

City of Boulder Multi-Hazard Mitigation Plan 2014 Annual Review



INTRODUCTION

The National Flood Insurance Program's (NFIP) Community Rating System (CRS) is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements. Flood insurance premium rates for community members are discounted based on the community's efforts to reduce flood losses beyond the minimum requirements. The City of Boulder participates in the CRS program and currently has a community rating of 5 out of 10 (1 being the highest rating). This rating provides an annual flood insurance premium discount of approximately 25 percent for property owners. The City's rating has steadily been improving since 2010, when the rating was a seven and thus only provided for a 15 percent discount for property owners.

Participating communities must submit documentation annually to the Federal Emergency Management Agency (FEMA) for recertification by Oct. 1. One of the program elements the City of Boulder elected to participate in was the preparation of a Multi-Hazard Mitigation Plan. The plan was prepared pursuant to the requirements of the federal Disaster Mitigation Act of 2000 so that the city would be eligible for the FEMA Pre-Disaster Mitigation and Hazard Mitigation Grant Program in addition to achieving CRS credits. The original Multi-Hazard Mitigation Plan was adopted by City Council on Aug.19, 2008 and a comprehensive update was adopted by City Council on April 2, 2013 and approved by FEMA on May 24, 2013.

The full City of Boulder Multi-Hazard Mitigation Plan can be found on the city's website at: www.bouldercolorado.gov > city A-Z > M > Multi-Hazard Mitigation Plan

While the comprehensive update was prepared and adopted prior to the September 2013 flood event, many of the action items in the plan have been implemented as a response to that event, thus improving the city's and county's preparation for and response to natural hazard events in the future.

BACKGROUND

The City of Boulder Multi-Hazard Mitigation Plan has three goals:

1. Increase community awareness of Boulder's vulnerability to natural hazards.
2. Reduce vulnerability of people, property and the environment to natural hazards.
3. Increase interagency capabilities and coordination to reduce the impacts of natural hazards.

To meet identified goals, the plan recommends 33 mitigation actions. The actions include:

- Twelve multi-hazard actions
- Twelve flood actions
- One human health actions
- Six wildfire actions
- Two drought action

The full plan includes a description of each action, identification of alternatives if applicable, the responsible office, the priority, a cost estimate, estimated benefits, potential funding sources and schedule.

EVALUATION OF PLAN ACTIONS

Each of the 33 actions was reviewed by the responsible office. The review includes a statement on how much has been accomplished, when the action is scheduled to be addressed, or if modifications to the action are recommended. The following presents the annual review by action item.

Multi-Hazard Actions

Action #1: Outreach Efforts Associated with BoCo911Alert.com

Now that many families had stopped using telephone land lines efforts need to be made to insure that emergency notifications can be sent to people potentially impacted by emergency situations. Public safety agencies throughout Boulder County are switching to a new emergency notification system which is accessible at BoCO911Alert.com. This system will allow residents of the county and all cities within the county to be notified of an emergency situation in a variety of ways, including on their cell phone, home and work phones and by text messaging and e-mail. This project would include outreach efforts to raise awareness about BoCO911Alert.com to increase the number of subscribers.

Reviewer / Responsible Office: Boulder Office of Emergency Management (“OEM”)

This action is ongoing. The Boulder OEM website has been updated to include BOCO911Alert.com as a link to allow for community sign up. Media releases throughout 2014 included not only the current topic but also included the BOCO911 sign up message. Three community meetings related to flooding in the City of Boulder were held with the BOCO911.Alert message in the agenda. Social media is also being used to push the BOCO911.Alert message.

Action # 2. Develop Updated City Continuity of Operations and Emergency Evacuation Plans

The city has outdated or incomplete plans for staff evacuation and continuity of operations following a disaster. These plans need to be updated / developed to ensure adequate safety and services.

Reviewer / Responsible Office: CMO/Department Heads

Evacuation information for every city facility was posted on the employee intraweb in 2014. Evacuation maps will continue to be posted in all city facilities within the floodplain. Full updates to the City Continuity of Operations Plan (COOP) and Emergency evacuation plans will

be completed in 2015. The September 2013 flood was a real application of these plans, and the lessons learned will be applied and plans revised and updated. Flood recovery staff will assist in coordinating these updates in conjunction with a multi-departmental staff team.

Action #3. Preplan prime evacuation points/shelter locations for emergency situations (fire, flood, snow, etc.)

The city and county have developed systems to alert the public when there is an emergency or disaster. These mass notification systems are effective tools to use when evacuating the public out of harm's way. Currently there is not a plan or infrastructure to identify locations or facilities as pre-designated evacuation sites. There is a shelter plan and this is managed by ESF 8 Mass Care and Red Cross. Shelters take 2-3 hours to establish and evacuation sites or locations are to be the intermediary locations for the public to gather safely and obtain information with little assistance provided except for immediate life threatening and safety issues. This project would entail preplanning prime evacuation points/shelter locations for emergency situations (fire, flood, snow, etc.).

