Brandon Comprehensive Wastewater Study

July 2013
SEI No. 8112

Brandon
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COMPREHENSIVE WASTEWATER COLLECTION AND TREATMENT SYSTEMS STUDY

FOR

THE

CITY OF BRANDON

JULY 2013

SEI NO. 8112

I hereby certify that this report was prepared
by me or under my direct supervision and that
I am a duly Registered Professional Engineer
under the laws of the State of South Dakota.

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INTRODUCTION

PURPOSE OF STUDY

The City of Brandon contacted Stockwell Engineers, Inc. (SEI) to investigate their wastewater collection and treatment systems. The City would like to make improvements to the sanitary sewer system. This study identifies the deficiencies that the systems have based on the South Dakota Design Criteria Manual and presents options to fix these deficiencies. The City of Brandon can use this plan to budget for future projects and to obtain grant and loan funding for the proposed improvements.

SCOPE OF STUDY

The scope of the agreement between the City of Brandon and SEI is a follows:

1) Provide existing maps, plans, relevant information, wastewater fund financial records, customer connections, lift station hour meter records, wastewater treatment plant influent records, billed water records and sanitary sewer videos.
2) Provide data on existing and future conditions of the City including land use, growth trends and population estimates.
3) Provide data on existing sewer.
4) Complete a general population analysis.
5) Evaluate sanitary sewer collection system, install flow meter, watch sewer videos, calibrate lift stations, determine infiltration and inflow rates, perform smoke testing and determine existing basin boundaries.
6) Evaluate future west, south, southeast, northeast and northwest basins.
7) Evaluate existing wastewater treatment system to determine required storage for existing and future flow.
8) Provide options for additional storage at existing site or one new site.
9) Provide options for additional aeration at existing site.
10) Identify mechanical plant capacity with preliminary cost estimate.
11) Compare capital cost and long term cost for 100% pumping to Sioux Falls, partial storage with pumping to Sioux Falls and 100% storage with mechanical treatment.
12) Outline need for improvements.
13) Make recommendations for improvements to meet future growth requirements.
14) Prepare "Engineers Estimate" of probable construction cost for project alternatives.
15) Present "draft" study at Council meeting.
16) Address Client's comments and submit final study to the Client.

COMMUNITY INFORMATION

GENERAL

The City of Brandon is a Class 1 municipality located in eastern Minnehaha County on Interstate 90. Minnehaha County is located in southeastern South Dakota. The City is Governed by a Mayor and six member Council. The City has a City Administrator, Finance Officer and Public Works Director that oversee the day-to-day activities. Brandon was incorporated as a city on July 31, 1973. The City encompasses an area of approximately 3,331 acres. The land uses range from low density residential to commercial and industrial properties.

FINANCIAL STATISTICS

Based on the 2000 Census, Brandon has a median household income of $58,421 compared to the state average of $35,282. The 2000 Census also reported that 2.5% of the families in Brandon had incomes below the poverty level compared to the state average of 9.3%.

POPULATION STATISTICS

Based on the 2010 census, Brandon has a population of 8,785. The City has shown strong growth since being incorporated in 1973. Most other communities in South Dakota have seen a decline in recent years. However, Brandon's close proximity to Sioux Falls creates a unique opportunity for people to work in Sioux Falls and live in Brandon. The 2010 census indicated that 7.8% of the people living in Brandon were over the age of 65 compared to 14.3% for the State of South Dakota. It is anticipated that the population will continue to increase due to Brandon's location and their low percentage of people over 65. The population for 2013 was based on the average housing unit size and the number of housing units added since the 2010 census. The projected populations through 2027 were obtained from the Brandon Comprehensive Plan that was prepared by South Eastern Council of Governments (SECOG). Stockwell Engineers estimated the 2033 population.

Table 1 Population Statistics

Year	Population
1980	2,589
1990	3,543
2000	5,693
2010	8,785
2013	9,088
2017 (proj)	10,734
2022 (proj)	12,217
2027 (proj)	13,700
2033 (proj)	15,700

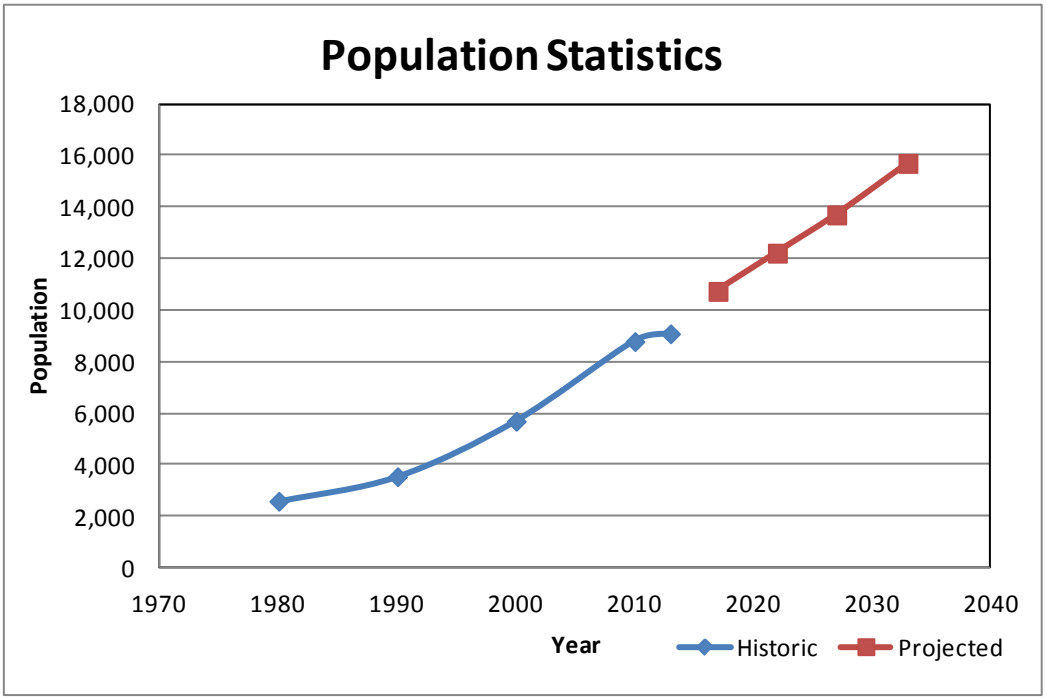

Figure 1 Population Statistics

EXISTING WASTEWATER SYSTEM

GENERAL COLLECTION SYSTEM

The current system consists of 48 miles of vitrified clay pipe (VCP) and polyvinyl chloride (PVC) pipe, 11 lift stations with 10 miles of force main and 839 manholes. There are currently 3,025 users connected to the system with an estimated 212,000 ft of service line.

There are three areas that currently are not served by gravity sewer in the City limits. The McHardy Park soccer complex and the tennis courts both have holding tanks that need to be pumped by the City's jet truck. In addition, there are homes east of Aspen Park along Split Rock Boulevard that have individual septic tanks. The existing system is shown in Figure 4.

EXISTING LIFT STATIONS

The current collection system includes 11 main lift stations and one small grinder pump for the restroom at McHardy Park. These lift stations pump to other areas of the collection system that gravity flow to the treatment system or are pumped by another lift station that gravity flows to the treatment system. On January 9, 2013 SEI helped the City calibrate all the lift station pumps. The lift station calibration determined that some of the pumps needed to be pulled and rebuilt because the flow rates varied drastically between the two pumps. The City provided the hour meter records for all the lift stations for the years of 2009, 2010 and 2011. The hour meter records were used to develop graphs for each lift station showing the average daily pumping. Copies of the graphs are located in Appendix C.

During the lift station calibration it was determined that numerous lift stations have reached their useful life expectancy and need to be replaced. Several of the lift stations do not have cathodic protection and are rusting out. The golf course lift station has been flooded in the past. Pictures of the rusting is shown in the following figures. Information about the lift stations is shown in the following table. The lift station locations are shown in Figure 4.

Table 2 Lift Station Information

Lift Station	Type	Pump #1 (gpm)	Pump #2 (gpm)	Pump Variation %	Discharge Point
Park	Submersible	258	286	11%	Gravity to WWT
Ponderosa	Wet/Dry Well	193	199	3%	Gravity to WWT
Pool	Wet/Dry Well	135	118	12%	Gravity to WWT
Wyams	Wet/Dry Well	68	223	227%	Gravity to WWT
Rushmore	Wet/Dry Well	84	95	14%	Gravity to Wyams LS
Golf Course	Wet/Dry Well	313	336	7%	Gravity to WWT
Pioneer Park	Wet/Dry Well	253	220	13%	Gravity to WWT
West Side	Submersible	268	339	27%	Gravity to WWT
Bethany	Submersible	168	251	50%	Gravity to Golf Course LS
French Creek	Submersible	109	111	1%	Gravity to Industrial LS
Industrial	Wet/Dry Well	169	208	23%	Gravity to WWT

Figure 2 Rust at the Pioneer Lift Station

Figure 3 Rust at the Ponderosa Lift Station

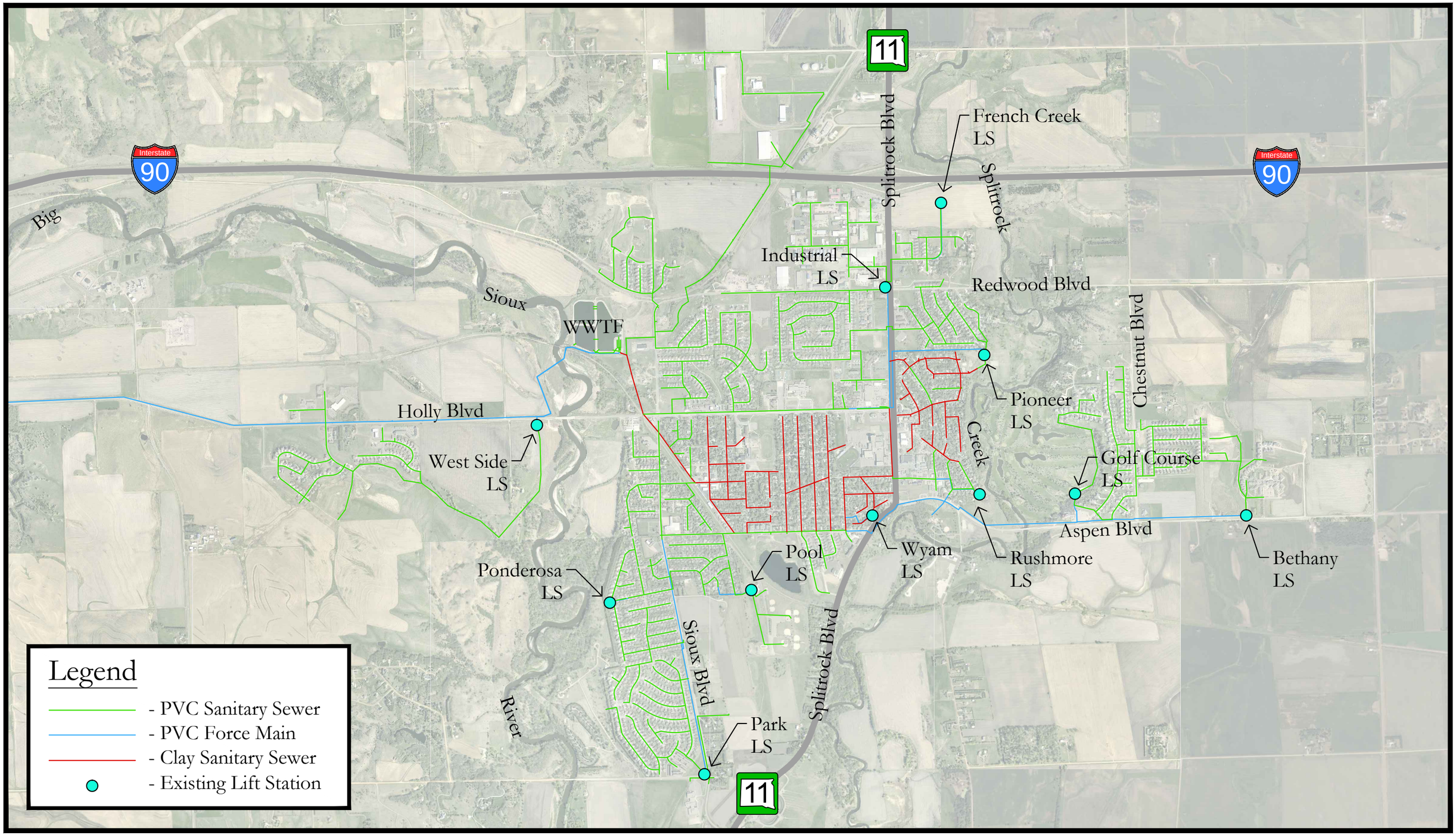

Figure 4 | Existing Wastewater Collection System

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EXISTING BASIN BOUNDARIES AND SERVICE AREA

Brandon's existing collection system can be divided into 12 basins. These basins include 11 lift station basins and one basin that gravity flows to the treatment system. Determining flow in a basin is largely contingent upon the size of the contributing watershed boundary. The watershed boundary is determined by the topography of the basin. It is defined by the area tributary to a given point on a stream and is separated from adjacent basins by a divide, or ridge, that can be traced on topographic maps. Watershed boundaries can be very large depending on the size and location of the stream. Typically they are divided into smaller tributary basins and sub-basins.

The age old method of designing sewer systems generally involves installing trunk line sewers at the lowest point of interception and extending lateral sewers toward higher or more specific locations. Trunk line sewers are typically responsible for capturing all the flow in a primary basin while lateral sewers are dedicated to intercept individual sub-basins. Lateral sewers are typically the direct interceptors for individual properties. It is critical to consider the overall drainage basin when sizing the trunk sewers. However, Brandon's rapid growth in the recent past has caused the City to install area lift stations to service new developments. The number of lift stations could be reduced if deeper trunk sewers were installed along the bottom of the basin. The size of each basin and the number of acres for each zoning classification in each basin is shown in the following table.

Table 3 Existing Basin Information

Basin	Area (acres)	Acres in Each Zoning Classification								
		NRC	R-1	R-2	R-3	CB	GB	LI	HI	PD
French Creek	18	0	14	0	0	0	4	0	0	0
Rushmore	42	0	36	6	0	0	0	0	0	0
Pool	58	51	6	0	0	0	0	0	0	0
Wyams	81	0	46	1	0	0	33	0	0	0
Ponderosa	83	7	76	0	0	0	0	0	0	0
Bethany	87	29	34	24	0	0	0	0	0	0
Park	131	29	94	8	0	0	0	0	0	0
Golf Course	175	31	114	19	0	0	11	0	0	0
West Side	209	108	44	27	0	0	30	0	0	0
Pioneer Park	225	17	139	33	0	0	36	0	0	0
Industrial	246	8	61	18	0	0	41	0	118	0
Core	886	77	591	42	0	6	39	5	126	0
Total	2,239	356	1,256	177	0	6	195	5	244	0

NRC Natural Resource Conservation District

R-1 Single Family Residential District

R-2 Multi-Family Residential District

R-3 Manufactured Housing Residential District

CB Central Business District

GB General Business District

LI Light Industrial District

HI Heavy Industrial District

PD Planned Development District

CLEANING AND TELEVISING

Over the years the City has had A-Tech Sewer Cleaning and Televising of Watertown, South Dakota clean and televised most of the existing collection system. The televising has shown holes, cracks, sags, infiltration, flattened PVC pipe and tree roots. Images of the televising are shown below. In order to verify the quality of new construction, the City has adopted a policy of having new sewer lines televised before they will accept them from the developer.

Figure 5 Tree Roots on 7th Avenue

Figure 6 Crack on Sioux Boulevard

SMOKE TESTING

In November 2012 SEI conducted smoke testing of the entire collection system. The smoke testing revealed several deficiencies. The deficiencies include cleanouts that are not capped properly, open pick manholes, several homes that had smoke in them and there were multiple blocks of the VCP in the old core part of town that the smoke wouldn't travel through. Large sags and heavy tree roots will prevent smoke from traveling between manholes. It is recommended these areas be cleaned and televised again to determine the current pipe condition.

Figure 7 Smoke Testing

Figure 8 Smoke From Cracks Around Manhole

WASTEWATER FLOWS

The wastewater flows in a collection system are comprised of domestic water and clear water. Domestic water comes from homes and businesses. Clear water comes from rain water and ground water. Clear water is also called infiltration and inflow (I & I). Infiltration is ground water leaking through joints, cracks in the pipe and manhole walls. Inflow is sump pumps, roof drains, perforated manhole covers and storm sewer that are connected to the sanitary collection system. Every system is subject to some level of I & I. When I & I becomes excessive, there is potential for sewage backups and flooding of basements.

Domestic wastewater flow can be determined using water use records. The SD Design Criteria states that projected wastewater flows for a community could be calculated by using 80% of the actual water consumption. This is typically applied to the winter months of December, January and February. These months are used because there is little water usage that does not reach the collection system. During these winter months it can be assumed that 100% of metered water at the homes reaches the collection system. The City reads the water meters monthly with a radio drive-by system. Based on these records for 2008-2011, the residents of Brandon use an average of 553,388 gallons per day (gpd).

Based on the billed water records, the average daily flow is 65 gallons per capita per day (gpcpd) in the winter months. Chapter I.C.2 of the SD Design Criteria states that an alternate method to determine design capacity could be justified by local water consumption records but shall not be less than 60 gpcpd.

SEI installed a flow meter in the third manhole upstream of the intake structure at the wastewater ponds. The average wastewater flow that was recorded is 535,456 gpd. This flow does not include the West Side lift station, Stone Ridge or the Corson Industrial Park. The daily flow meter readings are shown on the following figure. The figures shows how precipitation increases the flows.

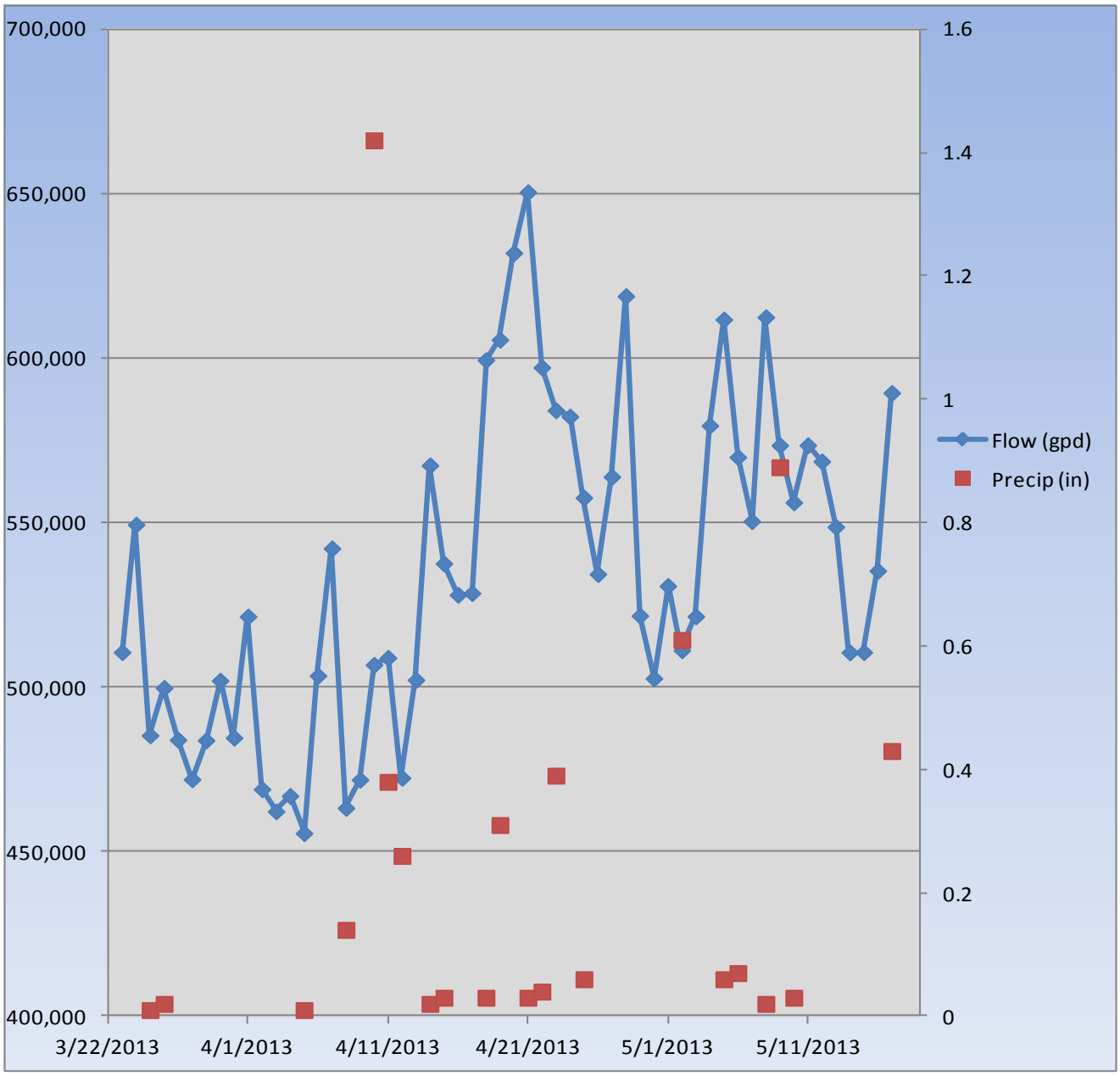

Figure 9 Flow Meter Records

The City of Brandon reads and records the hour meters on the lift station pumps and provided that data to SEI. SEI calibrated the lift station pumps to determine the daily wastewater that was pumped. The City also reads and records the amount of influent at the wastewater ponds. The total wastewater that was pumped by each lift station for 2009, 2010 and 2011 are shown in the following table.

Table 4 Wastewater Flows

Flow Pumped to a Second Lift Station	WW Flow (gal)	WW Flow (gpd)
Rushmore	29,999,252	31,162
Bethany	9,149,317	8,405
French Creek	22,559,331	20,668
Total	61,707,899	60,235
Flow Pumped and Gravity Flows to WWT	**WW Flow (gal)**	**WW Flow (gpd)**
Park	39,142,794	36,205
Ponderosa	48,645,562	44,943
Pool	21,397,621	19,672
Wyams	271,715,349	246,803
Golf Course	61,075,307	56,807
Pioneer Park	98,065,403	90,308
West Side	47,603,132	44,574
Industrial	123,084,217	112,723
Total	710,729,385	652,034
Wastewater Pond Influent	732,916,000	669,330
Core Basin Gravity Flows	22,186,615	17,295

The average daily flow from the lift stations is 652,034 gpd and the wastewater ponds receive 669,330 gpd. The Rushmore, Bethany and French Creek lift stations are not included because they pump to other lift station basins and are included in those flows. The core basin area gravity flows to the wastewater ponds and are be included in the pond influent flow. A graph for the wastewater pond influent is shown in Appendix D. The graph shows how the amount of precipitation really affects the wastewater flows. The amount of I & I can be determined by comparing the calculated domestic wastewater flows to the wastewater pond influent. This results in a average I & I flow rate of 115,942 gpd (669,330 gpd - 553,388 gpd). In comparison, the maximum daily I&I that the

treatment plant experienced was that was 3,640,000 gpd (4,194,000 gpd - 553,388 gpd) on February 11, 2009.

Typically infiltration is considered constant during the winter months because the ground is frozen and the water table is stable. During the summer months wet periods and dry periods can affect the ground water table having a significant effect on the I&I rates. As the ground water table rises, more of the collection system is submerged. Therefore, the amount of infiltration increases. The higher the groundwater table, the higher the pressure is on the sewer, forcing more water into the system. In the case of the City of Brandon, the lift station records show how rainfall events affect the wastewater flows.

The SD Design Criteria Manual states in section I.C.2 that the design allowance for a sewer system shall be 200 gallons per inch of pipe diameter per mile of pipe per day for VCP. Current practice recommends an allowance for PVC of 50 gallons per inch of pipe diameter per mile of pipe per day. Based on this allowance, Brandon's collection system can have a maximum allowable infiltration rate of 43,983 gpd which is lower than the average I&I rate of 115,942 gpd.

Table 5 Allowable Collection System Infiltration

Sanitary Sewer Dia (in)	Pipe Type	Length (ft)	Diameter-Length (in-mile)	Allowable Infiltration (gpd)
4	Clay	39,851	30.2	6,038
6	Clay	5,374	6.1	1,221
8	Clay	36,793	55.7	11,149
10	Clay	443	0.8	168
12	Clay	4,886	11.1	2,221
15	Clay	162	0.5	92
10	Ductile Iron	202	0.4	19
4	PVC	171,731	130.1	6,505
6	PVC	353	0.4	20
8	PVC	173,535	262.9	13,147
10	PVC	16,389	31.0	1,552
12	PVC	13,263	30.1	1,507
15	PVC	1,253	3.6	178
30	PVC	583	3.3	166
			Total =	43,983

The Environmental Protection Agency (EPA) has established guidelines to determine dry weather flow and wet weather flow. The dry weather flow is 120 gpcpd and the wet weather flow is 275 gpcpd. Wastewater flows over these amounts are considered excessive. The dry weather period is

during the winter months when the collection system is subject to domestic flow and infiltration. The wet weather period is during the summer when the collection system is subject to domestic flow, infiltration and inflow. Based on these limits, the City of Brandon should not experience flows over 1,090,560 gpd (120 gpcpd x 9,088) during December, January and February. The wet weather flows should not exceed 2,499,200 gpd (275 gpcpd x 9,088). Records show the wet weather flow was exceeded 4 days and the dry weather flow was exceeded 17 days since January 1, 2009.

WASTEWATER TREATMENT

Brandon's wastewater treatment system was built in 1982 and it is located in the northwest corner of the community west of Redwood Blvd and Sioux Blvd. The wastewater treatment plant consists of an aerated cell followed by three additional storage cells. The system operates under Surface Water Discharge (SWD) Permit #SD0022535 and is permitted to discharge directly into the Big Sioux River. A copy of the permit is located in Appendix A. The aerated cell has a water surface area of 0.68 acres, cell one has a water surface area of 10.5 acres, cell two has a water surface area of 5.5 acres and cell three has a water surface area of 5.5 acres. The aerated cell has an effective storage depth of 10 feet, cell one has an effective storage depth of 5.5 feet and cells two and three have an effective storage depth of 6.5 feet. Typically, the dikes are built with the top three feet for freeboard and the bottom two feet for residual storage resulting in an effective storage depth of three feet. Freeboard is used as a safety factor and the water level should never be into the freeboard. The freeboard also keeps wave action from overtopping the berm and creating a breach of the berm. Brandon's cells are deeper than normal because the aeration allows the effective storage depth to be increased. The existing treatment system is shown in the following figures.

Figure 10 Aerated Cell

Figure 11 Wastewater Treatment

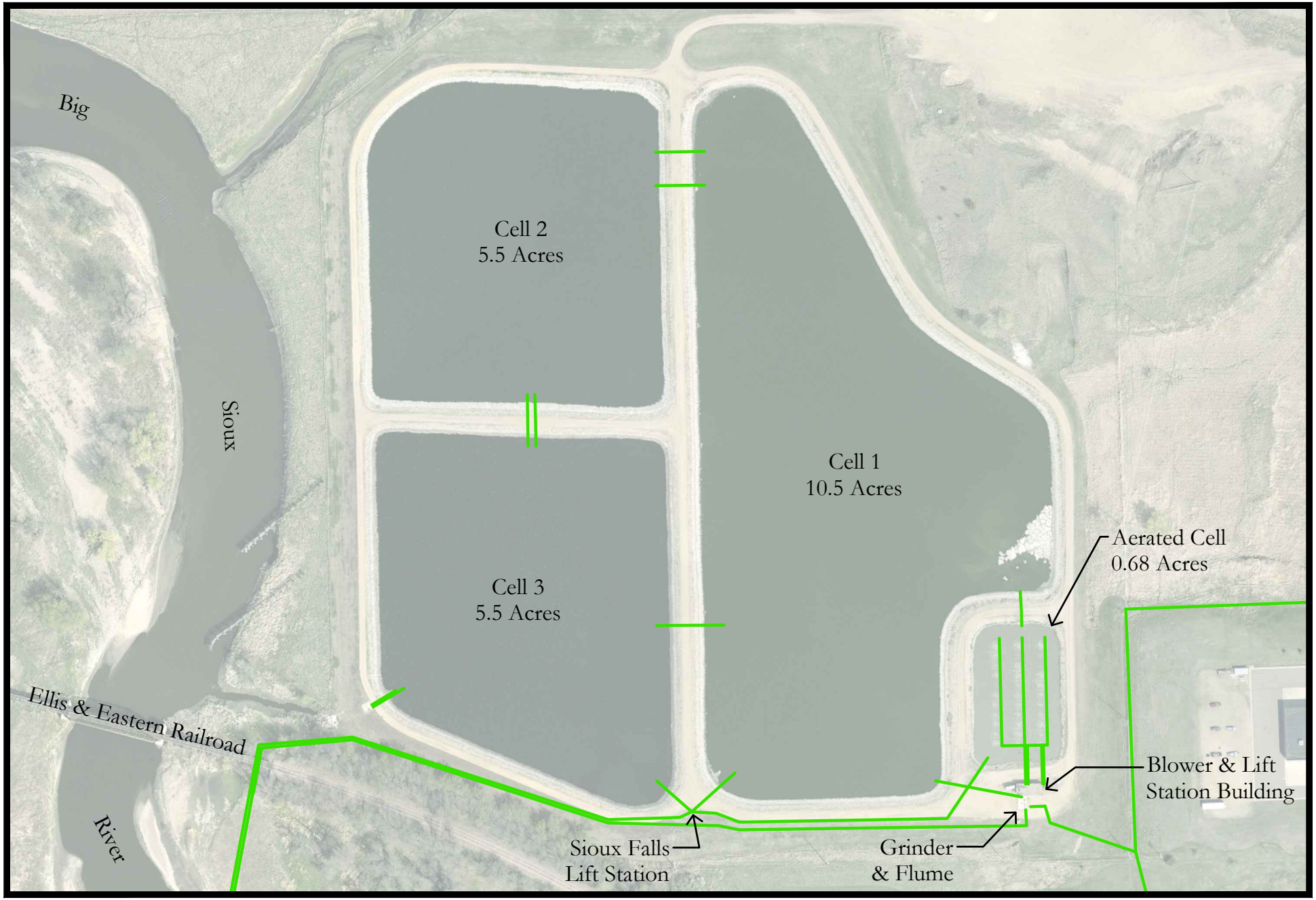

Figure 12 | Existing Treatment System

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On June 8, 2012 the SD DENR completed a Surface Water Discharge Compliance Inspection. A copy of the inspection is located in Appendix B. The inspection provided the following requirements:

- Samples must be preserved according to the proper sampling methods.
- The City must look into modifications of its operation to allow for adequate treatment of the wastewater.
- All sample results must be reported on Discharge Monitoring Reports.
- The maximum 7-day average should be reported for BOD_5 and TSS.
- More care should be taken when filling out DMRs.
- DMRs need to be submitted on time.
- The facility should take more care when submitting DMRs via NetDMR.

SLUDGE

In 2012 cell one was dredged to remove the sludge that had accumulated on the cell floor. Approximately 21,400 CY of in place solids were removed from cell one. The sludge was pumped to geotextile tubes to be dewatered. The dewatered sludge will be land applied in 2013. Due to budget constraints all of the sludge could not be removed from cell one. A post construction survey revealed there is approximately 11,900 CY still remaining in cell one. The City should plan to remove this sludge if they decide to make improvements and maintain this site for the next 20 years. This does not include the bottom six inches of sludge because the cutter head could damage the clay liner.

Figure 13 Dredging Machine

Figure 14 Geotextile Tubes

INTAKE STRUCTURE

All of the wastewater flow from the City of Brandon currently flows through an intake structure before entering the aerated cell. This structure consists of a grinder followed by a nine-inch parshall flume with flow meter. The grinder was installed to help break-down the solids entering the treatment system. The grinder is constantly plugged and stops working. In addition, the lift station records indicate that the flow meter is not reading accurately. The lift stations indicate that the total amount of wastewater that was pumped from 2009 - 2011 was 710,729,385 gallons compared to the flow meter measurement of 732,916,000 gallons. The core basin accounts for 40% of the contributing area of the City. The flow meter should be reading substantially more flow than the lift stations to account for the core basin of the City that gravities to the treatment system. The potential reasons for the discrepancy are the flow meter is not installed correctly, the lift station records are not accurate and the wastewater is exfiltrating in the old clay pipes.

SIOUX FALLS LIFT STATION

In 1995 the City of Brandon added a lift station at the treatment system to pump wastewater to the City of Sioux Falls. The lift station was added because the treatment system was overloaded and the City of Sioux Falls was willing to take the additional wastewater that Brandon could not treat. A single pump submersible lift station was added at the southwest corner of cell one. The lift station is capable of pumping from the aerated cell, cell one or cell three. Currently, the City pumps approximately 300,000 gpd to Sioux Falls from the aerated cell during the night. In the summer of 2011 the pump burned up and had to be replaced. Brandon was unable to pump to Sioux Falls for three weeks until a new pump could be installed. During this time the wastewater almost breached the dikes because the City couldn't meet their discharge limits and they couldn't pump to Sioux Falls.

On January 1, 2013 the City of Sioux Falls raised their pumping charge. The current charge is $3.89 per 1,000 gallons. The City of Brandon can receive a $0.43 per 1,000 gallon credit for equalization and $0.54 per 1,000 gallon credit for partial treatment. However, the BOD levels required to get the partial treatment credit need to be lower than Brandon's current discharge limit. It is unlikely that the City of Brandon will receive the partial treatment credit because they have difficulty meeting their BOD discharge limit. The rate will be reviewed every two years. Sioux Falls is also implementing a new System Development Charge "SDC". The City of Brandon will be required to pay the City of Sioux Falls for every new connection after July 11, 2013. The charge will range from $2,931 to $59,772 depending on the water meter size. A history of the pumping charge is shown in the following table.

Table 6 Sioux Falls Charge History

Year	Charge per Thousand Gallons	Annual Cost to Pump to Sioux Falls
2008	$ 0.75	$99,538.83
2009	$ 1.10	$118,292.27
2010	$ 1.10	$119,544.47
2011	$ 1.41	$140,341.00
2012	$ 1.41	$152,662.96
2013	$ 3.89	
2014	$ 3.89	

WASTEWATER TREATMENT HYDRAULIC LOADING

There are two elements to consider when sizing a treatment system. The element that provides the larger size governs. The first way is to calculate the hydraulic loading or the amount of wastewater that is flowing to the treatment system. The following table shows the wastewater flows that the treatment system is experiencing. The table also shows the design and projected hydraulic loading for the treatment system. The current treatment system is overloaded hydraulically as shown by the negative values. The overloading is due to the City's population increasing by 351% since the treatment system was built.

Table 7 Treatment System Hydraulic Loading

	Designed 1982	Current 2013	Projected 2033
Population	2,589	9,088	15,700
Wastewater Flow (gpcpd)	65	65	65
Infiltration & Inflow (gpd)	0	115,942	115,942
Design Storage Time (days)	180	180	180
Total Pond Influent (gal)	30,291,300	127,199,120	204,559,520
Cell 1			
10.5ac x 43560sf/ac x 5.5ac x 7.48	18,817,871	18,817,871	18,817,871
Cell 2			
5.5ac x 43560sf/ac x 6.5ac x 7.48	11,649,158	11,649,158	11,649,158
Cell 3			
5.5ac x 43560sf/ac x 6.5ac x 7.48	11,649,158	11,649,158	11,649,158
Total Storage (gal)	42,116,187	42,116,187	42,116,187
Remaining Storage (gal)	11,824,887	-85,082,932	-162,443,332
Additional Storage Req @ 6' (ac)	0.0	43.5	83.1

WASTEWATER TREATMENT ORGANIC LOADING

The second way to size a treatment system is to calculate the organic loading. The SD Design Criteria states in Section B.1.a of Chapter IV that the maximum design loading on the primary cell shall not exceed 30 pounds of Biochemical Oxygen Demand (BOD_5) per acre. Based on this criteria, the primary pond should receive less than 315 pounds of BOD_5. Furthermore, Section B.1.d states the total organic loading for the total surface area shall not exceed 20 pounds BOD_5 per acre per day. Based on this criteria, the treatment system should receive less than 430 pounds of BOD_5. The SD Design Criteria also states that on average a person will generate 0.17 pounds of BOD_5.

Wastewater sampling completed in October of 2011 indicated the average influent composite BOD sample was 298 mg/L and the average aerated composite sample was 141 mg/L. This results in a per capita loading of .19 lbs per person per day. These samples are used to calculate the actual treatment loading and show the treatment system is overloaded organically in following table.

Table 8 Treatment System Organic Loading

	Designed 1982	Current 2013	Projected 2033
Population	2,589	9,088	15,700
Per Capita Loading (lbs)	0.19	0.19	0.19
Total Loading (lbs)	492	1,727	2,983
Aerated Effluent (lbs)	233	832	2,061
Primary Loading Limit (lbs/ac)	30	30	30
Primary Size Required (ac)	7.8	27.7	68.7
Total System Loading Limit (lbs/ac)	20	20	20
Total System Size Required (ac)	11.7	41.6	103.1

DEVELOPMENT OF WASTEWATER ALTERNATIVES

GENERAL ALTERNATIVE INFORMATION

Each of the following alternatives includes an estimate of the total project cost. Included in the total project cost are the construction cost, contingencies, legal and administration, engineering and testing costs. It should be noted that these are only estimates and does not guarantee the cost of actual construction. Field measurements will be taken during the design phase to complete a more accurate estimate. Contract prices can be affected by project location, year built, contractor work load, project size, contract time and the time of year that the project is built. These estimates should be updated on a yearly basis to reflect current industry conditions. Inflation factors have not been included in the estimates.

EQUIVALENT UNIFORM ANNUAL COST

When choosing the most cost effective solution to a problem, you have to consider the initial cost, long term cost and lifetime of the system. The alternative that reflects the cheapest initial cost may not be the least expensive alternative when operation and maintenance cost are taken into account. The capital cost and equivalent uniform annual cost (EUAC) are provided for some of the alternatives. The EUAC is evaluated over 20 years and an interest rate of 3.0% to provide the long term costs. The salvage value at the end of 20 years will be 0% or 60%. The EUAC will provide the owner with the best long term solution.

WASTEWATER COLLECTION ALTERNATIVES

The following alternatives were developed to correct the deficiencies listed below:

1) The VCP has outlived its useful life expectancy and needs to be replaced or rehabilitated.
2) Televising revealed several deficiencies that should be corrected.
3) The system is experiencing excessive I & I.
4) New trunk sewers should be installed to eliminate lift stations.
5) Four lift stations that are not eliminated need to be replaced because they are rusting out or parts are not available.
6) A SCADA system should be installed to closely monitor lift stations and the treatment system closer.

COLLECTION ALTERNATIVE 1: REPLACE VCP WITH PVC

Alternative 1 includes replacement of all the remaining VCP with PVC. The service lines would be replaced from the main line to the property line and the streets would be completely rebuilt. The

new PVC lines would reduce the amount of I&I and correct the deficiencies that the televising revealed.

It should be noted that the cost for this alternative may be reduced if during the design it is determined that sections of the sewer system can be lined. Normally liner is more cost effective because the asphalt surface doesn't need to be replaced. The cost estimate for this alternative is shown in the following table.

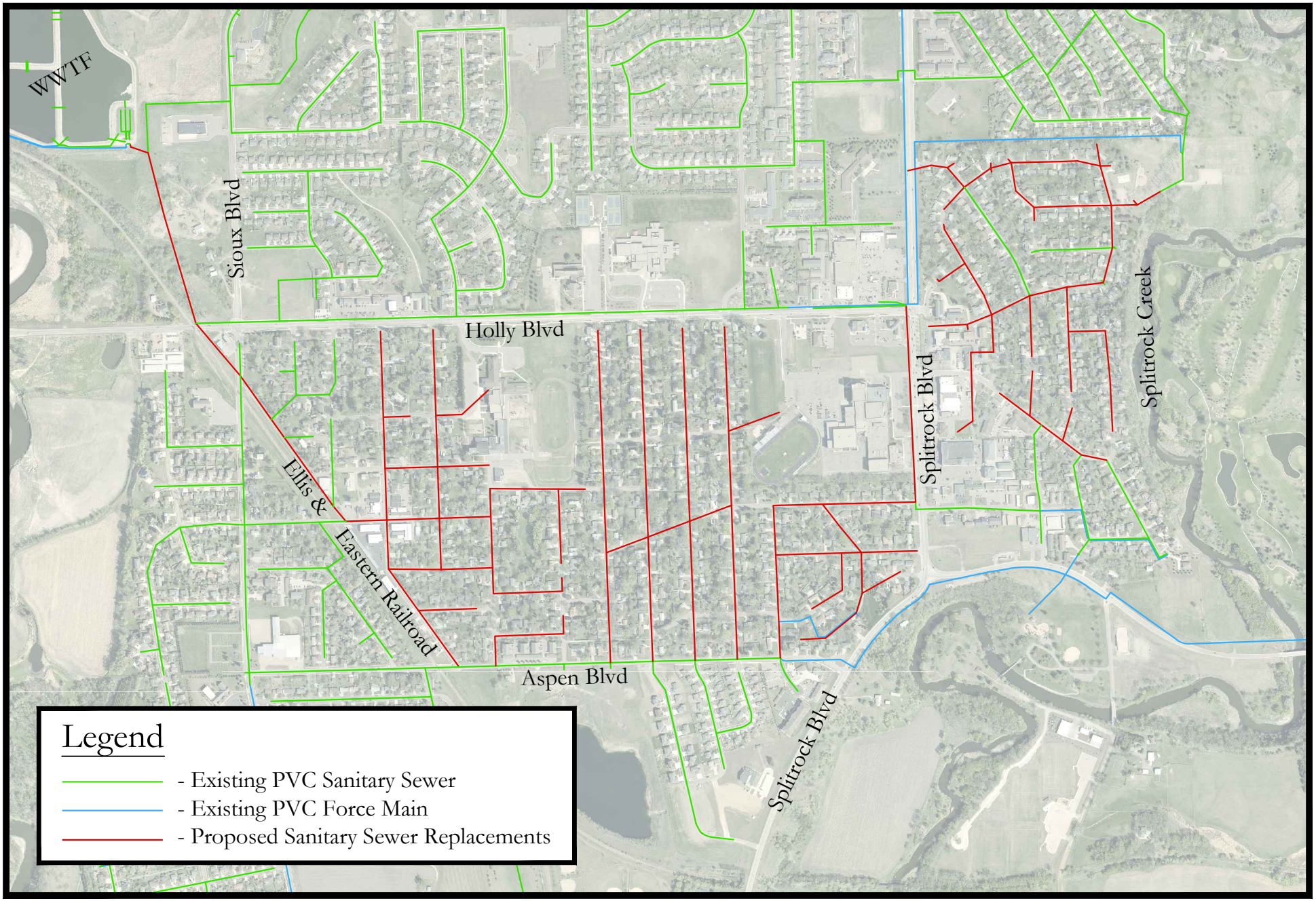

Figure 15 | Collection Alternative 1

Brandon SOUTH DAKOTA Building a Better Life

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Table 9 Cost Estimate for Collection Alternative 1

Item No.	Description	Quantity	Unit	Unit Price	Price
1	Mobilization	1	LS	$1,219,000.00	$1,219,000.00
2	Clearing	1	LS	$15,000.00	$15,000.00
3	Remove Sewer Pipe	47,700	FT	$4.00	$190,800.00
4	Remove Asphalt Concrete Pavement	153,300	SY	$2.50	$383,250.00
5	Remove Existing Manhole	160	EA	$400.00	$64,000.00
6	Remove Concrete Curb & Gutter	95,600	FT	$4.00	$382,400.00
7	Saw Existing Surfacing	1,800	FT	$7.00	$12,600.00
8	Unclassified Excavation	83,600	CY	$6.00	$501,600.00
9	Scarify & Recompact Subgrade	187,900	SY	$1.00	$187,900.00
10	Sanitary Sewer Manhole	140	EA	$3,000.00	$420,000.00
11	Sanitary Sewer Manhole Lined	20	EA	$6,000.00	$120,000.00
12	4" PVC Sanitary Service Line	18,900	FT	$25.00	$472,500.00
13	8" PVC Sanitary Sewer Pipe	42,200	FT	$35.00	$1,477,000.00
14	10" PVC Sanitary Sewer Pipe	500	FT	$40.00	$20,000.00
15	12" PVC Sanitary Sewer Pipe	5,100	FT	$48.00	$244,800.00
16	Sanitary Sewer Pipe Bedding Material	47,800	FT	$6.00	$286,800.00
17	Sewer Wye	570	EA	$300.00	$171,000.00
18	Sewer Fittings	1710	EA	$100.00	$171,000.00
19	Reconnect Sewer Main	50	EA	$500.00	$25,000.00
20	Reconnect Sewer Service	570	EA	$250.00	$142,500.00
21	Salvage & Place Topsoil	37,100	CY	$5.00	$185,500.00
22	Aggregate Base Course (12")	122,600	TON	$12.00	$1,471,200.00
23	Asphalt Concrete Surfacing (4")	35,700	TON	$70.00	$2,499,000.00
24	Concrete Curb & Gutter	95,600	FT	$12.00	$1,147,200.00
25	Geotextile Fabric	187,900	SY	$1.50	$281,850.00
26	6" Concrete Fillet Section	6,560	SY	$45.00	$295,200.00
27	6" Concrete Valley Gutter	7,530	SY	$45.00	$338,850.00
28	4" Concrete Sidewalk	24,000	SF	$4.00	$96,000.00
29	Detectable Warning Surface	1,600	SF	$45.00	$72,000.00
30	Traffic Control	1	LS	$50,000.00	$50,000.00
31	Seeding, Fertilizing & Mulching	222,400	SY	$1.50	$333,600.00
32	Post Televising	47,800	FT	$1.00	$47,800.00
33	Erosion Control	1	LS	$25,000.00	$25,000.00
34	Bypass Pumping	1	LS	$20,000.00	$20,000.00
35	Trench Dewatering	1	LS	$30,000.00	$30,000.00
				Subtotal	$13,400,350.00
				Contingencies (15%)	$2,011,000.00
				Total Estimated Construction Costs	**$15,411,350.00**
				ENGINEERING	**$1,977,000.00**
				LEGAL, ADMINISTRATION & TESTING (4%)	**$617,000.00**
				TOTAL ESTIMATED PROJECT COST	**$18,005,350.00**

Table 10 EUAC for Collection Alternative 1

Capital Cost Description	Price	Salvage Value	Present Worth of Salvage Value	Net Present Worth
Mobilization	$1,219,000.00	$0.00	$0.00	$1,219,000.00
Clearing	$15,000.00	$0.00	$0.00	$15,000.00
Remove Sewer Pipe	$190,800.00	$0.00	$0.00	$190,800.00
Remove Asphalt Concrete Pavement	$383,250.00	$0.00	$0.00	$383,250.00
Remove Existing Manhole	$64,000.00	$0.00	$0.00	$64,000.00
Remove Concrete Curb & Gutter	$382,400.00	$0.00	$0.00	$382,400.00
Saw Existing Surfacing	$12,600.00	$0.00	$0.00	$12,600.00
Unclassified Excavation	$501,600.00	$0.00	$0.00	$501,600.00
Scarify & Recompact Subgrade	$187,900.00	$0.00	$0.00	$187,900.00
Sanitary Sewer Manhole	$420,000.00	$252,000.00	$139,526.29	$280,473.71
Sanitary Sewer Manhole Lined	$120,000.00	$72,000.00	$39,864.65	$80,135.35
4" PVC Sanitary Service Line	$472,500.00	$283,500.00	$156,967.08	$315,532.92
8" PVC Sanitary Sewer Pipe	$1,477,000.00	$886,200.00	$490,667.45	$986,332.55
10" PVC Sanitary Sewer Pipe	$20,000.00	$12,000.00	$6,644.11	$13,355.89
12" PVC Sanitary Sewer Pipe	$244,800.00	$146,880.00	$81,323.89	$163,476.11
Sanitary Sewer Pipe Bedding Material	$286,800.00	$0.00	$0.00	$286,800.00
Sewer Wye	$171,000.00	$102,600.00	$56,807.13	$114,192.87
Sewer Fittings	$171,000.00	$102,600.00	$56,807.13	$114,192.87
Reconnect Sewer Main	$25,000.00	$0.00	$0.00	$25,000.00
Reconnect Sewer Service	$142,500.00	$0.00	$0.00	$142,500.00
Salvage & Place Topsoil	$185,500.00	$0.00	$0.00	$185,500.00
Aggregate Base Course (12")	$1,471,200.00	$882,720.00	$488,740.66	$982,459.34
Asphalt Concrete Surfacing (4")	$2,499,000.00	$1,499,400.00	$830,181.43	$1,668,818.57
Concrete Curb & Gutter	$1,147,200.00	$688,320.00	$381,106.10	$766,093.90
Geotextile Fabric	$281,850.00	$0.00	$0.00	$281,850.00
6" Concrete Fillet Section	$295,200.00	$177,120.00	$98,067.05	$197,132.95
6" Concrete Valley Gutter	$338,850.00	$203,310.00	$112,567.82	$226,282.18
4" Concrete Sidewalk	$96,000.00	$57,600.00	$31,891.72	$64,108.28
Detectable Warning Surface	$72,000.00	$43,200.00	$23,918.79	$48,081.21
Traffic Control	$50,000.00	$0.00	$0.00	$50,000.00
Seeding, Fertilizing & Mulching	$333,600.00	$0.00	$0.00	$333,600.00
Post Televising	$47,800.00	$0.00	$0.00	$47,800.00
Erosion Control	$25,000.00	$0.00	$0.00	$25,000.00
Bypass Pumping	$20,000.00	$0.00	$0.00	$20,000.00
Trench Dewatering	$30,000.00	$0.00	$0.00	$30,000.00
Remaining Capital Costs	$4,605,000.00	$0.00	$0.00	$4,605,000.00
Total Construction Cost	**$18,005,350.00**	**$5,409,450.00**	**$2,995,081.31**	**$15,010,268.69**
Annual Operation and Maintenance Cost				
Description	**Annual Cost**			**Net Present Worth**
Equipment	$2,000.00			$29,754.95
Supplies	$2,000.00			$29,754.95
Utilities	$0.00			$0.00
Labor	$3,000.00			$44,632.42
Total Annual Cost	**$7,000.00**			**$104,142.32**
			Total Net Present Worth	**$15,114,411.02**
			EUAC	**$1,015,925.83**

COLLECTION ALTERNATIVE 2: FUTURE BASIN IMPROVEMENTS

Collection Alternative 2 proposes a long range future basin plan that reduces the number of collection lift stations in Brandon from 11 to 2. This can be accomplished by installing new trunk sewers along the bottom of the basin. These new trunk sewers would be deeper and would extend further to eliminate the need for lift stations. The new trunk sewers would also open up new areas for development. Brandon's rapid growth in the recent past has caused the City to install area lift stations to service new developments instead of being able to construct deeper truck sewers. The proposed basins are shown in Figure 16.

The two main components in the design of trunk sewers are the location and size. Trunk line sewers are typically responsible for capturing all the flow in a primary basin while lateral sewers are dedicated to intercept individual sub-basins. Lateral sewers are typically the direct interceptors for individual properties. It is critical to consider the overall drainage basin when sizing the trunk sewers. The wastewater flow from a basin can be calculated by knowing the size of basin and the land use. The recommended wastewater flows for each land use type is shown in the following table. The land use type is based on the current zoning and the future land use established in the Brandon Comprehensive Plan. It is recommended the City change their current Design Standards to follow the table below.

