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Water Tank Site Evaluation Memo
Lakeview Reservoir (Res 113) Two Zone System

MADISON WATER UTILITY
October 22, 2014

Introduction

The purpose of this report is to perform an evaluation between the currently proposed single structure, two zone reservoir option at the Lake View site, the two separate reservoir structure option for each of zones 5 and 6E, and the zone 6E reservoir with booster station option.

1.0 Evaluation Matrix

Part of the evaluation was conducted using the evaluation matrix shown in the table below. The matrix ranks each alternative based upon economic considerations, footprint, and reliability.

Evaluation Matrix

(Scale 1 – 3: 1 = Least Desirable, 3 = Most Desirable)			
Alternative	Two Zone Reservoir	Zone 5 Reservoir + Zone 6E Reservoir	Zone 6E Reservoir + Booster Station Upgrade
Economic Considerations	3	3	3
Impact to Environment	3	1	2
Public Feedback	3	1	1
Permitting/Timeline	3	1	1
Totals	11	6	5

Economic Considerations

Cost must be considered when determining which alternative should be selected for this project. Capital costs and energy consumption were considered when evaluating each alternative. The capital costs for the two zone reservoir and the two separate structure reservoirs were higher compared to the capital cost of the zone 6E reservoir with booster station upgrade. The single, two zone option has a unique structure which will make up most of the capital costs for this alternative. Whereas most of the capital cost difference for the two separate structure option comes from additional watermain and access road construction, additional land purchase and an additional tank foundation. The energy consumption for the two zone reservoir and the two separate structure reservoirs are equivalent. Both options utilize water towers which inherently use very little energy. Since water flows into the tanks from system pressure, energy usage will be identical. The zone 6E reservoir with booster station upgrade will have the most energy consumption since a small amount of extra energy will be expended to pump water to zone 5.

Impact to Environment

There are environmental concerns with each alternative, including the footprint of the structure(s) and the impact of construction activities to the area. Each proposed location is within the 3 mile inclusion zone of the Dane County Regional Airport and will require a variance due to height limitation zoning. The separate zone 5 and zone 6E water tower structures will have the greatest environmental impact due to having a larger footprint since two site locations are needed for each structure. Also having two separate structures will require height zoning variances for each location. For the zone 6E reservoir and booster station upgrade scenario, the environmental footprint is less than the two separate structure scenario, however the existing booster station will need to expand and upgrade which increases the environmental footprint over the two zone reservoir single structure.

Public Feedback

Public comment from the Citizen Advisory Panel (CAP) and public meetings indicated that most people wanted only one tank instead of two separate tanks. Also during the CAP and public meetings, the residents expressed their concern that fire flow needs be met with elevated storage tank instead of a pumping system. They felt more comfortable with the reliability of an elevated storage tank and less comfortable with a system that relied on a pumping system that could suffer mechanical or electrical malfunctions.

Permitting/Timeline

Permitting requirements and project timeline delays were also evaluated between the alternatives. The separate Zone 5 and Zone 6E water tower structures will require the most permitting. This option will require additional DNR permitting and an additional height zoning variance. There will also be additional planning required for the two separate reservoir option which could delay the project for 2 years.

2.0 Cost Analysis

Another part of this evaluation looks at the costs associated with each alternative. The Engineer’s estimate for the project is \$4,500,000 for the design and construction of a two zone reservoir. The total capital costs associated with this project are listed in Tables 1 through 3.

**Table 1
 Two Reservoir Scenario at Lake View Site**

Item	Cost
Welded Steel Water Tower	\$5,200,000
TOTAL	\$5,200,000 *

* Bid price

**Table 2
 Two Separate Tanks Scenario**

Item	Cost
Watermain	\$250,000
Land Purchase	\$100,000
Access Road	\$150,000
Lake View Tower	\$1,400,000
Sherman Tower	\$2,700,000
TOTAL	\$4,600,000

Table 3
Zone 6E Reservoir and Booster Station*

Item	Cost
Booster Station	\$1,700,000
Zone 6E Reservoir	\$3,000,000
TOTAL	\$4,700,000

***DNR will most likely require a Zone 5 tank even with rehabilitated booster station due to NR 811.62 Volume and Pressure requirements.**

Maintenance costs over the 50-year life cycle were also considered for this evaluation. This is summarized in Tables 4 & 5 below. With the combined capital costs and present worth maintenance costs, the overall costs for each alternative are equivalent.

