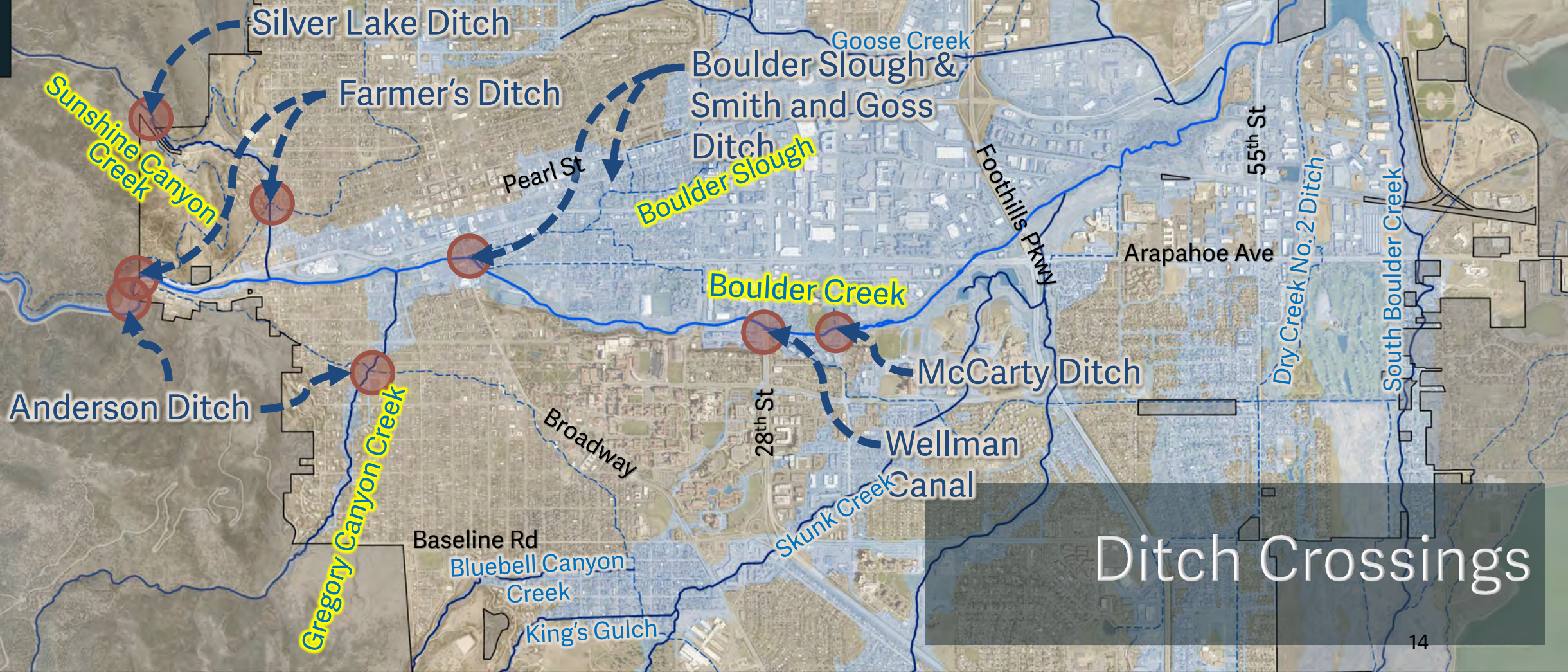
Boulder Creek, Boulder Slough, Sunshine Canyon Creek, Gregory Canyon Creek



Critical Facilities

Creek Overview

Boulder Creek, Boulder Slough, Sunshine Canyon Creek, Gregory Canyon Creek



Ditch Crossings

Creek Overview | Current Issues

Gregory Canyon Creek and Anderson Ditch



Creek Overview | Current Issues

Sunshine Canyon Creek and Farmer's Ditch



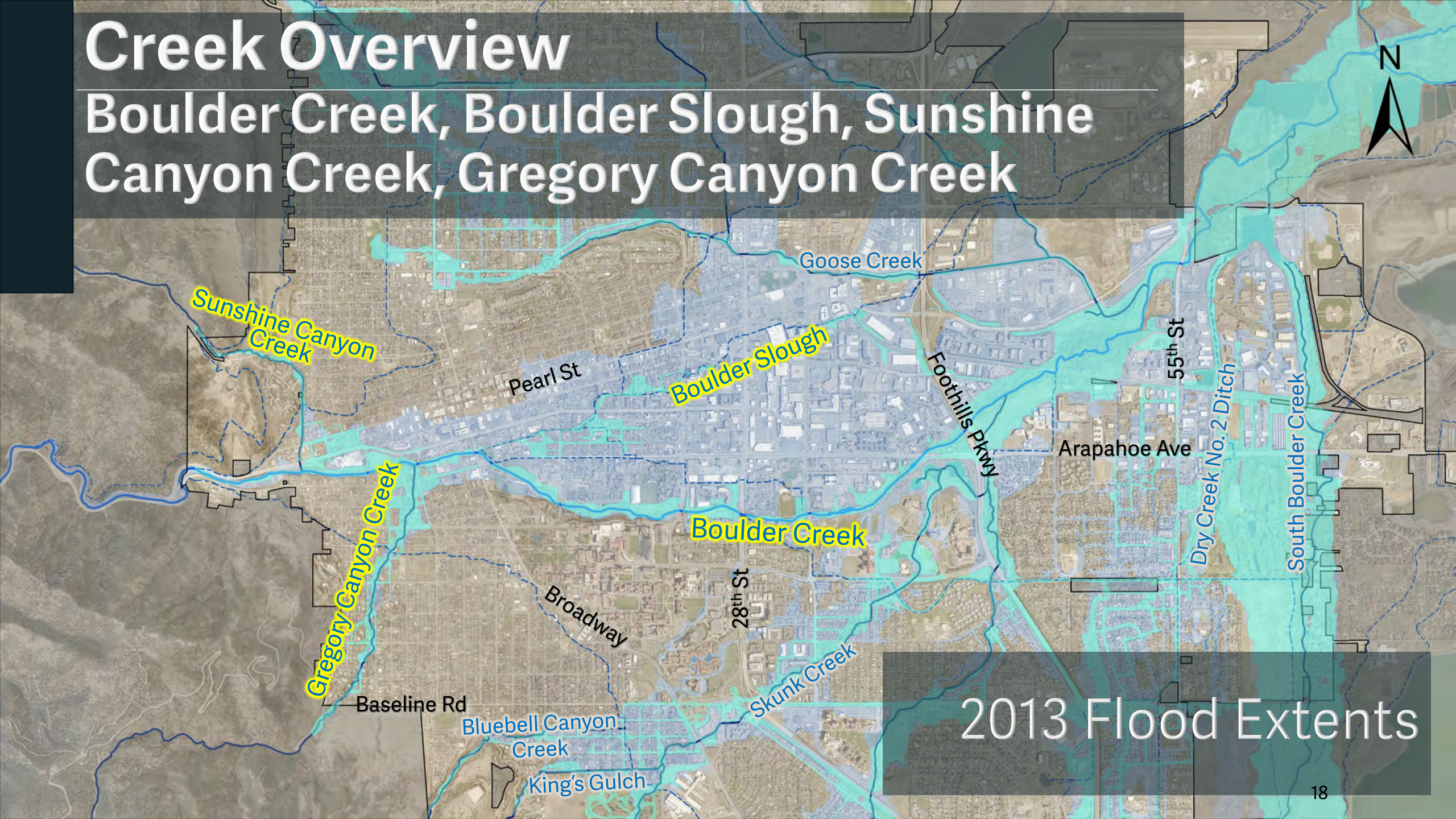
Creek Overview | Current Issues

Boulder Creek and Boulder Slough/Boulder and White Rock Ditch



Creek Overview

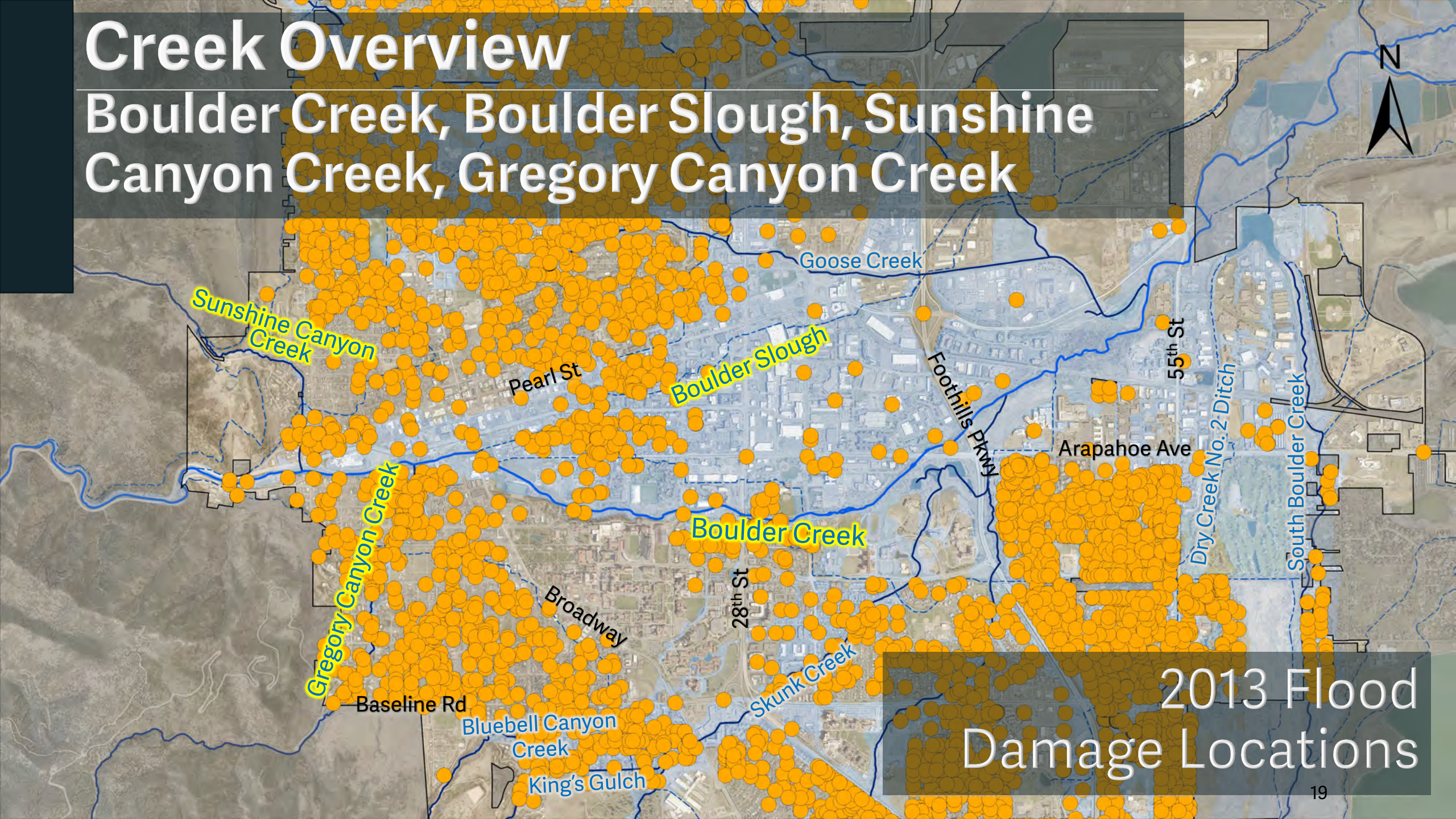
Boulder Creek, Boulder Slough, Sunshine Canyon Creek, Gregory Canyon Creek



2013 Flood Extents

Creek Overview

Boulder Creek, Boulder Slough, Sunshine Canyon Creek, Gregory Canyon Creek



2013 Flood
Damage Locations

Creek Overview | 2013 Flood

Boulder Creek



Creek Overview | 2013 Flood

Boulder Creek Debris



Creek Overview | 2013 Flood



**Boulder Creek &
Boulder Slough**
Central Park & Civic Area

Creek Overview | 2013 Flood

Boulder Slough



Creek Overview | 2013 Flood

Sunshine Canyon Creek



Creek Overview | 2013 Flood

Sunshine Canyon Creek



Knollwood Tennis
Courts



9th and Walnut

Creek Overview | 2013 Flood



**Gregory Canyon
Creek**
Gregory Canyon Rd

Creek Overview | 2013 Flood

Gregory Canyon Creek



Willowbrook



Pennsylvania
Ave.

