

**CITY OF BOULDER**

**WATER RESOURCES ADVISORY BOARD  
AGENDA ITEM**

**MEETING DATE: April 27, 2015**

**AGENDA TITLE:** Information Item -- Preliminary Draft 2016 Utilities Budget (Water, Wastewater and Stormwater/ Flood Management) including the 6-year Capital Improvement Program (CIP).

**PRESENTERS:**

Jeff Arthur, Director of Public Works for Utilities

Ken Baird, Utilities Financial Manager

Annie Noble, Acting Principal Engineer for Flood and Greenways

Douglas Sullivan, Acting Principal Engineer for Water, Wastewater and Stormwater

**EXECUTIVE SUMMARY:**

As part of the city’s annual budget process, Utilities develops a six-year planning budget, this year for the time period of 2016 through 2021. The Water Resources Advisory Board (WRAB) role in this process is defined in the Boulder Revised Code: “. . . to review all environmental assessments and capital improvements conducted or proposed by the utilities division.” Utilities staff has formulated initial revenue and expenditure projections for each of the three utility funds through the year 2021. Within the budget process, City Council approves and appropriates funds only for the first year, 2016. In addition to the six year CIP described above, Utilities staff develops a 20-yr CIP. The purpose of the 20-yr CIP is to look at long range needs for all three utilities. The 20-yr CIP is a valuable mechanism to look at upcoming regulatory requirements, asset management needs for aging facilities, and the associated debt service for existing bonds.

This agenda item provides an opportunity for the WRAB to discuss a “preliminary draft” of the CIP. Input from WRAB will guide staff in preparation of a draft CIP for discussion by WRAB at the May meeting. WRAB will be asked to make a recommendation to City Council regarding the 2016-2021 CIP at its June meeting. The Planning Board will review the complete city CIP, including utilities, in July. City Council generally plans for two study sessions in September, prior to adopting the 2016 budget.

This packet contains preliminary draft information concerning the 2016 Utilities Budget and the draft 2016-2021 Utilities CIP. The fund financials (**Attachment A**) have been updated to reflect actual revenues and expenditures for 2014, and the revised budget for 2015. These fund financials incorporate recommended changes to the CIP. There will be other, likely less significant, changes in the operating budget after the City’s budget office distributes budget guidelines on April 20.

**Fiscal Impacts:** Last year’s budget process resulted in increased investment in Utilities infrastructure with 2015 rate increases of 5% in Water, 30% in Wastewater and 75% in

Stormwater/flood Management. Future rate increases were also identified to maintain this level of service, and for 2016 the projected rate increases were 8% in Water, 5% in Wastewater and 4% in Stormwater/Flood Management. The preliminary update to the Fund Financials and CIPs reflect that these rate increases will provide sufficient revenues, subject to the deferral of some projects, for the recommended budget.

**Public Feedback:** A public hearing and recommendation is scheduled for the June WRAB meetings. At the June meeting, staff will request that the WRAB provide a final recommendation on the proposed 2016-2021 CIP to City Council and associated rates changes.

### **BACKGROUND and ANALYSIS:**

CIP projects are any major projects requiring the expenditure of public funds (over and above operation expenditures) for the purchase, construction, or replacement of the physical assets of the community. Projects are typically over \$50,000 in total project cost, and result in a durable, long lasting asset, with a useful life of at least 15 years. Capital Improvement Program projects are divided into five categories:

- Capital Enhancement - result in the expansion or significant improvement of an existing facility or asset.
- Capital Maintenance - result in the repair, replacement, or renovation of an existing asset with a useful life of at least 5 years.
- Capital Planning Studies - result in the development of a study or plan which is intended to identify, plan, or prepare for the construction or acquisition of capital assets or capital program.
- Land Acquisition - result in the acquisition of real property, such as land, mineral or water rights, or permanent easements.
- New Facility or Infrastructure – result in the construction or acquisition of a new asset or additional square footage of an existing asset.

The city developed nine CIP Guiding Principles to create a city wide understanding of which projects are chosen to be included in the CIP and shape capital planning decisions made throughout the CIP process. The CIP Guiding Principles also ensure individual department priorities for CIP funding are aligned with city goals. The CIP Guiding Principles are included as **Attachment B**.

During the annual CIP and budget process, individual projects are identified as requiring a Community and Environmental Assessment Process (CEAP). The purpose of the CEAP is to assess potential impacts of conceptual project alternatives in order to inform the selection and refinement of a preferred alternative. The CEAP provides the opportunity to balance multiple community goals in the design of a capital project by assessing a project against the policies outlined in the Boulder Valley Comprehensive Plan (BVCP) and departmental master plans. The criteria for projects requiring a CEAP include a project that could have: significant impact on an environmental, social or cultural resource; community controversy; more than one possible alternative or a requirement of internal or external permitting. All CIP projects are reviewed by an inter-departmental staff group to determine whether a CEAP will be required.

The Utilities Division’s primary focus is to provide quality water services, as desired by the community, in a manner which emphasizes efficient management of fiscal and natural resources, and protects human and environmental health. Each of the city’s three utilities (water, wastewater and stormwater/flood management) is a separate enterprise fund established to finance and account for the acquisition, operation and maintenance of each utility’s facilities and services while maintaining designated reserves and meeting debt service requirements.

Revenues generated from monthly utility bills are the largest source of revenue for each utility, in 2014 accounting for about 66% of revenues in the Water Fund, 84% in the Wastewater Fund, and 78% in the Stormwater/Flood Management Fund. Other significant sources of funds include development fees (Plant Investment Fees), hydroelectric revenues, funding from the Urban Drainage and Flood Control District (UDFCD) and interest earnings.

Approximately fifty-five percent of the Utilities expenditures are allocated for rehabilitating and improving the capital infrastructure either through the capital improvements program (cash financed) or through annual debt payments for revenue bonds that have been issued to fund capital improvements. This percentage was forty-five percent last year before the 2015 Budget rate increases. Maintaining existing infrastructure is critical to delivering safe and reliable services to our customers. Investment into maintenance of existing infrastructure is less costly in the long run. Other significant uses of funds include water treatment operations, wastewater treatment operations, system maintenance and water quality operations.

Revenues

The revenue forecasts have been updated and incorporated into the fund financials. Forecasted revenues from Plant Investment Fees (PIFs) have been adjusted up in the Water and Wastewater Funds to reflect recent private development activity. Hydroelectric revenues have also been adjusted with the current estimates based on projected generation and energy sales.

The preliminary draft 2016 budget provided with this memorandum reflects the following billed revenue increases: 8% Water, 5% Wastewater, and 4% Stormwater/Flood Management. The following table summarizes the 2015 adopted increase and preliminary projections for 2016-2018. The preliminary 2016 increases are in bold.

Table 1 – Proposed Rate Increases

	2015	<b>2016</b>	2017	2018
Water	5%	<b>8%</b>	8%	8%
Wastewater	30%	<b>5%</b>	5%	5%
Stormwater/Flood Management	75%	<b>4%</b>	8%	8%

The revenue increase represents the amount of additional revenue to be generated from the monthly utility charges. The actual rate increase (e.g. \$ per 1,000 gallons) may or may not be equal to the revenue increase depending on whether any changes in consumption or use are factored in when calculating the actual rates. For example, if there were a projected decrease in consumption, in order to generate 8% more revenue from last year's budget, monthly rates may need to increase greater than 8% to generate the needed revenue requirements.

#### Utility Bill Comparisons

Estimated single-family residential annual bills for the City's current and proposed rates are compared with other Colorado Front Range communities. **Attachment C** shows the water bill comparison, and an 8% Water increase puts Boulder in the middle for single-family residential bills. The bill comparison for a 5% increase in the Wastewater Utility is shown in **Attachment D**, and Boulder's position compared to the other Cities remains the same. **Attachment E** shows the Stormwater/Flood annual bill and the impact of the 4% increase, which remains the highest of the group. With its numerous drainageways, topography, and proximity to the foothills, The City of Boulder has the highest flood danger for any municipality in the State of Colorado. Since 2016 rate proposals are not yet available for the other cities, the survey uses their 2015 rates.

A fourth chart, **Attachment F** shows the annual bill comparison when all three utility fees are included. Of the fifteen communities in the survey, Boulder's combined rates would be the fifth highest of the fifteen Front Range Communities surveyed.

#### Construction Cost Inflation

Construction cost inflation is tracked using the Engineering News Record (ENR) Cost Index for Denver and the Colorado Department of Transportation (CDOT) Colorado Construction Cost Index. The ENR index is a composite index based on costs for: 1) local portland cement, 2) local 2x4 lumber, 3) national structural steel, and 4) local union wages plus fringes for carpenters, bricklayers and iron workers. The CDOT index is a composite index based on costs for 1) unclassified excavation, 2) hot bituminous pavement 3) concrete pavement, 4) structural steel and 5) reinforcing steel. The ENR index is more reflective of equipment and building construction such as projects that occur at the treatment plants. The Colorado Construction Cost Index is more reflective of heavy civil construction such as roadway and major drainageway work. Based on this information and recent City bids, it is recommended that capital improvement construction costs continue at a rate of 4% during the planning period.

#### Customer Bill Impact

The proposed preliminary 2016 revenue increases (8%-5%-4%) would increase a typical residential customer's monthly utility bill by \$4.98, or an increase of \$59.88 annually. The following table provides a breakdown of the potential increases by utility.

Table 3 – Average Monthly Bill Impacts

	Monthly Bill 2015 Rates	Monthly Bill 2016 Rates	Monthly Difference
Water	\$36.59	\$39.48	\$2.89
Wastewater	\$30.23	\$31.78	\$1.55
Stormwater/ Flood Mgmt	\$13.46	\$14.00	\$0.54
<b>Total</b>	<b>\$80.28</b>	<b>\$85.26</b>	<b>\$4.98</b>

Impact of Rate Changes

The impact of a 1% increase in revenue varies substantially across the three funds:

Table 4–Rate Impact	1%	2%	3%
Water	\$235,000	\$470,000	\$705,000
Wastewater	\$185,000	\$370,000	\$555,000
Stormwater / Flood Mgmt	\$ 100,000	\$200,000	\$300,000

Also, as a point of reference for budgeting future bonds, \$100,000 provides for debt service coverage on a bond of approximately \$1,000,000. So a revenue reduction of \$100,000 could mean reduced funding for a one-time capital expense or capital bond project by \$1,000,000.

**ANTICIPATED REVENUE BONDS:**

The current 2016-2021 utility fund financials reflect several bond issuances (and associated debt payments) to fund the following capital projects:

Water:

1. Betasso Water Treatment Plant Improvements (\$24 million in 2016) to fund improvements to maintain compliance with federal Safe Drinking Water Act regulations
2. Southern Water Supply Pipeline II (Carter Lake Pipeline) and the 2018 Waterline Replacement budget (\$37.6 million in 2018)
3. Barker Dam Outlet and Boulder Reservoir Water Treatment Facility (\$10.3 million in 2020) to fund repairs to the outlet works

Wastewater:

1. Sanitary Sewer Bond (\$10 million in 2015) to fund replacement of large diameter interceptor pipe
2. WWTF Improvements (\$18.5 million in 2020) to fund phosphorus treatment to meet Regulation 85 requirements

Stormwater and Flood Management:

1. Wonderland Creek and Four Mile Canyon Creek projects (\$23 million in 2015)
2. South Boulder Creek Improvements (\$25 million in 2018) to fund improvements designed to mitigate flood hazards in the South Boulder Creek West Valley area

The following table summarizes the debt obligations of the utilities, the year the debt is retired and the average annual debt payment. Items shown in italics are projects that are anticipated to be funded by issuing bonds.

Table 5 – Debt Obligations

<b>Utility</b>	<b>Projects</b>	<b>Year Debt is Retired</b>	<b>Approximate Annual Debt Payment</b>
Water	Boulder Reservoir WTF Improvements	2016	\$858,000
	Multiple Projects including Silver Lake Pipeline, Barker Purchase	2019	\$2,522,000
	Lakewood Pipeline	2021	\$2,066,000
	<i>Betasso WTP Imp. (2016)</i>	<i>2036</i>	<i>\$1,920,000</i>
	<i>Carter Lake Pipeline and Waterline Replacement (2018)</i>	<i>2038</i>	<i>\$3,568,700</i>
	<i>Barker Dam Improvements and Boulder Reservoir WTP Imp.(2020)</i>	<i>2040</i>	<i>\$983,773</i>
Wastewater	WWTP Improvements	2025	\$3,500,000
	WWTP Improvements	2030	\$674,000
	<i>Sanitary Sewer Pipe (2015)</i>	<i>2035</i>	<i>\$800,000</i>
	<i>WWTP Improvements – Reg 85 (2020)</i>	<i>2040</i>	<i>\$1,757,500</i>
Storm/Flood	Multiple projects including Goose Creek Improvements	2018	\$385,000
	<i>Wonderland Creek and Four Mile Canyon Creek Imp. (2015)</i>	<i>2035</i>	<i>\$1,725,000</i>
	<i>South Boulder Creek Imp. (2017)</i>	<i>2037</i>	<i>\$437,000</i>
	<i>South Boulder Creek Imp. (2021)</i>	<i>2041</i>	<i>\$1,425,000</i>

***\*Projects shown in italics are proposed bonds***

The Water Utility also pays a portion of the Northern Colorado Water Conservancy District’s debt related to the Windy Gap project. This debt will be retired in 2017 and Boulder’s annual debt payment is approximately \$1,650,000.