Table 4
50-Year Life Cycle Costs for Maintaining Water Tanks

Alternative Description	Maintenance Costs*	Present Worth
Two Zone Reservoir (One Structure)	\$7,829,900	\$2,975,250
Zone 6E Reservoir and Zone 5 Reservoir (Two Structures)	\$9,504,800	\$3,596,470
Zone 6E Reservoir and Booster Station	\$9,636,000	\$3,722,950

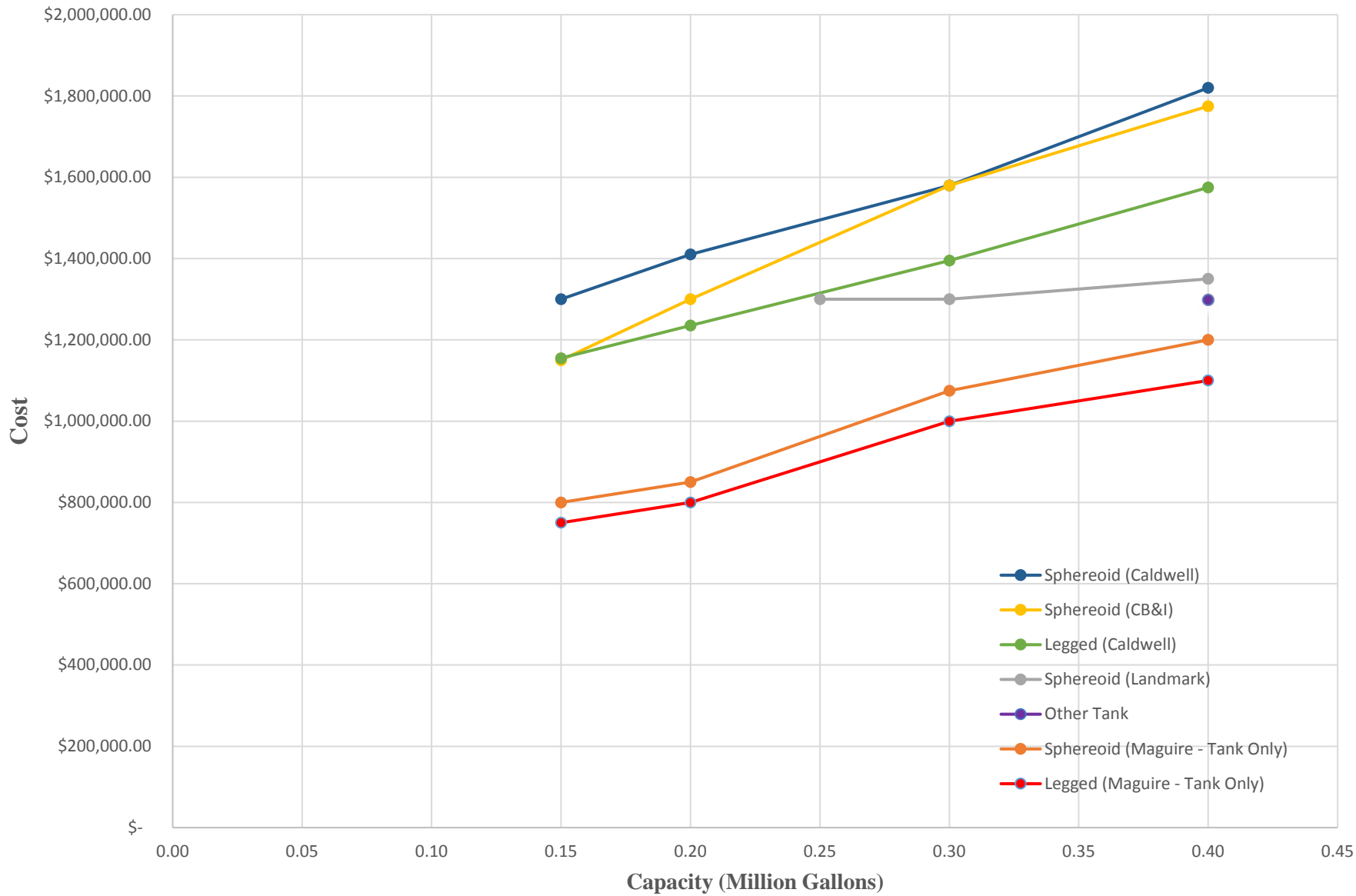
***Maintenance costs are converted to future value costs**

Table 5
Combined 50-Year Life Cycle Present Worth for Maintaining Water Tanks & Capital Costs

Alternative Description	Capital Costs	Combined Present Worth & Capital Costs
Two Zone Reservoir (One Structure)	\$5,200,000	\$8,175,250
Zone 6E Reservoir and Zone 5 Reservoir (Two Structures)	\$4,600,000	\$8,196,470
Zone 6E Reservoir and Booster Station	\$4,700,000	\$8,422,950

We also performed a cost analysis on different water tower sizes to see if there is any cost savings by going with a smaller tank for the Zone 5 reservoir. This is illustrated in Chart 1.

