PUBLIC WORKS AND UTILITIES
MEMORANDUM #09-08

DATE: February 12, 2009

TO: Honorable Mayor Kathleen M. Novak and City Council Members

FROM: William A. Simmons, City Manager
Raymond Reling, Acting Director of Utilities

SUBJECT: Bull Reservoir Outlet and Liner Emergency Repairs Updates

BACKGROUND:

As the council is aware, on June 24th the asphalt liner for Bull Reservoir was severely damaged near the outlet works that discharges the treated effluent from the Waste Water Treatment Plant (WWTP). Since that time, Council has authorized four contracts to facilitate the repairs. URS Corp was contracted to complete the design, J&T Consultants were selected for the construction management services, BT Construction, Inc. was hired to complete the construction and Joseph A. Cesare and Associates, Inc. was chosen for the materials testing. A more complete timeline is attached on pages 3 & 4.

On October 14th, the City of Northglenn was given approval for the completed design from the Colorado State Division of Safety of Dams. Shortly thereafter, as part of the dewatering process, staff took soundings of the reservoir bottom at the repair area and discovered an inaccuracy in the anticipated depth. This discovery halted the project. A survey of the reservoir bottom was initiated with the conclusion that the initial dewatering plan would not work.

J&T was asked to re-evaluate the dewatering plan and develop possible alternatives. The best option involves building a coffer dam between the two peninsulas creating two cells, the "South Cell" that will be dewatered allowing for construction and the "North Cell" that will keep the reservoir partially operational. Further details may be found in the attached memo from J&T on pages 5-7.

BUDGET/TIME IMPLICATIONS:

The change in scope is anticipated to increase project costs $175,000 raising the total project costs form $978,000 to $1.153 million. Staff proposes the use of funds from the Connection Charges to cover the cost of the increase. The full breakdown is incorporated on page 8. The construction contract and the addendums for URS and J&T will be brought back to Council for approval. The addendums are scheduled for February 26th and the construction contract is scheduled for March 26th or April 9th. The project is therefore anticipated to be substantial complete by mid August.

WATER SUPPLY IMPLICATIONS:

Model runs show a decrease in available water from 1200 acre-feet to 200 acre-feet and a decrease in lease water from 1400 acre-feet to 200 acre-feet. Water Resources staff with the

Plan (SWSP) to supply water to compensate for these decreases. Assuming the SWSP is successful, approximately 1000 acre-feet should be available.

STAFF REFERENCE:

If Council Members have any comments or questions, they may contact Raymond Reling at (303) 450-4049 or rreling@northglenn.org.

Bull Reservoir Project Timeline

6/24/08:

- The failure of the asphalt liner occurred.
- Colorado State Division of Safety of Dams is informed (SEO).

6/25/08:

- Design proposals requested from URS Corp and Joseph A. Cesare and Associates.

6/27/08:

- Bypass piping drawings submitted to the SEO for approval. Design and Construction were done in-house.

6/30/08:

- Bypass piping installed and operational.

7/10/08:

- CR-104 authorizing URS Corp to design the permanent repairs to the liner and outlet works ($44,100).

7/28/08:

- Pre-qualification notice to prospective bidders for construction of the project.

7/29/08:

- 60% design package submitted to City and SEO by URS.

8/5/08:

- 90% design package submitted to City and SEO by URS.

8/18/08:

- Requests for Proposal for the Construction Management (CM) of the project.

8/20/08:

- Invitation for Bid 2008-34 (for construction) sent to the pre-qualified contractors.

8/21//08:

- Mandatory pre-bid meeting held at the WWTP.

8/27/08:

- 100% design package submitted to City and SEO by URS.

8/29/08:

- RFP for the CM due (4 proposals were received J&T consulting was selected).
- IFB for the construction due (2 proposals were received BTC was selected).

9/17/08:

- InfraSource damages reservoir discharge line to Bull Canal during roadway construction.

9/25/08:

- CR-130, 131 & 142 authorized CM contract for J&T ($59,000), authorized Construction Contract with BTC ($700,000) and authorized Addendum to URS contract of $75,500 for the investigation and support during construction.
- CB-1672 supplemental appropriation for the project. $498,000 was taken from the 2008 Capital Improvement Fund and additional $480,000 was used from the Connection Charges Fund.

10/1/08:

- Began discharge to Big Dry Creek and draining of the reservoir.

10/9/08:

- CR-147 authorizing material testing services from Cesare ($15,000).

10/14/08:

- SEO provides approval for the design and green lights the construction.

10/15/08:

- Pre-construction meeting held at WWTP.

10/23/08:

- Acting City Manager notified Council of the problems with de-watering and the need for further investigation.

10/27/08:

- InfraSource finished repairs to the Bull Canal Discharge line.

11/20/08:

- American West Land Surveying Co. began the survey of the reservoir.

11/26/08:

- Coring samples are taken from the construction area.

12/12/08:

- Survey was completed.

