

Gayville, SD Green Project Business Case

Green Reserve Project Type

The town of Gayville, SD distribution system improvements project is being funded in part through the Drinking Water State Revolving Fund Loan (DWSRF) Program. The town of Gayville currently provides water service to approximately 420 people. This project proposes to replace cast iron pipe water lines (ranging from 4-inch to 6-inch) with polyvinyl chloride (PVC) pipe and increase line sizes to a minimum of 6-inch diameter. Other improvements include new gate valves, service lines, curb stops and fire hydrants. Because of the age and condition of the current distribution system, and considering the water loss rate of 20 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. "Water System Study Town of Gayville," by Arens Engineering, June 2008.
2. "Town of Gayville Purchased Water Usage Records (2008, 2009, and 2010 to date)," from Betty Putnam, Town Clerk, June 18, 2010.

List of eligible Green Project Reserve components:

1. Line Replacement = \$783,652
2. Total project cost = \$909,000
3. Total DWSRF Loan/Principal Forgiveness = \$900,000/\$480,000
4. Total project cost eligible for Green Project Reserve = \$783,652

Green Reserve Project – Categorical Project:

This 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% 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.

Technical Component Evaluation:

The water distribution system in the town of Gayville needs improvement. The original water system was installed in the 1910's and consists of 4- and 6-inch cast iron pipe. This pipe is in poor to fair condition. Several blocks of the original system were replaced in 1968, again with cast iron pipe. New housing developments added more cast iron mains in the late 1960's and early 1970's. The newer cast iron lines are in fair to good condition. More recently approximately seven blocks of PVC lines have been added to the distribution system for new housing or to loop dead-end lines. The town's water is supplied by the Clay Rural Water System. The water is metered by the Clay Rural Water System prior to entering the town's distribution system. Based on the 2009 water usage records, the town of Gayville experienced a 20 percent water loss. This project will replace all the cast iron lines within the distribution system and loop several dead-end lines. Only the replacement of the cast iron lines will apply toward the Green Project Reserve.

The City would like to replace the old cast iron water lines with polyvinyl chloride (PVC) pipe and increase the line sizes to a minimum of 6-inch. Other improvements include new gate valves, service lines, curb stops and fire hydrants. 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 Clay Rural Water System \$3.05 per 1000 gallons of water. The average amount of water purchased per month is approximately 1,135,000 gallons of which 20 percent, or 227,000 gallons, are wasted. The water system study for Gayville assumes that 40 percent of the losses are attributable to water being lost from the distribution system. Unmetered usage and under reading meters are assumed to account for the remaining water loss. Using this assumption, the amount of water that will be recaptured monthly as a result of replacing the cast iron lines will be approximately 91,000 gallons. As a result, the city will realize a savings of \$277.55 per month, or \$3,331 per year as a result of the line replacement portion of the project.

The city has spent approximately \$4,300 in the last two years to repair water line breaks. The frequency of breaks, and the cost of repairs, will increase as the system ages. By replacing the cast iron lines, the city is expected to save at least \$2,150 per year. Therefore, the total savings is estimated at \$5,481 per year. However, these numbers are based on assumptions and all the costs will vary over time.

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 \$783,652. The State contact is Mike Perkovich at 605-773-3128 or mike.perkovich@state.sd.us.

D. MONTHLY WATER LOSS ANALYSIS

The Town of Gayville water distribution system is metered and the water billing system is based on water use. The Town of Gayville implemented a water loss analysis program. The Monthly Water Loss Records are included in Exhibit C. The water loss analysis indicates that the water system has an approximate 9% water loss for 2004 to 2006. The water loss varied considerably through out the year, thus an annual water analysis was performed. Normal monthly variations are due to when the individual meters are read in relationship to when the rural water meter is read. The flushing of fire hydrants will cause a spike in the water loss analysis.

