

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

**MEETING DATE: May 19, 2014**

<b>AGENDA TITLE:</b> Information Item – Preliminary Draft Flood Survey Summary
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<b>PRESENTERS:</b>
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Jeff Arthur, Director of Public Works for Utilities Bob Harberg, Principal Engineer - Utilities Chris Trice, Senior GIS Technician Christin Dilley, Temporary GIS Technician
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The attached preliminary draft report summarizes the results of the City of Boulder property owner survey regarding the September 2013 flood disaster.

September 2013 brought unprecedented rainfall to the region, causing significant flooding and extensive damage to both private property and public infrastructure.

In response to this event, the city decided to review its flood management program and mitigation priorities and requested assistance identifying neighborhoods and areas in Boulder that were impacted by the recent flooding. An online survey was developed and requested information about the cause, location and magnitude of flood impacts to private property owners.

**Attachments:**

**A:** Summary of City of Boulder – Flood Survey Information

**SUMMARY OF CITY OF BOULDER  
FLOOD SURVEY INFORMATION  
SEPTEMBER 2013 FLOOD DISASTER**

*Preliminary Draft 05/12/14*

The report summarizes the results of the City of Boulder property owner survey regarding the September 2013 flood disaster.

**BACKGROUND**

September 2013 brought unprecedented rainfall to the region, causing significant flooding and extensive damage to both private property and public infrastructure.

In response to this event, the city initiated a review of its flood management program and mitigation priorities and requested assistance identifying neighborhoods and areas in Boulder that were impacted by the recent flooding. An online survey (**Attachment A**) was developed and requested information about the cause, location and magnitude of flood impacts to private property owners. The survey results have not yet been evaluated for statistical significance.

A letter (**Attachment B**) was sent to a list of approximately 8,500 property owners that were determined to have likely been affected by the flood disaster based on the methodology described in **Attachment C**.

**FEMA DAMAGE REPORT DATA**

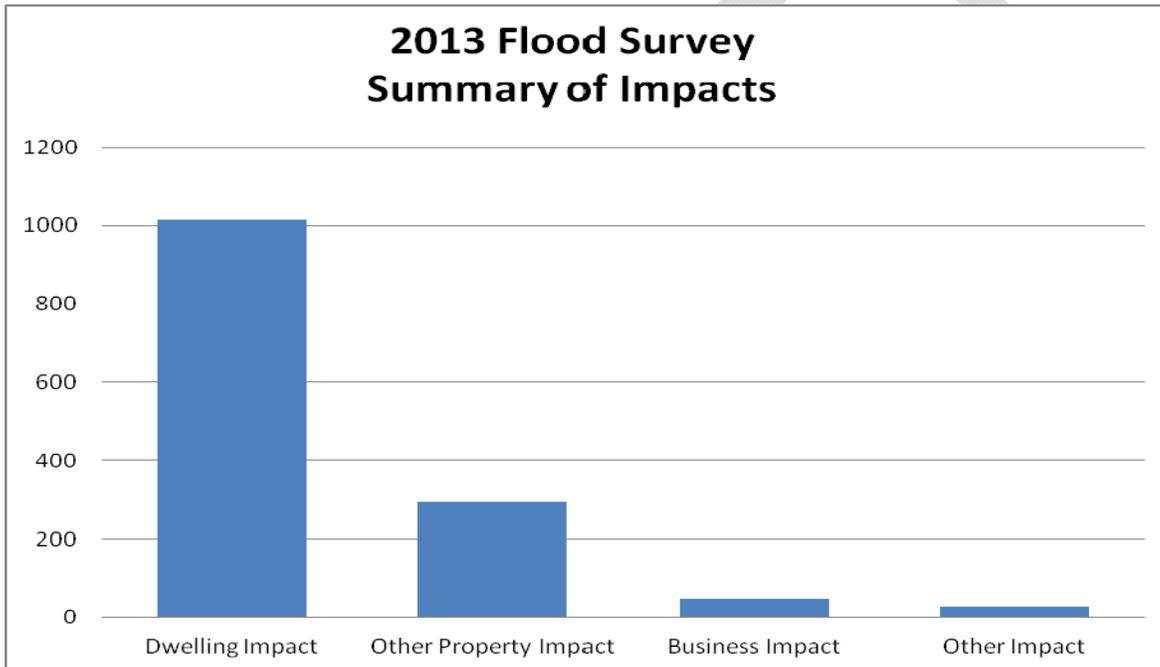
The Federal Emergency Management Agency (FEMA) has provided the city with data about private applications for assistance and associated damage claims paid. Although this data set provided information about FEMA insurance and disaster recovery payouts, it did not provide property owner out-of-pocket costs. For this reason, its usefulness for purposes of assessing flood damages was limited.