Chart 1
Water Tower Cost Analysis



3.0 Advantages and Disadvantages

This evaluation also considered the advantages and disadvantages of each option which are listed below.

Two Zone Reservoir

Advantages

- Smaller footprint since this is a single structure and would require only one parcel of land.
- No additional delay for planning and permitting.

Disadvantages

- Zoning variance required due to the proposed site locations being within the 3 mile inclusion zone of the Dane County Regional Airport.
- Possibly slightly increased capital cost due to complexity.

Zone 5 Reservoir & Zone 6E Reservoir

Advantages

- Simpler design.

Disadvantages

- Additional purchase of a one acre lot.
- Additional zoning variance due to the proposed site locations being within the 3 mile inclusion zone of the Dane County Regional Airport.
- Larger footprint due to building two structures on two separate parcels of land.
- There would be a 2 year delay due to additional planning, permitting, etc. for Zone 6E reservoir. This delay would lead to increased costs due to inflation.
- Location is outside the City of Madison. Additional time and cost will be needed for annexation or township approval for Zone 6E reservoir.

Zone 6E Reservoir and Booster Station

Advantages

- Lower capital costs.
- Lower overall height elevation may help with height zoning variance approval

Disadvantages

- Higher energy costs due to booster pump operation.
- Additional construction disturbance at the Lake View site to improve the existing booster station.
- Lower overall height may cause issues with the communications entities that utilize the existing tower.
- Emergency power would be required for the station.

4.0 Bidding Restrictions

Constructing large drinking water reservoirs is specialized work that is conducted by a handful of companies across the country. Additionally these companies also construct reservoirs for industry including manufacturing, oil, and other bulk storage. Reservoir contractors have a lot of options to choose from when considering work and due to current economic conditions they have plenty of work to keep them busy.

With that in mind, when they approach a project in Madison they look at local conditions and requirements. The Board of Public Works has a “Best Value Contracting” requirement that adds administrative costs and burden on any bidders. It has been communicated to Madison Water Utility that with this requirement in place, several contractors have chosen not to bid resulting in the receipt of a single bid for the Lake View Reservoir. Any time there is only one bid it brings into question the economics of that single bid. It is suspected that the \$5.2 million bid for the two zone Lake View Reservoir may be inflated by approximately \$500,000. There is no way to confirm this or verify this suspicion other than rebidding the project and hoping for more bidders.

One possibility to entice additional bidding and competition for the project is to remove the restrictions that are discouraging bidders from submitting bids. We are exploring the possibility with the City Attorney’s office and the City Engineer’s office of having an exclusion inserted into the City Ordinance that would eliminate the requirement for Best Value Contracting for Tank Construction and Tank Painting. If successful, this would quite possibly result in a reduced bid price for the project.

5.0 Summary

Based on conversation with water utility staff there are three alternatives to proceed with and they are as follows:

- **Alternative 1:** Award Contract as currently bid.
- **Alternative 2:** Change ordinance to increase possibility of additional bidders.
- **Alternative 3:** Reject bids and Bid the project with two options.
 - **Option-1:** original design with two reservoirs in a single structure.
 - **Option-2:** construct a single zone 5 reservoir at the existing site and begin planning for a second reservoir for zone 6E.

After meeting and conferring with Utility staff, it was determined that the recommended course of action would be to pursue Alternative 3. We recommend that the Water Utility reject all bids and rebid the project. The project would be bid after the Ordinance is revised to provide an exclusion for water reservoir construction and painting. The bid would provide two options, a) the original configuration of a two zone reservoir and b) a bid for a single elevated reservoir on the existing site. Based on the bids received, the Utility would have the option of continuing with the original concept of a two zone reservoir or starting the process of constructing two separate reservoirs. It is expected that the original project schedule could possibly maintained using Alternative 3.