

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

MEETING DATE: February 24, 2014

AGENDA TITLE: Informational Item –Wastewater Utility Capital Improvement Program (CIP) Preview

PRESENTERS:

Jeff Arthur, Director of Public Works for Utilities
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Chris Douville, Wastewater Treatment Manager
Douglas Sullivan, Engineering Project Manager
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EXECUTIVE SUMMARY

This information item is intended to provide an update regarding Wastewater Capital Improvement Program (CIP) issues ahead of the formal budget process by providing:

- ❖ Background information
- ❖ Flood update
- ❖ Project updates
- ❖ Schedule of key milestones

The formal CIP budget discussion will begin in April with a WRAB recommendation scheduled in June. Therefore, no formal action by the WRAB is requested at this time.

BACKGROUND

In 2009, City staff completed the Wastewater Utility Master Plan (WWUMP). The WWUMP is an overarching document that is intended to present key issues, programs, projects, and associated budgets for the City's Wastewater Utility including the collection system, wastewater treatment plant, and associated water quality and support programs. The WWUMP is supported by three primary planning documents for the Wastewater Utility: Wastewater Collection System Master Plan (WWCSMP), Wastewater Treatment Plant Master Plan (WWTPMP), and the Water Quality Strategic Plan (WQSP).

The mission of the Utilities Division 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. In general, the planning process for the Wastewater Utility focuses on identifying opportunities that continue the high level of service provided to its customers and evaluating the associated cost of the opportunities. The opportunities and

recommendations resulting from the planning process take the form of capital construction projects; system rehabilitation and repair projects; preparing systems and operational processes that anticipate future regulations; and evaluating staffing needs. Wastewater and water quality planning projects, such as the WWTPMP, WWCSMP, and WQSP are the primary tools that provide the detailed analysis that result in the opportunities and recommendations contained within the WWUMP.

A series of guiding principles, policies and implementation measures were used to define the planning process for the Utility. The guiding principles for the WWUMP are based on Boulder's planning approach to community sustainability through evaluating social, environmental, and economic impacts associated with various program and projects within the city. Specifically, the guiding three principles for the WWUMP are:

- Protect Public Health and Safety
- Protect Boulder's Natural Resources and the Environment
- Maximize the use of the Wastewater Utility's Funds

In general, the policies that support the guiding principles noted above are defined by the Boulder Revised Code (BRC) and the Boulder Valley Comprehensive Plan (BVCP). The WWTPMP, WWCSMP and the WQSP provide the implementation measures by defining planning elements, requirements, recommendations, and, where applicable, identify capital improvement projects.

The Water Resources Advisory Board (WRAB) accepted the final Wastewater Utility Master Plan by a 5-0 vote at its May 18, 2009 meeting. At its December 17, 2009 meeting, Planning Board voted 6-0 to recommend City Council acceptance of the Wastewater Utility Master Plan and approve the revisions to the BVCP Wastewater Utility Master Plan Summary. On February 2, 2010, City Council voted 6-2 (with one absent) to accept the Wastewater Utility Master Plan.

The majority of the Wastewater Utility CIP projects and programs were identified in the WWUMP, and in previously completed master plans. The Wastewater Utility was significantly impacted by the September 2013 flood event – specifically in the wastewater collection system. As a result, City staff is in the process of updating the Wastewater Utility CIP to include several new projects and programs to specifically address the damage that resulted from the flood event.

ANALYSIS

The Wastewater Utility Master Plan (WWUMP) includes a comprehensive list of Wastewater Utility projects to be completed during the 20-year planning period. These include wastewater treatment plant capital and maintenance related projects, as well as wastewater collection system capital and maintenance related projects. The Wastewater Utility Fund CIP has numerous line items identifying various projects for the WWTF and the wastewater collection system. The significant CIP expenditures fall into the following three categories:

- WWTF Capital Projects
- WWTF Rehabilitation Projects
- WWCS Rehabilitation Projects

Wastewater Treatment Facility

There will be several critical wastewater treatment facility (WWTF) projects in various stages of completion over the next six years. These projects will address a variety of issues in the following areas: discharge permit requirements, instrumentation and controls, asset management, and maintenance and rehabilitation projects.

The 6-year CIP includes funding for two permit driven projects in the 2015–2020 CIP to address more stringent CDPHE effluent discharge regulations. The City's new WWTF discharge permit became effective May 1, 2011 and includes some new and more restrictive effluent limits for various parameters. The permit also includes a compliance schedule for some of these parameters which will allow the City adequate time to design and construct these new treatment facilities. Utilities staff completed a Nutrient Compliance Study (NCS) in 2012 that estimated the costs of three future WWTF permit driven projects. These three permit changes are associated with the current permit, Regulation 85, and Regulation 31.