Creek Overview | 2013 Flood



7th Street



2013 Flood Recovery
Upgraded Trash Racks

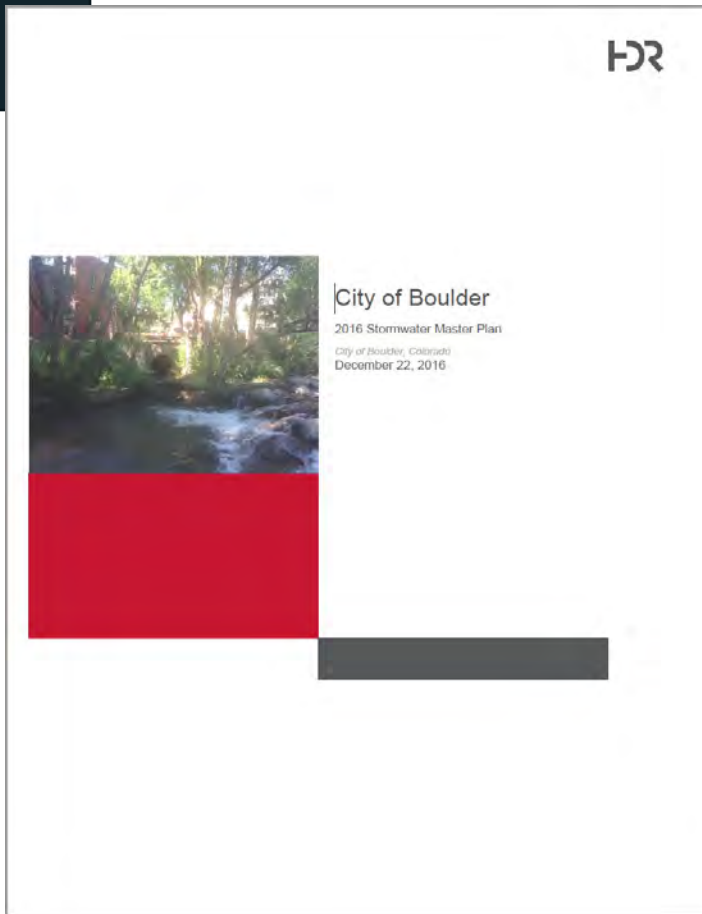


Willowbrook



Creek Overview

Boulder Creek, Boulder Slough, Sunshine Canyon Creek, Gregory Canyon Creek



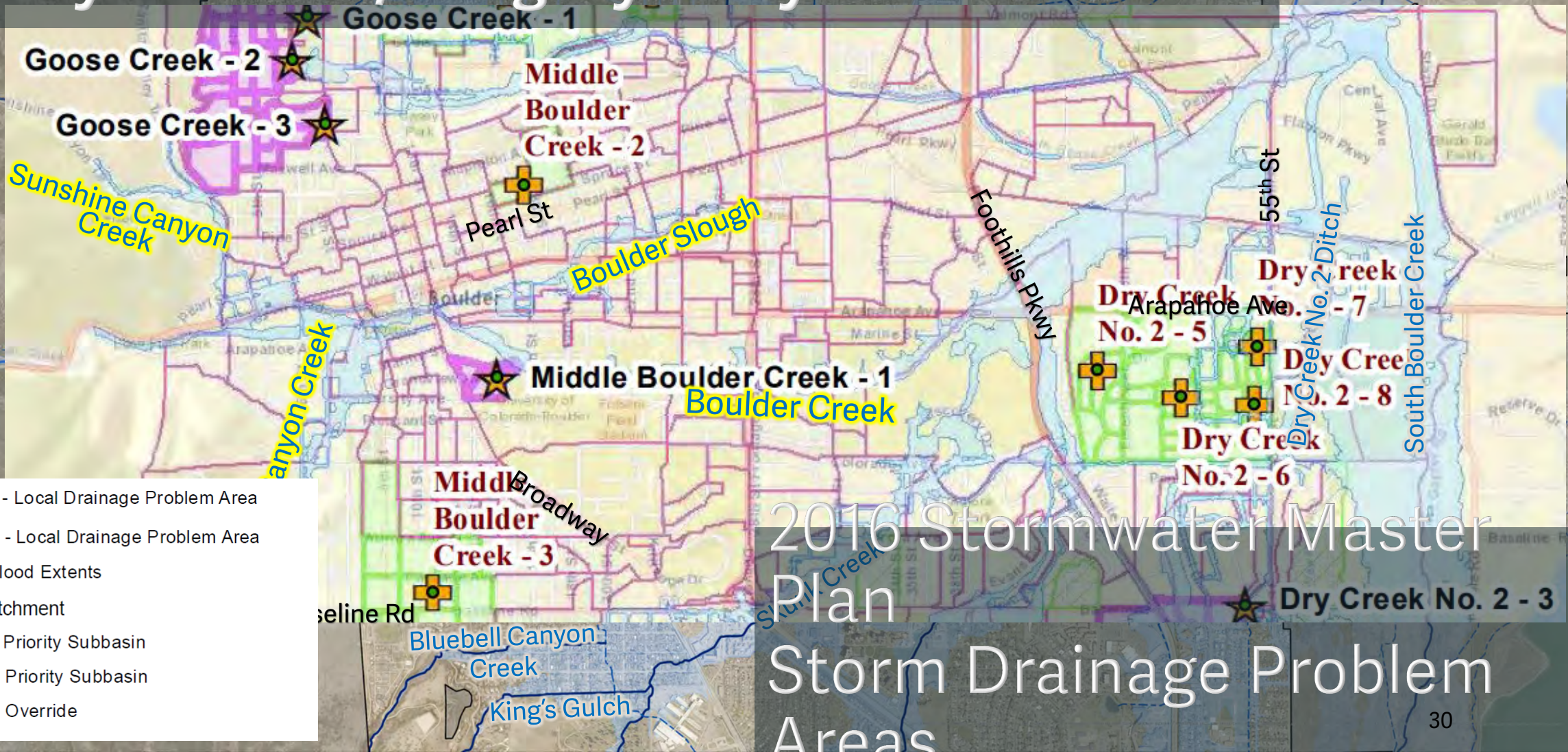
Stormwater Master Plan



Drainageway Mitigation Plans

Creek Overview

Boulder Creek, Boulder Slough, Sunshine Canyon Creek, Gregory Canyon Creek



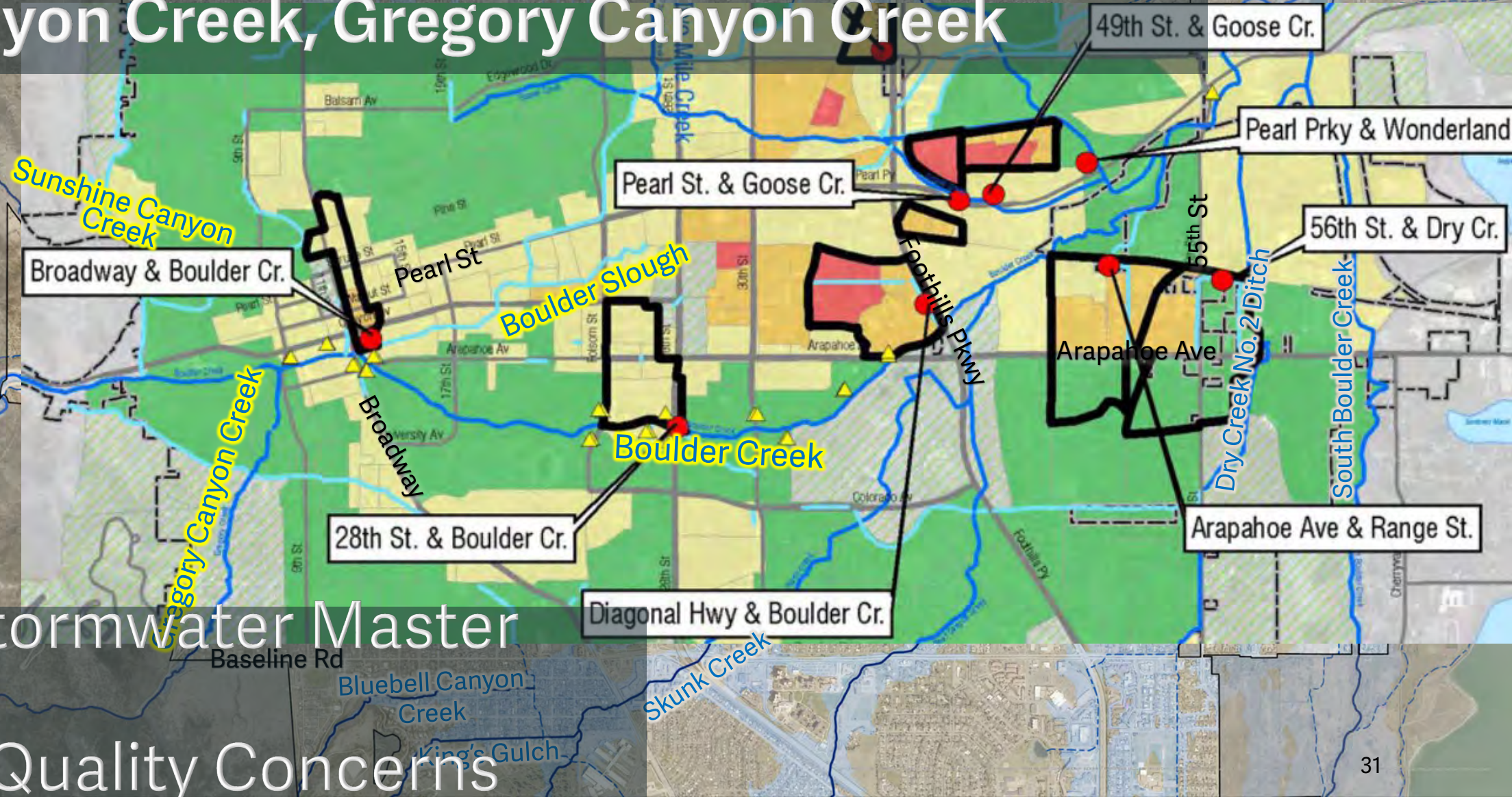
2016 Stormwater Master Plan

Storm Drainage Problem Areas

Creek Overview

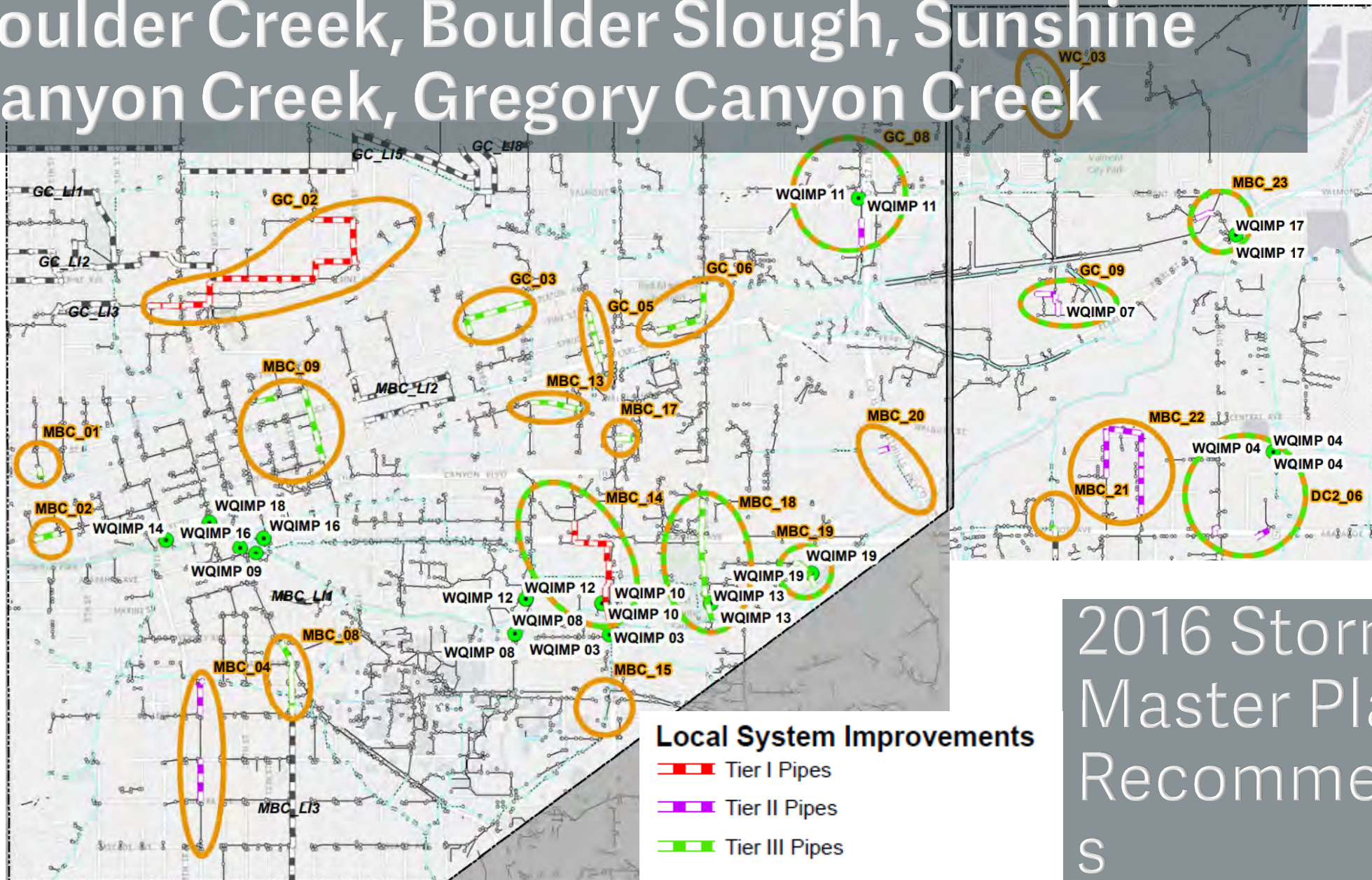
Boulder Creek, Boulder Slough, Sunshine Canyon Creek, Gregory Canyon Creek

2016 Stormwater Master Plan
Water Quality Concerns



Creek Overview

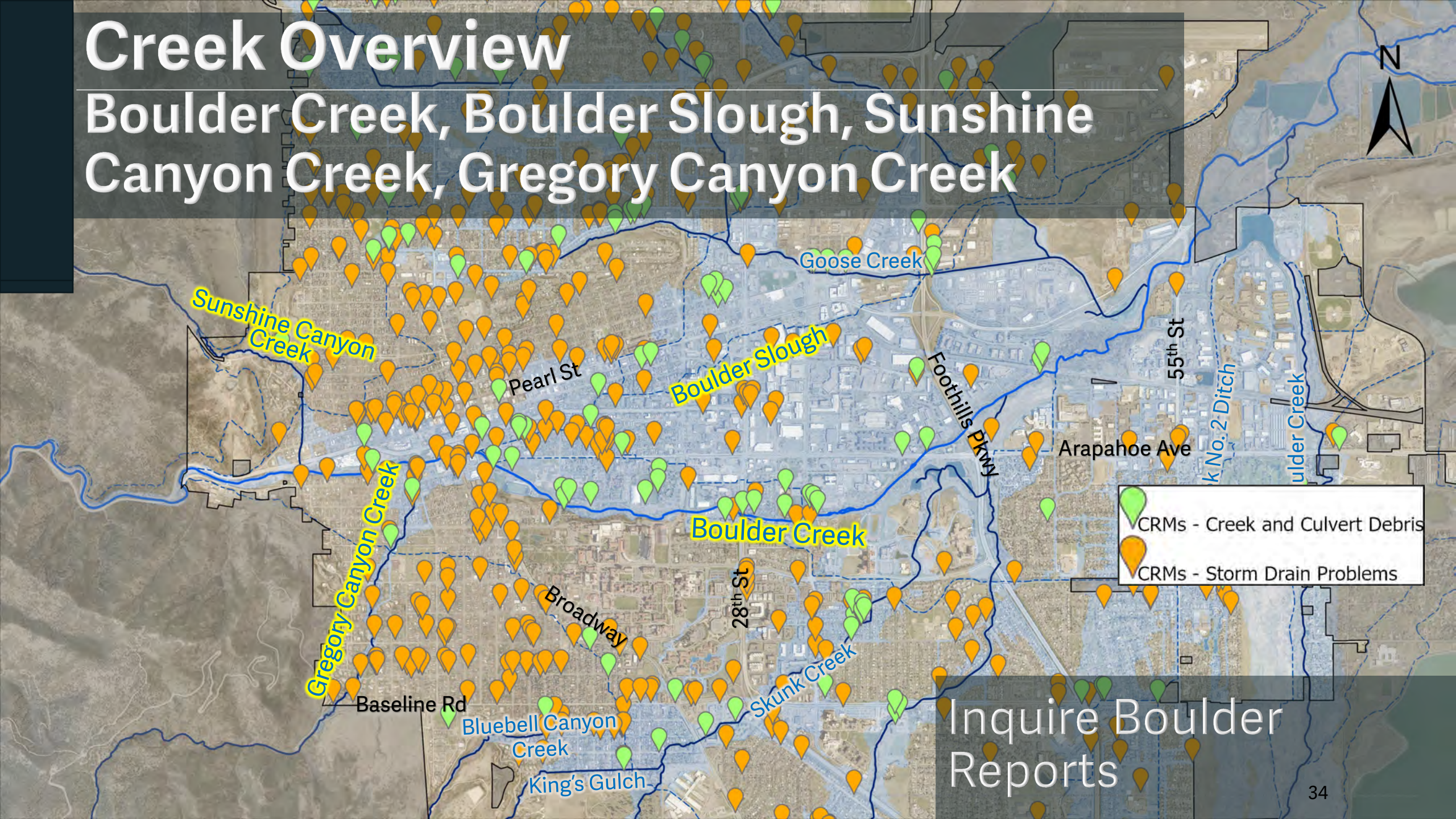
Boulder Creek, Boulder Slough, Sunshine Canyon Creek, Gregory Canyon Creek



