

Montrose, SD Green Project Business Case

Green Reserve Project Type

The town of Montrose, SD distribution system improvements project is being funded in part through the Drinking Water State Revolving Fund Loan (DWSRF) Program. The town of Montrose currently provides water service to approximately 443 people. The project proposes to replace 4-inch cast iron pipe water lines with polyvinyl chloride (PVC) pipe and increase line sizes to a minimum of 6-inch diameter. Other improvements include 20 new fire hydrants and approximately 34 new gate valves. Because of the age and condition of the current distribution system, and considering the water loss average rate of 48 percent, replacing the water lines is critical to improving the water distribution throughout the city. The project will also address unaccounted for water loss rate which is higher than the industry-accepted limit of 15 percent. Replacing the water distribution system can be considered 'green' for water efficiency.

Documents submitted and reviewed by the State:

1. "Engineering Study for Water Distribution Improvements, City of Montrose South Dakota," by East River Engineering, July 2010

List of eligible Green Project Reserve components:

1. Line replacement = \$989,000.00
2. Auto Read Water Meters = \$80,500.00 (categorical)
3. Total project cost = \$1,069,500.00
4. Total DWSRF Loan/Principal Forgiveness = \$893,000/\$593,000
5. Total project cost eligible for Green Project Reserve = \$893,000

Green Reserve Project – Categorical Project:

The line replacement portion of the project is not considered categorically green as defined by the 2010 Clean Water and Drinking Water State Revolving Fund 20% Green Project Reserve: Guidance for Determining Project Eligibility (April 21, 2010).

Green Reserve Project – Business Case Evaluation:

As stated in the USEPA April 21, 2010 Guidance for Determining GPR Eligibility, for traditional projects that are not categorically green, for the project, or components of the project, to be counted towards the 20 percent requirement, the State project files must contain documentation that a clear business case for the project (or portion) investment includes achievement of identifiable and substantial benefits that qualify as Green Project benefits. The documentation should reference to a preliminary engineering or other planning document that makes clear that the basis upon which the project (or portion) was undertaken included identifiable and substantial benefits qualifying for the Green Project Reserve.

Green Project Reserve Type:

This project meets the water efficiency and energy efficiency components of the Green Reserve guidance.

Type Component Evaluation:

The water distribution system in the town of Montrose needs improvement. Although the original age of the water lines is unknown, the poor performance of the water line can be linked to the prevalence of aged 4-inch cast iron pipe (CIP) water main located throughout the city. The town's water is supplied by the Kingbrook Rural Water System. The water is metered by the Kingbrook Rural Water System prior to entering the town's distribution system. Based on the 2009 water usage records, the town of Montrose experienced an average of 48.33 percent water loss. The project will replace all 4 inch cast iron and PVC water main with a 6- and 8-inch PVC water main. Only the replacement of the cast iron lines will apply toward the Green Project Reserve.

Other improvements include the installation of up to 20 new hydrants and approximately 34 new gate valves. This project will improve the distribution of water throughout the city and reduce unaccounted for water loss rates to within the industry accepted standard of 15%.

Financial Component Evaluation:

The project was chosen because it will reduce unaccounted-for water losses to an acceptable level. In addition, water quality will be improved throughout the entire system. The City pays Kingbrook Rural Water System \$2.25 per 1,000 gallons of water. The average amount of water purchased per month is approximately 1,309,727 gallons, along with 300,000 gallons supplied from the city well, of which 48 percent of the total water, or 778,000 gallons on average, are wasted. The water system study for Montrose assumes that 50 percent of losses are attributable to water being lost from the distribution system. Un-metered usage and under reading meters are assumed to account for the remaining water loss. Using the assumption, the amount of water from the rural water system that will be recaptured monthly as a result of replacing the cast iron lines will be approximately 314,335 gallons. As a result, the city will realize a savings of \$707.25 per month, or \$8,487.00 per year as a result of the line replacement portion of the project.

The city has spent approximately \$16,000 since 2008 to repair water line breaks. The frequency of breaks, and the cost of repairs, will increase as the system ages.

Green Reserve Project – Evaluation Conclusion:

The State has determined that this business case identifies clear and substantial technical and financial benefits in accordance with USEPA guidance. As noted above, the green portion of the project will be \$893,000. The State contact is Mike Perkovich at 605-773-3128 or mike.perkovich@state.sd.us.

II. Existing and Future Conditions

Project Need and Planning Area Identification

The City of Montrose currently buys water from the Kingbrook Rural Water System in addition to maintaining a wet well capable of providing an alternate source of water. An agreement with KRWS was developed in 1991 and states that the minimum amount of water to be purchased by the city is 760,000 gallons per month. Montrose currently uses a 70,300 gallon water tower that was also built in 1991. Water purchased from KRWS is measured by passing through one of two meters, one located on the water main that feeds the water tower, and the other is located on the line that feeds the distribution system at times of peak demand.

Previous Engineering Reports identified a water usage rate of about 34,100 gpd (70 gpcd), a number arrived at by analyzing monthly water usage over a 6 month period. Previous reports also identify that the only water treatment performed by the City of Montrose is chlorination of the city well water prior to its introduction to the distribution system.

Through the analysis of system users' self-reported water consumption, the sold water quantities reported by Kingbrook Rural Water, and estimates of the water contributions from the wet well, the City of Montrose has determined that the current distribution system is experiencing steady and considerable losses. Monthly water usage data has

been collected for a majority of 2009 and has been analyzed to determine monthly water loss rates. The information is presented in Table II-1 below.