Reviewer / Responsible Office: Boulder OEM

- Boulder OEM has worked with the Red Cross to verify shelter locations and Americans with Disabilities Act compliance.
- ESF 6- Mass Care has performed an After Action Report from flood disaster and is making improvements.
- ESF 6- Mass Care created EOC summary sheet describing the roles, responsibilities and operational concepts of operations.
- Operational Planning has emergency notification polygons with evacuation points identified. Having polygons predetermined makes it is easier to launch messages and also know size of evacuation for shelter capacity and location of the shelter.
- 3 access and functional needs shelters in the County exist right now. North Boulder Rec is currently in the inventory and East Boulder Rec is becoming an access functional needs site and should be completed in 2015.
- BCARES deploys to all shelter sites for communications between the EOC and shelter

Action #4. Prepare pre-disaster forms to facilitate public infrastructure mitigation through the FEMA public assistance program during post-disaster recovery

Following a disaster there is a 60 day filing time to complete project sheets to qualify for funding under the Public Assistance (PA) program within a Stafford Act (Presidential Disaster) Declaration. Having the critical infrastructure project sheets completed in advance and updated yearly ensures that the City of Boulder will qualify to the maximum benefit under a disaster declaration within reimbursement cost share guidelines. In addition, if mitigation projects are included in the assessment and written into the project sheets it will increase opportunities to apply mitigation projects into the recovery process. This project would entail assembling, in a pre-disaster environment, data for PA forms for infrastructure that would be expected to be impacted by; flood, fire, or technological hazards.

Reviewer / Responsible Office: Boulder OEM

Emergency Management meeting with City officials was held on August 18, 2014. The scope of meeting was to define future projects that specifically will impact this objective. The first phase of project worksheets is to identify the damages. The city needs to complete a damage assessment plan and recover plan to execute the above objective. Recommendations from the August 18 meeting are as follows: review and update existing facility or Department Emergency Plans and Continuity of Operations Plans, adopt the City's Emergency Operation Plan, meet with OEM to review existing recovery, debris management and damage assessment plans.

Action #5. Recovery Plan Development

Currently there is not a recovery plan for the City and County of Boulder. The process is currently under way and integrating the efforts of the (UASI) Wide Area Recovery Plan and the State of Colorado Recovery Plan. Recovery planning is important because mitigation projects and efforts post disaster are coordinated through the recovery coordination group.

Reviewer / Responsible Office: Boulder OEM

A Recovery Plan and a Damage Assessment Plan has been completed by Boulder OEM but have not yet been adopted. A damage assessment and recovery group was established during the 2013 flood. Damage Assessment After Action Reports have been completed and the plan is revised and under first draft approval.

Action #6. Become a StormReady Designated Community

The National Weather Service provides a StormReady assessment for local communities that develop their severe weather monitoring capability, public warning systems, and rain / stream gauge monitoring systems. If a community obtains this rating they can receive credits under the Community Rating System which could potentially lower the cost of flood insurance for residents. Boulder OEM has been working with the NWS to prepare and submit this application in 2012.

Reviewer / Responsible Office: Boulder OEM

The City of Boulder and Boulder County were designated as storm ready in 2013.

Action #7. Increase web-based public outreach

Increased public awareness of hazards in the city and county is a goal of this plan and an ongoing activity of the city and County of Boulder Office of Emergency Management. This project would continue and supplement existing outreach efforts with additional web-based information on hazards and personal preparedness measures.

Reviewer / Responsible Office: Boulder OEM/Public Works

In the spring of 2014, the city launched an eight-week campaign to increase public awareness of flood safety and personal preparedness measures. The campaign was paired with online advertising, social media posts and an integrated web presence.

The ads and messages pointed users to Boulder's Community Guide to Flood Safety, a comprehensive guide on how to prepare before, during and after a flood. Based on campaign metrics, a total of 311,184 Boulder County residents saw some iteration of the web-based public outreach.

Action #8. Enhance Outdoor Emergency Warning System - add sirens to NW, East & SE areas of the City

There are 11 outdoor warning sirens operating in the City of Boulder currently. The sirens should be evaluated for all risk placement to ensure coverage serves the identified hazard message capability of the system. For example the sirens in sector 5 may need to be moved further west to increase coverage capability. The movement may require additional sirens towards the core of the city in the Northern corridor. In addition, to cover the entire city in outdoor warning sirens it possibly could require 6 additional sirens.

Reviewer / Responsible Office: Boulder OEM

A siren inventory has been verified to determine coverage gaps and determined approximate 6 locations where sirens should be installed; 3 sirens west of Broadway (one west of Lee Hill and Broadway, one west of Linden and Broadway, and one in the vicinity of BCH); the neighborhood SE of Baseline and Foothills (near the East Boulder Rec Center or Manhattan Middle School) ; the area around 55th and Valmont; and also the City properties in Gunbarrel, as there are no nearby sirens in that area at all. Sirens are intended for outdoor warning, so they don't necessarily need to be placed only in neighborhoods, but also anywhere the active Boulder citizens play outdoors. The cost estimate is \$45,000 dollars per siren.