The utility continues to maintain a high credit rating, most recently Aa1 from Moody’s and AAA from Standard and Poor’s. This is due to sound financial practices, one of the most important of which is maintaining sufficient reserves.

**CAPITAL IMPROVEMENT PROGRAM**

See **Attachment G** for the proposed 2016-2021 Water, Wastewater, and Stormwater/Flood Utility CIP’s.

## Water Utility

### Source Water Facilities:

As with any long standing water supply system, significant portions of the Source Water Infrastructure Facilities are over 50 years old and many are already over 100 years old or contain significant elements that are over 100 years old. In addition to source water facilities owned and operated by the Northern Colorado Water Conservancy District, the city owns and operates 14 source water storage dams/reservoirs along with approximately 29 miles of water supply transmission pipelines with 4 source water hydroelectric/pressure reducing facilities (and four treated water hydroelectric/pressure reducing facilities).

### Source Water Storage Facilities:

<b>Dam/Facility</b>	<b>Storage (AF*) /Length &amp; Pressure</b>	<b>Initial Construction and Repair Dates</b>
Green #1 <sup>A</sup>	175	+/- <u>1910</u>
Green #2 <sup>A</sup>	333	+/- <u>1910</u>
Green #3 <sup>A</sup>	285	+/- <u>1910</u>
Green #4	116	+/- <u>1910</u>
Green #5	74	+/- <u>1910</u>
Albion	1,111	<u>1910 - 1913</u>
Goose	1,036	<u>1908, 2000 repair</u>
Island Lake	334	<u>1900, 2010 repair</u>
Silver Lake <sup>B</sup>	3,987	<u>1887, 1907, 1927, 1956, 1966 (final raise)</u>
Lakewood	42	<u>1906, 1996 full rehabilitation</u>
Skyscraper	146	<u>1940</u>
Barker <sup>B</sup>	11,686	<u>1909, 1947 upstream repair, 1980 spillway modification,</u> <u>1985 post-tensioned anchors for stability</u>
Kossler <sup>B</sup>	120	<u>1909, 2011 downstream stability berm and toe drain repair,</u> <u>2015 upstream embankment face repairs pending</u>
Boulder Reservoir <sup>B</sup>	13,300	<u>1955</u>
Silver Lake Pipeline	3.6 miles  660 psi max.	Replaced – <u>1997-1998</u>

<b>Dam/Facility</b>	<b>Storage (AF*) /Length &amp; Pressure</b>	<b>Initial Construction and Repair Dates</b>
Lakewood Pipeline	10.8 miles  800 psi max.	Replaced – <u>1994-2004</u>
Barker Gravity Line	11.7 miles Gravity plus 90 psi max. in siphons	<u>1905-1910</u> original with assorted pipe repairs since 2001
Boulder Canyon Penstock	10,000 feet  800 psi max.	Original construction <u>1909-1910</u>
Betasso Penstock	2,900 feet  900 psi max.	<u>1964</u> ,CML added- <u>1985</u> , <u>Replaced 2010</u>
Source Water Hydroelectric Facilities	NA	(Betasso 1987, Silver Lake 1998, Lakewood 2004, Boulder Canyon 2013)

\*Acre feet

A – Restricted Storage Level by State Dam Safety Branch

B - High Hazard Dam Designation

Four of the source water storage dams are also rated as high hazard potential due to downstream loss of life in the event of a theoretical failure, which requires the facilities to meet more stringent dam safety requirements.

The city has been implementing repairs on a priority basis according to operational needs and also in general agreement with the 2009 Source Water Master Plan. Updated priorities and schedules for the projects identified in the master plan are reflected in the 2015 CIP.

The Treated Water System Includes:

- Two water treatment facilities
- Over 460 miles of distribution and transmission lines associated with over 6,500 valves, 28,000 meters, 5 water quality monitoring stations, 4,600 fire hydrants and various other venting, draining and corrosion protection devices

- Three pump/pressure reducing stations
- Six treated water storage tanks
- Four treated water hydro facilities and one pressure reducing station

Betasso Water Treatment Facility was put into service over 50 years ago with various modifications and additions over the years. Much of the original equipment is still in use. In some cases the original equipment has served the City beyond its predicted useful service life. The need to replace aging equipment and bring facilities up to current best practices for water treatment is the main driver for the 2016 plant improvement project.

Boulder Reservoir Water Treatment Facility was put into service in the early 1970's. It underwent major improvement projects over the past 15 years to bring the treatment process up to current standards. Some original equipment is still due for replacement and is the main driver for the money budgeted in 2020.

The annual distribution main replacement program has been in place for over 15 years and has focused on the 460 miles of treated water piping 12" diameter and smaller that makes up the majority of the system. Recent funding and program development has begun for the transmission mains that are 16" diameter and larger. The age the water lines mirrors growth patterns in the City with a high percentage dating from the late 50's to early 70's, some infrastructure over 100 years old still in service.

The three pump/pressure reducing stations that are critical in moving water between east and central Boulder underwent complete overhauls in 2010. The original installations date back to the construction of the Boulder Water Treatment Facility.

The six treated water storage tanks range in age from over 110 years old to 20 years old. Kohler Reservoir is due for a roof replacement in 2016 and the rest are subject to regular maintenance and inspection.

From 1986 to 1999 the four treated water hydroelectric facilities and the pressure reducing station at the mouth of Boulder Canyon were constructed. While these facilities are relatively new, the power generation equipment's useful life is closer to 20 years than 50 and is requiring more and more maintenance. Installation of new power generation equipment is proposed for the 101 Pearl pressure reducing station in the six year CIP.

#### 2014 Accomplishments

1. The city completed its FERC license exemption process in September 2014 for the Boulder Canyon Hydroelectric Project based on receipt of a US Forest Service Special Use Permit for the Barker Gravity Pipeline. The SUP was required for pipeline access road segments that cross USFS lands.
2. ROW purchasing and environmental studies continued in 2014 for the Carter Lake Pipeline Project. An agreement with the NCWCD provides for the preliminary design and ROW acquisition along the designated and permitted total alignment including those

sections in Boulder County. Final design and construction is proposed in the CIP for 2017 and 2018 respectively.

3. The annual maintenance repair program continued on the Barker Gravity Pipeline. Pipeline sections repaired in 2014 include:
  - a. An emergency repair of a 90 foot long section at risk of slope failure just upstream of Siphon No. 7 in the alignment segment closest to Barker Dam. The repair included placing rock anchors and a pipe stability concrete saddle support to rock at the undermined section along with welded steel pipe across the section where the pipe bench was at risk of sliding.
  - b. Concrete grouting of the deteriorating pipe sections in the segment from Siphon No. 7 to the Pipe Inlet at the Farmer's Gate & Measuring Weir Structure. Grouting repairs and drain pipe / valve re-setting were also completed to eliminate significant leakage from upstream of the Measuring Weir Structure to the outlet tunnel.
  - c. New Manhole Access and Drain Valve Vaults were installed on Siphon No.2 and Siphon No.3 after completing emergency repair on the Siphon No. 2 drain valve leak (i.e. new valve assembly installed).
  - d. Grouting repairs were completed from Tunnel No. 1 to Siphon No. 1 at the damaged, misaligned and deteriorated pipe sections within the segment.
4. Silver Lake Watershed Dams: In 2014 an existing access path that previously only allowed ATV and foot traffic was improved so that four-wheel-drive pickup trucks and construction equipment can access the crest of Albion Dam. The road work was done in advance of the outlet system repairs, dam rehabilitation studies and construction activities. The valve house piping assembly and valves at Goose Lake Dam were scraped down to bare metal and repainted with epoxy paint to prevent further corrosion. The solar powered instrumentation system at Silver Lake Dam was initialized and tied into the data reporting channel of the new radio transmitter system. At Green Lake No. 3, the broken actuator gearing was repaired and the stem coupling lowered to allow operation from a newly installed platform at ground level.
5. A contract for the Barker Caretaker Residence was awarded and permitting as well as agency coordination continued.
6. The Betasso Hydroelectric Relay Project was completed in 2014.
7. The access bridge to the Boulder Canyon Hydroelectric Facility was rehabilitated and is now load rated for 20 tons.
8. Preliminary design and facility assessment for the Betasso Water Treatment Facility Project and completion of several preliminary studies.
9. Replacement of over 22,000 feet of water distribution main.

10. Installation of new effluent mag meters at both water treatment facilities.
11. Hydraulic model updates that included updates to the pipe roughness coefficients, demands and inclusion of hydrant laterals.
12. Completion of flood restoration projects on treated water transmission mains.
13. Devil's Thumb tank mixing improvements.
14. Post filter flash mix improvements and MIOX scrubber removal at the Boulder Reservoir Water Treatment Facility.
15. Gunbarrel Tank painting and structural steel rehabilitation.

*Projects Anticipated for Completion in 2015*

1. Sunshine Pipeline inspection and replacement of 2,200 feet of transmission line between Sunshine Hydro and 4<sup>th</sup>/Mapleton. An access road will also be re-established along the length of the pipeline.
2. Preliminary investigation of transmission line replacement from Sunshine Hydro south to Chautauqua Reservoir.
3. Kossler Reservoir Concrete Facing Rehabilitation including re-establishment of freeboard for the PMF, spillway modification for the PMF, and repairs to the severely deteriorated concrete at the Outlet Structure
4. Barker Gravity Pipeline Repairs – ongoing repairs in order of priority and availability
5. Barker Dam Outlet Gate Test – ongoing plan to test / inspect gates as reservoir level allows
6. Albion Dam Assessment and Rehabilitation Alternatives Study – this funding will be shifted/used in 2015 for reinforcing the temporary outlet repairs that were installed by divers in 2013. This will require draining of the reservoir which will depend on water supply and catchment conditions at the end of the summer/early fall. The rehabilitation analysis study will be shifted into 2016 with construction to quickly follow as the concrete face and the overall condition of the dam is continuing to deteriorate.
7. A full inspection of the Silver Lake Dam outlet conduit and control valve systems, required by State Dam Safety regulations, is scheduled for May 2015. In coordination with water supply and seasonal run-off periods, the dam is being lowered by supplying WTP demand to allow for the full inspection.
8. Barker Caretaker Residence is to be completed in 2015
9. The Sixth Internal Inspection of the Lakewood Pipeline is to be completed with a recommendation of potential pipe serviceability taking into account the type of pipe welding flaws previously discovered and corrosion rates documented to date.
10. Refurbishment of the Silver Lake Hydroelectric Bypass Valve (by city hydro staff and technical representatives from Mokveld Valve Inc.)
11. Replacement and installation of approximately 25,000 feet of water distribution main.

Several thousand of those feet will be funded by a CDPHE grant to help flood affected properties annexing along Old Tale Road.

12. Final design and permit application for the Betasso Water Treatment Facility project.
13. Devil's Thumb Tank water quality monitoring and security improvements.
14. Integration work at the Orodell hydroelectric facility.
15. Meter and building improvements at Kohler and Maxwell hydroelectric facilities.