The first project will address lower nitrogen and ammonia effluent limits identified in the current discharge permit. This project is funded at approximately \$4,000,000 with design in 2014, construction in 2015/2016 and start-up in 2016. City staff awarded the design contract in January 2014 to meet CDPHE requirements for the design's completion by December 2014.

The second permit related project will involve the design and construction of new treatment facilities to meet more stringent phosphorus effluent limits that are part of Regulation 85, which will likely be required as part the projected 2020 permit cycle. The NCS estimated total cost associated with the phosphorus improvements was \$20,000,000. The design of these facilities is currently scheduled for 2018/2019 with construction to follow in 2020/2021. The Regulation 31 improvements are anticipated between 2027-2031, and therefore, are not addressed in the memo.

Utilities staff has identified the need for significant instrumentation and controls (I&C) upgrades at the WWTF. Utilities completed a Process Automation System (PAS) Strategic Plan in 2013 which identified fourteen I&C projects at a total estimated cost of \$6,000,000. These projects were organized in three levels of prioritization deemed critical, high, and medium. The I&C projects are funded at approximately \$600,000 per year for the next 10 years in the CIP.

In addition to the I&C upgrades described above, City staff has identified numerous WWTF electrical improvements that are needed to replace aging electrical infrastructure. These facilities include several motor control centers (MCC's) load centers, and switchgear. The estimated cost of these improvements is estimated at \$1,300,000. Design of these improvements is scheduled in 2016 with construction scheduled in 2017.

The WWTF has two anaerobic digesters that treat the solids removed from primary and secondary treatment processes. The secondary digester is a 90-foot diameter storage tank which utilizes a floating cover to store methane gas released during the digestion process. The gas is used in the facility's cogeneration engines to provide heat and electricity for the facility. The digester cover has tipped twice during the last seven years; once during the Liquid Stream Upgrades project (2006-2008), and again during the 2013 flood event when moisture penetrated the cover and caused an imbalance. When the cover tips, the secondary digester must be taken off-line, cleaned, inspected and the guides repaired. During this time, staff has no redundancy in the digestion

process with the secondary tank off-line. Repairing the guides is a temporary fix as there are structural problems with the interface between the tank walls and the cover. Utilities staff has identified a CIP project to provide a permanent solution to replace the secondary digester floating cover at an estimated cost of \$2,000,000.

IBM Lift Station

In 2014, Utilities will complete design improvements for the IBM Lift Station to address CDPHE's requirements regarding overflow protection. Over the last few years, Utilities staff has been addressing various aspects of the lift stations needs. In 2012, Utilities completed an evaluation of the IBM Lift Station. The design was initially scheduled to follow the study, but was postponed to allow the completion of an inflow and infiltration (I&I) study of the drainage basin tributary to the lift station. The purpose of the I&I study was to quantify the volume of rainfall induced I&I entering the collection system during storm events. Following the I&I evaluation, additional field tests were conducted including smoke testing, dye testing and manhole inspections. Utilities has budgeted \$100,000 for the design and \$1,000,000 for the construction of the IBM Lift Station Improvements in 2015 and 2016 respectively. The funding for this project is a carryover from previous years as this project's design and construction has been postponed. Utilities staff anticipates the need for an additional \$100,000 to supplement the current funding.

Wastewater Collection System Monitoring

Utilities staff completes a flow monitoring program about every 10 years to quantify the inflow and infiltration (I&I) component of the wastewater flow during rainfall events. The purpose of the I&I investigation is to determine the volume and the locations of stormwater entering the wastewater collection system. This analysis is then used to identify recommended improvements to the wastewater collection system to minimize the rainfall component entering the system. During the September 2013 flood event, the total flow measured at the WWTF was in excess of 50 million gallons per day (mgd) for a 6-day period. This flow is over four times the average annual flow of 12 mgd recorded at the WWTF in 2012. Funding of \$300,000 in 2015 is being considered to complete a comprehensive updated I&I investigation of the wastewater collection system to identify potential sources of this extraneous flow.

Wastewater Collection System Condition Assessment

In 2014, Utilities staff will begin implementing an expedited condition assessment program for the wastewater collection system. Currently, condition assessment data is available for approximately 15 to 20 percent of the collection system. The goal of the condition assessment will be to inspect the entire collection system at a defined frequency. The information generated from this effort will then be used to guide the implementation of the City's sewer rehabilitation programs.