It is anticipated that FEMA will compile a more complete dataset by the end of June. This will provide for a more complete and accurate account of costs, claims and money awarded by FEMA. Therefore, the information presented below based on extrapolation of the flood survey results to the FEMA data set should be considered preliminary and subject to potential change.

## SUMMARY OF FLOOD SURVEY RESULTS

A total of 1,325 unique property owners responded to the survey. The following table and figure summarize the responses regarding whether flooding affected the property and the type of property affected:

Total Unique Responses	Flooding Impacts	Dwelling Impact	Other Property Impact	Business Impact	Other Impact
1325	1269	1015	295	46	27
<i>Percent of Total Responses</i>	96%	77%	22%	3%	2%



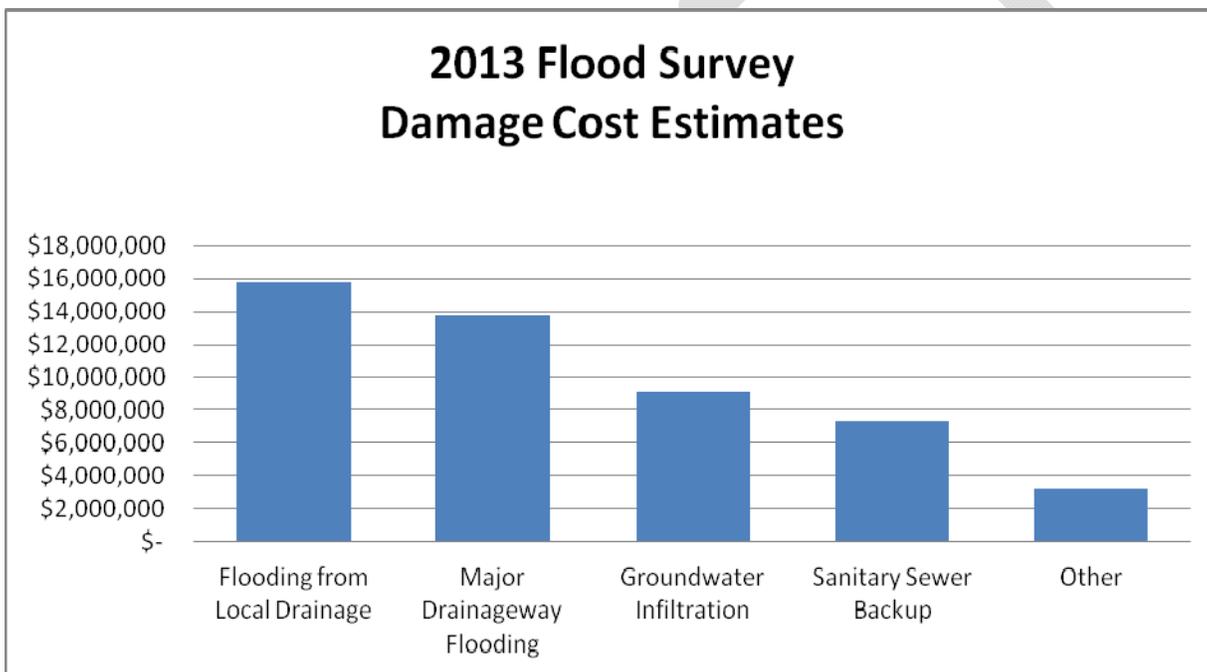
A question was asked about the cause of disaster impact and the results are summarized below. Multiple causes of damage were indicated by many respondents as summarized in the following table:

	<b>Groundwater Infiltration</b>	<b>Local Drainage Flooding</b>	<b>Sanitary Sewer Damage</b>	<b>Major Drainageway</b>	<b>Other Damage</b>
<b>Groundwater Infiltration</b>	661	250	83	51	29
<b>Local Drainage Flooding</b>	250	439	51	91	43
<b>Sanitary Sewer Damage</b>	83	51	216	27	8
<b>Major Drainageway</b>	51	91	27	157	10
<b>Other Damage</b>	29	43	8	10	127

A question was asked about the out of pocket costs to property owners due to the flood disaster. Because many respondents indicated multiple causes of damage, these responses were apportioned with equal weight given to each damage cause category. For example, it was common for people to report both groundwater infiltration and local drainageway flooding and so 50% of the total estimated out of pocket costs was assigned to each of these categories. This is but one approach to provide approximate information regarding the damage costs based on cause.

The following table and figure summarize the estimated out of pocket costs to property owners by various disaster related causes based on flood survey responses:

<b>Total Estimated Damages</b>	<b>Flooding from Local Drainage</b>	<b>Major Drainageway Flooding</b>	<b>Groundwater Infiltration</b>	<b>Sanitary Sewer Backup</b>	<b>Other</b>
\$49,000,000	\$ 16,000,000	\$ 14,000,000	\$ 9,000,000	\$7,000,000	\$ 3,000,000
<i>Percent of Total</i>	32%	28%	19%	15%	6%



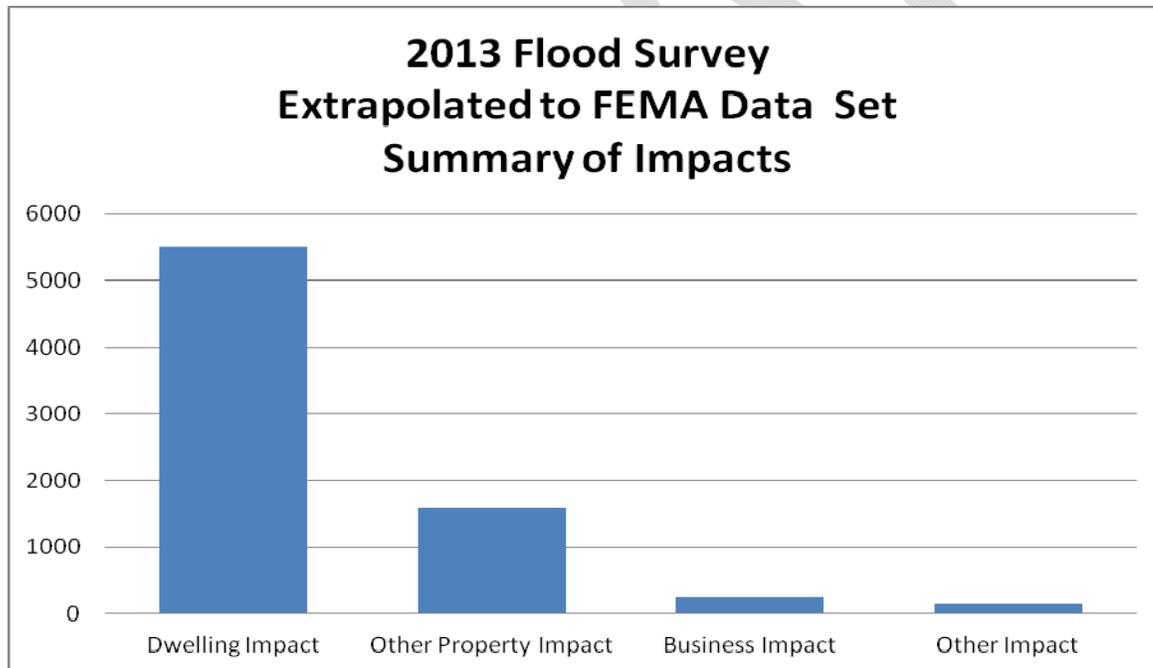
A concern with the data is that property owners may not have been able to discern whether the damage was caused by local drainage flooding or major drainageway flooding. In some cases this was obvious, but in other cases where water from a major drainageway spilled into streets and other areas this is cause for confusion.