Action #9. Implement Replacement Planting Program to Meet Tree Criteria

Target a 2:1 replacement ratio for the planting program and target species diversity such that no tree species comprises more than 10 percent of the current population (consistent with City of Boulder Environmental Management Audit 2001).

Reviewer / Responsible Office: City Parks and Recreation

The current annual Parks and Recreation Forestry tree planting budget is \$18,500. This budget allows approximately 100 trees to be planted per year. To achieve a 2:1 planting to removal ratio based upon pre-emerald ash borer losses, the budget would need to be approximately doubled. Planting to removal ratio for the past five years has ranged from 1:2 to 1.5:1. In 2010 thru 2014, the city Urban Forestry has achieved a minimum of a 2:1 planting ratio using funding from the Tree Mitigation program. Urban Forestry receives reimbursement for trees removed or destroyed per B.R.C, 6-6-7. This funding source is variable from year to year however and therefore not stable.

Additional tree loss will occur however over the next decade due to the emerald ash borer (EAB). EAB was discovered within the city of Boulder in September, 2013. Ash comprises at least 15% of the urban tree canopy and it is estimated the city of Boulder has over 90,000 ash trees.

Action #10. Increase Urban Forest Canopy from 7 Percent to 9 Percent in Commercial Areas and from 31 Percent to 35 Percent in Residential Areas to Provide Maximum Flood Reduction Benefit

Extensive research conducted worldwide provides evidence that stream degradation occurs with as little as 10 percent impervious cover. During storms, accumulated pollutants are quickly washed off and rapidly delivered to aquatic systems as stormwater runoff. In a typical small-scale storm event (0.5 inch), highly concentrated and polluted stormwater would, without interference, flow directly into Boulder’s waterways. These small storms are responsible for most pollutant washout, also known as the “first flush” effect. Urban stormwater runoff is the second most common source of water pollution for lakes and estuaries and the third most common source for rivers nationwide. (From Calculating the Value of Boulder’s Urban Forest, October 2002, Chapter 1, page 2)

Trees in urban areas can protect water quality by substantially reducing the amount of runoff from the more frequent but less extreme storm events that are responsible for most annual pollutant runoff. Infiltrating and treating stormwater runoff on site can reduce runoff and pollutant loads by 20 to 60 percent. Trees’ extensive fibrous root systems also hold soil in place, reducing further impacts on water quality due to erosion. (From Calculating the Value of Boulder’s Urban Forest, October 2002, Chapter 1, page 4)

Reviewer / Responsible Office: City Parks and Recreation

The numbers stated in the action item were extrapolated from a series of plots within the city. The city teamed up with the City of Denver on the 2013 USFS Metro Denver Urban Forest Assessment report. For this report, the USFS estimated the total urban tree canopy in Boulder at 27.4%. The raw GIS data will be analyzed once it is received from the researchers to determine if it is possible to determine the urban tree canopy per zoning district.

The Forestry Division received additional funding starting in 2009 for tree planting and maintenance in the commercial areas. Forestry planted 208 trees in the Business Improvement District since spring 2008 (23 trees in 2008, 19 trees in 2009, 33 trees in 2010, 25 trees in 2011, 24 trees in 2012, 21 trees in 2013 and 63 trees in 2014).

Ash comprises at least 15% of the urban tree canopy and it is estimated the city of Boulder has over 90,000 ash trees. In September 2013, City of Boulder Parks and Recreation Forestry staff discovered an emerald ash borer (EAB) infestation within the city. The subsequent delimitation survey showed EAB is well established within a corridor in central Boulder. Over the next decade, EAB management, including tree removal, tree replacement, wood disposal and pesticide treatments will have a significant direct budgetary impact to the City of Boulder and

private residents. The loss of urban tree canopy will have considerable economic, social, and environmental impacts for decades.

Forestry staff has developed a city 2014 EAB Workplan to respond to the infestation within the city and potentially slow the spread throughout Boulder and to nearby communities. An EAB city interdepartmental working group has been formed and will meet over the next several months to identify the key issues and recommendations for long term EAB management. Recommendations will be presented to City Council in a study Session in 2015.

Action #11. Implement a System of Automatic Vehicle Location for Police, Fire, Snow Removal Vehicles

City snow removal vehicles now have GPS vehicle locators; however, this information is not shared with police, fire, and other agencies. Police and fire vehicles, if equipped with automatic vehicle location (AVL), will enable better tracking and dispatching of resources. Tracking of resources during flood warnings will enable police, fire, and snow vehicles potentially at risk to flooding to be mobilized. During a major flood event on Boulder Creek, the city will be cut in two. The AVL system will help the tracking and dispatching of resources on the north and south sides of Boulder Creek. Sharing of snow removal vehicle movement during winter storms and blizzards will assist fire and police personnel with emergency response access and evacuation needs.

Reviewer / Responsible Office: Boulder Office of Emergency Management (“OEM”)

An AVL has been installed in city law and fire resources vehicles and in city snow removal vehicles.