### Highlights of 2016-2021 Projects

1. It is recommended that the city continue its annual maintenance program of the Barker Gravity Line by prioritizing pipeline repair projects. In terms of condition assessment and importance to water supply, the gravity line is the highest priority in the source water system. The planned maintenance program for the gravity pipeline includes pipe replacement or lining in small segments over a number of years with a test section planned in 2016. Costs and installation rates for the test section will be used to update the 15 year rehabilitation/replacement plan for the Barker Gravity Pipeline starting in 2017. The 2017 to 2032 CIP costs in the present CIP Plan have been modified to reflect city staff's opinion of likely construction costs from experience to date.
2. It is recommended that capital funding be allocated in 2016 to fund the Betasso Water Treatment Facility Improvements project. The construction improvements are estimated at \$24M. This is a significant increase to last year's 6-yr CIP estimate for a \$12M bond in 2016. Last year's 20-yr CIP included major investment for future Betasso WTF projects in 2021 (\$6M) and 2026 (\$14M). This year's approach is to consolidate the numerous Betasso projects into a larger single project in 2016. The future projects would be removed from the CIP. This approach will utilize the large project economies of scale, meet the various CDPHE requirements, and also take advantage of favorable bond rates available at this time.
3. A \$2M project for the Boulder Reservoir WTF is identified in the 2020 CIP to address filter valves, a wash water recovery tank, and various site improvements. This project was originally identified in the CIP as a \$5M project that also included significant pretreatment improvements. The pretreatment improvements will not be necessary if the Carter Lake pipeline project is completed. The Carter Lake pipeline would provide a better influent water quality eliminating the need for the pretreatment facilities.
4. Funding for the final design of the Carter Lake Pipeline is identified in 2017 and construction is identified in 2018. The Carter Lake Pipeline (also referred to as the Southern Water Supply Pipeline II) would be funded by project participants, including Boulder, and constructed, operated and managed by Northern. Project costs were updated with a new construction estimate provided by the Northern in 2014 and the previously forecasted costs have increased. The pipeline is considered the best long-term solution to water quality, operational and security vulnerability issues related to drawing water directly from either the Boulder Feeder Canal or Boulder Reservoir. The September 2013 flood event reinforced that the pipeline could also mitigate the potential for future problems in delivering water from the Boulder Reservoir WTP during future

disaster events. The pipeline would potentially provide an opportunity to develop a new hydroelectric facility. Funding for construction of this facility is proposed in 2020.

5. CIP funding has been added for Boulder Reservoir in 2016 to inspect the Main and Auxiliary Outlet. To avoid draining the reservoir, this activity will require an underwater diving/inspection contractor. Due to corrosive water chemistry, potential relining or structural replacement of the auxiliary outlet steel conduit may be required once the conditions are documented (i.e. an alternatives analysis and design may have to be undertaken).
6. The Barker Dam outlet facilities are over 100-years old and in need of significant rehabilitation. However, as a result of the recent successful testing of a lower gate in typical condition and the inspection of Gates No. 1 through Gate No. 7 (30-inch) to confirm apparent readiness for service, funding has been delayed by an additional 2 years for final design (now 2019) and construction (now 2020) of the rehabilitation project. The outlet facilities would also provide an opportunity to develop a new hydroelectric facility and funding for construction of this facility is now allocated in 2024. Continued good reviews from operations for the stepped outlet gates (Gates No. 1 through No. 9) may allow a further delay of the outlet rehabilitation project subject to further evaluation of the mechanical reliability of the system. The 1910 spillway gates (dual 36-inch) are already showing signs of requiring replacement with the electrical geared actuator replacement as a priority. The downstream pipe segments encased adjacent to the spillway are leaking at the joints (i.e. infiltration present when not flowing full) thus most likely requiring a structural re-lining. The 2016 CIP budget was increased to allow for new actuators on the spillway gates with other future repairs to wait (if possible) until the outlet system rehabilitation study results.
7. In 2016 and 2017, CIP budget has been added for a study on the type of investigation required to evaluate the post-tensioned anchors at Barker Dam and to repair the grouted pads on top of the anchors in a two phased approach. The results obtained from the first phase repair on the dam crest will be used to determine if it is necessary to continue with replacing the grout pads on the downstream face, as these are much more difficult to access.
8. Due to previously documented issues with concrete deterioration and continued risk of plugging the outlet system at Albion Dam; the planned study, design and rehabilitation construction activities have been moved up in the CIP to the years 2016, 2018 and 2019 respectively. Due to this re-prioritization of the Albion Dam activities, the planned study and repair of the Green Lake No. 2 Dam has been moved out an additional year and may be moved out further if required for other priority tasks in the watershed.
9. The Kossler Dam Face Rehabilitation Project and the included concrete repairs to the Outlet Structure in 2015 has highlighted the need to also complete significant concrete and grouted riprap repairs to the Inlet Structure to the reservoir at the termination of the Barker Gravity Pipeline. \$75,000 has been added to the CIP in 2016 for the Inlet Structure repairs to allow for continued operation without potential structural failure of

retaining walls and grouted riprap. Once initial critical repairs are completed on the Inlet, both the Inlet and Outlet Structure will require replacement within approximately 10 years due to the condition of the concrete and the nature of the temporary repairs. A placeholder estimate has been entered in the year 2023 with design and permitting in advance by a year.

10. The CIP budget for the Silver Lake Hydroelectric Facility has been increased in 2016 through 2018 for PLC upgrades and replacement of the turbine needles/seats.
11. The CIP budget for the Betasso Hydroelectric Facility has been increased in years 2017 and 2018 for replacement of the HPU and transformer. The HPU is scheduled for replacement and City Hydro Staff has noted overheating issues at full capacity on the transformer. The transformer oil has been tested and will be monitoring closely to allow for a delayed replacement in 2018.
12. In 2017, the Boulder Canyon Hydroelectric Facility will require a 5-year inspection and CIP funds have been added.
13. A new CIP item has been added starting in 2016 for the Source Water Facilities Rehabilitation Program. This program, which is presently forecasted at \$150,000/year, will allow for funds to be available for the non-forecast activities (i.e. unexpected emergency repairs, designs, permitting and or studies) which are typically required in keeping the city source water infrastructure systems in reliable condition.
14. Funding for treated water transmission infrastructure includes both assessment and replacement of critical pressure zone 3 pipes. During the summer of 2013 several transmission mains experienced failures that were repaired and revealed the need to replace certain pipe segments sooner than anticipated.
15. Evaluation and potential installation of hydroelectric generation equipment at 101 Pearl. Currently no power generating equipment exists at this facility.

### **Wastewater Utility**

The September 2013 flood event highlighted numerous vulnerabilities in the wastewater collection system. The 2015 budget included a significant rate increase to fund new programs and projects to address the collection system rehabilitation.

### **2014 Accomplishments**

1. A City-wide inflow and infiltration (I&I) study of the wastewater collection system was completed in 2014. The purpose of this study was to quantify the rainfall induced I&I component entering the collection system. This I&I study was scheduled May through July 2014 to take advantage of the historically high groundwater that remained following the 2013 September flood event. The study utilized 58 temporary flow meters at locations throughout the system. The study's data are being used to recalibrate to

- wastewater collections system hydraulic model for the 2014 Master Plan Update.
2. Redzone Robotics inspected 31,189 feet of the City's large diameter sanitary sewer interceptor sewer. This project was a comprehensive condition assessment process that utilized TV inspection, laser and sonar technologies for the section of interceptor sewer from South Boulder Rd to the WWTF. The inspection revealed severe levels of corrosion and structural degradation in the downstream half of the interceptor system.
  3. Contractors performed standard CCTV inspection of 113,000 ft of 8" to 12" sewers in areas which had severe wastewater backups during the 2013 flood. No significant quantity of flood debris was identified.
  4. Utilities staff continued the annual cured in place pipe (CIPP) lining program and lined approximately 10,000 feet of 8", 10", and 15" mains. This represents a decrease in lining over previous years because part of the funding for this program was reallocated to the inspection and flow monitoring projects.

#### Projects Anticipated for Completion in 2015

1. IBM Lift Station construction project
2. WWTF Nitrogen Upgrades construction project
3. 61<sup>st</sup> Street Interceptor Replacement construction project
4. WWTF Process Automation System (PAS) Phase I implementation
5. Annual CIPP lining contract
6. Medium diameter sanitary sewer condition assessment
7. Wastewater collection system condition assessment and debris removal
8. Wastewater collection system permanent flow monitoring

#### Highlights of 2016-2021 Projects

1. The Wastewater collection system Condition Assessment Program is new in 2015. Utilities will complete a comprehensive wastewater collection system condition assessment over the next four years (2015-2018). This assessment will involve cleaning and TV inspection of approximately 360 miles of sanitary sewer. This program will help prioritize the wastewater collection system rehabilitation program.
2. The Sanitary Sewer Rehabilitation program has significantly increased funding that began in 2015. The projected annual budget is estimated at \$2,250,000 in an effort to accelerate the lining program. This new funding level will permit the lining of the entire collection system in approximately 20 years.
3. The city received a new discharge permit for the 75th Street wastewater treatment facility (WWTF) with an effective date of May 1, 2011. City of Boulder staff negotiated a 6-year compliance schedule with CDPHE to allow for the design, construction, start-up and funding of the new facilities. Utilities will bid the Nitrogen Upgrades construction project in 2015. This project will include improvements to meet new permit regulations for total inorganic nitrogen (TIN) and daily maximum ammonia limits, which go into

effect December 1, 2017. This project's construction cost is estimated at \$4,000,000 and will be completed in 2015/2016.

4. New CDPHE regulations concerning nutrient criteria, specifically Regulation 85 and Regulation 31, were adopted by the Colorado Department of Public Health and Environment (CDPHE) in March 2012. The criteria will pose serious treatment challenges for the WWTF and will have significant financial impacts. City staff has estimated approximately \$18.5 million of funding in 2020 to address the phosphorus treatment improvements required to address Regulation 85. Regulation 31 contains much more stringent provisions and funding for this regulation is identified in the 20-year CIP with \$11 million in 2029.
5. The Process Automation System (PAS) Strategic Plan was completed in 2013 and identified approximately \$6,000,000 in instrumentation and controls (I&C) recommendations to be completed at the WWTF. Funding for these improvements is estimated at \$600,000 per year (escalated at 4% annually) for the next 10 years. The PAS recommended Tier 1 (critical priority) projects will be completed in 2015/2016 at an estimated construction cost of \$1,100,000.
6. The IBM Lift Station improvements project will be bid in 2015. The project will include various civil, mechanical, electrical, and instrumentation & controls upgrades to meet CDPHE requirements. The upgrades will involve modifications to expand the wet well capacity, new submersible pumps, an influent ogee weir, an intermediate floor with new pipe gallery, new MCC's and a stand-by emergency pump. The estimated construction cost is \$1,000,000. The construction duration is estimated at nine months.
7. A comprehensive list of WWTF rehabilitation projects has been identified from the Wastewater Utility Fund Asset Management tool, and included in the 20-year CIP based on staff input, engineering studies and the asset management database. For the current 6-year CIP, funding for the rehabilitation projects has been allocated to various WWTF components as shown in the detailed CIP list.

### **Stormwater and Flood Management Utility**

The city has a comprehensive flood management program designed to identify flood risks along the major drainageways, reduce those risks, minimize loss of life and property damage, and support recovery following major flood events. The overall process for meeting these objectives includes: updating the Flood Insurance Rate Maps (FIRMs), developing mitigation plans to identify feasible opportunities to reduce the risk of flooding and programming flood mitigation projects into the CIP.

As a result of the September 2013 flood, funding was added in the 2015-2020 CIP as a placeholder for the design and construction of improvements along the various drainageways in anticipation of completing mapping studies and mitigation plans. Much of the funding shown in the 2016-2021 CIP was carried forward from last year's CIP, as many of these studies are still on-going.

Flood mitigation plans are currently being developed for the following creeks:

- Bear Canyon Creek
- Gregory Creek
- Boulder Creek
- South Boulder Creek

In anticipation of completing flood mapping studies this year, flood mitigation plans will be initiated in 2016 for the following creeks:

- Skunk, Bluebell and King's Gulch
- Upper Goose and Twomile Creeks

Below is a list of the schedule for each drainageway shown in the CIP and the changes in funding levels from the 2015-2020 CIP to 2016-2021 CIP.

The current draft of the South Boulder Creek Mitigation Plan is anticipated to be presented to the WRAB in May and to City Council in August. The South Boulder Creek Phase I project cost is estimated at \$25M. In last year's CIP, \$10M was allocated to the project in 2018 to fund a regional detention facility at U.S. Hwy 36. This \$10M figure assumed that the remaining \$15 million would be funded through a grant. In this year's CIP, Utilities is recommending \$25M funding in 2018 based on a less optimistic expectation of receiving grant funding for this project. The downstream phases were not shown in last year's CIP and are not shown in 2016-2021.

On-going funding was also shown in the 2015-2020 CIP for improvements along Wonderland and Fourmile Canyon Creek based on the 2011 Mitigation Plan recommendations. The Wonderland Creek Foothills to Winding Trail Greenways project will be bid this summer, and is currently estimated to cost \$22.5M to construct. Last year the construction cost was estimated to be \$20M, with the CIP including a \$16 million bond and the assumption that the remaining \$4M would be cash financed with carry over funds from 2014 to 2015. Funding previously budgeted for the Wonderland Creek project was used to cover costs (\$5.1 million) for the September 2013 post-flood recovery work. While not reflected in the 2016-2021 CIP, the 2015 bond amount will be increased from \$16M to \$23M to cover the additional \$2.5 million, as well as take advantage of favorable interest rates to cover a greater portion of the Wonderland project, and the Fourmile project at 19<sup>th</sup> Street that were originally intended to be cash financed.