2016 Stormwater
Master Plan
Recommendation
s

Creek Overview

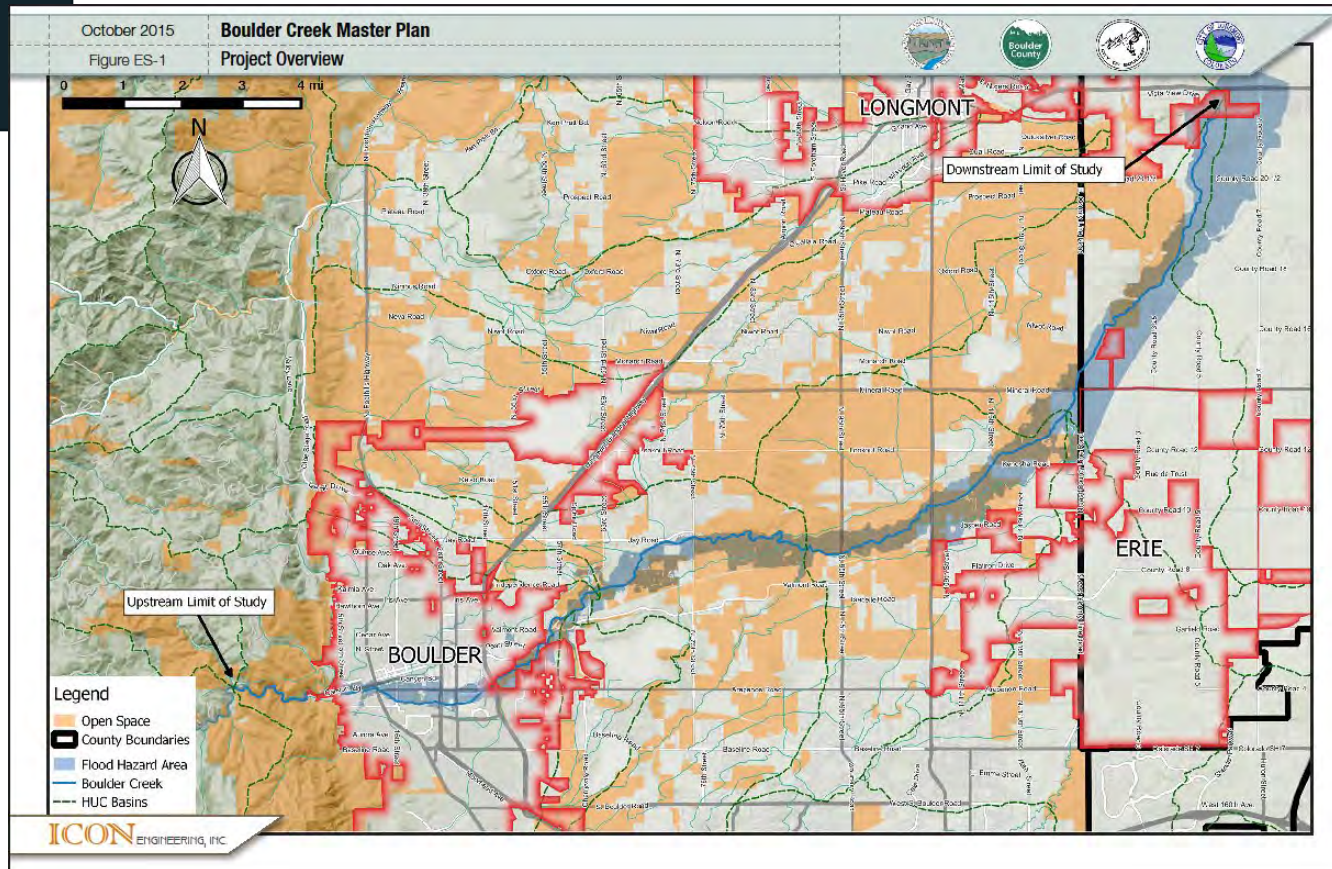
Boulder Creek, Boulder Slough, Sunshine Canyon Creek, Gregory Canyon Creek



Inquire Boulder Reports

Creek Overview

Boulder Creek, Boulder Slough, Sunshine Canyon Creek, Gregory Canyon Creek



Plan for Resiliency and Stability

- Stream restoration & stabilization
- Ecological health
- Transportation
- Recreation
- Public safety

2016 Boulder Creek Restoration Master Plan

Creek Overview

Boulder Creek, Boulder Slough, Sunshine Canyon Creek, Gregory Canyon Creek

- Open Space and Mountain Parks
 - Stream restoration
- Bridge Improvements
 - BNSF Railroad (Minimum 180' Span)
 - Old Valmont Pedestrian Crossing
 - Access bridges on CU Campus
- Sediment Deposition
- Specific Problem Locations:
 - Boulder Community Health Access (500 Year)
 - Boulder Slough at 14th Street
 - Improvements to High Hazard areas



2016 Boulder Creek Restoration Master Plan

Creek Overview

Boulder Creek, Boulder Slough, Sunshine Canyon Creek, Gregory Canyon Creek



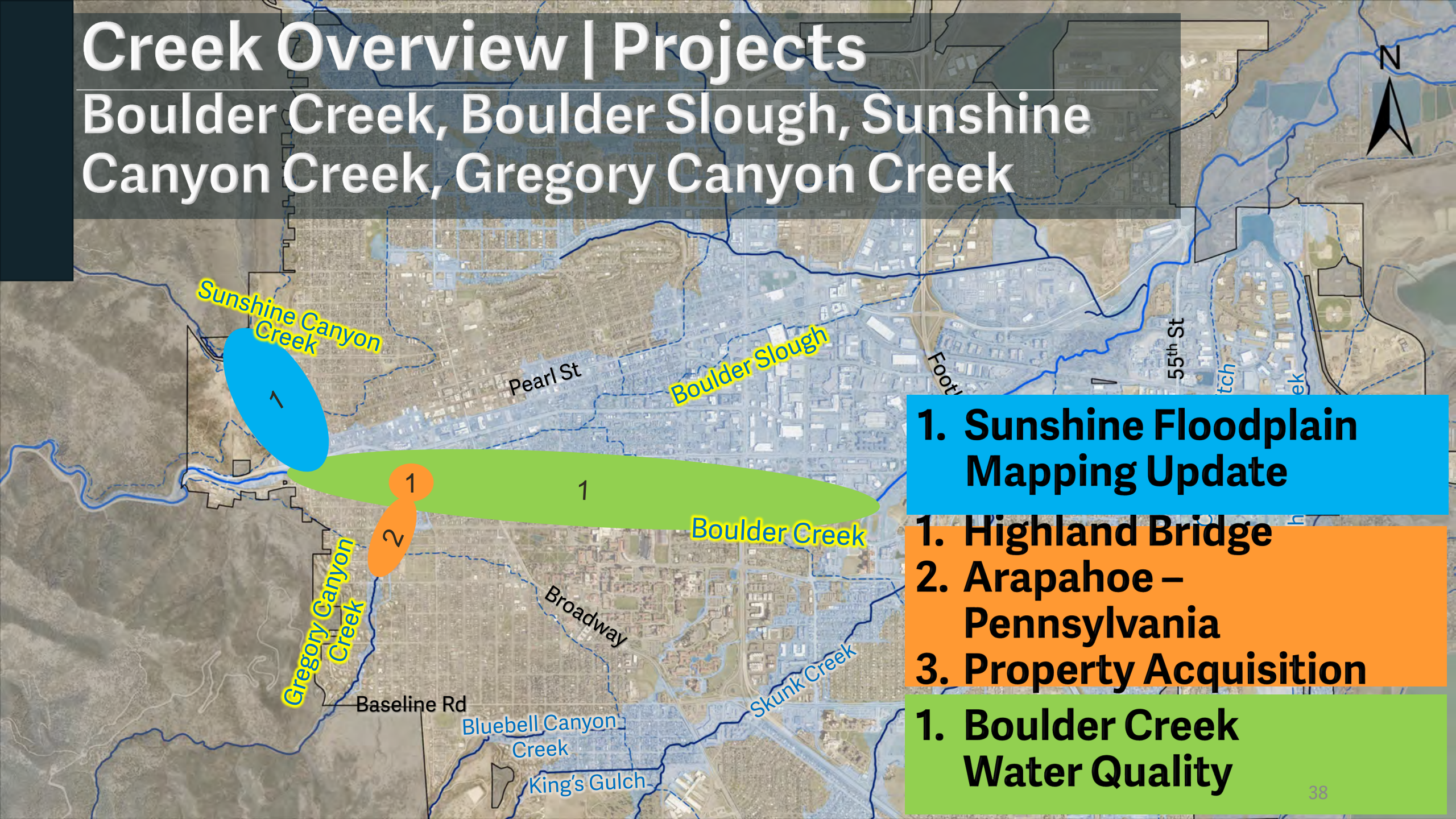
LEGEND

- Channel Improvements
- Habitat Improvements
- Existing Culvert
- Proposed Culvert/Bridge
- Priority HHZ Property Aquisition
- Street Improvements
- Flood Mitigation Opportunity

2015 Gregory Canyon Creek Master Plan

Creek Overview | Projects

Boulder Creek, Boulder Slough, Sunshine Canyon Creek, Gregory Canyon Creek



1. Sunshine Floodplain Mapping Update

1. Highland Bridge
2. Arapahoe – Pennsylvania
3. Property Acquisition

1. Boulder Creek Water Quality

Creek Overview | Projects

Gregory Canyon Creek Highland Bridge



4-foot Pipe
7 CFS



30-foot Bridge
830 CFS

Highland City Club
Before & After

Creek Overview | Projects

Gregory Canyon Creek

Arapahoe Ave To Pennsylvania Ave

Project Start
Arapahoe Ave

Project End
Pennsylvania Ave



Creek Overview | Projects

Gregory Canyon Creek

Arapahoe Ave To Pennsylvania Ave

Project Start
Arapahoe Ave

Project End
Pennsylvania Ave



Creek Overview | Projects

Gregory Canyon Creek

Arapahoe Ave To Pennsylvania Ave



744 University Ave
Relocation

810 Marine St
Deconstruction

712 Pleasant St
Deconstruction

Boulder Slough

Boulder Creek

Gregory Canyon
Creek

Arapahoe Ave

Broadway

University Ave

College Ave

Anderson Ditch

9th St

College Ave

Flagstaff Rd

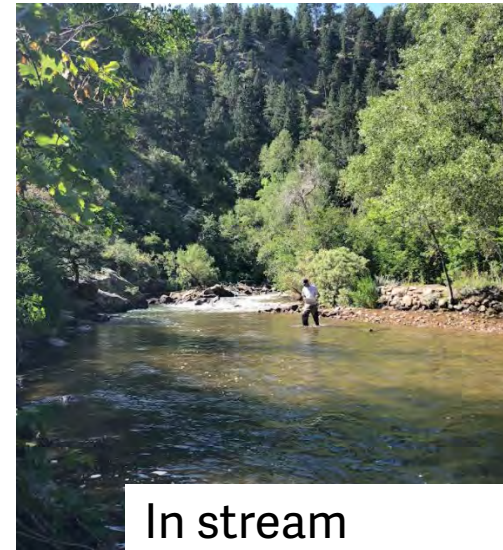
Creek Overview | Water Quality

Recent Initiatives

- *E. coli* signage
- *E. coli* Investigation and Mitigation Efforts
- Outfall Flow Monitoring
- Greenways Vegetation Management



