COLORADO
Colorado Water Conservation Board
Department of Natural Resources

AECOM

Beaver Creek Alternatives Analysis City of Brush, CO

The Colorado Water Conservation Board (CWCB) initiated a project to investigate potential hazard mitigation and flood risk reduction alternatives in the City of Brush, CO. CWCB requested that AECOM analyze four alternatives and present findings to the stakeholders.

Additional project information will be included on the project website: www.coloradohazardmapping.com

Background

The Federal Emergency Management Agency's (FEMA) Flood Insurance Rate Maps (FIRMs) identify significant flood potential in the City of Brush. Historic flooding confirms the flood potential in the City, with damaging floods occurring in both 1935 and 1965. Historic newspaper accounts from the Brush News Tribune also indicate floodwaters reaching downtown in 1935 due to floodwaters spilling over the top of the BNSF Railway, with floodwater north of the tracks inundating businesses at an average depth of two feet. In 1965, residents successfully stopped runoff from reaching downtown by constructing a five-foot dike around the southeast portion of town.

Alternatives Analysis

AECOM will model four alternative structural improvements to minimize regulatory flood risk to insurable structures in the City of Brush along Beaver Creek. For each alternative AECOM will estimate costs for permitting, field investigations and survey, and design as a percentage of construction cost. AECOM will also conduct a benefit cost analysis for the alternatives by estimating losses from the 1% and 10% annual chance floods using Hazus for the existing conditions and for the four proposed alternatives.

The following options are conceptual in nature, and will need further design to determine feasibility.

Detention Alternative

At a location approximately three miles north of the Morgan County Line and east of SH 71 just south of County Road D, a potential reservoir will be sized. This location was chosen after a brief investigation of topographic data in the area. AECOM will calculate the ability to detain the 100-year event, and will comment on the reservoir's classification per the Office of the State Engineer's requirements and additional design requirements.

Channelization Alternative without Levees

Channelization will be analyzed without embankment modifications. AECOM will attempt to reduce flood considerations by increasing channel capacity for a portion of Beaver Creek. The channelization alternative without embankment modification will require bridge replacements at County Road S, two BNSF Bridges, at SH 34, and at I-76.

Levee Alternative

Approximately 2.8 miles of levee will be modeled to prevent inundation of downtown Brush north of the Burlington Northern Santa Fe Railroad (BNSF) Rail Bridge. This levee could also offer an opportunity for a recreational trail. AECOM will comment on the probability of certifying the levees to meet 44 Code of Federal Regulations Part 65.10 (44 CFR 65.10) given the railroad tie-ins and construction costs.

Combination Alternative

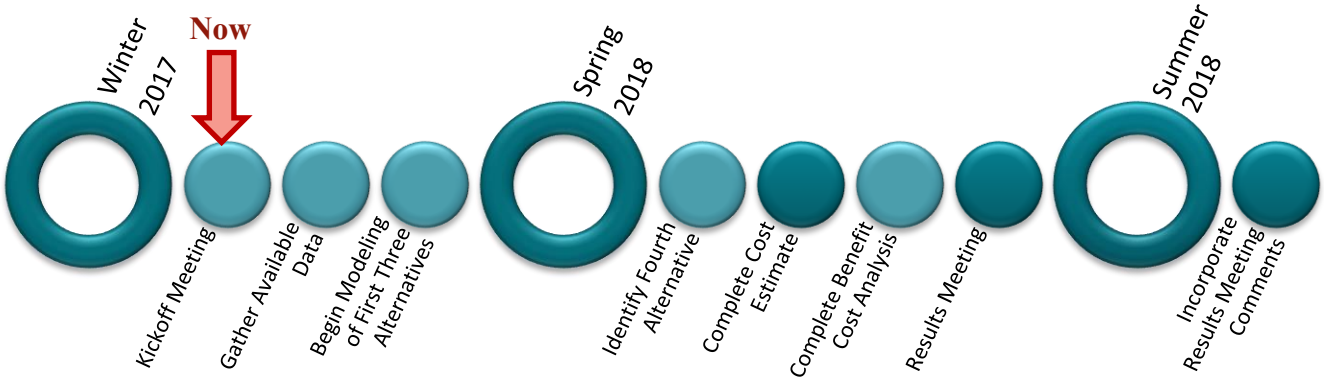
Based on preliminary findings of effectiveness of alternatives 1 to 3, AECOM will prepare a fourth alternative combining the more cost effective elements of options 1 to 3.

The table below discusses some of the impacts with each suggested alternative.