Design of improvements along Fourmile Canyon Creek between 19<sup>th</sup> and 22<sup>nd</sup> Streets was put on hold following the September 2013 flood. The design work is now moving forward, with construction anticipated next summer. A CEAP was completed in 2012 for this project. This project has been added to the 2015 bond issuance for Wonderland Creek and funds carried over from last year will be used for future projects. A CEAP is also currently underway for flood mitigation and Greenways improvements along Fourmile Canyon Creek upstream of 19<sup>th</sup> Street. The CEAP will be reviewed by the Greenways Advisory Committee and provided to WRAB as an information item at the end of this year. On-going funding from 2016-2021 has been included in the draft CIP to design and construct these improvements.

**Status and Funding Changes for the Major Drainageway Projects**

<b>Drainage</b>	<b>Mapping Study</b>	<b>Mitigation Plan to Council</b>	<b>Funding Planned</b>	<b>Changes from 2015-2020 to 2016-2021</b>
Bear Canyon	updated	1 <sup>st</sup> Quarter 2016	2015, 2016	none
Gregory	updated	4 <sup>th</sup> Quarter 2015	2015, 2016	none
Boulder Creek	Submitted to FEMA	1 <sup>st</sup> Quarter 2016	2015, 2016, 2017	Reduced by \$250k in 2016
Skunk, Bluebell, King's Gulch	Anticipate to submit early 2016	Initiate in 2016	2017, 2018	none
Upper Goose, Twomile	Anticipate to submit early 2016	Initiate in 2016	2017, 2018	none
South Boulder Creek	updated	On-going	2018	Added \$15M Bond in 2018
Fourmile - 19 <sup>th</sup> to 22nd	updated	completed	2015	Bonding \$2M in 2015, 2014 carry over funds revert to fund balance
Fourmile upstream of 19 <sup>th</sup> (Upland to Violet)	updated	completed	2016-2020	Added \$500k in 2021
Wonderland – Foothills to Winding Trail	updated	completed	2015	Added \$2.5M Bond in 2015

The September 2013 flood event identified the need for increased analysis and rehabilitation in the storm water drainage system. Additional funding was allocated in the 2015 budget process to supplement existing funding. The additional funding will be used to rehabilitate existing storm sewer infrastructure and to construct local drainage improvements projects throughout the city. The prioritization of these projects will be based on recommendations from the Stormwater Master Plan (SMP) Update, which will be completed in 2015.

2014 Accomplishments

1. Significant flood recovery work was completed in 2014 including removing approximately 720 tons of debris and 46,000 cubic yards of sediment from the major drainageways, in addition to repairing drop structures, areas of erosion and channel infrastructure. A survey and analysis of the damage to private properties from the September 2013 flood was conducted, as well as an analysis of the amount of rainfall and associated runoff for each major drainageway in order to estimate the flood recurrence interval. An analysis was also completed on the Fourmile Canyon Creek mapping to evaluate the spill flows to Wonderland Creek, based on the flood extents of the September 2013 flood. The analysis confirmed the effective mapping adopted in 2007 to be correct.
2. Flood mapping updates were reviewed and recommended for approval by WRAB and City Council and submitted to FEMA for Bear Canyon Creek (from Colorado Avenue to

Boulder Creek) and Boulder Slough (Broadway to 30th Street).

3. A Council Study Session was held on September 30<sup>th</sup> to provide Council with background information about the city's flood management program and upcoming agenda items including flood mapping and mitigation studies. An extensive Flood Management Overview was provided including maps and information about the city's major drainageways, flood regulations, and the floodplain mapping and mitigation process. The study session concluded with a presentation on the South Boulder Creek flood mitigation study for feedback from Council.
4. As a result of the additional 2015-2020 CIP funding, two new positions were budgeted in the Flood and Greenways work program (Utilities Planner and Flood and Greenways Project Manager). The Utilities Planner position was hired in July and the Flood and Greenways Project Manager position was hired in December. A Flood and Greenways Civil Engineer I was hired in December to fill a vacant GIS position.
5. In 2014 the City focused on the repair of existing storm sewers and expansion of existing storm sewers to address localized drainage issues. The City utilized contractors to repair or replace damaged storm sewers at 30th St & Colorado, Baseline Rd & 10th St, 4th St & Kalmia, 4th St & Juniper, 6th St & College Ave, Ithaca Dr & Wildwood Rd, Goose Creek along Edgewood Dr, Bear Creek at Wildwood Dr, and Two Mile Creek at Spring Valley Dr. A contractor also excavated the detention basins at the intersection of Foothills Hwy and Baseline Rd to restore their design capacity and establish a low-flow channel. Approximately 800 ft of storm sewer on 14th St from College Ave to Euclid Ave was also lined using cured in place pipe.

Projects Completed or Anticipated for Completion in 2015

1. The Wonderland Creek - Foothills to Winding Trail project, which includes flood mitigation and a multi-use path connection is proposed to be bid in June and will have a two year construction schedule. This project is being funded by multiple sources including federal Transportation Improvement Program funds (TIP), the Urban Drainage and Flood Control District and the city's Greenways budget, in addition to Flood Utilities funding. Flood Utilities funding for the construction of these improvements will be bonded in 2015.
2. It is anticipated that the Upper Goose and Twomile Canyon Creek Mapping Update and Skunk Creek, King's Gulch and Bluebell Creek Mapping Update will be presented to City Council in July.
3. The Gregory Creek Mitigation Plan is expected to be taken to City Council for review and approval in the fall.
4. The Bear Canyon Creek and Boulder Creek Mitigation Plans are anticipated to be completed and presented to WRAB by the end of this year.

5. Additional alternatives for detention at U.S. 36 for flood mitigation of South Boulder Creek are currently being evaluated to identify alternatives that have less environmental impact. These alternatives will be presented to the Open Space Board of Trustees and the WRAB in May and City Council in the summer or fall.
6. Utilities will complete an update to the 2007 Stormwater Master Plan (SMP) in 2015. The purpose of this update is address city-wide water quality issues, analyze underserved storm sewer infrastructure areas, and to incorporate the September 2013 flood inundation data.
7. Utilities staff will be inspecting 40,000 ft of storm sewers in the University Hill district as part of the storm sewer condition assessment program. Recent inspections of these sewers have confirmed that some sections are in a deteriorating condition. The inspection results will be used to define the scope of a storm sewer rehabilitation and replacement program which will begin in the fall of 2015. This program will utilize the 2015 Stormwater drainage Utility funding. Minor local drainage improvements to address citizen drainage complaints will also be implemented.

#### Highlights of 2016-2021 Projects

1. Improvements along Fourmile Canyon Creek, 19<sup>th</sup> to 22<sup>nd</sup> Streets that include 100 year flood mitigation at 19<sup>th</sup> Street, a multi-use path and an emergency access connection from 19<sup>th</sup> Street to Tamarack Avenue and a bicycle and pedestrian underpass at 19<sup>th</sup> Street are expected to be bid in 2016. Carry over funds budgeted in previous years for this project will be returned to the fund balance for use on future projects in order to take advantage of favorable interest rates. Cash funding is shown for additional improvements along Fourmile Canyon Creek between Upland and Violet in outlying years.
2. Funding through bonding was increased from \$10 to \$25 million in 2018 for construction of improvements along South Boulder Creek.
3. Funding continues to be shown for Bear Canyon Creek, Gregory Creek and Boulder Creek in 2016 and will be based on the recommendations of the mitigation planning studies. Funding in 2016 for Boulder Creek was reduced from \$2.5 million to \$2.25 million in order to maintain sufficient reserves in the fund financial.
4. Funding for design of capital improvements along Skunk, Bluebell, King's Gulch, Twomile and Upper Goose Creeks is shown starting in 2017 and will be based on the updated mapping and a mitigation planning effort.
5. Funding is also shown for the design and construction of localized drainage improvements throughout the city. These improvements include storm water collection and conveyance facilities designed to address the 2-year and 5-year storm events.

## **BUDGET SUPPLEMENTAL REQUESTS, CHANGES**

Some additional needs have been identified subsequent to adoption of the 2015 budget and are being proposed to City Council as budget adjustments. WRAB generally does not make a recommendation on mid-year budget adjustments and is not being asked to make a recommendation on these proposed changes.

- An additional \$200,000 for a filter rehab project at the Betasso Water Treatment Plant. Performance issues were identified in filter #6 and problems with the filter underdrain system were discovered. Plant capacity is currently reduced by 15% with Filter 6 unavailable and failure of any of the other filters could strain the overall system ability to meet water demands during peak periods.
- And additional \$595,000 is appropriated from additional grant revenue for re-routing a portion of the 61<sup>st</sup> Street interceptor pipe. The September 2013 flood exposed a vulnerable section of this pipe, and the City was awarded grant funds from the Colorado Department of Public Health and Environment for design and construction of re-routing.

## **RATE STUDIES**

Staff are in the early stages of conducting a review of the Utility rate structures. It has been over nine years since comprehensive rate studies have been completed for the Water, Wastewater, or Stormwater/Food Utilities. The results of this rate study will inform any adjustments for 2017 budget development.

## **BUDGET SCHEDULE:**

The current schedule of major budget milestones is provided below. Elements involving the WRAB are highlighted in bold italics.

Milestone	Date
<b>WRAB Preliminary Draft CIP Budget Discussion</b>	<b>April 27, 2015</b>
Budget Guidelines to Departments	April 20, 2015
<b>WRAB Draft CIP Review</b>	<b>May 18, 2015</b>
Proposed Budget Submittal to City Manager	May 29, 2015
<b>WRAB Recommendation on CIP/Budget</b>	<b>June 22, 2015</b>
Departmental Budget Review by City Manager	May/June 2015
Planning Board Recommendation on CIP	July 2014
City Council Study Session on CIP	August 11, 2015
City Council Study Session on Budget	September 8 and 22, 2015
City Council Consideration/Adoption of Budget	October 6 and 20, 2015

## **NEXT STEPS:**

Staff is seeking feedback on the preliminary draft CIP, updated financial information, and potential rate impacts. This feedback will be considered by staff in developing a draft CIP for WRAB discussion at the May 18, 2015 meeting. At the June 22, 2015 WRAB meeting, staff will request that WRAB provide a final recommendation concerning the proposed 2016-2021 CIP to Planning Board and City Council.

