

WATER RESOURCES ADVISORY BOARD MEETING

MEETING DATE: Monday, 21 November 2016

MEETING TIME: 6:00 p.m.

MEETING LOCATION: Municipal Services Center, 5050 Pearl St., Boulder, CO 80301

Agenda Highlights:

Agenda

1. Call to Order (6:00 p.m.)
2. Approval of Minutes (6:01 p.m.)
3. *Public Comment (6:05 p.m.)
4. Information Item – Skunk Creek, Bluebell Canyon Creek, and King’s Gulch Floodplain Mapping Study (6:15 p.m.)
5. Information Item – Agricultural Water Leasing Program (7 p.m.)
6. Matters from the Board (7:45 p.m.)
7. Matters from Staff (7:55 p.m.)
8. Discussion of Future Schedule (8:05 p.m.)
9. Adjourn (8:15 p.m.)

Information Packet

Information Packet Memorandum – FEMA Community Rating System Update (Stafford)

* Public Comment Item

Agenda item times are approximate.

Information:

- Please contact the WRAB Secretary email group at:
WRABSecretary@bouldercolorado.gov
- Packets are available on-line at: <http://www.bouldercolorado.gov> – [A to Z, Water Resources Advisory Board \(WRAB\)](#), Next Water Resources Advisory Board Meeting

CITY OF BOULDER, COLORADO
BOARDS AND COMMISSIONS MEETING MINUTES

Name of Board / Commission: Water Resources Advisory Board	
Date of Meeting: 17 October 2016	
Contact Information of Person Preparing Minutes: Rene Lopez 303-413-7149	
Board Members Present: Lesley Smith, Kirk Vincent, Mark Squillace, Kate Ryan, Dan Johnson Board Members Absent: None	
Staff Present: Jeff Arthur, Director of Public Works for Utilities Ken Baird, Utilities Financial Manager Eric Ameigh, Project Coordinator for Public Works Christin Shepherd, Civil Engineer Annie Noble, Principle Engineer Russ Sands, Water Sustainability and Outreach Rene Lopez, Board Secretary	
Consultants Present: Jeff Brislawn, Amec Foster Wheeler	
Meeting Type: Regular	
Agenda Item 1 – Call to Order	[6:30 p.m.]
Agenda Item 2 – Approval of the 19 September 2016 Meeting Minutes Motion to approve minutes from 19 September 2016 as written. Moved by: Squillace Seconded by: Vincent Vote: 5:0	[6:30 p.m.]
Agenda Item 3– Public Participation and Comment	[6:31 p.m.]
Public Comment: None	
Agenda Item 4– Public Hearing and Consideration of a Recommendation to City Council Regarding the Bear Canyon Creek Flood Mitigation Study	[6:32 p.m.]
Executive Summary from the Packet Materials: The purpose of this memorandum is to present the final Bear Canyon Creek Flood Mitigation Plan (Attachment A) for the WRAB’s consideration, input and recommendation to City Council. In 2014, the city retained Amec Foster Wheeler to evaluate potential improvements along Bear Canyon Creek. Over time, flood improvements have been made at various locations along the drainageway, but the September 2013 flood highlighted areas of hydraulic limitation that prompted the public to request additional flood mitigation. Recommendations were developed, analyzed and presented to the public and the WRAB throughout this study. Feedback and comments were collected and incorporated into the final flood mitigation plan where feasible. The final recommended plan includes a combination of maintenance and capital improvements that yield the greatest reduction in flood risk. In general, the recommended improvements include increased capacity in 13 culverts, channel grading and widening, channel maintenance including sediment and debris removal, and reconfiguring three stormwater outfalls. The recommended improvements are detailed in the table in the Analysis section of this memo and shown on maps in Appendix G of Attachment A. A Benefit Cost Analysis (BCA) was also performed on the recommended improvements and a Benefit Cost Ratio (BCR) of 0.02 was calculated. Although the BCR was low, the recommended improvements result in other benefits including: decreased property damage, increased emergency access during major storm events, and improved safety for multi-use path users.	
WRAB Discussion Included:	
<ul style="list-style-type: none"> • Questions regarding the FEMA Benefit Cost Ratio (BCR) methodology and grant funding • Discussions around a BCR analysis for just maintenance work as an alternative • Comments requesting more information to proceed in recommending the motion • Comments around how well written the plan was 	

Public Comment:

Carl Norby – One problem with the study, funding. Wastewater backups during the flood are impacts that are not discussed in the plan, but the plan will still provide benefit to residents. If the creek does not flow into the sanitary sewer, then the sanitary sewer would not be as much of an issue, please put things in the proper order.

Ned Williams – The driveway culverts at St. Andrew Church are a pinch point.. In support of increasing channel capacity, so long as mature trees are protected. Asphalt scouring during the flood, no sewage backups.

Jane Brooks – Urge City to follow the recommendation. Boulder is an incredible place to live, think of the human element involved with this plan not the BCR. Let the whole public process play out on the individual pieces of the project after its been recommended to council.

Motion: The Water Resources Advisory Board recommends a motion to recommend the Bear Canyon Creek Flood Mitigation Plan be recommended to City Council for acceptance with the understanding that further refinement and alternative analysis may be warranted through the CEAP process to address the low Benefit Cost Ratio (0.02).

Moved by: Smith **Seconded by:** Ryan

Vote: 5:0

Agenda Item 5 – Information Item – Update on Rate Study Next Step [7:52 p.m.]

Ken Baird and Eric Ameigh presented this item.

Executive Summary from the Packet Materials:

The purpose of this item is to follow up on the August and September 2016 WRAB discussions related to the Utility Rate Study Phase 1 analysis and confirm support for the proposed water rate structure alternatives to be studied in Phase 2.

Through the August and September discussions, WRAB provided feedback related to Phase 1 findings. This included generally affirming the key findings related to each of the three utility rate structures. Areas of discussion included Commercial, Industrial, Institutional (CII) water budgets, the residential indoor water budget allocation, the fixed-service charge in the wastewater fee, and alternative calculations for the stormwater/flood management fee.

In September, WRAB expressed support for studying rate structure alternatives in the wastewater and stormwater/flood management utilities. Staff also sought and received additional feedback related to issues in the water rate structure which assisted in the development of alternatives for study. Those water rate structure alternatives are described in this memo.

WRAB Discussion Included:

- Comments regarding the Historical Monthly Users (HMU)
- Discussions around the Commercial, Industrial, Institutional (CII) budgets being broken into several classes to suit their diversity
- Discussions regarding Behavioral Economics professors coming to a future board meeting
- Comments regarding staff recommendations moving forward

Agenda Item 7 - Matters from Board: [8:29 p.m.]

- Smith – CU South meeting
- Johnson - BVCP meeting

Agenda Item 8 – Matters from Staff: [8:35 p.m.]

- Sullivan – Betasso Construction Update
- Budget to Council
- Water Efficiency Plan Information Item
- Civic Area Project

Agenda Item 9 – Future Schedule [8:46 p.m.]

- Retreat
- November & December Meetings – Holiday Schedules

- January & February Meetings – move to fourth Monday of the month
- Skunk/Bluebell/Kings Gulch for November
- Agriculture Leasing program update
- Flood studies

Adjournment

[8:41p.m.]

There being no further business to come before the Board at this time, by motion regularly adopted, the meeting was adjourned at 8:41 p.m.

Motion to adjourn by: Squillace Seconded by: Smith

Motion Passes 4:0

Date, Time, and Location of Next Meeting:

The next WRAB meeting will be **Monday, November 21th 2016 at 6:00 p.m.**, at the **City's Municipal Services Center, 5050 East Pearl St., Boulder, CO 80301**

APPROVED BY:

ATTESTED BY:

Board Chair

Board Secretary

Date

Date

An audio recording of the full meeting for which these minutes are a summary, is available on the Water Resources Advisory Board web page.

<https://bouldercolorado.gov/boards-commissions/water-resources-advisory-board-next-meeting-agenda-and-packet>

**CITY OF BOULDER
WATER RESOURCES ADVISORY BOARD
AGENDA ITEM**

MEETING DATE: November 21, 2016

AGENDA TITLE: Information Item - Skunk Creek, Bluebell Creek and King's Gulch Floodplain Mapping Update

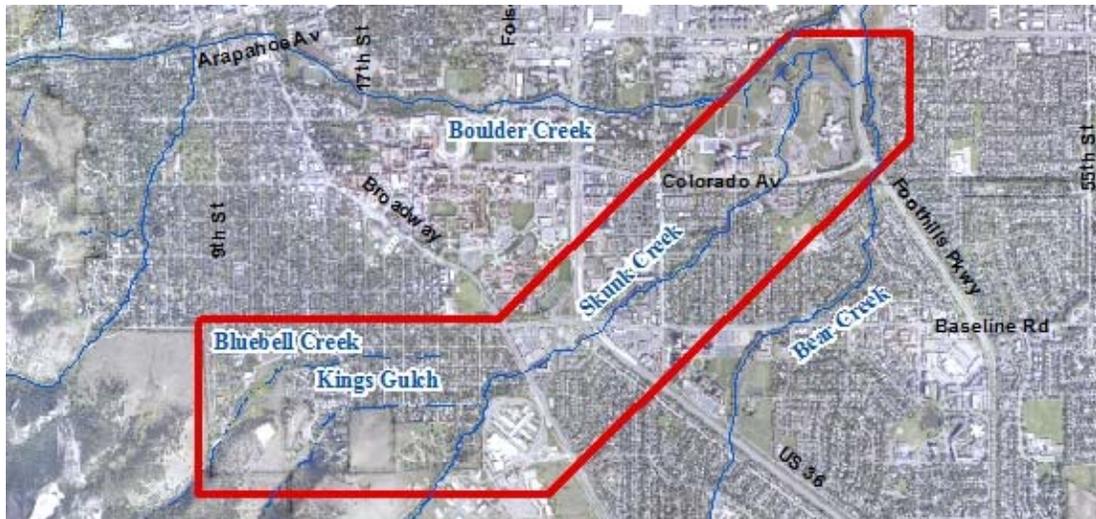
PRESENTER/S:

Jeff Arthur, Director of Public Works for Utilities
Annie Noble, Acting Principal Engineer for Flood and Greenways
Katie Knapp, Engineering Project Manager

EXECUTIVE SUMMARY

The purpose of this memorandum is to provide a general summary of the history and preliminary results of the Skunk Creek Floodplain Mapping Update.