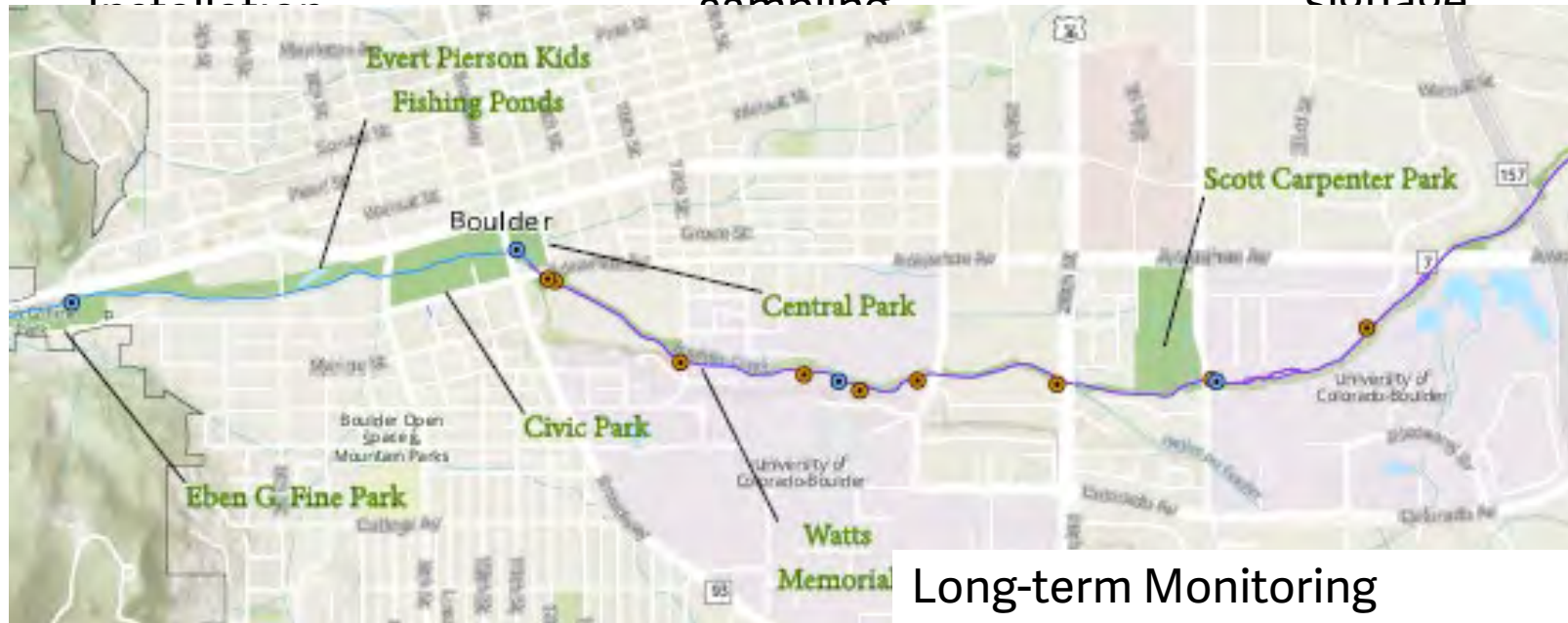
Flow Meter Installation



In stream sampling

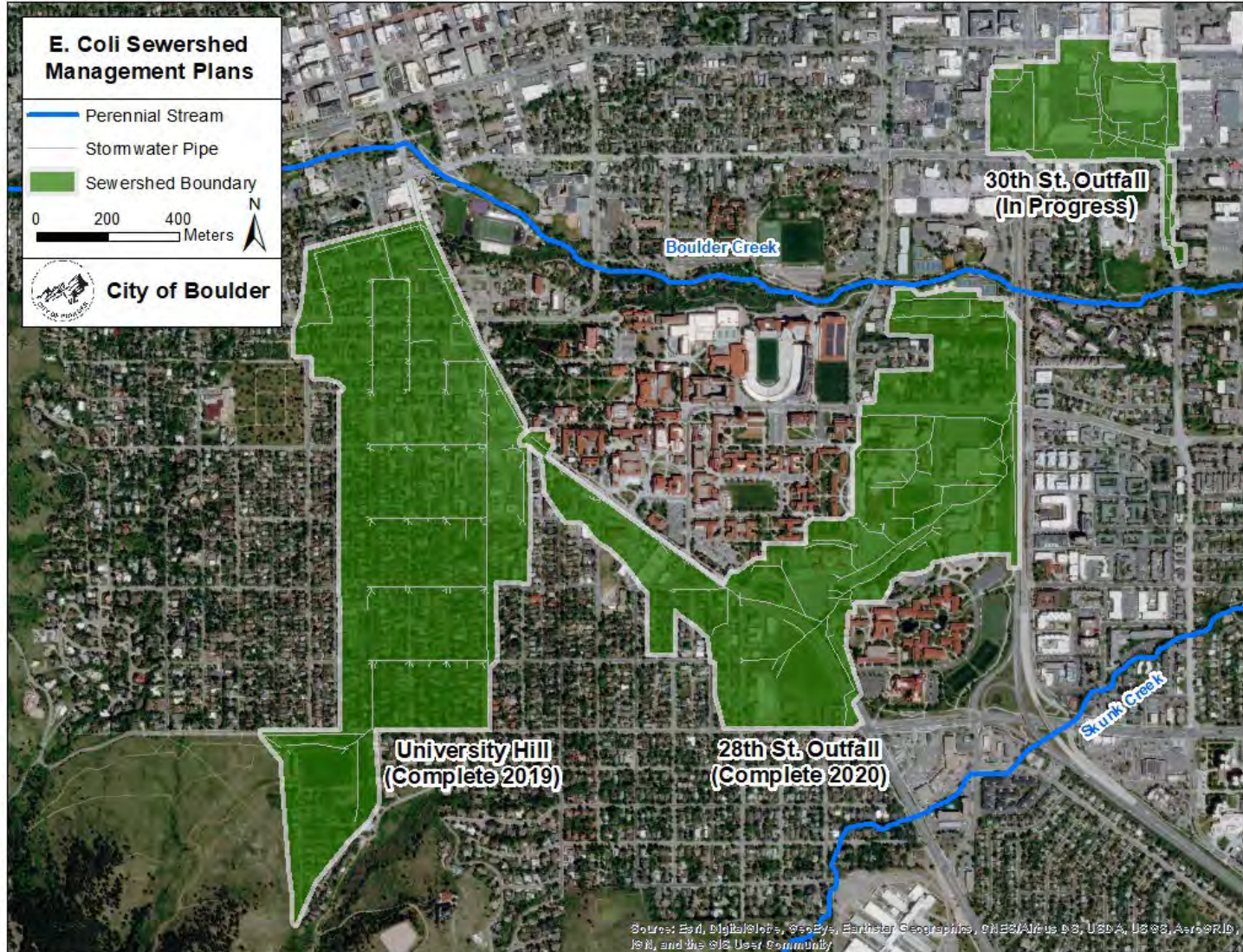


E. coli signage



Long-term Monitoring Locations

Creek Overview | Water Quality



E. Coli Investigation and Mitigation

Continued Storm Sewershed
Assessment

Exploring project with UC-
Boulder to install a smart
headgate to address irrigation
overflows

Special studies related to
better understanding
contribution to the creek

Partnership with USDA to look
at fecal contributions to
stormwater discharges from
urban wildlife

**Policy &
Program
Evaluation** + **Community
Input** + **Existing
Creek
Plans**



**Inform Policy
Recommendations**

**Develop Project
Prioritization
Framework**

Project Prioritization Criteria

Life Safety

Ability to
Implement

Efficiency & Cost

**Social Impact,
Equity & Fairness**

Protect Property

Cultural
Resources

Environmental
Resources

Infrastructure
Resiliency

Protect Critical
Facilities

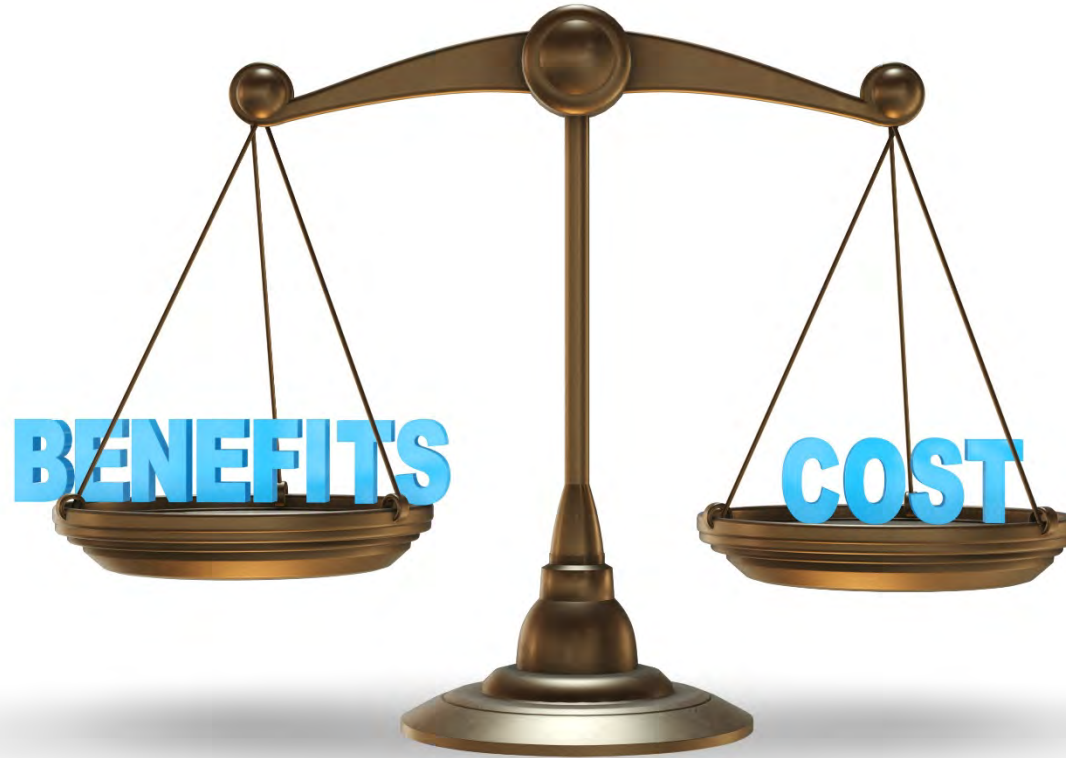
Equity



When one's identity cannot predict the outcome.

Source: OEHR.

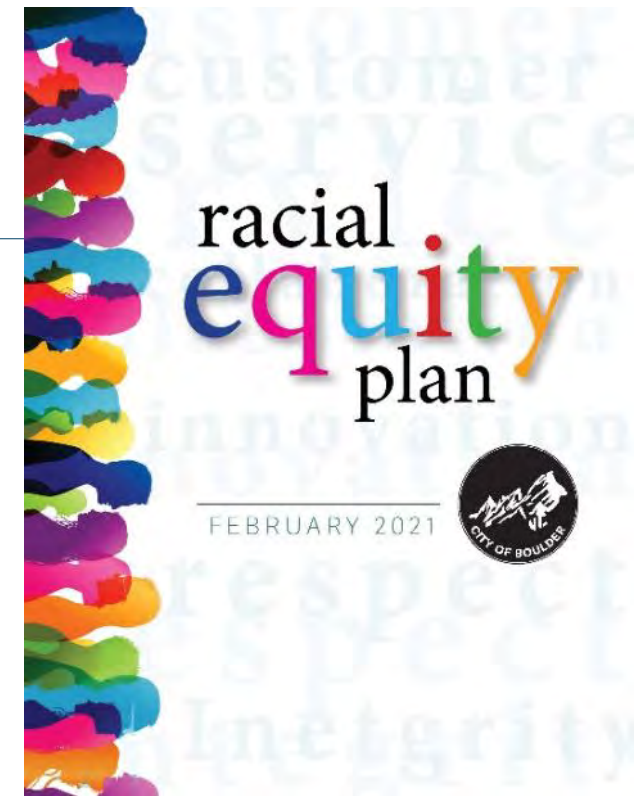
Project Prioritization Criteria



Racial Equity

When race does not determine or predict the distribution of resources, economic/political/social opportunities, and burdens for group members in society.