**Attachments:**

**A:** Preliminary 2016 Fund Financials – Water, Wastewater, Stormwater/Flood Management

**B:** CIP Guiding Principles

**C:** Colorado Utility Bill Comparison – Water

**D:** Colorado Utility Bill Comparison – Wastewater

**E:** Colorado Utility Bill Comparison – Stormwater/Flood Management

**F:** Colorado Utility Bill Comparison – Combined Utilities

**G:** Preliminary 2016-2021 CIP, Water, Wastewater, Stormwater/Flood Management

**H:** Betasso 2016 Project Cost Estimates and Identified Alternatives













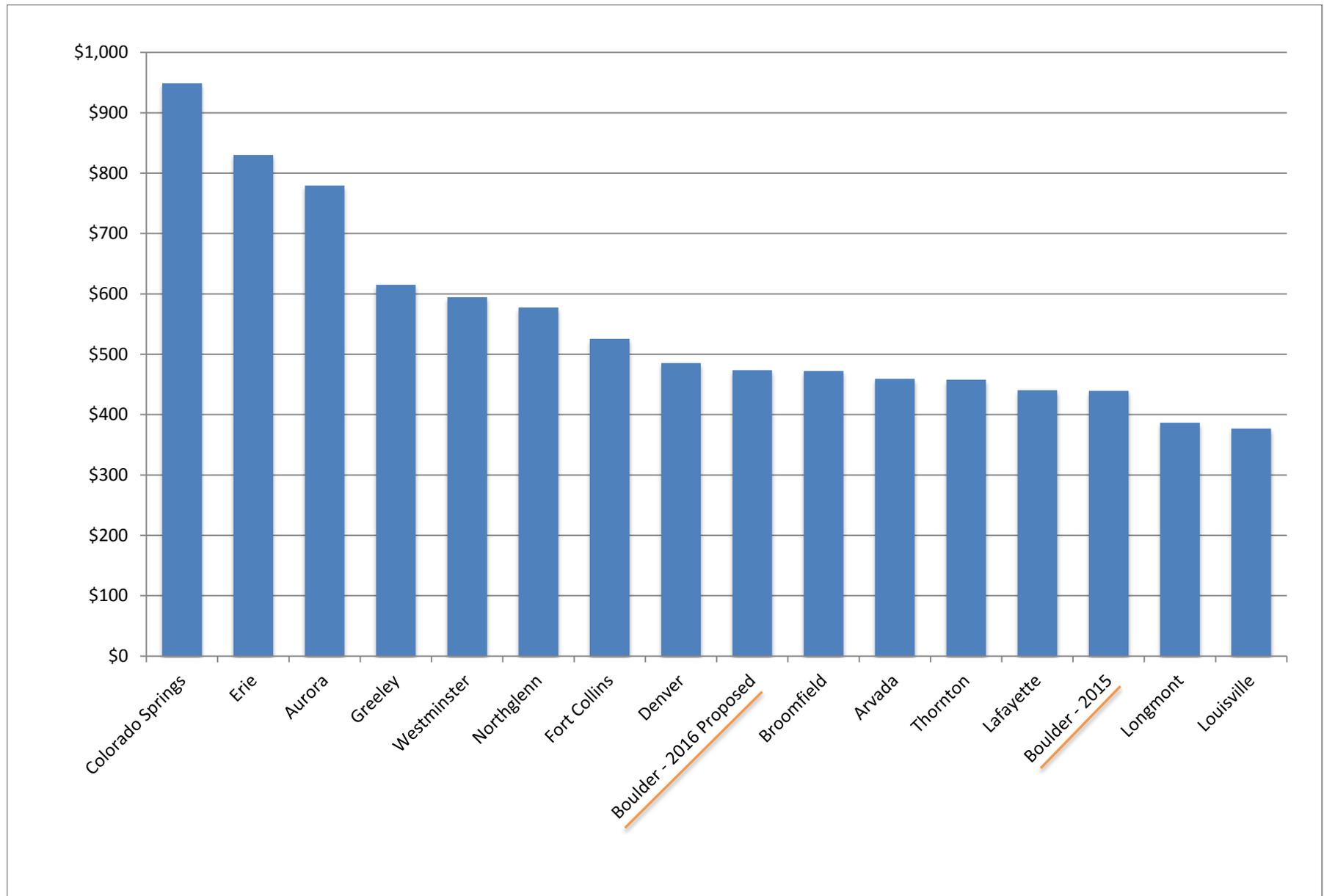
## **Attachment B**

### **CIP Guiding Principles**

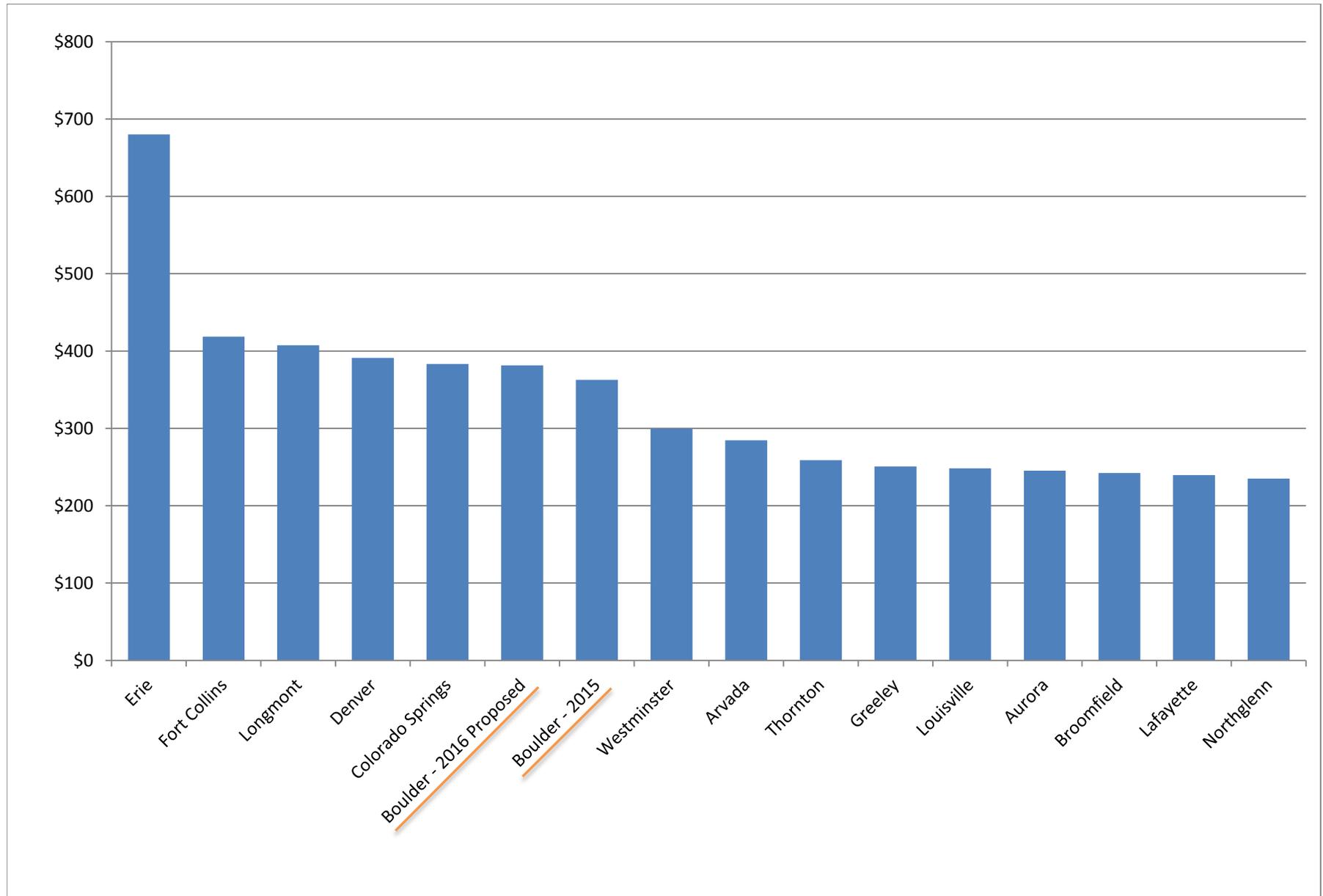
The City of Boulder develops a Capital Improvement Program (CIP) that addresses the ongoing major business needs and maintenance and repair of city assets as well as enhancements and expansion called for in the Boulder Valley Comprehensive Plan. The CIP is a strategic document that assures that the municipal organization maintains a strong bond rating, implements community values, and has fiscal integrity. The city prioritizes its investments both across and within funds based on the following guiding principles:

1. Capital Improvement Programs should be consistent with and implement Council accepted master plans and strategic plans.
2. Capital Improvements should achieve Community Sustainability Goals:
  - Environmental – sustainable materials, construction practices, renewable resources, etc.
  - Social – enhancements that improve accessibility to city services and resources provided to the community
  - Economic – effective and efficient use of public funds across the community.
3. As potential capital investments are identified, the city must demonstrate in the CIP process that there are sufficient funds to operate and maintain the project or program.
4. Capital Improvement Programs should provide enough capacity and flexibility in our long-term planning to be able to respond to emerging, unanticipated needs.
5. Capital Improvement Programs should maintain and enhance the supporting city-wide “business systems”, such as information and finance systems, for the city over the long term.
6. Capital Improvement Programs should sustain or improve maintenance of existing assets before investing in new assets.
7. Capital improvements should:
  - Meet legal mandates from federal, state, or city levels
  - Maintain or improve public safety and security
  - Leverage external investments
  - Promote community partnerships
  - Reduce operating costs and improve efficiency.
8. Capital programming should maximize efficiency of investments demonstrated by measurable cost/benefit analyses and coordination of projects across departments within and across funds.
9. The Capital Improvement Program should provide sufficient reserves to allow for a sound fiscal foundation with benefits that include:
  - A strong bond rating
  - The ability to address emergencies and natural disasters.