Action #12. Increase Rotational Pruning of Street Trees to Eight Years

The current pruning rotation of ten years places undue stress on the urban forest. Improving the pruning rotation from 10 years to 8 years will improve structure, reduce sight clearance problems, remove deadwood, mechanically remove insect/disease problems, and most importantly, reduce potential liability. An eight-year pruning rotation would make trees stronger and more resistant to storm, freeze, and snow damage, thus reducing post-storm cleanup costs and liability exposure.

Note that Boulder’s urban forest, when maintained in a healthy condition, returns benefits of \$56 per tree or \$2 million annually. Furthermore, for every \$1 spent on tree care, Boulder receives \$3.64 in benefits (E.G. McPherson, et al. September 2005).

Reviewer / Responsible Office: City Parks and Recreation

The current city pruning rotation is 10 years for trees in the public street rights-of-way and 8 years for city park trees. An additional \$30,000 was allocated to the Parks and Recreation Forestry Division in 2014 and on-going to ensure the current pruning rotation can be maintained given additional public trees added through development projects over the past eight years.

Flood Mitigation Actions

Action #13. Enhance Flood Warning System on Smaller Tributaries

There are 14 tributaries to Boulder Creek that flow through the City of Boulder. The city has an extensive network of rain and stream gages that provide real-time data for Boulder Creek and South Boulder Creek. The city also has cameras showing stream conditions on Boulder Creek and Fourmile Creek. The city is 'blind', however, on most of the smaller tributaries. Storm flows in these tributaries peak too quickly to make installation of stream gages effective. Installation of cameras, however, would greatly enhance the city's knowledge of flood conditions along the smaller tributaries. Installation of additional rain gages located within the city's smaller tributary watersheds would also provide reliable real-time information that could be accessed by the Urban Drainage and Flood Control's ALERT network.

Reviewer / Responsible Office: Public Works

The city installed a camera along Bear Canyon Creek in spring of 2013. The city will continue to evaluate the need and location options for additional cameras such as along Fourmile Canyon Creek.

Action #14. Relocate Fire Station out of 100-year Floodplain

As noted in the City of Boulder's 2011 Operations and Management Assessment, Fire Station #3 at Arapahoe and 30th Street is currently located in the 100-year floodplain. The city's 2012 Fire Master Plan also recommends that a new station include administrative staff space and records storage. This project would entail relocation of the station to a location outside of the 100 and 500 year floodplains.

Reviewer / Responsible Office: Public Works

In August 2013, the critical facilities ordinance was approved by City Council which identified requirements for critical city facilities in the 500-year floodplain, which a fire station would be subject to.

The Fire Department along with Information Resources has mapped out response times of existing stations with current and expected growth in the city to identify optimal station locations. Per City Council's request, the Fire Department is also looking at smaller fire response vehicles which will affect station sizing. FAM will conduct a space study for sizing a new Fire Station 3 and it is anticipated that this study will be completed in Spring 2015. The goal is to identify the cost of a new station in preparation for a possible 2016 bond to go to the citizens of Boulder.

Action #15. Flood Hazard Prioritization

The city prepares flood mitigation studies for creek systems. The flood master plans prioritize flood mitigation among each creek system. The city, however, has not conducted an evaluation to prioritize flood mitigation efforts city wide.

Reviewer / Responsible Office: Public Works

No action has been taken to date. However, funding for this study is scheduled for 2017.

Action #16. Update the Comprehensive Flood and Stormwater Master Plan (CFS)

The city prepared a Comprehensive Flood and Stormwater Master Plan (CFS) in 2004. The plan provides a framework for evaluating, developing, and implementing programs and activities related to the city's flood management, stormwater quality and stormwater drainage problems. The plan is nearly eight years old and requires updating.

Reviewer / Responsible Office: Public Works

No action has been taken to date. However, funding for this study is scheduled for 2016.

Action #17. Update Flood Preparedness Web Mapping Site

The Flood Preparedness website is a primary tool for city flood preparedness. The site brings together a large amount of city GIS data with real time USGS/UDFCD rain and stream gages along with NWS radar info. ESRI, the GIS software company, will sunset the WebADF API in future releases of software; meaning the Flood Preparedness site will not work in 10.1 (released July '12). The city is holding off upgrading to 10.1 until all issues have been explored. The plan is to upgrade to a Javascript or Silverlight application. Once the flood site has been upgraded, consider adding All-Hazards functionality depending on how useful it would be to other departments.

Reviewer / Responsible Office: Public Works

The city is holding off upgrading the flood preparedness website to 10.1 until all issues have been explored. Other platforms will be evaluated during the analysis in 2015. It is anticipated that this will be completed in Fiscal year 2015.

Action #18. Develop Flood Mitigation Plans After Flood Mapping Updates

Develop major drainageway Phase A flood mitigation plans following floodplain mapping updates.

