

# FLOOD MITIGATION STUDY UPDATE

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Upper Goose Creek & Twomile Canyon Creek  
Water Resources Advisory Board 3/18/2019

I'm Katie Knapp, Flood and Greenways Project Manager and am here to provide an update on the Upper Goose Creek and Twomile Canyon Creek Flood Mitigation Study.

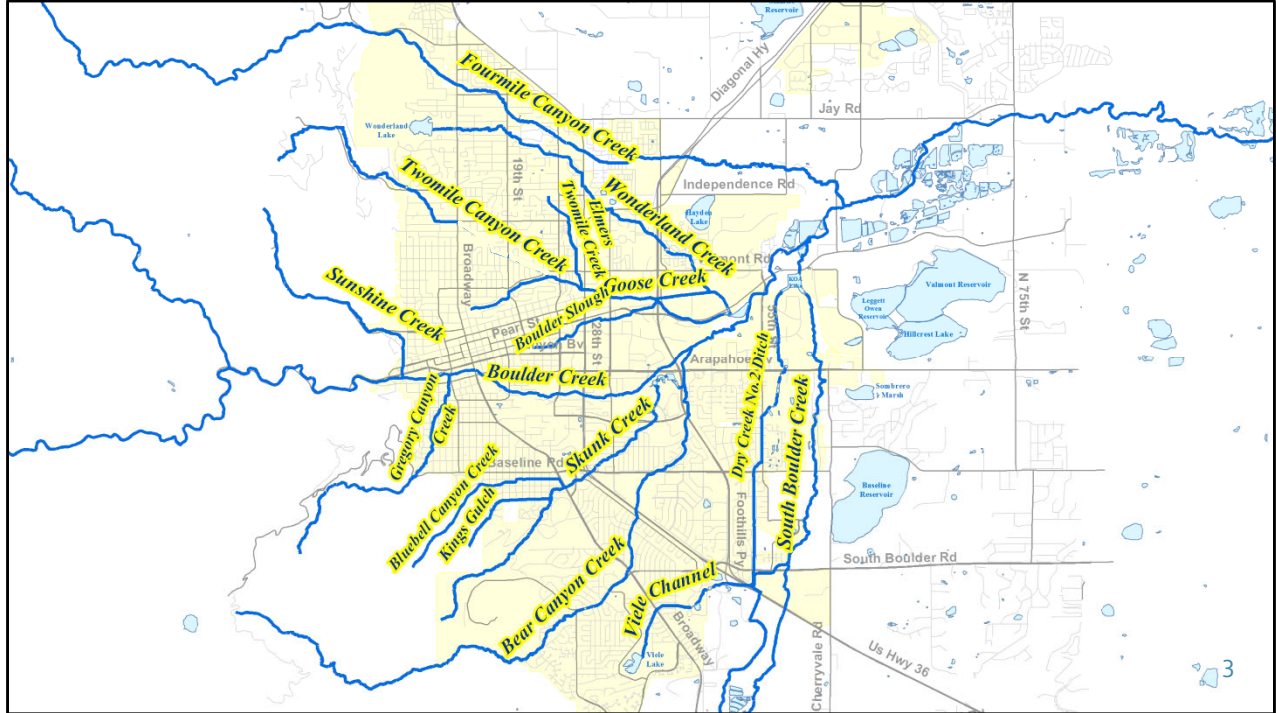
# Flood Management Program

Identify and Mitigate Flood Risk

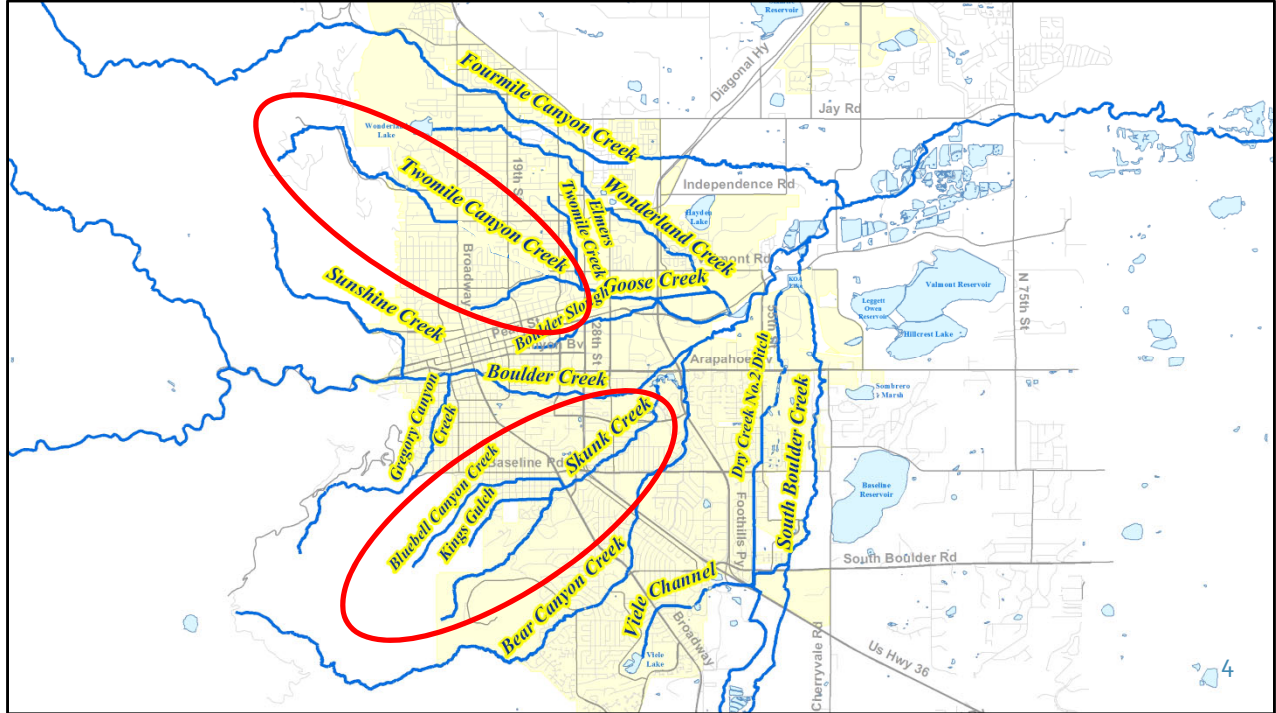


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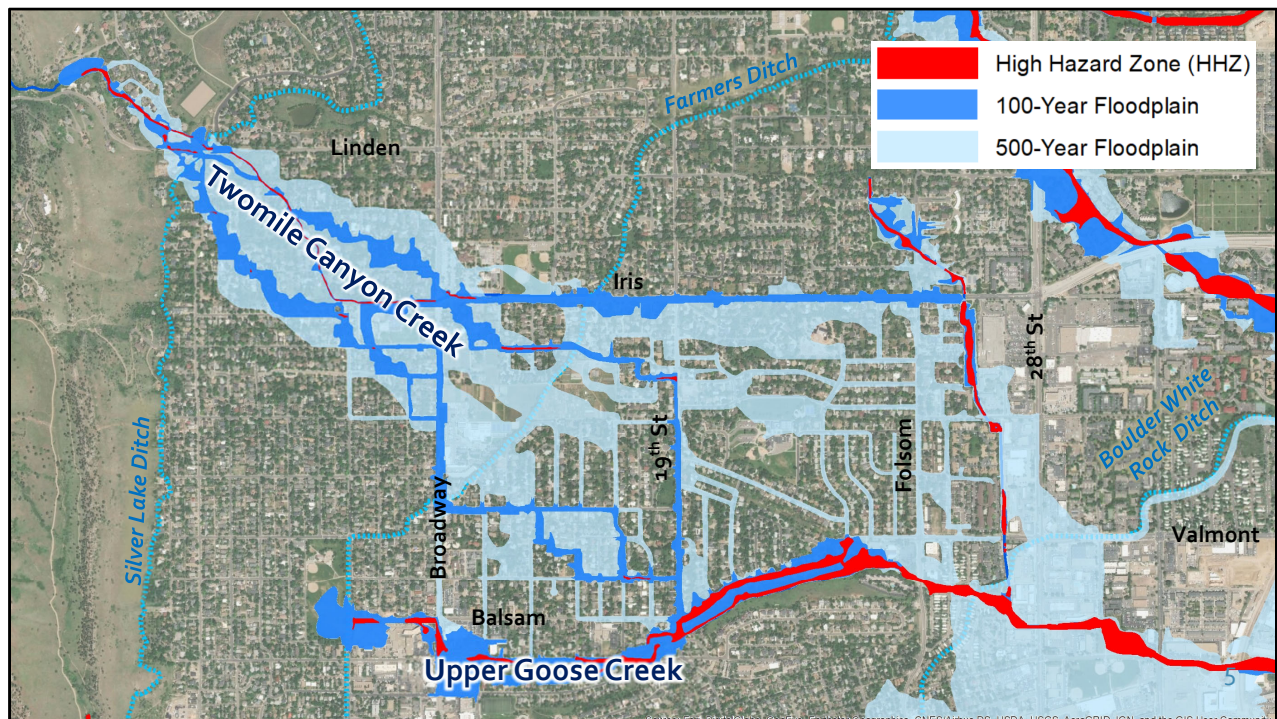
Flood mitigation studies are an important part of the City's Flood management program to identify and mitigate flooding risks. This is best accomplished through a process that starts with updated floodplain mapping to understand the flooding risks, followed by mitigation planning. Projects identified in the mitigation plan are then prioritized and incorporated into the Capital Improvement Program for design and construction. After significant improvements are constructed, the floodplain maps can be updated to reflect the reduced flooding risk. We will soon be starting discussions about the budget process and CIP, so I also wanted to mention that the Upper Goose Creek area was previously identified as the highest priority for local storm sewer improvements to handle minor storm events. The current capital funding plan includes \$24.5 million dollars in 2023 for these improvements, including channel improvements for Goose Creek between 19<sup>th</sup> St and Folsom, to increase the channel capacity to accommodate a 5-yr storm event, because without channel improvements, there is not sufficient capacity to improve the storm sewer system to drains into the channel.