The Skunk Creek Floodplain Mapping Update includes the King's Gulch, Skunk and Bluebell Canyon Creek floodplains between the western city limits to east of Foothills Parkway where Skunk Creek confluences into Bear Canyon Creek as shown below.



Engineering consultants provided hydrologic and hydraulic modeling to update the floodplain mapping and predicted water surface elevations. The existing and proposed floodplain mapping is illustrated in **Attachment A**.

Flood mapping provides the basis for FEMA's National Flood Insurance Program (NFIP) flood insurance requirements and is also used to regulate development. Flooding areas with less than 1-foot depths (shallow, 100-year floodplain areas) are generally mapped as

500-year floodplain areas, which have limited regulatory restrictions and no flood insurance requirements. The City has the option of mapping these areas as a 100-year floodplain for regulatory purposes, but maintaining the Zone X (shaded) designation on FEMA's map therefore not triggering the requirement for flood insurance. WRAB feedback is requested on this option.

Following input from the public and the WRAB, the mapping study will be finalized and presented at a future WRAB meeting with a request for a motion. The WRAB review of the floodplain mapping update does not require board members to verify the analysis and calculations, but accepts the overall mapping study process and that results are reasonable and acceptable.

BOARD AND COMMISSION FEEDBACK

The Skunk Creek, Bluebell Canyon Creek and King's Gulch floodplain mapping study was first presented to the WRAB as an information item on August 18, 2014. The board requested that staff continue to work with the public to inform them about the proposed floodplain mapping and address comments and concerns. It was also requested that information about FEMA's Letter of Map Amendment (LOMA) process be made available on the city's website. Staff continued to work with the public and will continue to send out notification letters and postcards for the mapping update. Information about FEMA's LOMA process was also included on the project website and on the city's general website about floodplain mapping.

Revised floodplain mapping was then presented to the WRAB on September 15, 2014. At the time of the WRAB meeting, additional refinements were being done to the mapping because some of the mapping results did not correlate well with observations from the September 2013 flood event. WRAB recommended that an additional peer review be conducted for the work that was completed by ICON Engineering.

A second peer review was completed in January, 2015 by a third party consultant, Anderson Consulting Engineers, Inc. The peer review highlighted some spill areas to study in more detail. Revised floodplain mapping was presented to the WRAB on May 18, 2015. There were still unresolved questions about some of the mapping results. Further analysis resulted in identifying errors in the hydrology used for the study. Therefore, the mapping study was revised starting with a new hydrologic analysis.

PUBLIC FEEDBACK

Public notification post cards about the mapping update have been sent to all property owners in the study area and a project web site has been developed to provide information (<https://bouldercolorado.gov/water/skunk-creek-floodplain-mapping-update>).

An open house was held on August 18, 2014 immediately prior to the WRAB meeting to inform the public about the mapping update and hear comments and concerns about the study. Public comments were also received at the September 15, 2014 and May 18, 2015 WRAB meetings. Staff has met with residents in person and responded to phone calls and emails. In general, most of the comments and questions have been about impacts to

specific properties and requests for more detailed information such as proposed base flood water elevations. There were also concerns about the high hazard zone delineations and the distribution of the Bluebell Canyon Creek split flow paths downstream of 15th Street. A summary of past public feedback is provided in **Attachment C**.

An open house meeting is being held immediately prior to this WRAB meeting to inform the public about the revisions to the mapping update. A summary of public input gathered at the open house will be provided at a future WRAB meeting.

BACKGROUND

The city has a comprehensive floodplain management program designed to identify flood risks, mitigate the risks of flooding, and support community recovery following a major flood. For additional information about the city's floodplain management program, floodplain regulations and flood insurance, read the [Flood Management Program Overview](#).

Floodplain mapping provides the basis for flood management by identifying the areas subject to the greatest risk of flooding. This information is essential for determining areas where life safety is threatened and property damage is likely and is the basis for floodplain regulations and the National Flood Insurance Program (NFIP). The city's floodplain maps need to be periodically updated to reflect changes in the floodplain resulting from land development, flood mitigation improvements, new topographic mapping information and new mapping study technologies.

The city delineates four flood zones:

500-year floodplain: The 500-year floodplain delineates the flood limits resulting from a storm that has a 0.2 percent chance of occurring in any given year.

100-year floodplain: The 100-year floodplain delineates the flood limits resulting from a storm that has a one percent chance of occurring in any given year.

Conveyance zone: The conveyance zone is defined as the areas in the floodplain that are reserved for the main passage of the entire 100-year flood flow when the 100-year floodplain is artificially narrowed until a maximum six-inch increase in flood water depth is created. This zone is delineated to allow development to occur up to the narrowed floodplain and still provide passage of 100-year storm flows.

High hazard zone: The high hazard zone defines the area of the floodplain where water depth and velocity pose the greatest threat to life and safety. This area is delineated for areas in the floodplain where water depths are four feet or greater or where the water velocity (feet per second) multiplied by water depth (feet) equals or exceeds the number four.

Skunk Creek, Bluebell Canyon Creek, and Kings Gulch were first studied in 1987 by the consulting firm Greenhorne & O'Mara and the resulting Flood Hazard Area Delineation

(FHAD) report included the delineation of the 100-year floodplain along these creeks. The Flood Insurance Study (FIS) and Flood Insurance Rate Map (FIRM) approved for these creeks were originally based on the 1987 FHAD and included a federally-regulated one foot rise floodway. Since that time, both the City of Boulder and the State of Colorado have adopted a ½ foot rise floodway, which the City refers to as the Conveyance Zone.

In 1989, Love and Associates delineated the High Hazard Zone and City of Boulder Conveyance Zone (½ foot rise floodway). The delineations were based on the hydraulic models used in the 1987 FHAD.

On May 6, 1991, FEMA issued a Letter of Map Revision (LOMR) for Skunk Creek to incorporate the results of a channel improvement project. The limit of the LOMR was in the University of Colorado's Research Park, downstream of Colorado Avenue to just upstream of the confluence of Boulder Creek.

Several road-crossing structures for Skunk Creek have been improved since 1991: culverts at Broadway and at 27th Way, crossings at Anderson Ditch and the cemetery maintenance road, and the low water crossing upstream of 27th Way. These improvements are being incorporated into the current mapping study.

The City initially contracted with Belt Collins to develop the updated floodplain maps but they closed their Boulder office in 2013. ICON Engineering provided a peer review of Belt Collin's 2011 initial study and was selected to complete the project, using the floodplain models developed by Belt Collins, which used 2003 aerial topography and supplemental ground survey.

In 2013, the city acquired state-of-the-art Light Detection and Ranging (LiDAR) technology to produce high-resolution topographic mapping. The new LiDAR mapping was compared to the 2003 topographic base mapping and areas showing substantial differences were updated in the hydraulic models.

In September 2013, major flooding occurred within the study area. The flood resulted in creeks overtopping and spill flows. A 2-dimensional (2D) hydraulic model was completed to assess the differences between the draft floodplain mapping and the 2013 flood observations. This 2D analysis was used to refine primary flow paths and split flow areas used in the conventional 1-dimensional hydraulic model. In December, 2014, Anderson Consulting Engineers was selected to complete a peer review of the draft floodplain mapping study completed by ICON Engineering. The additional peer review was completed and among other things, recommended that the spill flows north across Baseline Road from Bluebell Canyon Creek, and spill flows north east across US Highway 36 from Skunk Creek be explored further and documented with the floodplain mapping update. Additional review and analysis resulted in questions about the hydrology of the watershed, so a new hydrologic evaluation was initiated.

ANALYSIS

This mapping study updates the hydrologic and hydraulic models and flood hazard mapping for the 500-year floodplain, 100-year floodplain, Conveyance and High Hazard Zones for Skunk Creek, including the King's Gulch, and Bluebell Canyon Creek tributaries.

The revised mapping presented in this memorandum includes several spill flows and is different than the mapping presented in 2014 as it is now based on a new hydrologic model, a 2D analysis developed from LiDAR topographic mapping data, and information collected before and after the September 2013 flood event.

The hydrologic model for the watershed was developed through an iterative process using CUHP, FLO-2D and SWMM computer programs. First, CUHP was used to determine sub-basin runoff hydrographs for the full range of effective discharges at various design points. Second, sub-basin hydrographs were converted to a steady state condition and routed through the project area using FLO-2D to identify watershed flow patterns and areas of split flows diverting to and from the major flow paths. This FLO-2D model was used to develop diversion rating curves for the major split flow locations which were then numerically incorporated into SWMM to establish peak flows along major tributaries. Finally, the resulting flows from SWMM were incorporated into the FLO-2D model to establish main channel and split flow discharges for the reaches that were selected for detailed floodplain modeling. The hydrologic analysis was peer reviewed by the Urban Drainage and Flood Control District (UDFCD) prior to the development of the detailed hydraulic models.

Utilizing the FLO-2D model results, flow paths were selected for detailed hydraulic modeling based on flow concentration locations with depths, on average, of greater than 1-foot for the 100-year floodplain. Discharges for detailed study reaches were taken directly from applicable cross sections in the FLO-2D model. This modeling was also submitted to the UDFCD for a peer review. The peer review comments have all been addressed and the mapping will be resubmitted for concurrence after incorporating comments received from the public and the WRAB.