Table 11 Density Design Table

Districts	A_D Area Density (Units/Acre)	U_D Unit Density (People/Unit)	R Rate (gpcd)	F Flow (gal/ac)
Natural Resource Conservation (NRC)	1	3	100	300
Single Family Residential (R-1)	4	3	100	1,200
Multi-Family Residential (R-2)	12	2	100	2,400
Manufactured Housing Residential (R-3)	6	3	100	1,800
Central Business (CB)	2	10	100	2,000
General Business (GB)	2	10	100	2,000
Light Industrial (LI)	2	3	100	600
Heavy Industrial (HI)	1	15	100	1,500
Planned Development (PD)	2	10	100	2,000

The previous table determines the average daily flow from a basin by multiplying the number of acres from each zoning classification by a unit density and flow rate. The flow of wastewater varies throughout the day and the year. The peak daily flow from a small residential area will typically occur around noon or in the early evening hours and may vary from 200 to 400 percent of the average daily flow. Due to storage and lag time in larger basins, daily peak flows are more

consistent and may only vary 180 to 250 percent of the average daily flow. For this reason a peak daily flow factor or peaking factor is assumed and multiplied by the average daily flow to obtain the peak daily flow. The SD Design Criteria Manual requires a peaking factor of 2.5 for trunk sewers and 4 for lateral sewers. The peak daily flow is typically used in the design and sizing of sanitary sewer mains. The wastewater flows from the future basins are shown in the following table.

Table 12 Future Basin Flows

Basin	Area (acres)	NRC	R-1	R-2	R-3	CB	GB	LI	HI	PD	Average Daily Flow (cfs)	Peaking Factor	Peak Flow (cfs)
Husets	3,629	348	3,078	131	0	0	72	0	0	0	6.6	2.5	16.5
McHardy	496	181	295	13	0	0	7	0	0	0	0.7	2.5	1.8
Bethany	1,756	0	1,673	56	0	0	26	0	0	0	3.4	2.5	8.5
Split Rock	2,765	475	1,787	137	0	0	221	0	146	0	5.1	2.5	12.7
Hidden Valley	1,573	1,573	0	0	0	0	0	0	0	0	0.7	2.5	1.8
Country Gable	379	379	0	0	0	0	0	0	0	0	0.2	2.5	0.4
Parkview	936	367	569	0	0	0	0	0	0	0	1.2	2.5	3.1
Big Sioux Rec	342	267	75	0	0	0	0	0	0	0	0.3	2.5	0.7
West Side	1,470	216	850	32	0	0	203	0	169	0	2.8	2.5	7.0
Core	1,422	257	648	42	0	6	60	5	404	0	2.6	2.5	6.6
Total	14,768	4,061	8,976	411	0	6	590	5	720	0	23.6		59.0

Installing all of the trunk sewers at one time would be a significant financial burden on the City. In addition, development doesn't warrant all of the trunk sewers to be installed at this time. Therefore, Collection Alternative 2 is broken into three phases. Phase A includes installing a lift station in McHardy Park and all of the trunk sewer upstream. This would eliminate seven of the existing lifts stations. The lift station would pump back to the existing treatment system along the railroad tracks. Currently there are holding tanks in McHardy Park for the bathrooms and a grinder lift station for the bathroom on the north side of Split Rock Creek. These two areas would now be served by gravity sewer. Phase A would also open up 496 acres for development in the McHardy Basin.

Phase B would install a new lift station for the Parkview Basin. Three of the existing lift stations would be eliminated and additional area would be opened for development. The lift station would pump along the backside of the properties on the east side of the Big Sioux River. Phase C would eliminate the new lift station that was installed in Phase A and build a new lift station further to the south. This phase would be completed after Phase A and B. This lift station would pump in a new force main that follows Phase B. This would open up 3,629 acres of development in the Husets basin.

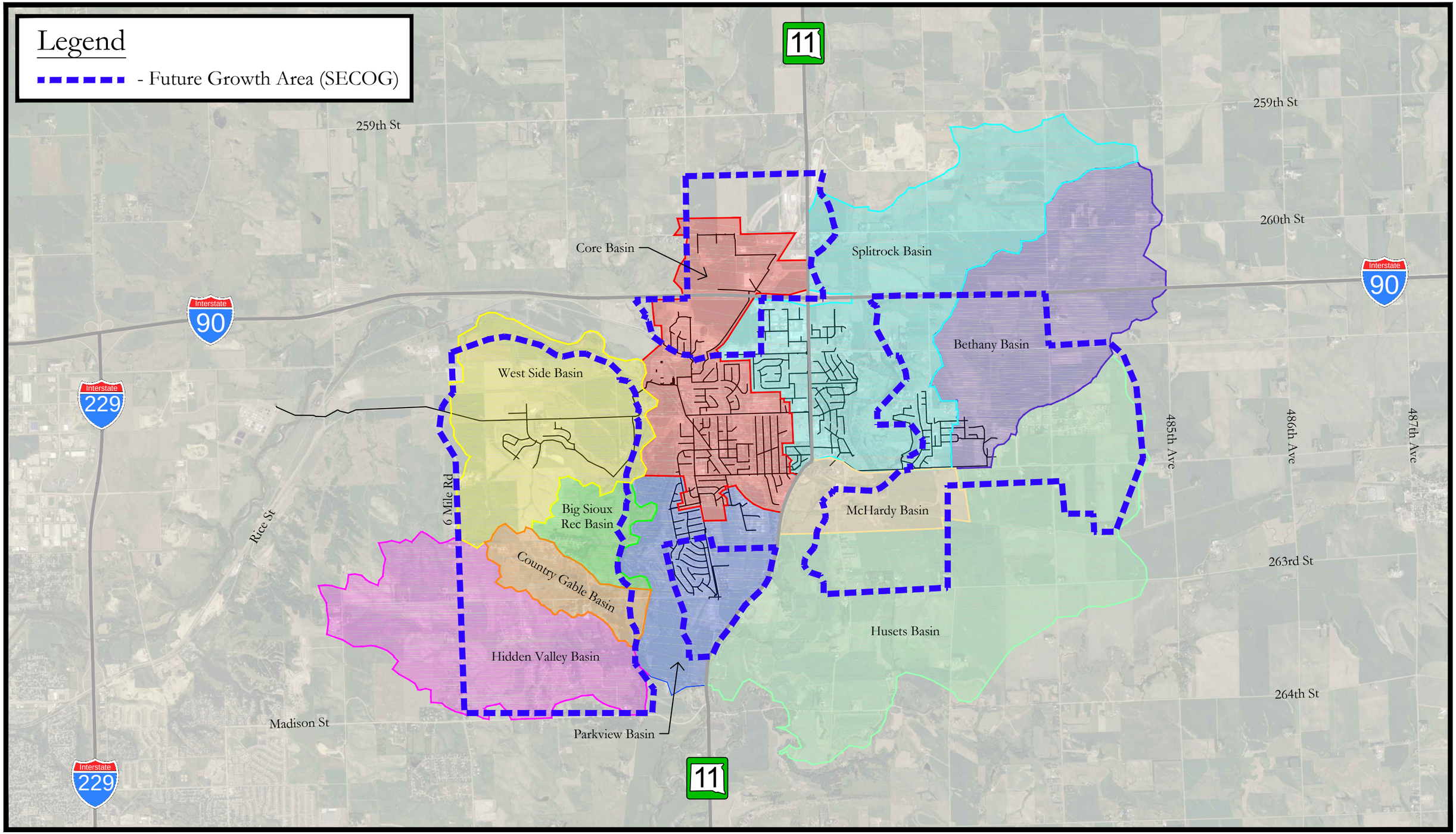

Figure 16 | Future Basins

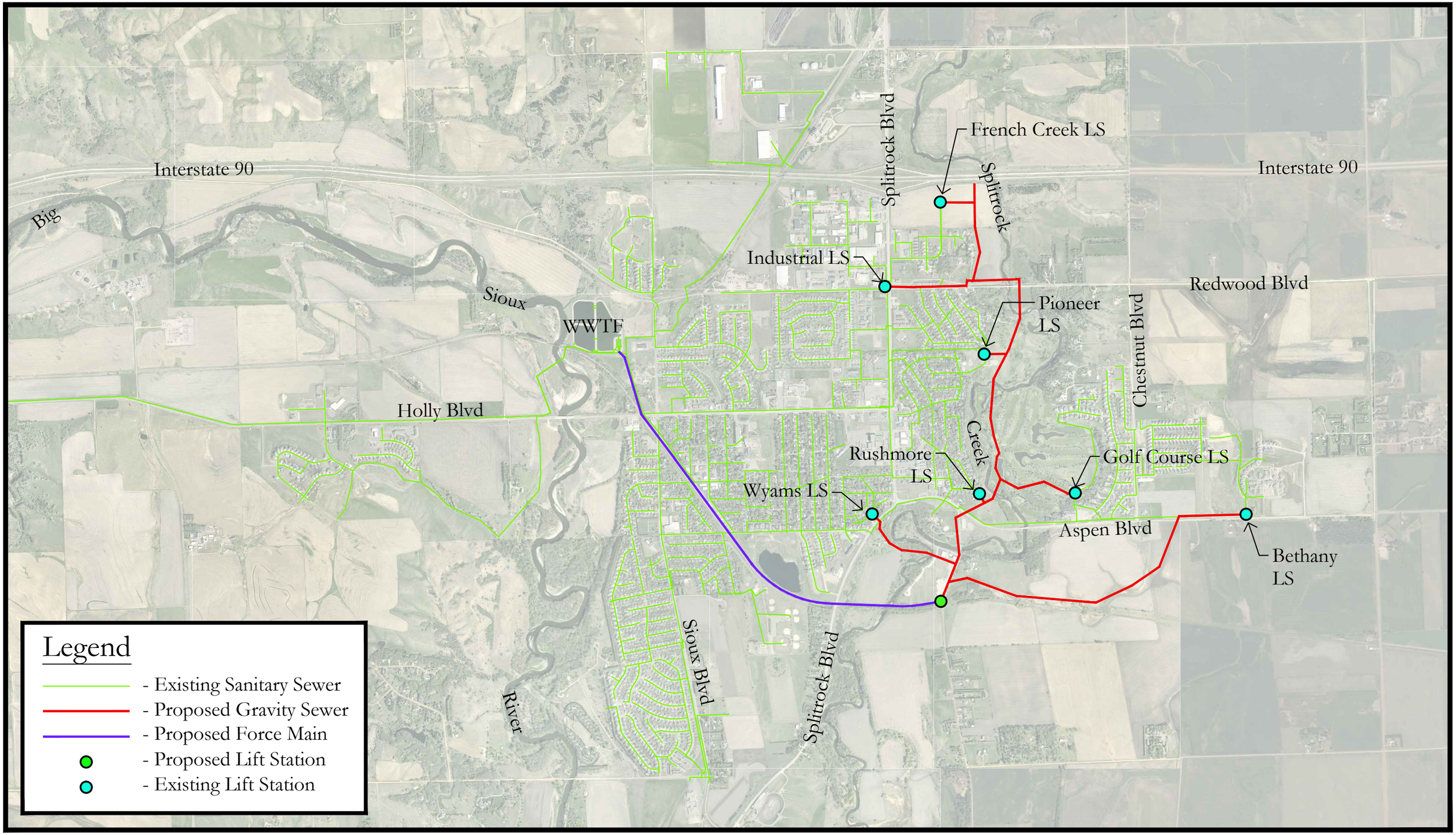

Figure 17 | Collection Alternative 2A

Brandon SOUTH DAKOTA *Building a Better Life*

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Table 13 Cost Estimate for Collection Alternative 2A

Item No.	Description	Quantity	Unit	Unit Price	Price
1	Mobilization	1	LS	$654,000.00	$654,000.00
2	Clearing	1	LS	$20,000.00	$20,000.00
3	Remove Sewer Pipe	700	FT	$4.00	$2,800.00
4	Remove Asphalt Concrete Pavement	12,700	SY	$2.50	$31,750.00
5	Remove Concrete Pavement	300	SY	$4.00	$1,200.00
6	Remove Existing Lift Station	7	EA	$10,000.00	$70,000.00
7	Unclassified Excavation	7,030	CY	$6.00	$42,180.00
8	Scarify & Recompact Subgrade	15,800	SY	$1.00	$15,800.00
9	Standby Generator & Tank	1	LS	$50,000.00	$50,000.00
10	Wet/Dry Well Lift Station	1	LS	$734,000.00	$734,000.00
11	Sanitary Sewer Manhole Lined	70	EA	$6,000.00	$420,000.00
12	Air Release Manhole	3	EA	$5,000.00	$15,000.00
13	21" Force Main	20,000	FT	$65.00	$1,300,000.00
14	8" PVC Sanitary Sewer Pipe	5,200	FT	$35.00	$182,000.00
15	10" PVC Sanitary Sewer Pipe	2,600	FT	$40.00	$104,000.00
16	24" PVC Sanitary Sewer Pipe	3,700	FT	$85.00	$314,500.00
17	27" PVC Sanitary Sewer Pipe	11,800	FT	$105.00	$1,239,000.00
18	30" PVC Sanitary Sewer Pipe	2,900	FT	$125.00	$362,500.00
19	42" PVC Sanitary Sewer Pipe	500	FT	$150.00	$75,000.00
20	8" Sanitary Sewer Pipe Bedding Material	5,200	FT	$4.00	$20,800.00
21	10" Sanitary Sewer Pipe Bedding Material	2,600	FT	$5.00	$13,000.00
22	21" Sanitary Sewer Pipe Bedding Material	20,000	FT	$7.00	$140,000.00
23	24" Sanitary Sewer Pipe Bedding Material	3,700	FT	$8.00	$29,600.00
24	27" Sanitary Sewer Pipe Bedding Material	11,800	FT	$9.00	$106,200.00
25	30" Sanitary Sewer Pipe Bedding Material	2,900	FT	$9.00	$26,100.00
26	42" Sanitary Sewer Pipe Bedding Material	500	FT	$10.00	$5,000.00
27	Trench Stabilization Material	13,300	TN	$15.00	$199,500.00
28	River Crossings	7	EA	$20,000.00	$140,000.00
29	Highway Crossing	300	FT	$300.00	$90,000.00
30	Irrigation Repairs	1	LS	$10,000.00	$10,000.00
31	Reconnect Sewer Main	7	EA	$500.00	$3,500.00
32	Salvage & Place Topsoil	20,400	CY	$5.00	$102,000.00
33	Aggregate Base Course (12")	10,400	TN	$12.00	$124,800.00
34	Asphalt Concrete Surfacing (4")	3,000	TN	$70.00	$210,000.00
35	Concrete Surfacing	300	SY	$50.00	$15,000.00
36	Geotextile Fabric	15,800	SY	$1.50	$23,700.00
37	Traffic Control	1	LS	$15,000.00	$15,000.00
38	Seeding, Fertilizing & Mulching	122,400	SY	$1.50	$183,600.00
39	Post Televising	26,700	FT	$1.00	$26,700.00
40	Erosion Control	1	LS	$25,000.00	$25,000.00
41	Bypass Pumping	1	LS	$20,000.00	$20,000.00
42	Trench Dewatering	1	LS	$30,000.00	$30,000.00
				Subtotal	$7,193,230.00
				Contingencies (15%)	$1,079,000.00
				Total Estimated Construction Costs	**$8,272,230.00**
				ENGINEERING	**$1,078,000.00**
				LEGAL, ADMINISTRATION & TESTING (4%)	**$331,000.00**
				TOTAL ESTIMATED PROJECT COST	**$9,681,230.00**

Table 14 EUAC for Collection Alternative 2A

Capital Cost		Salvage	Present Worth	Net Present
Description	Price	Value	of Salvage Value	Worth
Mobilization	$654,000.00	$0.00	$0.00	$654,000.00
Clearing	$20,000.00	$0.00	$0.00	$20,000.00
Remove Sewer Pipe	$2,800.00	$0.00	$0.00	$2,800.00
Remove Asphalt Concrete Pavement	$31,750.00	$0.00	$0.00	$31,750.00
Remove Concrete Pavement	$1,200.00	$0.00	$0.00	$1,200.00
Remove Existing Lift Station	$70,000.00	$0.00	$0.00	$70,000.00
Unclassified Excavation	$42,180.00	$0.00	$0.00	$42,180.00
Scarify & Recompact Subgrade	$15,800.00	$0.00	$0.00	$15,800.00
Standby Generator & Tank	$50,000.00	$30,000.00	$16,610.27	$33,389.73
Wet/Dry Well Lift Station	$734,000.00	$440,400.00	$243,838.80	$490,161.20
Sanitary Sewer Manhole Lined	$420,000.00	$252,000.00	$139,526.29	$280,473.71
Air Release Manhole	$15,000.00	$9,000.00	$4,983.08	$10,016.92
21" Force Main	$1,300,000.00	$780,000.00	$431,867.09	$868,132.91
8" PVC Sanitary Sewer Pipe	$182,000.00	$109,200.00	$60,461.39	$121,538.61
10" PVC Sanitary Sewer Pipe	$104,000.00	$62,400.00	$34,549.37	$69,450.63
24" PVC Sanitary Sewer Pipe	$314,500.00	$188,700.00	$104,478.61	$210,021.39
27" PVC Sanitary Sewer Pipe	$1,239,000.00	$743,400.00	$411,602.56	$827,397.44
30" PVC Sanitary Sewer Pipe	$362,500.00	$217,500.00	$120,424.48	$242,075.52
42" PVC Sanitary Sewer Pipe	$75,000.00	$45,000.00	$24,915.41	$50,084.59
8" Sanitary Sewer Pipe Bedding Material	$20,800.00	$0.00	$0.00	$20,800.00
10" Sanitary Sewer Pipe Bedding Material	$13,000.00	$0.00	$0.00	$13,000.00
21" Sanitary Sewer Pipe Bedding Material	$140,000.00	$0.00	$0.00	$140,000.00
24" Sanitary Sewer Pipe Bedding Material	$29,600.00	$0.00	$0.00	$29,600.00
27" Sanitary Sewer Pipe Bedding Material	$106,200.00	$0.00	$0.00	$106,200.00
30" Sanitary Sewer Pipe Bedding Material	$26,100.00	$0.00	$0.00	$26,100.00
42" Sanitary Sewer Pipe Bedding Material	$5,000.00	$0.00	$0.00	$5,000.00
Trench Stabilization Material	$199,500.00	$0.00	$0.00	$199,500.00
River Crossings	$140,000.00	$84,000.00	$46,508.76	$93,491.24
Highway Crossing	$90,000.00	$54,000.00	$29,898.49	$60,101.51
Irrigation Repairs	$10,000.00	$0.00	$0.00	$10,000.00
Reconnect Sewer Main	$3,500.00	$0.00	$0.00	$3,500.00
Salvage & Place Topsoil	$102,000.00	$0.00	$0.00	$102,000.00
Aggregate Base Course (12")	$124,800.00	$74,880.00	$41,459.24	$83,340.76
Asphalt Concrete Surfacing (4")	$210,000.00	$126,000.00	$69,763.15	$140,236.85
Concrete Surfacing	$15,000.00	$9,000.00	$4,983.08	$10,016.92
Geotextile Fabric	$23,700.00	$0.00	$0.00	$23,700.00
Traffic Control	$15,000.00	$0.00	$0.00	$15,000.00
Seeding, Fertilizing & Mulching	$183,600.00	$0.00	$0.00	$183,600.00
Post Televising	$26,700.00	$0.00	$0.00	$26,700.00
Erosion Control	$25,000.00	$0.00	$0.00	$25,000.00
Bypass Pumping	$20,000.00	$0.00	$0.00	$20,000.00
Trench Dewatering	$30,000.00	$0.00	$0.00	$30,000.00
Remaining Capital Costs	$2,488,000.00	$0.00	$0.00	$2,488,000.00
Total Construction Cost	**$9,681,230.00**	**$3,225,480.00**	**$1,785,870.07**	**$7,895,359.93**
Annual Operation and Maintenance Cost				
Description	Annual Cost			Net Present Worth
Equipment	$3,000.00			$44,632.42
Supplies	$3,000.00			$44,632.42
Utilities	$4,000.00			$59,509.90
Labor	$4,500.00			$66,948.64
Total Annual Cost	**$14,500.00**			**$215,723.39**
			Total Net Present Worth	**$8,111,083.31**
			EUAC	**$545,192.20**

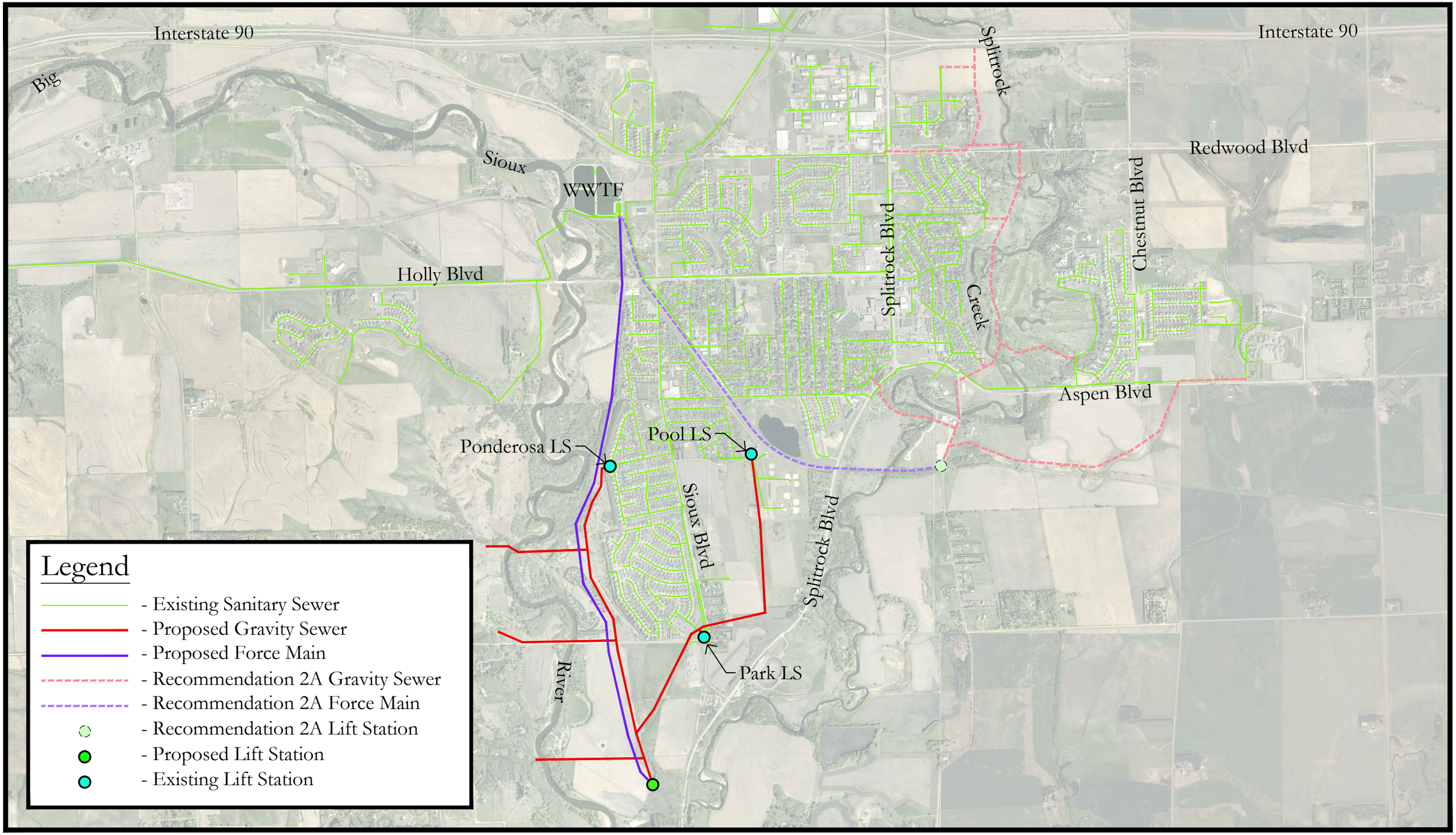

Figure 18 | Collection Alternative 2B

0 500 1000 2000

Brandon SOUTH DAKOTA *Building a Better Life*

STOCKWELL ENGINEERS

Table 15 Cost Estimate for Collection Alternative 2B

Item No.	Description	Quantity	Unit	Unit Price	Price
1	Mobilization	1	LS	$424,000.00	$424,000.00
2	Clearing	1	LS	$10,000.00	$10,000.00
3	Remove Sewer Pipe	300	FT	$4.00	$1,200.00
4	Remove Asphalt Concrete Pavement	600	SY	$2.50	$1,500.00
5	Remove Existing Lift Station	3	EA	$10,000.00	$30,000.00
6	Unclassified Excavation	320	CY	$6.00	$1,920.00
7	Scarify & Recompact Subgrade	700	SY	$1.00	$700.00
8	Standby Generator & Tank	1	LS	$50,000.00	$50,000.00
9	Wet/Dry Well Lift Station	1	LS	$685,000.00	$685,000.00
10	Sanitary Sewer Manhole Lined	60	EA	$6,000.00	$360,000.00
11	Air Release Manhole	3	EA	$5,000.00	$15,000.00
12	12" Force Main	26,000	FT	$45.00	$1,170,000.00
13	8" PVC Sanitary Sewer Pipe	7,100	FT	$35.00	$248,500.00
14	10" PVC Sanitary Sewer Pipe	7,200	FT	$40.00	$288,000.00
15	12" PVC Sanitary Sewer Pipe	7,400	FT	$48.00	$355,200.00
16	18" PVC Sanitary Sewer Pipe	600	FT	$60.00	$36,000.00
17	21" PVC Sanitary Sewer Pipe	600	FT	$70.00	$42,000.00
18	8" Sanitary Sewer Pipe Bedding Material	7,100	FT	$4.00	$28,400.00
19	10" Sanitary Sewer Pipe Bedding Material	7,200	FT	$5.00	$36,000.00
20	12" Sanitary Sewer Pipe Bedding Material	33,400	FT	$5.00	$167,000.00
21	18" Sanitary Sewer Pipe Bedding Material	600	FT	$6.00	$3,600.00
22	21" Sanitary Sewer Pipe Bedding Material	600	FT	$7.00	$4,200.00
23	Trench Stabilization Material	10,900	TN	$15.00	$163,500.00
24	River Crossings	3	EA	$20,000.00	$60,000.00
25	Highway & Railroad Crossing	300	FT	$250.00	$75,000.00
26	Reconnect Sewer Main	3	EA	$500.00	$1,500.00
27	Salvage & Place Topsoil	20,000	CY	$5.00	$100,000.00
28	Aggregate Base Course (12")	500	TN	$12.00	$6,000.00
29	Asphalt Concrete Surfacing (4")	200	TN	$70.00	$14,000.00
30	Geotextile Fabric	700	SY	$1.50	$1,050.00
31	Traffic Control	1	LS	$10,000.00	$10,000.00
32	Seeding, Fertilizing & Mulching	119,700	SY	$1.50	$179,550.00
33	Post Televising	22,900	FT	$1.00	$22,900.00
34	Erosion Control	1	LS	$25,000.00	$25,000.00
35	Bypass Pumping	1	LS	$10,000.00	$10,000.00
36	Trench Dewatering	1	LS	$30,000.00	$30,000.00
				Subtotal	$4,656,720.00
				Contingencies (15%)	$699,000.00
				Total Estimated Construction Costs	**$5,355,720.00**
				ENGINEERING	**$710,000.00**
				LEGAL, ADMINISTRATION & TESTING (4%)	**$215,000.00**
				TOTAL ESTIMATED PROJECT COST	**$6,280,720.00**

Table 16 EUAC for Collection Alternative 2B

Capital Cost		Salvage	Present Worth	Net Present
Description	Price	Value	of Salvage Value	Worth
Mobilization	$424,000.00	$0.00	$0.00	$424,000.00
Clearing	$10,000.00	$0.00	$0.00	$10,000.00
Remove Sewer Pipe	$1,200.00	$0.00	$0.00	$1,200.00
Remove Asphalt Concrete Pavement	$1,500.00	$0.00	$0.00	$1,500.00
Remove Existing Lift Station	$30,000.00	$0.00	$0.00	$30,000.00
Unclassified Excavation	$1,920.00	$0.00	$0.00	$1,920.00
Scarify & Recompact Subgrade	$700.00	$0.00	$0.00	$700.00
Standby Generator & Tank	$50,000.00	$30,000.00	$16,610.27	$33,389.73
Wet/Dry Well Lift Station	$685,000.00	$411,000.00	$227,560.73	$457,439.27
Sanitary Sewer Manhole Lined	$360,000.00	$216,000.00	$119,593.96	$240,406.04
Air Release Manhole	$15,000.00	$9,000.00	$4,983.08	$10,016.92
12" Force Main	$1,170,000.00	$702,000.00	$388,680.38	$781,319.62
8" PVC Sanitary Sewer Pipe	$248,500.00	$149,100.00	$82,553.05	$165,946.95
10" PVC Sanitary Sewer Pipe	$288,000.00	$172,800.00	$95,675.17	$192,324.83
12" PVC Sanitary Sewer Pipe	$355,200.00	$213,120.00	$117,999.38	$237,200.62
18" PVC Sanitary Sewer Pipe	$36,000.00	$21,600.00	$11,959.40	$24,040.60
21" PVC Sanitary Sewer Pipe	$42,000.00	$25,200.00	$13,952.63	$28,047.37
8" Sanitary Sewer Pipe Bedding Material	$28,400.00	$0.00	$0.00	$28,400.00
10" Sanitary Sewer Pipe Bedding Material	$36,000.00	$0.00	$0.00	$36,000.00
12" Sanitary Sewer Pipe Bedding Material	$167,000.00	$0.00	$0.00	$167,000.00
18" Sanitary Sewer Pipe Bedding Material	$3,600.00	$0.00	$0.00	$3,600.00
21" Sanitary Sewer Pipe Bedding Material	$4,200.00	$0.00	$0.00	$4,200.00
Trench Stabilization Material	$163,500.00	$0.00	$0.00	$163,500.00
River Crossings	$60,000.00	$36,000.00	$19,932.33	$40,067.67
Highway & Railroad Crossing	$75,000.00	$45,000.00	$24,915.41	$50,084.59
Reconnect Sewer Main	$1,500.00	$0.00	$0.00	$1,500.00
Salvage & Place Topsoil	$100,000.00	$0.00	$0.00	$100,000.00
Aggregate Base Course (12")	$6,000.00	$3,600.00	$1,993.23	$4,006.77
Asphalt Concrete Surfacing (4")	$14,000.00	$8,400.00	$4,650.88	$9,349.12
Geotextile Fabric	$1,050.00	$0.00	$0.00	$1,050.00
Traffic Control	$10,000.00	$0.00	$0.00	$10,000.00
Seeding, Fertilizing & Mulching	$179,550.00	$0.00	$0.00	$179,550.00
Post Televising	$22,900.00	$0.00	$0.00	$22,900.00
Erosion Control	$25,000.00	$0.00	$0.00	$25,000.00
Bypass Pumping	$10,000.00	$0.00	$0.00	$10,000.00
Trench Dewatering	$30,000.00	$0.00	$0.00	$30,000.00
Remaining Capital Costs	$1,624,000.00	$0.00	$0.00	$1,624,000.00
Total Construction Cost	**$6,280,720.00**	**$2,042,820.00**	**$1,131,059.90**	**$5,149,660.10**
Annual Operation and Maintenance Cost				
Description	**Annual Cost**			**Net Present Worth**
Equipment	$3,000.00			$44,632.42
Supplies	$3,000.00			$44,632.42
Utilities	$4,000.00			$59,509.90
Labor	$4,500.00			$66,948.64
Total Annual Cost	**$14,500.00**			**$215,723.39**
			Total Net Present Worth	**$5,365,383.48**
			EUAC	**$360,638.05**

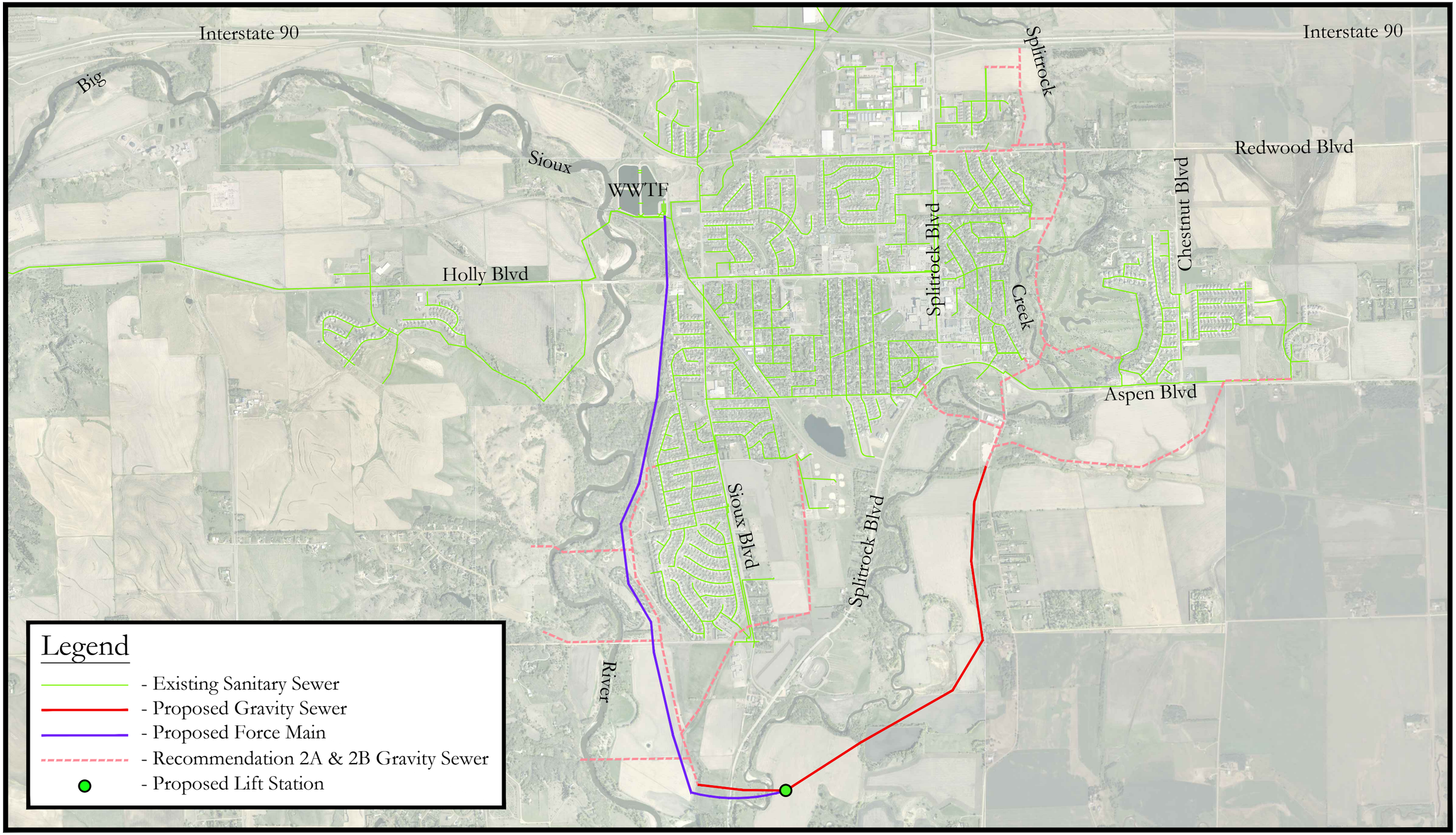

Figure 19 | Collection Alternative 2C

Brandon SOUTH DAKOTA Building a Better Life

STOCKWELL ENGINEERS

Table 17 Cost Estimate for Collection Alternative 2C

Item No.	Description	Quantity	Unit	Unit Price	Price
1	Mobilization	1	LS	$708,000.00	$708,000.00
2	Clearing	1	LS	$10,000.00	$10,000.00
3	Remove Sewer Pipe	200	FT	$4.00	$800.00
4	Remove Existing Lift Station	2	EA	$10,000.00	$20,000.00
5	Standby Generator & Tank	1	LS	$50,000.00	$50,000.00
6	Wet/Dry Well Lift Station	1	LS	$783,000.00	$783,000.00
7	Sanitary Sewer Manhole Lined	30	EA	$6,000.00	$180,000.00
8	Air Release Manhole	2	EA	$5,000.00	$10,000.00
9	27" Force Main	30,000	FT	$100.00	$3,000,000.00
10	21" PVC Sanitary Sewer Pipe	2,000	FT	$70.00	$140,000.00
11	42" PVC Sanitary Sewer Pipe	5,300	FT	$150.00	$795,000.00
12	54" PVC Sanitary Sewer Pipe	4,400	FT	$180.00	$792,000.00
13	21" Sanitary Sewer Pipe Bedding Material	32,000	FT	$7.00	$224,000.00
14	42" Sanitary Sewer Pipe Bedding Material	5,300	FT	$10.00	$53,000.00
15	54" Sanitary Sewer Pipe Bedding Material	4,400	FT	$11.00	$48,400.00
16	Trench Stabilization Material	29,200	TN	$15.00	$438,000.00
17	River Crossings	2	EA	$20,000.00	$40,000.00
18	Highway & Railroad Crossing	500	FT	$400.00	$200,000.00
19	Reconnect Sewer Main	2	EA	$500.00	$1,000.00
20	Salvage & Place Topsoil	14,900	CY	$5.00	$74,500.00
21	Traffic Control	1	LS	$5,000.00	$5,000.00
22	Seeding, Fertilizing & Mulching	89,000	SY	$1.50	$133,500.00
23	Post Televising	11,700	FT	$1.00	$11,700.00
24	Erosion Control	1	LS	$25,000.00	$25,000.00
25	Bypass Pumping	1	LS	$10,000.00	$10,000.00
26	Trench Dewatering	1	LS	$30,000.00	$30,000.00
				Subtotal	$7,782,900.00
				Contingencies (15%)	$1,168,000.00
				Total Estimated Construction Costs	**$8,950,900.00**
				ENGINEERING	**$1,163,000.00**
				LEGAL, ADMINISTRATION & TESTING (4%)	**$359,000.00**
				TOTAL ESTIMATED PROJECT COST	**$10,472,900.00**

Table 18 EUAC for Collection Alternative 2C

Capital Cost		Salvage	Present Worth	Net Present
Description	Price	Value	of Salvage Value	Worth
Mobilization	$708,000.00	$0.00	$0.00	$708,000.00
Clearing	$10,000.00	$0.00	$0.00	$10,000.00
Remove Sewer Pipe	$800.00	$0.00	$0.00	$800.00
Remove Existing Lift Station	$20,000.00	$0.00	$0.00	$20,000.00
Standby Generator & Tank	$50,000.00	$30,000.00	$16,610.27	$33,389.73
Wet/Dry Well Lift Station	$783,000.00	$469,800.00	$260,116.87	$522,883.13
Sanitary Sewer Manhole Lined	$180,000.00	$108,000.00	$59,796.98	$120,203.02
Air Release Manhole	$10,000.00	$6,000.00	$3,322.05	$6,677.95
27" Force Main	$3,000,000.00	$1,800,000.00	$996,616.36	$2,003,383.64
21" PVC Sanitary Sewer Pipe	$140,000.00	$84,000.00	$46,508.76	$93,491.24
42" PVC Sanitary Sewer Pipe	$795,000.00	$477,000.00	$264,103.33	$530,896.67
54" PVC Sanitary Sewer Pipe	$792,000.00	$475,200.00	$263,106.72	$528,893.28
21" Sanitary Sewer Pipe Bedding Material	$224,000.00	$0.00	$0.00	$224,000.00
42" Sanitary Sewer Pipe Bedding Material	$53,000.00	$0.00	$0.00	$53,000.00
54" Sanitary Sewer Pipe Bedding Material	$48,400.00	$0.00	$0.00	$48,400.00
Trench Stabilization Material	$438,000.00	$0.00	$0.00	$438,000.00
River Crossings	$40,000.00	$24,000.00	$13,288.22	$26,711.78
Highway & Railroad Crossing	$200,000.00	$120,000.00	$66,441.09	$133,558.91
Reconnect Sewer Main	$1,000.00	$0.00	$0.00	$1,000.00
Salvage & Place Topsoil	$74,500.00	$0.00	$0.00	$74,500.00
Traffic Control	$5,000.00	$0.00	$0.00	$5,000.00
Seeding, Fertilizing & Mulching	$133,500.00	$0.00	$0.00	$133,500.00
Post Televising	$11,700.00	$0.00	$0.00	$11,700.00
Erosion Control	$25,000.00	$0.00	$0.00	$25,000.00
Bypass Pumping	$10,000.00	$0.00	$0.00	$10,000.00
Trench Dewatering	$30,000.00	$0.00	$0.00	$30,000.00
Remaining Capital Costs	$2,690,000.00	$0.00	$0.00	$2,690,000.00
Total Construction Cost	**$10,472,900.00**	**$3,594,000.00**	**$1,989,910.66**	**$8,482,989.34**
Annual Operation and Maintenance Cost				
Description	**Annual Cost**			**Net Present Worth**
Equipment	$3,000.00			$44,632.42
Supplies	$3,000.00			$44,632.42
Utilities	$4,000.00			$59,509.90
Labor	$4,500.00			$66,948.64
Total Annual Cost	**$14,500.00**			**$215,723.39**
			Total Net Present Worth	**$8,698,712.72**
			EUAC	**$584,690.13**

COLLECTION ALTERNATIVE 3: REPLACE LIFT STATIONS

Collection Alternative 3 proposes that existing lift stations be replaced if the City doesn't proceed with Collection Alternative 2. Currently there are seven wet/dry well lift stations and four of these need immediate attention. The Pioneer and Ponderosa lift stations are rusting out. Parts are no longer available for the pumps in the Wyams lift station and the existing two pumps vary 227% in pumping rate. The golf course lift station has been flooded in the past and should be replaced. The cost to replace these lift stations in shown in the following table.

Table 19 Cost Estimate for Collection Alternative 3

Item No.	Description	Quantity	Unit	Unit Price	Price
1	Mobilization	1	LS	$87,000.00	$87,000.00
2	Clearing	1	LS	$5,000.00	$5,000.00
3	Remove Sewer Pipe	400	FT	$4.00	$1,600.00
4	Remove Asphalt Concrete Pavement	400	SY	$2.50	$1,000.00
5	Remove Existing Lift Station	4	EA	$10,000.00	$40,000.00
6	Unclassified Excavation	230	CY	$6.00	$1,380.00
7	Scarify & Recompact Subgrade	500	SY	$1.00	$500.00
8	Standby Generator & Tank	3	EA	$30,000.00	$90,000.00
9	Wet/Dry Well Lift Station	4	LS	$160,000.00	$640,000.00
10	6" Force Main	200	FT	$25.00	$5,000.00
11	8" PVC Sanitary Sewer Pipe	400	FT	$35.00	$14,000.00
12	Sanitary Sewer Pipe Bedding Material	600	FT	$4.00	$2,400.00
13	Reconnect Sewer Main	4	EA	$500.00	$2,000.00
14	Salvage & Place Topsoil	300	CY	$5.00	$1,500.00
15	Aggregate Base Course (12")	400	TN	$12.00	$4,800.00
16	Asphalt Concrete Surfacing (4")	100	TN	$70.00	$7,000.00
17	Geotextile Fabric	500	SY	$1.50	$750.00
18	Traffic Control	1	LS	$5,000.00	$5,000.00
19	Seeding, Fertilizing & Mulching	1,500	SY	$1.50	$2,250.00
20	Post Televising	400	FT	$1.00	$400.00
21	Erosion Control	1	LS	$5,000.00	$5,000.00
22	Bypass Pumping	4	EA	$5,000.00	$20,000.00
23	Trench Dewatering	4	EA	$5,000.00	$20,000.00
				Subtotal	$956,580.00
				Contingencies (15%)	$144,000.00
				Total Estimated Construction Costs	**$1,100,580.00**
				ENGINEERING	**$174,000.00**
				LEGAL, ADMINISTRATION & TESTING (4%)	**$45,000.00**
				TOTAL ESTIMATED PROJECT COST	**$1,319,580.00**

Table 20 EUAC for Collection Alternative 3

Capital Cost Description	Price	Salvage Value	Present Worth of Salvage Value	Net Present Worth
Mobilization	$87,000.00	$0.00	$0.00	$87,000.00
Clearing	$5,000.00	$0.00	$0.00	$5,000.00
Remove Sewer Pipe	$1,600.00	$0.00	$0.00	$1,600.00
Remove Asphalt Concrete Pavement	$1,000.00	$0.00	$0.00	$1,000.00
Remove Existing Lift Station	$40,000.00	$0.00	$0.00	$40,000.00
Unclassified Excavation	$1,380.00	$0.00	$0.00	$1,380.00
Scarify & Recompact Subgrade	$500.00	$0.00	$0.00	$500.00
Standby Generator & Tank	$90,000.00	$54,000.00	$29,898.49	$60,101.51
Wet/Dry Well Lift Station	$640,000.00	$384,000.00	$212,611.49	$427,388.51
6" Force Main	$5,000.00	$3,000.00	$1,661.03	$3,338.97
8" PVC Sanitary Sewer Pipe	$14,000.00	$8,400.00	$4,650.88	$9,349.12
Sanitary Sewer Pipe Bedding Material	$2,400.00	$0.00	$0.00	$2,400.00
Reconnect Sewer Main	$2,000.00	$0.00	$0.00	$2,000.00
Salvage & Place Topsoil	$1,500.00	$0.00	$0.00	$1,500.00
Aggregate Base Course (12")	$4,800.00	$2,880.00	$1,594.59	$3,205.41
Asphalt Concrete Surfacing (4")	$7,000.00	$4,200.00	$2,325.44	$4,674.56
Geotextile Fabric	$750.00	$0.00	$0.00	$750.00
Traffic Control	$5,000.00	$0.00	$0.00	$5,000.00
Seeding, Fertilizing & Mulching	$2,250.00	$0.00	$0.00	$2,250.00
Post Televising	$400.00	$0.00	$0.00	$400.00
Erosion Control	$5,000.00	$0.00	$0.00	$5,000.00
Bypass Pumping	$20,000.00	$0.00	$0.00	$20,000.00
Trench Dewatering	$20,000.00	$0.00	$0.00	$20,000.00
Remaining Capital Costs	$363,000.00	$0.00	$0.00	$363,000.00
Total Construction Cost	**$1,319,580.00**	**$456,480.00**	**$252,741.91**	**$1,066,838.09**
Annual Operation and Maintenance Cost				
Description	**Annual Cost**			**Net Present Worth**
Equipment	$3,000.00			$44,632.42
Supplies	$3,000.00			$44,632.42
Utilities	$11,200.00			$166,627.72
Labor	$4,500.00			$66,948.64
Total Annual Cost	**$21,700.00**			**$322,841.20**
			Total Net Present Worth	**$1,389,679.30**
			EUAC	**$93,408.28**

COLLECTION ALTERNATIVE 4: NEW SCADA SYSTEM

Collection Alternative 4 proposes adding a Supervisory Control and Data Acquisition (SCADA) system for the wastewater treatment system. SCADA allows the remote monitoring of several facilities at one location. The base unit consisting of a computer and radio antenna would be installed at the City Shop. Radios would then be installed at each lift station and the wastewater treatment ponds. The computer screen would show an icon for each site. The screen would show if pumps are running and what the water level is in the wet well. The influent at the wastewater treatment plant could be shown on the screen. All alarm conditions would show up on the screen as well. The installation of a SCADA system would reduce the time spent going to each individual site multiple times a week. In addition, new safety criteria for the City requires confined space entry for the dry well lift stations. The SCADA system would reduce the number of trips down the lift stations with harnesses on for confined space entry.

Table 21 Cost Estimate for Collection Alternative 4

Item No.	Description	Quantity	Unit	Unit Price	Price
1	Mobilization	1	LS	$20,000.00	$20,000.00
2	SCADA System	1	LS	$172,000.00	$172,000.00
3	Radio Installation	1	LS	$20,000.00	$20,000.00
				Subtotal	$212,000.00
				Contingencies (15%)	$32,000.00
				Total Estimated Construction Costs	**$244,000.00**
				ENGINEERING	**$55,000.00**
				LEGAL, ADMINISTRATION & TESTING (4%)	**$10,000.00**
				TOTAL ESTIMATED PROJECT COST	**$309,000.00**

Table 22 EUAC for Collection Alternative 4

Capital Cost		Salvage	Present Worth	Net Present
Description	Price	Value	of Salvage Value	Worth
Mobilization	$20,000.00	$0.00	$0.00	$20,000.00
SCADA System	$172,000.00	$0.00	$0.00	$172,000.00
Radio Installation	$20,000.00	$0.00	$0.00	$20,000.00
Remaining Capital Costs	$97,000.00	$0.00	$0.00	$97,000.00
Total Construction Cost	**$309,000.00**	**$0.00**	**$0.00**	**$309,000.00**
Annual Operation and Maintenance Cost				
Description	Annual Cost			Net Present Worth
Equipment	$500.00			$7,438.74
Supplies	$500.00			$7,438.74
Utilities	$500.00			$7,438.74
Labor	$500.00			$7,438.74
Total Annual Cost	**$2,000.00**			**$29,754.95**
			Total Net Present Worth	**$338,754.95**
			EUAC	**$22,769.65**

COLLECTION ALTERNATIVE 5: CORE BASIN TRUNK SEWER

Collection Alternative 5 proposes a new trunk sewer be installed along the railroad tracks from the WWTP to north of Aspen Park and across Splitrock Blvd. The trunk sewer would take all the existing gravity sewer that flows to the treatment system and carry the wastewater to the south side of McHardy Park where a new lift station would pump to a new treatment system. This alternative is only needed if the existing wastewater treatment system is abandoned and a new treatment system is built. This alternative would reduce the amount of clay pipe replacement that is part of Collection Alternative 1 because it would be replaced as part of the trunk sewer in this alternative. A figure showing the proposed improvements and cost estimates are shown on the following pages.