There are 15 major drainageways in the City, making Boulder the #1 flood risk in the State.



We are currently working on 2 different flood mitigation studies, which are following similar processes. The southern study is for Skunk Creek, Bluebell Canyon Creek and King's Gulch. The northern study for Twomile Canyon Creek and Upper Goose Creek is the focus of tonight's update.



This slide illustrates the floodplain mapping for Twomile and Upper Goose Creeks which was updated in 2015. The flood mitigation study was initiated in 2017.

## Planning Process

- Evaluated Priorities
- Assessed Mitigation Strategies
- Developed Alternatives
- Incorporated Community Input
- Refined Alternative

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For almost 2 years, we have been working through a planning process that has included a lot of community input. Thank you to everybody who has been involved in this process.

## Planning Process

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- Stormwater and Flood Management Program
- Greenways Program



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We started with understanding the communities concerns about flooding and evaluating priorities from the Storm and flood management program and the greenways program.



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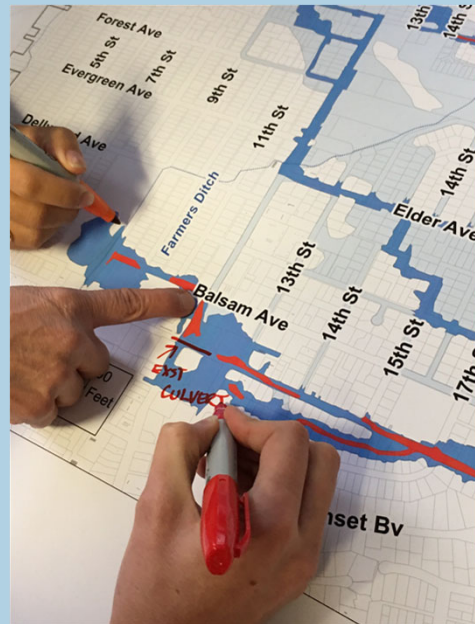


We then looked at different flood mitigation strategies, including open channel improvements, piped drainage systems, detention facilities, and roadway conveyance.