Attachments A includes figures showing a comparison between existing and proposed floodplain mapping. A summary of how these changes impact existing structures is included in **Attachment B**.

Flooding areas with less than 1-foot depths (shallow, 100-year floodplain areas) are generally mapped to be consistent with the FEMA, non-regulatory Zone X (shaded) mapping zones and are therefore mapped as 500-year floodplain areas on the city's maps. For this study, these areas have been highlighted for further consideration, since shallow flooding can cause significant damage to basements and those damages are not typically covered by flood insurance. The City has the option of mapping these shallow flooding areas as 100-year floodplain for regulatory purposes and is requesting WRAB feedback on this option. If the shallow 100-year areas are included in the 100-year floodplain for regulatory purposes, future improvements would be required to be elevated or floodproofed and basements would not be permitted in residential structures, reducing the

flood risk of newly built structures in these areas. The FEMA flood zone would be Zone X (shaded) for either option, so flood insurance would not be mandatory for these areas, and would be available at a reduced rate (preferred risk policy). A total of 43 parcels, 51 structures and 70 dwelling units are included in these areas. The two options are outlined in the following table:

Shallow 100-Year Floodplain Areas		
	Option 1	Option 2
City Flood Zone	500-Year	100-Year
City Regulations	Flood protection and emergency management plans required for Critical Facilities only	100-year Floodplain regulations apply: <ul style="list-style-type: none"> - No new residential basements (elevate to flood protection elevation) - Floodproofing/Elevation required for non-residential structures - Sewer back-flow prevention required
Structures within the new 100-Year Floodplain	143	194
FEMA Flood Zone	Zone X (shaded)	Zone X (shaded)
Mandatory Flood Insurance	No	No

NEXT STEPS:

Following input from the public and the WRAB, the mapping will be finalized and presented to the WRAB with a request for a motion to recommend approval of the new floodplain mapping.

The WRAB review of the floodplain mapping update does not require board members to verify analysis and calculations, but indicates the overall mapping study process and results are reasonable and acceptable.

Following a recommendation from the WRAB, the mapping revisions will be considered by City Council. If City Council approves the map revisions, the city will submit a request to FEMA for review. During the FEMA review and approval process it is recommended that the new mapping be used for regulatory purposes by regulating to the more restrictive of the existing and proposed mapping. This would mean that development within the newly identified flood zones would be subject to the city floodplain regulations. In order to comply with FEMA requirements, development within the areas that are being removed from the floodplain would still be subject to the city’s floodplain regulations until FEMA officially adopts the new floodplain mapping. Following formal adoption by FEMA, the city would regulate solely based on the new mapping.

ATTACHMENTS

- A. Existing and Proposed Floodplain Mapping
- B. Summary of Impacts to Existing Structures
- C. Summary of Public Comments



**Zone X 100-Year designation is shallow flooding in the 100-year floodplain. Structures in this designation may be mapped as City 100-year floodplain for regulatory purposes and Zone X Shaded for FEMA flood insurance purposes.*

The information depicted on this map is provided as graphical representation only. The City of Boulder provides no warranty, expressed or implied, as to the accuracy and/or completeness of the information contained herein.

Legend	 Skunk Creek AE Zone	 Structure Added	 Effective 100 Year Floodplain	 Creek
	 Skunk Creek AO Zone 1-ft	 Structure Unchanged	 City Limits	
	 Skunk Creek AO Zone 2-ft	 Structure Removed	 LOMC	
	 Skunk Creek Zone X 100-Year	 Zone X (100Year) *see note		

Skunk Creek

Proposed 100 Year Floodplain
Compared to FEMA Effective

Map 1 of 2



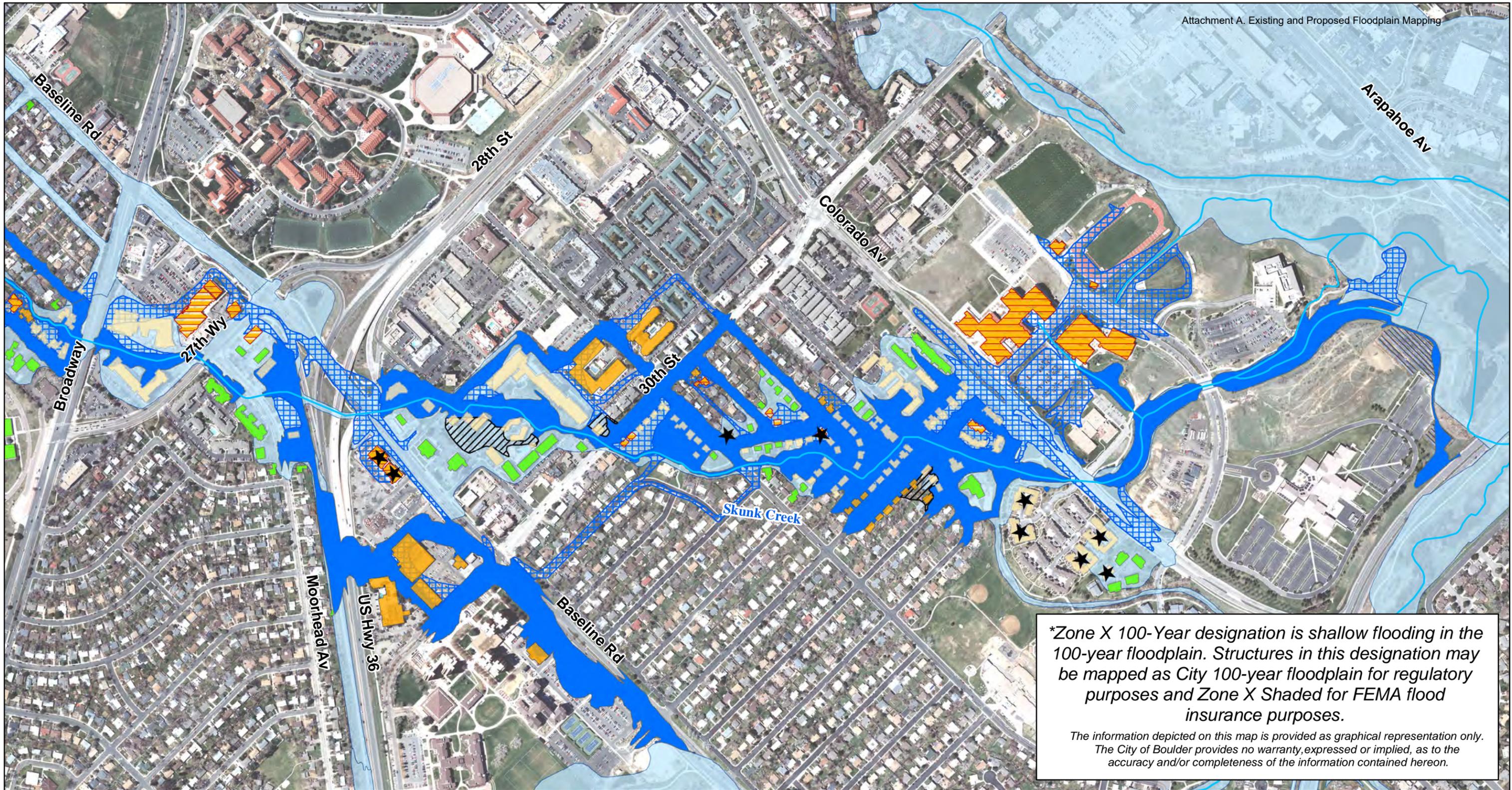
0 250 500 1,000 1,500 Feet



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Rev: 11/10/2016



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	 Skunk Creek AO Zone 1-ft	 Structure Unchanged	 City Limits	 LOMC
	 Skunk Creek AO Zone 2-ft	 Structure Removed		
	 Skunk Creek Zone X 100-Year	 Zone X (100Year) *see note		

Skunk Creek

Proposed 100 Year Floodplain
Compared to FEMA Effective
Map 2 of 2





Utilities Division
Rev: 11/10/2016



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Legend	 Effective Conveyance Zone	 Structure Added	 Creek
	 Proposed Skunk Creek Conveyance Zone	 Structure Unchanged	 City Limits
	 Structure Removed		