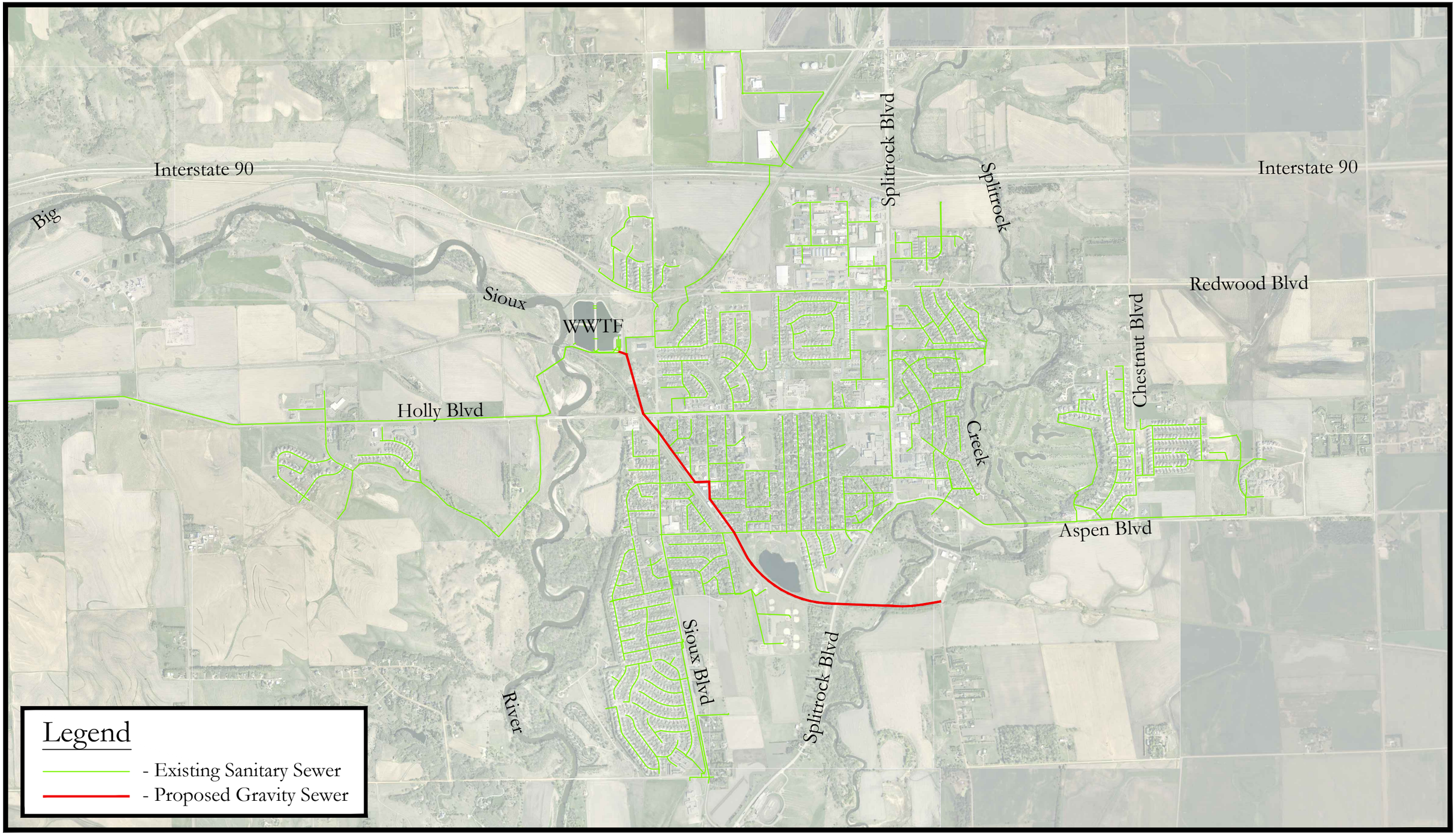

Figure 20 | Collection Alternative 5

Table 23 Cost Estimate for Collection Alternative 5

Item No.	Description	Quantity	Unit	Unit Price	Price
1	Mobilization	1	LS	$195,000.00	$195,000.00
2	Clearing	1	LS	$15,000.00	$15,000.00
3	Remove Sewer Pipe	5,140	FT	$4.00	$20,560.00
4	Remove Asphalt Concrete Pavement	6,000	SY	$2.50	$15,000.00
5	Remove Concrete Pavement	300	SY	$4.00	$1,200.00
6	Remove Existing Manhole	20	EA	$400.00	$8,000.00
7	Remove Concrete Curb & Gutter	3,460	FT	$4.00	$13,840.00
8	Saw Existing Surfacing	510	FT	$7.00	$3,570.00
9	Unclassified Excavation	3,430	CY	$6.00	$20,580.00
10	Scarify & Recompact Subgrade	7,700	SY	$1.00	$7,700.00
11	Sanitary Sewer Manhole Lined	30	EA	$6,000.00	$180,000.00
12	4" PVC Sanitary Service Line	700	FT	$25.00	$17,500.00
13	8" PVC Sanitary Sewer Pipe	280	FT	$35.00	$9,800.00
14	24" PVC Sanitary Sewer Pipe	10,100	FT	$85.00	$858,500.00
15	8" Sanitary Sewer Pipe Bedding Material	280	FT	$4.00	$1,120.00
16	24" Sanitary Sewer Pipe Bedding Material	10,100	FT	$8.00	$80,800.00
17	Trench Stabilization Material	7,100	TN	$15.00	$106,500.00
18	River Crossings	1	EA	$20,000.00	$20,000.00
19	Highway Crossing	300	FT	$300.00	$90,000.00
20	Sewer Wye	20	EA	$300.00	$6,000.00
21	Sewer Fittings	60	EA	$100.00	$6,000.00
22	Reconnect Sewer Main	14	EA	$500.00	$7,000.00
23	Reconnect Sewer Service	20	EA	$250.00	$5,000.00
24	Salvage & Place Topsoil	5,800	CY	$5.00	$29,000.00
25	Aggregate Base Course (12")	5,100	TN	$12.00	$61,200.00
26	Asphalt Concrete Surfacing (4")	1,400	TN	$70.00	$98,000.00
27	Concrete Surfacing	300	SY	$50.00	$15,000.00
28	Concrete Curb & Gutter	3,460	FT	$12.00	$41,520.00
29	Geotextile Fabric	7,700	SY	$1.50	$11,550.00
30	6" Concrete Fillet Section	240	SY	$45.00	$10,800.00
31	6" Concrete Valley Gutter	280	SY	$45.00	$12,600.00
32	4" Concrete Sidewalk	6,720	SF	$4.00	$26,880.00
33	Detectable Warning Surface	450	SF	$45.00	$20,250.00
34	Traffic Control	1	LS	$15,000.00	$15,000.00
35	Seeding, Fertilizing & Mulching	34,600	SY	$1.50	$51,900.00
36	Post Televising	10,380	FT	$1.00	$10,380.00
37	Erosion Control	1	LS	$15,000.00	$15,000.00
38	Bypass Pumping	1	LS	$10,000.00	$10,000.00
39	Trench Dewatering	1	LS	$20,000.00	$20,000.00
				Subtotal	$2,137,750.00
			Contingencies (15%)		$321,000.00
			Total Estimated Construction Costs		**$2,458,750.00**
				ENGINEERING	**$345,000.00**
			LEGAL, ADMINISTRATION & TESTING (4%)		**$99,000.00**
			TOTAL ESTIMATED PROJECT COST		**$2,902,750.00**

Table 24 EUAC for Collection Alternative 5

Capital Cost Description	Price	Salvage Value	Present Worth of Salvage Value	Net Present Worth
Mobilization	$195,000.00	$0.00	$0.00	$195,000.00
Clearing	$15,000.00	$0.00	$0.00	$15,000.00
Remove Sewer Pipe	$20,560.00	$0.00	$0.00	$20,560.00
Remove Asphalt Concrete Pavement	$15,000.00	$0.00	$0.00	$15,000.00
Remove Concrete Pavement	$1,200.00	$0.00	$0.00	$1,200.00
Remove Existing Manhole	$8,000.00	$0.00	$0.00	$8,000.00
Remove Concrete Curb & Gutter	$13,840.00	$0.00	$0.00	$13,840.00
Saw Existing Surfacing	$3,570.00	$0.00	$0.00	$3,570.00
Unclassified Excavation	$20,580.00	$0.00	$0.00	$20,580.00
Scarify & Recompact Subgrade	$7,700.00	$0.00	$0.00	$7,700.00
Sanitary Sewer Manhole Lined	$180,000.00	$108,000.00	$59,796.98	$120,203.02
4" PVC Sanitary Service Line	$17,500.00	$10,500.00	$5,813.60	$11,686.40
8" PVC Sanitary Sewer Pipe	$9,800.00	$5,880.00	$3,255.61	$6,544.39
24" PVC Sanitary Sewer Pipe	$858,500.00	$515,100.00	$285,198.38	$573,301.62
8" Sanitary Sewer Pipe Bedding Material	$1,120.00	$0.00	$0.00	$1,120.00
24" Sanitary Sewer Pipe Bedding Material	$80,800.00	$0.00	$0.00	$80,800.00
Trench Stabilization Material	$106,500.00	$0.00	$0.00	$106,500.00
River Crossings	$20,000.00	$12,000.00	$6,644.11	$13,355.89
Highway Crossing	$90,000.00	$54,000.00	$29,898.49	$60,101.51
Sewer Wye	$6,000.00	$3,600.00	$1,993.23	$4,006.77
Sewer Fittings	$6,000.00	$3,600.00	$1,993.23	$4,006.77
Reconnect Sewer Main	$7,000.00	$0.00	$0.00	$7,000.00
Reconnect Sewer Service	$5,000.00	$0.00	$0.00	$5,000.00
Salvage & Place Topsoil	$29,000.00	$0.00	$0.00	$29,000.00
Aggregate Base Course (12")	$61,200.00	$36,720.00	$20,330.97	$40,869.03
Asphalt Concrete Surfacing (4")	$98,000.00	$58,800.00	$32,556.13	$65,443.87
Concrete Surfacing	$15,000.00	$9,000.00	$4,983.08	$10,016.92
Concrete Curb & Gutter	$41,520.00	$24,912.00	$13,793.17	$27,726.83
Geotextile Fabric	$11,550.00	$0.00	$0.00	$11,550.00
6" Concrete Fillet Section	$10,800.00	$6,480.00	$3,587.82	$7,212.18
6" Concrete Valley Gutter	$12,600.00	$7,560.00	$4,185.79	$8,414.21
4" Concrete Sidewalk	$26,880.00	$16,128.00	$8,929.68	$17,950.32
Detectable Warning Surface	$20,250.00	$12,150.00	$6,727.16	$13,522.84
Traffic Control	$15,000.00	$0.00	$0.00	$15,000.00
Seeding, Fertilizing & Mulching	$51,900.00	$0.00	$0.00	$51,900.00
Post Televising	$10,380.00	$0.00	$0.00	$10,380.00
Erosion Control	$15,000.00	$0.00	$0.00	$15,000.00
Bypass Pumping	$10,000.00	$0.00	$0.00	$10,000.00
Trench Dewatering	$20,000.00	$0.00	$0.00	$20,000.00
Remaining Capital Costs	$765,000.00	$0.00	$0.00	$765,000.00
Total Construction Cost	**$2,902,750.00**	**$884,430.00**	**$489,687.45**	**$2,413,062.55**
Annual Operation and Maintenance Cost				
Description	**Annual Cost**			**Net Present Worth**
Equipment	$1,000.00			$14,877.47
Supplies	$1,000.00			$14,877.47
Utilities	$0.00			$0.00
Labor	$3,000.00			$44,632.42
Total Annual Cost	**$5,000.00**			**$74,387.37**
			Total Net Present Worth	**$2,487,449.93**
			EUAC	**$167,195.71**

WASTEWATER TREATMENT ALTERNATIVES

The following alternatives were developed to correct the deficiencies listed below:

1) The existing treatment system is overloaded hydraulically.
2) The existing treatment system is overloaded organically and has had several permit violations. The DENR is requiring the City to improvement the wastewater treatment system.
3) The flow meter is not reading correctly.
4) A bar screen needs to be added prior to flows entering the treatment system to remove solids.
5) The lift station that pumps to Sioux Falls needs to be a duplex station with back-up power.

It should be noted that total retention and wetlands will not be considered. These two types of treatment would require a substantial amount of land and storage that would not make them feasible options.

TREATMENT ALTERNATIVE 1: BUILD NEW TREATMENT SYSTEM

The existing treatment system was built in 1982 when the population was approximately 2,589. The treatment system is overloaded both hydraulically and organically because the system has never been expanded and the current population is 9,088. Treatment Alternative 1 proposes the City build a new treatment system at a new site. Potential sites for the new treatment system are shown in Appendix F. The SD DENR recommends the treatment system be located at least 1/4 mile from a farm house or residence, 1,000 feet from a potable water well, avoid wetlands and has dikes above the 100-year flood elevation. Wind charts have also been included in Appendix G. The new site includes the purchase of 40 acres to allow for future expansion at the site.

This Alternative includes continuous treated discharge and would eliminate the need to pump to Sioux Falls. The proposed treatment system includes two aeration cells followed by aerated rock beds. The aerated rock beds maintain adequate treatment even in the winter time when the water temperature drops. UV disinfection has been included in the alternative but it might not be needed. One variable that will change depending on the location is the length of the outfall piping. Cost estimates and a schematic of Treatment Alternative 1 are shown on the following pages.

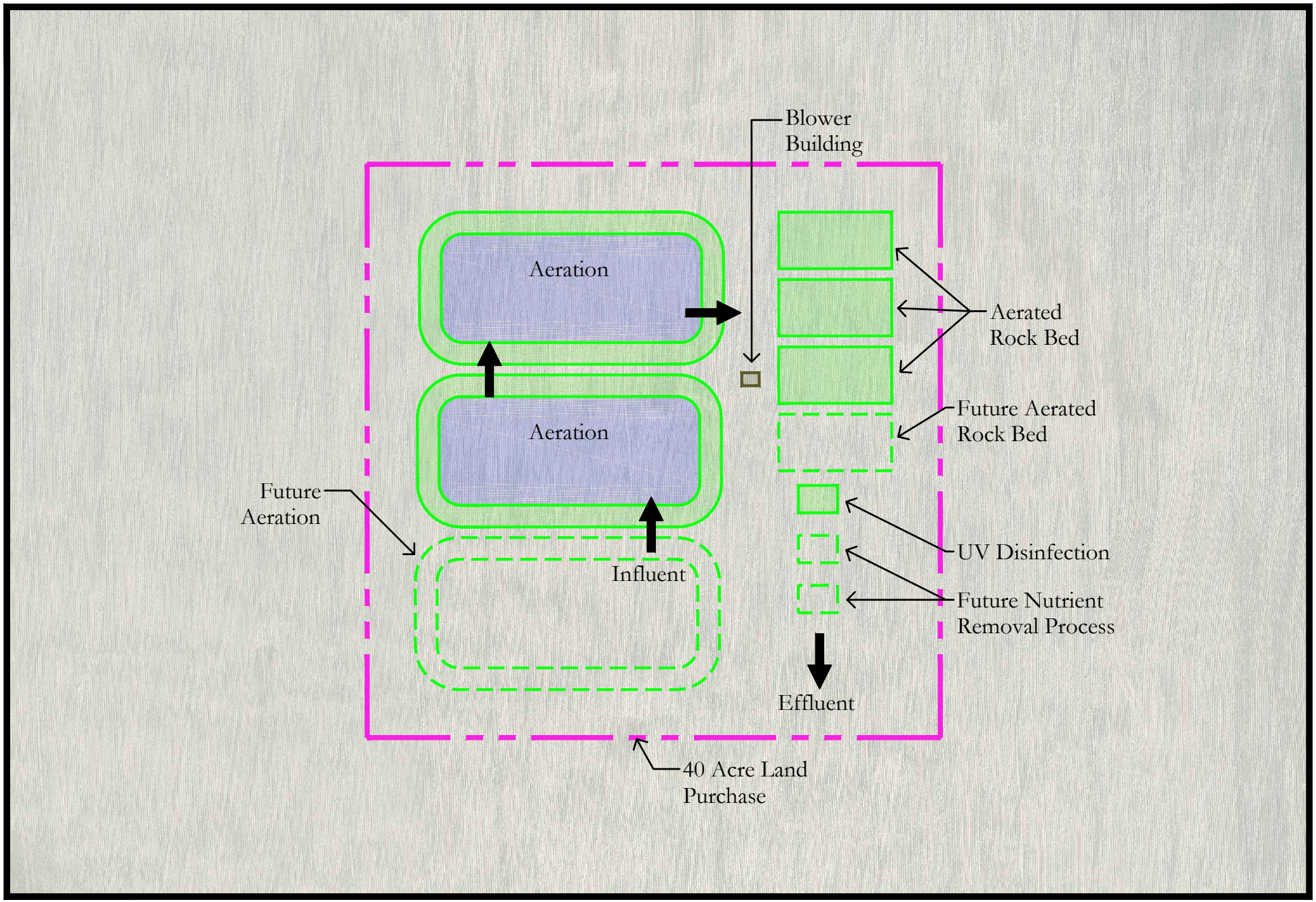

Figure 21 | Treatment Alternative 1

0 75 150 300

Brandon SOUTH DAKOTA Building a Better Life

STOCKWELL ENGINEERS

Table 25 Cost Estimate for Treatment Alternative 1

Item No.	Description	Quantity	Unit	Unit Price	Price
1	Mobilization	1	LS	$658,000.00	$658,000.00
2	Clearing	1	LS	$10,000.00	$10,000.00
3	Gravel Surfacing	3,600	TON	$12.00	$43,200.00
4	Unclassified Excavation	171,500	CY	$3.00	$514,500.00
5	Scarify & Recompact Liner	18,800	SY	$1.00	$18,800.00
6	Pond Depth Indicators	2	EA	$4,000.00	$8,000.00
7	Pond Site Warning Signs	20	EA	$150.00	$3,000.00
8	Class B Rip Rap	16,700	TON	$35.00	$584,500.00
9	Type B Drainage Fabric	23,000	SY	$2.50	$57,500.00
10	12" PVC Sanitary Sewer Pipe Outfall	1,000	LF	$53.00	$53,000.00
11	12" DIP Piping	130	LF	$65.00	$8,450.00
12	12" Gate Valve & Box	4	EA	$2,500.00	$10,000.00
13	Concrete Water Stop	4	EA	$300.00	$1,200.00
14	Pond Inlet Structure	2	EA	$2,500.00	$5,000.00
15	Pond Outlet Structure	2	EA	$2,000.00	$4,000.00
16	Bar Screen	1	LS	$275,000.00	$275,000.00
17	Parshall Flume & Flow Meter	1	LS	$20,000.00	$20,000.00
18	Blower & Bar Screen Buildings	2	EA	$90,000.00	$180,000.00
19	SCADA System	1	LS	$20,000.00	$20,000.00
20	Electrical Service	1	LS	$125,000.00	$125,000.00
21	Fine Bubble Aeration System	1	LS	$678,000.00	$678,000.00
22	4" Fiber Reinforced Concrete	300,000	SF	$3.00	$900,000.00
23	Barb Wire Fence	6,000	FT	$5.00	$30,000.00
24	Salvage & Place Topsoil	10,600	CY	$3.00	$31,800.00
25	Seeding, Fertilizing & Mulching	20,720	SY	$1.50	$31,080.00
Aerated Rock Beds					
26	Aerated Rock Bed Equipment	1	LS	$1,237,500.00	$1,237,500.00
27	Install Rock Bed Equipment	1	LS	$123,750.00	$123,750.00
28	Clean Graded Rock	51,800	TON	$20.00	$1,036,000.00
29	Mulch Insulation	4,600	CY	$10.00	$46,000.00
30	Geotextile Fabric	28,700	SY	$1.50	$43,050.00
31	HDPE Liner	137,300	SF	$1.25	$171,625.00
32	Aerated Rock Bed Walls	2,400	LF	$16.00	$38,400.00
33	Influent Flow Splitter Structure	2	EA	$15,000.00	$30,000.00
34	Piping, Fittings, Valves	1	LS	$73,000.00	$73,000.00
35	Effluent Level Control MH	3	EA	$5,000.00	$15,000.00
36	Aeration Site Piping	100	LF	$65.00	$6,500.00
37	Discharge Piping	1,200	LF	$50.00	$60,000.00
38	UV Disinfection System	1	LS	$84,000.00	$84,000.00
				Subtotal	$7,234,855.00
				Contingencies (15%)	$1,086,000.00
			Total Estimated Construction Costs		**$8,320,855.00**
				ENGINEERING	**$1,084,000.00**
				LAND PURCHASE (40 AC.)	**$800,000.00**
				LEGAL, ADMINISTRATION & TESTING (4%)	**$333,000.00**
			TOTAL ESTIMATED PROJECT COST		**$10,537,855.00**

Table 26 EUAC for Treatment Alternative 1

Capital Cost		Salvage	Present Worth	Net Present
Description	Price	Value	of Salvage Value	Worth
Mobilization	$658,000.00	$0.00	$0.00	$658,000.00
Clearing	$10,000.00	$0.00	$0.00	$10,000.00
Gravel Surfacing	$43,200.00	$25,920.00	$14,351.28	$28,848.72
Unclassified Excavation	$514,500.00	$0.00	$0.00	$514,500.00
Scarify & Recompact Liner	$18,800.00	$0.00	$0.00	$18,800.00
Pond Depth Indicators	$8,000.00	$4,800.00	$2,657.64	$5,342.36
Pond Site Warning Signs	$3,000.00	$1,800.00	$996.62	$2,003.38
Class B Rip Rap	$584,500.00	$350,700.00	$194,174.09	$390,325.91
Type B Drainage Fabric	$57,500.00	$34,500.00	$19,101.81	$38,398.19
12" PVC Sanitary Sewer Pipe Outfall	$53,000.00	$31,800.00	$17,606.89	$35,393.11
12" DIP Piping	$8,450.00	$5,070.00	$2,807.14	$5,642.86
12" Gate Valve & Box	$10,000.00	$6,000.00	$3,322.05	$6,677.95
Concrete Water Stop	$1,200.00	$720.00	$398.65	$801.35
Pond Inlet Structure	$5,000.00	$3,000.00	$1,661.03	$3,338.97
Pond Outlet Structure	$4,000.00	$2,400.00	$1,328.82	$2,671.18
Bar Screen	$275,000.00	$165,000.00	$91,356.50	$183,643.50
Parshall Flume & Flow Meter	$20,000.00	$12,000.00	$6,644.11	$13,355.89
Blower & Bar Screen Buildings	$180,000.00	$108,000.00	$59,796.98	$120,203.02
SCADA System	$20,000.00	$12,000.00	$6,644.11	$13,355.89
Electrical Service	$125,000.00	$75,000.00	$41,525.68	$83,474.32
Fine Bubble Aeration System	$678,000.00	$406,800.00	$225,235.30	$452,764.70
4" Fiber Reinforced Concrete	$900,000.00	$540,000.00	$298,984.91	$601,015.09
Barb Wire Fence	$30,000.00	$0.00	$0.00	$30,000.00
Salvage & Place Topsoil	$31,800.00	$0.00	$0.00	$31,800.00
Seeding, Fertilizing & Mulching	$31,080.00	$0.00	$0.00	$31,080.00
Aerated Rock Beds				
Aerated Rock Bed Equipment	$1,237,500.00	$742,500.00	$411,104.25	$826,395.75
Install Rock Bed Equipment	$123,750.00	$0.00	$0.00	$123,750.00
Clean Graded Rock	$1,036,000.00	$621,600.00	$344,164.85	$691,835.15
Mulch Insulation	$46,000.00	$0.00	$0.00	$46,000.00
Geotextile Fabric	$43,050.00	$25,830.00	$14,301.44	$28,748.56
HDPE Liner	$171,625.00	$102,975.00	$57,014.76	$114,610.24
Aerated Rock Bed Walls	$38,400.00	$0.00	$0.00	$38,400.00
Influent Flow Splitter Structure	$30,000.00	$18,000.00	$9,966.16	$20,033.84
Piping, Fittings, Valves	$73,000.00	$43,800.00	$24,251.00	$48,749.00
Effluent Level Control MH	$15,000.00	$9,000.00	$4,983.08	$10,016.92
Aeration Site Piping	$6,500.00	$3,900.00	$2,159.34	$4,340.66
Discharge Piping	$60,000.00	$36,000.00	$19,932.33	$40,067.67
UV Disinfection System	$84,000.00	$50,400.00	$27,905.26	$56,094.74
Land Purchase	$800,000.00	$480,000.00	$265,764.36	$534,235.64
Remaining Capital Costs	$2,503,000.00	$0.00	$0.00	$2,503,000.00
Total Construction Cost	**$10,537,855.00**	**$3,919,515.00**	**$2,170,140.42**	**$8,367,714.58**
Annual Operation and Maintenance Cost				
Description	**Annual Cost**			**Net Present Worth**
Equipment	$1,500.00			$22,316.21
Supplies	$1,500.00			$22,316.21
Utilities	$51,000.00			$758,751.22
Labor	$10,000.00			$148,774.75
Total Annual Cost	**$64,000.00**			**$952,158.39**
			Total Net Present Worth	**$9,319,872.97**
			EUAC	**$626,441.86**

TREATMENT ALTERNATIVE 2: ADD AERATED ROCK BEDS

The existing treatment system was built in 1982 when the population was approximately 2,589. The treatment system is overloaded both hydraulically and organically because the system has never been expanded and the current population is 9,088. Treatment Alternative 2 proposes the City add aeration to cell three and constructed aerated rock beds to the north of the existing site. This system would have continuous discharge and eliminate the need to pump to Sioux Falls. UV disinfection has been included in the alternative but it might not be needed. This alternative includes the purchase of 15 acres. Cost estimates and a schematic of this alternative are shown on the following pages.

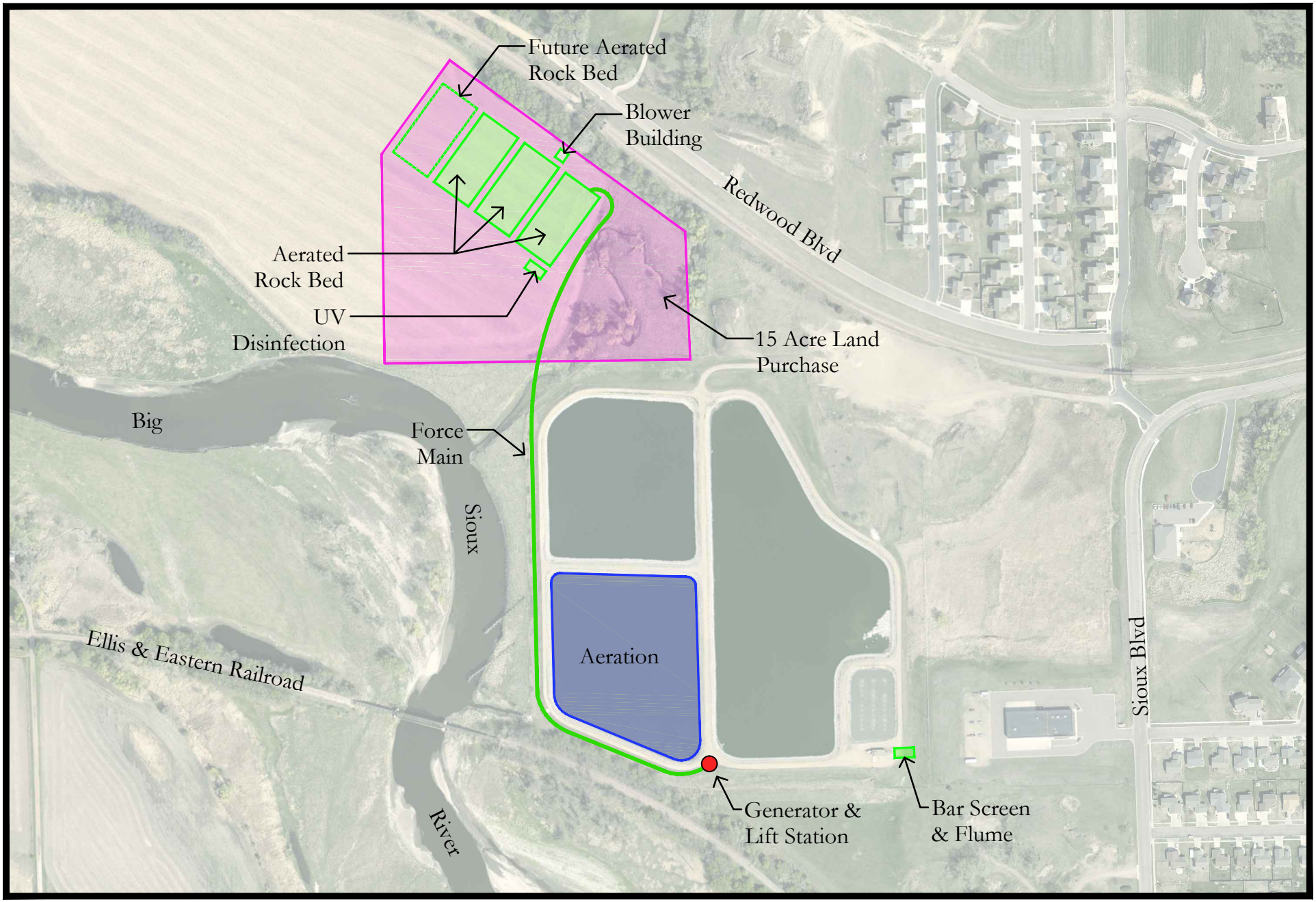

Figure 22 | Treatment Alternative 2

Brandon SOUTH DAKOTA Building a Better Life

STOCKWELL ENGINEERS

Table 27 Cost Estimate for Treatment Alternative 2

Item No.	Description	Quantity	Unit	Unit Price	Price
1	Mobilization	1	LS	$481,000.00	$481,000.00
2	Clearing	1	LS	$5,000.00	$5,000.00
3	Gravel Surfacing	2,300	TON	$12.00	$27,600.00
4	Unclassified Excavation	15,600	CY	$3.00	$46,800.00
5	Pond Site Warning Signs	10	EA	$150.00	$1,500.00
6	12" DIP Piping	40	FT	$65.00	$2,600.00
7	12" PVC Sanitary Sewer Pipe	20	FT	$50.00	$1,000.00
8	12" Sanitary Sewer Force Main	1,800	FT	$40.00	$72,000.00
9	Sanitary Sewer Pipe Bedding Material	1,860	FT	$5.00	$9,300.00
10	Trench Dewatering	1	LS	$5,000.00	$5,000.00
11	Bar Screen	1	LS	$275,000.00	$275,000.00
12	Parshall Flume & Flow Meter	1	LS	$20,000.00	$20,000.00
13	Blower & Bar Screen Buildings	2	EA	$90,000.00	$180,000.00
14	SCADA System	1	LS	$20,000.00	$20,000.00
15	Electrical Service	1	LS	$125,000.00	$125,000.00
16	Fine Bubble Aeration System	1	LS	$255,000.00	$255,000.00
17	Standby Generator & Tank	1	LS	$30,000.00	$30,000.00
18	Wet/Dry Well Lift Station	1	LS	$160,000.00	$160,000.00
19	Remove & Dispose of Existing Lift Station	1	LS	$10,000.00	$10,000.00
20	Connect to Existing Piping	4	EA	$500.00	$2,000.00
21	Barb Wire Fence	2,000	FT	$5.00	$10,000.00
22	Salvage & Place Topsoil	2,000	CY	$3.00	$6,000.00
23	Seeding, Fertilizing & Mulching	8,000	SY	$1.50	$12,000.00
24	Sludge Removal	11,900	CY	$30.00	$357,000.00
Aerated Rock Beds					
25	Aerated Rock Bed Equipment	1	LS	$1,397,000.00	$1,397,000.00
26	Install Rock Bed Equipment	1	LS	$139,700.00	$139,700.00
27	Clean Graded Rock	53,800	TON	$20.00	$1,076,000.00
28	Mulch Insulation	4,700	CY	$10.00	$47,000.00
29	Geotextile Fabric	28,700	SY	$1.50	$43,050.00
30	HDPE Liner	142,300	SF	$1.25	$177,875.00
31	Aerated Rock Bed Walls	2,400	LF	$16.00	$38,400.00
32	Influent Flow Splitter Structure	2	EA	$15,000.00	$30,000.00
33	Piping, Fittings, Valves	1	LS	$73,000.00	$73,000.00
34	Effluent Level Control MH	3	EA	$5,000.00	$15,000.00
35	Aeration Site Piping	100	LF	$65.00	$6,500.00
36	Discharge Piping	900	LF	$50.00	$45,000.00
37	UV Disinfection System	1	LS	$84,000.00	$84,000.00
				Subtotal	$5,286,325.00
				Contingencies (15%)	$793,000.00
				Total Estimated Construction Costs	**$6,079,325.00**
				ENGINEERING	**$801,000.00**
				SF PUMPING CHARGE DURING CONST	**$200,000.00**
				LAND PURCHASE (15 AC.)	**$300,000.00**
				LEGAL, ADMINISTRATION & TESTING (4%)	**$244,000.00**
				TOTAL ESTIMATED PROJECT COST	**$7,624,325.00**

Table 28 EUAC for Treatment Alternative 2

Capital Cost Description	Price	Salvage Value	Present Worth of Salvage Value	Net Present Worth
Mobilization	$481,000.00	$0.00	$0.00	$481,000.00
Clearing	$5,000.00	$0.00	$0.00	$5,000.00
Gravel Surfacing	$27,600.00	$16,560.00	$9,168.87	$18,431.13
Unclassified Excavation	$46,800.00	$0.00	$0.00	$46,800.00
Pond Site Warning Signs	$1,500.00	$900.00	$498.31	$1,001.69
12" DIP Piping	$2,600.00	$1,560.00	$863.73	$1,736.27
12" PVC Sanitary Sewer Pipe	$1,000.00	$600.00	$332.21	$667.79
12" Sanitary Sewer Force Main	$72,000.00	$43,200.00	$23,918.79	$48,081.21
Sanitary Sewer Pipe Bedding Material	$9,300.00	$0.00	$0.00	$9,300.00
Trench Dewatering	$5,000.00	$0.00	$0.00	$5,000.00
Bar Screen	$275,000.00	$165,000.00	$91,356.50	$183,643.50
Parshall Flume & Flow Meter	$20,000.00	$12,000.00	$6,644.11	$13,355.89
Blower & Bar Screen Buildings	$180,000.00	$108,000.00	$59,796.98	$120,203.02
SCADA System	$20,000.00	$12,000.00	$6,644.11	$13,355.89
Electrical Service	$125,000.00	$75,000.00	$41,525.68	$83,474.32
Fine Bubble Aeration System	$255,000.00	$153,000.00	$84,712.39	$170,287.61
Standby Generator & Tank	$30,000.00	$18,000.00	$9,966.16	$20,033.84
Wet/Dry Well Lift Station	$160,000.00	$96,000.00	$53,152.87	$106,847.13
Remove & Dispose of Existing Lift Station	$10,000.00	$0.00	$0.00	$10,000.00
Connect to Existing Piping	$2,000.00	$0.00	$0.00	$2,000.00
Barb Wire Fence	$10,000.00	$0.00	$0.00	$10,000.00
Salvage & Place Topsoil	$6,000.00	$0.00	$0.00	$6,000.00
Seeding, Fertilizing & Mulching	$12,000.00	$0.00	$0.00	$12,000.00
Sludge Removal	$357,000.00	$0.00	$0.00	$357,000.00
Aerated Rock Beds				
Aerated Rock Bed Equipment	$1,397,000.00	$838,200.00	$464,091.02	$932,908.98
Install Rock Bed Equipment	$139,700.00	$0.00	$0.00	$139,700.00
Clean Graded Rock	$1,076,000.00	$645,600.00	$357,453.07	$718,546.93
Mulch Insulation	$47,000.00	$0.00	$0.00	$47,000.00
Geotextile Fabric	$43,050.00	$25,830.00	$14,301.44	$28,748.56
HDPE Liner	$177,875.00	$106,725.00	$59,091.04	$118,783.96
Aerated Rock Bed Walls	$38,400.00	$23,040.00	$12,756.69	$25,643.31
Influent Flow Splitter Structure	$30,000.00	$18,000.00	$9,966.16	$20,033.84
Piping, Fittings, Valves	$73,000.00	$43,800.00	$24,251.00	$48,749.00
Effluent Level Control MH	$15,000.00	$9,000.00	$4,983.08	$10,016.92
Aeration Site Piping	$6,500.00	$3,900.00	$2,159.34	$4,340.66
Discharge Piping	$45,000.00	$27,000.00	$14,949.25	$30,050.75
UV Disinfection System	$84,000.00	$50,400.00	$27,905.26	$56,094.74
Land Purchase	$300,000.00	$180,000.00	$99,661.64	$200,338.36
Remaining Capital Costs	$2,038,000.00	$0.00	$0.00	$2,038,000.00
Total Construction Cost	**$7,624,325.00**	**$2,673,315.00**	**$1,480,149.70**	**$6,144,175.30**
Annual Operation and Maintenance Cost				
Description	**Annual Cost**			**Net Present Worth**
Equipment	$1,500.00			$22,316.21
Supplies	$1,500.00			$22,316.21
Utilities	$53,000.00			$788,506.17
Labor	$5,000.00			$74,387.37
Total Annual Cost	**$61,000.00**			**$907,525.97**
			Total Net Present Worth	**$7,051,701.27**

TREATMENT ALTERNATIVE 3: REHABILITATE EXISTING SITE

The existing treatment system was built in 1982 when the population was approximately 2,589. The treatment system is overloaded both hydraulically and organically because the system has never been expanded and the current population is 9,088. Treatment Alternative 3 proposes the existing site be modified to add aeration to cells one and two and convert cell three to aerated rock beds. This system would have continuous discharge and eliminate the need to pump to Sioux Falls. UV disinfection has been included in the alternative but it might not be needed. This also provides another alternative if the City is unable to purchase land for a new site or expand to the north. Cost estimates and a schematic of this alternative are shown on the following pages.

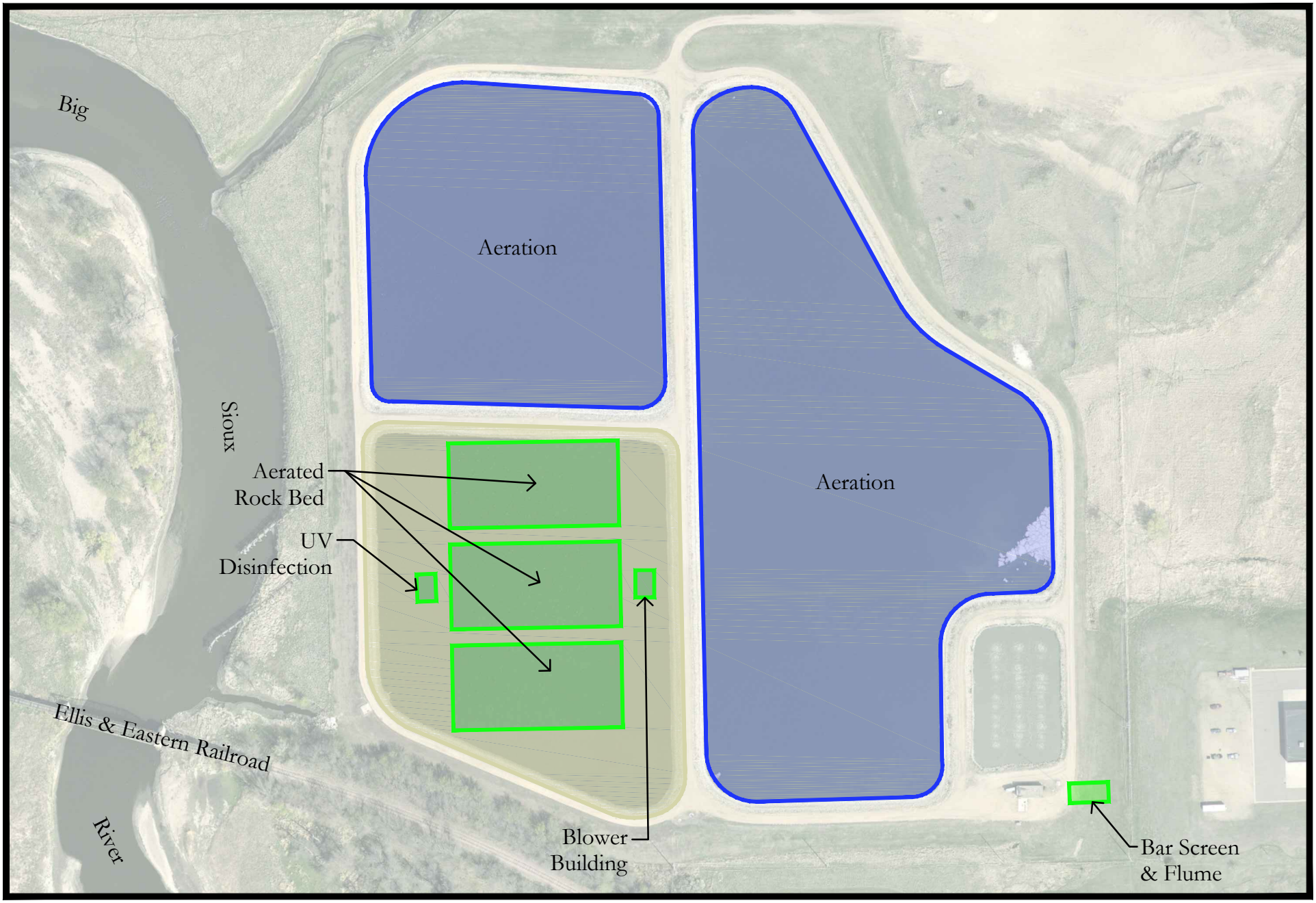

Figure 23 | Treatment Alternative 3

Brandon SOUTH DAKOTA Building a Better Life

STOCKWELL ENGINEERS

Table 29 Cost Estimate for Treatment Alternative 3

Item No.	Description	Quantity	Unit	Unit Price	Price
1	Mobilization	1	LS	$496,000.00	$496,000.00
2	Clearing	1	LS	$5,000.00	$5,000.00
3	Gravel Surfacing	1,400	TON	$12.00	$16,800.00
4	On Site Borrow Material	30,200	CY	$3.00	$90,600.00
5	Class B Rip Rap	1,400	TON	$35.00	$49,000.00
6	Type B Drainage Fabric	1,800	SY	$2.50	$4,500.00
7	12" DIP Piping	150	FT	$65.00	$9,750.00
8	12" Gate Valve & Box	2	EA	$2,500.00	$5,000.00
9	Cell Dewatering	1	LS	$5,000.00	$5,000.00
10	Bar Screen	1	LS	$275,000.00	$275,000.00
11	Parshall Flume & Flow Meter	1	LS	$20,000.00	$20,000.00
12	Blower & Bar Screen Buildings	2	EA	$90,000.00	$180,000.00
13	SCADA System	1	LS	$20,000.00	$20,000.00
14	Electrical Service	1	LS	$125,000.00	$125,000.00
15	Fine Bubble Aeration System	1	LS	$690,000.00	$690,000.00
16	Remove & Dispose of Existing Lift Station	1	LS	$10,000.00	$10,000.00
17	Salvage & Place Topsoil	800	CY	$3.00	$2,400.00
18	Seeding, Fertilizing & Mulching	4,450	SY	$1.50	$6,675.00
19	Sludge Removal	11,900	CY	$30.00	$357,000.00
Aerated Rock Beds					
20	Aerated Rock Bed Equipment	1	LS	$1,331,000.00	$1,331,000.00
21	Install Rock Bed Equipment	1	LS	$133,100.00	$133,100.00
22	Clean Graded Rock	53,800	TON	$20.00	$1,076,000.00
23	Mulch Insulation	4,700	CY	$10.00	$47,000.00
24	Geotextile Fabric	28,700	SY	$1.50	$43,050.00
25	HDPE Liner	142,300	SF	$1.25	$177,875.00
26	Aerated Rock Bed Walls	2,400	LF	$16.00	$38,400.00
27	Influent Flow Splitter Structure	2	EA	$15,000.00	$30,000.00
28	Piping, Fittings, Valves	1	LS	$73,000.00	$73,000.00
29	Effluent Level Control MH	3	EA	$5,000.00	$15,000.00
30	Aeration Site Piping	150	LF	$65.00	$9,750.00
31	Discharge Piping	500	LF	$50.00	$25,000.00
32	UV Disinfection System	1	LS	$84,000.00	$84,000.00
				Subtotal	$5,450,900.00
				Contingencies (15%)	$818,000.00
		Total Estimated Construction Costs			**$6,268,900.00**
				ENGINEERING	**$825,000.00**
		SF PUMPING CHARGE DURING CONST			**$600,000.00**
		LEGAL, ADMINISTRATION & TESTING (4%)			**$251,000.00**
		TOTAL ESTIMATED PROJECT COST			**$7,944,900.00**

Table 30 EUAC for Treatment Alternative 3

Capital Cost		Salvage	Present Worth	Net Present
Description	Price	Value	of Salvage Value	Worth
Mobilization	$496,000.00	$0.00	$0.00	$496,000.00
Clearing	$5,000.00	$0.00	$0.00	$5,000.00
Gravel Surfacing	$16,800.00	$10,080.00	$5,581.05	$11,218.95
On Site Borrow Material	$90,600.00	$0.00	$0.00	$90,600.00
Class B Rip Rap	$49,000.00	$29,400.00	$16,278.07	$32,721.93
Type B Drainage Fabric	$4,500.00	$2,700.00	$1,494.92	$3,005.08
12" DIP Piping	$9,750.00	$5,850.00	$3,239.00	$6,511.00
12" Gate Valve & Box	$5,000.00	$3,000.00	$1,661.03	$3,338.97
Cell Dewatering	$5,000.00	$0.00	$0.00	$5,000.00
Bar Screen	$275,000.00	$165,000.00	$91,356.50	$183,643.50
Parshall Flume & Flow Meter	$20,000.00	$12,000.00	$6,644.11	$13,355.89
Blower & Bar Screen Buildings	$180,000.00	$108,000.00	$59,796.98	$120,203.02
SCADA System	$20,000.00	$12,000.00	$6,644.11	$13,355.89
Electrical Service	$125,000.00	$75,000.00	$41,525.68	$83,474.32
Fine Bubble Aeration System	$690,000.00	$414,000.00	$229,221.76	$460,778.24
Remove & Dispose of Existing Lift Station	$10,000.00	$0.00	$0.00	$10,000.00
Salvage & Place Topsoil	$2,400.00	$0.00	$0.00	$2,400.00
Seeding, Fertilizing & Mulching	$6,675.00	$0.00	$0.00	$6,675.00
Sludge Removal	$357,000.00	$0.00	$0.00	$357,000.00
Aerated Rock Beds				
Aerated Rock Bed Equipment	$1,331,000.00	$798,600.00	$442,165.46	$888,834.54
Install Rock Bed Equipment	$133,100.00	$0.00	$0.00	$133,100.00
Clean Graded Rock	$1,076,000.00	$645,600.00	$357,453.07	$718,546.93
Mulch Insulation	$47,000.00	$0.00	$0.00	$47,000.00
Geotextile Fabric	$43,050.00	$25,830.00	$14,301.44	$28,748.56
HDPE Liner	$177,875.00	$106,725.00	$59,091.04	$118,783.96
Aerated Rock Bed Walls	$38,400.00	$23,040.00	$12,756.69	$25,643.31
Influent Flow Splitter Structure	$30,000.00	$18,000.00	$9,966.16	$20,033.84
Piping, Fittings, Valves	$73,000.00	$43,800.00	$24,251.00	$48,749.00
Effluent Level Control MH	$15,000.00	$9,000.00	$4,983.08	$10,016.92
Aeration Site Piping	$9,750.00	$5,850.00	$3,239.00	$6,511.00
Discharge Piping	$25,000.00	$15,000.00	$8,305.14	$16,694.86
UV Disinfection System	$84,000.00	$50,400.00	$27,905.26	$56,094.74
Remaining Capital Costs	$2,494,000.00	$0.00	$0.00	$2,494,000.00
Total Construction Cost	**$7,944,900.00**	**$2,578,875.00**	**$1,427,860.56**	**$6,517,039.44**
Annual Operation and Maintenance Cost				
Description	Annual Cost			Net Present Worth
Equipment	$1,500.00			$22,316.21
Supplies	$1,500.00			$22,316.21
Utilities	$74,000.00			$1,100,933.14
Labor	$5,000.00			$74,387.37
Total Annual Cost	**$82,000.00**			**$1,219,952.94**
			Total Net Present Worth	**$7,736,992.38**
			EUAC	**$520,047.42**

TREATMENT ALTERNATIVE 4: AERATION EXPANSION WITH SIOUX FALLS PUMPING

The existing treatment system was built in 1982 when the population was approximately 2,589. The treatment system is overloaded both hydraulically and organically because the system has never been expanded and the current population is 9,088. Treatment Alternative 4 proposes cell one be divided into two aeration cells. This system would improve the treatment and allow the City to meet the discharge limits easier. However this system would not be continuous discharge and would still need to pump to Sioux Falls to handle the hydraulic loading. The City would not receive the second credit for partial treatment due to the low BOD requirement. This alternative allows the City to compare the Sioux Falls pumping cost to other alternatives. The table below illustrates how the pumping charge will increase over time. This table assumes the Sioux Falls charge will increase by 1.5% annually and electrical cost will increase by 1% annually. It also shows the System Development Charge that Sioux Falls will require. Cost estimates and a schematic of this alternative are shown on the following pages.