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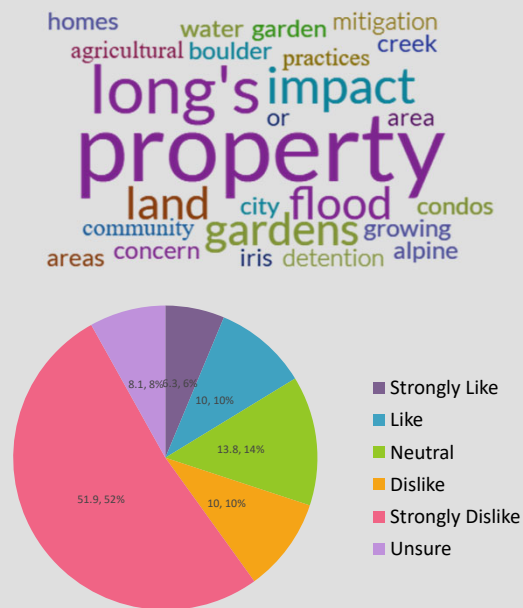


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With help from the community, several different alternatives were developed and presented for feedback

## Planning Process

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We received a lot of great input from the community. 477 people responded to an on-line questionnaire with 830 individual comments; we also received ~250 emails. Again – thank you to everyone who provided input. It is really appreciated!

## Planning Process

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- Developed Alternatives
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- **Refined Alternatives**

### **Alternatives Eliminated**

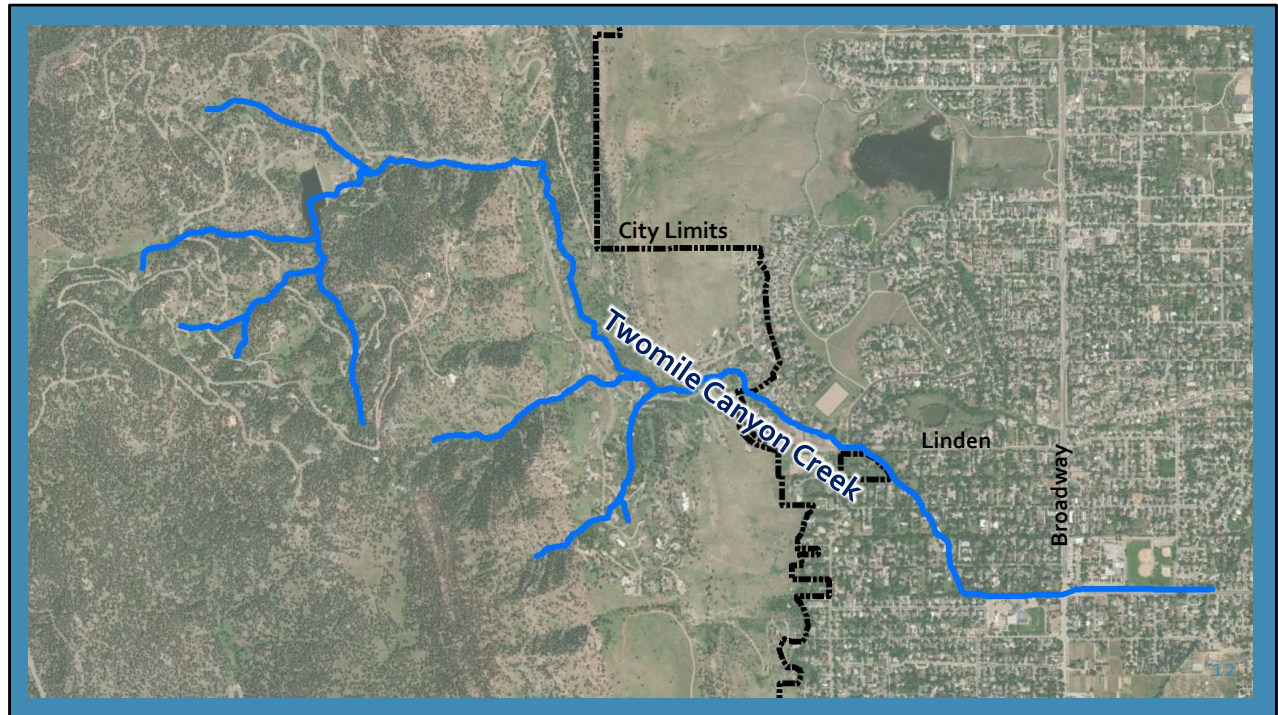
- Impacts to Long's Gardens
- Removal of Houses
- Removal of Alpine Condominiums
- Removal of Community Plaza/Ideal Market