Skunk Creek

*Proposed Conveyance Zone
Compared to FEMA Effective*

Map 1 of 2



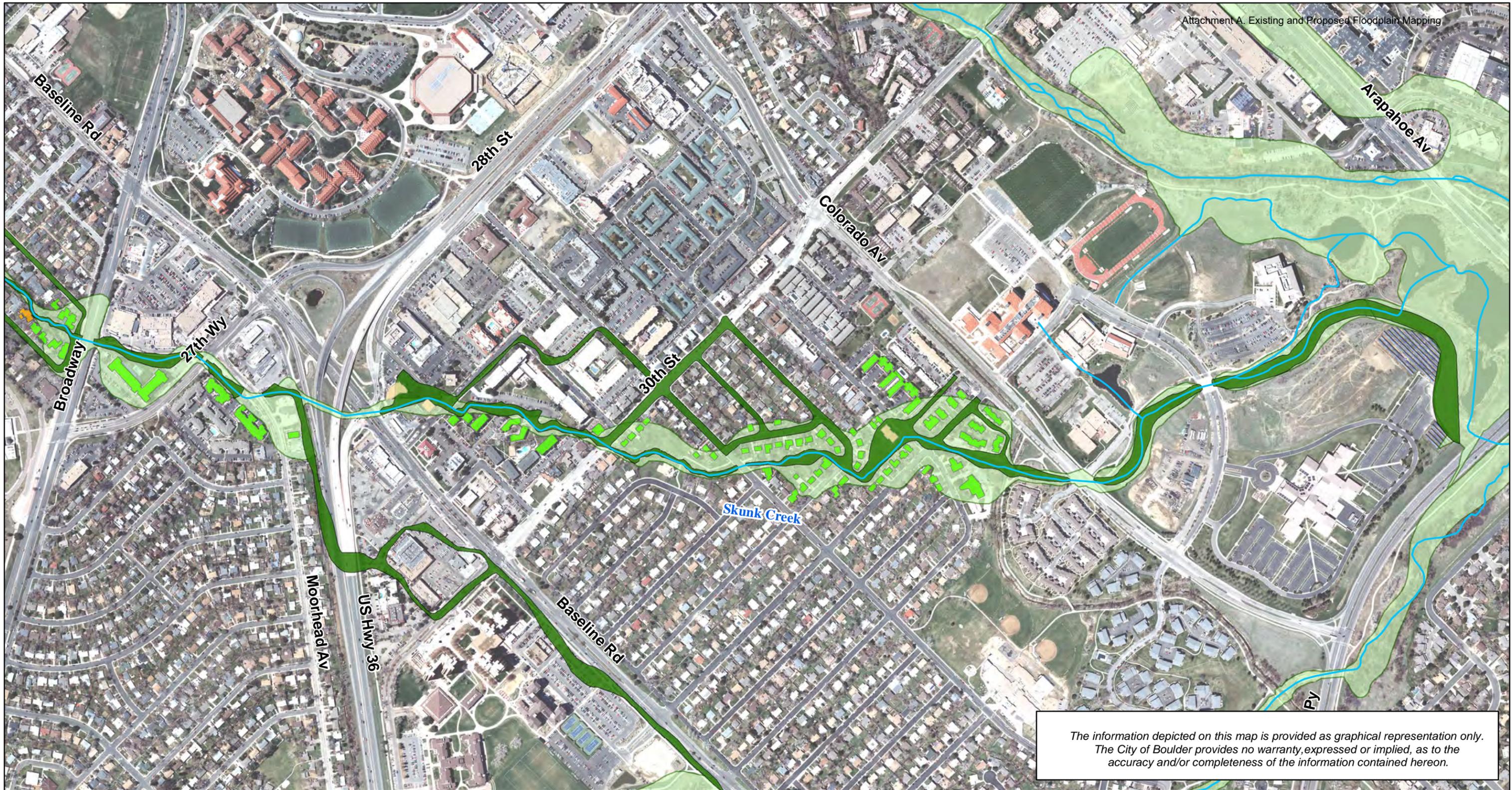
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Legend	 Effective Conveyance Zone	 Structure Added	 Creek
	 Proposed Skunk Creek Conveyance Zone	 Structure Unchanged	 City Limits
	 Structure Removed		

Skunk Creek

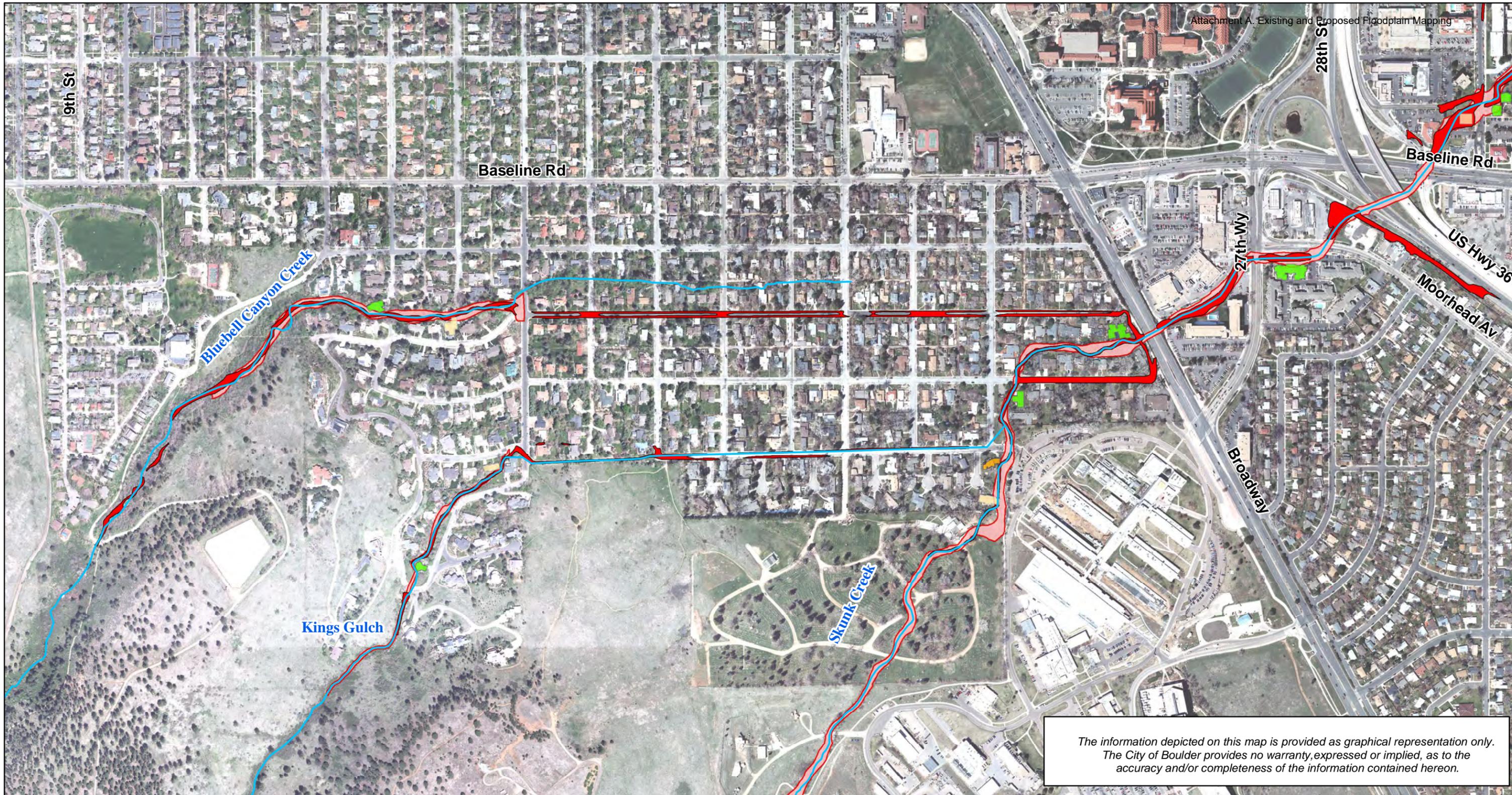
Proposed Conveyance Zone
Compared to FEMA Effective
Map 2 of 2



0 250 500 1,000 1,500 Feet




City of Boulder
Utilities Division
Rev: 11/10/2016



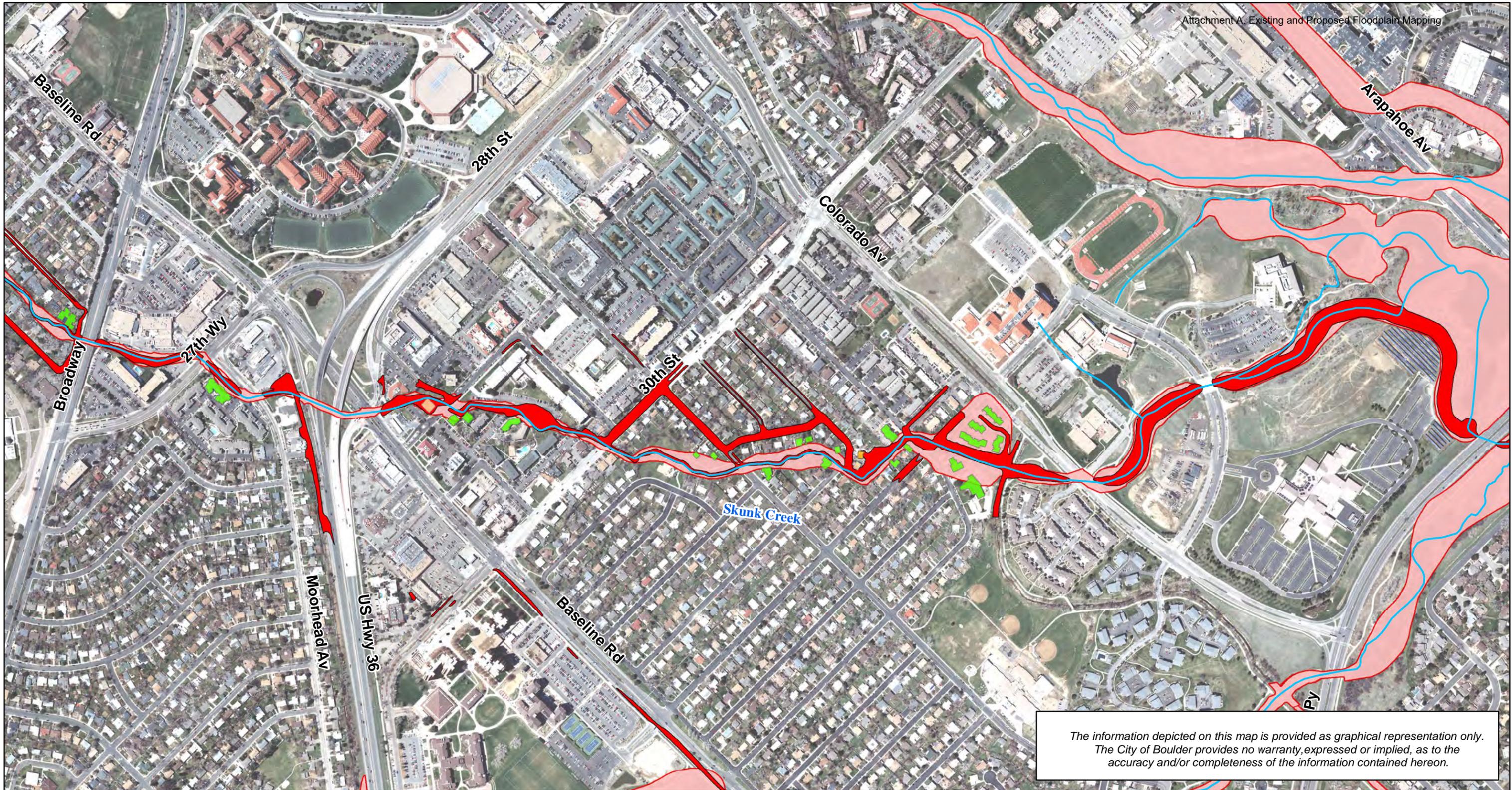
The information depicted on this map is provided as graphical representation only. The City of Boulder provides no warranty, expressed or implied, as to the accuracy and/or completeness of the information contained herein.