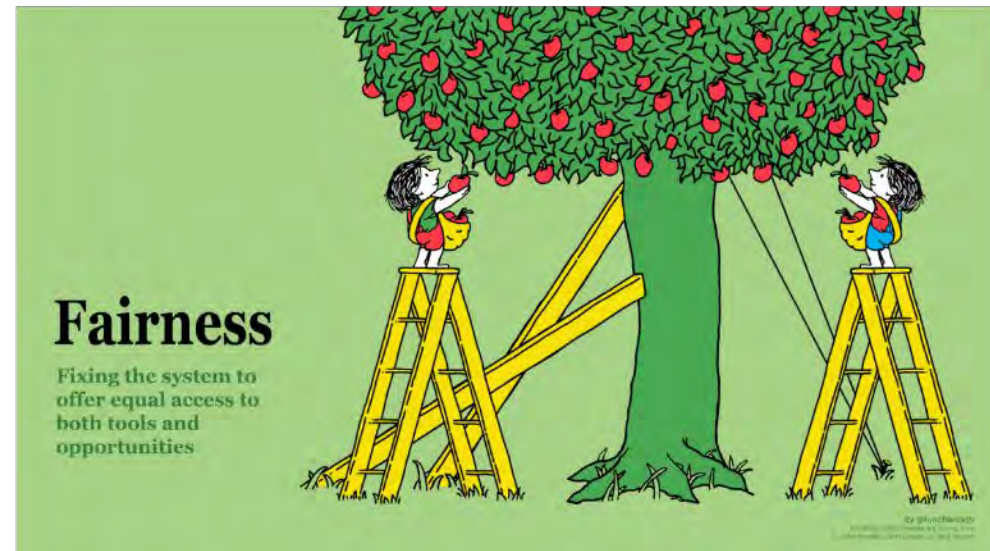
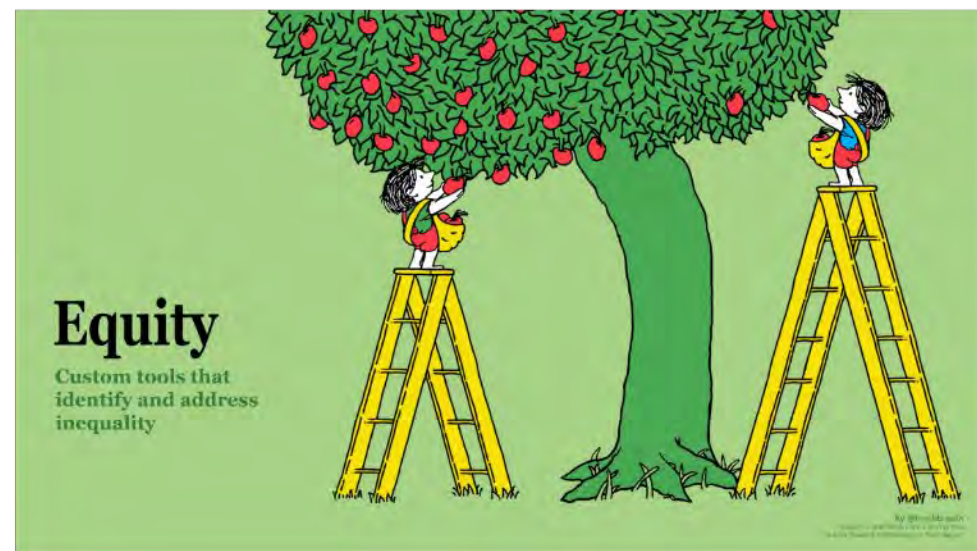
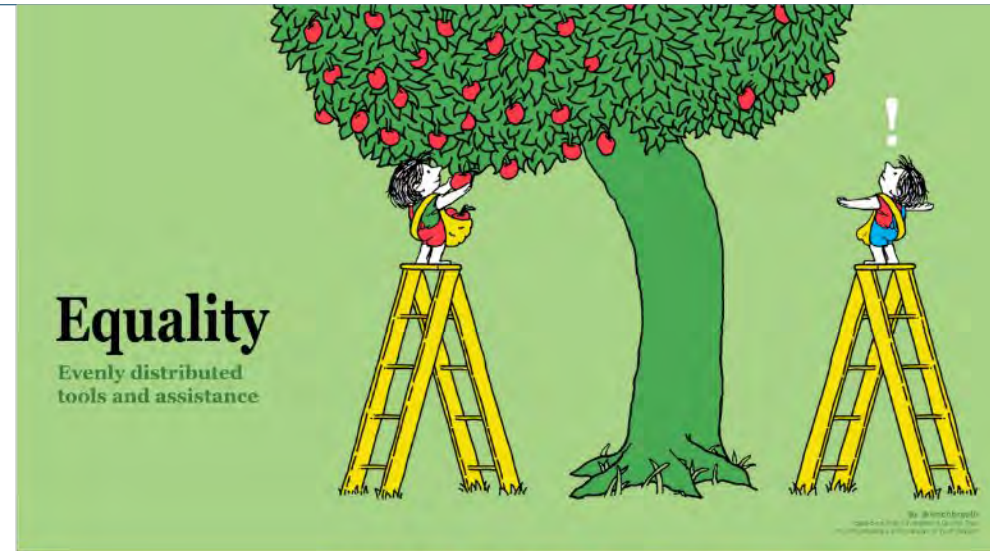
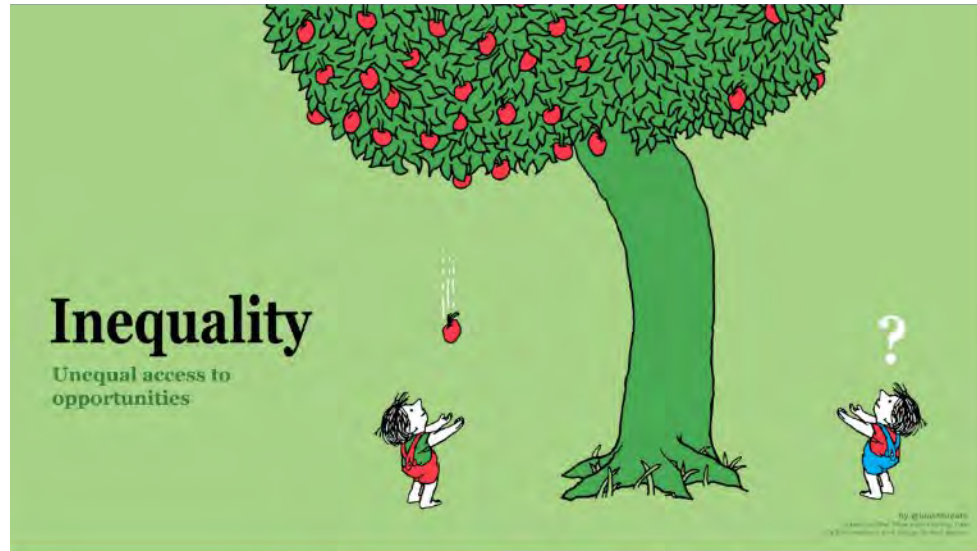
Source: OEHR and Seattle RSJI.



City of Boulder Racial Equity Plan, 2021



What does *Equity* mean?

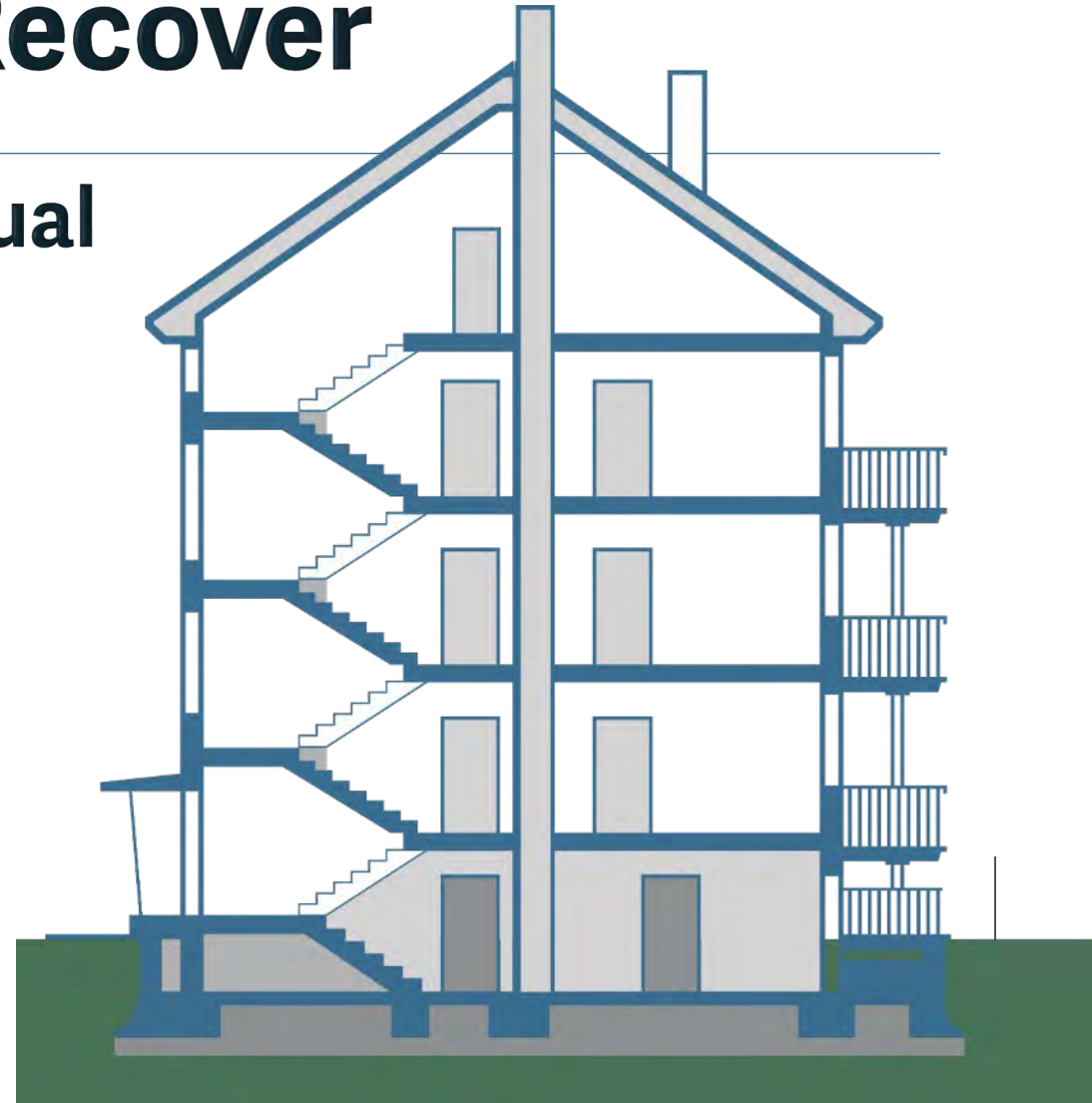
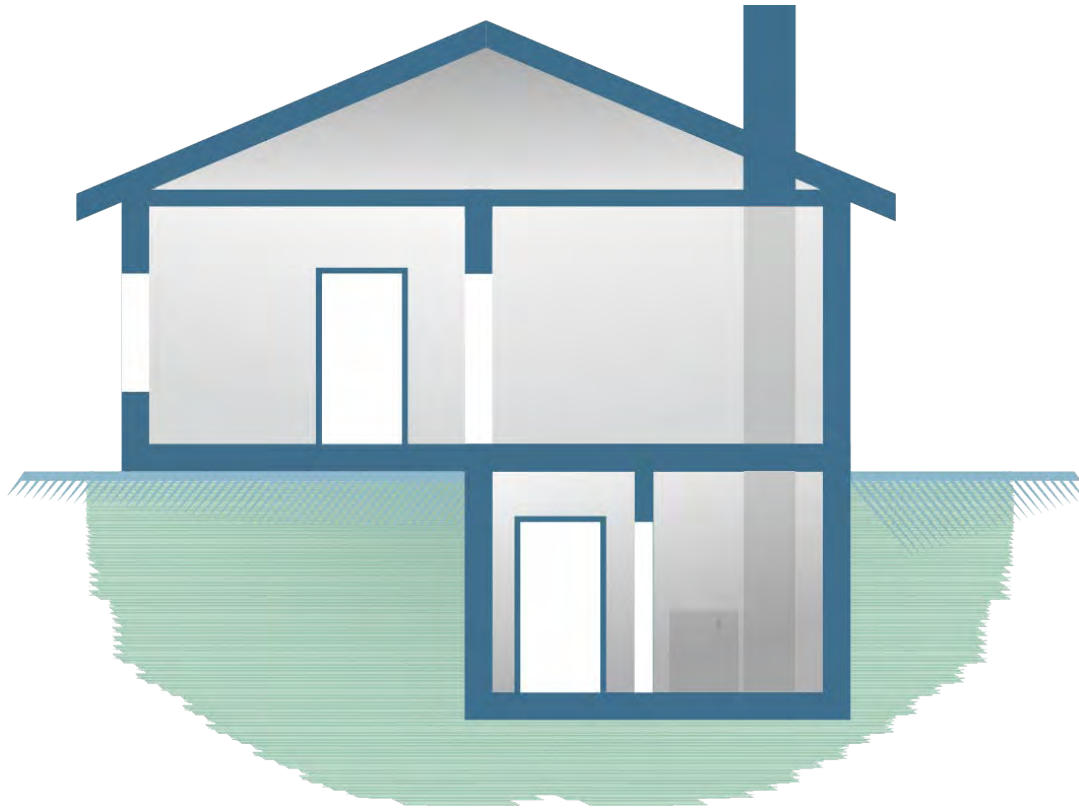


How do we prioritize projects with equity and fairness in mind?



Resiliency & Ability to Recover

Impacts from flooding are not equal



Equity, Fairness and Resiliency

Variation in creeks and drainage areas



Boulder Creek



Gregory Canyon Creek



Bluebell Canyon Creek

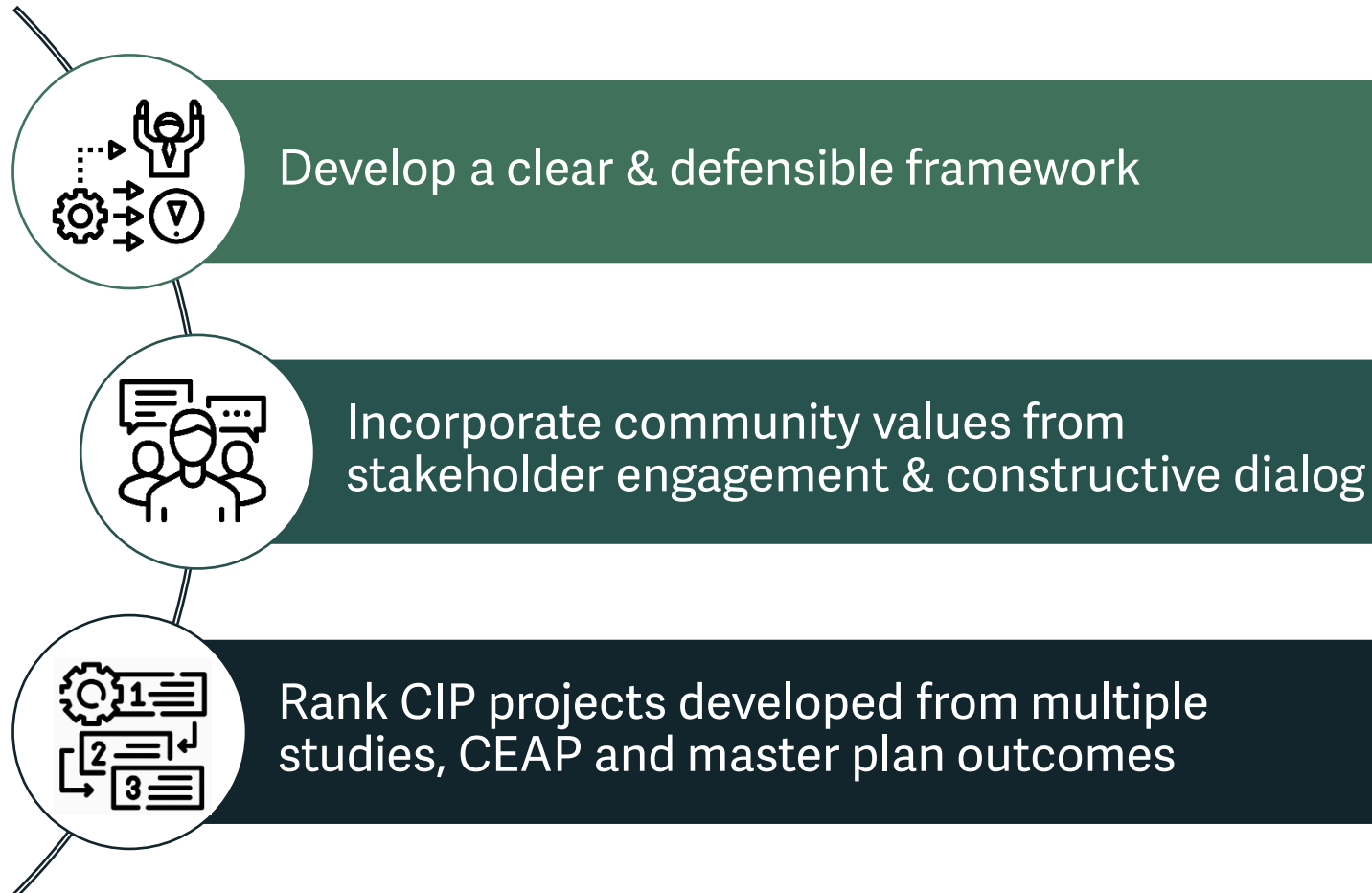


Project Prioritization Framework to Aid Good Decision Making

Building projects that align with community values & meet the Utility's goals and objectives

Project Prioritization Framework to Aid Good Decision Making

Building projects that align with community values & meet the Utility's goals and objectives



CIP Project Prioritization | Background

Historic Criteria Sets Used in Boulder

- Stormwater and Flood Management CIP Prioritization Guiding Principles
- Mitigation Planning Evaluation of Alternatives
- Community & Environmental Assessment Process (CEAP) Criteria



Other County & City CIP Prioritization Criteria

Stormwater and Flood Management Project Prioritization Goals

Stormwater and flood management projects should...