### **Alternatives Added**

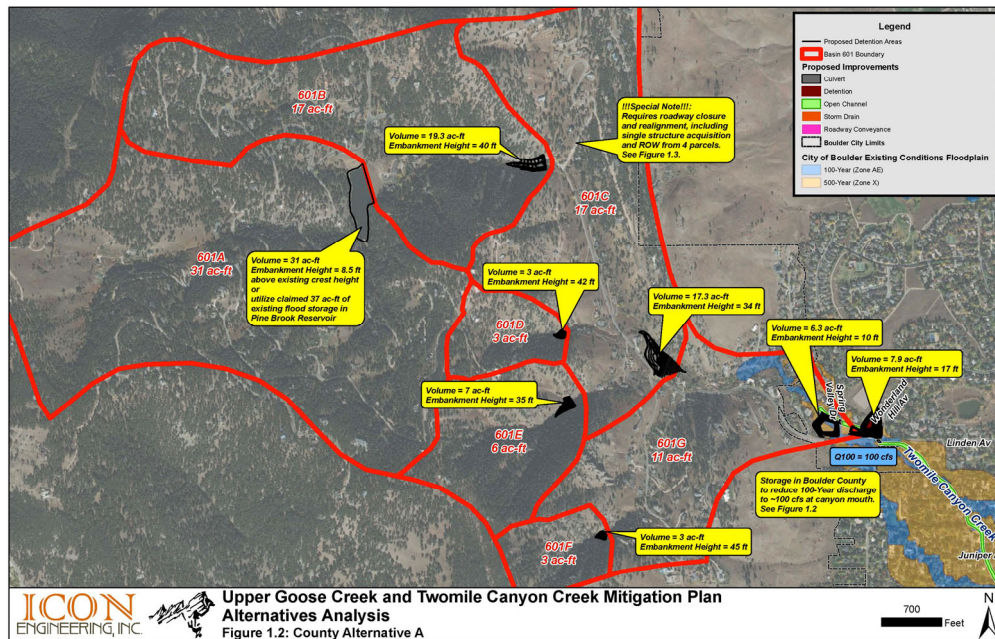
- Detention Upstream of City Limits
- Roadway Conveyance W of Broadway

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The initial, broad list of alternatives has been refined, with some alternatives eliminated from further consideration due to the excessive impacts to cultural resources and existing development. Additional alternatives were added to the analysis. One of the new alternatives we looked at was providing flood detention in the county, upstream of the city limits.