1/16/08:

- URS made the determination that full exposure of the liner is required for adequate repairs.

2/2/09:

- J&T provides de-watering options.

2/4/09:

- URS provides draft failure analysis report.

J&T Consulting, Inc.

Bull Reservoir – Emergency Repairs

Date: February 2, 2009 File No.: 08-124
Subject: Alternatives for dewatering and subsequent repair of Bull Reservoir

Over the past three months several options have been evaluated to determine the most cost effective method of dewatering the existing Bull Reservoir to allow for the required repairs to the embankment and liner and to maintain a minimum of 500 acre-feet of storage available to the City of Northglenn.

Additional survey information was obtained for the entire reservoir to help develop a dewatering plan as well as locate possible coffer dam locations and estimate reservoir storage volumes.

This memo summarizes our recommended alternatives for dewatering the reservoir, opinions of probable cost for these options, recommendations for rebidding the project, and a brief summary of the alternatives that were evaluated but not selected.

Recommended Alternatives for Dewatering Bull Reservoir

The recommended options for dewatering Bull Reservoir and constructing the emergency repairs center around an earthen coffer dam constructed at either the repair area (option 2) or between the peninsulas that separate the North cell from the South cell (option 1). The attached sketches depict these options. We have also provided an opinion of probable cost for each option.

We recommend the City of Northglenn proceed with constructing a coffer dam between the peninsulas in the reservoir (option 1) for the following reasons.

1. The overall cost for this option is slightly lower (4%) than option 2.
2. The majority of the coffer dam material can be placed in the dry. There is much greater chance of constructing a successful coffer dam if the embankment material can be placed in the dry.
3. Option 1 does require significantly more effluent bypass and dewatering pipe than option 2 however there would likely be some salvage value to this pipe.
4. We feel that option 1 provides a significantly safer work environment. If the coffer dam were to leak or breach, the entire south cell of Bull Reservoir could attenuate these flows.
5. The option 2 coffer dam effectively limits the work area. At this point the

extent of the liner replacement has only been estimated. Once the reservoir is dewatered, if it were determined that additional liner needed to be repaired, outside the limits of the coffer dam, then additional coffer dam would need to be constructed at a significant cost.

6. Construction of the option 2 coffer dam requires the embankment material be placed over the asphalt lining. If the asphalt lining where damaged below the water surface of the reservoir, there would be no way to repair this liner without once again dewatering the entire reservoir.

Recommended Items for Re-Bidding the Dewatering and Emergency Repairs Project:

1. Prepare basic design drawings and specifications for the coffer dams.
2. Optimize height of coffer dams to meet the exact temporary storage requirements.
3. Prepare basic design drawings and specifications for effluent pipe. Coordinate design and dewatering requirements with City's existing effluent discharge requirements to minimize the size of the discharge pipe.
4. Conduct soil testing of onsite materials to insure suitability for construction of coffer dam.
5. Confirm that the State Engineer's Office for Dam Safety (SEO) does not take jurisdiction over the coffer dam.
6. Confirm that the effluent pipeline routing and discharge points are acceptable with SEO and CDPHE.
7. Update emergency repair drawings, specifications, and bid quantities to reflect information obtained in the recent survey of the reservoir. Provide additional information on granular bedding material and asphalt liner materials to prospective bidders.

Alternatives that were evaluated but not selected:

1. Use of a "hydro barrier" at various locations in the reservoir as opposed to construction of an earthen coffer dam.
    - A hydro barrier was originally considered for erection around the work zone however the hydro barrier can only retain 4 - 6 feet of water when freeboard and wave action is taken into account. Regardless of the

location selected, the hydro barrier cannot provide the minimum storage needed (500 acre-feet) and in most cases cannot even maintain the current water surface elevation of the reservoir.

2. Use the existing emergency outlet structure to dewater the reservoir and make future releases from the reservoir.
    - After discussion with CDPHE, it was determined that this was not a permitted discharge point and as such would not be allowed without significant time delays for permitting.
    - Significant cost for additional infrastructure (pipeline, measurement structures, etc..) would have been required to make this option feasible with no guarantee the option would have been approved by CDPHE.
3. Construction of a new measurement structure and screening facility (i.e. headworks) to allow effluent flows to bypass Bull Reservoir entirely.
    - This option was desirable as additional infrastructure cost associated with this option would provide a long term benefits for the treatment facility however, the cost associated with this additional infrastructure and the time needed for additional permitting and design far exceed the cost associated with the recommended options.
4. Redesign of emergency repairs that would not require dewatering of the reservoir.
    - Various options were presented and evaluated for construction of the new reservoir inlet that would not require further dewatering.
    - While it was possible to construct the new inlet/outlet without further dewatering for similar costs as the infrastructure currently proposed, it was determined by the City's design consultant that the reservoir needed to be completely dewatered to the toe of the upstream embankment slope to construct the anticipated repairs to the liner and embankment.