The cost of completing one full condition assessment cycle has been estimated at \$3,800,000. Industry guidance suggests that condition assessments be considered at a recurring interval ranging from every 3 to 10 years. Because of the age of the city's wastewater collection system, it is recommended that the initial condition assessment cycle be expedited at the 3 year interval and relaxed thereafter. This expedited rate is also necessary to identify and address any flood-related damage in a timely manner. The cost of this program is therefore \$1,200,000 per year from 2015 through 2017, and \$750,000 per year thereafter and these costs are being considered for budgeting in the CIP.

Wastewater Collection System Rehabilitation

The wastewater collection system includes approximately 1.9 million feet of sewers (354 miles). Utilities staff has utilized a cured-in-place-pipe (CIPP) technology to rehabilitate these sewers for the last 10 years. The wastewater collection system rehabilitation program has been funded at approximately \$500,000 per year, which permits the lining of about 20,000 feet of sewer. It is recommended that the lining program be suspended in 2014 and the money used to fund the start of the condition assessment program. The condition assessment data will then be used to develop priority areas for the rehabilitation program in future years. Consideration is being given to increase the on-going budget for the sewer rehabilitation program to \$1,000,000 per year.

Wastewater Collection System Manhole Rehabilitation

The wastewater collection system includes approximately 9,800 manholes. Utilities staff has replaced structurally deficient sewer manholes for the last five years. The manhole rehabilitation program has been funded at approximately \$100,000 per year, which permits the replacement of about 10 manholes. Upon completion of the upcoming collection system condition assessment, Utilities staff will develop a recommended approach for the future manhole rehabilitation program. It is anticipated that the condition assessment program will reveal a need for significantly increased rates of manhole rehabilitation, therefore utilities staff anticipates to fund the 2015-2020 CIP manhole rehabilitation program at \$400,000 in 2015, increasing to \$600,000 by 2020.

Wastewater Interceptor Condition Assessment

At 42" in diameter, the wastewater collection system interceptor is the City's largest sewer. The interceptor collects the majority of the City's wastewater and conveys it to the WWTF. It therefore represents the single most critical pipeline in the collection system. However, apart from some isolated evaluations, it has not undergone a systematic and thorough inspection since its construction in the 1960's. Based on utilities staff experiences during the flood there is also the potential that flood debris has accumulated in the interceptor. This project entails performing a multi-sensor robotic inspection of the interceptor to gather detailed information on the structural condition of the interceptor and to quantify the amount and location of debris trapped in the pipeline. The cost of this project has been estimated at \$300,000 and would be funded by a 2014 budget supplemental request.

Wastewater Interceptor Debris Removal

The aforementioned wastewater interceptor condition assessment will yield detailed information on the location and quantity of debris that has accumulated in the interceptor. This data will be used to advise a subsequent project to remove the debris. Utilities staff have been in contact with contractors who specialize in the removal of debris from large diameter interceptors, and estimate the cost of the debris removal at \$200,000 and would be funded by a 2014 budget supplemental request.

Wastewater Interceptor Alignment at 61st Street

A large section (over 100 feet) of the interceptor is currently exposed in Boulder Creek at a location on the west side of 61st Street. The interceptor is vulnerable in this condition because the embankment that formerly protected the pipe has been washed away. This damage occurred during the September 2013 flood event when increased Boulder Creek flows scoured away the creek's north embankment exposing the interceptor. This section of the interceptor will have to be reconstructed in a new alignment offset from the creek to provide a stable long-term solution. The

cost associated with the interceptor reconstruction is estimated at \$350,000 and would be funded by a 2014 budget supplemental request.

Asset Management

The Utilities Division has developed a comprehensive asset management system that provides details regarding component age and condition. The proposed CIP assumes funding for the replacement/rehabilitation of existing Utilities assets at a level of 75 percent of the predicted rate based on master plan recommendations. Staff believes this level of replacement/rehabilitation will be adequate and sustainable since renewal and rehabilitation techniques and approaches can be accomplished at a lower cost than complete replacement.

The Wastewater Utility asset management database includes identified individual assets for both the WWTF and the wastewater collection system. In addition to the asset's age and condition information, the database utilizes a useful life calculation to estimate the remaining useful years of each asset that has a value of at least \$5,000. The asset management information is used as planning tool to directly advise the CIP regarding the various project recommendations and associated timing of the necessary improvements.

NEXT STEPS

Budget Schedule

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

WRAB Preliminary CIP Budget Discussion - April 21, 2014

Budget Guidelines to Departments - April 2014

WRAB Draft CIP Review - May 19, 2014

Proposed Budget Submittal to City Manager - May 2014

WRAB Recommendation on CIP/Budget - June 16, 2014

Departmental Budget Review by City Manager - May/June 2014

Planning Board Recommendation on CIP - August 2014

City Council Study Session on CIP - August 2014

City Council Study Session on Budget - September 2014

City Council Consideration/Adoption of Budget – October/November 2014