- Legend**
- Effective High Hazard Zone
 - Proposed Skunk Creek High Hazard Zone
 - Structure Added
 - Structure Unchanged
 - Structure Removed
 - Creek
 - City Limits

Skunk Creek
Proposed High Hazard Zone
Compared to FEMA Effective
Map 1 of 2

0 250 500 1,000 1,500
Feet

CITY OF BOULDER
Utilities Division
Rev: 11/10/2016



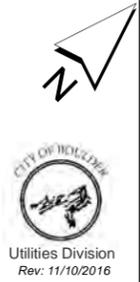
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- Legend**
-  Effective High Hazard Zone
 -  Structure Added
 -  Creek
 -  Proposed Skunk Creek High Hazard Zone
 -  Structure Unchanged
 -  City Limits
 -  Structure Removed

Skunk Creek

*Proposed High Hazard Zone
Compared to FEMA Effective*

Map 2 of 2



Summary of Impacts to Structures

Skunk Creek				
Number of Structures	100-Year Floodplain <i>NOT including</i> Shallow Flooding	100-Year Floodplain <i>including</i> Shallow Flooding	Conveyance Zone	High Hazard Zone
Existing Floodplain	165	175	82	29
Proposed Floodplain	143	194	10	7
Change				
No Longer Affected	62	62	76	24
Newly Affected	40	81	4	2
No Change	103	113	6	5

There are 10 LOMRs

5 No Change (LOMC in existing mapping and are **not included** in the new mapping)

5 Added to 100 year (LOMC in existing mapping and are **included** in the new mapping)



Skunk Creek, Bluebell Canyon Creek and King's Gulch Remapping Study Public Comment Summary

Open House Date: Aug. 18, 2014

Open House Meeting Location: Municipal Building Lobby

Number of attendees that signed-in: 23

Staff in Attendance:

Robert Harberg

Katie Knapp

Kristin Dean

Laurel Olsen-Horen

Douglas Sullivan

Public Comments:

- Location:** 2042 Baseline
Commenter: Property owner (Ben Chancellor; Christina Jurgens)
Comment: Did not see flooding in September 2013 and do not feel that the high hazard designation is warranted; question split values for Mariposa vs. Columbine
- Location:** Area south of Baseline Road between 20th and Broadway
Commenter: Several property owners
Comment: Flooding in September 2013 was confined to streets; no flow behind homes; water did not appear to be originating from Bluebell Canyon Creek proper.
- Location:** 22nd and Mariposa Avenue
Commenter: Several property owners
Comment: Flows traveling east on Mariposa turned north on 22nd Street and continued to Columbine Avenue; this is not shown as 100-year flooding.
- Location:** 19th and Mariposa Avenue
Commenter: Property owner
Comment: structure at south east corner is shown in the 100-year floodplain but did not experience damage during the September 2013 event; please review assumptions here.
- Location:** 955 Quinn Street
Commenter: Property owner (Lee Payne)
Comment: Structure does not show as impacted on floodplain maps (tree cover issue?); how was floodplain delineated at corner of Denton Avenue and Quinn Street.

6. **Location:** 3130 Aurora
Commenter: Property Owner
Comment: It seems like the HHZ could be the result of a small depression that we may not want to include in the mapping.
7. **Location:** 1700 Bluebell
Commenter: Property Owner (Bill Mooz)
Comment: Structure is shown as in proposed floodplain but was not impacted by September 2013 event; wants to know why actual data was disregarded.
8. **Location:** 1849 Mariposa Ave,
Commenter: Property Owner (Steve Brown, Guen Simons)
Comment: Water from Bluebell creek did not flow to Mariposa. It flowed down the Bluebell drainage but primarily to the north along 19th Street and down Columbine.
9. **Location:** 2100 Baseline
Commenter: Property Owner (Jamie Karpohl)
Comment: a) There were no eastbound flows observed on Columbine west of 20th Street. b) The flooding at 20th and Columbine originated from the Anderson ditch on the north side of Columbine. This water flowed through properties to the north-east and down the Columbine North alley towards 21st. At 21st the flows split - continuing down the alley and heading north towards Baseline. c) During the flood, there was no flow observed coming down Columbine west of 20th. The only flows observed in Columbine were from Anderson ditch on the north side of the street. When I visited the location of Bluebell Canyon Creek at 15th St. on the morning of September 14th, I observed all of the flow heading down Mariposa. I did not observe any man-made diversions at this location.

Public Hearing: WRAB Meeting, Aug. 18, 2014

Meeting Location: Council Chambers

Public Comments:

1. Steve Brown, Guen Simons - Water from Bluebell creek did not flow to Mariposa. It flowed down the Bluebell drainage but primarily to the north along 19th Street and down Columbine.
2. Lee Payne - My home does not show up as either added, removed or remaining in the 100 year floodplain on the "structures affected proposed 100 year floodplain". I believe this is due to the dense tree cover on my lot. The buildings on this lot look to be un-included in the 100 year flood zone, but it is unclear. The grading and slopes on my lot are high from the street and I believe the new mapping to be close to reality in that the homes are excluded. Can you please contact me to clarify if the structures are excluded and what the base flood elevation is in this area? There is also no information on sections or elevations for this lot on the city's website. Thank you!

Public Hearing: WRAB Meeting, Sept. 15, 2014

Meeting Location: Council Chambers

Public Comments:

1. Christina Jurgens – Concerns are with the Bluebell and that there were no diversions, which isn't reflected accurately in the mapping presented. Question is if a lot of water falls in the area, water will not flow uphill to 19th street and over Columbine if it's natural direction is downhill. She would like for this to be considered when moving forward with the amendment.
2. Bryan Boots – Owns a home at 20th and Columbine, which is in a newly designated hazard zone. He was completely unaware of the changes in zoning and is feeling like he is coming to the conversation late. Questions the assumptions that are going into this decision making and having a hard time reconciling the recent studies with what he actually experienced last September. He would like to better understand the next steps in the process regarding what is decided. It doesn't seem reasonable to put the burden on residents. He is requesting better, more effective outreach to citizens.
3. Tim Fuller-Rowell – Lives on Columbine Avenue, which is affected by the new floodplain, which now makes up half of his property. Increase in the water table flooded the basement. Flow down Mariposa didn't affect us. Rock dam broke causing a flash flood and persistent rainfall and wonders if that was factored into the analysis, but didn't see any major flow on

Columbine. Wants to understand the actual impact of flood to his property and physical reasons why it is now included on the floodplain. What is the process for deciding how the new boundaries are drawn and decided? Premature to start approving a new floodplain before the previous event is fully understood and would like the city to have more interaction with the people who are actually affected.

4. Jamie Krapohl – Property owner affected by the proposed flow split changes at 15th is his major concern. He didn't observe what is being shown on the maps and feels there is a lack of correlation in how the split affects these three blocks. On the Saturday of the flood, he was at 15th and Mariposa and didn't observe any diversions that were put into place by residents. The flooding on his corner was due to the Anderson Ditch overflowing, which is not represented in the changes. Since the open house, he has reached out to neighbors, but there are many renters around his property. He contacted three other property owners and informed them of the recent flood mapping changes. Feels that neighbors were not aware of these new changes. Concerned with the accuracy of the models, based on observations from walking around the neighborhood and what is being reflected in the updated maps. He feels this just doesn't make sense.

Public Hearing: WRAB Meeting, May 18, 2015

Meeting Location: Municipal Service Center

Public Comments:

1. Christina Jurgens – Concerned that too much of the water from Bluebell Canyon Creek is mapped that it flowed down Columbine, rather than where it was actually observed during flood. Concern that there are errors in proposed flood map that misrepresent the risk to her property and possibly other properties. Regarding item 53, which points out in the peer review that flood maps need to follow topography, question of syntheses of two kinds of mapping and worried about errors in representation of potential risk. Worried that proposed map represents inaccuracies that present risk. Residents have not heard of any structures that were flooded in this particular section. Asks why the proposed floods from Bluebell Canyon Creek to Mariposa, from 16th to 17th smaller than the northward flows at 18th and 19th? Seems by looking at it, they should be more similar to each other. Feels this is a mistake. What method was used to determine the split at 20th and Columbine?
2. Beth Robinson – Noticed big difference this time in the conveyance zone on her block. Several people are constructing drainage pipes from the back conveyance zones to the front of the street from the easement at the back of the property. This will impact at least one property owner on the block, who is not able to rebuild without extensive regrading.