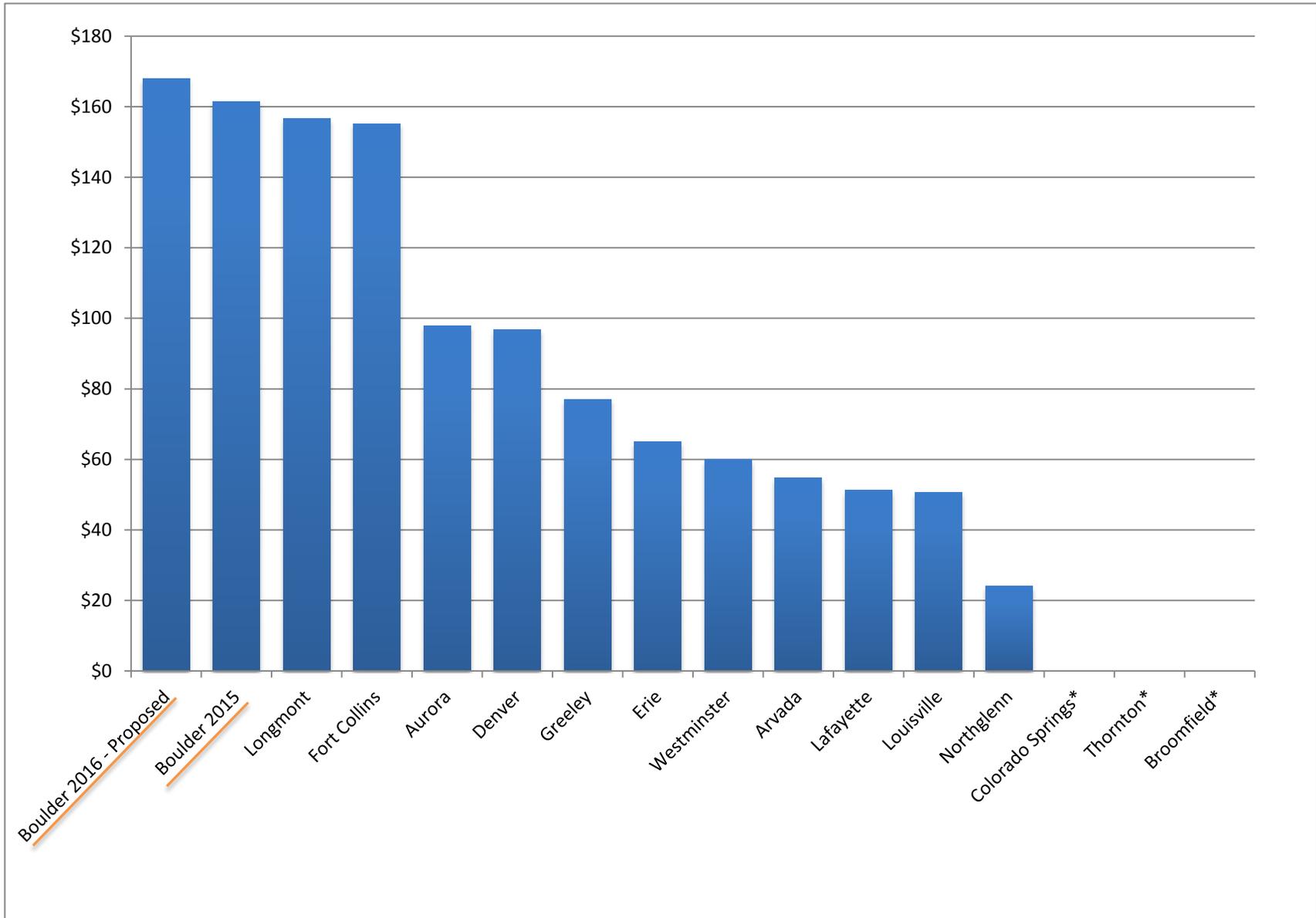
# 2015 Annual Water Bills



# 2016 Annual Wastewater Bills

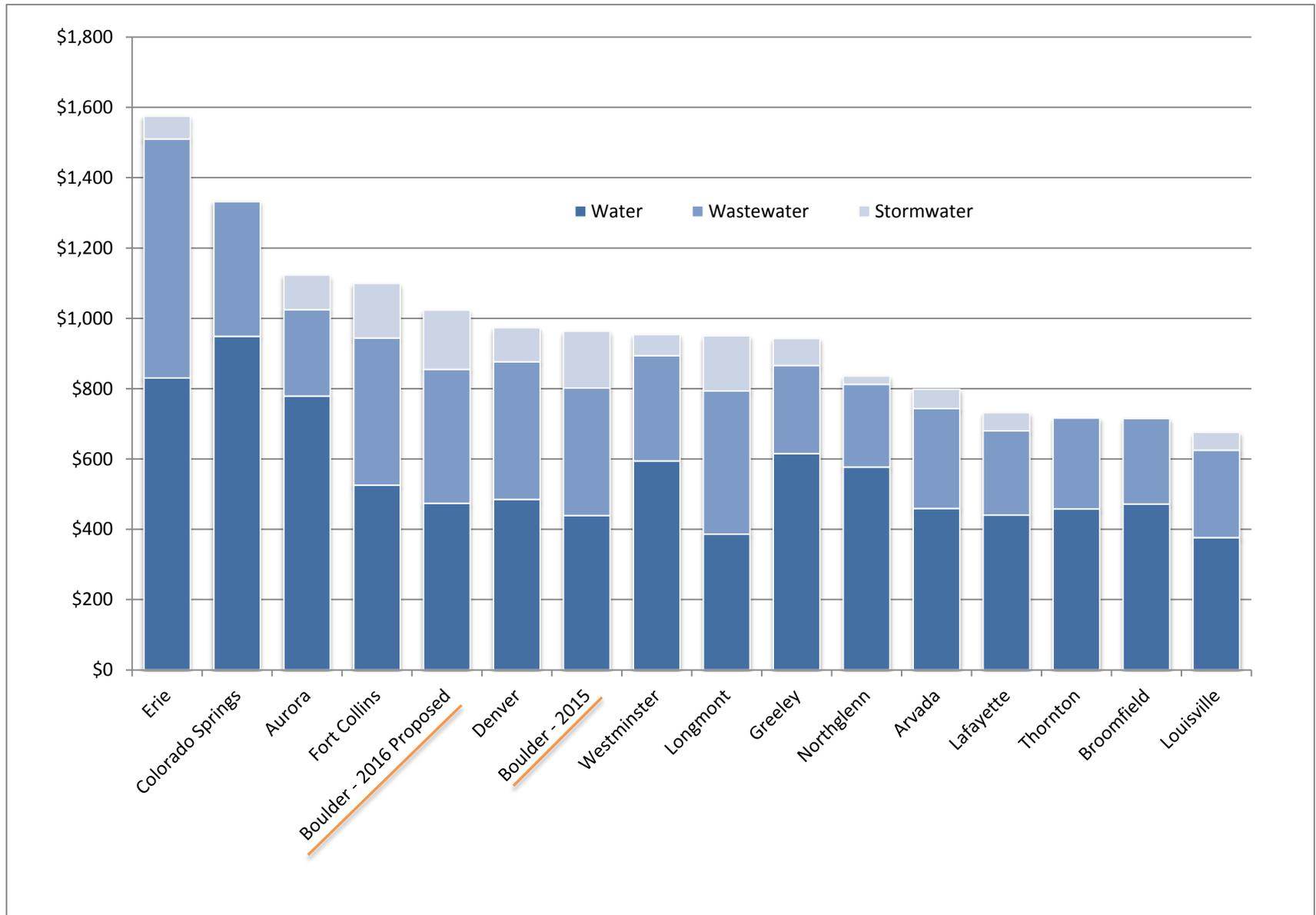


# 2015 Annual Stormwater/Flood Bills



\*Cities with no Stormwater Utility Fee

# Combined 2015 Front Range Utility Bills



Attachment G - DRAFT WATER CIP

	A	H	I	J	K	L	M	N	O	
1	20-Apr-15			CITY OF BOULDER						
2				DRAFT 2016-2021 CAPITAL IMPROVEMENT PROGRAM						
3				WATER UTILITY FUND						
4										
5										
6	Assumed Inflation Rate	2014	2015	2016	2017	2018	2019	2020	2021	
7	PROJECT NAME	ACTUAL	REVISED	PROJECTED	PROJECTED	PROJECTED	PROJECTED	PROJECTED	PROJECTED	
8										
9	<b>Treated Water Pressure Reducing and Hydroelectric Facilities</b>									
10	Kohler Hydro/PRV Facility	\$0	\$50,000	\$0	\$0	\$0	\$0	\$0	\$0	
11	Maxwell Hydro/PRV Facility	\$0	\$50,000	\$0	\$0	\$0	\$0	\$0	\$0	
12	Orodel Hydro/PRV Facility	\$0	\$0	\$75,000	\$0	\$0	\$0	\$0	\$0	
13	Sunshine Hydro/PRV Facility	\$0	\$0	\$0	\$271,875	\$0	\$0	\$0	\$0	
14	Pearl Street Hydro/PRV Facility	\$0	\$0	\$0	\$0	\$24,333	\$243,331	\$0	\$0	
15	<b>Subtotal - Treated Water PRV and Hydro</b>	\$0	\$100,000	\$75,000	\$271,875	\$24,333	\$243,331	\$0	\$0	
16										
17	<b>Water Treatment Facilities</b>									
18	Betasso WTF	\$413,974	\$1,108,318	\$900,000	\$0	\$0	\$0	\$0	\$0	
19	Betasso WTF - Bond Proceeds	\$0	\$0	\$24,000,000	\$0	\$0	\$0	\$0	\$0	
20	Bond Issuance Costs	\$0	\$0	\$240,000	\$0	\$350,000	\$0	\$100,000	\$0	
21	Boulder Reservoir WTF	\$203,296	\$7,100	\$164,000	\$0	\$0	\$0	\$2,000,000	\$0	
22	Boulder Res WTF - Bond Proceeds	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
23	<b>Subtotal - Water Treatment Facilities</b>	\$617,270	\$1,115,418	\$25,304,000	\$0	\$350,000	\$0	\$2,100,000	\$0	
24										
25	<b>Treated Water Pump Stations</b>									
26	Cherryvale Pump Station	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
27	Boulder Reservoir WTF High Service Pump	\$0	\$84,289	\$0	\$0	\$0	\$0	\$0	\$0	
28	Iris Pump Stations	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
29	<b>Subtotal - Treated Water Pump Stations</b>	\$0	\$84,289	\$0	\$0	\$0	\$0	\$0	\$0	
30										
31	<b>Treated Water Storage Tanks</b>									
32	Gunbarrel Storage Tank	\$644,449	\$39,746	\$0	\$0	\$0	\$0	\$0	\$0	
33	Maxwell Storage Tank	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
34	Booten Storage Tank	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
35	Devil's Thumb Storage Tank	\$0	\$50,000	\$0	\$0	\$0	\$0	\$0	\$0	
36	Kohler Storage Tank	\$64	\$103,487	\$799,875	\$0	\$0	\$0	\$0	\$0	
37	Chautauqua Storage Tank	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
38	Betasso Storage Tank	\$0	\$0	\$0	\$292,465	\$0	\$0	\$0	\$0	
39	Boulder Reservoir Storage Tank	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
40	<b>Subtotal - Treated Water Storage Tanks</b>	\$644,513	\$193,233	\$799,875	\$292,465	\$0	\$0	\$0	\$0	
41										
42	<b>Treated Water Distribution System</b>									
43	Zone Isolation Valves	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
44	Cathodic Protection	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
45	Waterline Replacement	\$3,293,113	\$3,522,017	\$3,352,960	\$3,487,078	(\$0)	\$3,771,624	\$3,922,489	\$4,079,389	
46	<b>Subtotal - Treated Water Distribution System</b>	\$3,293,113	\$3,522,017	\$3,352,960	\$3,487,078	(\$0)	\$3,771,624	\$3,922,489	\$4,079,389	
47										
48	<b>Treated Water Transmission System</b>									
49	Sunshine Transmission Pipe	\$568,313	\$2,259,938	\$0	\$0	\$0	\$0	\$0	\$0	
50	Boulder Canyon - Orodel to Fourmile Pipe	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
51	Mountain Transmission Pipes	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
52	Zone 1 Transmission Pipes	\$0	\$0	\$0	\$0	\$250,000	\$0	\$0	\$250,000	
53	Zone 2 Transmission Pipes	\$0	\$0	\$0	\$250,000	\$0	\$0	\$250,000	\$0	
54	Zone 3 Transmission Pipes	\$0	\$0	\$1,200,000	\$0	\$0	\$250,000	\$0	\$0	
55	<b>Subtotal - Treated Water Transmission System</b>	\$568,313	\$2,259,938	\$1,200,000	\$250,000	\$250,000	\$250,000	\$250,000	\$250,000	
56										
57	<b>Source Water Transmission System</b>									
58	Lakewood Pipeline	\$0	\$530,400	\$0	\$0	\$0	\$316,330	\$0	\$0	
59	Silver Lake Pipeline	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
60	Source Water Transmission Pipe Inspection	\$0	\$73,653	\$0	\$0	\$0	\$0	\$0	\$0	
61	<b>Subtotal - Source Water Transmission System</b>	\$0	\$604,053	\$0	\$0	\$0	\$316,330	\$0	\$0	
62										
63	<b>Barker Water System</b>									
64	Barker Gravity Pipeline Repair	\$305,389	\$475,882	\$667,416	\$1,169,859	\$1,216,653	\$1,265,319	\$1,315,932	\$1,368,569	
65	Barker-Kossler Penstock Repair	\$0	\$0	\$0	\$116,986	\$0	\$0	\$0	\$0	
66	Barker Dam Outlet	\$0	\$0	\$100,000	\$175,000	\$0	\$835,551	\$0	\$0	
67	Barker Dam Outlet - Bond Proceeds	\$0	\$0	\$0	\$0	\$0	\$0	\$8,355,509	\$0	
68	Barker Dam and Reservoir	\$2,625	\$495,174	\$65,000	\$50,000	\$0	\$0	\$0	\$0	
69	Barker Hydro System Integration	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
70	Barker Relicensing	\$25,377	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
71	Barker Instream Flow Release	\$0	\$6,052	\$0	\$0	\$0	\$0	\$0	\$0	
72	Barker Residence	\$78,481	\$214,799	\$0	\$0	\$0	\$0	\$0	\$0	
73	Betasso Penstock	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
74	Kossler Dam	\$56,204	\$135,738	\$75,000	\$0	\$0	\$0	\$0	\$0	
75	<b>Subtotal - Barker Water System</b>	\$468,076	\$1,327,645	\$907,416	\$1,511,844	\$1,216,653	\$2,100,870	\$9,671,441	\$1,368,569	
76										
77	<b>Raw Water Storage Reservoirs</b>									
78	Albion Dam	\$0	\$80,000	\$125,000	\$0	\$341,636	\$3,416,361	\$0	\$0	
79	Silver Lake Dam	\$0	\$75,000	\$0	\$0	\$100,000	\$0	\$0	\$0	
80	Island Lake Dam	\$0	\$0	\$0	\$0	\$50,000	\$0	\$0	\$0	
81	Green Lake 1 Dam	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
82	Green Lake 2 Dam - Bond Proceeds	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
83	Green Lake 2 Dam	\$0	\$24,719	\$0	\$0	\$0	\$0	\$75,000	\$486,773	
84	Green Lake 3 Dam	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
85	Goose Lake Dam	\$0	\$20,000	\$0	\$0	\$75,000	\$0	\$0	\$0	
86	Boulder Reservoir	\$0	\$0	\$50,000	\$0	\$0	\$0	\$118,434	\$0	