However, the Town of Gayville water distribution water loss was approximately 16% for 2007. In 2007, the Town of Gayville bought 14,939,000 gallons of water from Clay Rural Water System. The 2007 water loss was 2,323,000 gallons. The Town of Gayville buys the water from Clay Rural Water at a cost of \$2.85 per 1,000 gallons. The Town of Gayville water rate is \$2.85 per 1,000 gallons above the base minimum of 1,000 gallons. The Town of Gayville does not add a municipal water fee to Clay Rural Water District water rate its charges its customers use above the minimum 1,000 gallons per month minimum water consumption. Using the assumption that 40% of the water loss was due to line loss, 40% of the water loss was due to non-metered water use, and the final 20% of the water loss was due to under reading meters. The pipe line water loss would be 40% times 2,323,000 which equals 929,200 gallons. The expense for this water loss would be 929,200 G times \$2.85/1,000 gallons, which equals \$2,648.00. The non-metered water loss would be 40% times 2,323,000 Gallons, which equals 929,200 gallons. Assuming this water loss is split 40% Town water use for park watering, etc. and 60% water customer non-meter water use, the lost revenue from the water customers would be 0.6 times 929,200 gallons times \$2.85/ 1,000 Gallons, which equals, \$1,590.00. The final 20% of the water loss was assumed to be under read meters, this water loss would be 20% times 2,323,200 equaling 464,600 Gallons. The loss revenue from under reading meters would be 464,600 Gallons times \$2.85/ 1,000 Gallons which equals \$1,324.00. Under this scenario, the total revenue lost would be \$5,562.00. This would be approximately 7.2% of the Water Department annual metered water revenues. Thus it is important to get a handle on the water distribution system water loss. The Town of Gayville 16% water loss is considered to be above normal for a municipal water distribution system. The study recommendations include 1) insuring that all water users service lines are metered, 2) the metering the Town's uses of watering such as park watering,, vehicle washing, etc., and 3) the continue monitoring of the water system water loss.

3) The Total Cast Iron Watermain Replacement alternative is a viable option for the Town of Gayville water distribution system. This alternative will result in the replacement of all the cast iron watermain installed in the early 1900's and in 1968. The original cast iron watermains are the principle reason for the lack of water pressure and red water complaints in the central part of the Town of Gayville water distribution system. This alternative addresses the original cast iron watermain that increasing personnel commitment to maintaining the water distribution system along with the water budget being consumed by water maintenance costs and lost revenue to water loss. The Total Cast Iron Water Main Replacement layout is shown in Exhibit .

Total Cast Iron Watermain Replacement

1.	6" PVC Watermain	14,000 LF	\$20.00/LF	\$280,000
2.	6" Fire Hydrant	26 Each	\$1,900/Each	\$49,400
3.	6" Gate Valves	58 Each	\$850/Each	\$49,300
4.	Watermain Connections	10 Each	\$560/Each	\$ 5,600
5.	1" Water Service Lines	3,400 LF	\$16.00/LF	\$54,400
6.	1" Curb Stop & Connection	110 Each	\$250.00/Each	\$27,500
7.	Gravel Surfacing	6,500 Tons	\$ 12.00/Ton	\$78,000
8.	Double Chip Seal Surfacing	18,000 SY	\$2.50/SY	\$45,000
9.	Main Street Asphalt Surfacing	240 Tons	\$90/Ton	\$21,600
10.	Railroad Boring & Casing Pipe	120 LF	\$120/LF	\$14,400
11.	10% Contingencies			\$62,500
	Construction Total			\$687,700 + \$95,952 = \$783,652

Dead End Main Loop Closures

1.	6" PVC Watermain	3,100 LF	\$20.00/LF	\$62,000
2.	6" Fire Hydrant	4 Each	\$1,900/Each	\$ 3,800
3.	6" Gate Valves	10 Each	\$850/Each	\$ 8,500
4.	Watermain Connections	11 Each	\$560/Each	\$ 6,200
5.	Gravel Surfacing	1,000 Tons	\$ 12.00/Ton	\$12,000
6.	Double Chip Seal Surfacing	3,000 SY	\$2.50/SY	\$ 7,500
7.	10% Contingencies			\$ 10,000
	Construction Subtotal			\$110,000

Construction Total **\$797,700**

Project Design/Construction Engineering

1.	Design Engineering	\$33,500
2.	Construction Engineering	\$71,800
3.	Administration/Legal	\$6,000
	Services Total	\$111,300

Construction Budget **\$909,000**

GPR Eligible Engineering % = $\frac{\$687,700}{797,700} = 86.21\%$

Eligible Engineering & Misc Costs = $\$111,300 (8.621) = \$95,952$

GAYVILLE WATER STUDY
 Monthly Water Loss Record
 Gallons Bought from Clay Rural Water