Reviewer / Responsible Office: Public Works

Floodplain mitigation studies have been developed for Fourmile Canyon Creek and Wonderland Creek. A floodplain mitigation plan is currently being developed for South Boulder Creek and Gregory Canyon Creek. A floodplain mitigation study is being initiated for Bear Canyon Creek. A watershed master plan is being initiated by the UDFCD for Boulder Creek

Action #19. Implement Mitigation Plan for Fourmile Creek and Wonderland Creek

Fourmile Canyon Creek and Wonderland Creek exhibits a significant flood risk to a number of residential neighborhoods in Boulder. The existing system is undersized along most reaches of both creeks. Fourmile Canyon Creek spills to Wonderland Creek during storms greater than the 50-year event, increasing the flood risk along Wonderland Creek during major events. In addition, approximately 20 percent of the Fourmile Burn area that occurred in 2010 is tributary to Fourmile Canyon Creek. The burn area will increase the flood risk along Fourmile Canyon Creek for up to the next 10 years. The Fourmile Canyon and Wonderland Creek Flood Mitigation Final Plan presents background information and recommended flood mitigation measures.

Reviewer / Responsible Office: Public Works

A Community and Environmental Assessment Process (CEAP) application was prepared and accepted in March 2012 for flood improvements and multi-use path enhancements from 19th Street to Tamarack Avenue. The CEAP improvements include constructing a new underpass at 19th Street with a path connection to Tamarack Avenue. The improvements are in the preliminary design phase and a new CEAP evaluating upstream mitigation alternatives but both actions were put on hold following the September 2013 flood. A CEAP evaluating mitigation alternatives upstream from 19th Street to Broadway and possibly areas west of Broadway will be initiated late fall 2014.

Action #20. Update City's Floodplain Mapping

The city recognizes that floodplain maps need to be periodically revised to incorporate changes in development, modeling techniques, and improved topographic data as well as LOMR information. The city is trying to keep mapping at least 10 years current. The city is currently updating Boulder Creek, Skunk Creek, Kings Gulch, Bluebell Canyon Creek, Boulder Slough, Upper Goose, and Two Mile Canyon Creek. The city goal is to keep all 14 tributaries to Boulder Creek current within a 10-year timeframe. Other basins that will need future updating include: Sunshine Canyon Creek.

Updates to floodplain mapping should include the development of depth grids which can be imported and used to refine loss estimation through programs such as HAZUS-MH.

Reviewer / Responsible Office: Public Works

Boulder Creek mapping has been updated and adopted through City Council. It has been submitted to the Federal Emergency Management Agency (FEMA) for final approval.

Bear Canyon Creek, Boulder Slough, Upper Goose and Twomile Canyon Creek, Skunk Creek, Bluebell Canyon Creek and Kings Gulch mapping has been analyzed and updated by consultants to the City. The proposed mapping updates are currently going through the City approval process. Once the mapping updates are approved by City Council, then they must be submitted to FEMA for final approval and regulatory adoption.

Action #21. Acquire Properties in the High Hazard Flood Zone

Numerous structures are located in the City of Boulder's High Hazard Flood Zone where there exists the potential for risk to life and safety. In 1989, Boulder created a floodplain ordinance that prohibits new construction of structures intended for human occupancy in the high hazard zone. As part of this objective, community acquisition and removal of high hazard structures has been a key component of mitigating floodplain impacts in the city. The High Hazard Zone acquisition program has been in place for many years with funding by the flood management utility. Available funds are leveraged with matching funds from other organizations such as the Urban Drainage and Flood Control District, and purchases are made as high hazard properties become available on the market.

Reviewer / Responsible Office: Public Works

The city budgets \$500,000 a year to purchase property from willing sellers in flood prone areas. This is an on-going effort. The following properties have been acquired for the sole purpose of removing them from flood risk and not for the purpose of completing a drainageway improvement project:

- ▶ 299 Arapahoe
- ▶ 810 Marine
- ▶ 1228 17th St.
- ▶ 1800 Violet
- ▶ 1650 Alpine
- ▶ 2400 Topaz
- ▶ 2435 Topaz
- ▶ 2446 Sumac
- ▶ 2490 Topaz
- ▶ 2650-2660 13th St.
- ▶ 4018 26th St.

Action #22. Mitigate Flooding in the South Boulder Creek Floodplain

Updated floodplain mapping has identified several hundred residential structures to be subject to South Boulder Creek flooding that are located in the city and were previously not determined to be in the floodplain. These structures were developed without flood protection measures. The large residential area is primarily "built-out" and is referred to as the West Valley. West Valley flood is the result of flooding that spills the main creek along the east side of the valley and spreads to the west, exacerbated by the U.S. 36 highway that serves to redirect flows away from the main creek corridor. Floodplain mitigation would preserve the regulatory floodplain status

that existed during the development stages of the West Valley and would prevent the flood potential to structures that are not designed to accommodate flood impacts.

Reviewer / Responsible Office: Public Works

A draft South Boulder Creek Major Drainageway Plan has been completed along with a study recommendation.

The recommended alternative would provide significant flood protection within the West Valley area, including eliminating the 100-year floodplain designation that currently affects approximately 700 structures. The estimated cost of the alternative is approximately \$46 million, but the project could be constructed in three phases. Construction of the project would require numerous permits, agreements with the University of Colorado and Boulder Valley School District, disposal of Open Space and Mountain Park land and would be regulated by the State as a high hazard dam. Construction of the regional detention facility at US36 would result in significant impacts to wetlands, habitat for threatened and endangered species and other environmental and aesthetic resources. In 2014, the recommendation has been presented to the public, twice to the Water Resources Advisory Board and once to the Open Space and Mountain Parks Board of Trustees. The remaining public process includes the following items:

- A second meeting with the Open Space Board of Trustees at which a motion will be requested.
- A study session with City Council is scheduled for September 30, 2014.
- Additional agenda items meetings with City Council will follow the study session.