Table 31 Future Treatment Cost Projections

Year	Charge per Thousand Gallons	Charge With Credits	Annual Cost to Pump to Sioux Falls	System Development Charge	WWT Utility Costs	Annual Treatment Cost
2008	$ 0.75		$99,539		$50,000	$149,539
2009	$ 1.10		$118,292		$51,000	$169,292
2010	$ 1.10		$119,544		$52,000	$171,544
2011	$ 1.41		$140,341		$53,000	$193,341
2012	$ 1.41		$152,663		$55,000	$207,663
2013	$ 3.89	$ 3.46	$589,000	$40,647	$55,550	$685,197
2014	$ 3.89	$ 3.46	$598,000	$81,294	$56,106	$735,400
2017	$ 4.07	$ 3.64	$760,000	$88,610	$57,806	$906,416
2022	$ 4.38	$ 3.95	$962,000	$101,902	$60,754	$1,124,656
2027	$ 4.72	$ 4.29	$1,194,000	$117,187	$63,853	$1,375,041
2033	$ 5.16	$ 4.73	$1,538,000	$138,281	$67,782	$1,744,063

Figure 24 | Treatment Alternative 4

0 50 100 200

Brandon SOUTH DAKOTA Building a Better Life

STOCKWELL ENGINEERS

Table 32 Cost Estimate for Treatment Alternative 4

Item No.	Description	Quantity	Unit	Unit Price	Price
1	Mobilization	1	LS	$322,000.00	$322,000.00
2	Clearing	1	LS	$5,000.00	$5,000.00
3	Gravel Surfacing	2,200	TON	$12.00	$26,400.00
4	On Site Borrow Material	23,900	CY	$3.00	$71,700.00
5	Pond Depth Indicators	2	EA	$4,000.00	$8,000.00
6	Class B Rip Rap	7,600	TON	$35.00	$266,000.00
7	Type B Drainage Fabric	10,400	SY	$2.50	$26,000.00
8	Cell Dewatering	1	LS	$5,000.00	$5,000.00
9	Bar Screen	1	LS	$275,000.00	$275,000.00
10	Parshall Flume & Flow Meter	1	LS	$20,000.00	$20,000.00
11	Blower & Bar Screen Buildings	2	EA	$90,000.00	$180,000.00
12	SCADA System	1	LS	$20,000.00	$20,000.00
13	Electrical Service	1	LS	$125,000.00	$125,000.00
14	Fine Bubble Aeration System	1	LS	$678,000.00	$678,000.00
15	4" Fiber Reinforced Concrete	300,000	SF	$3.00	$900,000.00
16	Standby Generator & Tank	1	LS	$40,000.00	$40,000.00
17	Wet/Dry Well Lift Station	1	LS	$160,000.00	$160,000.00
18	Remove & Dispose of Existing Lift Station	1	LS	$10,000.00	$10,000.00
19	Sludge Removal	11,900	CY	$30.00	$357,000.00
20	12" DIP Piping	190	FT	$65.00	$12,350.00
21	12" PVC Sanitary Sewer Pipe	20	FT	$50.00	$1,000.00
22	12" Sanitary Sewer Force Main	20	FT	$40.00	$800.00
23	Sanitary Sewer Pipe Bedding Material	230	FT	$5.00	$1,150.00
24	12" Gate Valve & Box	2	EA	$2,500.00	$5,000.00
25	Concrete Water Stop	4	EA	$300.00	$1,200.00
26	Pond Inlet Structure	2	EA	$2,500.00	$5,000.00
27	Pond Outlet Structure	2	EA	$2,000.00	$4,000.00
28	Salvage & Place Topsoil	800	CY	$3.00	$2,400.00
29	Seeding, Fertilizing & Mulching	4,500	SY	$1.50	$6,750.00
30	Trench Dewatering	1	LS	$5,000.00	$5,000.00
				Subtotal	$3,539,750.00
				Contingencies (15%)	$531,000.00
		Total Estimated Construction Costs			**$4,070,750.00**
				ENGINEERING	**$548,000.00**
				SF PUMPING CHARGE DURING CONST	**$400,000.00**
				LEGAL, ADMINISTRATION & TESTING (4%)	**$163,000.00**
				TOTAL ESTIMATED PROJECT COST	**$5,181,750.00**

Table 33 EUAC for Treatment Alternative 4

Capital Cost		Salvage	Present Worth	Net Present
Description	Price	Value	of Salvage Value	Worth
Mobilization	$322,000.00	$0.00	$0.00	$322,000.00
Clearing	$5,000.00	$0.00	$0.00	$5,000.00
Gravel Surfacing	$26,400.00	$15,840.00	$8,770.22	$17,629.78
On Site Borrow Material	$71,700.00	$0.00	$0.00	$71,700.00
Pond Depth Indicators	$8,000.00	$4,800.00	$2,657.64	$5,342.36
Class B Rip Rap	$266,000.00	$159,600.00	$88,366.65	$177,633.35
Type B Drainage Fabric	$26,000.00	$15,600.00	$8,637.34	$17,362.66
Cell Dewatering	$5,000.00	$0.00	$0.00	$5,000.00
Bar Screen	$275,000.00	$165,000.00	$91,356.50	$183,643.50
Parshall Flume & Flow Meter	$20,000.00	$12,000.00	$6,644.11	$13,355.89
Blower & Bar Screen Buildings	$180,000.00	$108,000.00	$59,796.98	$120,203.02
SCADA System	$20,000.00	$12,000.00	$6,644.11	$13,355.89
Electrical Service	$125,000.00	$75,000.00	$41,525.68	$83,474.32
Fine Bubble Aeration System	$678,000.00	$406,800.00	$225,235.30	$452,764.70
4" Fiber Reinforced Concrete	$900,000.00	$540,000.00	$298,984.91	$601,015.09
Standby Generator & Tank	$40,000.00	$24,000.00	$13,288.22	$26,711.78
Wet/Dry Well Lift Station	$160,000.00	$96,000.00	$53,152.87	$106,847.13
Remove & Dispose of Existing Lift Station	$10,000.00	$0.00	$0.00	$10,000.00
Sludge Removal	$357,000.00	$0.00	$0.00	$357,000.00
12" DIP Piping	$12,350.00	$7,410.00	$4,102.74	$8,247.26
12" PVC Sanitary Sewer Pipe	$1,000.00	$600.00	$332.21	$667.79
12" Sanitary Sewer Force Main	$800.00	$480.00	$265.76	$534.24
Sanitary Sewer Pipe Bedding Material	$1,150.00	$0.00	$0.00	$1,150.00
12" Gate Valve & Box	$5,000.00	$3,000.00	$1,661.03	$3,338.97
Concrete Water Stop	$1,200.00	$720.00	$398.65	$801.35
Pond Inlet Structure	$5,000.00	$3,000.00	$1,661.03	$3,338.97
Pond Outlet Structure	$4,000.00	$2,400.00	$1,328.82	$2,671.18
Salvage & Place Topsoil	$2,400.00	$0.00	$0.00	$2,400.00
Seeding, Fertilizing & Mulching	$6,750.00	$0.00	$0.00	$6,750.00
Trench Dewatering	$5,000.00	$0.00	$0.00	$5,000.00
Remaining Capital Costs	$1,642,000.00	$0.00	$0.00	$1,642,000.00
Total Construction Cost	**$5,181,750.00**	**$1,652,250.00**	**$914,810.76**	**$4,266,939.24**
Annual Operation and Maintenance Cost				
Description	**Annual Cost**			**Net Present Worth**
Equipment	$1,000.00			$14,877.47
Supplies	$1,000.00			$14,877.47
Utilities	$55,000.00			$818,261.12
Labor	$4,000.00			$59,509.90
Total Annual Cost	**$61,000.00**			**$907,525.97**
			Total Net Present Worth	**$5,174,465.20**
			EUAC	**$347,805.34**

TREATMENT ALTERNATIVE 5: PUMPING ONLY TO SIOUX FALLS

The existing treatment system was built in 1982 when the population was approximately 2,589. The treatment system is overloaded both hydraulically and organically because the system has never been expanded and the current population is 9,088. Treatment Alternative 5 proposes the City stop running the existing aeration system and pump everything to Sioux Falls. The City would add a new lift station that would pump all of the wastewater to Sioux Falls. This alternative allows the City to compare the Sioux Falls pumping cost to other alternatives. The table below illustrates how the pumping charge will increase over time. This table assumes the Sioux Falls charge will increase by 1.5% annually and electrical cost will increase by 1% annually. It also shows the System Development Charge that Sioux Falls will require. The cost estimate for this alternative is shown on the following page.

Table 34 Future Treatment Cost Projections

Year	Charge per Thousand Gallons	Annual Cost to Pump to Sioux Falls	System Development Charge	Lift Station Cost	Annual Treatment Cost
2008	$ 0.75	$99,539		$4,400	$103,939
2009	$ 1.10	$118,292		$4,500	$122,792
2010	$ 1.10	$119,544		$4,600	$124,144
2011	$ 1.41	$140,341		$4,800	$145,141
2012	$ 1.41	$152,663		$4,900	$157,563
2013	$ 3.89	$990,000	$40,647	$5,000	$1,035,647
2014	$ 3.89	$1,000,000	$81,294	$5,050	$1,086,344
2017	$ 4.07	$1,192,000	$88,610	$5,203	$1,285,813
2022	$ 4.38	$1,436,000	$101,902	$5,468	$1,543,370
2027	$ 4.72	$1,711,000	$117,187	$5,747	$1,833,935
2033	$ 5.16	$2,112,000	$138,281	$6,101	$2,256,382

Figure 25 | Treatment Alternative 5

0 50 100 200

Brandon SOUTH DAKOTA Building a Better Life

STOCKWELL ENGINEERS

Table 35 Cost Estimate for Treatment Alternative 5

Item No.	Description	Quantity	Unit	Unit Price	Price
1	Mobilization	1	LS	$70,000.00	$70,000.00
2	Bar Screen	1	LS	$275,000.00	$275,000.00
3	Parshall Flume & Flow Meter	1	LS	$20,000.00	$20,000.00
4	Bar Screen Buildings	1	EA	$90,000.00	$90,000.00
5	Electrical Service	1	LS	$70,000.00	$70,000.00
6	SCADA System	1	LS	$20,000.00	$20,000.00
7	Standby Generator & Tank	1	LS	$40,000.00	$40,000.00
8	Wet/Dry Well Lift Station	1	LS	$160,000.00	$160,000.00
9	Remove & Dispose of Existing Lift Station	1	LS	$10,000.00	$10,000.00
10	12" PVC Sanitary Sewer Pipe	20	FT	$50.00	$1,000.00
11	12" Sanitary Sewer Force Main	20	FT	$40.00	$800.00
12	Sanitary Sewer Pipe Bedding Material	41	FT	$5.00	$205.00
13	Connect to Existing Piping	4	EA	$500.00	$2,000.00
14	Aggregate Base Course (8")	100	TON	$25.00	$2,500.00
15	Salvage & Place Topsoil	100	CY	$5.00	$500.00
16	Seeding, Fertilizing & Mulching	300	SY	$1.50	$450.00
17	Trench Dewatering	1	LS	$5,000.00	$5,000.00
				Subtotal	$767,455.00
				Contingencies (15%)	$116,000.00
				Total Estimated Construction Costs	**$883,455.00**
				ENGINEERING	**$146,000.00**
				LEGAL, ADMINISTRATION & TESTING (4%)	**$36,000.00**
				TOTAL ESTIMATED PROJECT COST	**$1,065,455.00**

Table 36 EUAC for Treatment Alternative 5

Capital Cost		Salvage	Present Worth	Net Present
Description	Price	Value	of Salvage Value	Worth
Mobilization	$70,000.00	$0.00	$0.00	$70,000.00
Bar Screen	$275,000.00	$165,000.00	$91,356.50	$183,643.50
Parshall Flume & Flow Meter	$20,000.00	$12,000.00	$6,644.11	$13,355.89
Bar Screen Buildings	$90,000.00	$54,000.00	$29,898.49	$60,101.51
Electrical Service	$70,000.00	$42,000.00	$23,254.38	$46,745.62
SCADA System	$20,000.00	$12,000.00	$6,644.11	$13,355.89
Standby Generator & Tank	$40,000.00	$24,000.00	$13,288.22	$26,711.78
Wet/Dry Well Lift Station	$160,000.00	$96,000.00	$53,152.87	$106,847.13
Remove & Dispose of Existing Lift Station	$10,000.00	$0.00	$0.00	$10,000.00
12" PVC Sanitary Sewer Pipe	$1,000.00	$600.00	$332.21	$667.79
12" Sanitary Sewer Force Main	$800.00	$480.00	$265.76	$534.24
Sanitary Sewer Pipe Bedding Material	$205.00	$0.00	$0.00	$205.00
Connect to Existing Piping	$2,000.00	$0.00	$0.00	$2,000.00
Aggregate Base Course (8")	$2,500.00	$1,500.00	$830.51	$1,669.49
Salvage & Place Topsoil	$500.00	$0.00	$0.00	$500.00
Seeding, Fertilizing & Mulching	$450.00	$0.00	$0.00	$450.00
Trench Dewatering	$5,000.00	$0.00	$0.00	$5,000.00
Remaining Capital Costs	$298,000.00	$0.00	$0.00	$298,000.00
Total Construction Cost	**$1,065,455.00**	**$407,580.00**	**$225,667.16**	**$839,787.84**
Annual Operation and Maintenance Cost				
Description	**Annual Cost**			**Net Present Worth**
Equipment	$1,000.00			$14,877.47
Supplies	$1,000.00			$14,877.47
Utilities	$5,000.00			$74,387.37
Labor	$3,000.00			$44,632.42
Total Annual Cost	**$10,000.00**			**$148,774.75**
			Total Net Present Worth	**$988,562.58**
			EUAC	**$66,446.93**

TREATMENT ALTERNATIVE 6: MECHANICAL TREATMENT

The existing treatment system was built in 1982 when the population was approximately 2,589. The treatment system is overloaded both hydraulically and organically because the system has never been expanded and the current population is 9,088. Treatment Alternative 6 proposes a mechanical plant be built on a new site. This alternative would be continuous discharge and eliminate the need to pump to Sioux Falls. The cost estimate for this alternative is shown on the following page.

Table 37 Cost Estimate for Treatment Alternative 6

Item No.	Description	Quantity	Unit	Unit Price	Price
1	Mobilization	1	LS	$1,414,000.00	$1,414,000.00
2	Clearing	1	LS	$10,000.00	$10,000.00
3	Gravel Surfacing	1,000	TON	$12.00	$12,000.00
4	Unclassified Excavation	19,400	CY	$3.00	$58,200.00
5	12" PVC Sanitary Sewer Pipe Outfall	1,000	LF	$53.00	$53,000.00
6	Sanitary Manhole	3	EA	$3,000.00	$9,000.00
7	Mechanical Treatment Plant	1	LS	$13,638,000.00	$13,638,000.00
8	Sanitary Sewer Pipe Bedding Material	1,000	FT	$5.00	$5,000.00
9	SCADA System	1	LS	$40,000.00	$40,000.00
10	Electrical Service	1	LS	$125,000.00	$125,000.00
11	Standby Generator & Tank	1	LS	$50,000.00	$50,000.00
12	Barb Wire Fence	3,000	FT	$5.00	$15,000.00
13	Salvage & Place Topsoil	9,700	CY	$3.00	$29,100.00
14	Seeding, Fertilizing & Mulching	58,080	SY	$1.50	$87,120.00
				Subtotal	$15,545,420.00
				Contingencies (15%)	$2,332,000.00
				Total Estimated Construction Costs	**$17,877,420.00**
				ENGINEERING	**$2,288,000.00**
				LAND PURCHASE (12 AC.)	**$240,000.00**
				LEGAL, ADMINISTRATION & TESTING (4%)	**$716,000.00**
				TOTAL ESTIMATED PROJECT COST	**$21,121,420.00**

Table 38 EUAC for Treatment Alternative 6

Capital Cost		Salvage	Present Worth	Net Present
Description	Price	Value	of Salvage Value	Worth
Mobilization	$1,414,000.00	$0.00	$0.00	$1,414,000.00
Clearing	$10,000.00	$0.00	$0.00	$10,000.00
Gravel Surfacing	$12,000.00	$7,200.00	$3,986.47	$8,013.53
Unclassified Excavation	$58,200.00	$0.00	$0.00	$58,200.00
12" PVC Sanitary Sewer Pipe Outfall	$53,000.00	$31,800.00	$17,606.89	$35,393.11
Sanitary Manhole	$9,000.00	$5,400.00	$2,989.85	$6,010.15
Mechanical Treatment Plant	$13,638,000.00	$8,182,800.00	$4,530,617.96	$9,107,382.04
Sanitary Sewer Pipe Bedding Material	$5,000.00	$0.00	$0.00	$5,000.00
SCADA System	$40,000.00	$24,000.00	$13,288.22	$26,711.78
Electrical Service	$125,000.00	$75,000.00	$41,525.68	$83,474.32
Standby Generator & Tank	$50,000.00	$30,000.00	$16,610.27	$33,389.73
Barb Wire Fence	$15,000.00	$0.00	$0.00	$15,000.00
Salvage & Place Topsoil	$29,100.00	$0.00	$0.00	$29,100.00
Seeding, Fertilizing & Mulching	$87,120.00	$0.00	$0.00	$87,120.00
Land Purchase	$240,000.00	$144,000.00	$79,729.31	$160,270.69
Remaining Capital Costs	$5,336,000.00	$0.00	$0.00	$5,336,000.00
Total Construction Cost	**$21,121,420.00**	**$8,500,200.00**	**$4,706,354.65**	**$16,415,065.35**
Annual Operation and Maintenance Cost				
Description	**Annual Cost**			**Net Present Worth**
Equipment	$5,000.00			$74,387.37
Supplies	$5,000.00			$74,387.37
Utilities	$75,000.00			$1,115,810.61
Sludge Disposal	$20,000.00			$297,549.50
Labor (two new employees)	$200,000.00			$2,975,494.97
Total Annual Cost	**$305,000.00**			**$4,537,629.83**
			Total Net Present Worth	**$20,952,695.19**
			EUAC	**$1,408,350.23**

IMPLEMENTATION OF ALTERNATIVES

WASTEWATER COLLECTION

Collection Alternative 1 "Replace VCP with PVC" should be implemented by the City. However, due to the large capital cost the City should break the project into multiple phases and begin to budget for the first phase. These improvements will reduce the amount of I&I and correct the deficiencies that were discovered during televising. This alternative will also replace streets that are beyond their useful life and can be combined with water line and storm sewer improvements.

Collection Alternative 2 "Future Basin Improvements" should be implemented by the City. The City should start with Phase "A" and eliminate seven lift stations. These improvements will reduce the annual O&M amount because lift stations will be eliminated. This alternative will also open up future areas for development. Future development will drive the need for the City to complete Phases B and C.

Collection Alternative 3 "Replace Lift Station" should be completed if the City decides not to implemented Collection Alternative 2. There are lift stations that need replacement if they are not abandoned by new trunk sewers.

Collection Alternative 4 "New SCADA System" should be implemented by the City. The new SCADA system will improve monitoring of the system. The cost of this alternative will depend on what lift stations are eliminated or replaced. This alternative will also allow the maintenance staff to address other needs and not travel to the lift stations as often to inspect them because they can be monitored remotely from the shop.

Collection Alternative 5 "Core Basin Trunk Sewer" should be implemented if the City decides to relocate the treatment system to a new site along Splitrock Creek. The City will need to have the wastewater flow that is going to the current site and have it flow to the new site.

WASTEWATER TREATMENT

The EUAC needs to be compared in order to determine the most cost effective long term solution for the wastewater treatment system. The following table compares the capital cost and EUAC for all of the treatment alternatives.

Table 39 Comparison of Wastewater Treatment Alternatives

Treatment Alternatives	Capital Cost	Equivalent Uniform Annual Cost
1: Build New Treatment System	$10,537,855	$626,442
2: Add Aerated Rock Beds	$7,624,325	$473,985
3: Rehabilitate Existing Site	$7,944,900	$520,047
4: Aeration Expansion with Sioux Falls Pumping	$5,181,750	$1,499,858
5: Pumping only to Sioux Falls	$1,065,455	$1,538,657
6: Mechanical Treatment	$21,121,420	$1,408,350

Treatment Alternative 1 "Build New Treatment System" is recommended. This alternative is not the lowest capital or EUAC cost. However, the long term planning of the City needs to include moving the treatment system downstream. If the City maintained the existing site then the relocation of the facility in the future will only cost the City more money.

Treatment Alternative 2 "Add Aerated Rock Beds" is not recommended. This alternative has the lowest EUAC. However, the future of the treatment system needs to include moving the facility downstream. It is anticipated that expansion at the current site will have a lot of negative feedback with the adjacent residential areas.

Treatment Alternative 3 "Rehabilitate the Existing Site" is not recommended. Any future expansion will be difficult because the site is land locked. In addition, it would benefit the adjacent residential areas to have the system moved.

Treatment Alternative 4 "Aeration Expansion with Sioux Falls Pumping" is not recommended. The future pumping costs are only going to increase. This alternative can't provide enough treatment to get the partial treatment credit from the City of Sioux Falls or guarantee the City will always be able to meet the discharge limits. In addition, the EUAC shows this is one of the most costly Treatment Alternatives for the City.

Treatment Alternative 5 "Pumping Only to Sioux Falls" is not recommended because it is the highest cost EUAC. In addition, the future rate increases by the City of Sioux Falls can't be determined and the System Development Cost will hurt development in Brandon.

Treatment Alternative 6 "Mechanical Treatment" is not recommended because of the large capital cost and high O&M. The City would have to hire two new employees to run the plant. In addition, these employees would have to have higher certification by the DENR to operate the plant.

COST RECOVERY

Cost recovery is not included in any of these cost estimates. Development will drive the time and amount of cost recovery that the City receives. There are areas shown in the future basins map that the City will be able assess a cost recovery. It is anticipated that the City will incur these cost and it could take several years before these areas develop.

IMPACT ON OWNER'S BUDGET

There are several Alternatives the City needs to implement. Due to budget constraints and priority, the following Alternatives should be implemented immediately. The following figure shows the combined recommendation.

Table 40 Recommended Improvements

Collection Alternative 2A: Future Basin Improvements	$9,681,230.00
Collection Alternative 5: Core Basin Trunk Sewer	$2,902,750.00
Treatment Alternative 1: Build New Treatment System	$10,537,855.00
Combined Project Cost	**$23,121,835.00**

The City provided SEI their sewer revenue and expenses for the last two years. SEI evaluated the budget and the cost of the recommended improvements to determine how the City could fund the project. Based on Brandon's current revenue and expenses, they will have to obtain grant and loan dollars from various funding agencies to finance the project. The loan is based on an interest rate of 3.0% over 20 years. The owner's sewer fees will be used to make the loan payments. The current monthly residential sewer rate is a minimum of $7.21 plus $4.22 per thousand. The sewer bill for 5,000 gallons of water usage is $28.31.

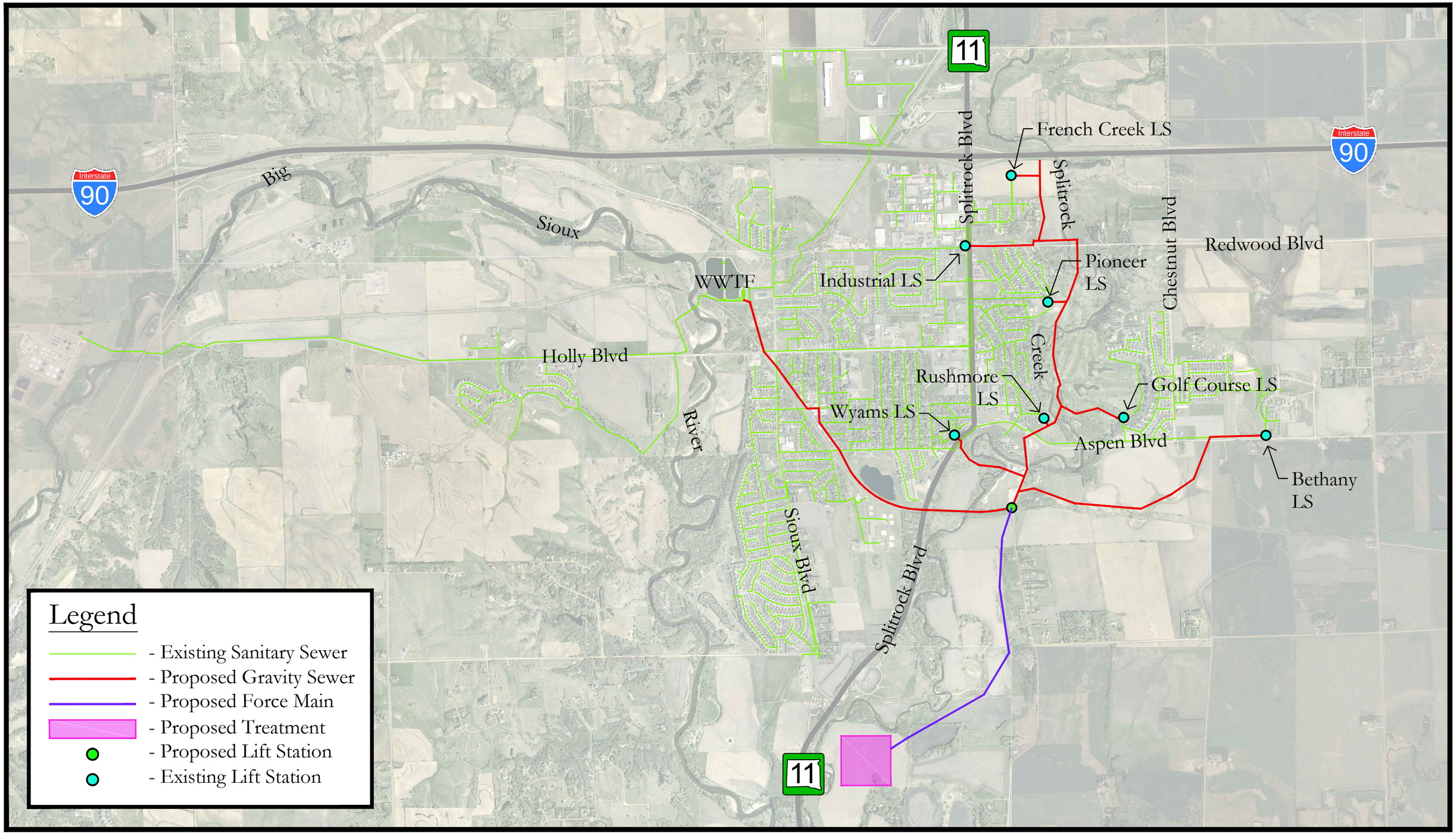

Figure 26 | Combined Collection & Treatment Alternatives

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Brandon SOUTH DAKOTA Building a Better Life

STOCKWELL ENGINEERS

Table 41 Funding Proposed Improvements

Revenue	$1,079,552.90
Expenses	$482,466.94
Current Debt Payment	$0.00
Net Cash From Operations	**$597,085.97**
New Loan Payment	$1,554,150.50
Debt Reserves (10%)	$155,415.05
Net Fund Balance	**-$1,112,479.59**
Monthly Rate Increase	$47.00
Number of Customers	3,025
Annual Revenue Generated	$1,706,100.00
Fund Balance After Increase	**$593,620.41**

The above table shows that the City of Brandon would have to increase their sewer rates to fund the project. The City will try to obtain grant dollars to reduce the loan amount. In order to be eligible for grant dollars the DENR has required a minimum monthly sewer rate of $22.00 for 5,000 gallons. The City of Brandon currently meets this requirement. The City should also consider raising their rates annually by 3%. This will keep up with the cost of inflation and reduce a bigger jump in rates to complete any future projects.

The potential project grant/loan percentages and how those amounts affect user rates are shown in the following table.

Table 42 Potential Grant/Loan Amounts

Grant/Loan	60/40	50/50	40/60	30/70	20/80	10/90
Expenses	$482,467	$482,467	$482,467	$482,467	$482,467	$482,467
Current Debt	$0	$0	$0	$0	$0	$0
Project Cost	$23,121,835	$23,121,835	$23,121,835	$23,121,835	$23,121,835	$23,121,835
Grant Amount	$13,873,101	$11,560,918	$9,248,734	$6,936,551	$4,624,367	$2,312,184
Loan Amount	$9,248,734	$11,560,918	$13,873,101	$16,185,285	$18,497,468	$20,809,652
Annual Loan Payment	$621,660	$777,075	$932,490	$1,087,905	$1,243,320	$1,398,735
Debt Reserves	$62,166	$77,708	$93,249	$108,791	$124,332	$139,874
Total Annual Cost	$1,166,293	$1,337,250	$1,508,206	$1,679,163	$1,850,119	$2,021,076
Revenue	$1,079,553	$1,079,553	$1,079,553	$1,079,553	$1,079,553	$1,079,553
Balance After Project	-$86,740	-$257,697	-$428,653	-$599,610	-$770,566	-$941,523
Minimum Rate Increase	$2.39	$7.10	$11.81	$16.52	$21.23	$25.94
Current Rate (5,000 gal)	$28.31	$28.31	$28.31	$28.31	$28.31	$28.31
Proposed Monthly Rate	$30.70	$35.41	$40.12	$44.83	$49.54	$54.25

SEI has completed rate analysis for the City of Brandon over the last several years. It is recommended that the City include the proposed improvements in the next rate analysis to verify the potential rate increases. The above calculations are very cursory and do not include any increase in customers. The rate analysis is more in depth and will give a more accurate depiction of the impact on rates.

ENVIRONMENTAL EVALUATION

Funding agencies will require an environmental review to be completed for the proposed improvements before funding can be obtained. SEI will request comments on the proposed improvements prior to construction from various agencies. These comment letters will be provided to the funding agencies.

VIEWS OF THE PUBLIC AND CONCERNED INTEREST GROUPS

The City of Brandon will hold a public hearing to discuss the proposed improvements with residents that are affected by the project. The City will work with SEI to schedule this meeting and keep minutes of the meeting. These minutes will be provided to the funding agencies.

JUSTIFICATION AND DESCRIPTION OF SELECTED PLAN

This Comprehensive Study identified several deficiencies with the sewer system that do not meet current SD Design Criteria Standards. The alternatives will bring the system into compliance and provide an improved system to adequately handle growth.

DESIGN OF SELECTED PLAN

The alternatives will be designed by the City of Brandon's engineer. All construction plans and specifications will be reviewed and approved by the SD DENR. All state bid laws will be followed for the bidding process.

The SD DENR was contacted during this study to discuss current and future permit limits. The DENR stated that nutrient limits for phosphorus and nitrogen could be added requirements in the future. However, it could be at least five years until the DENR adopts limits and at least another five years until those limits could be implemented. An area should be set aside during the design to add the nutrient removal process in the future, if it is required.

It is more likely that tougher ammonia limits would be implemented before the nutrient requirements. In addition the ammonia limit would be somewhere between 0.4 and 1.0 mg/L if the City discharged to Split Rock Creek. It is anticipated that the other limits would not change.

LAND ACQUISITION

Land acquisition, temporary construction easements and permanent easements will be necessary to complete the improvements. Land acquisition costs have been included in the estimates. All easements will be obtained before construction is started.

IMPLEMENTATION SCHEDULE

The City should implement the recommended improvements as soon as possible. Funding application should be submitted for the first round of DENR funding in 2014. The earliest construction could begin is 2015.

REFERENCES

Brown, Jon., (2010). East Side Sanitary Sewer Analysis, (Sioux Falls, SD: Stockwell Engineers).

National Weather Service Forecast Office, Sioux Falls, SD, 11 December 2012 <http://www.weather.gov/climate/index.php?wfo=fsd>.

South Dakota Department of Environment and Natural Resources, (March 1991). Recommended Design Criteria Manual Wastewater Collection and Treatment Facilities, Pierre, SD: Division of Environmental Services.

Appendix A
Surface Water Discharge Permit

600 N. Main Ave, Suite 100
Sioux Falls, SD 57104
Ph. (605) 338-6668
Fax. (605) 338-8750
www.stockwellengineers.com

Permit No.: SD-0022535

SOUTH DAKOTA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES

JOE FOSS BUILDING
523 EAST CAPITOL AVENUE
PIERRE, SOUTH DAKOTA 57501-3181

AUTHORIZATION TO DISCHARGE UNDER THE

SURFACE WATER DISCHARGE SYSTEM

In compliance with the provisions of the South Dakota Water Pollution Control Act and the Administrative Rules of South Dakota (ARSD), Chapters 74:52:01 through 74:52:11,

the city of Brandon

is authorized to discharge from its wastewater treatment facility in Minnehaha County, located northwest of the city (Section 33, Township 102 North, Range 48 West) Latitude 43° 36' 00", Longitude 96° 35' 48"

to the Big Sioux River,

in accordance with discharge point(s), effluent limits, monitoring requirements and other conditions set forth herein. Authorization for discharge is limited to those outfalls specifically listed in the permit.

This permit shall become effective **April 1, 2000.**

This permit and the authorization to discharge shall expire at midnight, **March 31, 2005.**

Signed this 29th day of March, 2000.

Nettie H. Myers

Authorized Permitting Official

Nettie H. Myers
Secretary
Department of Environment and Natural Resources

TABLE OF CONTENTS

A. Definitions (Continued)

8. "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility.

9. "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

10. "Secretary" means the Secretary of the South Dakota Department of Environment and Natural Resources, or authorized representative.

11. "SDDENR" means the South Dakota Department of Environment and Natural Resources.

12. "Sewage Sludge" is any solid, semi-solid or liquid residue removed during the treatment of municipal wastewater or domestic sewage. Sewage sludge includes but is not limited to solids removed during primary, secondary or advanced wastewater treatment, scum, septage, portable toilet pumpings, and sewage sludge products. Sewage sludge does not include grit, screenings, or ash generated during the incineration of sewage sludge.

I. EFFLUENT LIMITS AND MONITORING REQUIREMENTS

A. Definitions.

1. The "30-day (and monthly) average," other than for fecal coliform bacteria and total coliform bacteria, is the arithmetic average of all samples collected during a consecutive 30-day period or calendar month, whichever is applicable. Geometric means shall be calculated for fecal coliform bacteria and total coliform bacteria. The calendar month shall be used for purposes of reporting self-monitoring data on discharge monitoring report forms.

2. The "7-day (and weekly) average" is the arithmetic mean of all samples collected during a consecutive 7-day period or calendar week, whichever is applicable. The 7-day and weekly averages are applicable only to those effluent characteristics for which there are 7-day average effluent limits. The calendar week which begins on Sunday and ends on Saturday, shall be used for purposes of reporting self-monitoring data on discharge monitoring report forms. Weekly averages shall be calculated for all calendar weeks with Saturdays in the month. If a calendar week overlaps two months (i.e., the Sunday is in one month and the Saturday in the following month), the weekly average calculated for that calendar week shall be included in the data for the month that contains the Saturday.

3. "Daily Maximum" ("Daily Max.") is the maximum value allowable in any single sample or instantaneous measurement.

4. "Composite samples" shall be flow proportioned. The composite sample shall, as a minimum, contain at least four (4) samples collected over the compositing period. Unless otherwise specified, the time between the collection of the first sample and the last sample shall not be less than six (6) hours nor more than 24 hours. Acceptable methods for preparation of composite samples are as follows:

   a. Constant time interval between samples, sample volume proportional to flow rate at time of sampling;

   b. Constant time interval between samples, sample volume proportional to total flow (volume) since last sample. For the first sample, the flow rate at the time the sample was collected may be used;

   c. Constant sample volume, time interval between samples proportional to flow (i.e., sample taken every "X" gallons of flow); and,

   d. Continuous collection of sample, with sample collection rate proportional to flow rate.

5. A "grab" sample, for monitoring requirements, is defined as a single "dip and take" sample collected at a representative point in the discharge stream.

6. An "instantaneous" measurement, for monitoring requirements, is defined as a single reading, observation, or measurement.

7. "Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limits because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

B. Description of Discharge Points

The authorization to discharge provided under this permit is limited to those outfalls specifically designated below as discharge locations. Discharges at any location not authorized under a SWD permit is a violation of the South Dakota Water Pollution Control Act and could subject the person{s} responsible for such discharge to penalties under Section 34A-2-75 of the Act. Knowingly discharging from an unauthorized location or failing to report an unauthorized discharge within a reasonable time from the first learning of an unauthorized discharge could subject such person to criminal penalties as provided under the South Dakota Water Pollution Control Act.

Outfall Serial Number	Description of Discharge Point
001	Any discharge to the Big Sioux River from the discharge structure located at the southwest corner of cell 3 (Latitude 43° 35' 57", Longitude 96° 35' 56")

C. Specific Limits and Self-Monitoring Requirements

1. Effluent Limits

Effective immediately and lasting through the life of this permit, the quality of effluent discharged by the facility shall, as a minimum, meet the limits as set forth below:

Effluent Characteristic	Effluent Limit		
	30-Day Average [1]	7-Day Average [1]	Daily Maximum [1]
BOD_5, mg/L	30	45	N/A
Total Suspended Solids, mg/L	90	135	N/A
Fecal Coliforms, no./100 mL [2] (May 1 - September 30)	200	N/A	400
Ammonia-Nitrogen, lbs/day (as N)			
Spring (April - May)	37	N/A	65
Summer (June - August)	76		133
Fall (September - October)	83		145
Winter (November - March)	83		145
Total Residual Chlorine, mg/L (Applicable only if effluent is chlorinated)	N/A	N/A	0.019
The pH of the discharge shall not be less than 6.5 nor greater than 9.0 in any sample.			

[1] See Definitions, Part I.A.

[2] Fecal Coliform organisms from May 1 to September 30 may not exceed a concentration of 200 per 100 milliliters as a geometric mean based on a minimum of 5 samples obtained during separate 24-hour periods for any 30-day period, and they may not exceed this value in more than 20 percent of the samples examined in this 30-day period. They may not exceed 400 per 100 milliliters in any one sample from May 1 to September 30.

C. Specific Limits and Self-Monitoring Requirements

2. Self-Monitoring Requirements - **Outfall 001**

As a minimum, upon the effective date of this permit, the following parameters shall be monitored at the frequency and with the type of measurement indicated; samples or measurements shall be representative of the volume and nature of the monitored discharge. If no discharge occurs during the entire monitoring period, it shall be stated on the Discharge Monitoring Report Form (EPA No. 3320-1) that no discharge or overflow occurred.

Effluent Characteristic	Frequency	Reporting Values [1]	Sample Type [1]
Rate of Discharge, MGD	Three times per week or weekly [2]	daily maximum; 30-day average; [3]	Instantaneous
pH, standard units [6]	Three times per week or weekly [2]	daily minimum; daily maximum	Instantaneous [4]
BOD_5, mg/L	Three times per week or weekly [2]	7-day average; 30-day average	Grab
Total Suspended Solids, mg/L	Three times per week or weekly [2]	7-day average; 30-day average	Grab
Fecal Coliform, no./l00 mL	[5]	daily maximum; 30-day geometric mean	Grab
Ammonia-Nitrogen, mg/L (as N)[6]	Three times per week or weekly [2]	daily maximum; 30-day average[7]	Grab

[1] See definitions, Part I.A.

[2] A minimum of three samples shall be taken during any discharge. A sample shall be taken at the beginning, middle, and end of the discharge if the discharge is less than one week in duration. If a single, continuous discharge is greater than one week in duration, three samples shall be taken the first week and one each following week. All of the samples collected during the 7-day or 30-day period are to be used in determining the averages. If only one sample is collected during the period, it must be considered the same as the average for that period. The permittee always has the option of collecting additional samples if appropriate.

[3] In addition to reporting the daily maximum and 30-day average flow rates, the total flow (million gallons) during the reporting period shall be reported. The date and time of the start and termination of each discharge shall also be reported.

[4] pH is to be taken within 15 minutes of sample collection with a pH meter. The pH meter must be capable of simultaneous calibration to two points on the pH scale that bracket the expected pH and are approximately three standard units apart. The pH meter must read to 0.01 standard units and be equipped with temperature compensation adjustment.

[5] For fecal coliform, if a minimum of 5 samples are collected in a 30-day period, all of the samples collected are to be used in determining the geometric mean. Samples are to be collected at the same time BOD_5, TSS, etc. Additional samples are to be collected during any other separate 24-hour periods. If less than five samples are taken during any 30-day period, the maximum limit still applies. ***This sampling protocol for fecal coliform only applies if the discharge occurs between May 1 and September 30.***

[6] The pH and temperature of the effluent shall be determined when ammonia samples are collected.

[7] SDDENR considers the analytical detection limit for ammonia to be 0.01 mg/L and for total residual chlorine to be 0.05 mg/L. If the effluent value is less than the analytical detection limit, "0" shall be used for reporting and averaging purposes.

C. Specific Limits and Self-Monitoring Requirements

2. Self-Monitoring Requirements - **Outfall 001**

Effluent Characteristic	Frequency	Reporting Values [1]	Sample Type [1]
Ammonia-Nitrogen, lbs/day (as N) [8]	As sample results are received	daily maximum; 30-day average	Calculated
Total Residual Chlorine, mg/L (Required only if the effluent is chlorinated)	Three times per week or weekly [2]	daily maximum [7]	Grab
Water Temperature, °C [6]	Three times per week or weekly [2]	daily maximum; 30-day average	Instantaneous [9]
Five-Day Carbonaceous Biochemical Oxygen Demand, mg/L	Quarterly	30-day average	Grab
Nitrates, mg/L (as N)	Quarterly	30-day average	Grab

[8] Daily ammonia-nitrogen loading (lbs/day) shall be calculated by multiplying the discharge flow rate (million gallons per day) by the measured pollutant concentration (mg/L) times 8.34 (a conversion factor). 30-day average nitrogen loading (lbs/day) shall be calculated by averaging the computed daily nitrogen loadings (lbs/day) for the monitoring period.

[9] The water temperature of the effluent shall be taken as a field measurement. Measurement shall be made with a mercury-filled, or dial type thermometer, or a thermistor. Readings shall be reported to the nearest whole degree Celsius.

C. Specific Limits and Self-Monitoring Requirements

3. Inspection Requirements: The permittee shall inspect its wastewater treatment facility on at least a **monthly** basis. During a discharge, the permittee shall inspect the facility on at least a **weekly** basis. The inspection shall be conducted to determine if a discharge is occurring, has occurred since the previous inspection, and/or if a discharge is likely to occur before the next inspection. In addition, the inspection shall be performed to determine if proper operation and maintenance procedures are being undertaken at the wastewater treatment facility. The permittee shall maintain a notebook recording information obtained during the inspection. At a minimum, the notebook shall include the following:

1. Date and time of the inspection;
2. Name of the inspector(s);
3. The facility's discharge status;
4. The measured amount of pond freeboard at the outlet works;
5. Identification of operational problems and/or maintenance problems;
6. Recommendations, as appropriate, to remedy identified problems;
7. A brief description of any actions taken with regard to problems identified; and
8. Other information, as appropriate.

The permittee shall maintain the notebook in accordance with proper record-keeping procedures and shall make the notebook available for inspection, upon request, by the Secretary or the U.S. Environmental Protection Agency.

II. MONITORING, RECORDING AND REPORTING REQUIREMENTS

A. Representative Sampling. Samples taken in compliance with the monitoring requirements established under Part I shall be collected from the effluent stream prior to discharge into the receiving waters. Samples and measurements shall be representative of the volume and nature of the monitored discharge.

B. Monitoring Procedures. Monitoring must be conducted according to test procedures approved under ARSD 74:52:03:06, a.b.r. 40 CFR, Part 136, unless other test procedures have been specified in this permit.

C. Penalties for Tampering. Any person who falsifies, tampers with, or knowingly renders inaccurate, any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a Class 1 misdemeanor. In addition to a jail sentence authorized by SDCL 22-6-2, a Class 1 misdemeanor imposed by SDCL, Chapter 34A-2, is subject to a criminal fine not to exceed ten thousand dollars per day of violation. The violator is also subject to a civil penalty not to exceed ten thousand dollars per day of violation, for damages to the environment of this state.

D. Reporting of Monitoring Results. Effluent monitoring results obtained during the previous three (3) months shall be summarized for each month and reported on separate Discharge Monitoring Report Form(s) (EPA No. 3320-1), postmarked no later than the 28th day of the month following the completed reporting period. If no discharge occurs during the reporting period, "no discharge" shall be reported. Legible copies of these, and all other reports required herein, shall be signed and certified in accordance with the Signatory Requirements (see Part IV), and submitted to the Secretary at the following address:

original to: South Dakota Department of
Environment and Natural Resources
Surface Water Quality Program
Joe Foss Building
523 East Capitol Avenue
Pierre, South Dakota 57501-3181

E. Compliance Schedules. Reports of compliance or noncompliance with, or any progress reports on interim and final requirements contained in any Compliance Schedule of this permit shall be submitted no later than 14 days following each schedule date.

F. Additional Monitoring by the Permittee. If the permittee monitors any pollutant more frequently than required by this permit, using test procedures approved under ARSD 74:52:03:06, a.b.r. 40 CFR 136 or as specified in this permit, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the DMR. Such increased frequency shall also be indicated.

G. Records Contents. Records of monitoring information shall include:

1. The date, exact place, and time of sampling or measurements;

2. The initials or name(s) of the individual(s) who performed the sampling or measurements;

3. The date(s) analyses were performed;

4. The time analyses was initiated;

5. The initials or name(s) of individual(s) who performed the analyses;

6. References and written procedures, when available, for the analytical techniques or methods used; and,

7. The results of such analyses, including the bench sheets, instrument readouts, computer disks or tapes, etc., used to determine these results.

H. Retention of Records. The permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least three years from the date of the sample, measurement, report or application. This period may be extended by request of the Secretary at any time. Data collected on site, copies of Discharge Monitoring Reports, a copy of this SWD permit and copies of any Unauthorized Release of Wastewater forms must be maintained on site during the duration of activity at the permitted location.

I. Twenty-four Hour Notice of Noncompliance Reporting.

1. The permittee shall report any noncompliance which may endanger health or the environment as soon as possible, but no later than twenty-four (24) hours from the time the permittee first became aware of the circumstances. The report shall be made to the State of South Dakota at (605) 773-3231 and the EPA, Region VIII, Emergency Response Branch at (303) 293-1788.

2. The following occurrences of noncompliance shall be reported by telephone to the Secretary at (605) 773-3351 by the first workday (8:00 a.m. - 4:30 p.m. Central Time) following the day the permittee became aware of the circumstances:

   a. Any unanticipated bypass which exceeds any effluent limit in the permit (See Part III.G., Bypass of Treatment Facilities.);

   b. Any upset which exceeds any effluent limit in the permit (See Part III.H., Upset Conditions.); or,

   c. Violation of a maximum daily discharge limit for any of the pollutants listed in the permit to be reported within 24 hours.

I. Twenty-four Hour Notice of Noncompliance Reporting. (Continued)

3. A written submission shall also be provided within five days of the time that the permittee becomes aware of the circumstances. The written submission shall contain:

   a. A description of the noncompliance and its cause;

   b. The period of noncompliance, including exact dates and times;

   c. The estimated time noncompliance is expected to continue if it has not been corrected; and,

   d. Steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

4. The Secretary may waive the written report on a case-by-case basis if the oral report has been received within 24 hours by the Surface Water Quality Program, South Dakota Department of Environment and Natural Resources, Pierre, (605) 773-3351.

5. Reports shall be submitted to the addresses in Part II.D., Reporting of Monitoring Results.

J. Other Noncompliance Reporting. Instances of noncompliance not required to be reported within 24 hours shall be reported at the time that monitoring reports for Part II.D. are submitted. The reports shall contain the information listed in Part II.I.3.

K. Inspection and Entry. The permittee shall allow the Secretary or EPA, upon the presentation of credentials and other documents as may be required by law, to:

1. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;

2. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

3. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and,

4. Sample or monitor at reasonable times, for the purpose of assuring permit compliance or as otherwise authorized by the Act, any substances or parameters at any location.

III. COMPLIANCE RESPONSIBILITIES

A. Duty to Comply. The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or for denial of a permit renewal application. The permittee shall give the director advance notice of any planned changes at the permitted facility or of an activity which may result in permit noncompliance.

B. Penalties for Violations of Permit Conditions. Any person who violates a permit condition shall, upon conviction, be punished by a Class 1 misdemeanor. In addition to a jail sentence authorized by SDCL 22-6-2, a Class 1 misdemeanor imposed by SDCL, Chapter 34A-2, is subject to a criminal fine not to exceed ten thousand dollars per day of violation. The violator is also subject to a civil penalty not to exceed ten thousand dollars per day of violation, for damages to the environment of this state. Except as provided in permit conditions on Part III.G., Bypass of Treatment Facilities and Part III.H., Upset Conditions, nothing in this permit shall be construed to relieve the permittee of the civil or criminal penalties for noncompliance.

C. Need to Halt or Reduce Activity not a Defense. It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

D. Duty to Mitigate. The permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

E. Proper Operation and Maintenance. The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems which are installed by a permittee only when the operation is necessary to achieve compliance with the conditions of the permit. However, the permittee shall operate, as a minimum, one complete set of each main line unit treatment process whether or not this process is needed to achieve permit effluent compliance.

F. Removed Substances. Collected screenings, grit, solids, sludges, or other pollutants removed in the course of treatment shall be buried or disposed of in such a manner so as to prevent any pollutant from entering any waters of the state or creating a health hazard. These materials may be landfilled at a municipal solid waste landfill. Sludge/digestor supernatant and filter backwash shall not be directly blended with or enter either the final plant discharge and/or waters of the state.

G. Bypass of Treatment Facilities:

1. Bypass not exceeding limits. The permittee may allow any bypass to occur which does not cause effluent limits to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of paragraphs 2. and 3. of this section.

2. Notice:
   a. Anticipated bypass. If the permittee knows in advance of the need for a bypass, it shall submit prior notice, if possible at least 60 days before the date of the bypass.

   b. Unanticipated bypass. The permittee shall submit notice of an unanticipated bypass as required under Part II.I., Twenty-four Hour Notice of Noncompliance Reporting.

G. Bypass of Treatment Facilities: (Continued)

3. Prohibition of bypass.

a. Bypass is prohibited and the Secretary may take enforcement action against a permittee for a bypass, unless:

(1) The bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

(2) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgement to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and,

(3) The permittee submitted notices as required under paragraph 2. of this section.

b. The Secretary may approve an anticipated bypass, after considering its adverse effects, if the Secretary determines that it will meet the three conditions listed above in paragraph 3.a. of this section.

H. Upset Conditions.

1. Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with technology based permit effluent limits if the requirements of paragraph 2. of this section are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review (i.e., Permittees will have the opportunity for a judicial determination on any claim of upset only in an enforcement action brought for noncompliance with technology-based permit effluent limits).

2. Conditions necessary for a demonstration of upset. A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

a. An upset occurred and that the permittee can identify the cause(s) of the upset;

b. The permitted facility was at the time being properly operated;

c. The permittee submitted notice of the upset as required under Part II.I., Twenty-four Hour Notice of Noncompliance Reporting; and,

d. The permittee complied with any remedial measures required under Part III.D., Duty to Mitigate.

3. Burden of proof. In any enforcement proceeding, the permittee seeking to establish the occurrence of an upset has the burden of proof.

I. Industrial Wastes

1. The permittee has the responsibility to protect the Publicly Owned Treatment Works (POTW) from pollutants which would inhibit, interfere, or otherwise be incompatible with operation of the treatment works including interference with the use or disposal of municipal sludge.

2. Each significant industrial user must be identified as to qualitative and quantitative characteristics of the discharge as well as production data. A significant industrial user is defined as an industrial user discharging to a publicly owned treatment works (POTW) that satisfies any of the following: (1)has a process wastewater flow of 25,000 gallons or more per average work day; (2) has a flow greater than five percent of the flow carried by the municipal system receiving the waste; (3) has in its waste a toxic pollutant in toxic amounts as defined under Section 307(a) of the Federal Clean Water Act of 1977, as amended, or is otherwise subject to Categorical Pretreatment Standards developed under Section 307(b) of the Federal Clean Water Act and 40 CFR chapter I and subchapter N; or, (4) is found by the permit issuing authority to have a significant impact on the treatment works or the quality of effluent from the POTW.

3. The permittee must notify the permitting authority of any new introductions by new or existing significant industrial users or any substantial change in pollutants from any significant industrial user. Such notice must contain the information described in paragraph 1. above and be forwarded no later than sixty (60) days following the introduction or change.

4. Pretreatment Standards [ARSD 74:52:11:01, a.b.r. 40 CFR 403.5] developed pursuant to Section 307 of the Federal Clean Water Act require that under no circumstances shall the permittee allow the introduction of the following pollutants to the waste treatment system from any source of nondomestic discharge:

   (a) Pollutants which create a fire or explosion hazard in the publicly owned treatment works (POTW), including but not limited to, wastestreams with a closed cup flashpoint of less than sixty (60) degrees Centigrade (140 degrees Fahrenheit) using the test methods specified in ARSD 74:28:22:01, a.b.r. 40 CFR 261.21;

   (b) Pollutants which will cause corrosive structural damage to the POTW, but in no case discharges with pH lower than 5.0, unless the works are specifically designed to accommodate such discharges;

   (c) Solid or viscous pollutants in amounts which will cause obstruction to the flow in the POTW, or other interference with the operation of the POTW;

   (d) Any pollutant, including oxygen demanding pollutants (e.g., BOD), released in a discharge at a flow rate and/or pollutant concentration which will cause interference with the POTW;

   (e) Heat in amounts which will inhibit biological activity in the POTW resulting in interference but in no case heat in such quantities that the temperature at the POTW treatment plant exceeds forty (40) degrees Centigrade (104 degrees Fahrenheit);

   (f) Petroleum oil, nonbiodegradable cutting oil, or products of mineral oil origin in amounts that will cause interference or pass through;

   (g) Pollutants which result in the presence of toxic gases, vapors, or fumes within the POTW in a quantity that may cause acute worker health and safety problems;

   (h) Any trucked or hauled pollutants, except at discharge points designated by the POTW;

   (i) Any pollutant which causes pass through or interference;

I. Industrial Wastes

(j) In addition to the general limits expressed above, more specific pretreatment limits have been promulgated for specific industrial categories under Section 307 of the Act (see ARSD, Chapter 74:52:10, a.b.r. 40 CFR Subchapter N, Parts 405 through 471, for specific information); and,

(k) Any specific pollutant which exceeds a local limit established by the permittee in accordance with ARSD 74:52:11:01 a.b.r. 40 CFR 403.5(c) and (d)

5. The permittee shall provide adequate notice to the Secretary of:

(a) Any new introduction of pollutants into the treatment works from an indirect discharger (i.e., industrial user) which would be subject to Sections 301 or 306 of the Federal Clean Water Act if it were directly discharging those pollutants;

(b) Any substantial change in the volume or character of pollutants being introduced into the treatment works by an industrial user introducing pollutants into the treatment works at the time of application of the SWD permit; and,

(c) For the purposes of this section, adequate notice shall include information on:

(1) The quality and quantity of effluent to be introduced into such treatment works; and,

(2) Any anticipated impact of the change on the quantity or quality of effluent to be discharged from such publicly owned treatment works.

