

SBC Flood Mitigation/CU South Annexation FAQ

Design

Why did the city choose 100-year flood protection for South Boulder Creek (SBC)?

The city has been evaluating flood mitigation options since 2010 and city council approved the SBC mitigation study in 2015. In [June 2020, city council](#) considered three different levels of flood protection (100-, 200-, and 500- year) and ultimately passed a motion in support of the 100-yr flood design concept. This concept was found to have the least environmental impacts, the lowest cost, and was identified to have the greatest probability of being permitted by the various regulatory agencies.

Why wasn't 500-year flood protection chosen?

The project team evaluated five-hundred-year conceptual designs and determined they were not feasible given project constraints. Specifically, the 500-year design concept was unable to match existing hydraulic loading conditions on the bridge structure and not increase flooding downstream.

What was the magnitude of the 2013 flood?

The prolonged rainfall event in September 2013 resulted in storm runoff citywide. The flood magnitude as measured throughout various parts of Boulder ranged between a 25- and 50-year event for many watersheds. Portions of lower South Boulder Creek, including the West Valley, experienced flows on the order of a 100-year event¹. A more detailed account is included in this [flood history document](#).

The flood project is using a short-duration, high intensity thunderstorm event as the basis for design of the flood mitigation project. This type of storm is closest to the SBC flood flows experienced in 2013 despite the 2013 precipitation event being more characteristic of a long-duration, low intensity general storm that results in lesser flood flows.

¹ *Rainfall-Runoff Analysis for September 2013 Flood in the City of Boulder, Colorado, Wright Water Engineers, Inc., October 2014*

What are the details of the South Boulder Creek Flood Mitigation Project?

| Project Criteria | Variant 1 (100-yr) |
|---|------------------------------|
| Downstream Flood Benefits | |
| People | 2,300 |
| Structures | 260 |
| Dwelling Units | 1,100 |
| Total Project Cost | \$66M |
| Regional Flood Detention | \$41M |
| Soil Fill | \$10M |
| Impacts to CU Property ⁽¹⁾ | \$15M |
| Size | |
| Length of Floodwall | 2,710 ft. ⁹⁽²⁾ |
| Height of Floodwall (max) | 8.8 ft. |
| Detention volume | 469 acre-feet |
| Estimated Project Footprint | 64 acres |
| Embankment/Floodwall | 10 acres |
| Fill Area (on CU South) | 34 acres |
| Excavation Area | 19 acres |
| Outlet | <1 acre |
| Environmental Impacts | |
| Wetlands | 7.7 acres |
| Open Water | 2.6 acres |
| PMJM Habitat | 3.9 acres |
| ULTO Habitat | 2.5 acres |
| Environmental Mitigation Potential | |
| Potential On-site Mitigation Area | 119 acres |
| Increased Floodplain Connectivity | 75 acres |
| Environmental Mitigation Costs | \$1.3M |
| Cost Impacts to CU Property ⁽³⁾ | |
| CU Tennis Courts | <i>Estimated \$15M Total</i> |
| South Loop Drive | |
| Warehouse | |
| Utilities Connections | |
| Project Feasibility ⁽⁴⁾ | In Progress |

1. Costs to be negotiated with CU during CU South Annexation process.
2. There may be opportunity to shorten the floodwall length depending upon the location of floodwall termination.
3. Estimated costs/impacts will be refined as the flood mitigation project progresses through the design process and finalized through the annexation process.
4. CU, CDOT and OSMP acceptability are still unknown until the final impacts of the project can be presented and additional design details developed. Because of the 2019 CDOT requirement for above-ground structures to be placed outside of CDOT Right-of-Way, the Variant 1, 100-year floodwall requires a disposal. The project requires extensive public process steps, including annexation of CU South and a disposal of impacted OSMP lands pursuant to the city charter.

Costs and funding

How much does the flood project cost and will taxpayer money be used to fund the SBC project?