## FLOOD SURVEY RESULTS EXTRAPOLATED TO FEMA DATA SET

The flood survey results presented above were extrapolated to the FEMA data set. The FEMA data set included responses from a total of 7,186 unique properties within the city’s jurisdictional limits. As discussed earlier, the information presented below should be considered preliminary and subject to potential change.

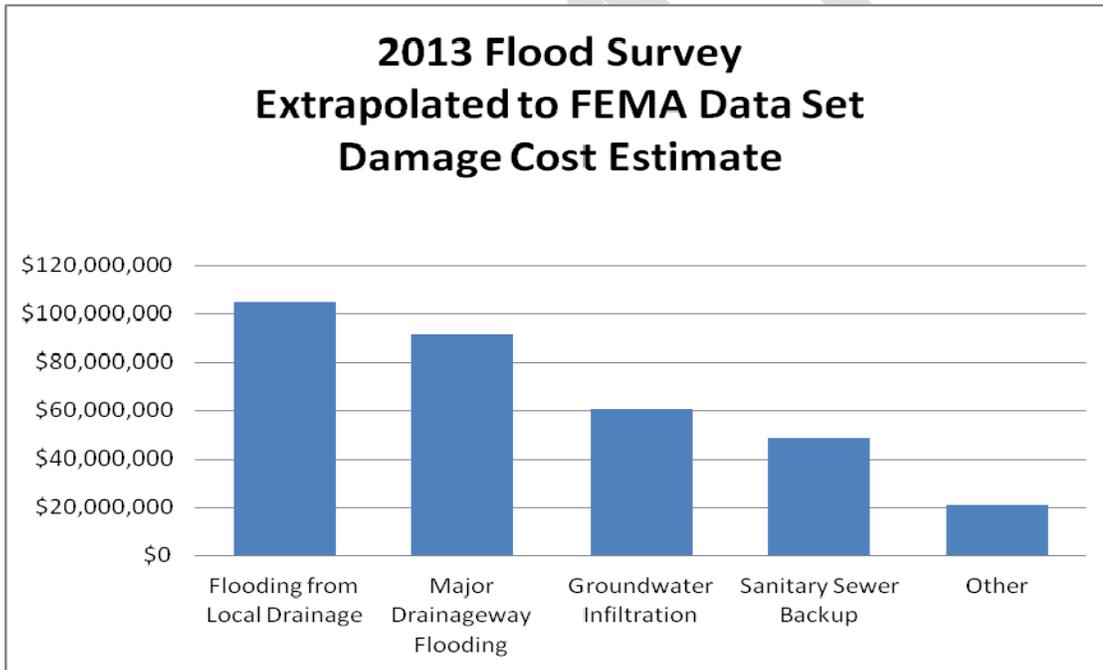
The following table and figure summarize the estimated number of properties affected by the flooding and the type of property affected based on flood survey responses extrapolated to the FEMA data set:

Total Properties	Flooding Impacts	Dwelling Impact	Other Property Impact	Business Impact	Other Impact
7186	6882	5505	1600	249	146
<i>Percent of Total Responses</i>	<i>96%</i>	<i>77%</i>	<i>22%</i>	<i>3%</i>	<i>2%</i>



The following table and figure summarize the estimated out of pocket costs to property owners affected by various disaster related causes based on flood survey responses extrapolated to the FEMA data set. As discussed earlier, the information presented below should be considered preliminary and subject to potential change.