6. At such time as a specific pretreatment limit becomes applicable to an industrial user of the permittee, the Secretary may, as appropriate, do the following:

(a) Amend the permittee's SWD discharge permit to specify the additional pollutant(s) and corresponding effluent limit(s) consistent with the applicable national pretreatment limit;

(b) Require the permittee to specify, by ordinance, permit, or similar means, the type of pollutant(s) and the maximum amount which may be discharged to the permittee's facility for treatment. Such requirement shall be imposed in a manner consistent with the POTW program development requirements of the General Pretreatment Regulations at [ARSD 74:52:11:01, a.b.r. 40 CFR 403]; and/or,

(c) Require the permittee to monitor its discharge for any pollutant which may likely be discharged from the permittee's facility, should the industrial user fail to properly pretreat its waste.

7. The Secretary retains, at all times, the right to take legal action against any source of nondomestic discharge, whether directly or indirectly controlled by the permittee, for violations of a permit, order, or similar enforceable mechanism issued by the permittee, violations of any Pretreatment Standard or requirement, or for failure to discharge at an acceptable level under national standards as required in ARSD 74:52:11:01 a.br. 40 CFR, chapter I, subchapter N. In those cases where a SWD permit violation has occurred because of the failure of the permittee to properly develop and enforce Pretreatment Standards and requirements as necessary to protect the POTW, the Secretary shall hold the permittee and/or the industrial user responsible and may take legal action against the permittee as well as the Industrial User(s) contributing to the permit violation.

IV. GENERAL REQUIREMENTS

A. Planned Changes. The permittee shall give notice to the Secretary as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required only when the alteration or addition could significantly change the nature or increase the quantity of pollutant discharged. This notification applies to pollutants which are not subject to effluent limits in the permit. The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source (see ARSD, Chapter 74:52:01:01(30)).

B. Anticipated Noncompliance. The permittee shall give advance notice to the Secretary of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

C. Permit Actions. This permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance, does not stay any permit condition.

D. Duty to Reapply. If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for and obtain a new permit. The application should be submitted at least 180 days before the expiration date of this permit.

E. Duty to Provide Information. The permittee shall furnish to the Secretary, within a reasonable time, any information which the Secretary may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The permittee shall also furnish to the Secretary, upon request, copies of records required to be kept by this permit.

F. Other Information. When the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or any report to the Secretary, it shall promptly submit such facts or information.

G. Signatory Requirements. All applications, reports or information submitted to the Secretary shall be signed and certified.

1. All permit applications shall be signed by either a principal executive officer or ranking elected official.

2. All reports required by the permit and other information requested by the Secretary shall be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:

   a. The authorization is made in writing by a person described above and submitted to the Secretary; and,

   b. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility, such as the position of plant manager, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.)

3. Changes to authorization. If an authorization under paragraph IV.G.2. is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of paragraph IV.G.2. must be submitted to the Secretary prior to or together with any reports, information, or applications to be signed by an authorized representative.

G. Signatory Requirements. (Continued)

4. Certification. Any person signing a document under this section shall make the following certification:

> "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

H. Penalties for Falsification of Reports. Any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or noncompliance shall, upon conviction, be punished by a Class 1 misdemeanor. In addition to a jail sentence authorized by SDCL 22-6-2, a Class 1 misdemeanor imposed by SDCL, Chapter 34A-2, is subject to a criminal fine not to exceed ten thousand dollars per day of violation. The violator is also subject to a civil penalty not to exceed ten thousand dollars per day of violation, for damages to the environment of this state, or both.

I. Availability of Reports. Except for data determined to be confidential under ARSD 74:52:02:17, all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of SDDENR and EPA. Permit applications, permits and effluent data shall not be considered confidential.

J. Oil and Hazardous Substance Liability. Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties to which the permittee is or may be subject under Section 311 of the Federal Clean Water Act.

K. Property Rights. The issuance of this permit does not convey any property rights of any sort, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of federal, state or local laws or regulations.

L. Severability. The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit, shall not be affected thereby.

M. Transfers. This permit may be automatically transferred to a new permittee if:

1. The current permittee notifies the Secretary at least 30 days in advance of the proposed transfer date;

2. The notice includes a written agreement between the existing and new permittees containing a specific date for transfer of permit responsibility, coverage, and liability between them; and,

3. The Secretary does not notify the existing permittee and the proposed new permittee of his or her intent to modify, or revoke and reissue the permit. If this notice is not received, the transfer is effective on the date specified in the agreement mentioned in paragraph 2. above.

N. Reopener Provision. This permit may be reopened and modified (following proper administrative procedures) to include the appropriate effluent limits (and compliance schedule, if necessary), or other appropriate requirements if one or more of the following events occurs:

1. Water Quality Standards: The water quality standards of the receiving water(s) to which the permittee discharges are modified in such a manner as to require different effluent limits than contained in this permit.

2. Total Maximum Daily Load: Additional controls in the permit are necessary to implement a total maximum daily load approved by the Secretary and/or EPA.

3. Water Quality Management Plan: A revision to the current water quality management plan is approved and adopted which calls for different effluent limits than contained in this permit.

4. Sludge: To include sludge conditions required when EPA delegates the 503 sludge program to the state.

O. Toxicity Limit-Reopener Provision. This permit may be reopened and modified (following proper administrative procedures) to include whole effluent toxicity limits if whole effluent toxicity is detected in the discharge.

Appendix B
Surface Water Discharge Compliance Inspection

600 N. Main Ave, Suite 100
Sioux Falls, SD 57104
Ph. (605) 338-6668
Fax. (605) 338-8750
www.stockwellengineers.com

DEPARTMENT of ENVIRONMENT and NATURAL RESOURCES
PMB 2020
JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182
denr.sd.gov

July 2, 2012

The Honorable Larry Beesley
Mayor, City of Brandon
PO Box 95
Brandon, SD 57005

RE: Surface Water Discharge Offsite Review (SWD Permit Number: SD0022535)

Dear Mayor Beesley,

The South Dakota Department of Environment and Natural Resources conducted a Surface Water Discharge Offsite Review of the city's wastewater treatment facility on June 8, 2012.

I have attached an inspection summary of the report. Please pay special attention to the Inspection Summary tables and implement the required corrective actions as soon as possible. All corrective actions taken will be reviewed during our next inspection at your facility. **By August 3, 2012, please submit a summary of the corrective actions taken to the department at the address listed in the letterhead.**

Thank you for your continued efforts to protect the environment and natural resources of South Dakota. Please review this report for accuracy, and respond within thirty days with any needed corrections. If you have any questions about this letter or the inspection reports, please contact me at (605) 773-3351.

Sincerely,

Tina Piroutek
Engineer II
Surface Water Quality Program
Enclosures

cc: Rollie Hoeke, Public Works Director, City of Brandon
Seth Draper, EPA Region 8, 8ENF-W-NP
SWD File - Pierre

INSPECTION SUMMARY

Facility: City of Brandon

SWD Permit: SD0022535

Inspection Date: June 8, 2012

The following comments detail violations of the permit that were identified during the inspection. Corrective actions are ***required*** for the city to come into compliance with its surface water discharge permit.

COMMENTS	REQUIRED CORRECTIVE ACTIONS
Numerous samples were not properly preserved or had too high of temperatures upon arriving at the lab, therefore were an invalid sample.	Samples must be preserved according to the proper sampling methods. Enough ice needs to be packed with the samples to ensure that the sample is not received at the lab at a temperature over 6 °C.
The city of Brandon had experienced several BOD_5 and fecal coliform effluent violations. BOD_5 violations occurred in September 2010, March 2011, June 2011, and July 2011. There was a fecal coliform violation in September 2010. ***Warning letters have been sent to the facility concerning these violations.***	The city **must** look into modifications of its operation to allow for adequate treatment of the wastewater. These violations are not acceptable and can lead to enforcement actions which can include fines and penalties. Please contact the department if you wish to have assistance from the state with these modifications.
State Health Lab data shows that the facility has been sampling for CBOD and nitrates on a quarterly basis as required by the permit, however, the city has not been reporting quarterly samples on DMRs.	All sample results must be reported on DMRs. More care should be taken when filling out DMRs. The October 2011 and March 2011 DMRs are being returned to the city for correction. Please resubmit these DMRs to DENR by **August 3, 2012.**

COMMENTS	REQUIRED CORRECTIVE ACTIONS
In several of the DMRs reviewed, it was found that the daily maximum is being reported instead of the maximum 7-day average for BOD_5 and TSS. Also, the last sample in the June 2011 discharge was taken in a week where the Saturday was in July. The sample results for that week should have been reported on the July 2011 DMR.	The maximum **7-day average** should be reported for BOD_5 and TSS. A 7-day average is based on a calendar week; Sunday – Saturday. During the last week of the month, the calendar week will often span the end of the current month and the beginning of the next month. This can result in confusion on how to properly report this 7-day average. In these cases, the 7-day average must be reported for the month where the week **ends** (i.e. – the month where the Saturday falls). The following DMRs are being returned to the city for correction: October 2010, December 2010, March 2011, June 2011, July 2011, and October 2011. Please resubmit these DMRs with the corrections by **August 3, 2012.** The March 2012 DMR, which was submitted via Net DMR, also needs to be corrected. The city needs to access this DMR in NetDMR to correct it. Please contact DENR if you have any questions about filling out DMRs. DMR calculation forms, showing the calculations are being sent with this inspection.
The September 2010 DMR was reviewed and it was found that the city is reporting a 30-day geometric mean for fecal coliform when less than 5 samples a month are taken.	More care should be taken when filling out DMRs. If less than five fecal coliform samples are taken in a month, the 30-day geometric mean should be reported as "NR" for Not Required. The September 2010 DMR is being returned for correction. Please resubmit the DMR with the correction by **August 3, 2012.**

COMMENTS	REQUIRED CORRECTIVE ACTIONS
The January 2011 DMR was submitted late.	Page 10 of your SWD Permit states under Reporting: *Effluent monitoring results obtained during the previous three (3) months shall be summarized for each month and reported on separate Discharge Monitoring Report Form(s) (EPA No. 3320-1), postmarked no later than the 28th day of the month following the completed reporting period.* Failure to submit the DMRs is a violation of your permit. DMRs shall be submitted in accordance with the following schedule: • January – March: Due April 28th • April – June: Due July 28th • July – September: Due October 28th • October – December: Due January 28th
The city was approved to submit DMRs via NetDMR on March 19, 2012. The facility correctly submitted the March 2012 DMR prior to April 28th. When the facility submitted the April and May DMRs on June 1, 2012, they accidentally submitted the January through March DMRs again and changed the March 2012 DMR to no discharge.	The facility should take more care when submitting DMRs via NetDMR. The March 2012 DMR with all of the discharge data should be resubmitted in NetDMR. The facility also needs to unsubmit the January and February 2012 DMRs on NetDMR as an original paper version of the DMR was submitted to DENR. Please contact Tim Flor or Andrew Renner at DENR if you have any questions regarding NetDMR. *Note: The facility corrected the NetDMR submission errors on June 22, 2012.*

SWD PERMIT OFF-SITE EVALUATION CHECKLIST

South Dakota Department of Environment and Natural Resources

I. GENERAL INFORMATION

Facility Name	City of Brandon		
SWD Permit No.	SD0022535		
Reviewer / Title	Tina Piroutek/ Engineer II		
Review Date	June 8, 2012	**Last Inspection Date**	June 16, 2010
Permit Effective Date	April 1, 2000	**Expiration Date**	March 31, 2005
Industries Potentially Served by the Facility (Review Phone Book, Internet, Industrial Guide, etc.)	Berquist Company, Crimson Fire, Front Line Chemicals, Luverne Truck Equipment, Pace Manufacturing, Total Fire Protection Inc.		
Population Served	8,785 (2010 census)		

Date Facility Began Operation 1983 **Date of Facility Upgrade(s)** 1991, 2002

II. PERMIT VERIFICATION

		Yes	No	N/A
1.	DENR has been notified of any new, different, or increased loading to the WWTF. **According to previous onsite inspection, influent flows have been remaining constant.**		X	
2.	Name of receiving water(s) and classification. **Big Sioux River 5, 7, 8, 9, 10**			
3.	Names, address, location, and phone number are correct in the database and ICIS. If not, indicate correct information below.		X	
4.	Are any changes to the permit necessary?		X	
5.	Is the permit properly coded (Review Limit Summary in ICIS)?	X		
6.	Is a follow-up letter to the facility required?	X		

Comments: *The Public Works Director, Rollie Hoeke, was added to the database and ICIS as a facility contact. DENR is waiting to reissue the permit until a TMDL of the watershed has been completed. Several monitoring requirements in the permit are written in old permit language and will need to be changed upon permit reissuance. Several parameters are coded using old codes. These will be fixed upon permit reissuance. A follow up letter will be sent to address calculation errors in DMRs, DMR reporting errors, the temperature of samples received at the State Health lab, and the number of violations since the last inspection.*

For office use only: ***OMA*** Yes ☐ No ☒ ***OME*** Yes ☐ No ☒ ***SEV*** Yes ☐ No ☒ ***ENF*** Yes ☐ No ☒

III. RECORDKEEPING AND REPORTING EVALUATION

1. The following information shall be reviewed where reasonably available:
   a. Lab results (Review Health Lab results, if applicable)
   b. Discharge Monitoring Reports (DMRs – Review last 2 years of DMRs)
   c. Emergency Discharge Forms
   d. Compliance Schedule Reports
   e. Other: ***Previous Inspection Report***
   f. Other: _____

	Yes	No	N/A
2. The facility is required to obtain permission from the department before discharging.		X	
a. If yes, has the facility requested permission for discharges			X
b. If yes, has the facility received permission for discharges			X
3. The facility is approved for NetDMR (If so, there will be no DMRs in the file after approval)	X		
4. The DMRs and/or Emergency Release Forms have been submitted on time		X	
5. The DMRs and/or Emergency Release Forms have been completed properly		X	
a. Monitoring for required parameters is performed at least as frequently as required by the permit		X	
b. Monitoring is performed for all required parameters	X		
c. Minimum, maximum, and average columns are properly completed		X	
d. The number of exceedances column (NO. EX) is completed properly	X*		
e. The permit signatory or authorized representative is signing the DMRs	X		
f. Each page of the DMRs is signed and dated	X		

Comments: *The facility is not required to receive permission to discharge. The facility does take a pre discharge sample to ensure that the wastewater meets the parameter limits. The facility was approved for NetDMR on March 19, 2012. The January 2011 DMR was submitted late to the department. The facility also accidentally resubmitted January through March 2012 DMRs on NetDMR and marked them all as no discharge. A discharge did occur in March 2012. All DMRs since June 2010, including the initial March 2012 DMR, were reviewed during this review and the DMR calculation forms can be found in Attachment 1. The facility is reporting the daily maximum values instead of the maximum 7-day averages for BOD_5 and TSS. The facility took a sample during the last week of June. Due to the "Saturday Rule", these results should have been reported for the maximum 7-day average on the July 2011 DMR. Also in September 2010, the facility calculated a geometric mean with only four sample results. The facility has also occasionally forgotten to report results for their quarterly testing of CBOD and nitrates. The number of exceedances column is being filled out correctly, however, because the facility had some calculation errors, the facility reported a couple of exceedances that were not violations. In September 2010, the fecal coliform 30-day geometric mean was counted as an exceedance, when it should have been reported as not required. In June 2011, the facility incorrectly calculated the BOD_5 maximum 7-day average as a violation, when the actual value was under the city's permit limit. Also, there should have been a violation reported on the July 2011 DMR for BOD_5 maximum7-day average. Numerous samples have been received at the State Health Lab above the maximum allowable temperatures of ≤6 °C for BOD_5, TSS, CBOD, and nitrates and <10 °C for fecal coliform.*

IV. COMPLIANCE EVALUATION

Facility Performance

		Yes	No	N/A
1. Facility has reported a discharge since last inspection. If yes, how many?	9	X		
2. Facility is in compliance with all effluent limits since last inspection.			X	
a. Effluent BOD_5 violations? If yes, how many?	6	X		
b. Effluent TSS violations? If yes, how many?			X	
c. Effluent pH violations? If yes, how many?			X	
d. Effluent ammonia violations? If yes, how many?			X	
e. Effluent fecal coliform violations? If yes, how many?	1	X		
f. Effluent total coliform violations? If yes, how many?				X
g. Effluent temperature violations? If yes, how many?				X

h.	Effluent TRC violations? If yes, how many?			X	
i.	Other effluent violations?			X	
3.	Department has received complaints (Describe below)			X	

Comments: *The facility had two daily maximum violations and a 30-day average violation for BOD_5 in September 2010. The facility also had a daily maximum fecal coliform violation in September 2010. The facility also reported a fecal coliform 30-day geometric mean violation, however they only took four fecal coliform samples during the month and a geometric mean is not appropriate. The facility had a 30-day average violation of BOD_5 in both March 2011 and June 2011. The facility also reported a maximum 7-day average violation on the June 2011 DMR. Due to the "Saturday Rule", this violation should have been reported on the July 2011 DMR.*

Enforcement/Compliance Schedule Evaluation

		Yes	No	N/A
1.	Has the facility received an enforcement action in the last 5 years?		X	
	a. Has the facility complied with the Order for Compliance?			X
	b. Have similar violations occurred?			X
	c. Were facility modifications or construction necessary to meet the Order?			X
2.	Is the facility subject to a compliance schedule either in its permit or in an enforcement action? If yes, note date and type of schedule.		X	
3.	List milestones that remain in the schedule:			
4.	Facility has missed milestone dates, but will still meet the final compliance date.			X

Comments: *DENR has sent warning letters to the facility on January 31, 2011, July 14, 2011, and June 6, 2012 concerning effluent violations.*

Sanitary Sewer Overflow Evaluation

Review file and SSO database for the following questions

		Yes	No	N/A
1.	Facility has reported sanitary sewer overflows or bypasses (internal, collection system, total). Describe in detail, including dates, total volumes, receiving waters: ***On September 24, 2010, there was an SSO at the Golf Course lift station due to the flooding of Splitrock Creek. An unknown amount of water was discharged into Splitrock Creek. The SSO was stopped by 10:30 am on September 25, 2010.***	X		
2.	DENR was properly notified of any bypasses/overflows (24-hr verbal notice plus written notification) or unauthorized releases (treated and/or untreated). If no, why not?	X		
3.	Samples were collected for all bypasses and/or overflows. If yes, summarize sampling results. If no, why not? ***The facility took 3 samples during the SSO: one upstream of the overflow, one at the overflow point, and one downstream of the overflow point. Samples were analyzed at the City of Sioux Falls Water Reclamation Plant. Attachment 2 contains the sample results.***	X		

Comments: *Facility had one SSO since the last inspection. DENR was notified within 24 hours of the SSO. The facility sent a letter to DENR with the sample results of the SSO the following month.*

Land Application Evaluation

		Yes	No	N/A
1.	Is the facility approved to land apply wastewater?		X	
2.	Has land application of wastewater occurred?			X
3.	Has the facility followed the sampling and reporting requirements for land application			X

Comments: *Facility has been interested in land applying sludge from the lagoon. A letter dated June 30, 2011 was sent to the city's public works director outline one-time sludge removal requirements. A second letter dated June 5, 2012 was sent to the city's engineer outlining the same requirements.*

Attachment 1- DMR Calculation Forms

***Notes for DMR Calculation Forms*:**

Data was obtained through the State Health Lab. Flow rate; temperature, pH, and ammonia are taken onsite on a daily basis. Therefore, not all values are provided to the state health lab and calculations on these parameters were not done in this review.

Highlighted cells = parameters filled out on the DMR incorrectly.

NA=Not applicable. The facility used this to fill out several fields that were not required. It is also used by DENR in this review to denote calculations that are not applicable because of the Saturday rule.

ND=No discharge.

NR=Not required.

NS= Not sampled.

Month of **July 2010**

Week 1 (July 4-10)						
Date	BOD (mg/L)	TSS (mg/L)	CBOD (mg/L)	Nitrates (mg/L)	Fecal (#/100mL)	Temp rec'd (°C)
7/6/2010	**15**	**36**	**9**	**<0.2**	**10**	**14**
7/7/2010	**16**	**30**	**NS**	**NS**	**40**	**10**
7/8/2010	**17**	**31**	**NS**	**NS**	**10**	**9**
Week Total	**48**	**97**	----------	----------	----------	----------
÷ # of Samples	**3**	**3**	----------	----------	----------	----------
=7-Day Avg.	**16**	**32.33**	----------	----------	----------	----------
Week 2 (July 11-17)						
Date	BOD (mg/L)	TSS (mg/L)	CBOD (mg/L)	Nitrates (mg/L)	Fecal (#/100mL)	Temp rec'd (°C)
7/12/2010	**21**	**50**	**NS**	**NS**	**10**	**9**
Week Total	**21**	**50**	----------	----------	----------	----------
÷ # of Samples	**1**	**1**	----------	----------	----------	----------
=7-Day Avg.	**21**	**50**	----------	----------	----------	----------
Week 3 (July 18-24)						
Date	BOD (mg/L)	TSS (mg/L)	CBOD (mg/L)	Nitrates (mg/L)	Fecal (#/100mL)	Temp rec'd (°C)
7/19/2010	**28**	**59**	**NS**	**NS**	**120**	**11**
Week Total	**28**	**59**	----------	----------	----------	----------
÷ # of Samples	**1**	**1**	----------	----------	----------	----------
=7-Day Avg.	**28**	**59**	----------	----------	----------	----------
Monthly Summary						
Date	BOD (mg/L)	TSS (mg/L)	CBOD (mg/L)	Nitrates (mg/L)	Fecal (#/100mL)	Temp rec'd (°C)
Daily Max.	----------	----------	----------	----------	**120**	----------
Daily Min.	----------	----------	----------	----------	----------	----------
Max. 7-day Avg.	**28**	**59**	----------	----------	----------	----------
Month Total	**97**	**206**	**9**	**<0.2**	----------	----------
÷ # of Samples	**5**	**5**	**1**	**1**	----------	----------
=30-Day Avg.	**19.4**	**41.2**	**9**	**<0.9**	**Geo=21.69**	----------
Reported on DMR						
Date	BOD (mg/L)	TSS (mg/L)	CBOD (mg/L)	Nitrates (mg/L)	Fecal (#/100mL)	Temp rec'd (°C)
Daily Max.	----------	----------	----------	----------	120	----------
Daily Min.	----------	----------	----------	----------	----------	----------
Max. 7-day Avg.	28	59	----------	----------	----------	----------
30-Day Avg.	19.45	41.2	9	<0.2	21.69	----------

Month of **September 2010**

Week 1 (September 12-18)						
Date	BOD (mg/L)	TSS (mg/L)	CBOD (mg/L)	Nitrates (mg/L)	Fecal (#/100mL)	Temp rec'd (°C)
9/13/2010	**34**	**47**	**NS**	**NS**	**<10**	**11**
9/14/2010	**44**	**42**	**NS**	**NS**	**10**	**7**
9/15/2010	**66**	**44**	**NS**	**NS**	**130**	**8**
Week Total	**144**	**133**	----------	----------	----------	----------
÷ # of Samples	**3**	**3**	----------	----------	----------	----------
=7-Day Avg.	**48**	**44.33**	----------	----------	----------	----------
Week 2 (September 19-25)						
Date	BOD (mg/L)	TSS (mg/L)	CBOD (mg/L)	Nitrates (mg/L)	Fecal (#/100mL)	Temp rec'd (°C)
9/20/2010	**106**	**55**	**NS**	**NS**	**910**	**10**
Week Total	**106**	**55**	----------	----------	----------	----------
÷ # of Samples	**1**	**1**	----------	----------	----------	----------
=7-Day Avg.	**106**	**55**	----------	----------	----------	----------
Monthly Summary						
Date	BOD (mg/L)	TSS (mg/L)	CBOD (mg/L)	Nitrates (mg/L)	Fecal (#/100mL)	Temp rec'd (°C)
Daily Max.	----------	----------	----------	----------	**910**	----------
Daily Min.	----------	----------	----------	----------	---------	----------
Max. 7-day Avg.	**106**	**55**	----------	----------	---------	----------
Month Total	**250**	**188**	**NR**	**NR**	---------	----------
÷ # of Samples	**4**	**4**	**0**	**0**	---------	----------
=30-Day Avg.	**62.50**	**47**	**NR**	**NR**	**Geo=NR**	----------
Reported on DMR						
Date	BOD (mg/L)	TSS (mg/L)	CBOD (mg/L)	Nitrates (mg/L)	Fecal (#/100mL)	Temp rec'd (°C)
Daily Max.	----------	----------	----------	----------	910	----------
Daily Min.	----------	----------	----------	----------	---------	----------
Max. 7-day Avg.	106	55	----------	----------	---------	----------
30-Day Avg.	62.50	47	NA	NA	265	----------

Month of **October 2010**

Week 1 (October 24-30)						
Date	BOD (mg/L)	TSS (mg/L)	CBOD (mg/L)	Nitrates (mg/L)	Fecal (#/100mL)	Temp rec'd (°C)
10/25/2010	**12**	**33**	**8**	**1.4**	**NR**	**8**
10/26/2010	**35**	**28**	**NS**	**NS**	**NR**	**7**
10/27/2010	**38**	**40**	**NS**	**NS**	**NR**	**5**
Week Total	**85**	**101**	----------	----------	----------	----------
÷ # of Samples	**3**	**3**	----------	----------	----------	----------
=7-Day Avg.	**28.33**	**33.67**	----------	----------	----------	----------

Monthly Summary						
Date	BOD (mg/L)	TSS (mg/L)	CBOD (mg/L)	Nitrates (mg/L)	Fecal (#/100mL)	Temp rec'd (°C)
Daily Max.	----------	----------	----------	----------	**NR**	----------
Daily Min.	----------	----------	----------	----------	----------	----------
Max. 7-day Avg.	**28.33**	**33.67**	----------	----------	----------	----------
Month Total	**85**	**101**	**8**	**1.4**	----------	----------
÷ # of Samples	**3**	**3**	**1**	**1**	----------	----------
=30-Day Avg.	**28.33**	**33.67**	**8**	**1.4**	**NR**	----------

Reported on DMR						
Date	BOD (mg/L)	TSS (mg/L)	CBOD (mg/L)	Nitrates (mg/L)	Fecal (#/100mL)	Temp rec'd (°C)
Daily Max.	----------	----------	----------	----------	NR	----------
Daily Min.	----------	----------	----------	----------	----------	----------
Max. 7-day Avg.	38	40	----------	----------	----------	----------
30-Day Avg.	28.33	33.67	8	1.4	NR	----------

Month of **December 2010**

Week 1 (December 5-11)						
Date	BOD (mg/L)	TSS (mg/L)	CBOD (mg/L)	Nitrates (mg/L)	Fecal (#/100mL)	Temp rec'd (°C)
12/6/2010	**24**	**27**	**NS**	**NS**	**NS**	**4**
12/7/2010	**17**	**21**	**NS**	**NS**	**NS**	**5**
12/8/2010	**18**	**22**	**NS**	**NS**	**NS**	**4**
Week Total	**59**	**70**	----------	----------	----------	----------
÷ # of Samples	**3**	**3**	----------	----------	----------	----------
=7-Day Avg.	**19.67**	**23.33**	----------	----------	----------	----------
Monthly Summary						
Date	BOD (mg/L)	TSS (mg/L)	CBOD (mg/L)	Nitrates (mg/L)	Fecal (#/100mL)	Temp rec'd (°C)
Daily Max.	----------	----------	----------	----------	**NR**	----------
Daily Min.	----------	----------	----------	----------	----------	----------
Max. 7-day Avg.	**19.67**	**23.3**	----------	----------	----------	----------
Month Total	**59**	**70**	**NR**	**NR**	----------	----------
÷ # of Samples	**3**	**3**	**0**	**0**	----------	----------
=30-Day Avg.	**19.67**	**23.33**	**NR**	**NR**	**NR**	----------
Reported on DMR						
Date	BOD (mg/L)	TSS (mg/L)	CBOD (mg/L)	Nitrates (mg/L)	Fecal (#/100mL)	Temp rec'd (°C)
Daily Max.	----------	----------	----------	----------	NR	----------
Daily Min.	----------	----------	----------	----------	----------	----------
Max. 7-day Avg.	19.67	27	----------	----------	----------	----------
30-Day Avg.	19.67	23.33	NA	NA	NR	----------

Month of **March 2011**

Week 1 (March 20-26)						
Date	BOD (mg/L)	TSS (mg/L)	CBOD (mg/L)	Nitrates (mg/L)	Fecal (#/100mL)	Temp rec'd (°C)
3/21/2011	**34**	**20**	**24**	**<0.2**	**NR**	**5**
3/22/2011	**37**	**20**	**NS**	**NS**	**NR**	**6**
3/23/2011	**39**	**20**	**NS**	**NS**	**NR**	**6**
Week Total	**110**	**60**	----------	----------	----------	----------
÷ # of Samples	**3**	**3**	----------	----------	----------	----------
=7-Day Avg.	**36.67**	**20**	----------	----------	----------	----------
Monthly Summary						
Date	BOD (mg/L)	TSS (mg/L)	CBOD (mg/L)	Nitrates (mg/L)	Fecal (#/100mL)	Temp rec'd (°C)
Daily Max.	----------	----------	----------	----------	**NR**	----------
Daily Min.	----------	----------	----------	----------	----------	----------
Max. 7-day Avg.	**36.67**	**20**	----------	----------	----------	----------
Month Total	**110**	**60**	**24**	**<0.2**	----------	----------
÷ # of Samples	**3**	**3**	**1**	**1**	----------	----------
=30-Day Avg.	**36.67**	**20**	**24**	**<0.2**	**NR**	----------
Reported on DMR						
Date	BOD (mg/L)	TSS (mg/L)	CBOD (mg/L)	Nitrates (mg/L)	Fecal (#/100mL)	Temp rec'd (°C)
Daily Max.	----------	----------	----------	----------	NR	----------
Daily Min.	----------	----------	----------	----------	----------	----------
Max. 7-day Avg.	39	20	----------	----------	----------	----------
30-Day Avg.	36.67	20	na	na	NR	----------

Month of **April 2011**

Week 1 (April 17-23)						
Date	BOD (mg/L)	TSS (mg/L)	CBOD (mg/L)	Nitrates (mg/L)	Fecal (#/100mL)	Temp rec'd (°C)
4/18/2011	**13**	**18**	**NS**	**NS**	**NR**	**8**
4/19/2011	**12**	**17**	**NS**	**NS**	**NR**	**7**
4/20/2011	**14**	**15**	**NS**	**NS**	**NR**	**8**
Week Total	**39**	**50**	----------	----------	----------	----------
÷ # of Samples	**3**	**3**	----------	----------	----------	----------
=7-Day Avg.	**13**	**16.67**	----------	----------	----------	----------
Week 2 (April 24-30)						
Date	BOD (mg/L)	TSS (mg/L)	CBOD (mg/L)	Nitrates (mg/L)	Fecal (#/100mL)	Temp rec'd (°C)
4/25/2011	**16**	**27**	**11**	**<0.2**	**NR**	**3**
Week Total	**16**	**27**	----------	----------	----------	----------
÷ # of Samples	**1**	**1**	----------	----------	----------	----------
=7-Day Avg.	**16**	**27**	----------	----------	----------	----------
Monthly Summary						
Date	BOD (mg/L)	TSS (mg/L)	CBOD (mg/L)	Nitrates (mg/L)	Fecal (#/100mL)	Temp rec'd (°C)
Daily Max.	----------	----------	----------	----------	**NR**	----------
Daily Min.	----------	----------	----------	----------	----------	----------
Max. 7-day Avg.	**16**	**27**	----------	----------	----------	----------
Month Total	**55**	**77**	**11**	**<0.2**	----------	----------
÷ # of Samples	**4**	**4**	**1**	**1**	----------	----------
=30-Day Avg.	**13.75**	**19.25**	**11**	**<0.2**	**NR**	----------
Reported on DMR						
Date	BOD (mg/L)	TSS (mg/L)	CBOD (mg/L)	Nitrates (mg/L)	Fecal (#/100mL)	Temp rec'd (°C)
Daily Max.	----------	----------	----------	----------	NR	----------
Daily Min.	----------	----------	----------	----------	----------	----------
Max. 7-day Avg.	16	27	----------	----------	----------	----------
30-Day Avg.	13.75	19.25	11	<0.2	NR	----------

Month of **June 2011**

Week 1 (June 5-11)						
Date	BOD (mg/L)	TSS (mg/L)	CBOD (mg/L)	Nitrates (mg/L)	Fecal (#/100mL)	Temp rec'd (°C)
6/6/2011	**64**	**27**	**NS**	**NS**	**40**	**8**
6/7/2011	**25**	**29**	**NS**	**NS**	**90**	**9**
6/8/2011	**16**	**25**	**NS**	**NS**	**30**	**7**
Week Total	**105**	**81**	----------	----------	----------	----------
÷ # of Samples	**3**	**3**	----------	----------	----------	----------
=7-Day Avg.	**35**	**27**	----------	----------	----------	----------
Week 2 (June 12-18)						
Date	BOD (mg/L)	TSS (mg/L)	CBOD (mg/L)	Nitrates (mg/L)	Fecal (#/100mL)	Temp rec'd (°C)
6/13/2011	**18**	**62**	**NS**	**NS**	**40**	**5**
Week Total	**18**	**62**	----------	----------	----------	----------
÷ # of Samples	**1**	**1**	----------	----------	----------	----------
=7-Day Avg.	**18**	**62**	----------	----------	----------	----------
Week 3 (June 19- 25)						
Date	BOD (mg/L)	TSS (mg/L)	CBOD (mg/L)	Nitrates (mg/L)	Fecal (#/100mL)	Temp rec'd (°C)
6/20/2011	**34**	**58**	**NS**	**NS**	**10**	**10**
Week Total	**34**	**58**	----------	----------	----------	----------
÷ # of Samples	**1**	**1**	----------	----------	----------	----------
=7-Day Avg.	**34**	**58**	----------	----------	----------	----------
Week 4 (June 26- July 2)						
Date	BOD (mg/L)	TSS (mg/L)	CBOD (mg/L)	Nitrates (mg/L)	Fecal (#/100mL)	Temp rec'd (°C)
6/29/2011	**78**	**65**	**NS**	**NS**	**130**	**4**
Week Total	**NA**	**NA**	----------	----------	----------	----------
÷ # of Samples	**NA**	**NA**	----------	----------	----------	----------
=7-Day Avg.	**NA**	**NA**	----------	----------	----------	----------
Monthly Summary						
Date	BOD (mg/L)	TSS (mg/L)	CBOD (mg/L)	Nitrates (mg/L)	Fecal (#/100mL)	Temp rec'd (°C)
Daily Max.	----------	----------	----------	----------	**130**	----------
Daily Min.	----------	----------	----------	----------	----------	----------
Max. 7-day Avg.	**35**	**62**	----------	----------	----------	----------
Month Total	**235**	**266**	**NR**	**NR**	----------	----------
÷ # of Samples	**6**	**6**	**0**	**0**	----------	----------
=30-Day Avg.	**39.17**	**44.33**	**NR**	**NR**	**Geo=42.16**	----------
Reported on DMR						
Date	BOD (mg/L)	TSS (mg/L)	CBOD (mg/L)	Nitrates (mg/L)	Fecal (#/100mL)	Temp rec'd (°C)
Daily Max.	----------	----------	----------	----------	130	----------
Daily Min.	----------	----------	----------	----------	----------	----------
Max. 7-day Avg.	78	65	----------	----------	----------	----------
30-Day Avg.	39.17	44.33	NA	NA	42.16	----------

Month of **July 2011**

Week 1 (June 26- July 2)						
Date	BOD (mg/L)	TSS (mg/L)	CBOD (mg/L)	Nitrates (mg/L)	Fecal (#/100mL)	Temp rec'd (°C)
6/29/2011	**78**	**65**	**NS**	**NS**	**130**	**4**
Week Total	**78**	**65**	----------	----------	----------	----------
÷ # of Samples	**1**	**1**	----------	----------	----------	----------
=7-Day Avg.	**78**	**65**	----------	----------	----------	----------
Monthly Summary						
Date	BOD (mg/L)	TSS (mg/L)	CBOD (mg/L)	Nitrates (mg/L)	Fecal (#/100mL)	Temp rec'd (°C)
Daily Max.	----------	----------	----------	----------	**NR**	----------
Daily Min.	----------	----------	----------	----------	----------	----------
Max. 7-day Avg.	**78**	**65**	----------	----------	----------	----------
Month Total	**NR**	**NR**	**NR**	**NR**	----------	----------
÷ # of Samples	**NR**	**NR**	**NR**	**NR**	----------	----------
=30-Day Avg.	**NR**	**NR**	**NR**	**NR**	**NR**	----------
Reported on DMR						
Date	BOD (mg/L)	TSS (mg/L)	CBOD (mg/L)	Nitrates (mg/L)	Fecal (#/100mL)	Temp rec'd (°C)
Daily Max.	----------	----------	----------	----------	ND	----------
Daily Min.	----------	----------	----------	----------	----------	----------
Max. 7-day Avg.	78	65	----------	----------	----------	----------
30-Day Avg.	ND	ND	ND	ND	ND	----------

Month of **October 2011**

Week 1(October 16-22)						
Date	BOD (mg/L)	TSS (mg/L)	CBOD (mg/L)	Nitrates (mg/L)	Fecal (#/100mL)	Temp rec'd (°C)
10/17/2011	**13**	**48**	**8**	**1.0**	**NR**	**5**
10/18/2011	**35**	**43**	**NS**	**NS**	**NR**	**8**
10/19/2011	**37**	**43**	**NS**	**NS**	**NR**	**8**
Week Total	**85**	**134**	----------	----------	----------	----------
÷ # of Samples	**3**	**3**	----------	----------	----------	----------
=7-Day Avg.	**28.33**	**44.67**	----------	----------	----------	----------
Monthly Summary						
Date	BOD (mg/L)	TSS (mg/L)	CBOD (mg/L)	Nitrates (mg/L)	Fecal (#/100mL)	Temp rec'd (°C)
Daily Max.	----------	----------	----------	----------	**NR**	----------
Daily Min.	----------	----------	----------	----------	---------	----------
Max. 7-day Avg.	**28.33**	**44.67**	----------	----------	---------	----------
Month Total	**85**	**134**	**8**	**1.0**	---------	----------
÷ # of Samples	**3**	**3**	**1**	**1**	---------	----------
=30-Day Avg.	**28.33**	**44.67**	**8**	**1.0**	**NR**	----------
Reported on DMR						
Date	BOD (mg/L)	TSS (mg/L)	CBOD (mg/L)	Nitrates (mg/L)	Fecal (#/100mL)	Temp rec'd (°C)
Daily Max.	----------	----------	----------	----------	NR	----------
Daily Min.	----------	----------	----------	----------	---------	----------
Max. 7-day Avg.	37	48	----------	----------	---------	----------
30-Day Avg.	28.33	44.67	8	NA	NR	----------

Month of **March 2012**

Week 1 (March 4-10)						
Date	BOD (mg/L)	TSS (mg/L)	CBOD (mg/L)	Nitrates (mg/L)	Fecal (#/100mL)	Temp rec'd (°C)
3/5/2012	**27**	**28**	**24**	**0.4**	**NR**	**6**
3/6/2012	**22**	**23**	**NS**	**NS**	**NR**	**6**
3/7/2012	**26**	**33**	**NS**	**NS**	**NR**	**5**
Week Total	**75**	**84**	----------	----------	----------	----------
÷ # of Samples	**3**	**3**	----------	----------	----------	----------
=7-Day Avg.	**25**	**28**	----------	----------	----------	----------
Monthly Summary						
Date	BOD (mg/L)	TSS (mg/L)	CBOD (mg/L)	Nitrates (mg/L)	Fecal (#/100mL)	Temp rec'd (°C)
Daily Max.	----------	----------	----------	----------	**NR**	----------
Daily Min.	----------	----------	----------	----------	---------	----------
Max. 7-day Avg.	**25**	**28**	----------	----------	---------	----------
Month Total	**75**	**84**	**24**	**0.4**	---------	----------
÷ # of Samples	**3**	**3**	**1**	**1**	---------	----------
=30-Day Avg.	**25**	**28**	**24**	**0.4**	**NR**	----------
Reported on DMR						
Date	BOD (mg/L)	TSS (mg/L)	CBOD (mg/L)	Nitrates (mg/L)	Fecal (#/100mL)	Temp rec'd (°C)
Daily Max.	----------	----------	----------	----------	NR	----------
Daily Min.	----------	----------	----------	----------	---------	----------
Max. 7-day Avg.	27	33	----------	----------	---------	----------
30-Day Avg.	25	28	NA	NA	NR	----------

Attachment 2- SSO Sampling Results

Upstream Results

PUBLIC WORKS

CITY OF SIOUX FALLS

AN EQUAL OPPORTUNITY EMPLOYER

Water Reclamation Laboratory
4500 North Sycamore Avenue • Sioux Falls, SD 57104-6407 • (605) 367-8188 • FAX (605) 367-8484

Report Number
10-10-002

REPORT OF ANALYSIS

Mail to: City of Brandon
304 Main Avenue
Brandon, SD 57005

Attn: Rollie Hoeke

Date Reported: 10/1/2010
Date Received: 9/24/2010

Purpose: Sanitary Sewer Overflow

Sample Point: City of Brandon
Receiving Stream, upstream of SSO

Sample ID	Parameter	Level Found	Units	Method Detection Limit	Units	Method	Analyst/Date
1009241645	Biochemical Oxygen Demand (BOD_5)	8.0	mg/L	0.1	mg/L	SM 5210 B	KK/9-25-10
	Total Suspended Solids (TSS)	84	mg/l	0.1	mg/L	SM 2540 D	KK/9-25-10
	pH	7.4	SU	NA		EPA 150.1	KK/9-25-10
	Fecal Coliforms	10,700	per 100mL	714	per 100mL	SM 9222 D	CB/9-24-10
	Ammonia Nitrogen (electrode)	0.11	mg/L	0.01	mg/L	SM 4500-NH3 F	KK/9-25-10

The method prefix "SM" refers to the 18th edition of Standard Methods for the Examination of Water and Wastewater.

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OCT 05 2010
STORMWATER PROGRAM

Submitted by:

Curt Brynjulson
Chemist

SSO-Outfall Results

PUBLIC WORKS

CITY OF SIOUX FALLS

AN EQUAL OPPORTUNITY EMPLOYER

Water Reclamation Laboratory
4500 North Sycamore Avenue • Sioux Falls, SD 57104-6487 • (605) 367-8188 • FAX (605) 367-8484

Report Number
10-10-001

REPORT OF ANALYSIS

Mail to: City of Brandon
304 Main Avenue
Brandon, SD 57005

Attn: Rollie Hoeke

Date Reported: 10/1/2010
Date Received: 9/24/2010

Purpose: Sanitary Sewer Overflow

Sample Point: City of Brandon
SSO Source

Sample ID	Parameter	Level Found	Units	Method Detection Limit	Units	Method	Analyst/Date
1009241641	Biochemical Oxygen Demand (BOD_5)	29.3	mg/L	0.1	mg/L	SM 5210 B	KK/9-25-10
	Total Suspended Solids (TSS)	256	mg/l	0.1	mg/L	SM 2540 D	KK/9-25-10
	pH	7.5	SU	NA		EPA 150.1	KK/9-25-10
	Fecal Coliforms	647,000	per 100mL	2,270	per 100mL	SM 9222 D	CB/9-24-10
	Ammonia Nitrogen (electrode)	1.74	mg/L	0.01	mg/L	SM 4500-NH3 F	KK/9-25-10

The method prefix "SM" refers to the 18th edition of Standard Methods for the Examination of Water and Wastewater.

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SURFACE WATER PROGRAM

Submitted by:

Curt Brynjulson
Chemist

Downstream Results

PUBLIC WORKS

CITY OF SIOUX FALLS
AN EQUAL OPPORTUNITY EMPLOYER
Water Reclamation Laboratory
4500 North Sycamore Avenue • Sioux Falls, SD 57104-6407 • (605) 367-8188 • FAX (605) 367-8484

Report Number
10-10-003

REPORT OF ANALYSIS

Mail to: City of Brandon
304 Main Avenue
Brandon, SD 57005

Attn: Rollie Hoeke

Date Reported: 10/1/2010
Date Received: 9/24/2010

Purpose: Sanitary Sewer Overflow

Sample Point: City of Brandon
Receiving Stream, downstream of SSO

Sample ID	Parameter	Level Found	Units	Method Detection Limit	Units	Method	Analyst/Date
1009241646	Biochemical Oxygen Demand (BOD_5)	5.1	mg/L	0.1	mg/L	SM 5210 B	KK/9-25-10
	Total Suspended Solids (TSS)	202	mg/l	0.1	mg/L	SM 2540 D	KK/9-25-10
	pH	7.8	SU	NA		EPA 150.1	KK/9-25-10
	Fecal Coliforms	10,000	per 100mL	714	per 100mL	SM 9222 D	CB/9-24-10
	Ammonia Nitrogen (electrode)	0.11	mg/L	0.01	mg/L	SM 4500-NH3 F	KK/9-25-10

The method prefix "SM" refers to the 18th edition of Standard Methods for the Examination of Water and Wastewater.