The total estimated flood project cost is \$66M. The project will be paid for by Stormwater and Flood utility fees included in monthly utility bills and in partnership with the Mile High Flood District. Costs include costs for construction of Phase 1 from the [South Boulder Creek mitigation plan](#). This includes the direct costs of constructing the flood mitigation structure (detention facility), as well as indirect project costs as outlined in the table below.

Opinion of Probable Construction Cost

| Project Components | Flood Project (100-yr) |
|---------------------------|------------------------|
| Regional Flood Detention | \$41M |
| Earth Fill | \$10M ⁽¹⁾ |
| SubTotal | \$51M |
| CU Impacts ⁽²⁾ | \$15M |
| Total | \$66M |

Note: Figures have been rounded to the nearest million dollars

- (1) Cost estimate includes the cost of the earth fill and related construction costs associated with fill placement.
- (2) Includes impacts to CU tennis courts, South Loop Drive, and warehouse. Estimated costs/impacts will be refined as the flood mitigation project progresses and may be influenced by the annexation process.

I've heard that the project will cost taxpayers \$99 million?

Prior to June 2020 when the flood project was still in an alternatives analysis phase, the conceptual design for the 500-year level of flood protection was estimated at \$99M. This option is no longer being considered. The 100-year project cost is estimated at a total of \$66M.

What are "Enterprise Funds" and what are they used for?

Enterprise Funds are generated through the collection of fees in exchange for services. City of Boulder Flood and Stormwater Utility fees are collected through customer utility bills in exchange for flood and stormwater services and are used to pay for project construction as well as indirect project components. Indirect project components can include environmental mitigation, property acquisition and community engagement related to the project, among others.

Can Enterprise Funds be used to pay for indirect project costs, such as earthfill and tennis courts?

Yes. Boulder's flood projects are frequently in the position of not owning the land needed for flood improvements. In these situations, Boulder must negotiate with landowners to reach agreement for use of the property. Project funds can be used to pay for resulting components of landowner agreements.

In the case of CU South, the university owns a portion of the land needed for the flood project. Boulder is negotiating with the university within the framework established in the 2017 Boulder Valley Comprehensive Plan (BVCP) [CU South Guiding Principles](#). Until an agreement is reached, the flood

project has conservatively estimated costs for both direct project impacts and the implications of these guiding principles. Specifically, estimated costs include compensation for impacts to the university’s existing facilities (*tennis courts, warehouse, and South Loop Drive*) as well as other project elements needed to comply with the guiding principles (*earthfill*). As the flood design progresses, staff will continue to refine design details and associated cost estimates. Likewise, ongoing annexation negotiations may influence cost allocations.

What is the “earthfill?” any why is the city paying for it?

The construction of the flood mitigation detention dam will change the current floodplain and will result in new areas of inundation that were previously outside of the floodplain. The flood project proposes strategic placement of earthfill to raise a portion of newly inundated areas out of the floodplain to allow for future university development as agreed upon in the CU South Guiding Principles.

The concept for soil fill was recommended in the [South Boulder Creek Flood Major Drainageway Plan](#) (accepted by City Council in 2015). In recognition of multiple property interests, the recommended flood concept was developed to combine *“excavation and fill to produce a configuration that minimizes the impacts to open space land and CU Boulder’s land.”* From a flood project management perspective, accounting for earthfill costs is the most conservative approach to project planning as the earthfill addresses impacts to the property owner from the flood mitigation project. However, evaluation of funding for project components such as fill are the subject of further evaluation and ongoing annexation negotiations.

Could the city condemn the CU South property instead of annexing?

The law regarding one government condemning the property of another is not settled. Whether a home rule city can condemn the property of a state university has not been addressed by the Colorado courts.

Schedule

What is the project schedule?

| Project Activity | Start Date | End Date |
|--------------------------|------------|----------|
| Conceptual Design | 2017 | 2020 |
| Preliminary Design (30%) | 2019 | 2022 |
| Annexation | 2019 | 2021 |
| Design | 2022 | 2024 |
| Permitting | 2020 | 2024 |
| Construction | 2024 | 2026 |

University development

How and where do the BVCP [CU South Guiding Principles](#) provide for area for CU to develop?