These items are anticipated to be completed in 2014 or early 2015. Selection of the recommended alternative or any phase of the alternative would require securing funding beyond what is currently approved in the 2014-2019 CIP.

Action #23. Develop a Critical Facilities Floodplain Ordinance

The 500-year floodplain affects approximately 20 percent of the incorporated lands in the City of Boulder. As a result, many of the community's critical facilities are located in the 500-year floodplain. There is a significant concern with the location of critical facilities given the need to ensure that these facilities are operational and accessible during a major flood event. Adoption of an ordinance that regulates new construction and improvements for critical facilities to the 500-year flood level will offer a higher level of protection for these facilities from flood losses and damage that could render them unusable during times of need. In addition to adopting flood protection standards, the critical facilities ordinance offers a mechanism to support funding opportunities to floodproof existing facilities that are subject to flood impacts. Given the vital nature of critical facilities, protection from flooding is of particular interest to the community.

Reviewer / Responsible Office: Public Works

The ordinance was approved on October 1, 2013 and became effective on March 1, 2014.

Action #24. Institute a Community Assisted Floodproofing Program Focusing on Critical Facilities

Evolving trends and philosophies in national and regional floodplain management have outlined alternative approaches and measures for addressing flood hazards in the future. These trends focus on the “wise use of the nation’s floodplains” and “no adverse impacts.” In an effort to allow possible development and flood mitigation flexibility that would avoid the need to implement publicly funded drainageway improvements to contain flood waters, the City of Boulder is interested in establishing opportunities to permit limited applications of floodproofing of critical facilities. City assistance under the program would involve development and adoption of local floodplain regulations to approve floodproofing applications for property owners to implement improvements to their facilities. The program would be consistent with nonstructural measures endorsed under the Comprehensive Flood and Stormwater Master Plan. This action would be focused on critical facilities in the floodplain.

Reviewer / Responsible Office: Public Works

The city is exploring resources and offering assistance with OEM to help critical facilities in completing their plans. It is intended that this will be more fully evaluated and most likely implemented in 2015.

Human Health Mitigation Actions

Action #25. Continue the City of Boulder West Nile Virus Mosquito Monitoring and Control Program

West Nile Virus is a mosquito-vectored disease first detected in the United States in 1999 in New York City, which has since spread westward across the United States. While many people who contract the virus experience very mild symptoms, infection can result in severe and sometimes fatal illnesses. In 2003, Colorado led the country in West Nile cases and deaths. Colorado experienced a significant decrease in cases in 2004 and 2005. During the 2006 mosquito season, Colorado had a resurgence of cases and ranked second only to Idaho in the national case count. Boulder and Weld Counties reported the highest number of cases (74 and 68) in Colorado. As in years past, the City of Boulder and Boulder County continued to conduct a very intensive mosquito testing program. With the widespread and frequent testing throughout the county, 107 pools of mosquitoes tested positive for the virus, which was significantly more than most other Colorado counties.

The city’s West Nile Virus Mosquito Management Plan was first adopted by City Council in 2004. Further refinements were adopted in 2006. The primary goal of the program is to reduce the risk of West Nile Virus infection while minimizing environmental impacts. The plan is directed at controlling the larval stages of vector mosquitoes and their sources. The objectives that have been used to accomplish this goal are categorizing the habitats that support mosquitoes that most effectively transmit WNV to humans; applying the larvicide (*Bacillus thuringiensis subspecies israelensis*, or *Bti*) to all sites where *Culex* species are found; using adult mosquito monitoring to provide an early warning system of the occurrence of West Nile Virus within and

near city limits; developing trigger mechanisms to respond to early larval detection and/or heightened mosquito activity to appropriately increase management activity; utilizing thresholds for initiating adult mosquito control in emergency cases; and continuing the program to educate the public about West Nile Virus and increase awareness of the city's West Nile Virus Mosquito Management Plan.

Reviewer / Responsible Office: Environmental Affairs

The management plan has been successful. The WNV risk index has not reached levels to warrant further action or response. Public education and outreach is crucial to reduce WNV risk by advising residents to drain standing water on their properties to reduce mosquito breeding habitat and to take personal protective measures to avoid mosquito bites.

Wildfire Mitigation Actions

Action #26. Structure Protection Plan

The City of Boulder communities are at risk to wildfire. A Structure Protection Plan would provide a common operating picture of the needs of protecting the communities on the west side of the city from wildfires.

Reviewer / Responsible Office: Boulder Fire

The Structure Protection Plan was completed in 2012. This plan will be updated periodically as needed.