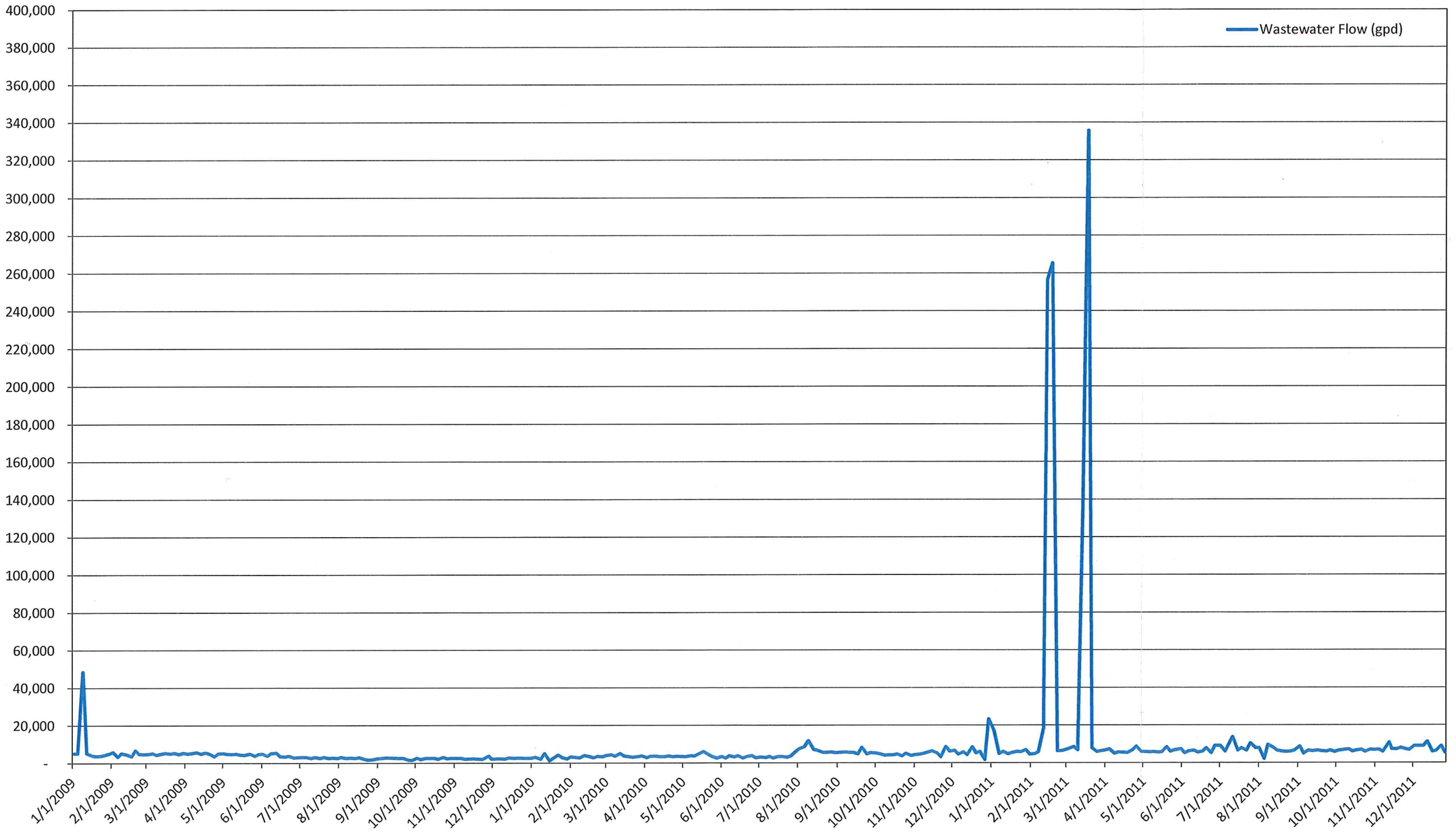
RECEIVED
OCT 25 2010
SURFACE WATER PROGRAM

Submitted by:

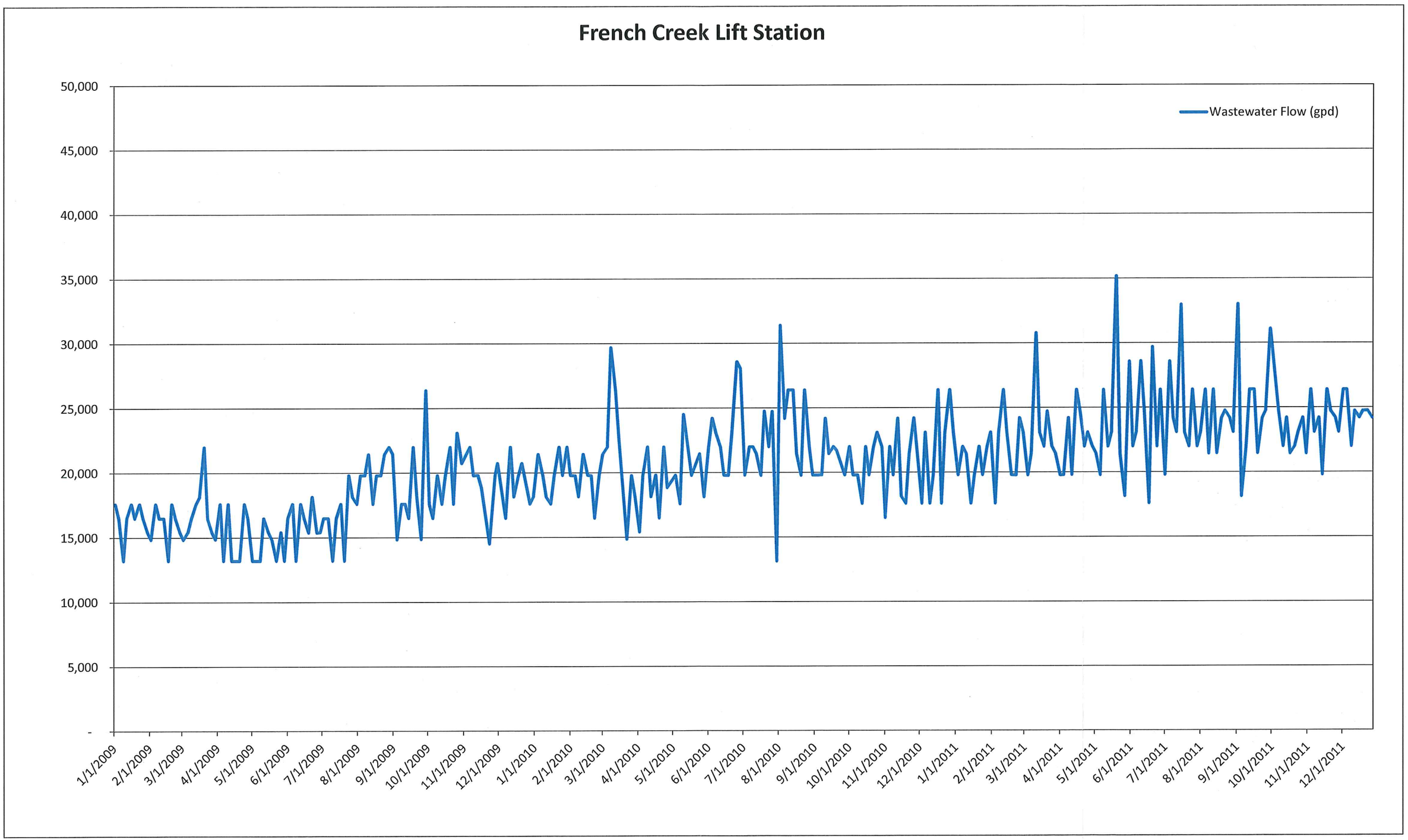
Curt Brynjulson
Chemist

Appendix C
Lift Station Records

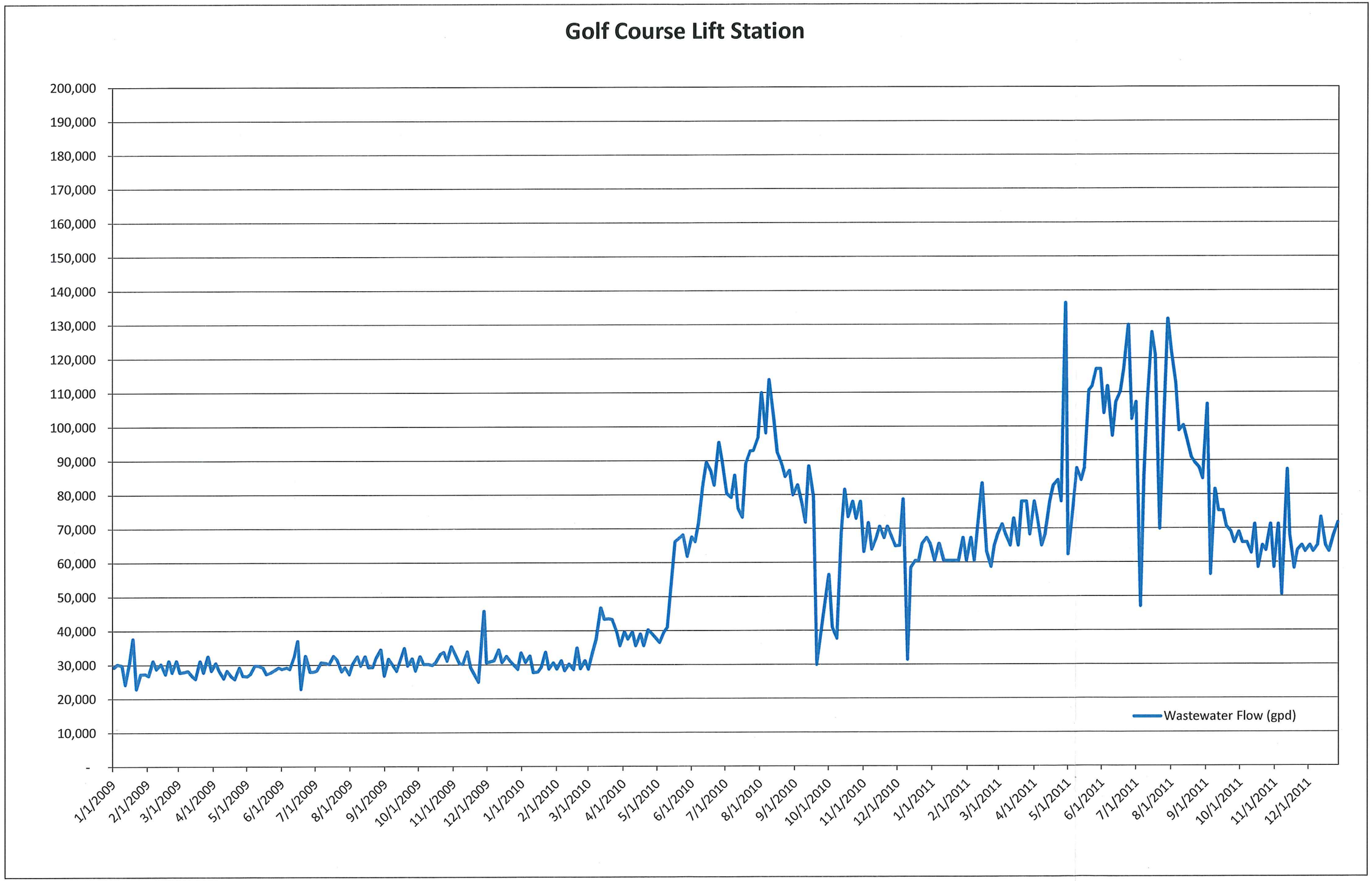
Bethany Lift Station



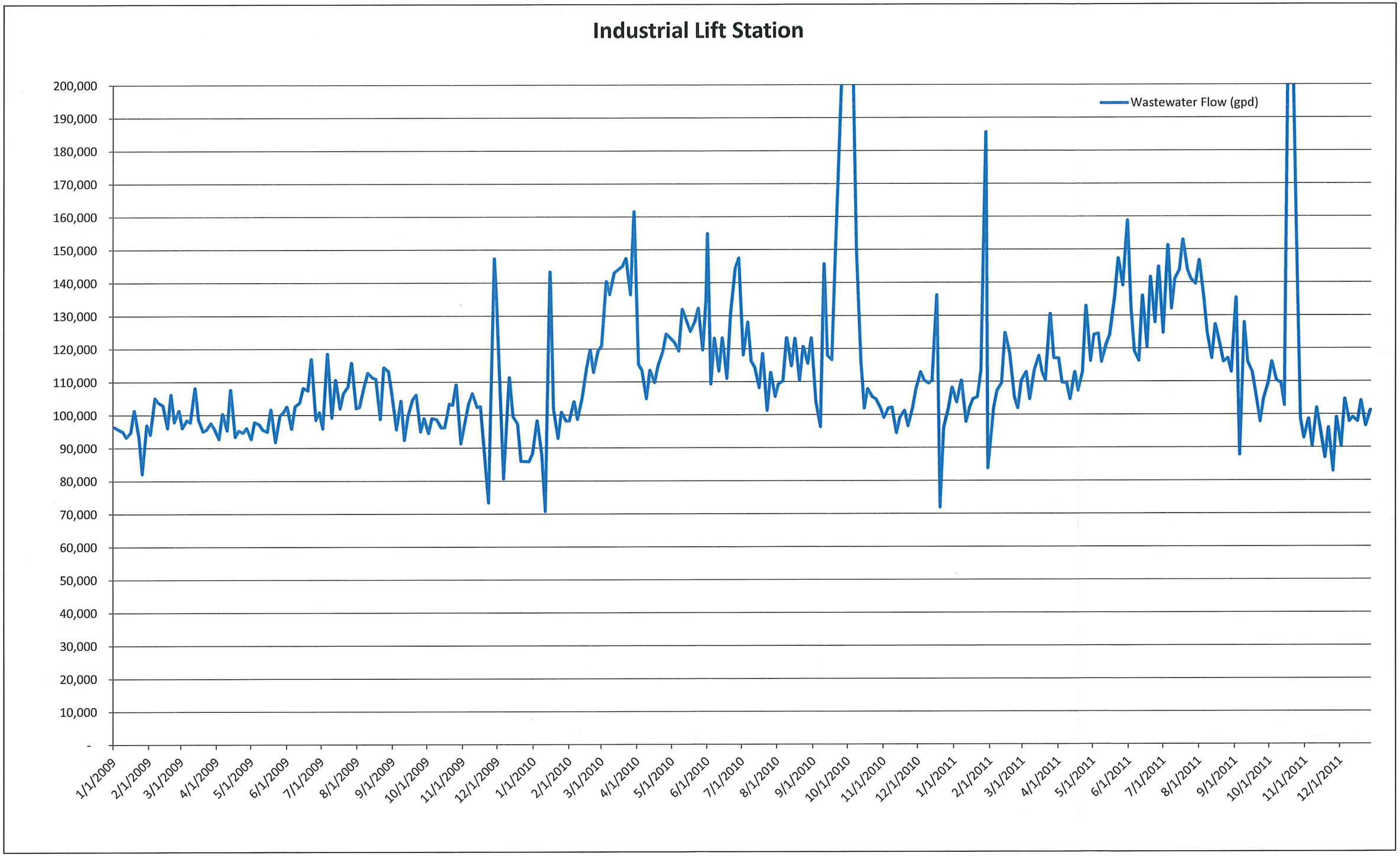
French Creek Lift Station



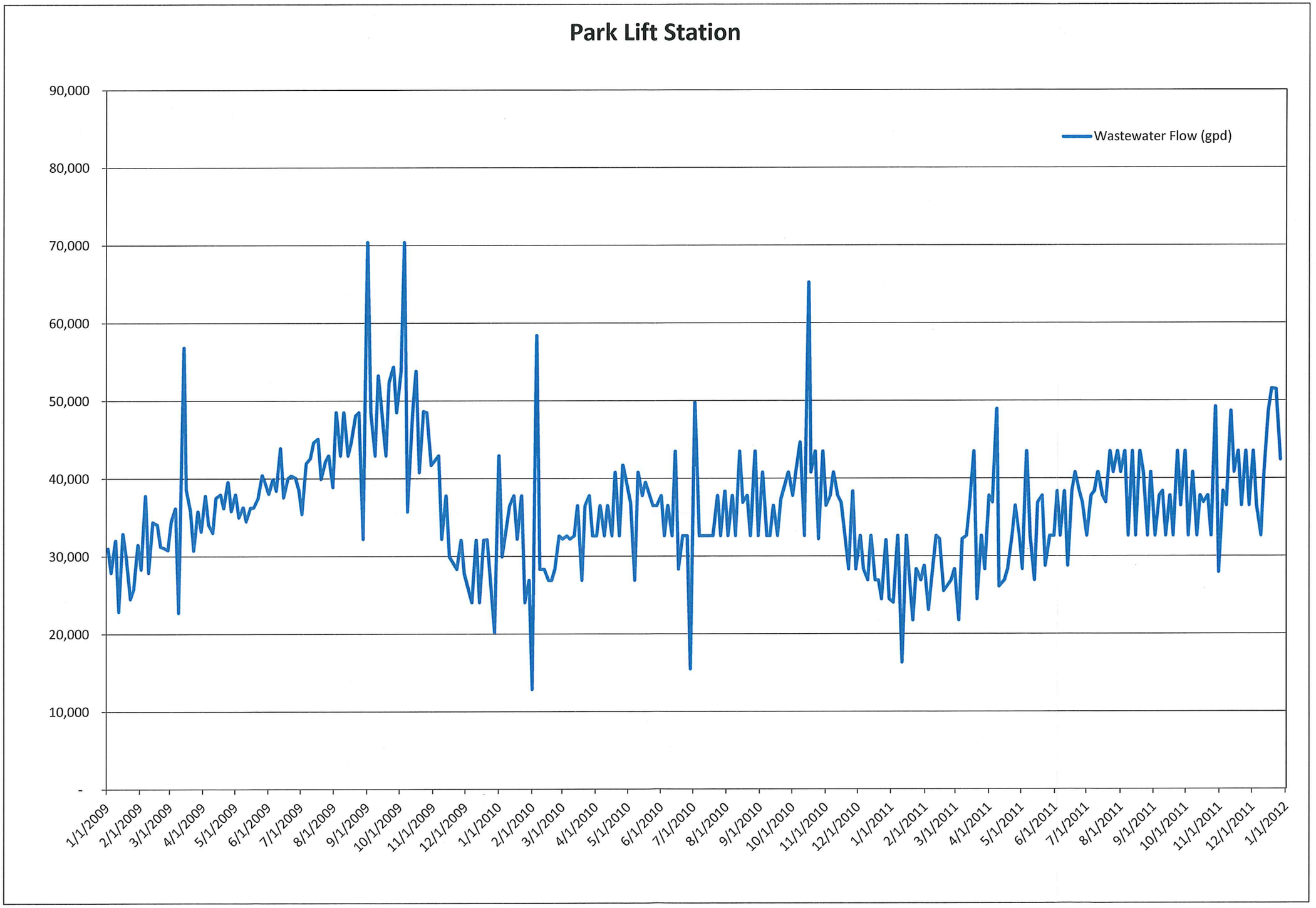
Golf Course Lift Station



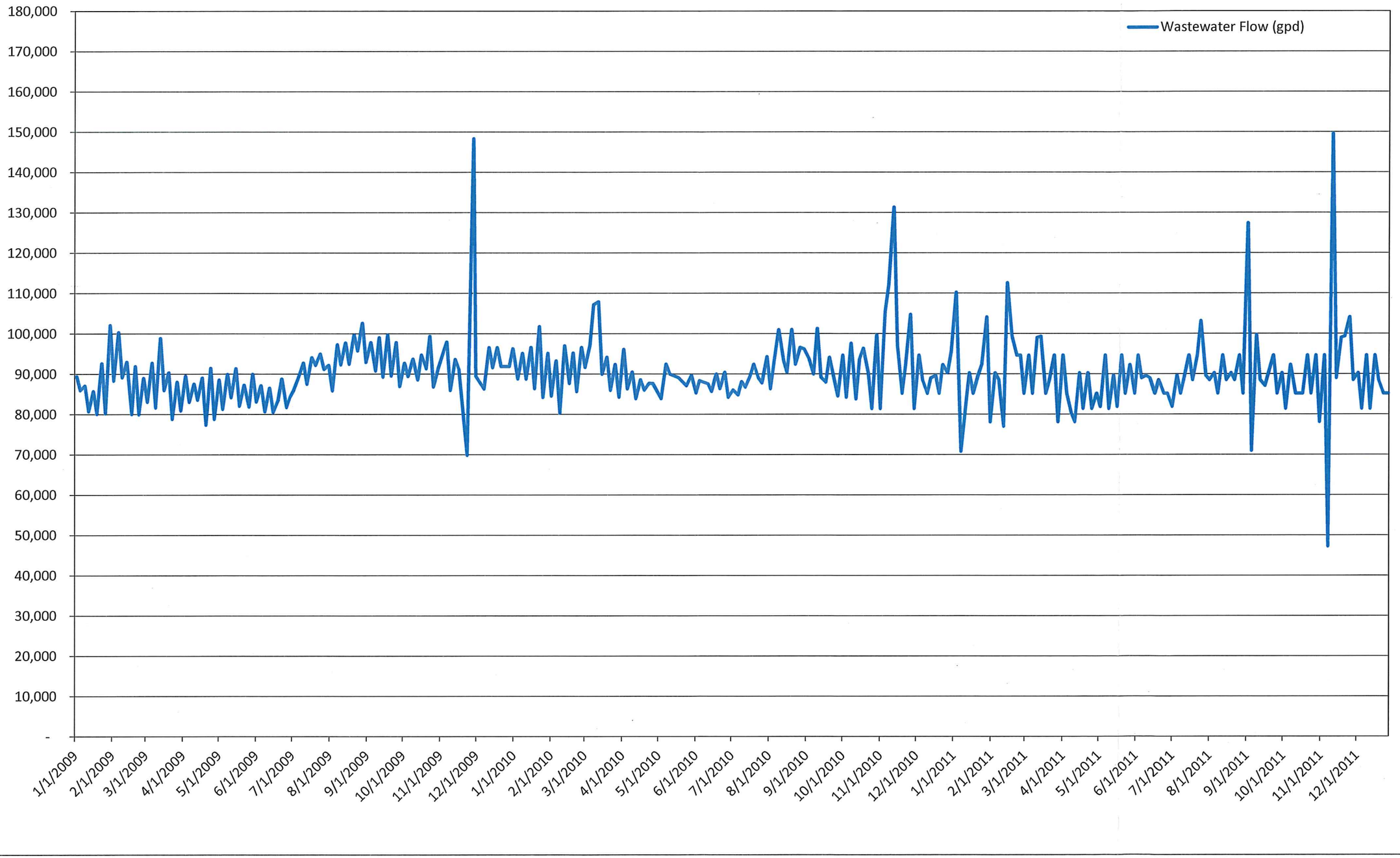
Industrial Lift Station



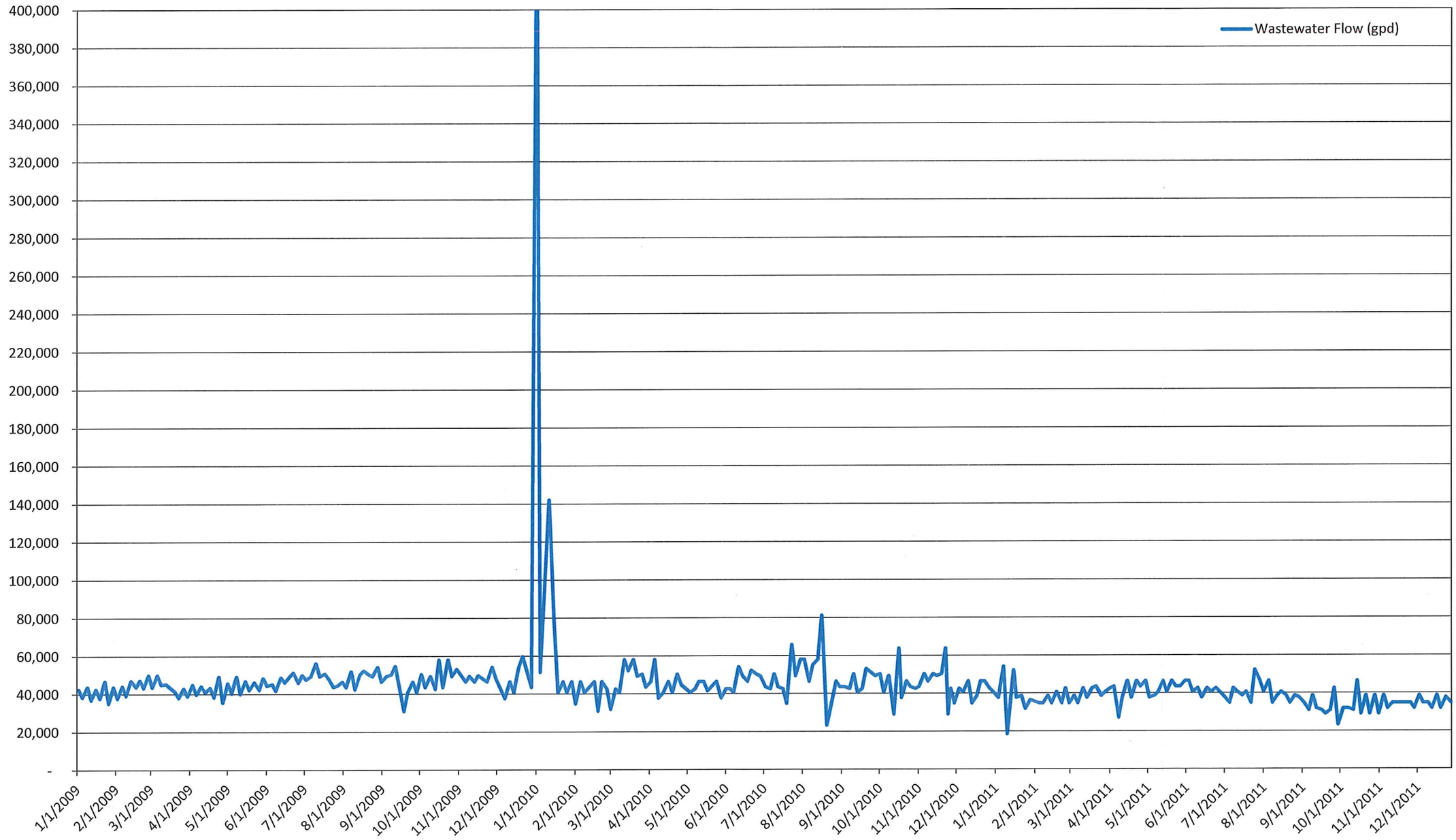
Park Lift Station



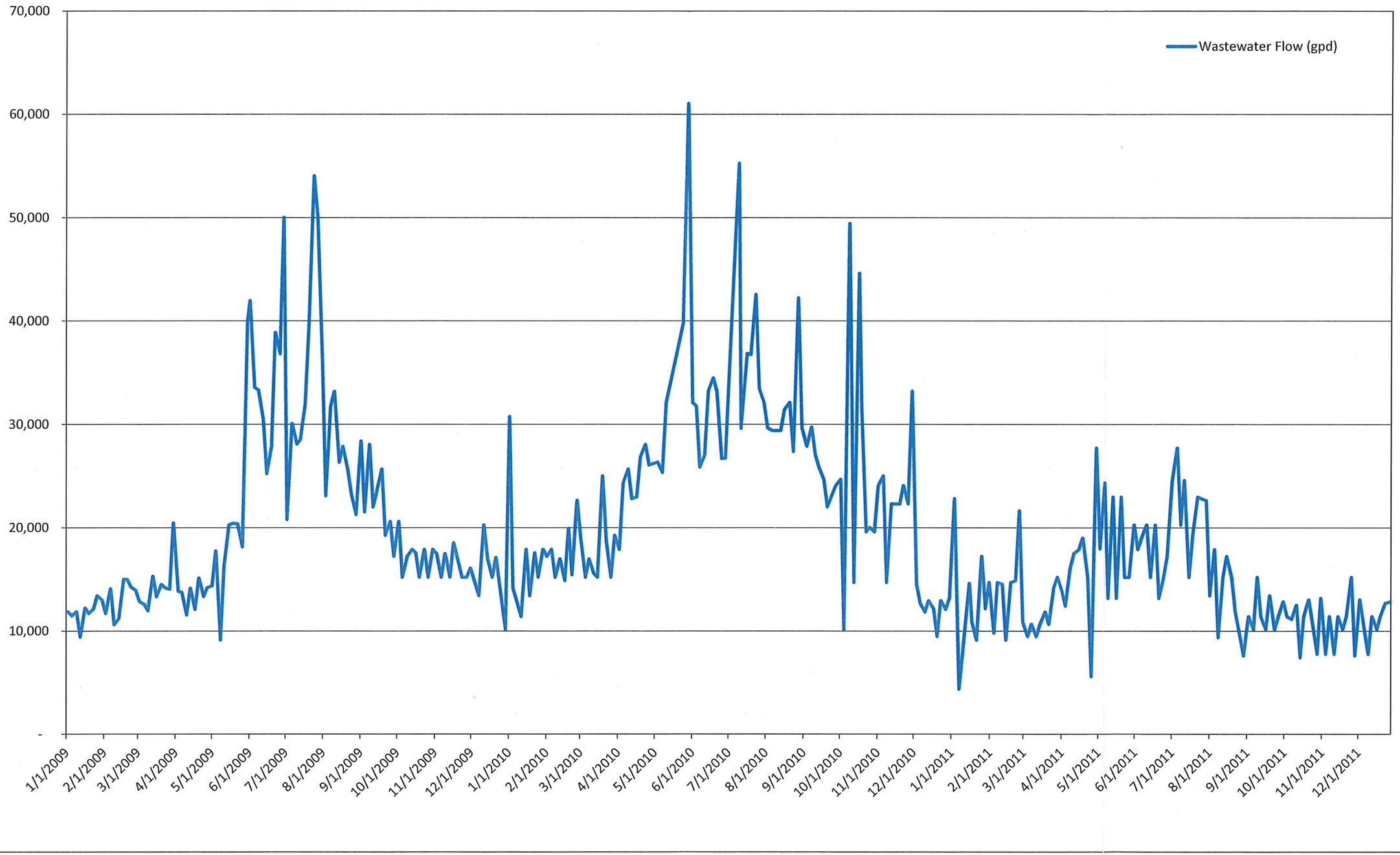
Pioneer Lift Station



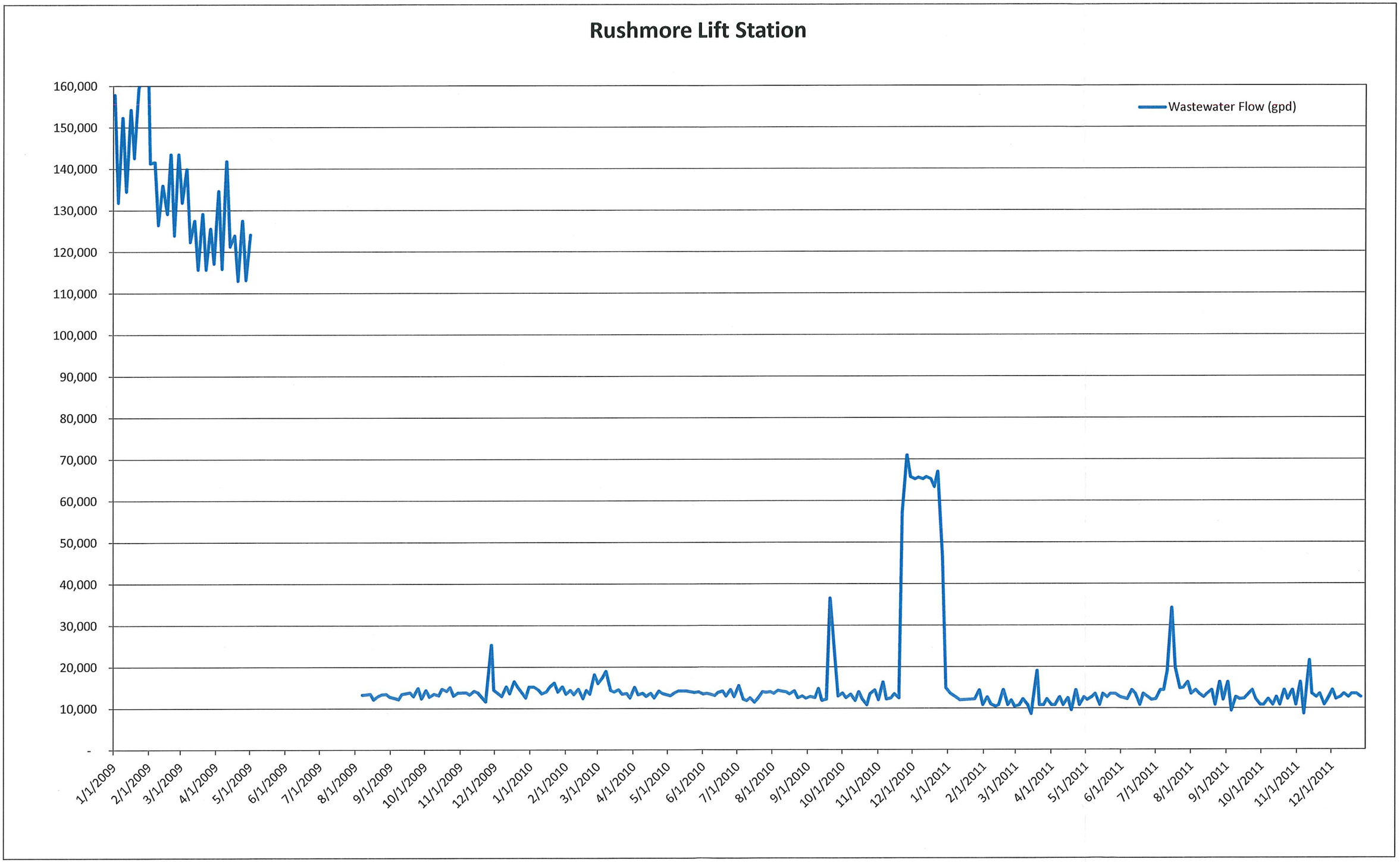
Ponderosa Lift Station



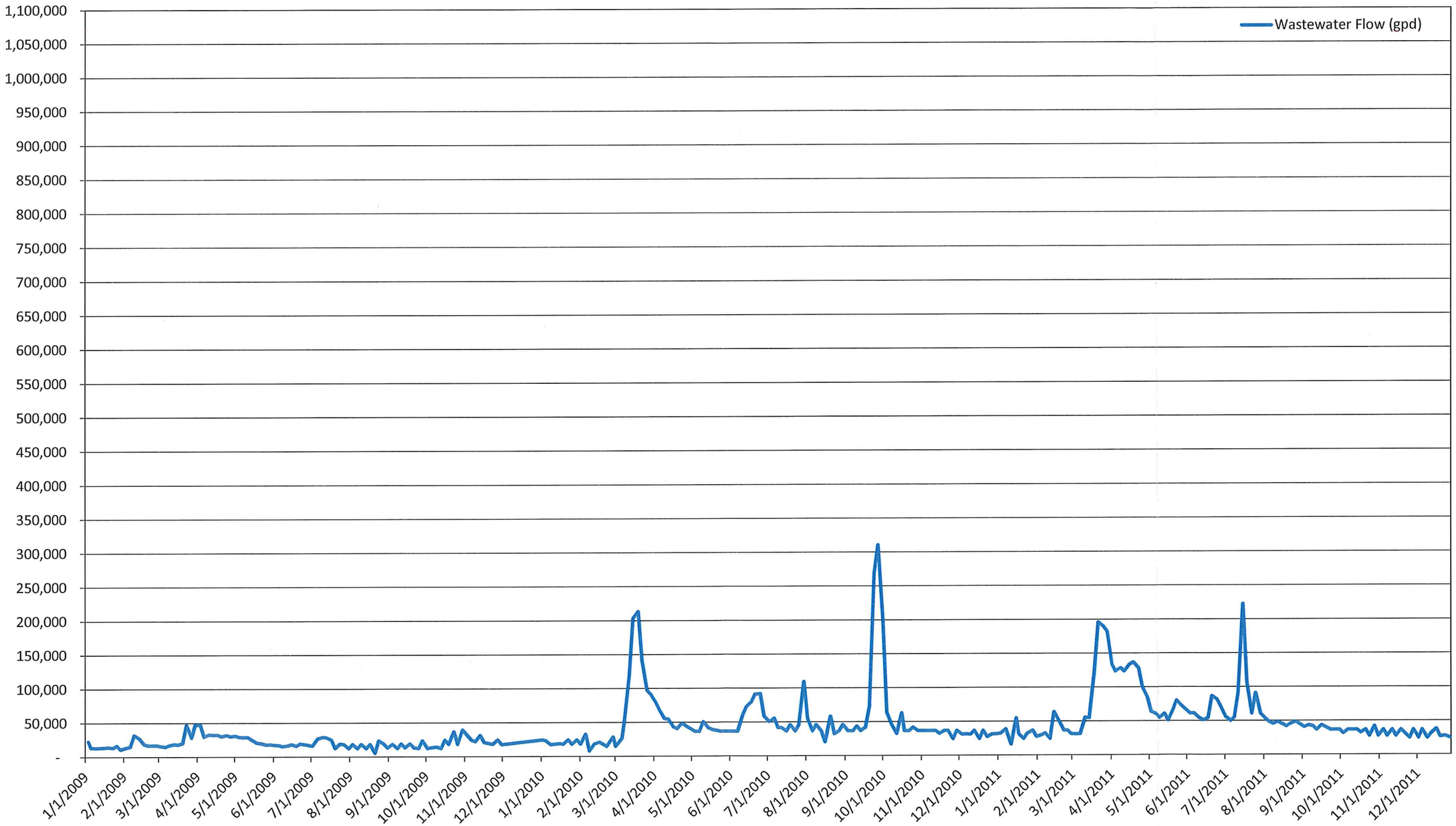
Pool Lift Station



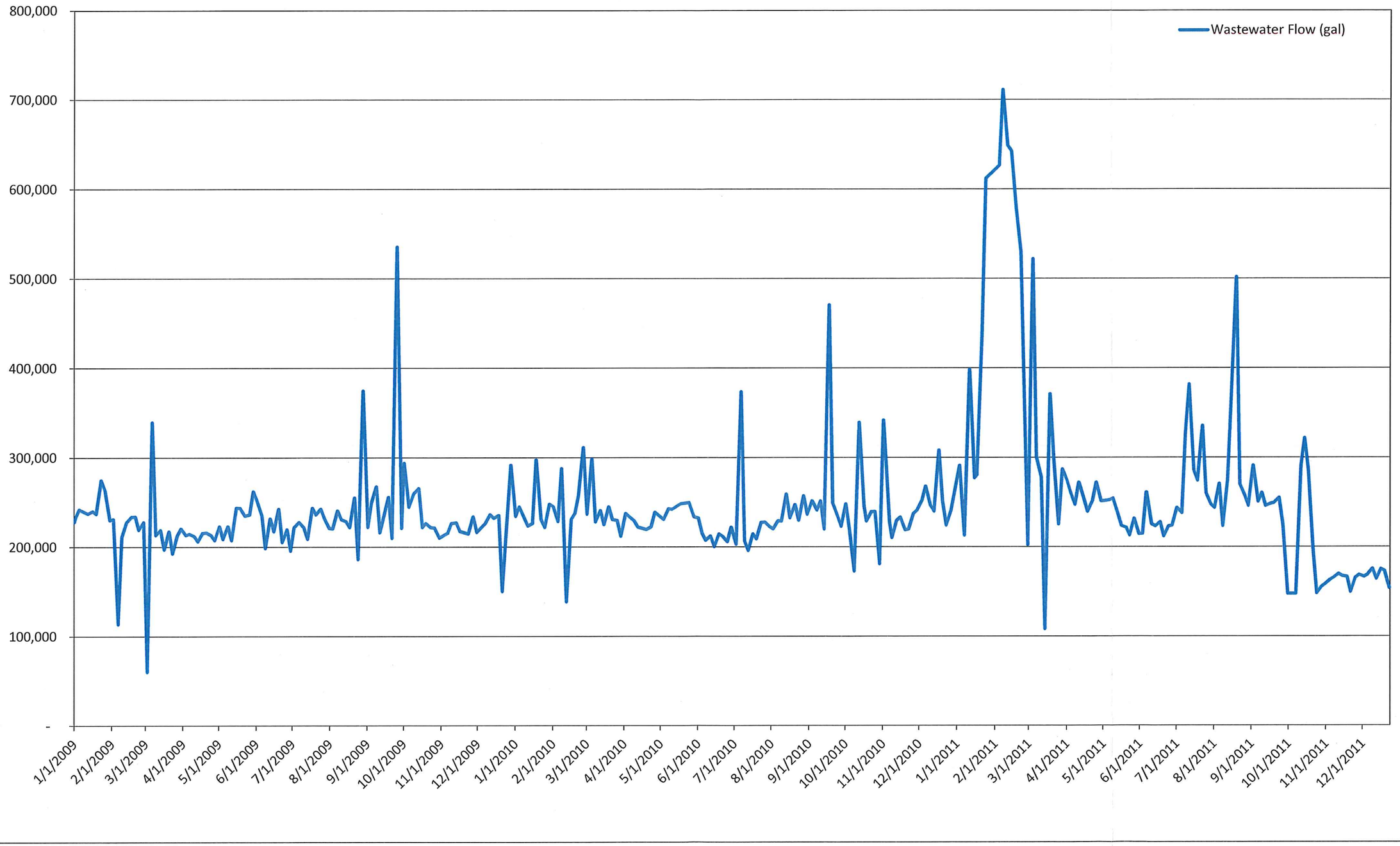
Rushmore Lift Station



West Side Lift Station



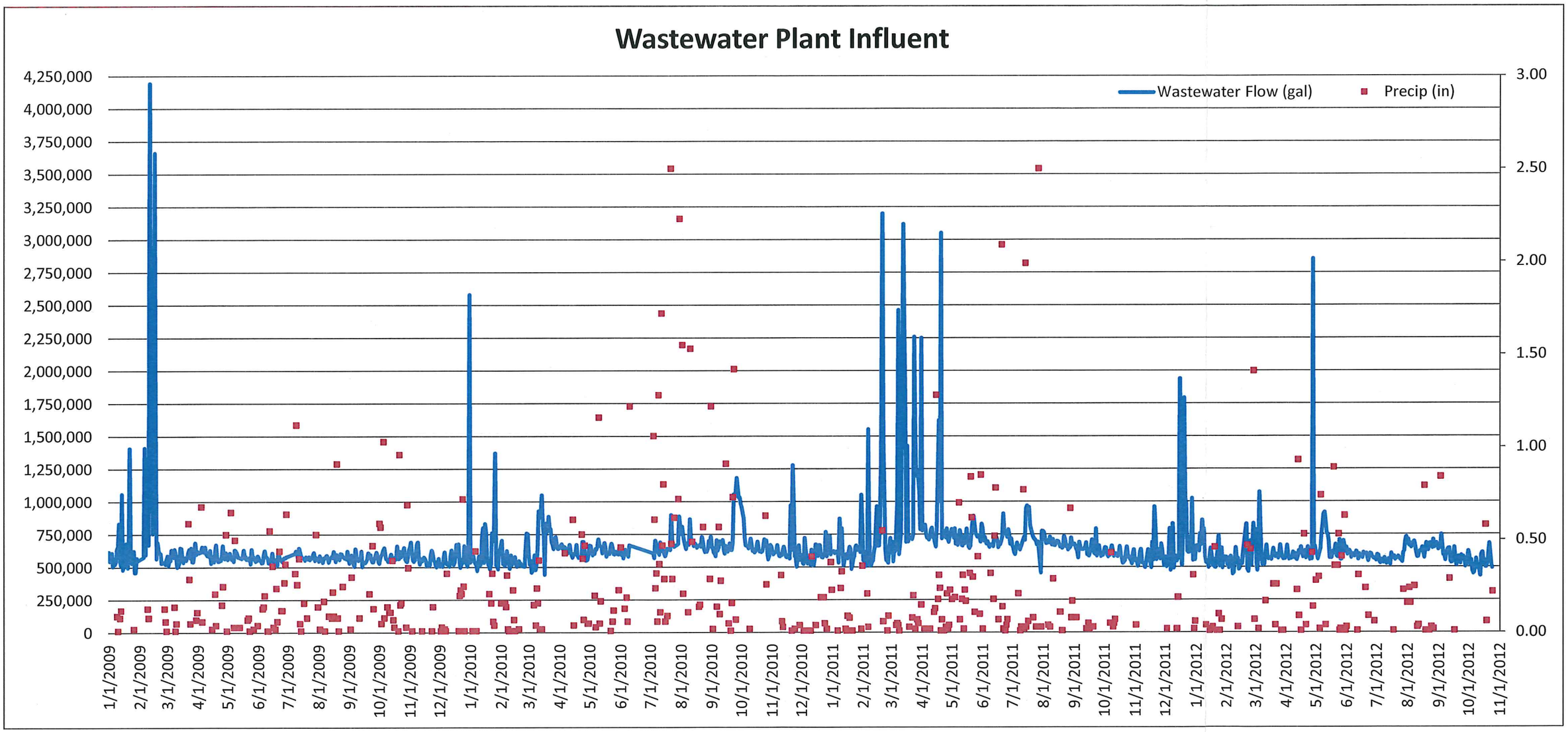
Wyams Lift Station



Appendix D
Wastewater Treatment Influent Records

600 N. Main Ave, Suite 100
Sioux Falls, SD 57104
Ph. (605) 338-6668
Fax. (605) 338-8750
www.stockwellengineers.com

Wastewater Plant Influent



Appendix E
Comprehensive Plan

BRANDON

Comprehensive Plan 2007 - 2027

Prepared by the South Eastern Council of Governments at the direction of the Planning and Zoning Commission and City Council of Brandon, South Dakota

ACKNOWLEDGMENTS

This Comprehensive Plan is a compilation of effort by many people, organizations and government entities. This document expresses the great civic pride that exists in the City of Brandon. Through the preparation and adoption of this document, the governing officials of Brandon have expressed their desire for orderly and efficient growth and development in the community and surrounding area.

City Council

Mayor: Larry Beesley

Council Members: Harry Buck, Don Hammond, Brett Karber, Dan Mostek, Steven Rubin, John Saarloos

City Administrator: Dennis E. Olson

Planning and Zoning Commission

Chairman: Chuck Parsons

Board Members: Paul Bosch, Jon Jacobson, Tim Jorgenson, Marvin Peterson, Linda Weber

The South Eastern Council of Governments prepared this document under the direction of the Brandon Planning and Zoning Commission and Brandon City Council.

RESOLUTION NO. _____

A RESOLUTION ADOPTING A COMPREHENSIVE PLAN FOR CITY OF BRANDON, AS PROVIDED FOR IN SDCL 11-6.

Whereas, Chapter 11-6-14 of South Dakota Codified Law has empowered the Planning Commission and City Council of Brandon to prepare a Comprehensive Plan for the development of the City and the surrounding area; and

Whereas, the Brandon Planning Commission has developed a Comprehensive Plan for the years 2007 - 2027, has held the required Public Hearing, and has made a recommendation for adoption of the Plan to the City Council; and

Whereas, the Brandon City Council has received the recommendation of the Planning Commission and has held the required Public Hearing; and

Whereas, the adoption of the Comprehensive Plan would enhance the responsible development of Brandon and the surrounding area.

Now therefore, be it resolved by Brandon City Council, that the Comprehensive Plan for the City of Brandon for the years 2007 through 2027 be hereby adopted and effective upon 20 days after publication of this resolution.

Adopted this _____ day of _____, 2007.

_____
Signed: Larry Beesley
Mayor, City of Brandon

ATTEST:

_____
Dennis Olson
City Administrator, City of Brandon

Publication Date: _____

Effective Date: _____

I. INTRODUCTION

A. PURPOSE, AUTHORIZATION AND ADOPTION

1. PURPOSE OF THE COMPREHENSIVE PLAN

There are three primary purposes of this document:

(1) To address the planning requirements of state law while also providing a sound and logical basis for city growth management strategies; and

(2) To provide some predictability about the potential land uses and timing of development so that both public and private sectors can make informed decisions in the area of real estate and capital investments.

(3) To provide the Planning Commission and City Council with policies for future planning decisions and the methods and justification to control land use through the zoning and subdivision ordinance, the capital improvements program, and other enforcement controls.

2. AUTHORIZATION UNDER STATE LAW

Under 11-6-14 of South Dakota Codified Laws, the planning commission of a municipality is directed to *"propose a plan for the physical development of the municipality...[to] include the general location, character, layout and extent of community centers and neighborhood units..."*

3. DEVELOPMENT AND ADOPTION

The Brandon City Council has adopted this document in accordance with state law. In developing this Comprehensive Plan, the Brandon Planning Commission has used background research, detailed inventories and assessments, and discussion sessions at Planning Commission and City Council meetings and public hearings. It is intended to guide the City in its implementation of zoning regulations, subdivision regulations, capital improvements plans and other related policies.

4. AREA OF PLANNING JURISDICTION

The City of Brandon shall, under South Dakota statutes, have the authority to control development within the corporate limits of Brandon.

B. COMMUNITY INPUT

As a part of the comprehensive plan process, the Brandon Planning and Zoning Commission requested community input on a variety of topics over several comprehensive planning meetings. The community input serves as one source of baseline information to help form the comprehensive plan goals, policies and objectives. A list of community strengths and weaknesses was formulated from these meetings.

<u>Strengths</u>

1. The school system is of good quality.
2. The close proximity to Sioux Falls has allowed major residential and modest industrial growth to occur.
3. The Interstate Highway system is an asset for growth - especially I-90.
4. The Sioux Falls Regional Airport is an asset for Brandon and entire region.
5. The Burlington Northern Santa Fe Railroad is an asset for industrial growth.
6. A strong water and sewer capacity is capable of handling growth well into the future.
7. Developers have been very competent and provided a good mix of quality and affordable single-family housing.
8. The community has enjoyed residential growth and maintained a small town atmosphere. However,

continued growth is welcomed.
9. Citizens have an easy time commuting to work.
10. The business community cooperates with each other.
11. Workable and active chamber.
12. The industrial and manufacturing base of the community is fairly diverse and clean.
13. The recreation system and facilities are of good quality.
14. The city government is progressive and efficient.
15. The region has a cooperative attitude.

Weaknesses

1. Physical constraints for growth - Big Sioux River and Split Rock Creek.
2. Losing out to retail and commercial areas because of Sioux Falls.
3. Corson as an existing subdivision and the conflict with existing and potential industrial development.
4. Very few small retailer establishments.
5. Lack of a typical Main Street - no place to focus retail and commercial business.
6. No low to moderate income housing which could create a labor shortage.
7. Truck traffic on State Highway 11 and Madison Street going east of town - truckers are avoiding scales.
8. Many pedestrian and car/truck traffic conflicts - especially on State Highway 11 and 264.

II. DEMOGRAPHIC DATA

A. DEMOGRAPHIC CONDITIONS

The population of Brandon steadily increased from 1980 to 2000. Between 1990 and 2000, the population increased by 60.59%. The population growth is the result of natural increase and net in-migration. There is a natural increase when the number of births exceeds the number of deaths. A net in-migration occurs when the number of people moving into the community is larger than the number leaving.

As can be seen in Table 2, the median household income (1999 dollars) is higher than the Minnehaha County and State of South Dakota average. The median household income has a correlation to the purchasing power of a household.

The City of Brandon has one of the lowest median ages in the state. Brandon's recent growth is attributable to many young families moving to town over the past 20 years. However, the elderly population (65 and over) did increase by 2% between 1990 and 2000. This indicates as does Table 3 that the population is diversifying and will gradually become older.

Table 1. Population History *(Source: U.S. Census Bureau)*

	Population	% Increase/Decrease
1980	2,589	
1990	3,545	+ 36.92%
2000	5,693	+ 60.59%

Table 2. Current Demographic Statistics *(Source: U.S. Census Bureau)*

	Brandon	Minnehaha County	South Dakota
1990 Pop	3,545	123,809	696,004
2000 Pop	5,693	148,281	754,844
1990 – 2000 % Change	+ 60.59%	+ 19.76%	+ 8.45%
2000 Median Age	31.3	33.5	35.6
Median Household Income in 1999 (dollars)	$58,421	$42,566	$35,282

Table 3. Population by Age *(Source: U.S. Census Bureau)*

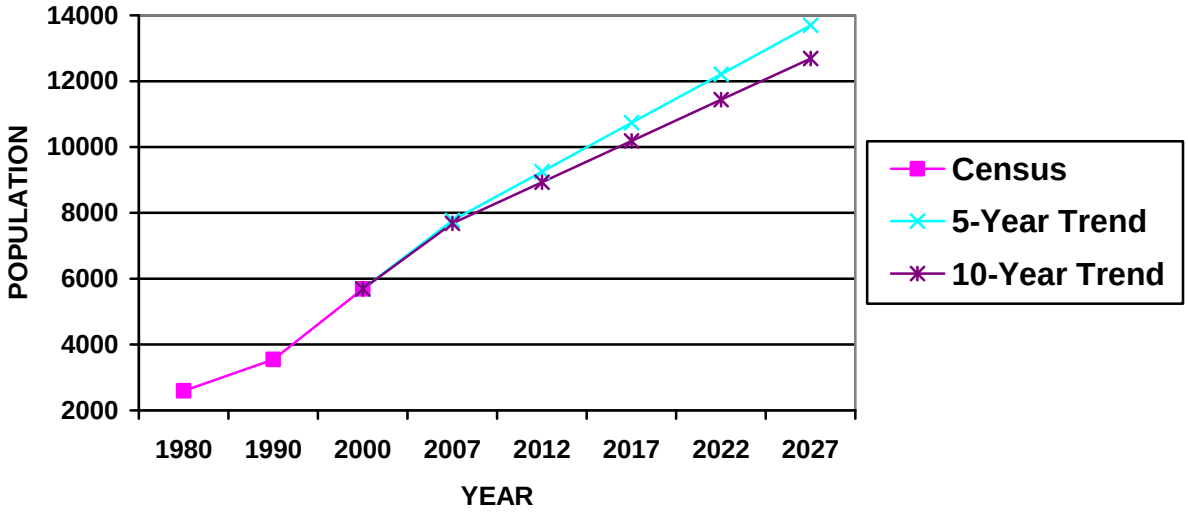
	Under 18	18-44	45-64	65 & Over	Total
1990	1,359	1,483	539	164	3,545
2000	1,962	2,361	981	389	5,693

B. POPULATION PROJECTIONS

Based upon current trends, a population projection through the study period indicates that the City of Brandon will have a population between 12,686 and 13,700 by the year 2027. The 5-year population trend concludes a population of 13,700, while the 10-year population trend concludes a population of 12,686. For purposes of land-use planning, the upper end of the population trend was utilized to ensure adequate land was reserved and planned for future development.

Table 4. Population Projections City of Brandon

	1980	1990	2000	**2007**	**2012**	**2017**	**2022**	**2027**
5-Year Trend	2,589	3,545	5,693	**7,768**	**9,251**	**10,734**	**12,217**	**13,700**
10-Year Trend	2,589	3,545	5,693	**7,676**	**8,929**	**10,181**	**11,434**	**12,686**



III. ENVIRONMENTAL CONSTRAINTS

A. PHYSICAL GEOGRAPHY

Brandon is located in southeastern South Dakota. The City is mostly situated between the Big Sioux River and Split Rock Creek. The landscape is primarily flat with some steep slopes near the rivers. The elevation ranges from 1,400 feet in the eastern section of the City to 1,300 feet along the rivers.

B. FLOOD HAZARDS

The City of Brandon has three major flood hazards within its area:

1. The Big Sioux River – within western boundary.
2. Split Rock Creek - within eastern Brandon.
3. Beaver Creek - south and east of Brandon.

The Federal Emergency Management Agency (FEMA) has classified a significant area adjacent to the rivers as having special flood hazard areas. All three rivers converge south of Brandon. (See **Map 1**)

C. DRAINAGE AND WETLANDS

Several small wetlands and potholes are found in the eastern sections of the City's growth areas, with the large majority being temporary in nature. Wetlands and water bodies are designated from base maps developed through the National Wetlands Inventory and other data sources. These natural resources provide a number of functions which are important to the health and welfare of the community. They provide storage for storm water, help to control flooding, provide wildlife habitat, improve water quality, and they provide recreational opportunities. (See **Map 1**)

Drainage in Brandon primarily occurs naturally. All developments either drain down street gutters or are directed by concrete drainage ways to major drainage points.