YEAR MONTH	WATER BOUGHT	WATER SOLD	WATER LOSS	WATER PERCENT
2004				
JANUARY	748,000	676,000	72,000	10
FEBRUARY	772,000	676,000	96,000	12
MARCH	907,000	814,000	93,000	10
APRIL	798,000	748,000	50,000	6
MAY	1,032,000	950,000	82,000	8
JUNE	1,143,000	1,125,000	18,000	2
JULY	1,334,000	1,195,000	139,000	10
AUGUST	1,318,000	1,191,000	127,000	10
SEPTEMBER	1,013,000	936,000	77,000	8
OCTOBER	934,000	786,000	148,000	16
NOVEMBER	763,000	736,000	27,000	4
DECEMBER	745,000	604,000	141,000	19
TOTAL	11,507,000	9,761,000	1,070,000	9
2005				
JANUARY	745,000	683,500	61,500	8
FEBRUARY	782,000	708,000	74,000	9
MARCH	671,000	654,000	17,000	3
APRIL	828,000	775,000	53,000	6
MAY	857,000	707,000	150,000	18
JUNE	1,047,000	983,000	64,000	6
JULY	1,079,000	971,000	108,000	10
AUGUST	1,696,000	1,566,000	130,000	8
SEPTEMBER	1,417,000	1,365,000	52,000	4
OCTOBER	1,066,000	860,000	206,000	19
NOVEMBER	971,000	799,000	172,000	18
DECEMBER	859,000	778,000	81,000	9
TOTAL	12,018,000	10,849,500	1,168,500	10
2006				
JANUARY	806,000	700,000	106,000	13
FEBRUARY	759,000	689,000	70,000	9
MARCH	917,000	799,000	118,000	13
APRIL	865,000	778,000	87,000	10
MAY	1,461,000	1,368,000	93,000	6
JUNE	1,457,000	1,329,000	128,000	9
JULY (Est.)	2,091,000	2,006,000	85,000	4
AUGUST	1,449,000	1,332,000	117,000	8
SEPTEMBER	886,000	831,000	55,000	6
OCTOBER	939,000	806,000	133,000	14
NOVEMBER	795,000	755,000	40,000	5
DECEMBER	762,000	731,000	31,000	4
TOTAL	13,187,000	12,124,000	1,063,000	8
2007				
JANUARY	776,000	676,500	99,500	13
FEBRUARY	1,148,000	917,000	231,000	20
MARCH	1,253,000	806,000	447,000	36
APRIL	1,135,000	907,290	227,710	20
MAY	1,156,000	1,113,260	42,720	4
JUNE	1,913,000	1,669,280	243,720	13
JULY	2,249,000	2,046,860	202,140	9
AUGUST	1,881,000	1,259,090	621,910	33
SEPTEMBER	948,000	917,660	30,340	3
OCTOBER	966,000	862,620	103,380	11
NOVEMBER	777,000	770,400	6,600	1
DECEMBER	737,000	670,000	67,000	9
TOTAL	14,939,000	12,615,980	2,323,020	16
		8		

EXHIBIT C

Town of Gayville		Purchased Water Usage Record		
PO Box 162		Report Date: 6-18-2010		
Gayville, SD 57031				
	2008 main meter	2008 Resident reading	Estimated gallon loss	Percent Loss
January	784,000	682,170	(101,830)	13%
February	692,000	584,450	(107,550)	16%
March	756,000	650,070	(105,930)	14%
April	1,012,000	882,060	(129,940)	13%
May	966,000	934,300	(31,700)	3%
June	1,346,000	1,252,140	(93,860)	7%
July	2,075,000	1,927,670	(147,330)	7%
August	1,673,000	1,604,760	(68,240)	4%
September	1,287,000	908,040	(378,960)	29%
October	1,074,000	827,500	(246,500)	23%
November	766,000	755,860	(10,140)	1%
December	874,900	683,670	(191,230)	22%
Total Gallons	13,305,900	11,692,690	(1,613,210)	12%
	2009 main meter	2009 Resident reading	Estimated gallon loss	
January	946,000	676,630	(269,370)	28%
February	812,000	675,830	(136,170)	17%
March	988,000	750,330	(237,670)	24%
April	994,000	759,300	(234,700)	24%
May	1,425,000	1,167,430	(257,570)	18%
June	1,686,000	1,419,180	(266,820)	16%
July	1,565,000	1,250,050	(314,950)	20%
August	1,655,000	1,302,480	(352,520)	21%
September	1,039,000	867,470	(171,530)	17%
October	818,000	664,520	(153,480)	19%
November	906,000	737,740	(168,260)	19%
December	788,000	693,940	(94,060)	12%
Total Gallons	13,622,000	10,964,900	(2,657,100)	20%
	2010 main meter	2010 Resident reading	Estimated gallon loss	
January	827,000	677,000	(150,000)	18%
February	756,000	591,670	(164,330)	22%
March	883,000	707,470	(175,530)	20%
April	974,000	804,810	(169,190)	17%
May	1,154,000	990,760	(163,240)	14%
June			-	
July			-	
August			-	
September			-	
October			-	
November			-	
December			-	
Total Gallons	4,594,000	3,771,710	(822,290)	18%