Action #27. Construct New Wildland Fire Facility

The city's current wildland cache is in a residential unit at 1888 Violet. Due to zoning restrictions, the facility cannot be remodeled for what's needed for a wildland fire facility. In the November 2011 ballot, voters approved \$1.15 million to construct a new Wildland Fire Facility; however, the 2011 Fire Operations and Management Assessment identified a need that doubled the space requirements from today's wildland fire operations to include adding permanent staff due to year-round wildland fire hazards and new equipment. A shortfall of \$1.3 million from the bond funding is anticipated.

Reviewer / Responsible Office: FAM

An additional amount of \$1.31 million in bond funding was approved in February 2014 for the shortfall. Construction began in January 2014.

The existing wildland cache was damaged beyond repair in the Sept 2013 floods and the wildland crew has relocated temporarily into the former Eco-cycle facility, which was the former Boulder Emergency Squad building, at the city's Municipal Service Center until the new facility is completed.

A FEMA Hazard Mitigation Grant Program for a new generator for the wildland fire station will be applied for in late August 2014. The FEMA HGMP funds will cover 75 percent of the \$47,000 cost for the new generator and the state will pay for 12.5 percent with the city paying for the remaining 12.5 percent.

Action #28. Implement the City's Community Wildfire Protection Plan

Project Description/Background: The City of Boulder is listed in the National Fire Plan as a community at high risk from wildfire. In 2007, the city worked with consultants to develop a Community Wildfire Protection Plan (CWPP) to address the wildfire threats to the community. The plan meets the requirements of the federal Healthy Forests Restoration Act and outlines steps the city can take to reduce and mitigate the threats of wildfire. The CWPP could be considered a parallel document to the city's Forest Ecosystem Management Plan (FEMP) in that the CWPP addresses areas within the city boundary, and the FEMP is focused on adjacent wildlands. The CWPP outlines steps the city and private property owners can take to both mitigate the threat of wildfire and increase public safety in the event of a wildfire. The plan makes recommendations for fuels modification projects, safety zones, evacuation routes, addressing, and ingress/egress routes. Funding for the plan development came from a combination of city departments and a matching state grant.

Reviewer / Responsible Office: Boulder Fire/OSMP

Several of the recommended fuels treatments have been accomplished. The training recommendation has been addressed and is ongoing, along with the defensible space evaluations of high risk communities. The fuels treatment recommendations are ongoing and should be completed within 2 years. The other projects and recommendations are ongoing and continue to be revised.

Action #29. Implement the City's Forest Ecosystem Management Plan

The City of Boulder Open Space and Mountain Parks Department (OSMP) manages approximately 10,000 acres of forested land. Due to the land's close proximity to homes, dense forest conditions, and risks of fire ignition, the forests of Boulder fall within the high hazard category of the wildland-urban interface. In June of 1999, the City Council approved the Forest Ecosystem Management Plan (FEMP). The plan established a framework, policy guidelines, and management direction for forest ecosystem management on city lands. One of the FEMP's primary goals is to "reduce the wildfire risk to forest and human communities." Part of this objective includes forest thinning and prescriptive burning as key components in mitigating the threat of large scale wildfire. Forest treatments are to be completed on a steady basis under the plan. Funding for projects completed to date has come from the annual OSMP budget.

Reviewer / Responsible Office: OSMP

OSMP has completed over 1200 acres of forest restoration and fire mitigation work over the past 10 years. The department continues to fund an annual seasonal crew of 8 people that is solely dedicated to the implementation of the City's Forest Ecosystem Management Plan. All of the

treatments to date have been located in high hazard areas and areas that decrease the risk of wildfire to the City, surrounding homes or private property or serve as important emergency egress routes. OSMP has also secured over \$200,000 in grant funds over the past 5 years to help fund forest management and fire mitigation operations on city lands. Forest work will continue on OSMP for the foreseeable future and will continue to include mitigation efforts in areas directly adjacent to the city and in areas where heavy fuel loads pose a significant risk in the event of a wildfire.

No additional resources are necessary at this time but an ongoing budget item to support seasonal crews is necessary for the work to continue in the future. This has been a regular part of the OSMP operating budget.

Action #30. Increase Boulder Wildland Fire Hazard Mitigation Crew Funding

Since the 1990s, Boulder has maintained its own seasonal Wildland Fire Hazard Mitigation Crew through the City of Boulder Fire–Rescue Department Wildland Fire Division. Funding for the mitigation crew has historically come from Open Space and Mountain Parks and the Fire–Rescue Department. Constrained budgets are supplemented by crew assignment to fire incidents outside the local area for which the department is reimbursed by the federal, state, or local agency. While this reduces Boulder’s cost to maintain the crew, it also reduces their availability to complete needed hazard mitigation on city-owned lands. The Utilities Division proposes to contribute to the Wildland Fire Hazard Mitigation Crew funding with the objective of increasing crew size and availability to:

- Identify and plan measures to protect infrastructure and access to Utilities Division properties,
- Complete hazard mitigation projects on lands owned and managed by the Utilities Division, and
- Participate in broader community hazard mitigation projects that would reduce risks to Utilities Division lands and facilities.