D. SOILS

While the soils in the Brandon planning area are excellent for agricultural purposes, their engineering properties present some limitations for urban development. Soil types found in many areas have severe limitations for various aspects of development including roads, streets, and dwellings with basements. These limitations are largely due to the following characteristics:

1. high clay and high water table
2. hydric soil
3. high flooding potential
4. shrink-swell
5. shallow depth to rock
6. gravel and sand pits
7. steep slopes

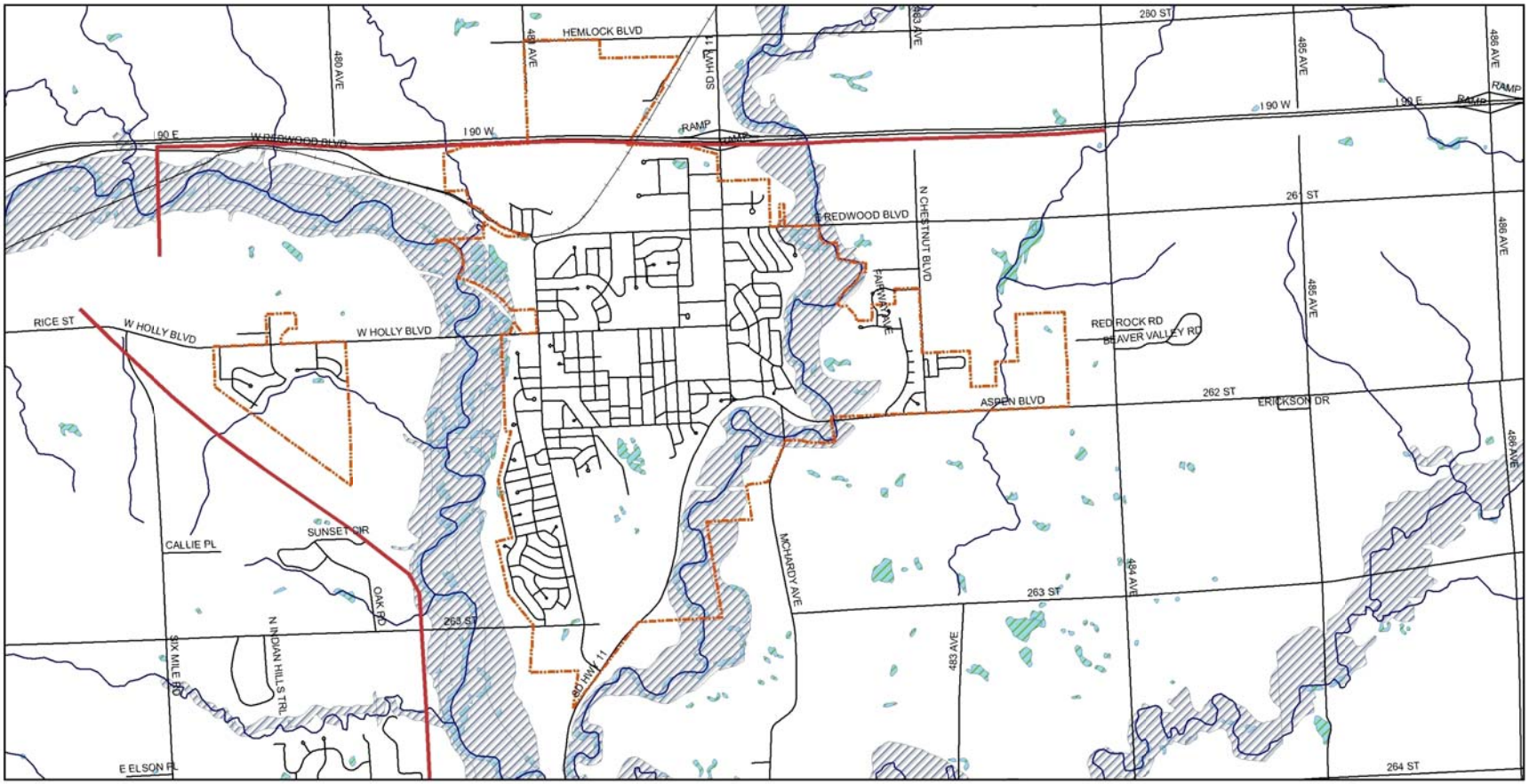
While these limitations do not rule out development, they do require compensating construction techniques and soil modification. The severe soil development limitations of the Brandon area are shown on **Map 2**.

E. ADDITIONAL ENVIRONMENTAL CONSTRAINTS

The following Xcel main electrical power lines are indicated on **Map 1**.

*running along south side of I-90

*running diagonally through western growth area



Legend

- 100 - Year Flood Plain
- Wetlands
- Powerlines
- Roads
- Rail
- City Limits

Map 1

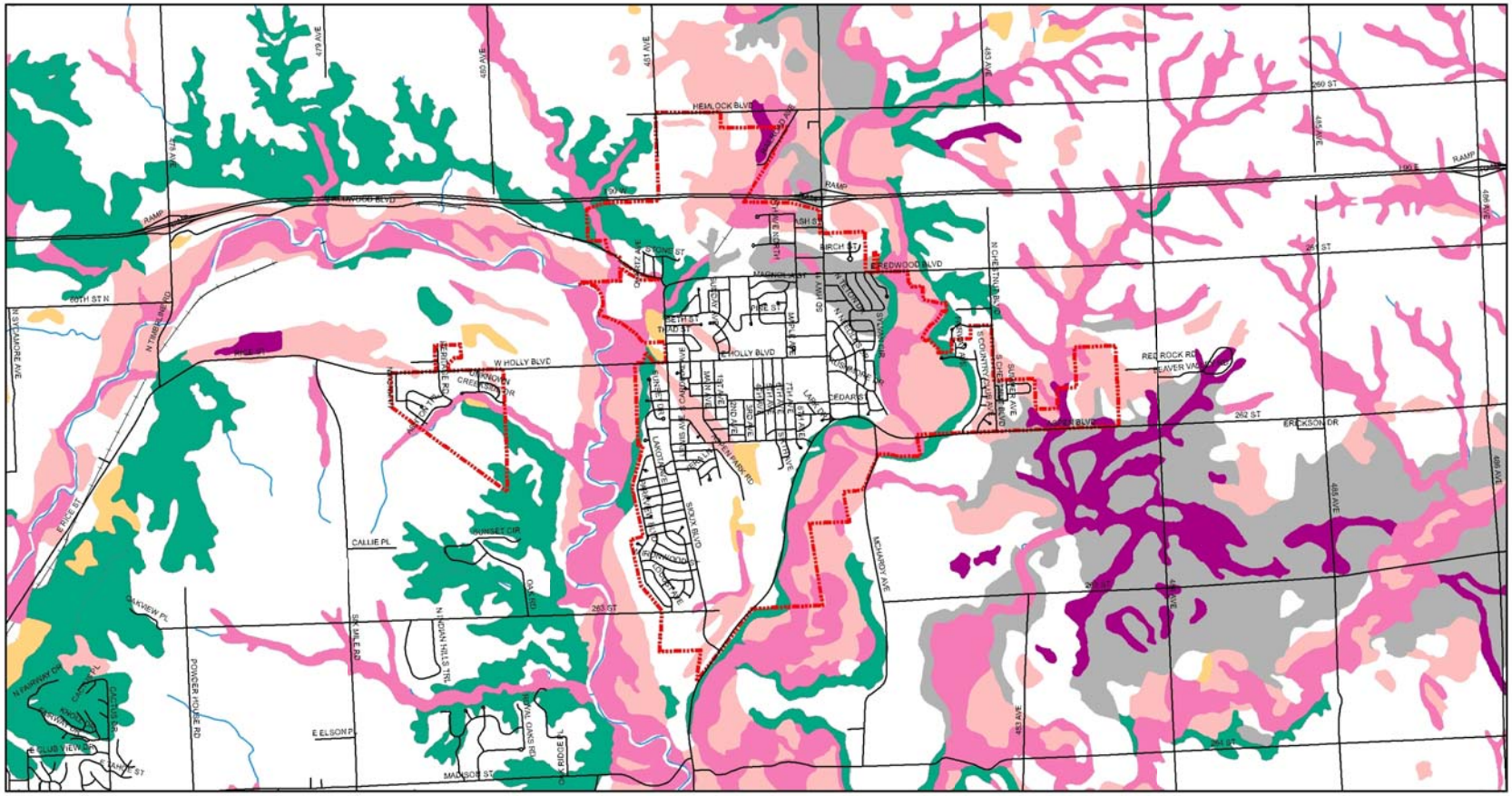
ENVIRONMENTAL CONSTRAINTS

City of Brandon

0 0.15 0.3 0.6 Miles

This information has been secured from sources we believe to be reliable, however, we do not guarantee the accuracy of the information contained herein. This map does not eliminate the need for an onsite investigation.

This map was compiled by South Eastern Council of Governments


Legend
Gravel/Sand Pits
High Clay & High Water Table
High Flooding Potential
Hydric
Shallow Depth To Rock
Shrink Swell
Steep Slope
Creeks, Rivers & Lakes
Roads
Rail
City Limits
Map 2
SOIL CONSTRAINTS
City of Brandon
0 0.2 0.4 0.8 Miles
This information has been secured from sources we believe to be reliable, however, we do not guarantee the accuracy of the information contained herein. This map does not eliminate the need for an onsite investigation.
This map was compiled by
South Eastern Council of Governments

IV. CURRENT LAND USE PATTERNS AND CONSUMPTION PROJECTIONS

A. EVALUATION OF URBAN LAND USE IN BRANDON

To simplify preparation of this plan, land uses have been grouped into six categories for Brandon:

(1) Industrial includes light manufacturing, warehouses and other similar uses.

(2) Commercial includes retail businesses, offices, etc.

(3) Single-Family Residential includes single-family, residential, duplexes, and manufactured housing.

(4) Multi-Family Residential includes all apartments.

(5) Institutional & Governmental includes schools, churches, government offices and similar uses.

(6) Park & Recreation includes parks and athletic fields. Also included are areas that should be protected from development to facilitate movement of flood water and runoff. Some types of development may be appropriate for such areas, as long as the development does not dramatically increase the incidence or severity of flood or drainage problems.

A physical land use inventory was prepared by SECOG in May of 2007. A map of **current land uses** in Brandon and the planning area are included on **Map 3**.

B. CURRENT LAND USE CONSUMPTION

Land Use	Acres Consumed
Single Family	**810 acres**
Multi Family	**36 acres**
Commercial	**90 acres**
Institutional	**231 acres**
Vacant	**811 acres**
Industrial	**156 acres**
Park and Recreation	**330 acres**

C. FUTURE LAND USE ESTIMATES

Households and a projected demand of certain land use categories are listed in the tables below.

City of Brandon

Household Projections

	Population	Persons per Household *(assuming number remains constant)*	Households
1980	2,589	3.40	780 (actual)
1990	3,545	3.16	1,120 (actual)
2000	5,693	2.96	1,909 (actual)
2007	7,768	2.96	2,624 (projected)
2012	9,251	2.96	3,125 (projected)
2017	10,734	2.96	3,626 (projected)
2022	12,217	2.96	4,127 (projected)
2027	13,700	2.96	4,628 (projected)

Households Added 2007 to 2027

New Households	2,719

Land Use Consumption Needs – Housing

Single-family Residential	3 units per acre (low density) x 2.96 persons per household (pph) = 8.88 persons per acre (ppa) *	8.88 ppa x 2,643 acres = 23,470 additional people
Multi-family Residential	3 units per acre (low density) x 2.96 pph = 8.88 ppa **	8.88 ppa x 114 acres = 1,012 additional people

* Projections based upon low density single-family development
** Projections based upon low density multi-family development

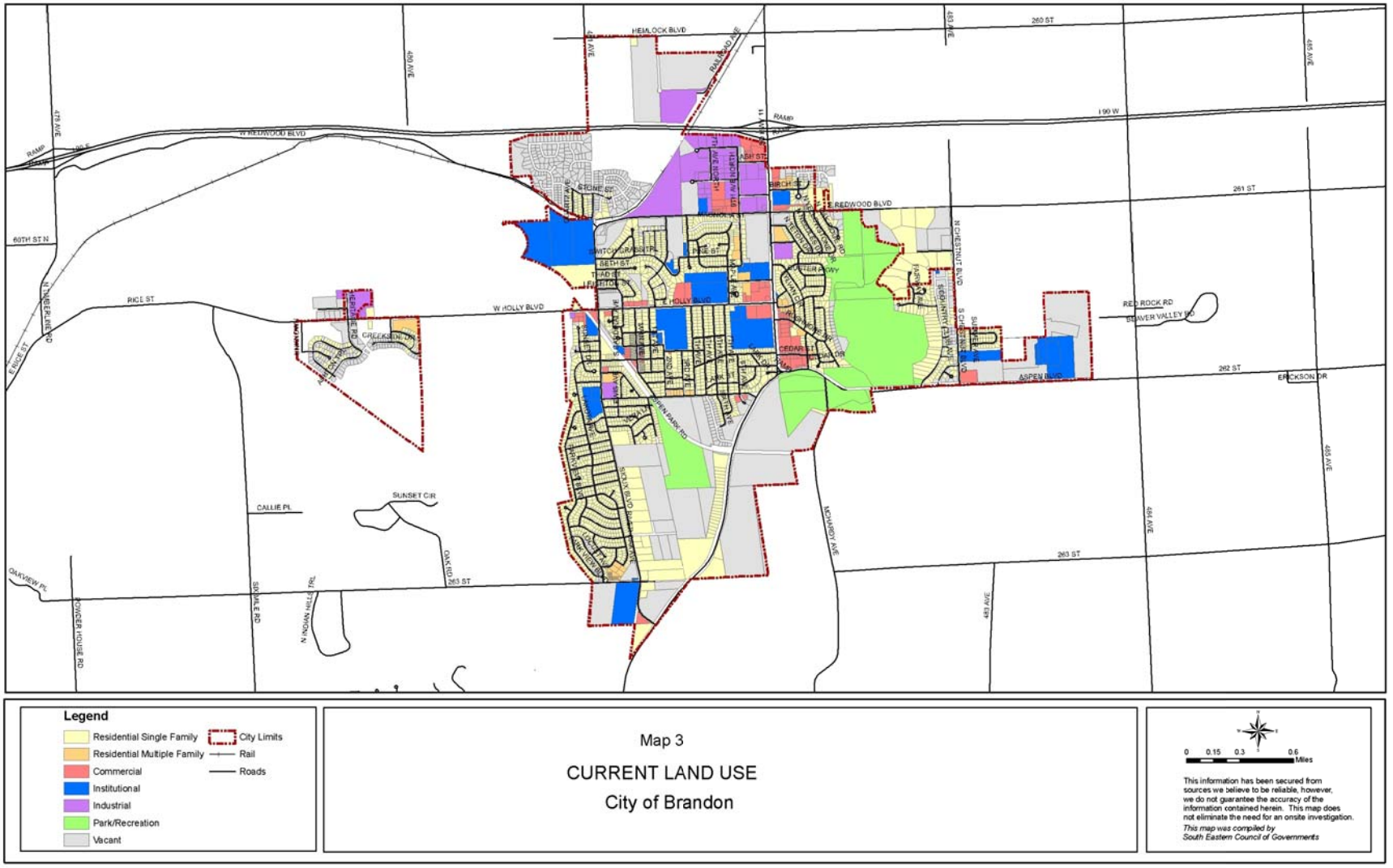
Based upon the above referenced analysis, the City of Brandon will be able to provide adequate housing through the year 2027.

Future Land Use Available

Land Use	Available Acres
Single Family	2643 acres
Multi Family	114 acres
Commercial	265 acres
Industrial	690 acres
Office/Institutional	248 acres
Park/Recreational/Greenway	1407 acres

A review of the population projections and land use consumption needs should be reviewed every five (5) years to ensure enough land is available for future land use needs.

Map 4 illustrates the future land uses. Future land uses were determined by the Brandon Planning Commission and SECOG, based on topographic features, compatibility of future and current land uses and existing infrastructure.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CALLIE PL
SUNSET CIR
OAK RD
263 ST
OAKVIEW PL
MCHARDY AVE
Legend
Residential Single Family
Residential Multiple Family
Commercial
Institutional
Industrial
Park/Recreation
Vacant
City Limits
Rail
Roads
Map 3
CURRENT LAND USE
City of Brandon
0 0.15 0.3 0.6 Miles
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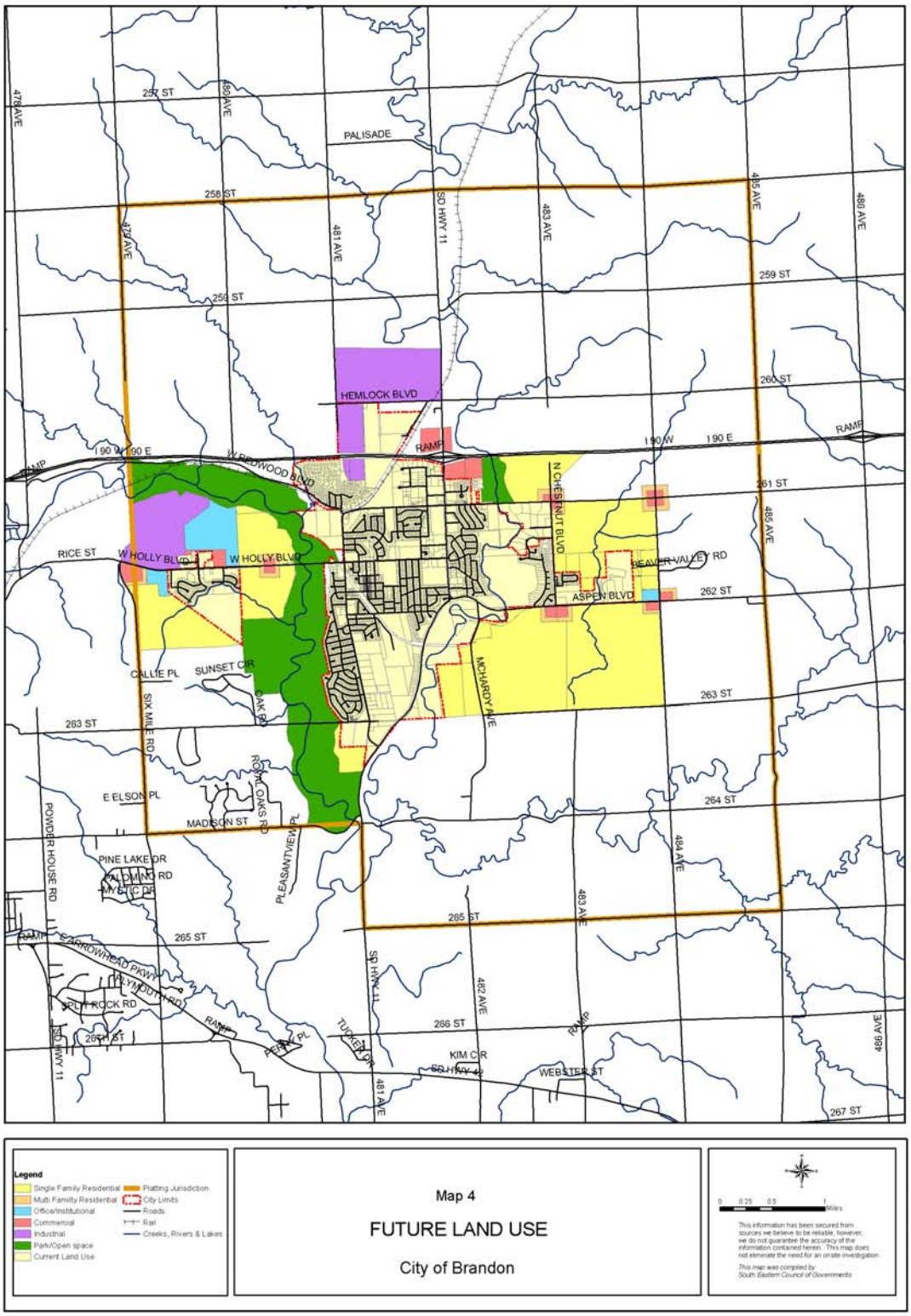
This map was compiled by South Eastern Council of Governments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MADISON ST
PLEASANTVIEW PL
POWDER HOUSE RD
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PINE LAKE DR
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265 ST
ARROWHEAD PKWY
PLYMOUTH RD
FLINT ROCK RD
482 AVE
266 ST
TUCKER DR
KIM CIR
SD HWY 42
481 AVE
WEBSTER ST
267 ST
486 AVE
Legend
Single Family Residential
Multi Family Residential
Office/Institutional
Commercial
Industrial
Park/Open space
Current Land Use
Platting Jurisdiction
City Limits
Roads
Rail
Creeks, Rivers & Lakes
Map 4
FUTURE LAND USE
City of Brandon
0 0.25 0.5 1 Miles
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V. INFRASTRUCTURE ASSESSMENT

A. TRANSPORTATION

Brandon currently has seven arterial roads within the community:

Interstate 90 is a major arterial and has become an important business and commuter highway. **Constraints:** As Brandon continues to grow, additional exits may be necessary to access I-90.

SD Highway 11 is a major arterial that moves traffic through town with only a small amount of obstruction. This road was recently improved and is in excellent condition. **Constraints:** Access points currently in place are limited and should remain as such.

Holly Boulevard is a minor arterial that links the community to Sioux Falls and provides a route to the business district and schools. **Constraints:** Unfortunately, the road has a dead end in the middle of town and limits connectivity of Brandon's road system. Future traffic will only increase from Sioux Falls; thus, the road could become a bottleneck. The community should consider encouraging alternative traffic routes to relieve pressure from Holly Boulevard. The road should become a portion of an overall regional transportation study in conjunction with the City of Sioux Falls and the Metropolitan Planning Organization.

Sioux Boulevard is a minor arterial that provides an important link for residential developments and future growth areas to SD Highway 11 and Holly Boulevard. **Constraints:** Sioux Boulevard is a fairly short arterial segment and will not be improved beyond a three-lane urban section.

County Highway 264 is a minor arterial that provides a critical route for residents living across Split Rock Creek and links the community to the Valley Springs area. **Constraints:** The road needs improvements to separate pedestrian conflicts.

Chestnut Avenue is a minor north-south arterial on the City's eastern limits. **Constraints:** In the future, the road will become a minor arterial as development proceeds. Access to the road must be limited to maintain the free flow of traffic.

Park/Maple Street is a minor arterial on the City's southern edge. The road will become an important road once development proceeds through the area. The road also leads to the main entrance of the Big Sioux Recreation area. **Constraints:** The road crosses the Big Sioux River to the west and is gravel to Six-Mile Road and beyond. To create a continuous arterial link, the road must be built and/or paved from the Big Sioux River Bridge to Six-Mile Road and ideally to the new Regional Beltway slated near Powderhouse Road. Cooperation with Minnehaha County and the City of Sioux Falls will be essential to improve the road to an arterial status.

Brandon currently has two collector roads within the community:

Redwood Boulevard is a major collector on the City's north side providing a route to new residential neighborhoods. **Constraints:** The road should be improved east of the Split Rock Creek Bridge. In the future, Redwood has great potential to be an arterial route, linking the east and west sections of town. Access to Redwood Boulevard should be strictly limited to allow mobility and free flow of traffic in the future.

Aspen Boulevard is a major collector within the City's central section providing alternate connection between Sioux Boulevard and SD Highway 11. **Constraints:** The road has good mobility for a collector. The City should encourage future development to be oriented away from Aspen Boulevard due to a lack of another feasible major east-west road south of Aspen Boulevard. Work should be done to correct a drainage problem near the railroad tracks. Wide sidewalks/bike path should be allowed for appropriate separation of pedestrian and car/truck traffic.

Local Roads

Overall the local road system is in good condition. The orientation of the roads has led to some constraints. The use of cul-de-sacs and curvilinear residential roads has limited flow and the development of collector roads, especially in the east and north sections of the City.

Map 5 illustrates the major street plan.

B. WATER FACILITIES

The City of Brandon recently completed a new water treatment plant located adjacent to Aspen Park. The water capacity of the community will accommodate the projected 20 year growth.

Wells: The community wells are located in Aspen Park near the new Municipal Water Treatment Plant.

Water Towers: One water tower is located in Brandon. The water tower is located near the Brandon Valley High School.

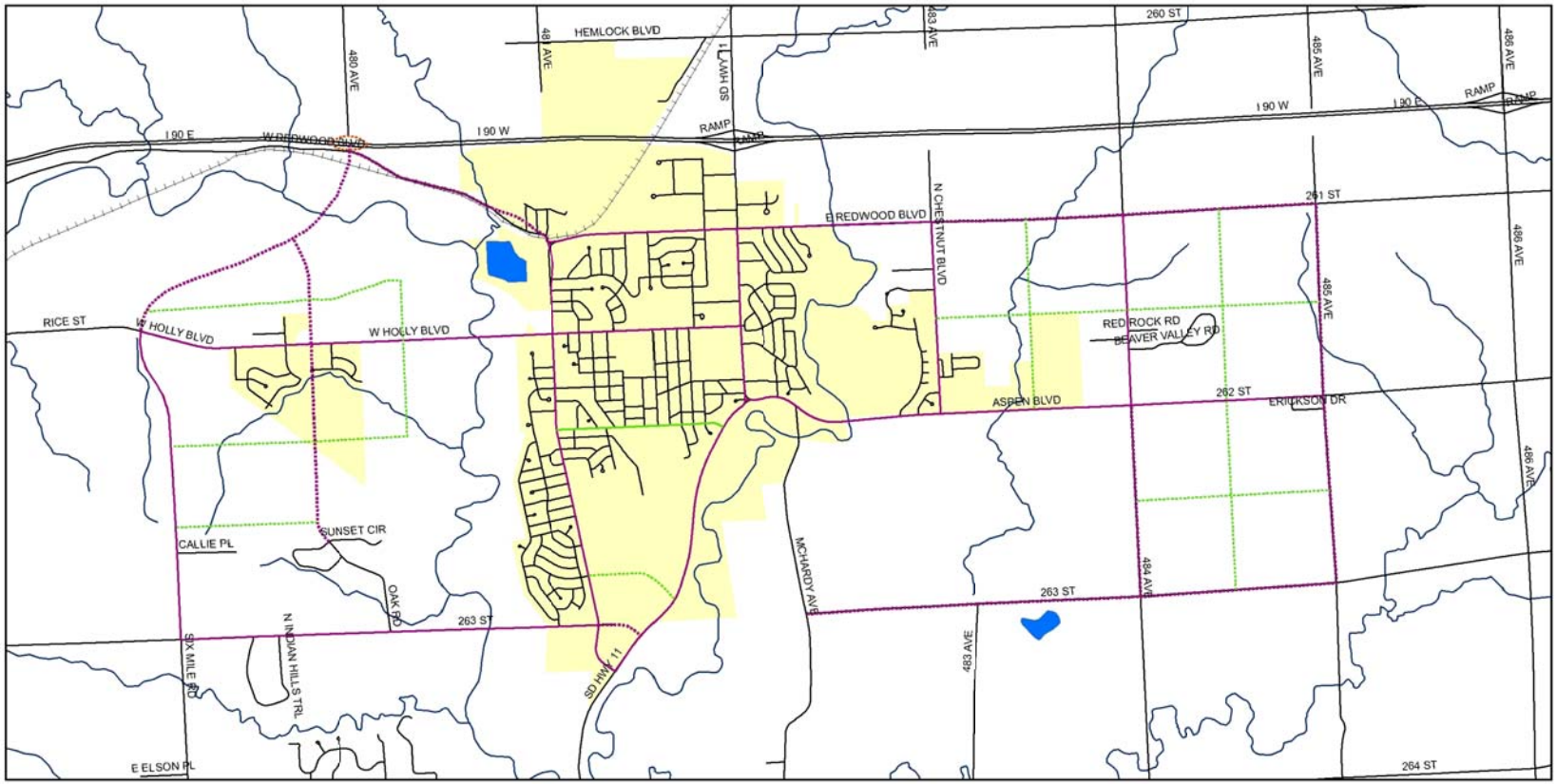
System Constraints: The water tower east of the Municipal Golf Course cannot serve additional growth. A water pumping station will need to be completed to create reliable service and growth potential to the east. Additional water towers may be needed to accommodate growth to the north, east, and west.

C. WASTEWATER FACILITIES

The wastewater system of Brandon has adequate capacity for the 20-year growth period. Treatment of the waste is pumped to the lagoons near the Big Sioux River where some effluent is treated with the lagoon system and some is pumped to the Sioux Falls Wastewater Treatment System west of Brandon.

Existing Facilities and Lift Stations: The existing lift stations are overall in good working order. However, new lift stations will be needed to open new growth areas and there is limited or no capacity to pump from one lift station to another lift station.

System Constraints: Careful study will be required to determine the best method to open new sewer basins. New main sewer trunk lines will likely be needed to open east and west growth areas. The north growth areas will also need a new trunk line leading to the wastewater facility.



Legend

- ARTERIAL
- FUTURE ARTERIAL
- COLLECTOR
- FUTURE COLLECTOR
- FUTURE RAMP
- Roads
- Rail
- Creeks, Rivers & Lakes
- City Limits

Map 5

MAJOR STREET PLAN

City of Brandon

0 0.2 0.4 0.8 Miles

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VI. SCHOOL PLANS AND PROJECTIONS

A. SCHOOL FACILITIES

The Brandon Valley School District maintains four (4) facilities within the Brandon City Limits including two K-5 elementary buildings, a middle school (6-8) and a high school (9-12). The district also operates a K-5 elementary school facility located in Valley Springs. The district lies entirely within Minnehaha County. The district owns two sites for future building development, one on Six-Mile Road in the Sioux Falls future growth area, and one adjacent to Robert Bennis Elementary located along Park Street in southern Brandon. The Brandon Valley School District has planned for most of its growth to occur between Brandon and Sioux Falls.

VII. PARK AND OPEN SPACE INVENTORY AND NEEDS

A. INVENTORY

Name	Acres	Type	Comments
Pioneer Park	21 acres	Community	sledding hill, playground equipment, ball field, scenic overlook, nature area, picnic area, soccer fields, basketball court, restrooms
Aspen Park	50 acres	Community	8 softball fields, 1 baseball field, swimming pool, picnic area, tennis courts, modern restrooms, playground equipment
Municipal Golf Course	146 acres	Golf Course	18-hole course
Bike trail	NA	Linear	links Big Sioux Recreation area and Aspen Park
McHardy Park	81 acres	Community	sledding, picnic area, recreational ball field, playground equipment, restrooms, lookout tower
Big Sioux Recreation Area	410 acres	State	camping, hiking, canoeing, picnicking, bike trail, archery range, modern comfort stations, playground equipment, cross-country skiing, snowmobiling
Tallgrass Park	3 acres	Neighborhood	playground equipment, parking lot, restrooms
Stone Ridge	1 acre	Neighborhood	undeveloped
The Bluffs	1 acre	Neighborhood	undeveloped

B. FUTURE NEEDS

Neighborhood parks are generally between five and ten acres in size. The effective service area of neighborhood parks is one mile, depending on location, facilities, and accessibility. School/park sites also serve as neighborhood parks and include playground equipment in addition to play fields, parking lots, and multi use paved areas for court games.

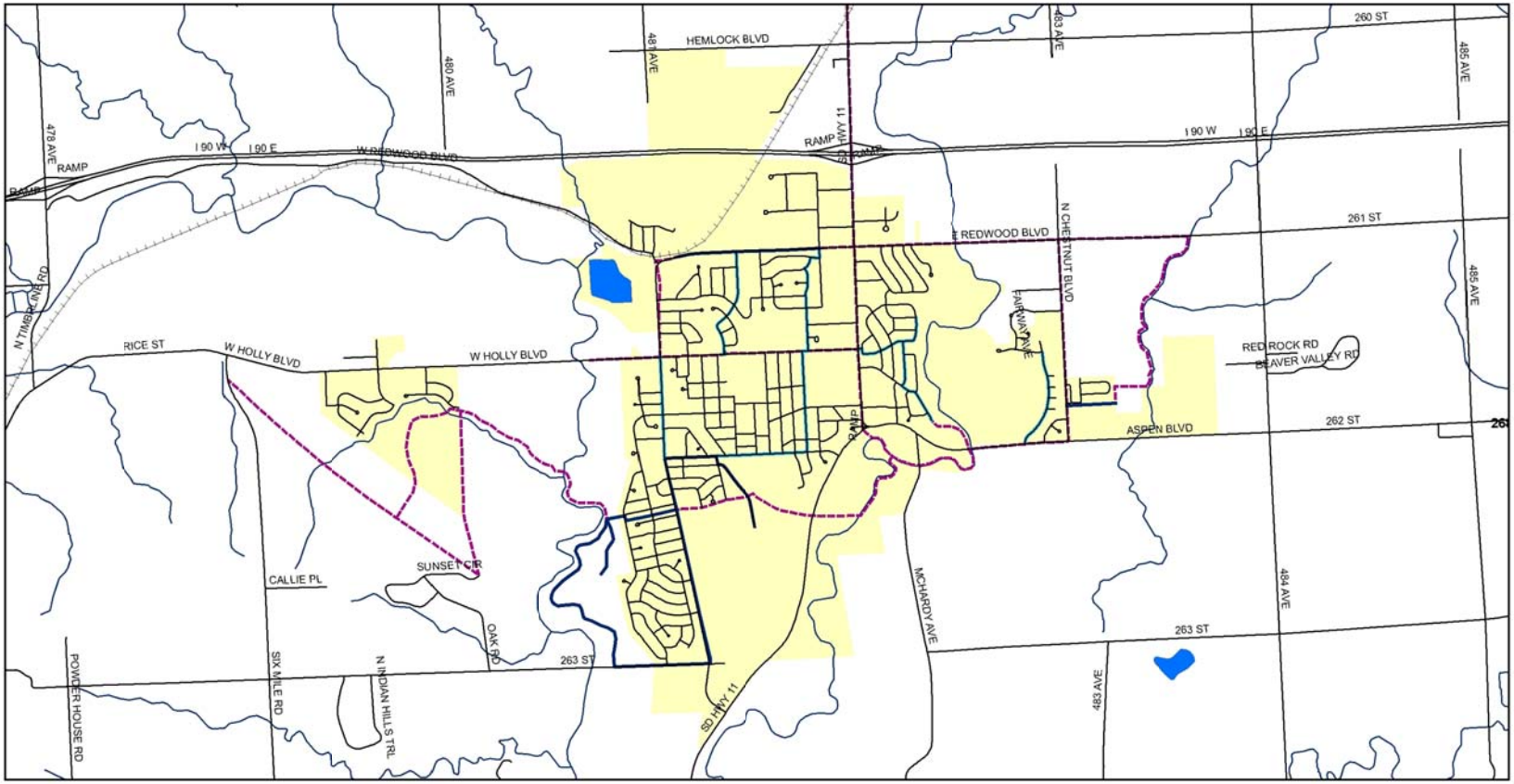
Community parks, because of their larger size, provide a much wider range of activities and facilities than neighborhood parks. The land area requirements generally range from 20 to 40 acres. Specialized facilities such as swimming pools, picnic areas, and athletic complexes can be accommodated in community parks. Community parks that should be provided include areas for passive uses, nature conservation, pools and aquatic centers, and athletic fields. Each of these four types of uses might include other uses such as neighborhood playground space, but generally larger parks will focus on one major type of activity.

Conservation and nature areas are specialized locations which preserve wildlife habitat, woodlands, and wetlands through open space development. Most commonly developed along the stream corridors and natural drainage ways are linear parts or greenways which provide a variety of recreational opportunities to adjacent neighborhoods. These activities easily accommodate the development of a bike trail system.

The parks and open spaces on the Future Land Use Map identify existing park facilities and proposed new facilities within the projected growth areas. A list of the new or expanded facilities is listed in the Capital Improvements Plan Summary on page 32. These facilities will bring nearly all residential development within the service area of both neighborhood and community parks. The specific improvements provided within each park facility should be tailored to meet the needs of the nearby population which it will primarily serve. Where feasible, proposed park sites are integrated with future elementary school sites to permit joint use of facilities. In addition, potential combinations of detention pond sites and neighborhood parks should be reviewed wherever feasible to allow more efficient land utilization and consolidation of maintenance costs.

If new parks are to be provided at a reasonable cost and in proper locations, it is essential that park land acquisition take place prior to residential development. Integration of park and school sites will likewise be feasible only if land acquisition occurs well ahead of residential development.

Expansion of the current bike trail system is proposed to continue. Future trail locations are planned along Holly and Redwood Boulevard, to the west of Brandon along the Big Sioux River and to the east of Brandon linking Aspen Park with McHardy Park. Additional designated bike routes are also proposed along major streets to provide better access to parks and the trail system. (See **Map 6**)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SUNSET CIR
OAK RD
SIX MILE RD
N INDIAN HILLS TRL
POWDER HOUSE RD
MCHARDY AVE
Legend
Bike Route
Current Bike Trail
Future Bike Trail
Roads
Rail
Creeks, Rivers & Lakes
City Limits
Map 6
BIKE TRAILS
City of Brandon
0 0.15 0.3 0.6
Miles
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VIII. GROWTH AREA ANALYSIS

The costs of extending water and sewer services are the primary considerations in designating future growth. However, other factors must also be considered, which includes capacity of the transportation system and environmental suitability. The following analysis is intended to provide the City of Brandon and Minnehaha County with a guide to land use decisions and direct implementation through subdivision and zoning regulations. **Map 7** illustrates all growth areas by the number indicated.

Growth Area Constraints

Area #1
1. Big Sioux and Split Rock Creek floodplains.
2. Existing development along Sioux Boulevard and SD Highway 11.
3. Sand and gravel pits.
4. Drainage between Sioux Boulevard and SD Highway 11.
5. Sewer and water are available to most of area.
6. Indian burial grounds.

Area #2
1. Water available in most of area with 2 - 15 inch water lines across river.
2. Limited area to develop beyond.
3. Need for I-90 interchange and associated arterial corridor/collectors - large cost.

Area #3
1. Need separate lift station for area.
2. A water tower is needed (Area #2 water tower will be satisfactory).
3. Significant amount of existing rural residential development.
4. Much of terrain is hilly with steep slopes.

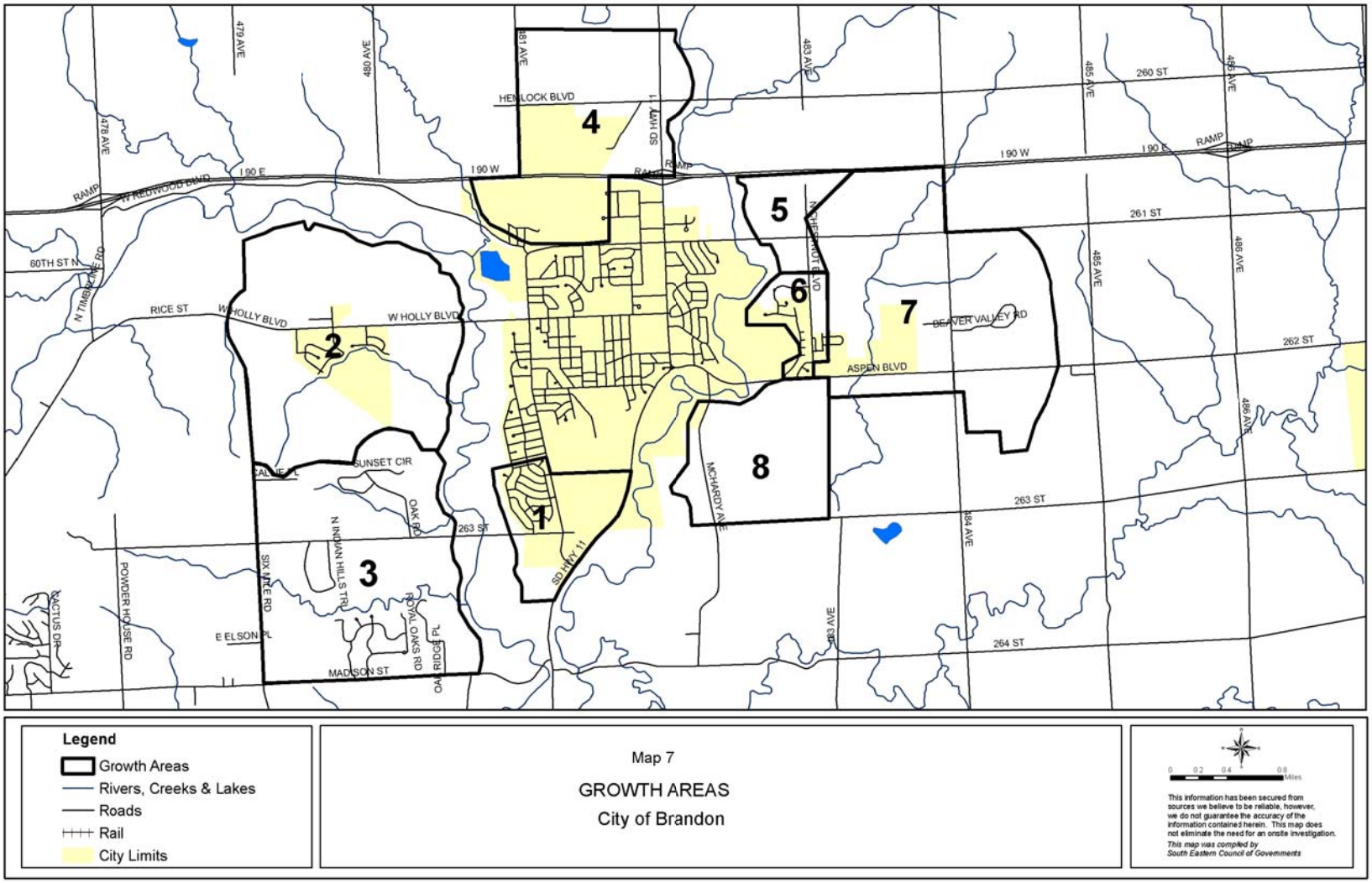
Area #4
1. Water and sewer available.

Area #5
1. Water and sewer available.
2. Will need to upgrade existing lift station (lift station pumping to another lift station).
3. Transportation issues - Redwood Boulevard as arterial.
4. Water runs along south side of property.

Area #6
1. Water and sewer available.

Area #7
1. Need new lift station and force main *(See Stockwell Engineers Preliminary Study)*.
2. A new water tower and treatment plant will be needed beyond 20 year planning period.
3. Transportation issues – Chestnut and Redwood Boulevard and other arterial options.

Area #8
1. Need to upgrade lift station.
2. Water and sewer available.
3. Sewer will need to have force main upgrade.


Legend
Growth Areas
Rivers, Creeks & Lakes
Roads
Rail
City Limits
Map 7
GROWTH AREAS
City of Brandon
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This map was compiled by South Eastern Council of Governments
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POWDER HOUSE RD
CACTUS DR
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ROYAL OAKS RD
OAK RIDGE PL
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IX. PLANNING POLICY FRAMEWORK

A. GROWTH MANAGEMENT AND CAPITAL IMPROVEMENTS STRATEGY

The City of Brandon details within this plan the types, locations and phasing of land uses. Growth management provides for economical provision of City services by coordinating public facility improvements with private development. To create a focus for the plan, listed below are the following growth management goals, policies, and objectives. In addition, the required capital improvements to facilitate growth and redevelopment are included, such as: streets, water, sewer, drainage, fire, police, and recreation.

Goal 1. Encourage Development and Redevelopment Within Existing City Limits Area

Objective 1 - Allow development within existing sanitary sewer basins as detailed by future land use map

Policy 1 - Sewer Basin #1 is open for development and will be developed as indicated by future land use map; except, preserve the Indian burial grounds in the southern section and wetland areas in the central section of the area.

Policy 2 - Encourage all other existing sewer basins in the city to develop as indicated by the future land use map.

Policy 3 - Develop proper drainage as the existing area develops with a mix of open space and proper site planning.

Goal 2. Direct New Growth into Designated Future Growth Areas

Objective 1 - Allow development into Growth Area #2 with regard to the following policies

Policy 1 - Continue to expand sewer services to the area through an area assessment.

Policy 2 - Continue to expand water services to the area through an area assessment and eventually construct a water tower to provide water service to southwestern sections of area.

Objective 2 - Allow development into Growth Area #4 with regard to the following policies

Policy 1 - Continue to extend sewer lines for future growth.

Policy 2 - Continue to extend water lines for future growth.

Policy 3 - Maintain area as a future industrial and office park area.

Policy 4 - Develop a tree and landscaped area on both sides of Interstate 90 as a method to soften the area's look and create an attractive gateway to the city.

Policy 5 - Encourage annexation of Corson and surrounding area for water and sewer issues.

Objective 3 - Encourage development within Growth Area #6 as detailed by future land use map

Policy 1 - Construct drainage area for existing and future growth.

Objective 4 - Encourage development within Growth Area #7 with regard to the following policies and as detailed by future land use map

Policy 1 - Continue to extend or expand sewer services to the area through an area assessment.

Policy 2 - Continue to extend or expand water services to the area through an area assessment.

Policy 3 - Construct drainage area for future development.

Objective 5 – Carefully examine growth into Growth areas #3, #5, and #8 due to high water and sewer system constraints

Goal 3. Construct and upgrade the major street system to handle new growth

Objective 1 - Construct an arterial road system to provide optimum traffic mobility

Policy 1 - Develop Redwood Boulevard into an arterial road from SD Highway 11 to 484th Avenue.

Policy 2 - Continue to develop Chestnut Avenue into an arterial section road from County Highway 264 to Redwood Boulevard.

Policy 3 - Widen Rice Street/Holly Boulevard to a 4 or 5-lane urban section from Six-Mile Road to Sioux Boulevard in a phased project and strictly limit access through shared driveways and maintain 100 foot right-of-way.

Policy 4 - Add a stop light at Sioux and Split Rock Boulevard to control projected increase in traffic.

Policy 5 - Study the overall regional transportation needs of growth area #2 including Holly Boulevard and Park Street through the Metropolitan Planning Organization process. The study should include the identification of a new I-90 interchange and associated arterial links as indicated on the Major Street Plan, improvements to current arterial systems to handle projected future traffic volumes, and access management guidelines.

Policy 6 - Investigate options to increase traffic control devices, turning lanes and a deceleration lane on Holly Boulevard at the Bluffs and Eagle Creek Development.

Objective 2 - Complete projects to enhance the safety of the transportation system

Policy 1 - Develop sidewalks in all areas of town to create safe neighborhoods by requiring developers to construct or assessing landowners at the directive of the City.

Goal 4. Improve Community Services for all residents of Brandon

Objective 1 - Improve Public Services and Buildings

Policy 1 - Complete construction of a new city government center.

Policy 2 - Complete construction of a community recreation center.

Objective 2 - Improve Park and Recreation Opportunities for Citizens

Policy 1 - Construct a bike trail from McHardy Park to the Brandon Golf Course area with the trail leading under SD 264 at the bridge to provide safe community access to the city park system.

Policy 2 - Construct a bike path along Redwood Boulevard to Pioneer Park to provide an access to bike path system for people in north residential neighborhoods.

Policy 3 - Construct additional playground equipment and a soccer complex at McHardy Park.

Policy 4 - Designate city bike routes to help provide a safe place for bike riding (See **Map 6**).

Policy 5 - Construct an extension of the bike trail from Aspen Park to McHardy Park alongside the railroad track right-of-way.

Policy 6 - Expand Aspen Park and add baseball and softball fields.

Policy 7 - Add a park area and associated bike trail in Growth Area #2 for neighborhood open space and recreational opportunities.

Policy 8 - Construct the Sioux Falls/Brandon bike path located in the growth area while also providing an area for open space and recreational needs on the north side of the Big Sioux River.

Policy 9 - Designate open space to construct a neighborhood park in Area #6.

Policy 10 - Designate open space to construct a neighborhood park in Area #2.

Policy 11 - Designate open space to construct a neighborhood park in Area #7.

Goal 5. Preserve the Function and Character of the Rural Area

Objective 1 - Encourage agriculture to remain the dominant land use activity

Policy 1 - Only agricultural uses will be allowed in the City's agricultural zones.

Objective 2 - Discourage scattered residential, commercial, or industrial development

Policy 1 - Work with Minnehaha County to ensure all proposed development within Brandon's growth areas are annexed and serviced with municipal utilities.

Goal 6. Improve Local Government

Objective 1 – Improve Communication

Policy 1 - Increase communication with the Brandon Valley School District.

Policy 2 - Increase communication with the public by holding informal public meetings and coffees.

Policy 3 - Increase communication with the city staff.

Objective 2 – Ensure financial stability of the city

Policy 1 - Establish fire and ambulance districts.

Policy 2 - Develop land development fees.

Policy 3 - Establish relationships with financial institutions.

Policy 4 - Continue to promote commercial and industrial expansion.

Policy 5 - Pursue donations through a community fund.

Objective 3 – Improve city staff management

Policy 1 - Provide adequate personnel to meet the needs of the increased workload.

Policy 2 - Provide leadership for a smooth transition of new staff.

Objective 4 – Remain current with new technologies

X. PLANNING STRATEGY

The City of Brandon has committed to shape the future of the community, to enhance economic development, and maintain a high quality of life for all citizens of the community. The following goals, objectives, and policies will guide the Planning and Zoning Commission and City Council, and are the basis for enforcement of the zoning and subdivision ordinances.

Goal 1. Ensure the Health and Safety of Citizens

Objective 1 - Separate structures for health and safety

Policy 1 - Sideyard setbacks will comply with fire safety separation distances for residential structures and minimum requirements for commercial and industrial structures.

Policy 2 - Ensure buildings and structures do not encroach on residential building air space.

Objective 2 - Design lots and blocks to emphasize cost efficiency and community values

Policy 1 - Require the City's consulting engineer review the utility plans before a plat is approved.

Policy 2 - Review the lot and block designs based upon subdivision design standards.

Objective 3 - All streets need adequate visibility at intersections and driveways

Policy 1 - Ensure adequate visibility at intersections and driveways by ensuring that structures do not obstruct the view of intersecting traffic.

Objective 4 - Design local streets to emphasize land access and safety

Policy 1 - Design residential streets with 66 feet right-of-ways and no more than 36 feet pavement width.

Objective 5 - Design major streets to emphasize mobility, safety, and adequate off-street parking

Policy 1 - Implement access management guidelines as a part of the subdivision ordinance.

Policy 2 - Maintain a policy of safe speed limits for all collectors and arterial roads. Limit the number of stop signs or stop lights to maintain an even traffic flow.

Policy 3 - Ensure single-family developments and other low intensity uses have driveway access off local or collector streets and not off major streets. Arterial streets should have limited access.

Policy 4 - Require development of a consistent collector street system as indicated by the Major Street Plan.

Policy 5 - Implement SD Highway 11/Splitrock Boulevard Access Plan as prepared by the South Dakota Department of Transportation and the City of Brandon.

Goal 2. Protect Natural Resources

Objective 1 - Retain runoff with open natural drainage systems

Policy 1 - Utilize open space such as parks or backyards to help naturally drain new developments.

Policy 2 - Complete drainage basin plans ahead of development.

Objective 2 - Create greenways and linear open spaces within floodplain areas

Policy 1 - Maintain the Big Sioux River and Split Rock Creek floodplains for open space, recreation areas, and bike path opportunities.

Policy 2 - Do not allow development to encroach upon the floodplains.

Objective 3 - Design around significant wetlands

Policy 1 - Preserve wetland areas as a part of drainage systems and park system where possible.

Objective 4 - Do not allow development on steep slopes

Policy 1 - Do not allow development to encroach into steep slope areas of Big Sioux River and Split Rock Creek areas.

Objective 5 - Limit development in areas with poor soils and high water table

Policy 1 - Maintain an open space area around the Brandon well fields in Aspen Park.

Goal 3. Enhance the Visual Quality of the Community

Objective 1 - Separate heavy industrial and residential uses

Policy 1 - Create a buffer zone for transitional areas between industrial, commercial, and residential areas.

Policy 2 - Create an office park between the industrial park and Redwood Boulevard.

Policy 3 - Create buffer zones for the proposed commercial zones.

Objective 2 - Soften the look of all uses to enhance the community's image as an attractive place

Policy 1 - Institute appropriate landscape regulations for all uses.

Policy 2 - Utilize the following gateways to Brandon as a way to create community identity through community welcome signage, landscape beautification, and design criteria.

* I-90 and Split Rock Boulevard
* Sioux Boulevard and Split Rock Boulevard
* Holly Boulevard and Six-Mile Road

Objective 3 - Create a transition from commercial to residential areas

Policy 1 - Require the use of berms, fences, and additional setbacks as measures to create an appropriate transition to single-family uses.