Attachment G - DRAFT WATER CIP

	A	H	I	J	K	L	M	N	O
1	20-Apr-15			CITY OF BOULDER					
2				DRAFT 2016-2021 CAPITAL IMPROVEMENT PROGRAM					
3				WATER UTILITY FUND					
4									
5									
6	Assumed Inflation Rate	2014	2015	2016	2017	2018	2019	2020	2021
7	PROJECT NAME	ACTUAL	REVISED	PROJECTED	PROJECTED	PROJECTED	PROJECTED	PROJECTED	PROJECTED
8									
87	Lakewood Dam	\$0	\$0	\$0	\$0	\$124,707	\$0	\$0	\$0
88	Skyscraper Dam	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$171,071
89	Wittermyer Ponds	\$0	\$0	\$0	\$0	\$0	\$100,000	\$492,685	\$4,926,849
90	<b>Subtotal - Raw Water Storage Reservoirs</b>	\$0	\$199,719	\$175,000	\$0	\$691,343	\$3,516,361	\$686,119	\$5,584,692
91									
92	<b>Other Raw Water Facilities</b>								
93	Farmer's Ditch	\$0	\$0	\$0	\$0	\$0	\$108,160	\$0	\$0
94	Anderson Ditch	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
95	<b>Source Water Facilities Rehab Program</b>			\$150,000	\$150,000	\$150,000	\$150,000	\$150,000	\$150,000
96	Watershed Improvements	\$78,886	\$146,357	\$80,000	\$0	\$0	\$0	\$100,000	\$0
97	Nederland WWTP	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
98	Instream Flow Structures and Gaging	\$0	\$48,428	\$0	\$0	\$0	\$0	\$0	\$0
99	Como Creek Diversion Structure	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
100	Lakewood Diversion Structure	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
101	Silver Lake Diversion Structure	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
102	NCWCD Conveyance - Boulder Feeder Can	\$25	\$61,271	\$0	\$0	\$0	\$0	\$0	\$0
103	NCWCD Conveyance - Carter Lake Pipeline	\$250,000	\$500,000	\$850,000	\$2,036,322	\$0	\$0	\$0	\$0
104	NCWCD Conveyance/Waterline replacemer	\$0	\$0	\$0	\$0	\$37,565,263	\$0	\$0	\$0
105	<b>Subtotal - Other Raw Water Facilities</b>	\$328,910	\$756,056	\$1,080,000	\$2,186,322	\$37,715,263	\$258,160	\$250,000	\$150,000
106									
107	<b>Source Water Pressure Reducing, Pumping and Hydroelectric</b>								
108	Lakewood Hydroelectric/PRV	\$0	\$0	\$130,000	\$0	\$0	\$300,000	\$0	\$0
109	Silver Lake Hydroelectric/PRV	\$0	\$150,000	\$25,000	\$50,000	\$80,000	\$0	\$0	\$0
110	Boulder Reservoir Intake and Pumping	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
111	Betasso Hydroelectric / Pressure Reducing	\$134,404	\$0	\$0	\$380,000	\$480,000	\$0	\$0	\$0
112	Barker Dam Hydroelectric	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
113	Barker Dam Hydro	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
114	Boulder Canyon Hydroelectric	\$100,755	\$33,641	\$0	\$0	\$0	\$0	\$0	\$0
115	Boulder Canyon Hydro - Grant	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
116	Boulder Canyon Hydro - Grant	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
117	Carter Lake Hydroelectric	\$0	\$0	\$0	\$0	\$50,000	\$250,000	\$0	\$0
118	Carter Lake Hydro	\$0	\$0	\$0	\$0	\$0	\$0	\$2,500,000	\$0
119	Source Water Pressure Reducing, Pumping	\$0	\$0	\$0	\$0	\$0	\$0	\$193,472	\$201,210
120	<b>Subtotal - Source Water PRV, Pumping and</b>	\$235,159	\$183,641	\$155,000	\$430,000	\$610,000	\$550,000	\$2,693,472	\$201,210
121									
122	<b>Water Distribution System Expansion</b>								
123	Annexation Related Water System Expansio	\$0	\$2,551,700	\$2,500,000	\$0	\$0	\$0	\$0	\$0
124	<b>Subtotal - Water Distribution System Expans</b>	\$0	\$2,551,700	\$2,500,000	\$0	\$0	\$0	\$0	\$0
125									
126	<b>Water System Monitoring and Metering</b>								
127	Automated Meter Reading	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$684,285
128	Water System Security/Quality Improvement	\$13,996	\$150,000	\$150,000	\$150,000	\$150,000	\$90,000	\$0	\$0
129	Source Water Monitoring and Protection	\$0	\$100,000	\$100,000	\$100,000	\$100,000	\$100,000	\$0	\$0
130	Distribution System Water Quality	\$14,100	\$0	\$0	\$0	\$0	\$0	\$0	\$0
131	Data Communications System	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
132	September 2013 Flood Disaster Recovery	\$860,072	\$304,301	\$0	\$0	\$0	\$0	\$0	\$0
133	Yards Master Plan Implementation	\$13,553	\$86,321	\$0	\$0	\$0	\$0	\$0	\$0
134	Utility Billing Computer System	\$0	\$100,000	\$0	\$0	\$0	\$0	\$125,000	\$0
135	<b>Subtotal - Water System Monitoring and Mete</b>	\$901,722	\$740,622	\$250,000	\$250,000	\$250,000	\$190,000	\$125,000	\$684,285
136									
137	<b>TOTAL CAPITAL USES OF FUNDS</b>	\$7,057,076	\$13,638,331	\$35,799,251	\$8,679,585	\$41,107,591	\$11,196,676	\$19,698,520	\$12,318,145

Attachment G - DRAFT WASTEWATER CIP

	A	H	I	J	K	L	M	N	O
1	20-Apr-15								
2									
3									
4									
5									
6	Assumed Inflation Rate	2014	2015	2016	2017	2018	2019	2020	2021
7	PROJECT NAME	ACTUAL	REVISED	PROJECTED	PROJECTED	PROJECTED	PROJECTED	PROJECTED	PROJECTED
8									
9	<b>Wastewater Treatment</b>								
10	WWTF Pumps	\$0	\$0	\$150,000	\$0	\$0	\$0	\$0	\$0
11	WWTF Permit Improvements	\$438,080	\$4,194,112	\$150,000	\$0	\$750,000	\$1,500,000	\$0	\$136,857
12	WWTF Nutrient Management Grant	\$144,485							
13	WWTF Permit Improvements - Proj. Bond	\$0	\$0	\$0	\$0	\$0	\$0	\$18,500,000	\$0
14	WWTF Laboratory	\$25,163	\$0	\$50,000	\$0	\$0	\$0	\$0	\$0
15	Lower Boulder Creek Enhancement	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
16	WWTF Headworks	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
17	WWTF Headworks - Proj. Bond	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
18	WWTF Instrumentation/Control	\$0	\$1,127,477	\$0	\$674,918	\$701,915	\$729,992	\$759,191	\$0
19	WWTF Electrical	\$0	\$0	\$120,000	\$1,200,000	\$0	\$0	\$0	\$0
20	WWTF Activated Sludge	\$0	\$389,376	\$0	\$58,493	\$0	\$0	\$0	\$0
21	WWTF Primary Clarifiers	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
22	WWTF Secondary Clarifiers	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
23	WWTF UV Disinfection	\$2,356	\$2,998	\$0	\$0	\$0	\$0	\$0	\$0
24	WWTF UV Disinfection - Proj. Bond	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
25	WWTF Permit Improvements - 2010 Bond	\$15,148	\$1,198	\$0	\$0	\$0	\$0	\$0	\$0
26	WWTF Rehabilitation	\$0	\$0	\$0	\$0	\$0	\$0	\$150,000	\$375,000
27	Valmont Butte	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
28	Biosolids Processing & Dewatering	\$110,044	\$0	\$0	\$0	\$0	\$0	\$0	\$0
29	WWTF Biosolids Digester	\$20,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0
30	WWTF Biosolids Digester - Proj. Bond	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
31	WWTF Cogeneration	\$0	\$39,995	\$0	\$0	\$0	\$0	\$184,481	\$0
32	WWTF Digester Complex	\$0	\$0	\$0	\$0	\$0	\$200,000	\$2,000,000	\$0
33	September 2013 Flood Disaster Recovery	\$453,442	\$606,987	\$0	\$0	\$0	\$0	\$0	\$0
34	WWTF Digester Cleaning	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
35	Bond Issuance Costs	\$0	\$125,000	\$0	\$0	\$0	\$0	\$125,000	\$0
36	<b>Subtotal - Wastewater Treatment Plant</b>	\$1,208,718	\$6,487,143	\$470,000	\$1,933,411	\$1,451,915	\$2,429,992	\$21,718,672	\$511,857
37									
38	<b>Marshall Landfill</b>								
39	Marshall Landfill	\$0	\$0	\$100,000	\$0	\$0	\$0	\$0	\$0
40	<b>Subtotal - Marshall Landfill</b>	\$0	\$0	\$100,000	\$0	\$0	\$0	\$0	\$0
41									
42	<b>Wastewater System Monitoring and Metering</b>								
43	Yards Master Plan Implementation	\$6,777	\$36,046	\$0	\$0	\$0	\$0	\$0	\$0
44	Automated Meter Reading	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
45	Utility Billing Computer System	\$0	\$50,000	\$0	\$0	\$0	\$0	\$65,000	\$0
46	<b>Subtotal - Monitoring and Metering</b>	\$6,777	\$86,046	\$0	\$0	\$0	\$0	\$65,000	\$0
47									
48	<b>Collection and Conveyance System Rehabilitation</b>								
49	Collection System Monitoring	\$338,636	\$3,426	\$0	\$0	\$0	\$0	\$0	\$0
50	Condition Assessment Program		\$780,000	\$811,200	\$843,648	\$877,394	\$912,490	\$948,989	\$986,949
51	Sanitary Sewer Rehabilitation	\$403,808	\$3,000,161	\$2,758,080	\$2,868,403	\$2,983,139	\$3,102,465	\$3,226,563	\$3,355,626
52	Sanitary Sewer Rehabilitation - Bond	-	10,000,000	-	-	-	-	-	-
53	Sanitary Sewer Manhole Rehabilitation	\$51,186	\$208,000	\$216,320	\$224,973	\$233,972	\$243,331	\$253,064	\$657,966
54	IBM Pump Station	\$79,395	\$1,235,402	\$0	\$0	\$0	\$0	\$0	\$0
55	Tier 1 Boulder Creek 2 Master Plan Project	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
56	Tier 1 Goose Creek 1/1A Master Plan Project	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$329,278
57	Tier 1 Goose Creek 3 Master Plan Project	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
58	Tier 1 Goose Creek 5 Master Plan Project	\$0	\$0	\$0	\$0	\$25,000	\$647,590	\$1,346,988	\$1,400,867
59	Tier 2 Boulder Creek 1 Master Plan Project	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
60	Tier 2 Boulder Creek 3 Master Plan Project	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
61	Tier 2 Boulder Creek 4 Master Plan Project	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
62	Tier 2 Goose Creek 4 Master Plan Project	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
63	Tier 2 Gunbarrel 1 Master Plan Project	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
64	Tier 2 Gunbarrel 2 Master Plan Project	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
65	Tier 2 South Boulder Creek 1 Master Plan Project	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
66	<b>Subtotal - Sewer System Rehabilitation</b>	\$873,024	\$15,226,990	\$3,785,600	\$3,937,024	\$4,119,505	\$4,905,875	\$5,775,604	\$6,730,686
67									
68	<b>Wastewater System Expansion</b>								
69	Annexation Related WW System Expansion	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
70	<b>Subtotal - Wastewater System Expansion</b>	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
71									
72	<b>TOTAL CAPITAL USES OF FUNDS</b>	\$2,088,519	\$21,800,178	\$4,355,600	\$5,870,435	\$5,571,420	\$7,335,867	\$27,559,277	\$7,242,543

Attachment G - DRAFT STORMWATER/FLOOD CIP

	A	G	H	I	J	K	L	M	N
1	20-Apr-15		CITY OF BOULDER						
2		DRAFT 2016-2021 CAPITAL IMPROVEMENT PROGRAM							
3		STORMWATER AND FLOOD MANAGEMENT UTILITY FUND							
4									
5									
6	Assumed Inflation Rate	2014	2015	2016	2017	2018	2019	2020	2021
7	PROJECT NAME	ACTUAL	PROJECTED	PROJECTED	PROJECTED	PROJECTED	PROJECTED	PROJECTED	PROJECTED
8									
9	<b>Major Drainageways</b>								
10	Elmer's Twomile Creek	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
11	Goose Creek	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
12	South Boulder Creek	\$72,856	\$451,683	\$750,000	\$750,000	\$0	\$0	\$0	\$0
13	South Boulder Creek - Bond Proceeds	\$0	\$0	\$0	\$0	\$25,000,000	\$0	\$0	\$0
14	Bond Issuance Costs	\$0	\$0	\$0	\$0	\$325,000	\$0	\$0	\$0
15	Skunk Canyon Creek	\$0	\$0	\$0	\$100,000	\$500,000	\$0	\$0	\$0
16	Sunshine Creek	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
17	Twomile Canyon Creek	\$0	\$0	\$0	\$100,000	\$500,000	\$0	\$0	\$0
18	Bluebell Canyon Creek - King's Gulch	\$0	\$0	\$0	\$100,000	\$500,000	\$0	\$0	\$0
19	Viele Channel	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
20	Four Mile Canyon Creek	\$0	\$0	\$0	\$0	\$500,000	\$1,250,000	\$1,250,000	\$500,000
21	Four Mile Canyon Creek - Upland to Violet	\$0	\$0	\$500,000	\$500,000	\$500,000	\$250,000	\$0	\$0
22	Four Mile Canyon Creek - 19th to 22nd - Bor	\$71,909	\$2,000,000	\$0	\$0	\$0	\$0	\$0	\$0
23	Bear Canyon Creek	\$0	\$100,000	\$500,000	\$0	\$0	\$0	\$0	\$0
24	Gregory Canyon Creek	\$0	\$100,000	\$500,000	\$0	\$0	\$0	\$0	\$0
25	Boulder Creek	\$0	\$600,000	\$2,250,000	\$2,500,000	\$0	\$0	\$0	\$0
26	Boulder Slough	\$788,165	\$0	\$0	\$0	\$0	\$0	\$0	\$0
27	Wonderland Creek	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
28	Wonderland Creek - Foothills to 30th	696,684	\$1,708,735	\$0	\$0	\$0	\$0	\$0	\$0
29	Wonderland Creek at 28th St.	399,202	\$628,221	\$0	\$0	\$0	\$0	\$0	\$0
30	Wonderland Creek - Bond Proceeds	\$0	\$21,000,000	\$0	\$0	\$0	\$0	\$0	\$0
31	Bond Issuance Costs	\$0	\$75,000	\$0	\$0	\$0	\$0	\$0	\$0
32	Preflood Acquisition	\$875	\$3,355,520	\$500,000	\$550,000	\$600,000	\$633,000	\$660,000	\$684,285
33	Greenways Program Transfer	\$814	\$710,282	\$97,500	\$97,500	\$97,500	\$97,500	97,500	133,435
34	<b>Subtotal - Major Drainageway Improvements</b>	\$2,030,505	\$30,729,441	\$5,097,500	\$4,697,500	\$28,522,500	\$2,230,500	\$2,007,500	\$1,317,720
35									
36	<b>Miscellaneous</b>								
37	Yards Master Plan Implementation	\$6,777	\$43,223	\$0	\$0	\$0	\$0	\$0	\$0
38	CU Bike/Ped Bridge Replacement I	\$0	\$200,000	\$0	\$0	\$0	\$0	\$0	\$0
39	September 2013 Flood Disaster Recovery	5,314,477	\$494,672						
40	Utility Billing Computer System	\$0	\$50,000	\$0	\$0	\$0	\$0	\$65,000	\$0
41	<b>Subtotal - Miscellaneous Drainage Improvem</b>	\$5,321,254	\$787,895	\$0	\$0	\$0	\$0	\$65,000	\$0
42									
43	<b>Stormwater Management</b>								
44	Upper Goose Creek	\$0	\$175,000	\$750,000	\$750,000	\$750,000	\$1,000,000	\$1,165,547	\$1,221,869
45	Local Drainage Improvements		\$712,400	\$730,080	\$759,283	\$789,655	\$821,241	\$854,090	\$986,949
46	Stormwater Quality Improvements	\$1,322	\$274,675	\$162,000	\$169,000	\$175,500	\$182,500	\$190,000	\$197,390
47	Storm Sewer Rehabilitation	\$194,114	\$444,156	\$270,400	\$281,200	\$292,500	\$304,000	\$632,700	\$657,966
48	Transportation Coordination	\$436,702	\$366,017	\$324,500	\$337,500	\$351,000	\$365,000	\$633,000	\$657,966
49	<b>Subtotal - Localized Drainage Improvements</b>	\$632,138	\$1,972,248	\$2,236,980	\$2,296,983	\$2,358,655	\$2,672,741	\$3,475,337	\$3,722,139
50									
51	<b>TOTAL CAPITAL USES OF FUNDS</b>	\$7,983,897	\$33,489,583	\$7,334,480	\$6,994,483	\$30,881,155	\$4,903,241	\$5,547,837	\$5,039,859