- *Protect people from harm, educate the community, reduce risks, and...*
- *Preserve, protect, and restore the natural resources associated with creeks and wetlands for the multiple benefits they provide to support a resilient community*
- *Provide resilient infrastructure that addresses uncertainty, including climate change considerations*
- *Provide access for emergency response and recovery efforts*
- *Minimize property damage*
- *Provide efficient and cost-effective solutions*

... in ways that are mindful and equitable to our entire community.

As we evaluate flood mitigation projects and approaches, we are committed to mutually respectful conversations about these issues in a way that is productive and safe for all involved.

Project Prioritization Criteria

Life Safety

Ability to
Implement

Efficiency & Cost

Social Impact,
Equity & Fairness

Protect Property

Cultural
Resources

Environmental
Resources

Infrastructure
Resiliency

Protect Critical
Facilities

LIFE SAFETY

- Consequence of Failure
- Reduce/Eliminate High Hazard Zone Areas or Residential Structures
- Maintain Emergency Access for First Responders

ABILITY TO IMPLEMENT

The background of the slide features a close-up, warm-toned photograph of several hands working together to assemble a wooden jigsaw puzzle on a wooden surface. The hands are positioned at different points, some holding pieces and others placing them into the larger, partially completed puzzle. The lighting is soft and directional, creating highlights and shadows that emphasize the texture of the wood and the skin. The overall composition suggests a collaborative effort and the process of building something from individual parts.

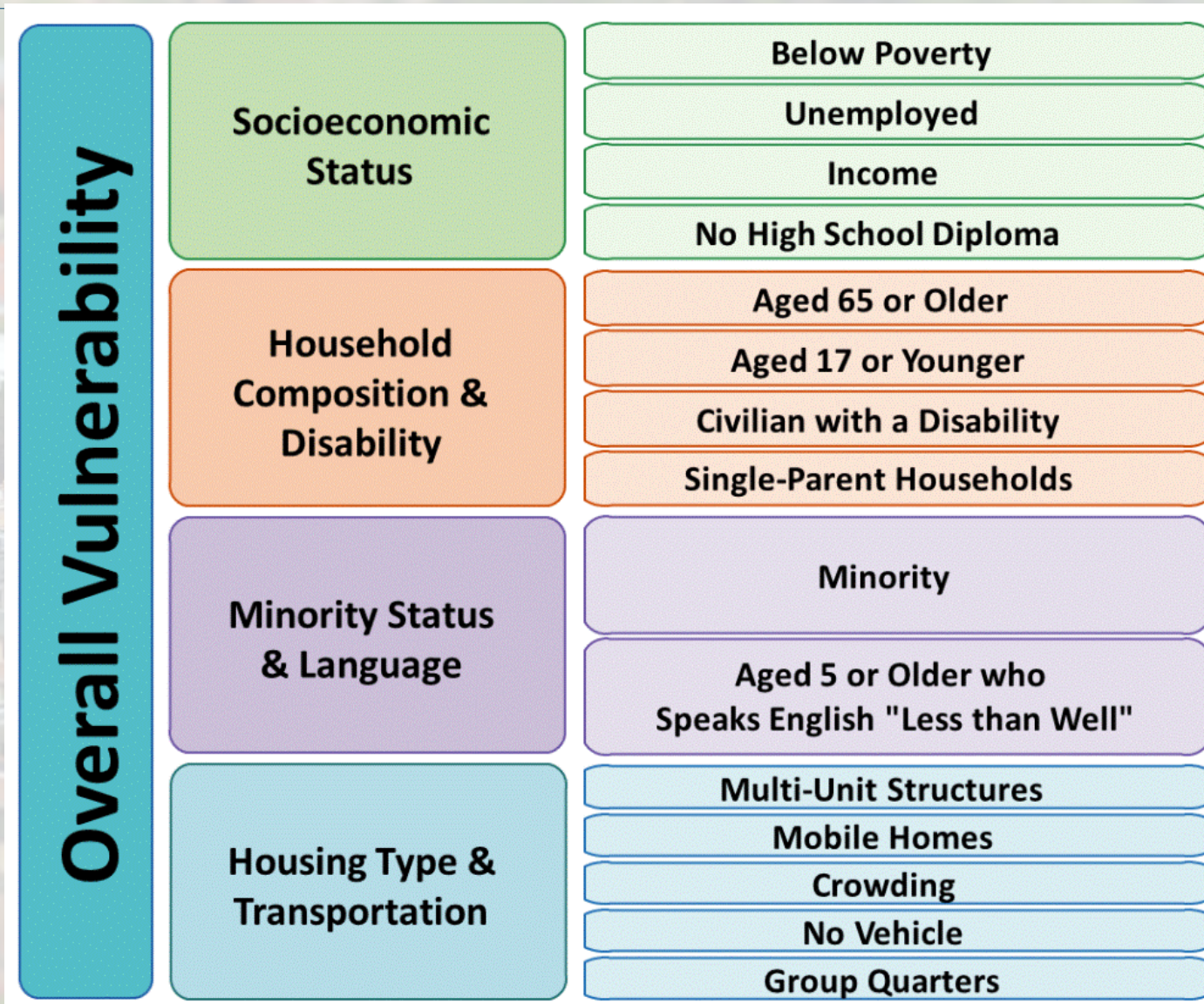
- Minimal Constraints: Institutional, Legal, Land ownership, etc.
- Community Acceptance/Support
- Project Readiness
- Ease of Construction

EFFICIENCY AND COST

- Capital Cost
- Operations and Maintenance Cost
- Ability to Leverage Funding



Social Impact, Equity and Fairness



PROTECT PROPERTY

- Protect from Physical Damage
- Reduce Economic Loss



CULTURAL RESOURCES

- Protect Historic Structures
- Protect/Provide Community Amenities



ENVIRONMENTAL RESOURCES


- Protect/Restore Floodplains and Wetlands
- Protect/Improve Water Quality
- Increase Habitat Connectivity

INFRASTRUCTURE RESILIENCY

- Reduce Damage to Existing Infrastructure: Roadways, Water & Sewer Lines, Utility Services, etc.
- Increase Infrastructure Capacity
- Reduce/Mitigate Channel Migration and Erosion
- Disconnect Storm Flows from Irrigation Ditches

PROTECT CRITICAL FACILITIES

- Schools, Daycares, Hospitals, Senior Living Facilities, etc.
- Essential Services: Fire, Police, Water Treatment, etc.
- Hazardous Materials Facilities



Breakout Discussion

Criteria Weighting Exercise

CIP Project Prioritization Tool | Criteria Voting

Step 1: Enter your name

Step 2: Click "Join"

The image shows a mobile application interface for a project prioritization tool. At the top, there is a text input field labeled "Enter your name to participate" with a yellow "Join" button to its right. Below this is a yellow header bar with the word "Chat" and a speech bubble icon. Under the chat header is a large white text area for messages. At the bottom, there is a section titled "Participants 1" which lists "Laurel Olsen".

CIP Project Prioritization Tool | Criteria Voting

Click light grey dots to vote

16 votes available
Private Voting

Enabled ☐

Infrastructure Resiliency

- Reduce Damage to Existing Infrastructure: roadways, water & sewer lines, utility services, etc.
- Increase Infrastructure Capacity
- Reduce/Mitigate Channel Migration and Erosion
- Disconnect Storm Flows from Irrigation Ditches

4

0

Environmental Resources

- Protect/Restore Floodplains and Wetlands
- Protect/Improve Water Quality
- Increase Habitat Connectivity

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Cultural Resources

- Protect Historic Structures
- Protect/Provide Community Amenities

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Efficiency & Cost

- Capital Cost
- Operations & Maintenance Cost
- Ability to Leverage Funding

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Red dots tally your total votes for the card

Click yellow dots to remove a vote

Click here for more information on the card

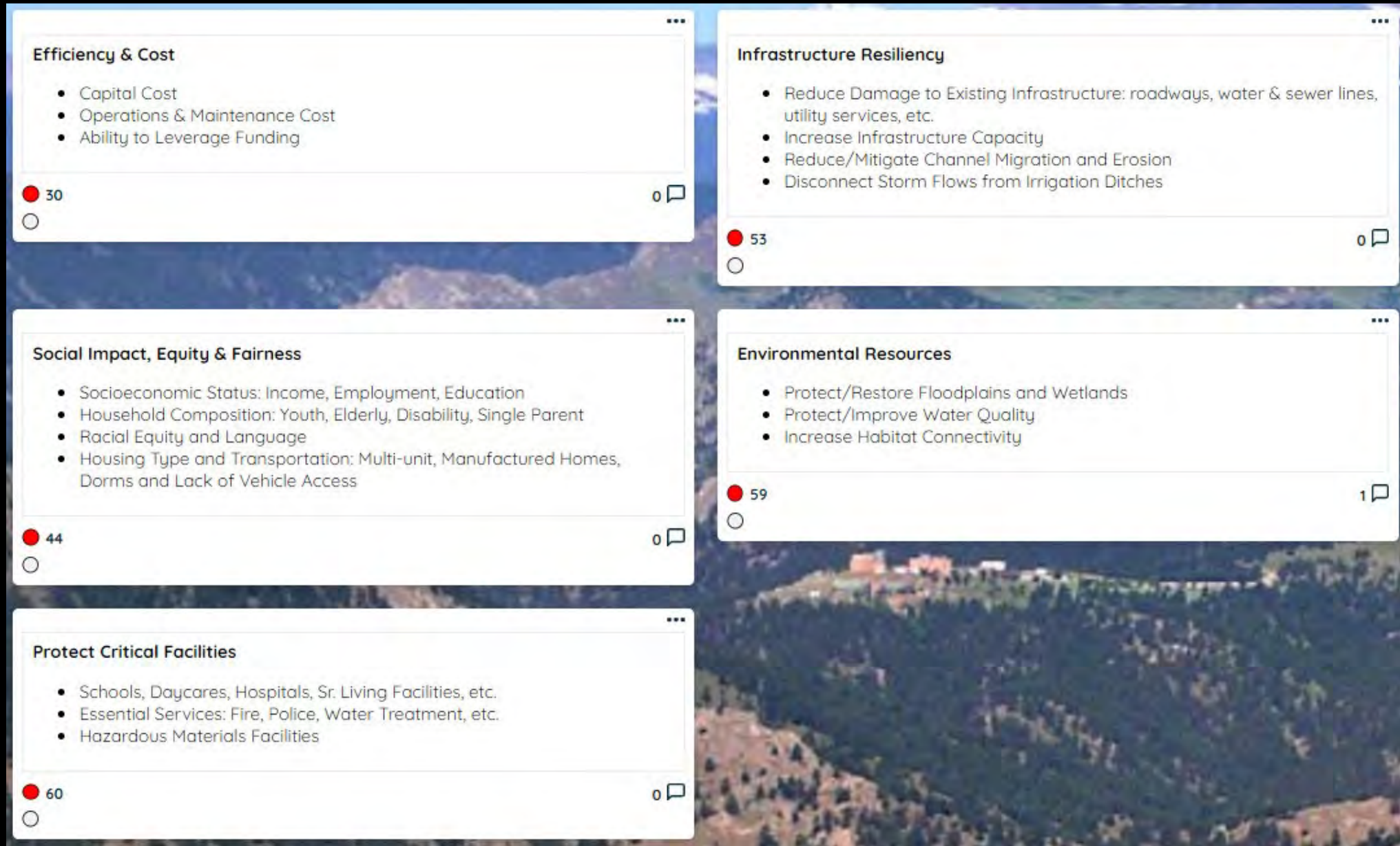
You're done when all 20 votes have been applied (0 votes available)

A diverse group of people, including men and women of various ethnicities, are seated in a classroom or lecture hall. They are all looking towards the front of the room. In the center foreground, a woman with dark curly hair is raising her right hand. To her left, a man with short dark hair is smiling. Other people in the background are also looking attentively. The overall atmosphere is one of an engaged audience.