The university owns a portion of the property needed for flood mitigation. The 2017 BVCP [CU South Guiding Principles](#) provide a framework for negotiations between the city and university and discuss use of the 308-acre parcel for flood mitigation, open space, recreation and future university development. A total of 129-acres of the 308-acre site (*show in the blue area and labeled - “PUB” below*) are anticipated for university development.

Figure: CU South Land Designations

Climate Change

How does the flood mitigation project factor in climate change?

The proposed project is using the best available information and engineering practices for the flood mitigation design. This includes Colorado Dam Safety guidance for reliability of the structure in a Probable Maximum Flood (PMF). This guidance includes a seven percent increase to the PMF inflow to account for a one-degree temperature raise in the future.

Additionally, the city hired the consulting firm, Lynker Technologies, to report on current federal, state and local guidance and rules related to climate change and flood mitigation design. [This report](#) found that while agencies acknowledge the potential impacts of climate change there is minimal specific guidance on how to incorporate this into infrastructure design. As the design progresses, the project will continue to evaluate if and how voluntary measures might be incorporated into the design.

Permitting

When will the city have approval from the permitting agencies to begin construction?

Formal permit applications for the flood project will be submitted when the design is 30 percent complete so that agencies have enough information to evaluate. Until that time, city staff will continue high-level discussions with permitting agencies to proactively address any anticipated issues. The 30 percent design documents are planned to be completed by the end of 2021 with permit applications following that. The timing of final permitting approvals is unknown until a formal submittal occurs with each of the regulatory agencies.

With which agencies is the city seeking permitting approval?

- U.S. Army Corps of Engineers
- U.S Fish and Wildlife Service
- Federal Emergency Management Agency
- Colorado Department of Transportation
- Colorado State Engineer's Office
- City of Boulder wetlands and floodplain permits

OSBT Disposal determination and upstream alternatives

What is a disposal and why is it needed?

The flood project will require up to five acres of Open Space and Mountain Parks (OSMP) lands for a flood wall. As flood mitigation is not a chartered purpose for city open space, a "disposal" process will be required to take land out of city open space protection. Any disposal of OSMP lands would comply with the provisions of Section 177 of the City Charter. City staff will continue working with the Open Space Board of Trustees (OSBT) on their environmental impact and mitigation concerns, including those about groundwater conveyance and project footprint, prior to requesting disposal consideration.

Upstream

Instead of detaining water by US36, could you capture water upstream and away from sensitive OSMP lands?

The City of Boulder has been considering [alternatives for SBC floodplain](#) mitigation since 1973 that have considered this question and arrived at the current project as the least environmentally damaging

alternative. Most recently on [Dec. 16, 2020, OSBT](#) considered a detailed upstream analysis that determined such an option would involve greater environmental impacts than the 100-year project and would require significant infrastructure on city open space. Therefore, OSBT did not recommend further work on the upstream alternative presented.

While a theoretically feasible option, the upstream alternative would also require annexation because it too relies on use of property owned by the university. The city would have to evaluate flood mitigation options if an annexation were not to occur, but there are not any easily identifiable, less damaging or obvious solutions.

Environment/levee/restoration

How will the project impact the existing environment?

The project is committed to minimizing and/or avoiding environmental and ecological impacts. South Boulder Creek is the second largest drainage route in Boulder, and this flood mitigation project has been found to have the least environmental impacts of the alternatives considered, including those to wetlands. Project design criteria includes replication of existing groundwater flow patterns to prevent upstream groundwater build up, drying up of downstream wetlands and other potential adverse impacts.