3. Kris Miller – Home has been in 100-year flood zone since moved in 2006 and has contacted the city multiple times to state that they should not be. Was told by city that all studies were approximate at that time and no official mapping was done. Was told in 2012 that a “real study” would be conducted and in April 2013, was informed by city that they were going to be taken out of the flood zone with this study, but it is a long process. She and neighbor were not flooded during the 2013 event. Lives on the corner and the flood jumped the banks and flooded south on Mariposa instead and flood didn’t even go near her property. When she called again, she was told that she was still in the floodplain. Concerned about the study. The flood actually occurred south of her property. Would like to know what happened and why she is still in the flood zone when the flood didn’t affect her property?
4. R. Chris Roark – Asked whether it was taken into account that there is a bridge at lower McClintock that significantly diverted water during the flood event, which washed out and ended up on his property. Bridge is no longer there and is not going to be replaced. Will this be considered in the flood mapping?
5. Ali Yager – Lives at the corner of 20th and Mariposa. All the water at 15th came down Mariposa and wants to know what the city can or should do to deal with the water that jumps onto Mariposa? Maintenance of Bluebell Creek between Mariposa and Columbine, which theoretically is where the water should go. Question is about maintenance of the systems that should be carrying water, which are not working properly.

**CITY OF BOULDER
WATER RESOURCES ADVISORY BOARD
INFORMATION ITEM**

MEETING DATE: November 21, 2016

AGENDA TITLE: Information Item – Utilities Annual Water Leasing Program

PRESENTER/S:

Jeff Arthur, Director of Public Works for Utilities
Joe Taddeucci, Water Resources Manager
Kim Hutton, Water Resources Engineer
Doug Dunn, Water Resources Specialist

EXECUTIVE SUMMARY:

The purpose of this item is to summarize Utilities’ annual raw water leasing program, including how it is integrated into municipal water supply operations, considerations that go into setting lease prices and revenue resulting from the program. This information is being provided in response to WRAB questions about opportunities to generate additional revenue through sale or lease of raw water supplies.

Utilities leasing program primarily serves agricultural lessees and is managed by the Water Resources work group. The majority of leased water is from Utilities’ Northern Water (“Northern”), Colorado-Big Thompson (CBT) allotment but also includes shares in private irrigation ditch companies. Over the past 16 years, Utilities has leased roughly 59,000 acre-feet of water resulting in \$1.7 million in revenue.

BACKGROUND:

Utilities’ annual water leasing program is one of many current practices resulting from well over 100 years of strategic water supply planning. The City of Boulder began operating a municipal water supply system in 1875, which included development of municipal direct flow and storage rights along Boulder Creek. In order to support growing municipal water demands in the early 1900s, the city began acquiring senior water rights associated with shares in irrigation ditch companies¹. The city’s early water supply development efforts eventually led to establishment of the North Boulder Creek source water system, including the Silver Lake Watershed.

In the 1940s and 1950s, additional municipal water supplies were sought due to population growth following World War II. As a result, the city decided to purchase CBT units and joined the Northern Colorado Water Conservancy District (also known as “Northern Water or “Northern”) in 1953. This water supply addition turned out to be timely with a severe drought occurring in 1954.

¹ From 1995-2015, approximately 30% of the city’s annual water supply was associated with water rights attributable to irrigation ditch shares, many of which date back to the late 1800s and early 1900s.

In 1989, City Council adopted the Raw Water Master Plan, which resulted in the city's acquisition of the Barker system in 2001 and establishment of the water supply "reliability criteria". The Barker system improved system reliability by increasing the storage volume available to the city from the Middle Boulder Creek source and by adding Barker infrastructure (reservoirs and pipelines) to the city's source water system. The reliability criteria established important policy guidance for the city's source water supply by defining the acceptable frequency of water restrictions for droughts of varying severity. The reliability criteria are central to the city's water supply philosophy² and are used to test the adequacy of the city's water supply by computer modeling.

The city's ability to manage year-to-year variation in water supply is possible due to past efforts to establish the physical supply through its North and Middle Boulder Creek and Northern Water sources and due to the reliability criteria, which describes the water supply level of service. The leasing program provides a mechanism to share surplus supply available to the city in wet years, and in dry years, the reliability criteria provide a framework for measures needed to manage limited water supply. Such measures include water restrictions for water utility customers and curtailing the leasing program. In 2002, a significant drought occurred due to low winter snowpack. To manage supply, the City of Boulder imposed water restrictions and did not lease any CBT water to others.

The City of Boulder's integration of water leasing into its water supply management strategy is not unique. Many front-range municipalities similarly have leasing programs that make water available to other users in most years while managing annual water supply variation. For many communities located north of metro Denver, Northern's CBT system makes up a significant component of water available for lease and Northern plays a significant role³ in administration of CBT leases.

ANALYSIS:

Utilities' leasing program involves a number of pricing considerations that affect water utility revenue either directly from the leasing program or at times from Northern's Regional Pool program. Both the pricing considerations and leasing program revenue are summarized below.

Lease Pricing Considerations - Utilities current leasing program is based on the following:

- 1) Policy guidance in the Boulder Valley Comprehensive Plan encourages support of local agriculture. Local agriculture is a primary use of Utilities leased water. In setting lease rates, Utilities' charges a modest 10% administrative fee on top of Boulder's per-acre-foot assessment so that the leased water is affordable for agricultural users. This approach has resulted in lease rates comparable to other front range municipalities who lease water.
- 2) During wet years when water availability is high, lease demand is generally lower. During dry years, lease demand is high but water availability is lower. It has not been Utilities' practice to adjust lease rates based on water availability, and staff is not aware of any municipalities who make such pricing adjustments.

² The reliability criteria are included in the city's current Drought Plan (Volume I-2010 and Volume II-2003) and most recent Source Water Master Plan (2009).

³ Northern has an online process for administration of water transfers associated with leases and has the infrastructure and operations staff required to deliver the water to lessees.

- 3) One distinction in Utilities' pricing is the desired use of the leased water. Most of Utilities' leases are for a single year and involve water used for irrigation purposes. However, the city receives numerous requests each year for augmentation water⁴, most of which involve long term lease commitments. The city's lease rates for augmentation water, which are also comparable to regional rates, are generally substantially higher (currently \$1,000 per acre-foot for guaranteed long term leases) than for irrigation water. The higher pricing is because water rights available for such use are generally in shorter supply and because such leases generally require use of stored water, are administratively burdensome and usually involve very small amounts of water (fractions of an acre-foot).
- 4) One other consideration in lease pricing involves legal and process constraints. Leases involving ditch shares and Northern supplies need to stay within the historic ditch service area or Northern district boundaries, respectively, which limits the geographic area available for most City of Boulder water leasing. The city's water rights decrees, city code and Northern rules preclude use of city water for certain applications such as hydraulic fracturing (fracking) associated with oil and gas extraction. Water leased for fracking can involve lease rates many times higher than typical municipal or agricultural lease rates, however, most municipalities have not looked favorably upon making water available for such use.

Leasing Program Revenue - Over the past 16 years, Utilities has leased roughly 59,000 acre-feet of water resulting in \$1.7 million in revenue. Of that 58,400 acre-feet and \$1.6 million was associated with agricultural leases, the majority of which was CBT water as shown in Attachment 1. From 2000 to 2016, agricultural lease rates have ranged from \$11 per acre foot to \$150 per acre foot depending on the year and water source⁵. The agricultural leasing program has had nearly 100 different lessees (individuals and organizations) since 2000, some of whom have leased water annually from the city since at least 1991.

Another related revenue component is Northern Water's Regional Pool program. With this program any CBT water that is not leased or otherwise goes unused by the city may be auctioned off annually by Northern Water to other water users within the Northern District. The city receives any funds generated from its water sold in this auction, less an administrative fee. The first year of Northern's implementation of the regional pool program was 2010. Since that time, Northern has auctioned off 76,000 acre feet of water and Utilities has received roughly \$300,000 in payments for its pro rata share in the auctions.

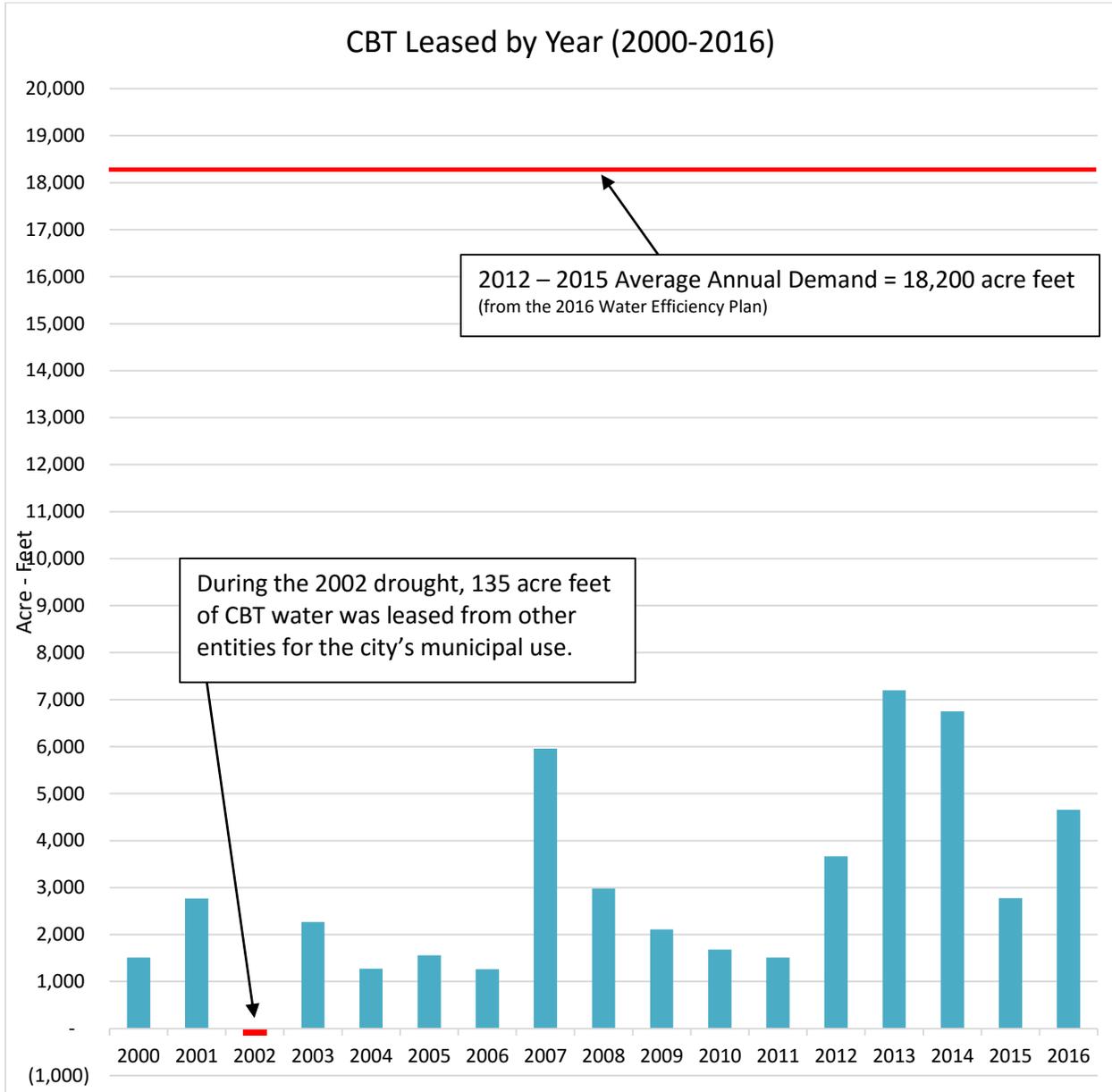
NEXT STEPS:

The city's current water supply approach, including the agricultural leasing program is largely defined by the Boulder Revised Code, Boulder Valley Comprehensive Plan, and adopted master plans. If the WRAB was interested in pursuing substantive changes to the leasing program or the city's water supply approach, it would likely require City Council direction to add this to their annual work program. WRAB will have the opportunity to discuss recommendations regarding the City Council work program priorities at its annual retreat on Dec. 10.

⁴ Water decreed for augmentation purposes may be used to replace water that was diverted from a creek or pumped from a well at a time when the water right for those diversions was not in priority.

⁵ For comparison, one acre-foot of treated water at the city's Block 1 rate (\$2.76 per 1,000 gallons) would cost \$899.

Attachment 1 – Annual CBT Water Leases





**CITY OF BOULDER
WATER RESOURCES ADVISORY BOARD
INFORMATION PACKET MEMORANDUM**

To: Water Resources Advisory Board

From: Jeff Arthur, Director of Public Works for Utilities
Edward Stafford, Development Review Manager - Public Works
Jessica Stevens, Floodplain and Wetland Administrator

Date: November 21, 2016

Subject: **Information Item: Community Rating System Update**

EXECUTIVE SUMMARY:

The National Flood Insurance Program (NFIP) Community Rating System (CRS) recognizes communities that exceed the minimum requirements for participation in the NFIP. Points are awarded for activities which educate the public on the risks of flooding, map and regulate development in areas of flooding, reduce the risk of damage due to flooding and demonstrate a preparedness to respond to flood events.

Property owners in a participating community are eligible for flood insurance premium reductions based on the number of points awarded to their community. Participating communities are rated on a class scale with a Class 10 community receiving no discount on insurance premiums and a Class 1 community receiving up to a 45 percent discount for premiums on properties located in the Special Flood Hazard Area (SFHA) or one hundred-year floodplain.

The CRS manual was updated in 2013 to include more stringent documentation requirements. Public Works staff completed the City of Boulder's first CRS cycle verification under the new manual on October 27, 2015 and have recently received the results from the Federal Emergency Management Agency (FEMA). The city was awarded a total of 2,687 points, maintaining a Class 5 rating. A Class 5 rating provides a flood insurance premium discount of 25 percent to properties within the floodplain.

ANALYSIS:

In 2015 WRAB asked staff to consider how a lower rating could be achieved for the city. Staff, with the assistance of a consultant, reviewed the criteria for achieving a Class 4 rating. For a community to become Class 4 a minimum of 3,000 points are required, along with meeting the following prerequisites;

1. Meet the Class 6 prerequisites. Boulder is a currently a Class 5 CRS community. *This criterion has been met.*

2. Maintain a Building Code Effectiveness Grading Schedule Classification (BCEGS) of 4/4 or better. Boulder received a 3/3 BCEGS Classification in 2015. *This criterion has been met.*
3. In order to demonstrate that appropriate steps have been taken to eliminate or minimize future flood losses, the city must receive credit for the following CRS Activities:
 - a. Activity 430 – Higher Regulatory Standards. Boulder must show that it enforces higher regulatory standards to manage new development in the floodplain.
 - i. Receive a minimum of 100 points for Freeboard. Boulder received 168.75 points in 2015. *This criterion has been met.*
 - ii. Receive a minimum of 700 points for the remaining sections of Activity 430 - Higher Regulatory Standards and sections a, e, and f under Activity 420 - Open Space Preservation. Boulder received 199 points for the remaining sections in Activity 430 in 2015.

Activity 420 - Open Space Preservation

 - a. Open Space Preserved. Boulder received 348 points in 2015.
 - e. Open Space Incentives. Boulder did not apply for credit in 2015.
 - f. Low Density Zone. Boulder did not apply for credit in 2015.Boulder received a total of 547 points for these activities in 2015. An additional 153 points must be obtained. *This criterion has not been met.*
 - b. Activity 450 – Stormwater Management. Boulder must receive the following credits for its watershed management plans.
 - i. A minimum of 90 points for the Watershed Master Plan. Boulder did submit the South Boulder Creek Flood Mitigation Study for review in 2015, but did not receive any credit. To date no local community has obtained credit under this activity under the 2013 manual. Public Works staff participate in the CRS Committee with other local jurisdictions and continue to work toward gaining a better understanding of the minimum requirements to receive this credit. In addition, staff is working to prepare language for inclusion in future Watershed Master Plans and will provide this language to the Insurance Services Office (ISO) for review prior to our next cycle verification. *This criterion has not been met.*
 - ii. A minimum of 30 points for managing the runoff from all storms up to and including the 100-year event. Boulder did submit the South Boulder Creek Flood Mitigation Study for review in 2015, but did not receive any credit. *This criterion has not been met.*
 - iii. A minimum ratio of 0.5 for the area covered by a credited Watershed Master Plan over the area of all watersheds affecting the community. The calculated ratio for the 2015 submittal was 0.64. *This criterion has been met. However, this activity only applies if Watershed Master Plan credit is received.*
 - c. Activity 510 – Floodplain Management Planning. Boulder must adopt and implement a floodplain management plan that received a minimum of 50 percent of the maximum credit available, 191 points. The credit must include a minimum of 50 percent of the available points in each of the following planning steps.
 - Step 2 – Involve the public. Boulder received 41 of the available 120 points for the 2012 Multi Hazard Mitigation plan in 2015. However, staff believes that additional documentation in the future will demonstrate that Boulder is able to meet this requirement. *This criterion has not been met.*

- Step 5 – Asses the problem. Boulder received 47 of the available 52 points for the 2012 Multi Hazard Mitigation plan in 2015. *This criterion has been met.*
- Step 8 – Draft an action plan. Boulder received 50 of the available 60 points for the 2012 Multi Hazard Mitigation plan in 2015. *This criterion has been met.*

Boulder received a total of 233 points for the Floodplain Management Planning activity in 2015. *This criterion has been met. However, this activity only applies if 50 percent of the available points are received for Step 2 – Involve the public.*

4. To demonstrate that Boulder is protecting natural floodplain functions, the city must receive a minimum of 100 points from one or more of the following elements:
 - a. Activity 420 - Natural Functions Open Space. Section 9-3-9 of the Boulder Revised Code, 1981 - Stream, Wetland, & Water Body Protection was submitted in 2015, but did not receive any credit.
 - b. Activity 420 - Natural Shoreline Protection. Boulder did not apply for credit in 2015.
 - c. Activity 430 – Prohibition of Fill. Boulder did not apply for credit in 2015.
 - d. Activity 440 - Mapped Natural Floodplain Function Areas. Boulder received 14 points, the maximum credit points available for this element in 2015.
 - e. Activity 450 - Stormwater Management Regulations Design Storm. Boulder received 200.7 points in 2015.
 - f. Activity 450 - Stormwater Management Regulations Low Impact Development. Boulder did not apply for credit in 2015.
 - g. Activity 450 - Watershed Management Plan. Boulder submitted the South Boulder Creek Flood Mitigation Study for review in 2015. No credit was received because the Plan did not address future conditions hydrology and focused on solutions to existing flood issues along the creek.
 - h. Activity 450 – Erosion and Sediment Control. Boulder received the uniform minimum credit available for all Colorado communities of 10 points in 2015.
 - i. Activity 450 – Water Quality. Boulder received 20 points in 2015.
 - j. Activity 510 – Natural Floodplain Functions Plan. Boulder did not request credit for this element in 2015.

Boulder received a total of 245 points. *This criterion has been met.*

5. To document additional life safety measures, Boulder must receive credit for the following measures:
 - a. Activity 610 - Flood Warning and Response. Boulder received 222 points in 2015. *This criterion has been met.*
 - b. Activity 620 – Levees. Have a map of all levees and all areas protected by levees, and an inventory of buildings and critical facilities that would be flooded if the levees were overtopped. The National Flood Hazard Layer shows that Boulder has 7 levees. An inventory of all the buildings and critical facilities affected if a levee overtopped would also be necessary. Boulder did not apply for credit in 2015. ***This criterion has not been met.***
 - c. Activity 630 – Dams. Have a description of the dam failure threat, including a map of all areas that would be flooded by the failure of each high-hazard-potential dam that affects the community, and an inventory of the buildings and critical facilities that would be flooded. The High Hazard Dam descriptions and inundation maps for Gross and Barker dams were submitted in 2015. An inventory of affected buildings was not submitted. Boulder received 45 points. ***This criterion has not been met.***

CONCLUSION:

A review of the results of the 2015 CRS cycle verification has demonstrated that the City of Boulder has the potential to achieve a class 4 rating. There are a number of possible alternatives for the obtaining the additional 313 points necessary. The greatest obstacle to an improved rating is understanding the criteria required to receive credit under Activity 450 - Watershed Master Plan. As indicated in Section 3.b.i. above, Public Works staff are working with other local jurisdictions and the ISO and hope to learn more about this activity prior to the city's next cycle verification.