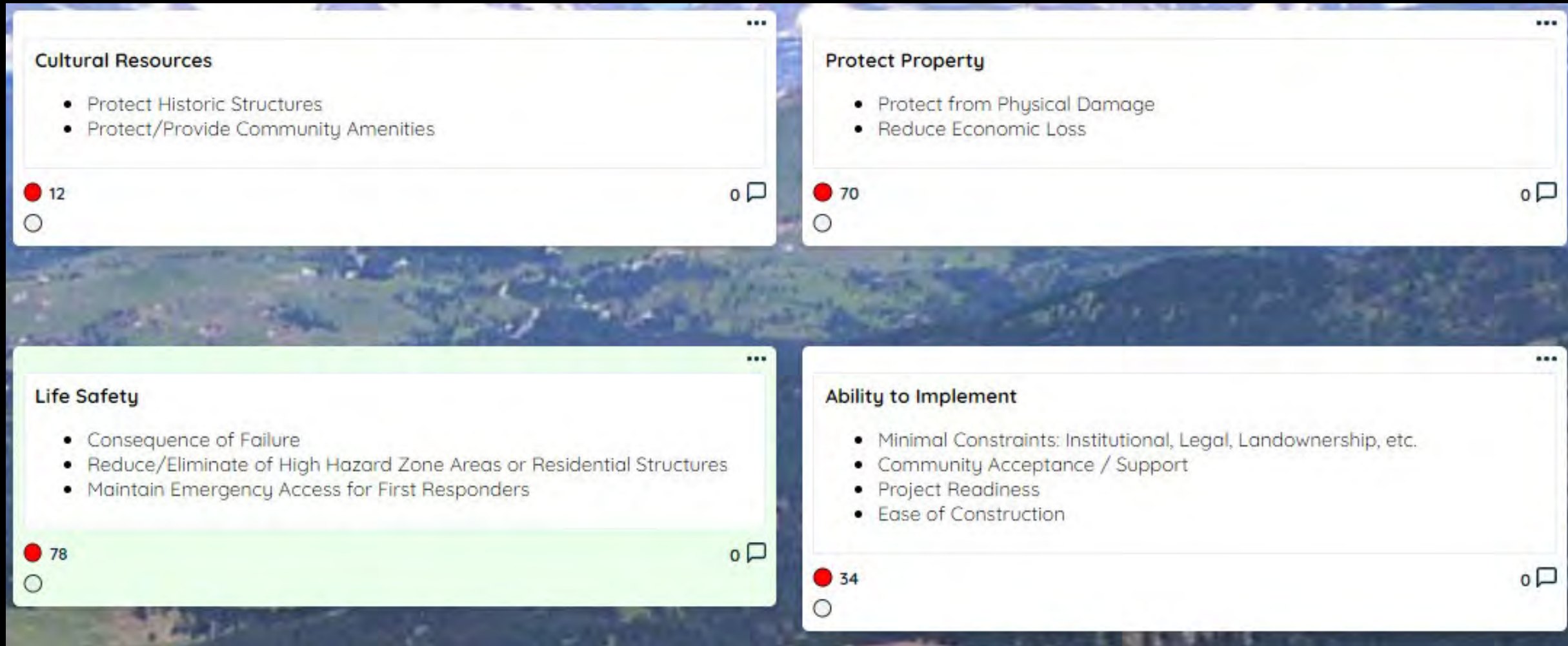
Poll Question

Did your thinking evolve over the course of the discussions and activities?

Dotstorming Results



Dotstorming Results





Comprehensive
**Flood and
Stormwater**
Master Plan



Wrap Up

Comment Form link in chat

Questions? Email:
cfsinfo@bouldercolorado.gov



Comprehensive Flood and Stormwater Master Plan





Comprehensive Flood and Stormwater Master Plan





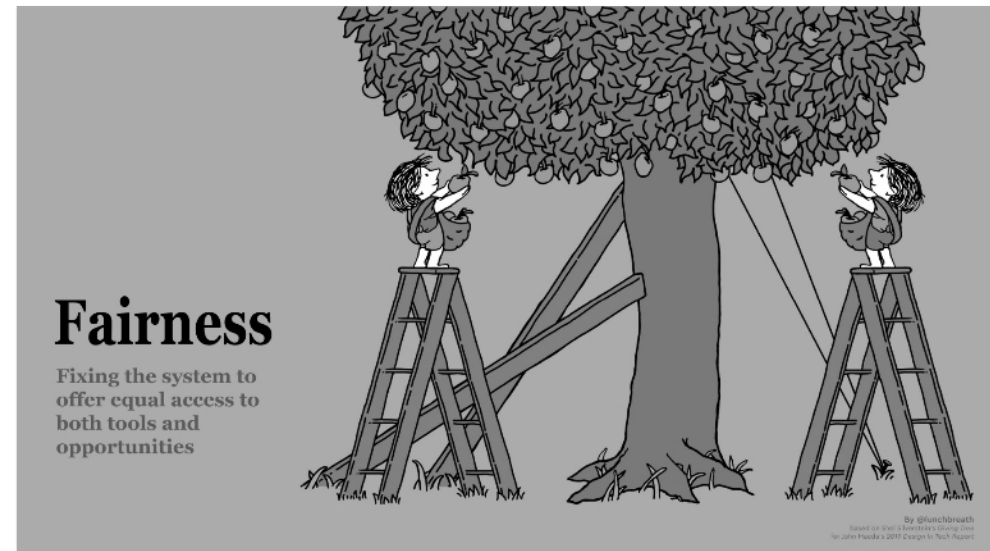
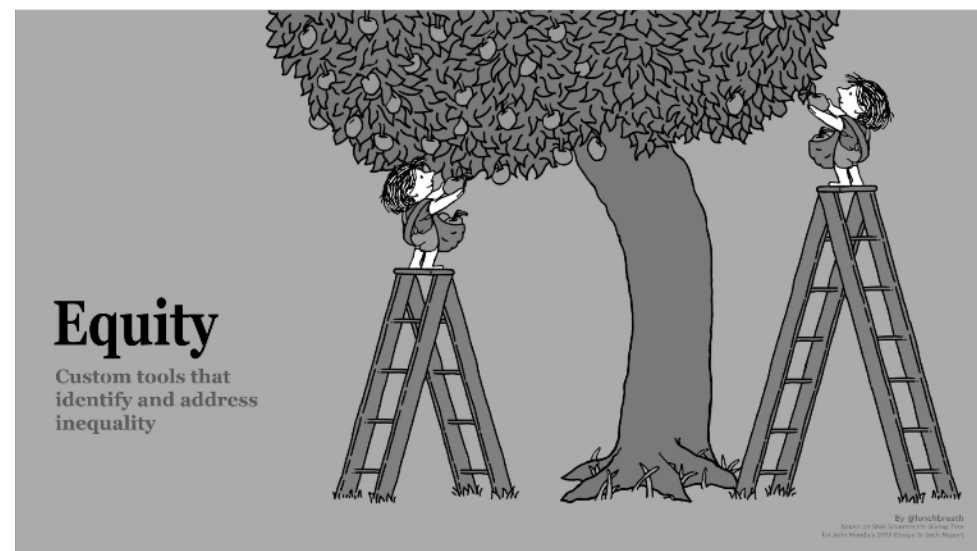
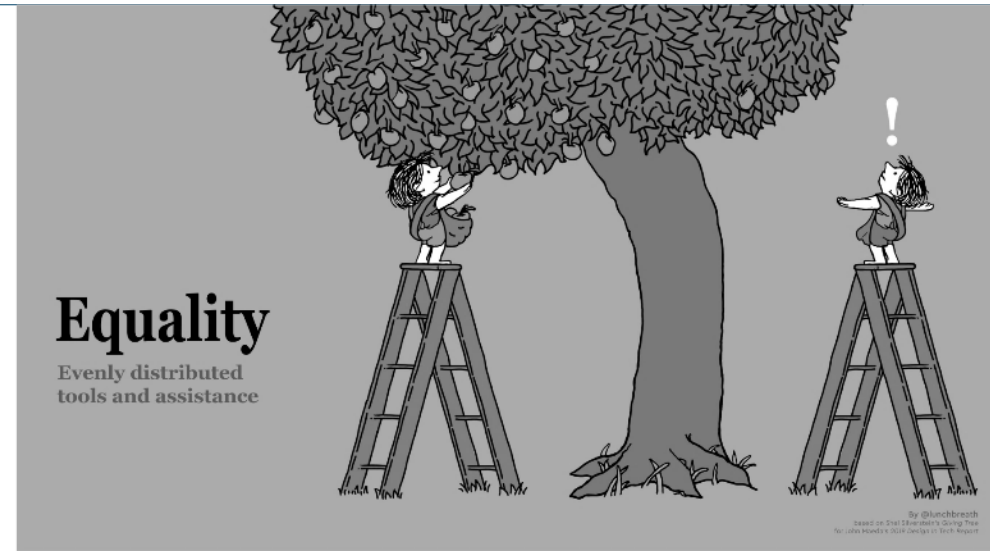
Breakout Discussion

How do we best protect our community so that all of us recover from flooding?

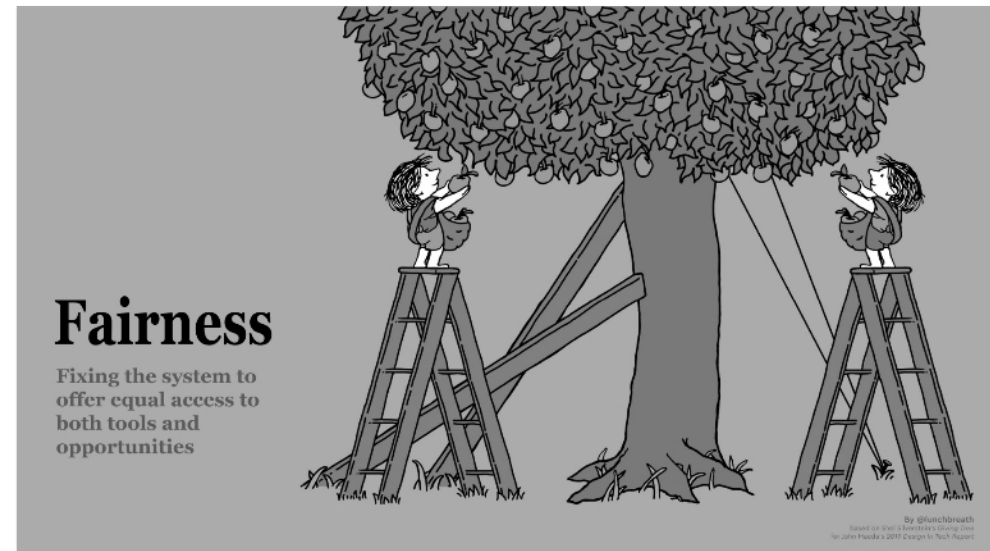
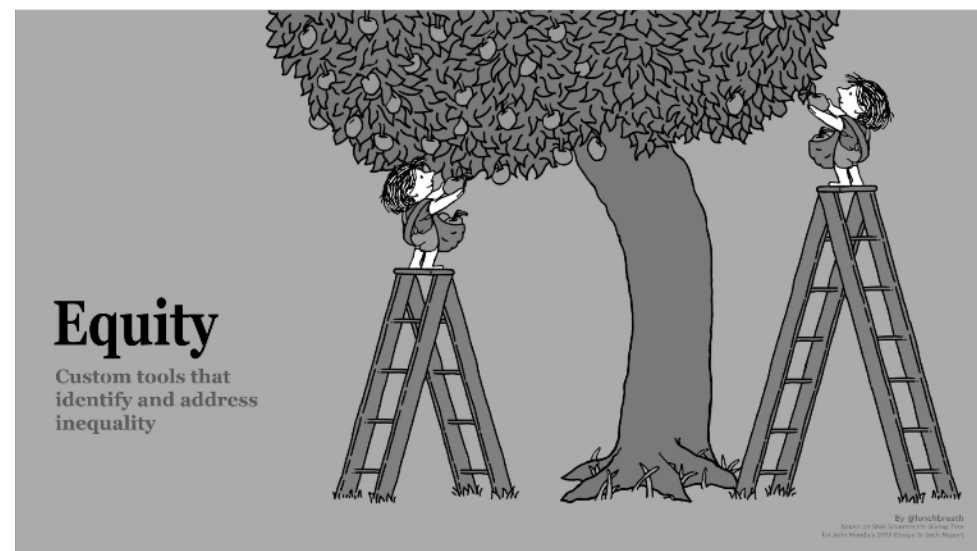
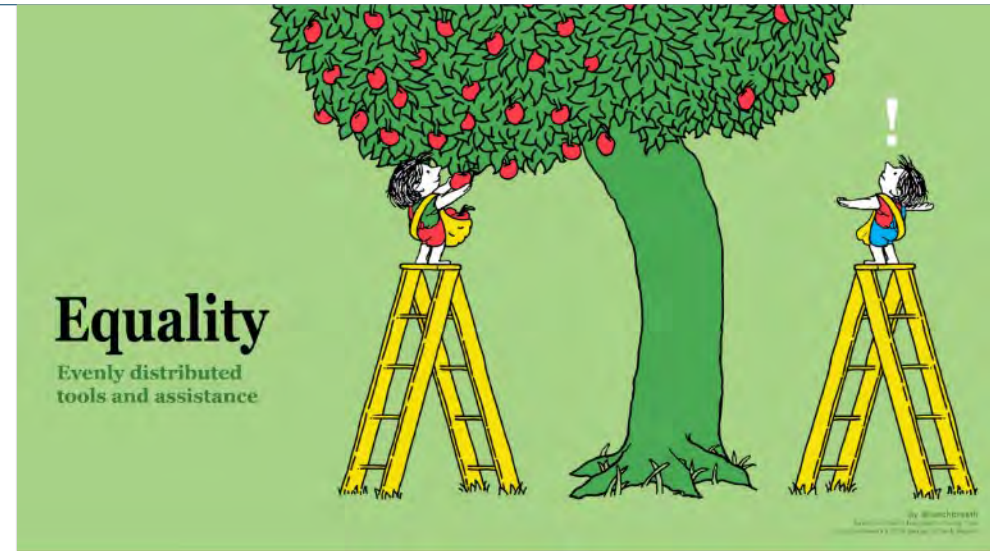
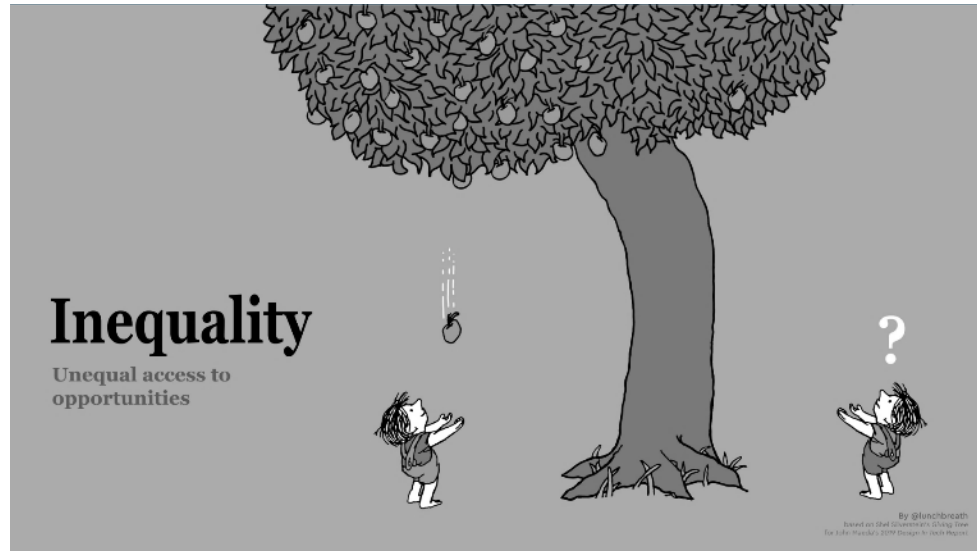
Given the examples provided, what is the city's role and what is the community's role?