Reviewer / Responsible Office: Public Works/ Boulder Fire

This year the city completed a three-year plan to upgrade six seasonal wildland firefighting positions to fulltime. Additionally, Public Works pays the Fire Department mitigation crew to perform specified wildland fire mitigation near or around Public Works facilities as needed. The need varies from year-to-year.

Action #31. Develop a Wildland Fire Mitigation Program for the Middle Boulder Creek Watershed

The city’s Barker Reservoir and Middle Boulder Creek supply approximately 35 percent of Boulder’s annual water needs. When considered in terms of both wildland fire hazard rating and structural density, the approximately 25,000-acre Middle Boulder Creek watershed contains large areas of high, very high, and extreme danger for wildland fire. As has been experienced by other Colorado Front Range water providers, a major wildland fire can render a reservoir unusable for years when ash, sediment, and debris from upstream fire-ravaged areas are washed

into streams and reservoirs following a fire. Reservoir clean-up and rehabilitation costs can be in the millions of dollars, not including loss of use of the water or lost hydroelectric power revenues.

The city proposes partnering with the Front Range Fuels Treatment Partnership (FRFTP), a coalition of federal, state, and local government agencies and private interests, to plan and implement a watershed-wide fire risk mitigation program targeted at the high and extreme risk areas within the Middle Boulder Creek basin. FRFTP exists to reduce wildland fire risks, protect communities from wildland fires, and restore fire-adapted ecosystems in the 10-county Front Range corridor. The city has successfully partnered with the FRFTP in the past in the 38,000-acre Winiger Ridge Ecosystem Restoration Project just south of the Middle Boulder Creek basin.

The city will explore recent guidelines developed by the Colorado State Forest Service for Community Wildfire Protection Planning specific to prioritizing watersheds for fuels treatment.

Reviewer / Responsible Office: Public Works

In 2012, the City began a pre- and post-fire watershed planning study. The study is being headed up by City Utilities staff in association with consultant JW Associates and involves small scale watershed hazard quantification and prioritization, establishment of watershed goals, identification of potential management projects, post fire planning and collaboration with other stakeholders. The studies are expected to be completed in the 2015 to 2016 timeframe with future management projects to follow.

Drought Mitigation Actions

Action #32. Review City Landscape Codes for Drought

The Statewide Water Supply Initiative 2010 (<http://cwcb.state.co.us/water-management/water-supply-planning/Documents/SWSI2010/SWSI2010.pdf>) published by the Colorado Water Conservation Board in January 2011, recommended the following actions be taken by municipalities for landscape water use restrictions (residential and non-residential) including:

- Targeted audits for high demand landscape customers
- Landscape transformation of some high water requirement turf to low water requirement plantings
- Irrigation efficiency improvements

This project would review the current city codes related to landscaping and water conservation and recommend suggested improvements that may increase the resiliency of the city during times of drought.

Reviewer / Responsible Office: Public Works and Comprehensive Planning & Sustainability

The city's current landscaping regulations include water conservation and xeriscape landscape standards. The city is due to update its Water Efficiency Plan in 2016 in accordance with the Colorado Water Conservation Board requirements. Additionally, the long-term water use is

currently being reviewed in the city's Water Conservation Future Study. These studies may help identify necessary changes to the landscaping regulations which would promote additional water conservation measures, including provisions related to irrigation use. Potential changes to the landscaping regulations would be evaluated by a citywide staff team and subsequently be presented for board and council consideration.

Action #33. Identify and Implement Priority Projects Identified in the City's Drought Plan

The City of Boulder is subject to drought due to its location in a semiarid climate. City Council adopted a Drought Plan in 2003 to mitigate the effects of drought on the municipal water supply. The plan applies principles of water conservation and reliability criteria for the city's raw water system. The reliability criteria specify acceptable levels of frequency and amount of reduction in water availability due to drought for the various classifications of use. Water provided by the city serves multiple purposes ranging from critical uses that require an assured supply, such as water for drinking or firefighting, to uses that can tolerate occasional restrictions, such as outdoor irrigation or car washing. The Drought Plan provides guidance for recognizing droughts that will affect water supply availability and responding to these droughts. Strategies for responding to drought include increasing the water supply (e.g., eliminate leasing programs to farmers, lease water, trade water) and decreasing water demand (e.g. voluntary restrictions, mandatory restrictions). Each option presents its own unique issues and must be considered individually and with respect to drought severity.

Reviewer / Responsible Office: Public Works

Monitoring the city's water supply and demand conditions is a continuous and ongoing process. Drought status was evaluated in accordance with the City's drought plan in the spring of both 2013 and 2014 (as it is every year). In both years, key water supply factors such as snowpack and reservoir storage levels were adequate such that no water restrictions were required. The existing drought plan is adequate for the city's needs for the foreseeable future. The update of Volume 2 of the drought plan mentioned in the 2012 MHMP has been put on hold to allow the city to focus on flood recovery in addition to other planning studies which will better inform future drought updates (e.g. climate studies, water conservation planning).

The city is due to update it's Water Efficiency Plan (formerly the Water Conservation Plan) in 2016 in accordance with Colorado Water Conservation Board requirements. The plan will include information from the planning studies mentioned above.