<b>Total Estimated Damages</b>	<b>Flooding from Local Drainage</b>	<b>Major Drainageway Flooding</b>	<b>Groundwater Infiltration</b>	<b>Sanitary Sewer Backup</b>	<b>Other</b>
\$326,000,000	\$105,000,000	\$92,000,000	\$60,000,000	\$49,000,000	\$21,000,000
<i>Percent of Total Responses</i>	32%	28%	19%	15%	6%



**FLOOD SURVEY RESULTS ORGANIZED BY MAJOR DRAINAGEWAY EXTRAPOLATED TO FEMA DATA SET**

The estimated out of pocket costs to property owners from the flood survey was organized based on geographic location with respect to the documented major drainageway flood extents and extrapolated to the FEMA data set. As discussed earlier, the information presented below should be considered preliminary and subject to potential change. The following table and figure summarize this information:

Major Drainageway	Groundwater Infiltration Costs	Localized Drainage Flooding Costs	Sanitary Sewer Costs	Major Drainageway Flooding Costs	Other Costs	Estimated Total Damage Costs
<b>South Boulder Creek</b>	\$13,400,000	\$4,600,000	\$10,700,000	\$3,000,000	\$3,700,000	<b>\$45,300,000</b>
<b>Boulder Creek</b>	\$900,000	\$200,000	\$300,000	\$2,200,000	\$100,000	<b>\$3,700,000</b>
<b>Wonderland Creek</b>	\$800,000	\$400,000	\$300,000	\$1,100,000	\$100,000	<b>\$5,100,000</b>
<b>Fourmile Canyon Creek</b>	\$1,400,000	\$1,000,000	\$200,000	\$2,900,000	\$600,000	<b>\$6,000,000</b>
<b>Bear Canyon Creek</b>	\$900,000	\$800,000	\$1,700,000	\$1,000,000	\$600,000	<b>\$4,900,000</b>
<b>Goose Creek</b>	\$300,000	\$800,000	\$0	\$600,000	\$0	<b>\$1,800,000</b>
<b>Gregory Canyon Creek</b>	\$0	\$800,000	\$0	\$1,100,000	\$0	<b>\$1,900,000</b>
<b>Twomile Canyon Creek</b>	\$600,000	\$1,700,000	\$1,400,000	\$2,300,000	\$500,000	<b>\$6,500,000</b>
<b>Skunk Creek</b>	\$100,000	\$300,000	\$100,000	\$200,000	\$200,000	<b>\$800,000</b>
<b>Elmers Twomile Creek</b>	\$600,000	\$100,000	\$2,600,000	\$100,000	\$200,000	<b>\$3,600,000</b>
<b>Bluebell Creek</b>	\$100,000	\$300,000	\$0	\$400,000	\$100,000	<b>\$900,000</b>
<b>Kings Gulch</b>	\$0	\$900,000	\$400,000	\$300,000	\$200,000	<b>\$1,800,000</b>
<b>Sunshine Creek</b>	\$0	\$0	\$0	\$100,000	\$0	<b>\$100,000</b>
<b>Total</b>	<b>\$19,100,000</b>	<b>\$11,800,000</b>	<b>\$17,500,000</b>	<b>\$15,000,000</b>	<b>\$6,400,000</b>	<b>\$82,200,000</b>

**ATTACHMENTS:**

Attachment A - Online Survey

Attachment B - Letter to Property Owners

Attachment C – Flood Survey Mailing List Data Methodology

**ATTACHMENT B  
ONLINE SURVEY FORM**

**Boulder Flood Impact Survey**

**September 2013 brought unprecedented rainfall to the region, causing significant flooding and extensive damage to both private property and public infrastructure.**

In response to this event, the city is reviewing its flood management program and mitigation priorities and needs your help in identifying neighborhoods and areas in Boulder that were severely impacted by the recent flooding.

**Please fill out the short survey below.**

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Property Address or Street Block

**Is your property in a designated floodplain?**

- Yes
- No
- Don't know

**Were you affected by September flooding?**

- Yes
- No

**Did flooding impact/damage your?**

- Dwelling/House
- Property
- Business
- Other

**What was the source of your flooding?**

- Surface flooding from known creek
- Surface flooding from local area rainfall and drainage
- Groundwater seepage flooding
- Floor drain or sump pump backup

- Sanitary sewer backup or surcharge
- Other

Other source specified

### **What building floors were affected?**

- First floor or main level
- Below grade basement or garden level
- Garage or ground level

### **If you suffered flood damage, please answer the following**

How deep was the flooding you experienced?