Prepare to share one surprising/important thing that was discussed.

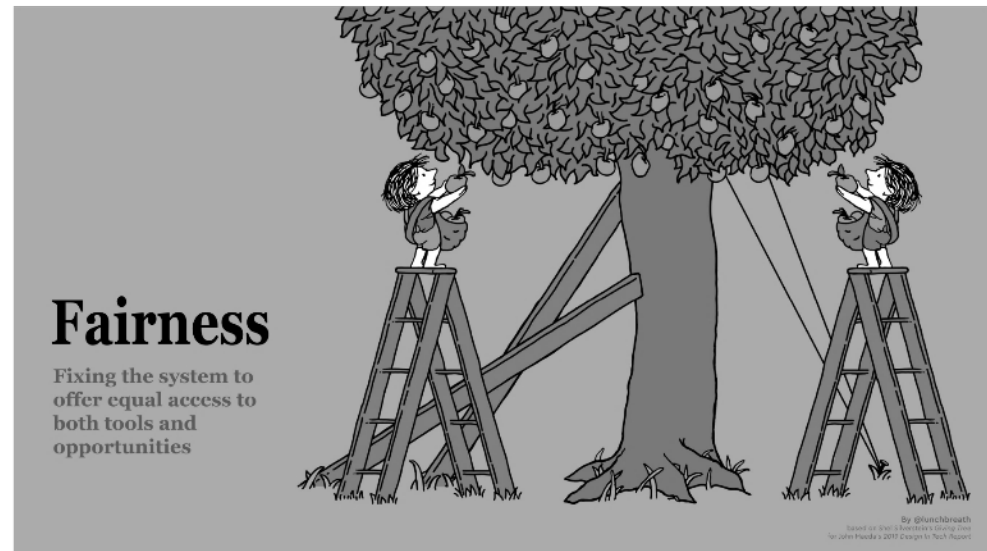
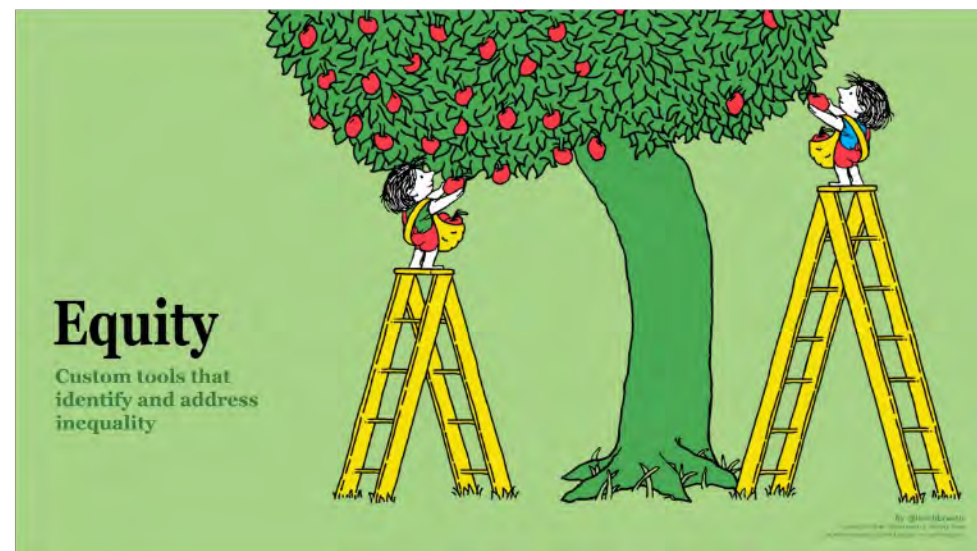
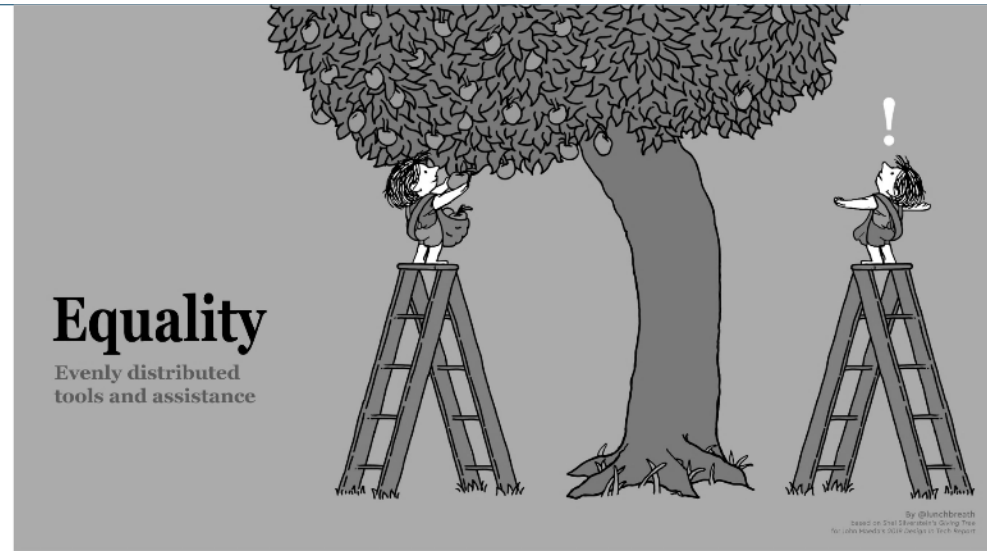
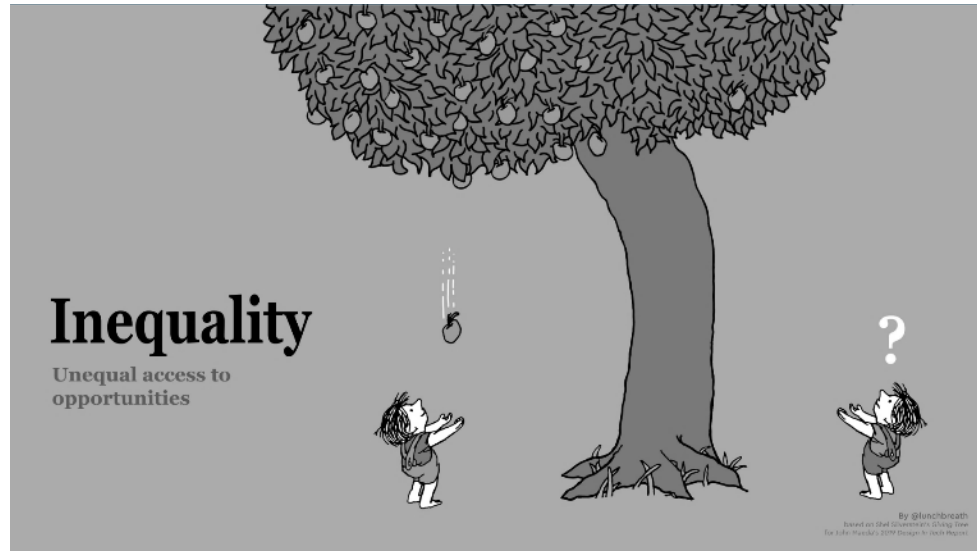
Inequity



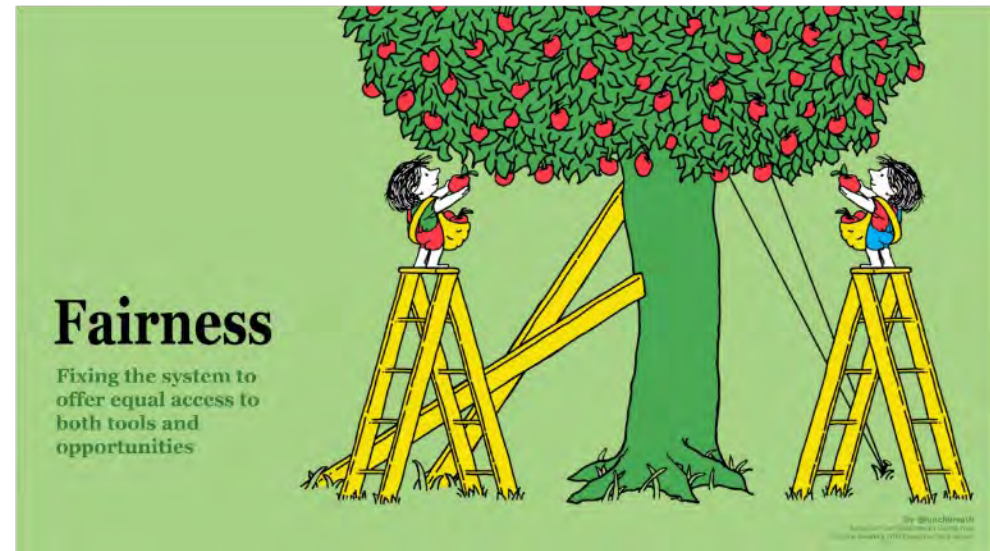
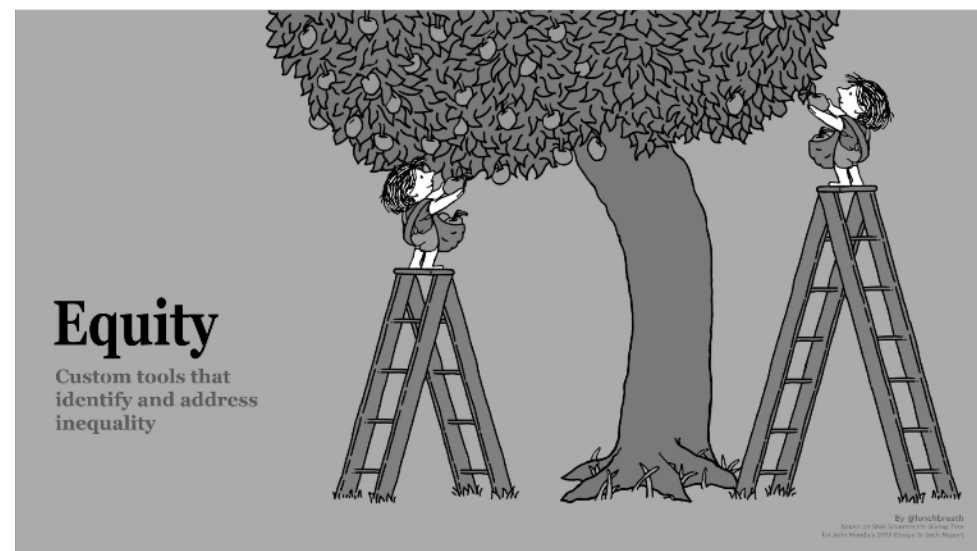
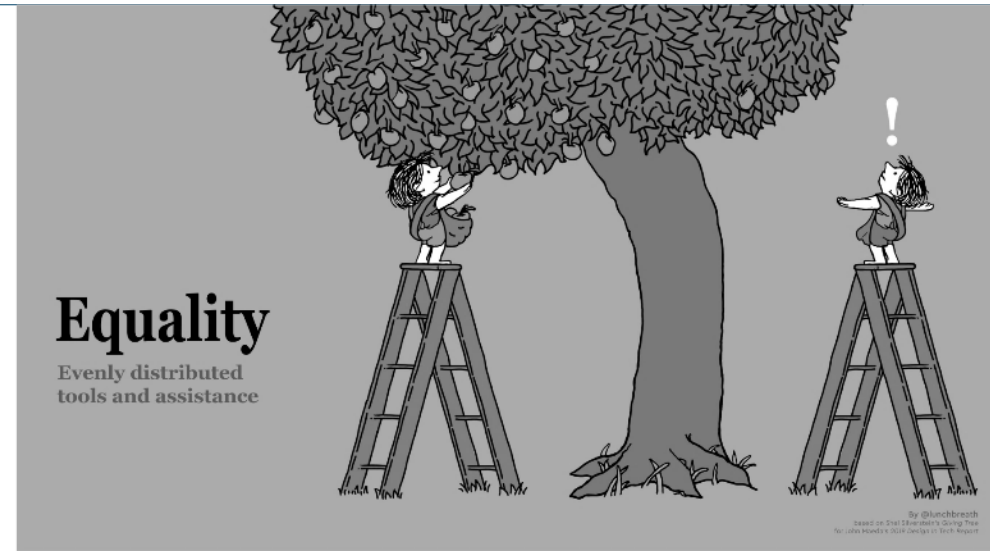
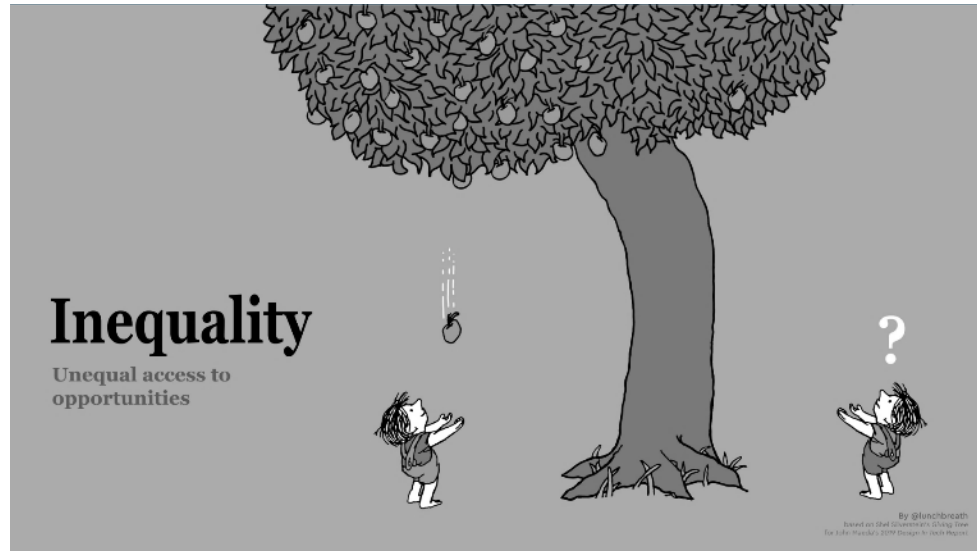
Equality



Equity



Fairness



Equity and Fairness