Alternative Impacts

#	Description	Benefits	Impacts	Cost Elements
1	Detention Alternative	Reduces flooding potential in Brush. Possible storage of water for agricultural or recreational uses.	Reservoir inundation limits would cover six or more square miles of existing active farmland and insurable structures on eleven properties.	4 mile dam, with minimum dam height 34 feet at highest point. Spillway must carry the Probable Maximum Flood. Substantial property acquisition and resident relocation from 11 properties required.
2	Channelization Alternative without Levee	Reduces flooding potential in Brush	Substantial excavation and widening of Beaver Creek and bridges over Beaver Creek.	Construct 1.8 miles of channel improvements and expand capacity of County Road 29 Bridge, 2 BNSF Bridges, and the SH 71 Bridge. Right of way acquisitions needed to allow for substantial bridge widenings and channel widenings.
3	Levee Alternative	Prevents flooding in Brush, provides Beaver Creek Trail	Raised water surface elevations for commercial properties east of the BNSF Rail alignment.	Construct 2.8 mile levee. Raise County Road S, BNSF, County Road R, and SH 34 to Cross over Levee.
4	Combination Alternative	TBD	TBD	TBD

Estimated Project Timeline



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Next Steps

AECOM will investigate available data, conduct analysis and present results.

Available data known to date is:

Terrain:	Lidar/USGS
Survey – As-Builds:	Multiple
Hydrology Model:	HEC-HMS
Hydraulic Model:	HEC-RAS

Project Contacts

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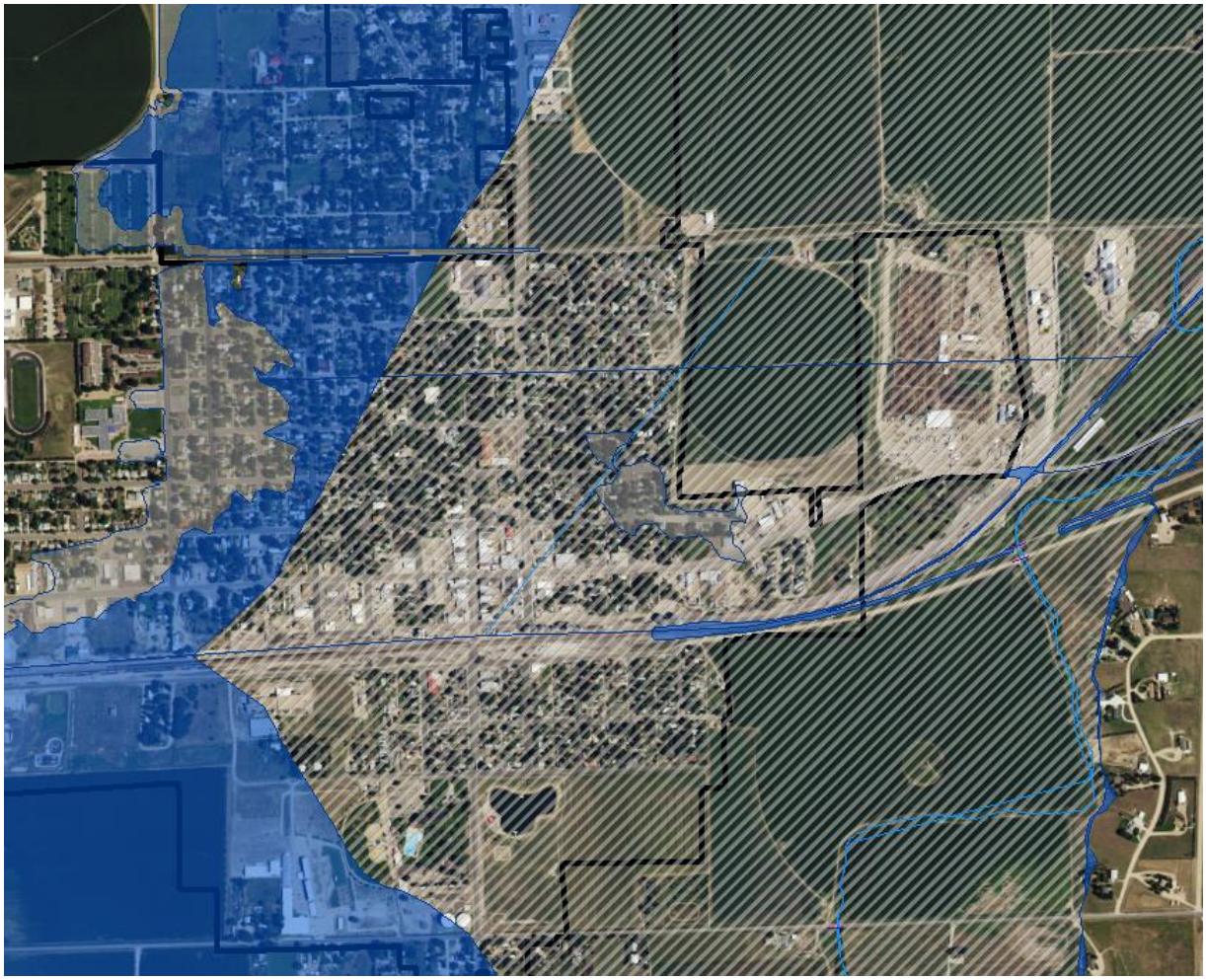

More Information

For more information, please visit these websites or contact the project team:

- Learn more about project (coming soon!): www.coloradohazardmapping.com
- For more information regarding CWCB: cwcb.state.co.us/
- For more information on FEMA's NFIP, please visit: www.fema.gov/floodplain-management
- To find out more about FEMA Flood Insurance, please visit: www.floodsmart.gov