NEXT STEPS:

Staff intends to pursue a Class 4 community rating by focusing on the prerequisite requirements and maximizing the credit received for the activities that the city is currently completing. Revisions to the Boulder Revised Code, 1981 may be necessary in order to obtain additional credit under Activity 430 -Higher Regulatory Standards. Public Works staff will need to contract with a consultant to prepare the inundation mapping required to receive credit under Activities 620 – Levees and 630 – Dams. Additional capital expenditures are not anticipated to be required in order to pursue a Class 4 community rating at this time.

ATTACHMENTS:

Attachment A - Community Rating System Verification Report – October 27th, 2015

November 9, 2016

Ms. Jane S. Brautigam
City Manager, City of Boulder
P.O. Box 791
Boulder, CO 80306



FEMA

Dear Ms. Brautigam:

The purpose of this letter is to provide you with the results of the National Flood Insurance Program (NFIP) Community Rating System (CRS) field verification findings based on your 3-year cycle application. I am pleased to inform you the Department of Homeland Security, Federal Emergency Management Agency (FEMA), Federal Insurance and Mitigation Administration (FIMA), has determined that your community will retain its current rating as a CRS Class 5 community in the NFIP CRS.

The floodplain management activities implemented by your community will continue to qualify flood insurance policy holders in your community for a 25 percent discount in the premium costs for NFIP policies issued or renewed in Special Flood Hazard Areas. I am enclosing the field verification report based on your 3-year cycle application for your records. This savings is a tangible result of the flood mitigation activities your community implements to protect lives and reduce property damage.

Please note that Preferred Risk Policies, applicable in Zones B, C, and X on your community's NFIP Flood Insurance Rate Map, are not eligible for the CRS discount. Standard rated flood insurance policies in Zones B, C, X, D, AR, and A99 are limited to a CRS discount of 10 percent in CRS Class 1–6 communities and 5 percent in CRS Class 7–9 communities. The rates for these zones already reflect significant premium reductions.

If your community remains in compliance with NFIP floodplain management regulations actions, the CRS rating for your community will automatically be renewed annually and a notification letter will not be sent to your community. This renewal will occur as long as your community continues to implement the CRS activities you certify each October. If no additional modifications or new CRS activities are added, the next verification visit for your community will be in accordance with its established 3-year cycle for Class 5 or better communities. FEMA will periodically send the *NFIP/CRS Update* newsletter and other notices to your CRS Coordinator.

I commend you on your community's actions and your determination to lead your community to be more disaster resistant. This commitment enhances public safety, protects property, preserves the natural functions of floodplains, and reduces flood insurance premiums.

If you have any questions or need additional information, please contact the FEMA Region VIII Office, CRS Coordinator, Matt Buddie, by telephone at (303) 235 - 4730.

Sincerely,

A handwritten signature in black ink that reads "William H. Lesser".

William H. Lesser
CRS Program Coordinator
Federal Insurance and Mitigation Administration

Enclosure

cc: Edward Stafford, P.E., Development Review Manager



COMMUNITY
RATING
SYSTEM

VERIFICATION
REPORT

City of Boulder, CO

Verified Class 5

NFIP Number: 080024

Cycle

Date of Verification Visit: October 27, 2015

This Verification Report is provided to explain the recommendations of Insurance Services Office, Inc. (ISO) to DHS/FEMA concerning credits under the Community Rating System (CRS) for the above named community.

A total of 2687 credit points are verified which results in a recommendation that the community remain classified as a CRS Class 5. The community has met the Class 6 prerequisite with a Building Code Effectiveness Grading Schedule (BCEGS) Classification of 3/3. The following is a summary of our findings with the total CRS credit points for each activity listed in parenthesis:

Activity 310 – Elevation Certificates: The Planning and Development Services department maintains elevation certificates for new and substantially improved buildings. Copies of elevation certificates are made available upon request. (28 points)

Activity 320 – Map Information Service: Credit is provided for furnishing inquirers with basic flood zone information from the community's latest Flood Insurance Rate Map (FIRM). Credit is also provided for the community furnishing additional FIRM information, problems not shown on the FIRM, historical flood information, and natural floodplain functions. The service is publicized annually and records are maintained. (90 points)

Activity 330 – Outreach Projects: Credit is provided for outreach projects, such as flood brochures mailed annually to all residents through the utility bill, flood information through handouts at city offices, high water markers, door hangers, flood safety booths, and targeted outreach projects that include a brochure to floodplain residents. These projects are disseminated annually. (169 points)

Activity 340 – Hazard Disclosure: Credit is provided for state and community regulations requiring disclosure of flood hazards. (25 points)

Activity 350 – Flood Protection Information: Documents relating to floodplain management are available in the reference section of the Boulder Public Library. Credit is also provided for floodplain information displayed on the community's website. (76 points)

City of Boulder, CO
NFIP #: 080024

Page 2

Activity 410 – Floodplain Mapping: Credit is provided for conducting and adopting flood studies for areas not included on the FIRMs and that exceed minimum mapping standards. Credit is also provided for a cooperating technical partnership agreement with FEMA. (284 points)

Activity 420 – Open Space Preservation: Credit is provided for preserving approximately 24 percent of the Special Flood Hazard Area (SFHA) as open space and protecting open space with deed restrictions. (372 points)

Activity 430 – Higher Regulatory Standards: Credit is provided for enforcing regulations that require development limitations, freeboard for new and substantial improvement construction, cumulative substantial improvement, protection of critical facilities, and local drainage protection. Credit is also provided for the enforcement of building codes, a Building Code Effectiveness Grading Schedule (BCEGS) Classification of 3/3, other higher standards, state mandated regulatory standards, and regulations administration. (318 points)

Activity 440 – Flood Data Maintenance: Credit is provided for maintaining and using digitized maps in the day to day management of the floodplain. Credit is also provided for establishing and maintaining a system of benchmarks and maintaining copies of all previous FIRMs and Flood Insurance Study Reports. (170 points)

Activity 450 – Stormwater Management: The community enforces regulations for stormwater management, soil and erosion control, and water quality. (247 points)

Section 502 - Repetitive Loss Category: Based on the updates made to the NFIP Report of Repetitive Losses as of July 22, 2015, the City of Boulder has 5 repetitive loss properties and is a Category B community for CRS purposes. All requirements for a Category B community have been met. (No credit points are applicable to this section)

Activity 510 – Floodplain Management Planning: Credit is provided for the adoption and implementation of the City of Boulder Multi-Hazard Mitigation Plan Comprehensive Update, adopted on April 2, 2013. A progress report must be submitted on an annual basis. An update to the credited plan will be due by October 1, 2018. (233 points)

Activity 520 – Acquisition and Relocation: Credit is provided for acquiring 21 buildings from the community's regulatory floodplain. (63 points)

Activity 540 – Drainage System Maintenance: All of the community's drainage system is inspected regularly throughout the year and maintenance is performed as needed. Credit is also provided for listing problem sites that are inspected more frequently. The community enforces a regulation prohibiting dumping in the drainage system, and has appropriate signs posted. (345 points)

City of Boulder, CO
NFIP #: 080024

Page 3

Activity 610 – Flood Warning and Response: Credit is provided for a program that provides timely identification of impending flood threats, disseminates warnings to appropriate floodplain residents, and coordinates flood response activities. Credit is also provided for the designation as a Storm Ready Community by the National Weather Service. (222 points)

Activity 630 – Dams: Credit is provided for a State Dam Safety Program. (45 points)

Activity 710 – County Growth Adjustment: All credit in the 400 series is multiplied by the growth rate of the county to account for growth pressures. The growth rate for Boulder County, CO is 1.07.

Attached is the Community Calculations Worksheet that lists the verified credit points for the Community Rating System.

CEO Name / Address:

Jane S. Brautigam
City Manager
1777 Broadway
Boulder, Colorado 80302

CRS Coordinator Name / Address:

Edward Stafford, P.E.
Development Review Manager
1739 Broadway
Boulder, Colorado 80302
303-441-3200

Date Report Prepared: May 9, 2016

Community : Boulder, City of, CO

NFIP Number : 080024

720 COMMUNITY CREDIT CALCULATIONS (Cycle):**CALCULATION SECTION :**

Verified Activity Calculations:	Credit
c310 28	28
c320 90	90
c330 169	169
c340 25	25
c350 76	76
c360	
c370	
c410 265 x CGA 1.07 =	284
c420 348 x CGA 1.07 =	372
c430 297 x CGA 1.07 =	318
c440 159 x CGA 1.07 =	170
c450 231 x CGA 1.07 =	247
c510 233	233
c520 63	63
c530	
c540 345	345
c610 222	222
c620	
c630 45	45

Community Classification Calculation:

cT = total of above	cT = <u>2687</u>
Community Classification (from Table 110-1):	Class = <u>5</u>

CEO Name/Address:

Jane S. Brautigam
City Manager
1777 Broadway
Boulder, Colorado 80302

CRS Coordinator Name/Address:

Edward Stafford, P.E.
Development Review Manager
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Boulder, Colorado 80302
303-441-3200

Date Report Prepared: May 9, 2016