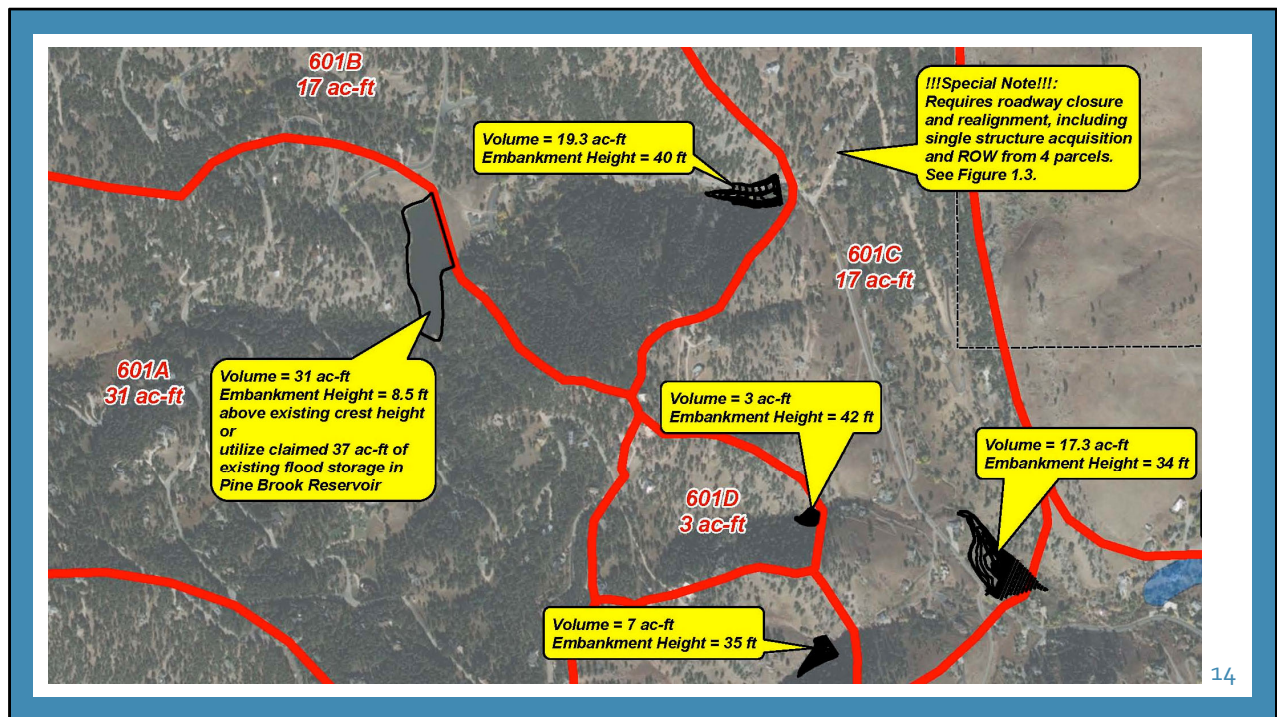


Here is the upstream area, with the city limits are shown in the black dashed line. You can see that Twomile Canyon Creek is not a simple drainageway. The terrain is steep and there are several branches to the creek system.



Our consultant, ICON Engineering, looked at these different sub-basins and identified locations for potential detention facilities that would need to be constructed together to help control the flood flows.





Zooming in to see more detail...In order to achieve adequate volume to capture flood flows from each basin, large embankments (30-45 feet high) would be required. These embankments would be classified as high-hazard dams, impactful to the riparian corridors, roadways and private properties and very expensive to build. Therefore, the initial analysis did not find upstream detention to be a feasible option, so this was added to the list of alternatives eliminated from further consideration.

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### Alternatives Eliminated

- Impacts to Long's Gardens
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- Detention Upstream of City Limits