Objective 4 - Encourage the appropriate siting and concentration of uses and structures

Policy 1 - Create a manufactured housing zoning district regulation.

Policy 2 - Add telecommunication tower regulations to ensure their appropriate placement and mitigate negative visual features.

Policy 3 - Allow appropriate fences that do not obscure peoples' view.

Policy 4 - Allow signs of an appropriate size relative to the lot size and limit their numbers.

Policy 5 - Allow accessory buildings in a rear yard location with appropriate setbacks.

XI. PLAN IMPLEMENTATION

The best possible way to implement a comprehensive plan is to utilize all of the administrative tools available in order to influence development in a positive manner. There are many tools which can be utilized, including: zoning regulations, subdivision regulations, policy plans, capital improvements plans, annexation studies, and well-rounded community involvement.

Local Governing and Advisory Boards. The key players in the implementation of a Comprehensive Plan are the Planning and Zoning Commission and the City Council. It is the duty of the governing body of Brandon to encourage progress by utilizing all of the tools available to ensure orderly growth and development can take place. With public input, the Planning and Zoning Commission and the City Council can create a balance between industry, commerce, and housing, allowing utilization of the resources available to facilitate civic improvement.

Local Regulatory Tools. Perhaps the most widely utilized administrative tools are the Zoning Ordinance and Subdivision Regulations. It is essential to revise either or both of these documents when they conflict with the Comprehensive Plan. It is especially important to create a cooperative agreement between Minnehaha County and the City of Brandon to insure the Brandon urban growth area is developed according to the Comprehensive Plan recommendations.

Annexation. If the orderly growth of Brandon is to continue over the planning period, it is essential the City continue an active annexation program. The boundaries for providing municipal services should generally coincide with the corporate limits. Areas designated by the land use plan as future growth areas of the City should be annexed in advance of major development as should existing rural subdivisions which lie adjacent to the City. This policy will assure that sufficient development land to accommodate the future growth of the urban areas is maintained.

Capital Improvements Planning. The purpose of capital improvements planning is to provide local government officials with a guide for budgeting for major improvements which will benefit the community. The City must review current infrastructure and identify and address any deficiencies prior to consideration of future development. It is the intention of the City to upgrade a portion of existing utilities and transportation routes on an annual basis. Information within the Comprehensive Plan will be utilized in constructing the Brandon capital improvement plan. On the following page is a list of major capital improvements over the 20-year study period.

Capital Improvements Summary of Needs 2007 - 2027

General

- Sidewalks along Splitrock Boulevard
- Redwood drainage repair

Police

- Garage for police behind City Hall

Water

- Construction in growth area #7 to include water booster station and water mains
- Construction of water tower to service area #2 (south of water pressure line)
- Extend water line from well #3 to water treatment plant
- Dedicated trunk line to growth area #4
- Controls from well #3 to water treatment plant
- Increase line size from the water treatment plant to 5th and Aspen
- Increase line size from the water treatment plant to Richland Park Addition

Street

- Reconstruction of Holly from Sioux Boulevard to Splitrock Boulevard and should be included in the transportation study in growth area #2
- Improve drainage at Main and Aspen
- Reconstruction of Redwood Boulevard and Chestnut Avenue and should be included in the transportation study in growth area #7
- Construction of arterial roads in growth area #2
- Construction of arterial roads in growth area #7
- Re-pave Rushmore Drive from Splitrock Boulevard to Teton Drive
- Overlay parts of Aspen Boulevard
- Construction of a 2-lane arterial from I-90 interchange to Redwood Boulevard
- I-90 Interchange, bridge and arterial extension to Six Mile Road
- Expand the turn lanes/deceleration lanes at Sandstone Avenue to Heritage Road along Holly Boulevard
- Add a stop light at the intersection of Redwood Boulevard and Splitrock Boulevard

Golf Course

- Chipping green and bunker on practice range

Parks

- Expansion of Aspen Park (McHardy Park) with additional softball and baseball fields
- Construction of additional soccer fields and playground equipment in McHardy Park
- Add lights on diamonds C & D in Aspen Park
- Bike trail from Pioneer Park to McHardy Park
- New park construction in growth area #2 south of Holly Boulevard
- Reconstruction of Aspen Park Avenue
- Big Sioux River bike trail Phase 2

- Bike trail from new area #2 park to Big Sioux Recreation area
- Pool blanket to preserve heat
- Park development around the Sweetman property on Aspen Boulevard
- Construction of a pool on the east side

APPENDIX 1
Land Use Location and Design Criteria

Residential

Low density (3 to 6 units/acre)
*Access to local street system-avoid direct access to arterial streets
*Convenient to neighborhood school, park, and commercial services
*Avoid environmentally sensitive areas such as wetlands and drainage ways

Medium density (6 to 16 units/acre)
*Access to major street system
*Well designed transition to adjacent land uses
*Provision of useable open space based on project size
*Transition between low density neighborhood and major streets
*Adjacent to neighborhood commercial center

High density (16 to 40 units/acre)
*Adjacent to principal arterials near major commercial, institutional, or employment centers
*Well designed transition to adjacent land use
*Provision of viable open space based on project size

Commercial

Highway oriented and regional centers
*Adjacent to major streets and regional highways
*Controlled access to arterial streets
*Quality architecture and well designed transition to adjacent uses

Community centers
*Intersection of arterial streets and along transit routes
*Mixed use development including office, institutional, or multifamily residences
*Well designed transition to adjacent uses

Neighborhood retail, office, and convenience services
*Convenient vehicular and pedestrian access to residential areas
*Adjacent to major street intersections
*Design compatible with surrounding uses
*Well designed transition to adjacent uses
*Located within residential, employment, or institutional centers

Downtown area
*Pedestrian orientation
*Quality urban design standards
*Mixed uses including office, retail, institutional, cultural and entertainment
*Orientation to green way where feasible
*Consolidate off-street parking areas
*Residential uses within walking distance of the Central Business District (CBD)

Industrial

General light industrial
*Regional highway access located close to major arterial streets
*Rail access for industrial uses requiring it
*Buffered from residential and other adjacent land uses

*Industrial park setting with building design and landscape amenities
*Include office, warehousing and limited retail uses

Limited heavy industrial

*Access to major streets
*Well designed buffer to adjacent land uses
*Minimize environmental impacts on surrounding properties

Mixed Use

Institutional, office, and other mixed use development

*Convenient to intended market area
*Vehicular access to major streets
*Minimization of traffic impact on adjacent uses
*Orderly expansion of institutional uses near residential areas
*Design compatibility with adjacent uses
*Include retail, multifamily and business-technology land uses

Appendix F
Potential Treatment Sites

600 N. Main Ave, Suite 100
Sioux Falls, SD 57104
Ph. (605) 338-6668
Fax. (605) 338-8750
www.stockwellengineers.com

Appendix G
Rose Wind Charts

600 N. Main Ave, Suite 100
Sioux Falls, SD 57104
Ph. (605) 338-6668
Fax. (605) 338-8750
www.stockwellengineers.com

SOUTH DAKOTA STATE UNIVERSITY

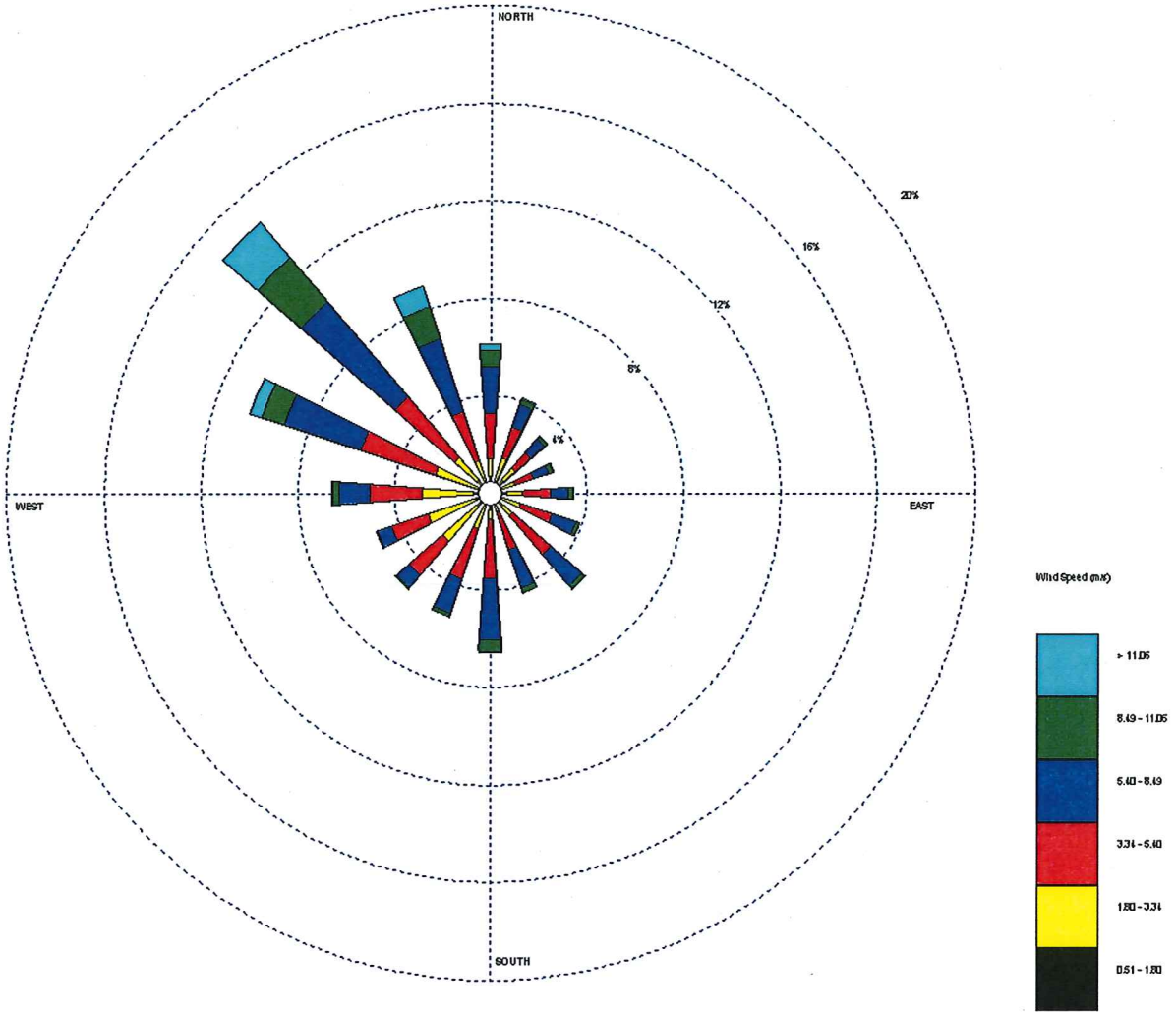
SOUTH DAKOTA Climate and Weather

Wind Rose charts (m/s)

For: Sioux Falls Month of: January :: Go ::

(click here to view hourly average wind/temperature charts)

Sioux Falls Foss Field (726510): 1973-2002
January



SOUTH DAKOTA STATE UNIVERSITY

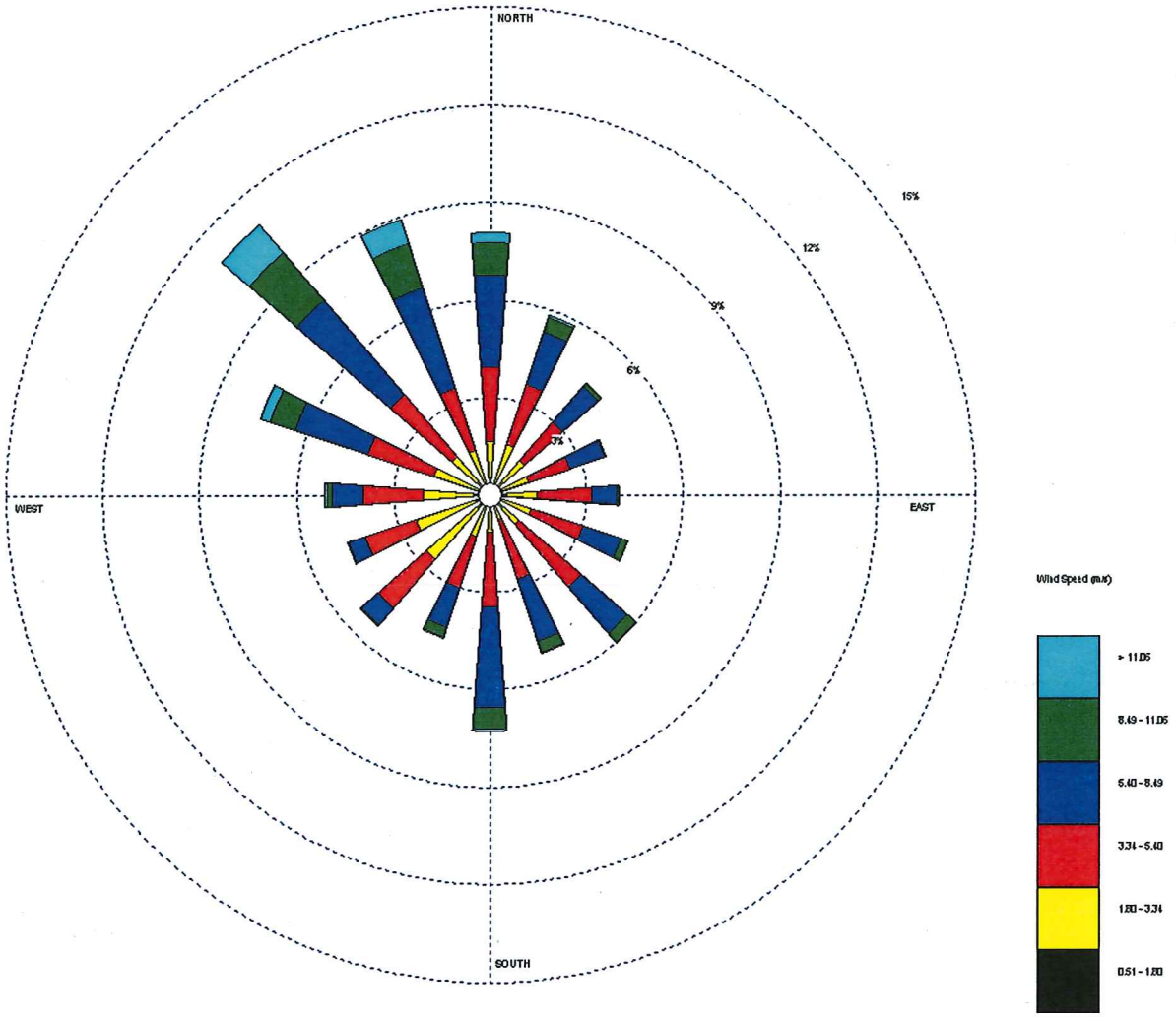
SOUTH DAKOTA Climate and Weather

Wind Rose charts (m/s)

For: Sioux Falls Month of: February :: Go ::

(click here to view hourly average wind/temperature charts)

Sioux Falls Foss Field (726510): 1973-2002
February



SOUTH DAKOTA STATE UNIVERSITY

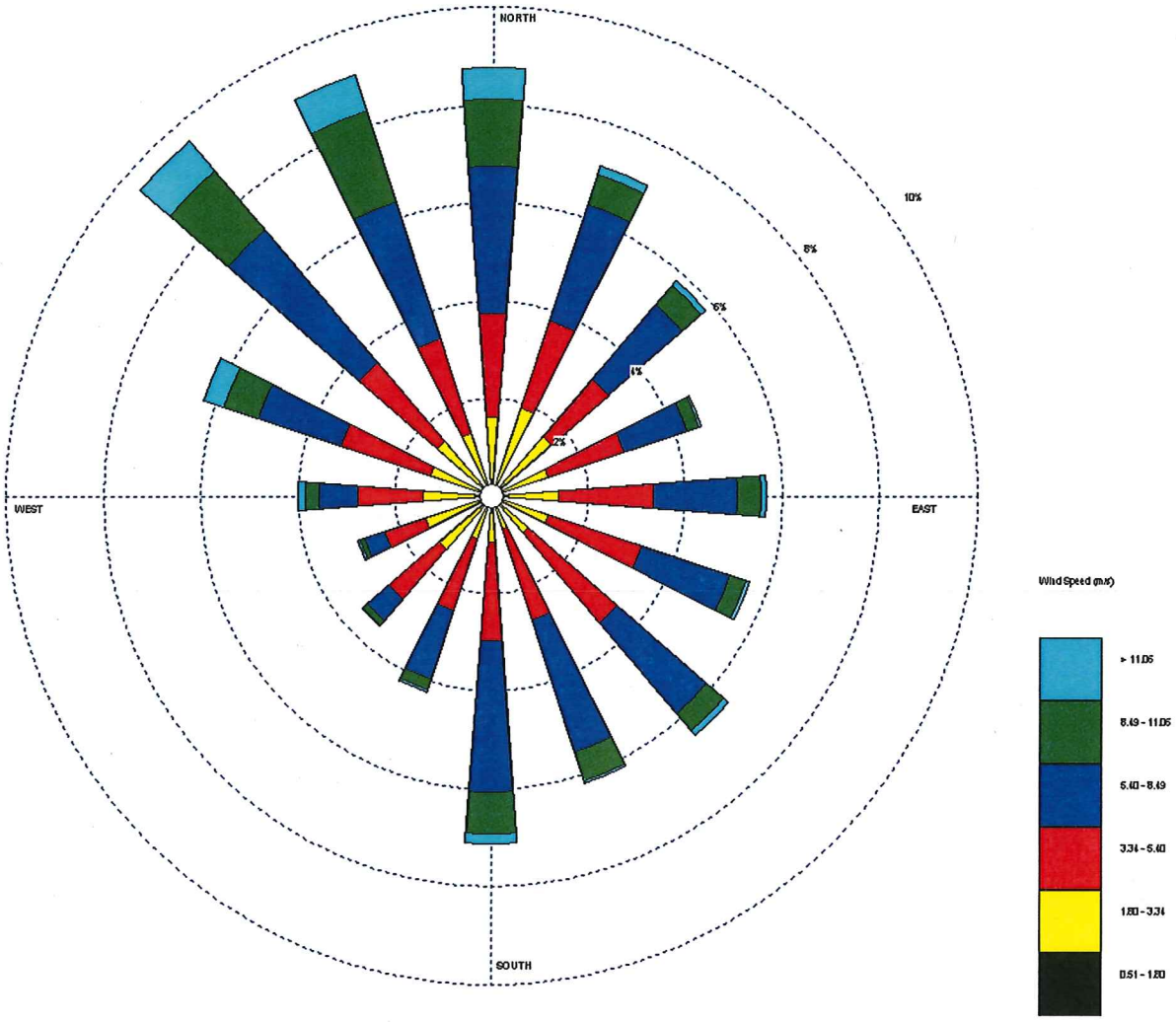
SOUTH DAKOTA Climate and Weather

Wind Rose charts (m/s)

For: Sioux Falls Month of: March :: Go ::

(click here to view hourly average wind/temperature charts)

Sioux Falls Foss Field (726510): 1973-2002
March



SOUTH DAKOTA STATE UNIVERSITY

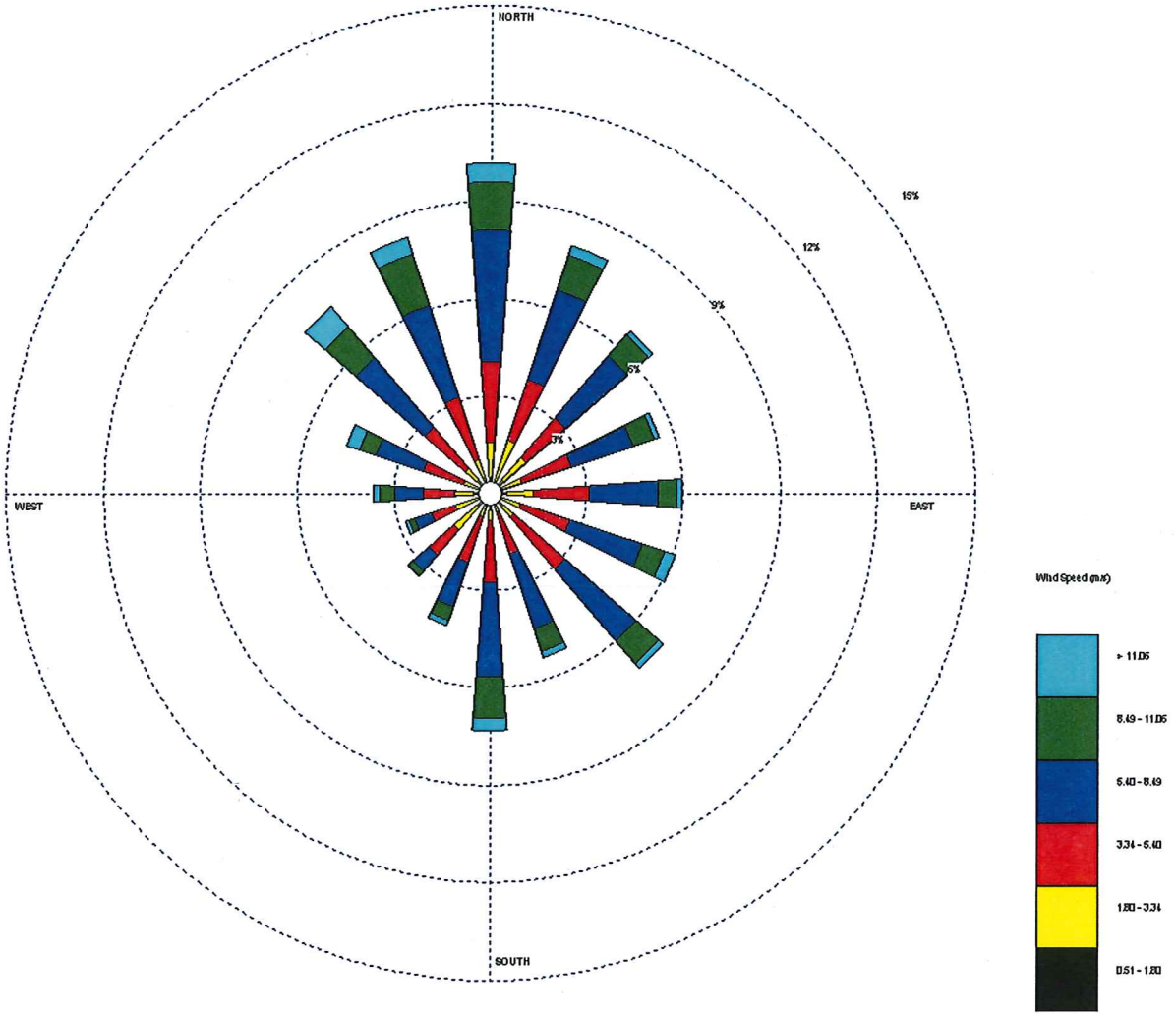
SOUTH DAKOTA Climate and Weather

Wind Rose charts (m/s)

For: Sioux Falls Month of: April :: Go ::

(click here to view hourly average wind/temperature charts)

Sioux Falls Foss Field (726510): 1973-2002
April



South Dakota State University

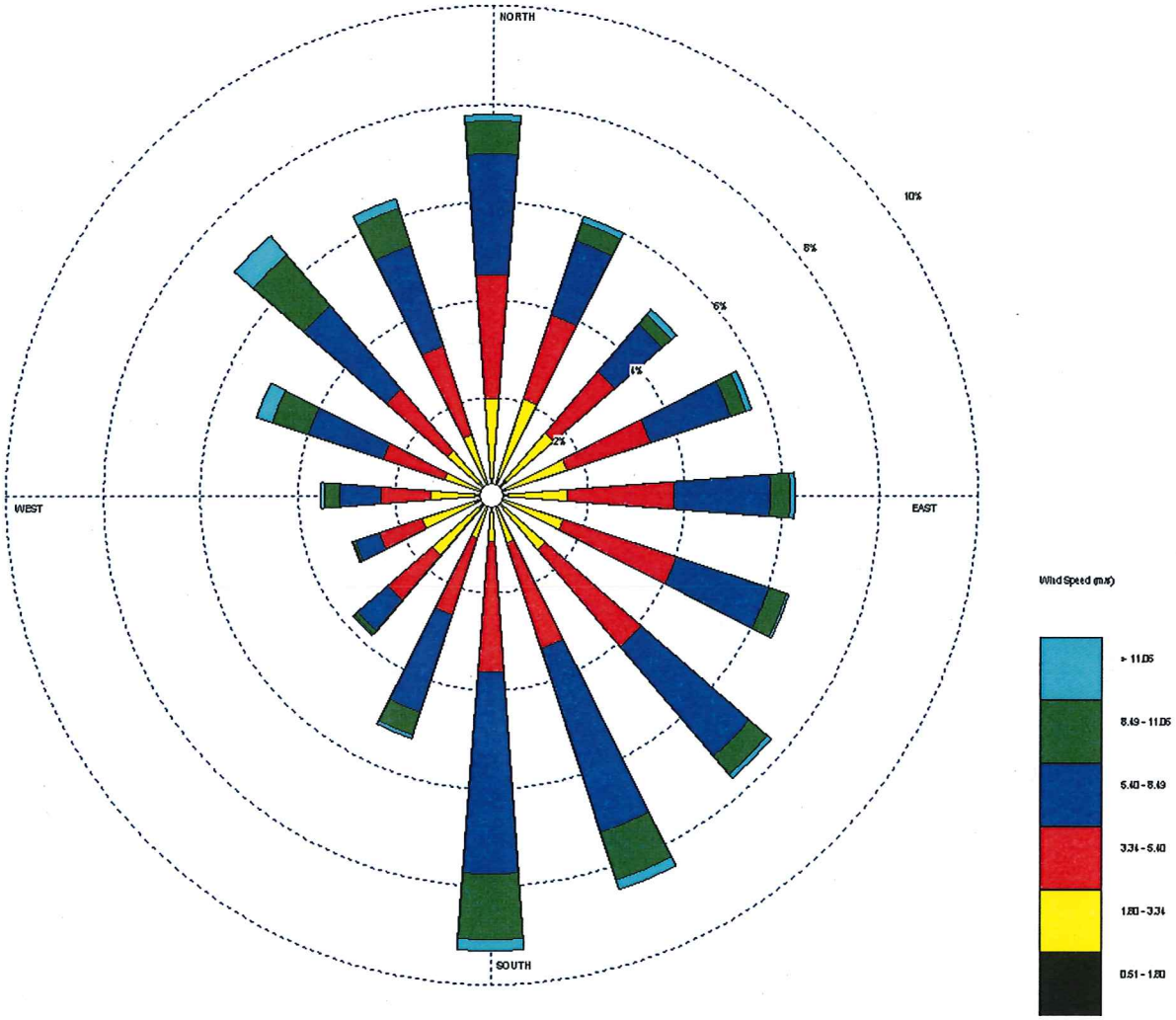
South Dakota Climate and Weather

Wind Rose charts (m/s)

For: Sioux Falls Month of: May :: Go ::

(click here to view hourly average wind/temperature charts)

Sioux Falls Foss Field (726510): 1973-2002
May



SOUTH DAKOTA STATE UNIVERSITY

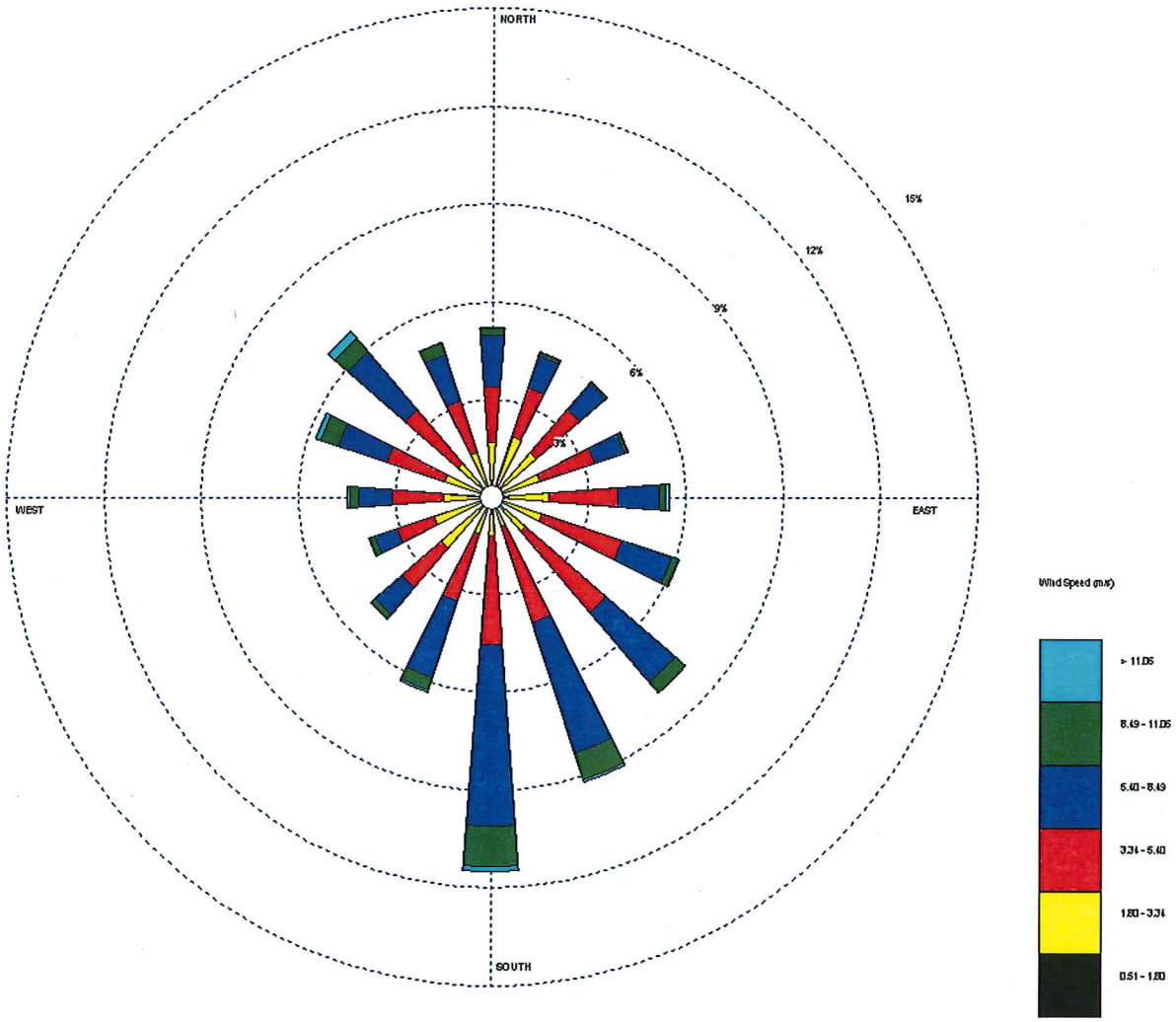
SOUTH DAKOTA Climate and Weather

Wind Rose charts (m/s)

For: Sioux Falls Month of: June :: Go ::

(click here to view hourly average wind/temperature charts)

Sioux Falls Foss Field (726510): 1973-2002
June



SOUTH DAKOTA STATE UNIVERSITY

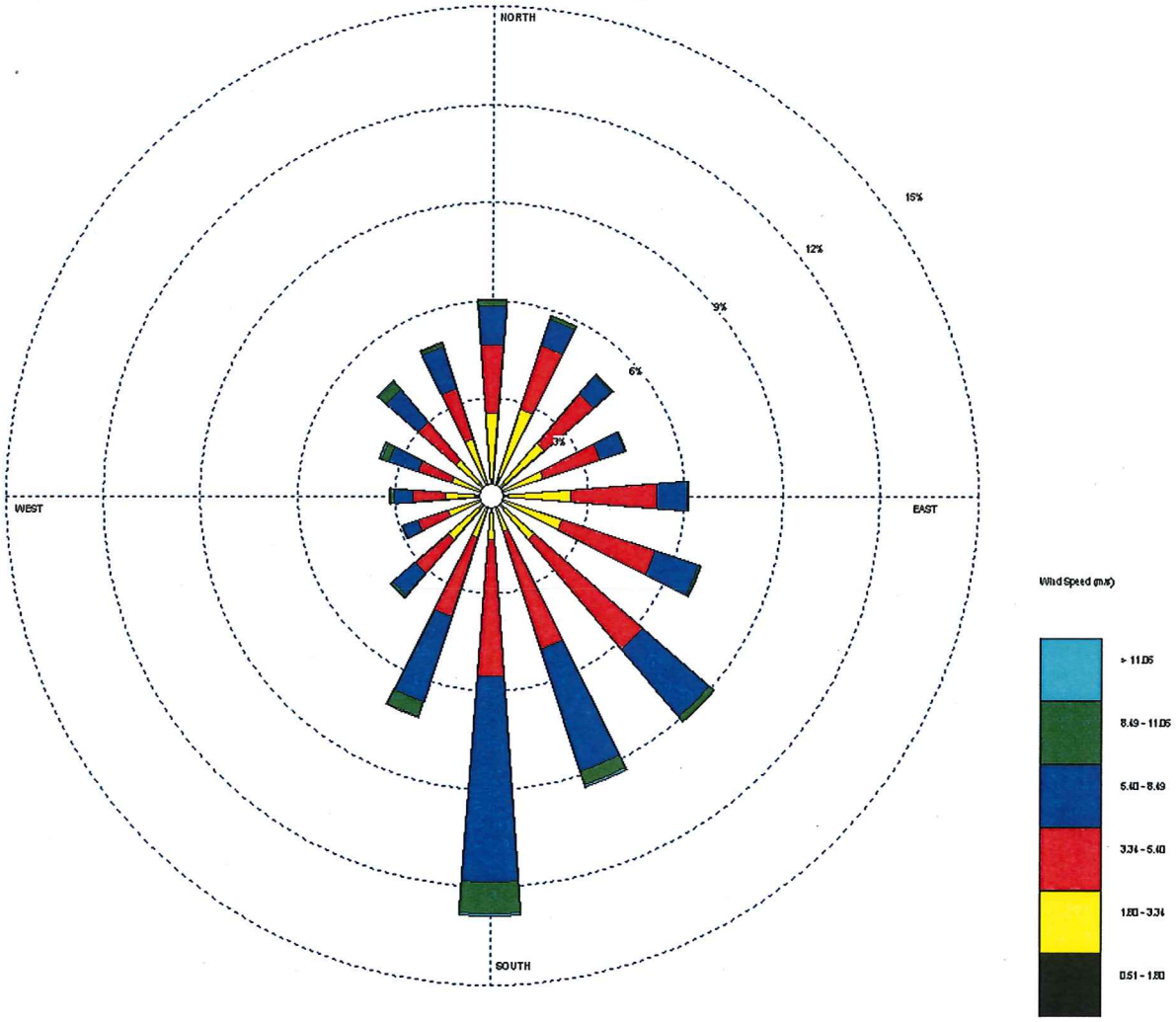
SOUTH DAKOTA Climate and Weather

Wind Rose charts (m/s)

For: Sioux Falls Month of: July :: Go ::

(click here to view hourly average wind/temperature charts)

Sioux Falls Foss Field (726510): 1973-2002
July



SOUTH DAKOTA STATE UNIVERSITY

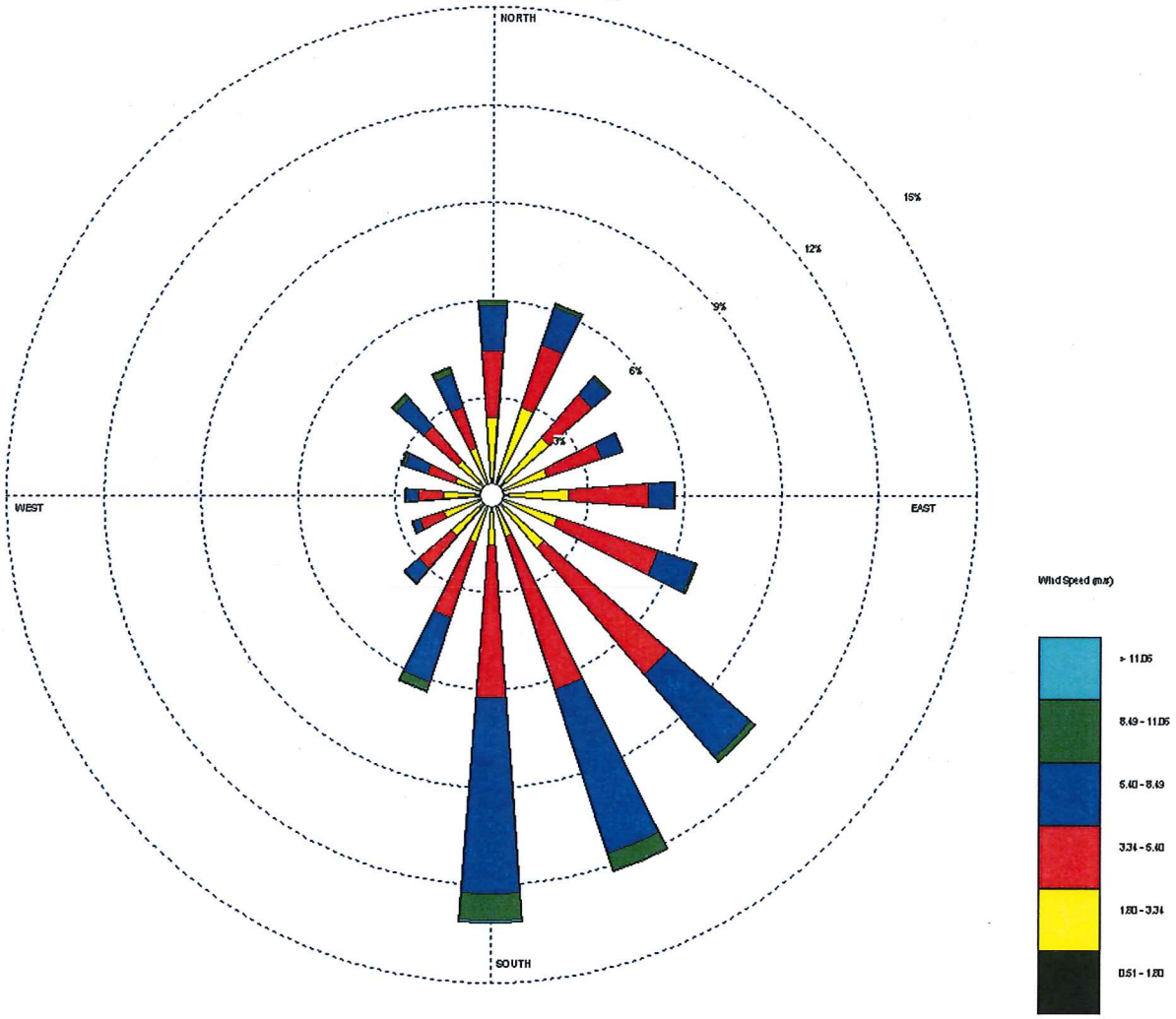
SOUTH DAKOTA Climate and Weather

Wind Rose charts (m/s)

For: Sioux Falls Month of: August :: Go ::

(click here to view hourly average wind/temperature charts)

Sioux Falls Foss Field (726510): 1973-2002
August



SOUTH DAKOTA STATE UNIVERSITY

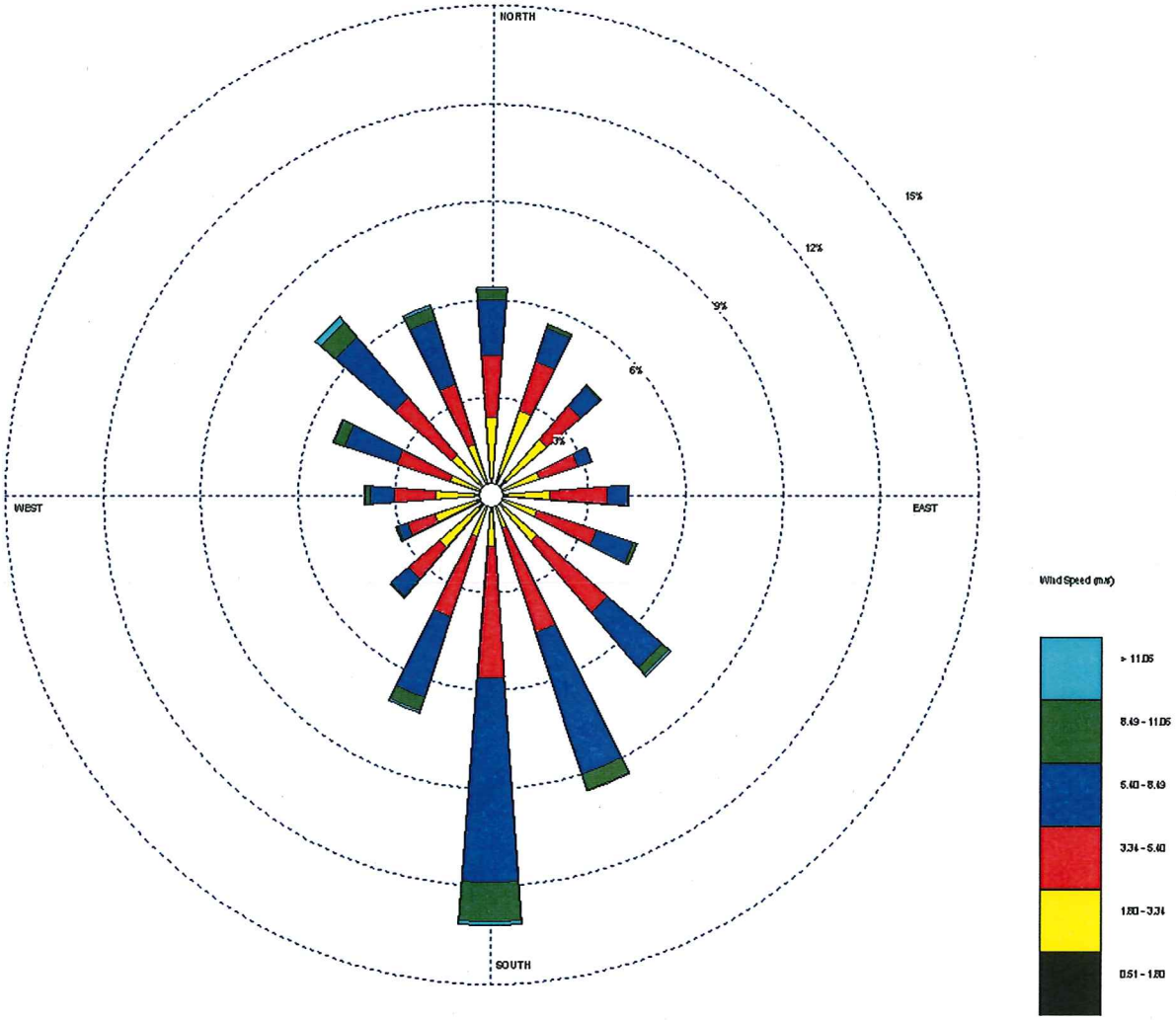
SOUTH DAKOTA Climate and Weather

Wind Rose charts (m/s)

For: Sioux Falls Month of: September :: Go ::

(click here to view hourly average wind/temperature charts)

Sioux Falls Foss Field (726510): 1973-2002
September



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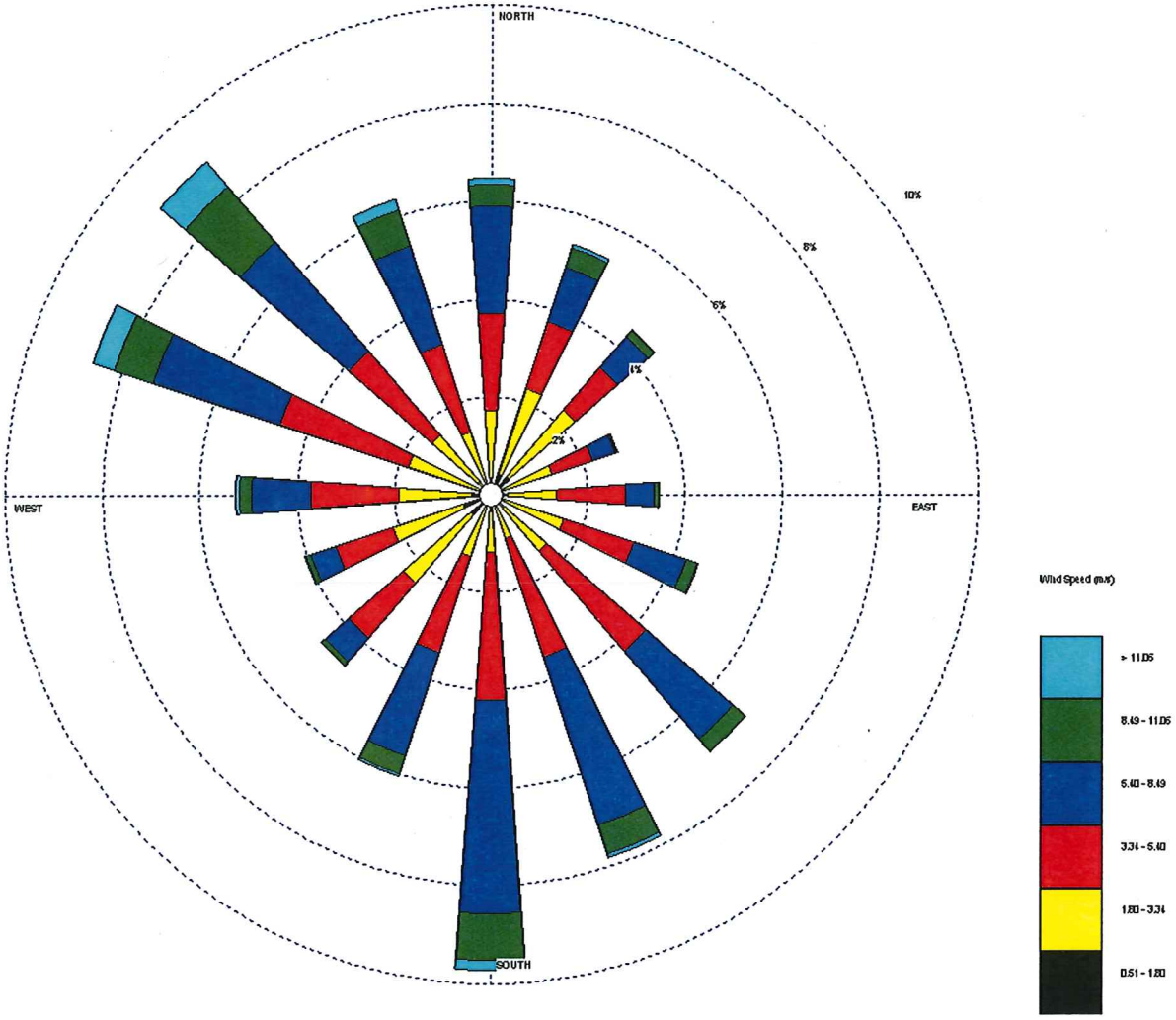
SOUTH DAKOTA Climate and Weather

Wind Rose charts (m/s)

For: Sioux Falls Month of: October :: Go ::

(click here to view hourly average wind/temperature charts)

Sioux Falls Foss Field (726510): 1973-2002
October



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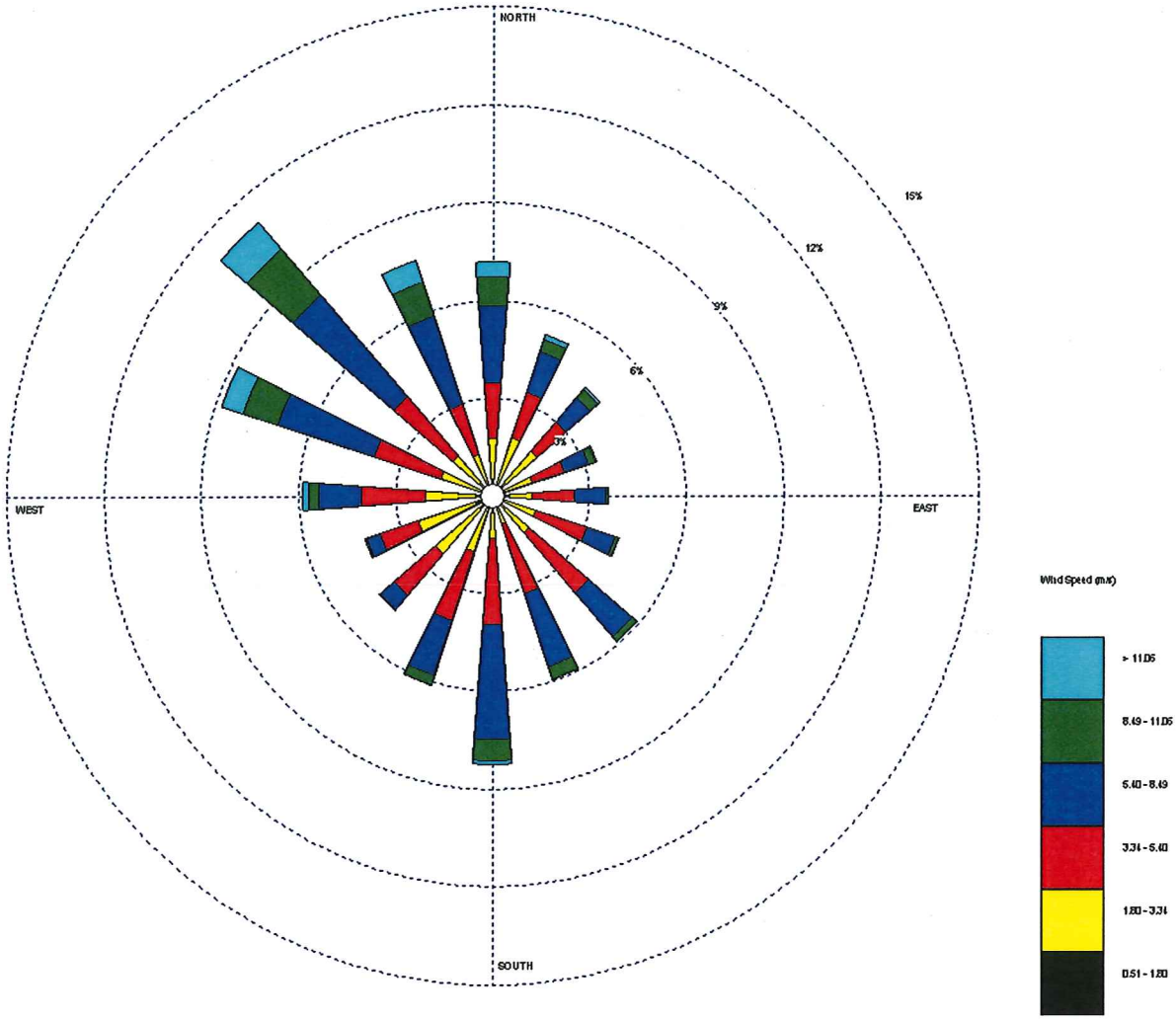
SOUTH DAKOTA Climate and Weather

Wind Rose charts (m/s)

For: Sioux Falls Month of: November :: Go ::

(click here to view hourly average wind/temperature charts)

Sioux Falls Foss Field (726510): 1973-2002
November



SOUTH DAKOTA STATE UNIVERSITY

SOUTH DAKOTA Climate and Weather

Wind Rose charts (m/s)

For: Sioux Falls Month of: December :: Go ::

(click here to view hourly average wind/temperature charts)

Sioux Falls Foss Field (726510): 1973-2002
December