# Memo

Date: Wednesday, April 08, 2015

Project: Capital Improvements Preliminary Design Project  
Betasso Water Treatment Facility

To: Steve Buckbee, P.E., Utilities Project Manager  
Tom Settle, Water Treatment Coordinator

From: Gary Fuller, P.E., Brian Daw, P.E. and Jenn Stillman P.E.

Subject: **Preliminary Phase 1 Project Descriptions and Cost Estimates**

## Introduction

In September 2014, the City of Boulder Utilities Division (the City) initiated the Betasso Water Treatment Facility (BWTF) Capital Improvements Project (Project) with the primary objectives of:

- Identifying improvements required to achieve a 40 million gallon per day (mgd) treatment capacity at the BWTF
- Developing a 20-year Capital Improvement Plan (CIP) for the BWTF
- Prioritizing asset repair and replacement at the BWTF
- Identifying Phase 1 improvements for implementation in 2016-2017, and
- Completing preliminary design of the proposed Phase 1 improvements

Table 1 outlines the Project's major tasks and the scheduled completion of each milestone. The project team is currently working on Task 500 – Capital Improvement & Implementation Plan which will result in a CIP report outlining proposed improvements for the BWTF over the next twenty years.

**Table 1. Summary of Project Tasks**

Task	Description	Status
Task 100	Project Coordination	In progress
Task 200	Data Collection & Review	October 2014
Task 300	Facility Assessment	January 2015
Task 400	Alternatives Analysis	March 2015
Task 500	Capital Improvement & Implementation Plan	In progress – Apr 2015
Task 600	Preliminary Design of Phase 1 Improvements	June 2015



This memorandum provides general descriptions of the major CIP projects proposed for the Phase 1 improvements and a summary of the preliminary cost estimates.

## CIP Project Descriptions

A workshop was conducted with City staff on March 31, 2015 to review CIP project descriptions and recommendations for prioritizing the projects. Based on results of the discussions during the workshop, the project team developed a proposed list of projects to be implemented in the Phase 1 improvements at the BWTF. The proposed improvements consist of the seven (7) major projects listed below:

- Pretreatment Basin Improvements
- Pretreatment Building Addition
- Filter Improvements
- Filter Valve Replacement Improvements
- Residuals Handling Improvements
- Power Reconfiguration Improvements
- Outdoor Tanks Improvements

In addition to the major projects listed above, a number of miscellaneous projects were also identified for Phase 1 implementation. These miscellaneous projects are referred to as the “balance of Phase 1 projects” and are organized by facility area.

### **Pretreatment Improvements Project**

The pretreatment system at the BWTF consists of rapid mix, flocculation, and sedimentation. The entire pretreatment process will be upgraded to enhance the BWTF’s treatment capacity. New pretreatment trains will be constructed using existing Sedimentation Basin Nos. 2 and 3 by installing new concrete walls and floor slabs within the basins, with a new center wall dividing each basin into two separate sedimentation basins. Plate settlers will be installed into each basin resulting in four new high-rate sedimentation basins with each basin rated at 10 million gallons per day (mgd). Rapid mix chambers will be constructed for each pair of basins, with new three-stage flocculation zones installed in each basin. New sludge collector systems will be installed below the plate settlers to remove settled solids. Access walkways with handrail will be installed above the treatment basins for mounting flocculator motor drives and providing access for operation and maintenance. Existing basin influent and effluent piping and valves will be reconfigured to distribute raw to and settled water from the basins.

### **Pretreatment Building Addition Project**

A building enclosure is proposed to be constructed above the new pretreatment basins. The proposed building footprint will only cover the plate settler zone with the rapid mix chambers and flocculation zones remaining open to the environment. The building enclosure would prevent the formation of ice on the surface of the water in the vicinity of the plate settlers and would also provide safe access to the plate settlers for cleaning during inclement weather. The new building will match the architectural style of the existing site architecture and consist of masonry walls, concrete double tee roof, skylights and windows for natural lighting, interior lighting, and



access doors. The project team will also evaluate the cost impact of using alternative building materials to enclose the entire pretreatment basins. Furthermore, the team is also considering layouts that will connect the existing filter building and provide covered access to the DAF building along with the new residuals handling building.

## **Filter Improvements Project**

The BWTF's eight gravity filters were constructed in two phases – four with the initial construction of the facility in 1962 and four during capacity improvements in 1976. The underdrains in the second generation of filters, Filter Nos. 5 through 8, are in good condition and suitable for continued service based on observed filter performance and investigation of Filter No. 6 completed in October 2014. The underdrains in the first generation of filters, Filters Nos. 1 through 4, are also assumed to be in good condition and will be further assessed in the fall of 2015. Under this premise, the filter improvements project will mainly consist of modifications that will extend their service life and maintain their treatment capability. The modifications consist of:

- Applying new protective concrete coatings to the filter walls and troughs to repair concrete deterioration and prevent further damage from low alkalinity water
- Replacing filter media including gravel, sand, and anthracite
- Replacing the surface wash arms and piping inside the filters
- Adding weir plates to the concrete backwash troughs

At some point in the future, the existing clay tile underdrains will need to be replaced in all of the BWTF filters and are recommended to be converted to gravel-less design with air scour with new backwash troughs. The future work will be included in the 20-year CIP planning for the BWTF.

## **Filter Valve Replacement Project**

The BWTF's Pipe Gallery contains a number of process valves and actuators that have reached the end of their service lives and are no longer providing the level of reliability required for the BWTF treatment process. The process valves and actuators that will be replaced are largely comprised of butterfly type valves with piston type pneumatic actuators used for operating the filters. Approximately fifty (50) valves ranging in size from 6 inch to 36 inch are proposed to be replaced. New pneumatic actuators will be provided for all valves providing open/close service and electric actuators will be provided for all valves providing modulating service. The compressed air system used to operate the pneumatic valves has also reached the end of its service life and will be replaced in its entirety including new air compressors, receiving tanks, air dryers, and compressed air piping.

## **Residuals Handling Project**

The residuals handling strategy at the BWTF has evolved from the initial objective of thickening residuals (sludge) to an emphasis on dewatering residuals for hauling and disposal. The change in approach is primarily due to considerations for implementing dewatering at the site in the future and the recent consolidation of two of the City's liquid waste hauling contractors and the subsequent increases to hauling and disposal costs. The project team is currently refining

the scope of the residuals handling project to include consideration of type of mechanical dewatering equipment, its location, onsite drying and storage options, and ultimate disposal.

For the purposes of the preliminary cost estimate, the conceptual design of the residuals handling system is based on a new combination gravity belt thickener (GBT)/ belt filter press (BFP) installed in a new building located adjacent to the SBE Basin. The GBT/BFP can thicken sludge prior to routing to the lagoons/drying beds, or dewater residuals that can be hauled offsite for disposal. The new residuals building is assumed to be masonry construction with the following provisions:

- A combined GBT/BFP unit
- A buried equalization tank to receive underflow from the pretreatment basins
- An interior parking bay for a roll-off container or end-dump trailer for hauling dewatered residuals
- Storage areas for ancillary equipment, i.e. polymer mixing and feed systems, sludge pumps, etc.
- Transfer piping to the existing drying beds and lagoons to provide a backup discharge location to allow for operating the GBT portion of the unit (i.e. thickening only and not dewatering) or direct discharge to the lagoons

## Power Reconfiguration Project

One of the primary recommendations resulting from the project's Facility Assessment is to reconfigure the overall power distribution system for the BWTF to eliminate equipment past the end of its useful life and to increase the reliability of the overall facility. The power reconfiguration project will consist of the following modifications:

- Remove electrical equipment that is at the end of its service life
- Use the DAF switchgear as the primary plant electrical distribution point, with radial feeders to motor control centers (MCCs) distributed through the facility
- Modify feeders to some MCCs to reduce "daisy-chain" power feeds and improve reliability and maintainability
- Provide a new diesel generator with capacity to power the entire facility
- Provide for a future means to deliver power from the hydropower plant into the water plant electrical distribution system

## Outdoor Tanks Improvements Project

The BWTF site has a number of large outdoor above-grade steel tanks. Three of the tanks are in need of repairs including the two clearwells and the Wash Water Tank. The scope of outdoor tank improvements consists of the following:

- Sand blast and paint exterior of Clearwell No. 1
- Sand blast and paint interior and exterior of Clearwell No. 2
- Sand blast and paint exterior of Wash Water Tank
- Replace up to 20 percent of the steel roof rafters in Clearwell No. 2



## Cost Estimates

Table 2 summarizes the cost estimates for the proposed Phase 1 improvements. The estimates are organized into two categories, which are the major Phase 1 projects and the balance of Phase 1 projects (organized by facility area). The preliminary prioritization for the major Phase 1 projects is reflected in the table below in descending order.

The estimated construction cost of the major Phase 1 projects is \$20.9 million with the balance of Phase 1 projects estimated at \$1.5 million. The total estimated construction cost for the Phase 1 improvements is \$22.4 million. Estimates only reflect capital costs and do not currently reflect the City's administrative, legal, engineering design, and construction administration costs that should be considered in developing total project costs.

**Table 2. CIP Prioritization Summary**

Prioritized Phase 1 Projects	Estimated Cost
Pretreatment Basin Improvements	\$ 10,508,000
Filter Improvements	\$ 1,562,000
Power Reconfiguration Improvements	\$ 2,500,000
Residuals Handling Improvements	\$ 2,500,000
Outdoor Tanks Improvements	\$ 800,000
Filter Valve Replacement Improvements	\$ 1,660,000
Pretreatment Building Addition	\$ 1,406,000
<b>Total</b>	<b>\$ 20,936,000</b>

Balance of Phase 1 Projects by Facility Area	Estimated Cost
General	\$ 100,000
Chemical Building	\$ 64,000
DAF Building	\$ -
Filter Room	\$ 396,000
Floc/Sed Basins	\$ -
Operation and Maintenance	\$ 68,600
Outdoor Equipment	\$ -
Outdoor Tanks	\$ -
Pipe Gallery	\$ 485,400
Pump Building	\$ -
Site Civil	\$ 385,000
<b>Total</b>	<b>\$ 1,499,000</b>