OSMP land within and surrounding the project area holds some of the highest ecological value anywhere in the Boulder Valley. The project area on OSMP property lies within the South Boulder Creek State Natural Area. This mosaic of mesic grasslands, wet meadows, and high-quality wetlands was designated in 2000 by the State of Colorado in recognition of its state-wide significance as an exceptional riparian and floodplain ecosystem. Ecological and agricultural resources contribute to an area rich in biological diversity. Some of the key resources to be avoided or mitigated for are: extensive high-quality wetlands and riparian areas, including plains cottonwood riparian forests, willow shrublands, freshwater marshes and wet meadows; tallgrass prairie communities; extremely high densities of the threatened Preble's Meadow Jumping Mouse and its critical habitat; and Ute ladies' tresses orchid populations, a rare wetland plant designated as threatened under the Endangered Species Act.

How will the project mitigate for environmental impacts?

This project will follow environmental regulations to limit and mitigate impacts. This will include a significant environmental restoration component. Newly restored natural areas are expected to be added to city open space. This project includes preservation and restoration to improve the natural ecosystem, reconnect the historic floodplain, and compensate for unavoidable environmental impacts.

Groundwater

The existing natural resources in the project area are highly dependent on current groundwater patterns. How will the project maintain existing groundwater conditions after the project is built?

Groundwater conveyance systems are common to detention facilities. From an environmental perspective, replication of existing groundwater conditions is essential in preserving wetlands. The SBC flood project requires a functioning ground water conveyance system that successfully replicates existing conditions both for dam safety and environmental purposes. To do this, the project team is using existing data, and groundwater and surface water data collected since Feb. 2018 to develop a

baseline groundwater model to represent existing conditions. The project will then use this model to design a groundwater conveyance system that maintains the existing conditions and will be required to work fully for as long as project features that tie into bedrock (*i.e.* the floodwall and detention dam) are in place. There will also be monitoring of the groundwater conditions around the project area to verify that the groundwater system is working as designed.

Why build flood detention? Why not just convey flood water in South Boulder Creek?

Boulder's Stormwater and Flood Utility prefers a "conveyance" approach – keeping floodwater in the creek channel - to flood management where conditions allow. In situations such as South Boulder Creek south of US36 where conveyance of flood waters would increase flooding above existing conditions, detention is used as an alternative flood mitigation tool.

The project team recently performed a detailed technical analysis around an upstream project concept, including two-dimensional flood modeling, that demonstrated it is not possible to prevent US36 from overtopping without structural features. The project will integrate environmental and aesthetic features into the overall project design as has been the city's practice on flood utility projects.

What will happen to the existing levee?

The existing levee is located on property owned by CU Boulder and the city and the university are still in negotiations about how the levee will be handled, including possible use of the levee material for the flood project. Although the levee does not impact the functionality of the flood mitigation, city staff would prefer to see the levee removed and the floodplain reconnected for the environmental benefits of such a plan. FEMA is the agency with jurisdiction over the levee.

Equity

Why is the city investing so much on this project?

The city does not currently have a citywide cost benefit comparison for its 16 drainageways. Each drainageway is evaluated through a lifecycle process of mapping, mitigation planning, design and construction that does not readily lend itself to a city-wide cost/benefit comparison since each drainageway is at a different point in the lifecycle and since there are many other factors that impact the viability of projects besides costs and benefits. Regardless of the selection criteria, South Boulder Creek is considered a high priority because of the identified flood risk, flood benefits from the project, damage experienced during the 2013 flood and direction from City Council.

The city is currently updating the 2004 Comprehensive Flood and Stormwater Master Plan, which will include development of prioritization criteria for future projects and programs. More information on this process, including engagement opportunities can be found [here](#).

Racial Equity Tool

The City of Boulder has an important role to play in welcoming, supporting and serving people of diverse backgrounds in our community and in government processes. While we have done valuable equity work in the past, including the creation of a diversity policy two decades ago, an inclusivity assessment conducted in 2017 showed us that our impact has been limited. The city is currently incorporating use of a Racial Equity Assessment Tool into project approach and implementation. While still relatively new, the hope is that applying the racial equity lens to projects such as this will create more equitable delivery of services. More information about the city's approach to racial equity can be found [here](#).

Where can I find more information?

More information is available on the [project webpage](#) or through Brandon Coleman, Utilities Engineering Project Manager at 303-441-4232 or colemanb@bouldercolorado.gov.