What types of damage did you experience?

How much damage did you incur?

Do you have an estimate or value of damage incurred?

### **Were you able to recover the costs of damage?**

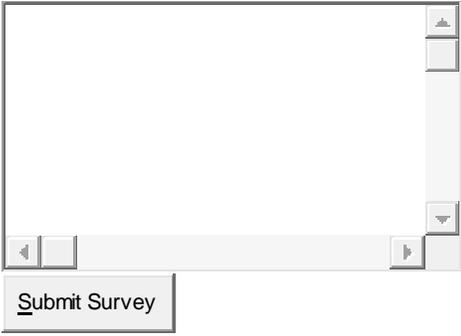
- Yes
- No
- Partial

### **How were damage costs recovered?**

- Flood insurance
- Standard homeowner's insurance
- Governmental grants
- Governmental loans
- Private loans or grants

### **Other Concerns**

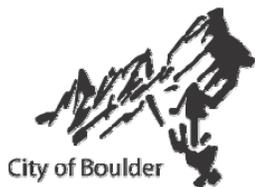
Did you observe notable flooding in other areas of the city that are a community concern?



Submit Survey

DRAFT

**ATTACHMENT B**  
**LETTER TO PROPERTY OWNERS**



Department of Public Works  
Utilities Division  
P.O. Box 791  
Boulder, CO 80306-0791

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Dear Resident or Property Owner,

September 2013 brought unprecedented rainfall to the region, causing significant flooding and extensive damage to both private property and public infrastructure.

In response to this event, the city is reviewing its flood management program and mitigation priorities and needs your help.

Over the past few months, the City of Boulder Utilities Division has been collecting flood damage information from site visits, community meetings, data provided by the Federal Emergency Management Agency (FEMA) and stories submitted via the Community Flood Assessment Map.

In an effort to learn more from the community, we're now asking for your assistance in identifying neighborhoods and areas in Boulder that were severely impacted by the recent flooding.

To do this, we've put together a short survey that is available at [www.BoulderFloodInfo.net](http://www.BoulderFloodInfo.net).

Please share your experience about the cause, location and magnitude of flood impacts to you and your property. Providing this information will help the city make the best use of limited funding and reduce the risk of future flood damages.

For more information about flood recovery, visit [www.BoulderFloodInfo.net](http://www.BoulderFloodInfo.net).

Thank you for your help.  
Sincerely,

Robert J. Harberg, P.E.  
Principal Engineer  
City of Boulder  
303-441-3266 or [harbergb@bouldercolorado.gov](mailto:harbergb@bouldercolorado.gov)

**ATTACHMENT C**  
**FLOOD SURVEY MAILING LIST**  
**DATA METHODOLOGY**

- Source Data
  - FEMA individual Assistance (IA)
  - Flood Recovery Permit (FLR) case tag properties
  - Public Works Call Log Database
  - Urban Flooding Extents
  - City of Boulder Parcel Dataset
  - City of Boulder Licensed Rental Properties
- How was the data used?
  - Latitude/Longitude information was extracted from the FEMA IA data to preserve personal information.
  - All data used for the initial selection was converted to points on the map
  - Said points were used to select City of Boulder (COB) parcel polygons. Those polygons were reselected to only include properties inside the city limits.
  - A static copy of parcel information was created and “pared” down to only include situs address, assessor account number and owner information.
  - Licensed rental properties were noted in final dataset
  - Licensed rentals with three or more dwelling units were noted in final dataset to facilitate mailing to entire complex if desired.
- How was the data changed?
  - Final parcel selection does not include COB or BOCO properties.
  - Final data does not include “dummy” accounts (e.g. account numbers 9999999, 7777777, etc.).
  - Final spreadsheet has had duplicates removed. Duplicates are defined as records with the same owner name and situs address. 79 such duplicates were removed.