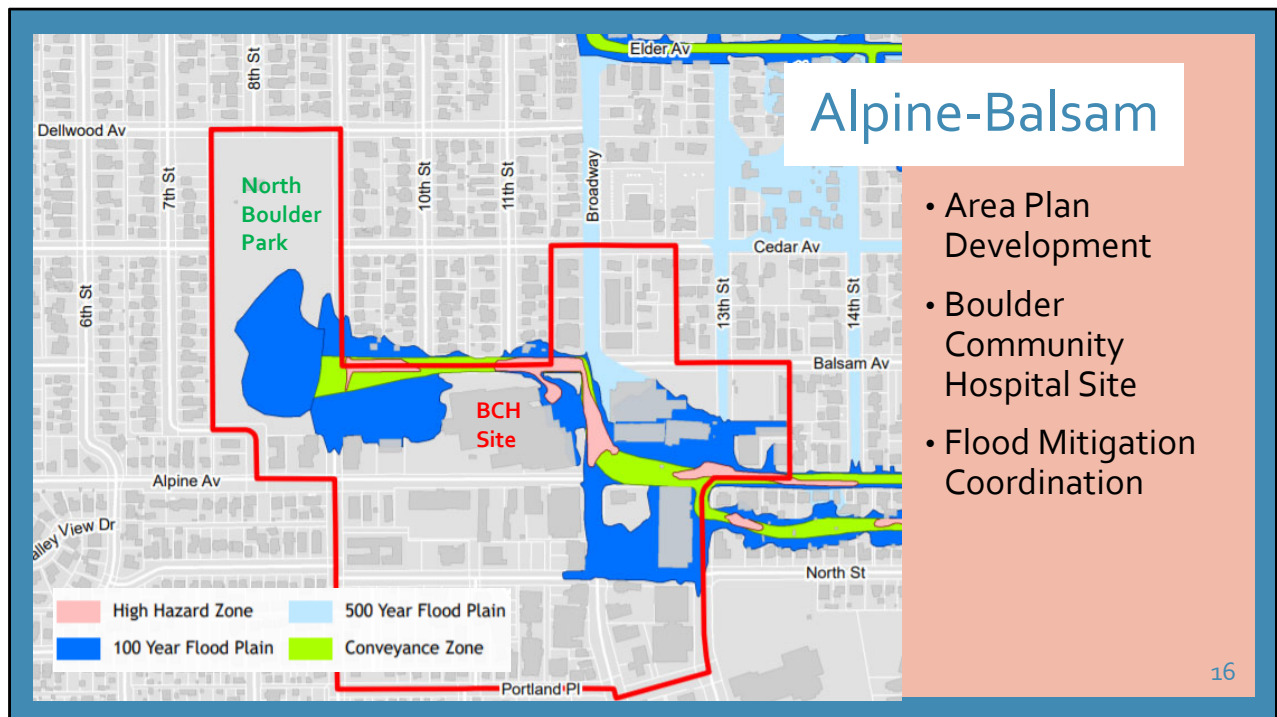
### Alternatives Added

- Roadway Conveyance W of Broadway

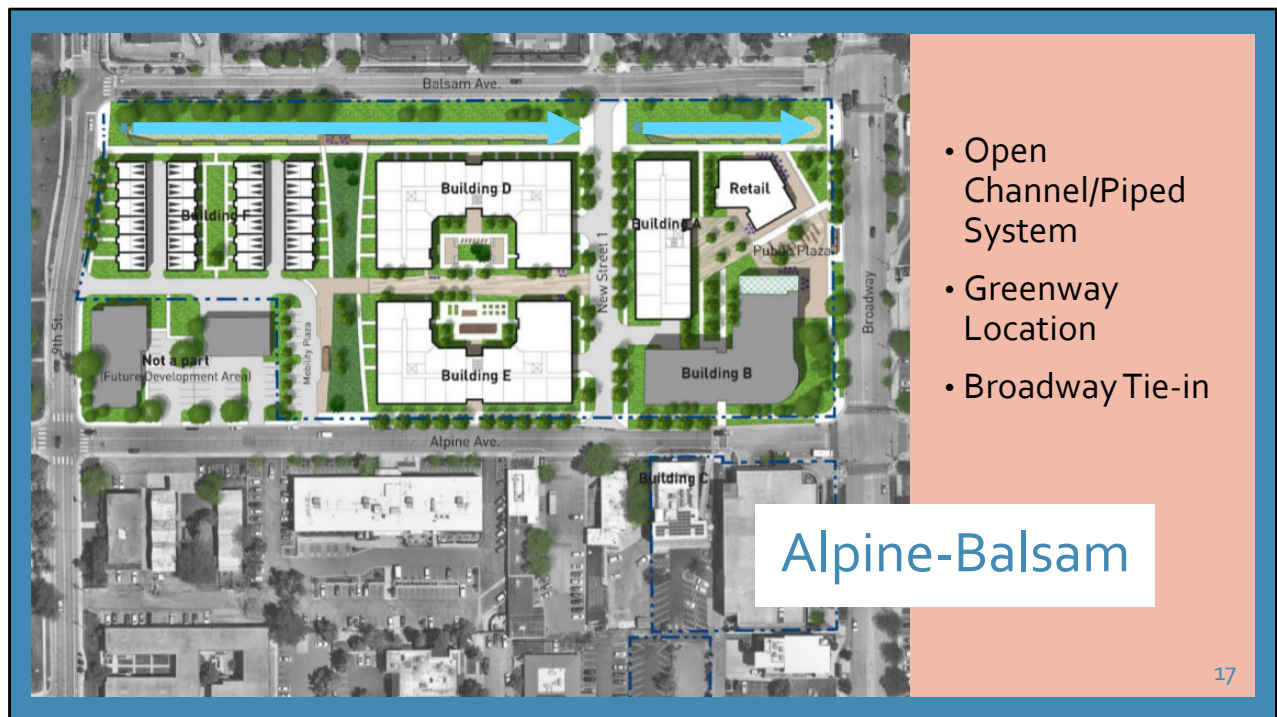
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Roadway conveyance west of Broadway was also added as an alternative for further consideration and is being looked at in further detail.