Table II-1

Month	Kingbrook Billed	City Well	Customer Reported	Loss (gal)	% Water Loss
Feb-09	1,432,000	300,000	784,000	948,000	54.73%
Mar-09	1,079,000	300,000	741,000	638,000	46.27%
Apr-09	1,310,000	300,000	833,000	777,000	48.26%
May-09	1,315,000	300,000	863,000	752,000	46.56%
Jun-09	1,468,000	300,000	962,000	806,000	45.59%
Jul-09	1,472,000	300,000	890,000	882,000	49.77%
Aug-09	1,645,000	300,000	880,000	1,065,000	54.76%
Sep-09	1,333,000	300,000	841,000	792,000	48.50%
Oct-09	1,147,000	300,000	816,000	631,000	43.61%
Nov-09	1,169,000	300,000	774,000	695,000	47.31%
Dec-09	1,037,000	300,000	765,000	572,000	42.78%
11 mo. total =	14,407,000	3,300,000	9,149,000	8,558,000	48.33%

The City of Montrose has also expressed concern over the apparent lack of adequate operating pressure in the current system. Most notably, the area along Elder Street running north along Second Avenue has been identified as the least adequate by city personnel. A pressure test recently performed in said area produced a static pressure reading of 38 psi (lowest observed) at the hydrant located at North Street and Second Avenue. When the flow hydrant located northeast of the static pressure hydrant was opened, the pressure at the hydrant located at Second Avenue and North Street fell to 0 psi while the flow hydrant discharged 158 gpm at an operating pressure of 1 psi. A complete map and table of fire flow data recorded throughout the City of Montrose can be found in Appendix C.

The most probably explanation for the area of poor performance is the prevalence of aged 4" CIP water main located throughout the city. A majority of the distribution system is

composed of 4" CIP water main with the only areas of exception being new housing developments and a stretch of equally aged 6" CIP water main running from the wet well to the city water tower. In addition, a majority of the 4" CIP water mains do not form proper distribution loops, and instead terminate at dead ends. The area of zero pressure identified earlier is one such area. The purpose of this report is to identify and propose potential rehabilitation options that would correct inadequate areas of water distribution in the City of Montrose.

Future Conditions

In order to provide the most economically feasible design to both existing and future residents of the City of Montrose, a projection of the city's population must be determined. It is recommended that the population be projected over a minimum period of 20 years, which, for this particular project, would be around the year 2030. This is done in order to ensure the cost of the project's construction incurred by the system's current users is balanced by the costs associated with expansion projects necessitated by the city's future increased population. Essentially, this design consideration maximizes the time between utility improvement projects while spreading costs over the longest time period possible.

To project the population of the City of Montrose, census data was collected for the period spanning from 1990 to 2006 and is presented in the following Table II-2.

A cost estimate for the Distribution System Alternative II option has been prepared and is presented in Table III-3 below.

Table III-3

Distribution System Alternative II Cost Estimate					
Item #	Description	Unit	Qty	Price	Total
1	Mobilization	LUMP	1	25,000.00	25,000.00
2	Furnish & Maintain Traffic Control	LUMP	1	3,500.00	3,500.00
3	Cut Asphalt (Full Depth)	LF	25664	2.50	64,160.00
4	Remove Asphalt Surfacing	SY	11406	2.10	23,953.07
5	Remove Fire Hydrant (disposal)	EA	20	365.00	7,300.00
6	F&I Project Staking	LUMP	1	7,800.00	7,800.00
7	F&I 8" Gravel Base Course	TON	4962	13.80	68,471.55
8	F&I 3" Asphalt Patch	SY	11406	18.00	205,308.00
9	F&I 8" PVC Water Main	LF	2869	19.00	54,511.00
10	F&I 6" PVC Water Main	LF	9963	16.00	159,408.00
11	F&I 8" Gate Valve & Box	EA	9	1,290.00	11,610.00
12	F&I 6" Gate Valve & Box	EA	25	910.00	22,750.00
13	F&I 8" MJ DI Cross	EA	1	510.00	510.00
14	F&I 8" MJ Sleeve	EA	2	280.00	560.00
15	F&I 8x6 MJ DI Cross	EA	6	545.00	3,270.00
16	F&I 8x8x6 MJ DI Tee	EA	6	375.00	2,250.00
17	F&I 6" MJ DI Cross	EA	2	421.00	842.00
18	F&I 6" MJ DI Tee	EA	32	364.00	11,648.00
19	F&I 6" MJ Sleeve	EA	10	230.00	2,300.00
20	F&I 6" Watermain Cap	EA	7	520.00	3,640.00
21	F&I 6x6x8 MJ DI Tee	EA	2	395.00	790.00
22	F&I 6x4 MJ Reducer	EA	2	230.00	460.00
23	F&I 6'-6" Bury Fire Hydrant	EA	20	2,420.00	48,400.00
24	F&I 1" Poly Water Service	LF	4125	9.80	40,425.00
25	F&I Auto Read Water Meters	EA	230	350.00	80,500.00
26	Water Service Line Reconnection	EA	125	273.00	34,125.00
27	Tie into Existing Watermain	EA	8	640.00	5,120.00
28	Cut & Tie into Existing Watermain	EA	3	960.00	2,880.00
29	Granular Pipe Bedding	TON	1662	11.60	19,280.27

Construction Total = \$910,771.89

Engineering Design: 66,400.00
 Staking and Inspection: 72,900.00

Total Project Cost = \$1,050,071.89