We are also working closely with the Alpine-Balsam Team on an Area Plan to help guide the redevelopment of the Boulder Community Hospital site purchased by the city. The Goose Creek floodplain crosses the site and is an important consideration in the site planning. One alternative being evaluated is providing flood detention at the North Boulder Park. Planning Board and City Council have both expressed support for investigating this option further provided the functionality of the park is not compromised. A detention facility would decrease the flood flows across the site and increase developable space. A geotechnical investigation is underway that will provide us with soil and groundwater information to determine if detention is a feasible option. If this alternative advances, additional public engagement would be planned to gather community input from park users and the Parks and Recreation Advisory Board.



We are also exploring the tradeoffs between an open channel and an underground piped system to convey flows across the site, and the best location for these elements. Water naturally flows down Balsam Street and across the northern side of the site, but with regrading, a center greenway could be accomplished, although it would require a deeper and wider channel because it would shift flows away from the natural flow path. Another design consideration is how to spread the flows back out at Broadway because there is no channel to tie into and the Upper Goose Creek system, including the channel between 19<sup>th</sup> St and Folsom, does not currently have adequate capacity to convey even a 5-year storm event.

## Next steps

- Further Assessment of Refined Alternatives
- Geotechnical Analysis/Groundwater Monitoring at North Boulder Park
- Creek Assessments
- Alpine-Balsam Coordination
- Develop Mitigation Recommendations
- Public Engagement

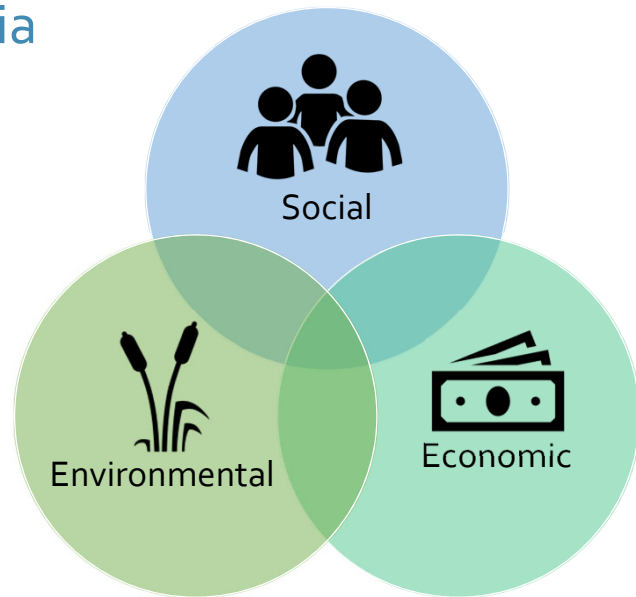
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Our next steps are to:

- further assess the current alternatives – calculating the benefits and costs and using a scoring matrix
- Review the geotechnical report for the North Boulder Park and monitor the groundwater conditions
- We are also working on field assessments of the existing creek channels. This was suggested by people in both mitigation planning areas. We started these assessments in Skunk Creek area and have been working with property owners to get legal right of entry. Efforts have been delayed due to weather conditions and our current staffing situation.
- We also continue to work with the Alpine-Balsam team on the area plan development
- As all of these efforts come together, we will develop draft mitigation recommendations
- And enter another round of community engagement to help refine the master plan recommendations that will then be brought to the WRAB for feedback.

## Evaluation Criteria

- Life Safety
- Property Damage Mitigation
- Water Quality Enhancement
- Habitat Protection and Restoration
- Operation/Maintenance Costs
- Protection of Cultural Resources
- Recreation Opportunities
- Alternative Transportation Routes
- Construction Costs
- Public Opinion/Community Acceptance
- Resiliency/Adaptability to Change
- Ability to Implement Quickly



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The evaluation criteria listed here was developed with input from the Board when we last provided an update on the Skunk/Bluebell and King's mitigation plan. We plan to use the same criteria on both mitigation plans. This provides consistency and could also be helpful for assessing flood mitigation priorities city-wide for Capital project prioritization.

Thank you !

# Questions



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Thank you for listening to this flood mitigation update! I'm happy to address any questions.