
West Yankton Sanitary Sewer Feasibility Study

Conducted for
The Yankton County Board of
Commissioners

Amendment #1

April 2022
No. 21515



STOCKWELL ENGINEERS

801 N. Phillips Ave, Suite 100
Sioux Falls, SD 57104

Phone: 605.338.6668
www.stockwellengineers.com

AMENDMENT # 1
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Sanitary Sewer
Feasibility Study
For the
Yankton County
Board of Commissioners

April 2022

SEI NO: 21515

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.

 4/15/2022

Ryan Truax

S.D. Registration No. 15372



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EXECUTIVE SUMMARY

SUMMARY

This amendment updates the cost estimates for provide sanitary sewer and treatment for the basin identified in the 2008 study. The total capital cost estimate is approximately \$50,000,000. The current recommended treatment alternative is for treatment at the City of Yankton's Wastewater Treatment Facility. However, costs for this alternative need further study as Yankton is currently pursuing upgrades to their wastewater treatment facility which is impact user rates and thus the costs for treatment. The City is also undergoing a collection system capacity study which is needed to determine how much flow can be sent into their system and whether further infrastructure improvements will be needed. This will likely result in additional costs for Yankton County should wastewater be sent into the City. A phased approach to the project may be beneficial for both parties to maximize the existing capacity in the City of Yankton's system.

This amendment also provides costs estimates for two additional basins: Napa Junction/Highway 50 and Highway 314 assuming the wastewater is sent to the City of Yankton for treatment. The cost estimate for Napa Junction/Highway 50 is approximately \$9,000,000. The cost estimate for Highway 314 is approximately \$15,000,000.

INTRODUCTION

PURPOSE OF AMENDMENT

This amendment is an update to the sanitary sewer feasibility study completed by Eisenbruan & Associates in October 2008. Eisenbruan & Associates has been acquired by Stockwell Engineers and continues to operate the office located in Yankton, SD.

Much of the information and recommendations presented in the 2008 study is still valid today. Cost estimates and graphics are outdated. This amendment updates estimated construction costs and figures throughout the study. An additional study areas have also been added into include Napa Junction and Highway 314. Furthermore, the original wastewater treatment recommendation is to send to the City of Yankton for treatment. A meeting between Stockwell Engineers and the City of Yankton was held to discuss the current feasibility of this alternative. This feasibility will be discussed in this amendment.

UPDATED FIGURES

BACKGROUND

The following figures have been recreated from the 2008 Study. Today's computers are capable of higher graphic resolutions which provide better visual clarity and ease of understanding. Subbasins have been adjusted to reflect changes in property boundaries and the proposed collection systems.

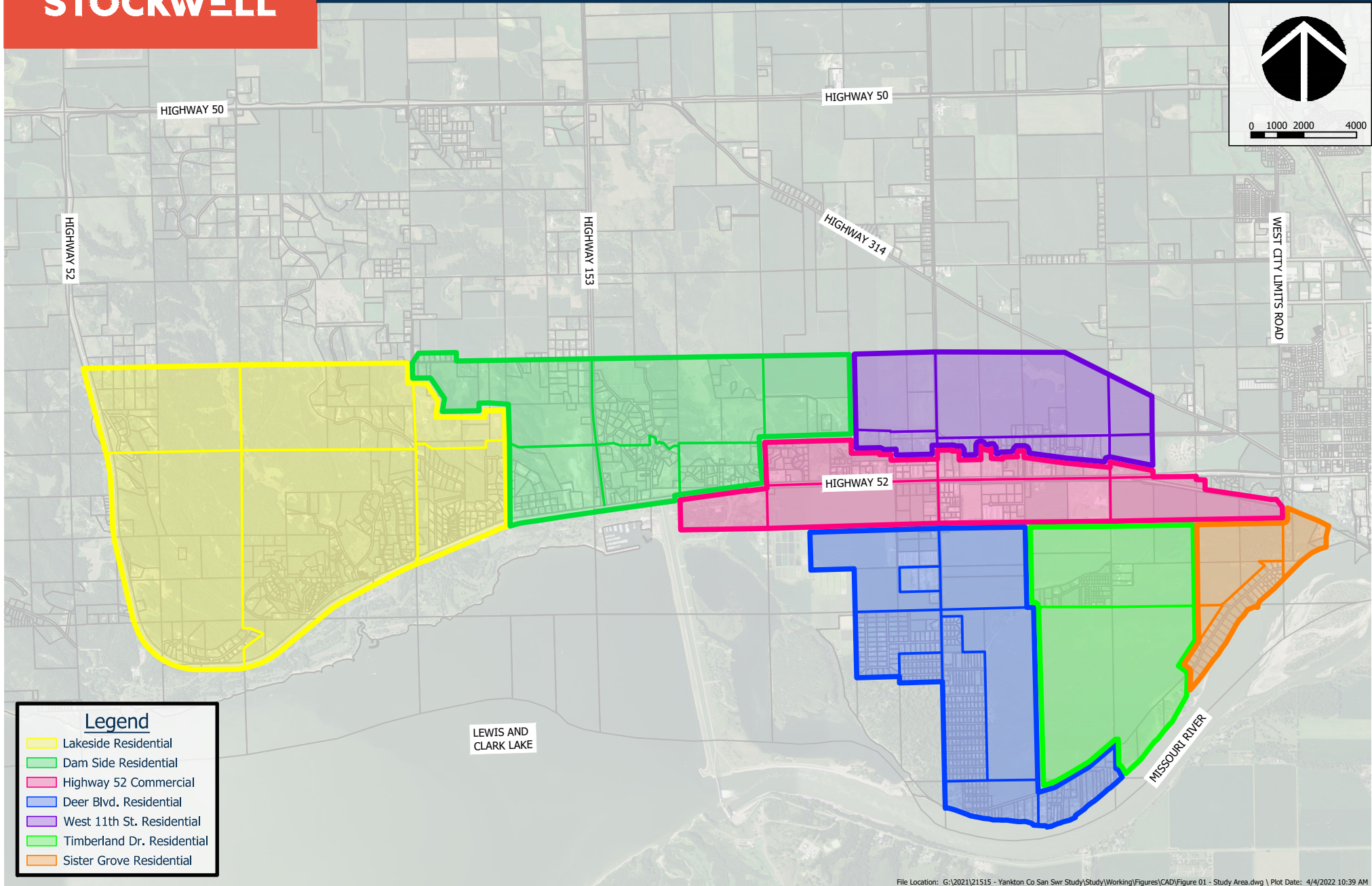


Figure 1
Update to "Figure 1. Study Area Sanitary Sewer Basins"



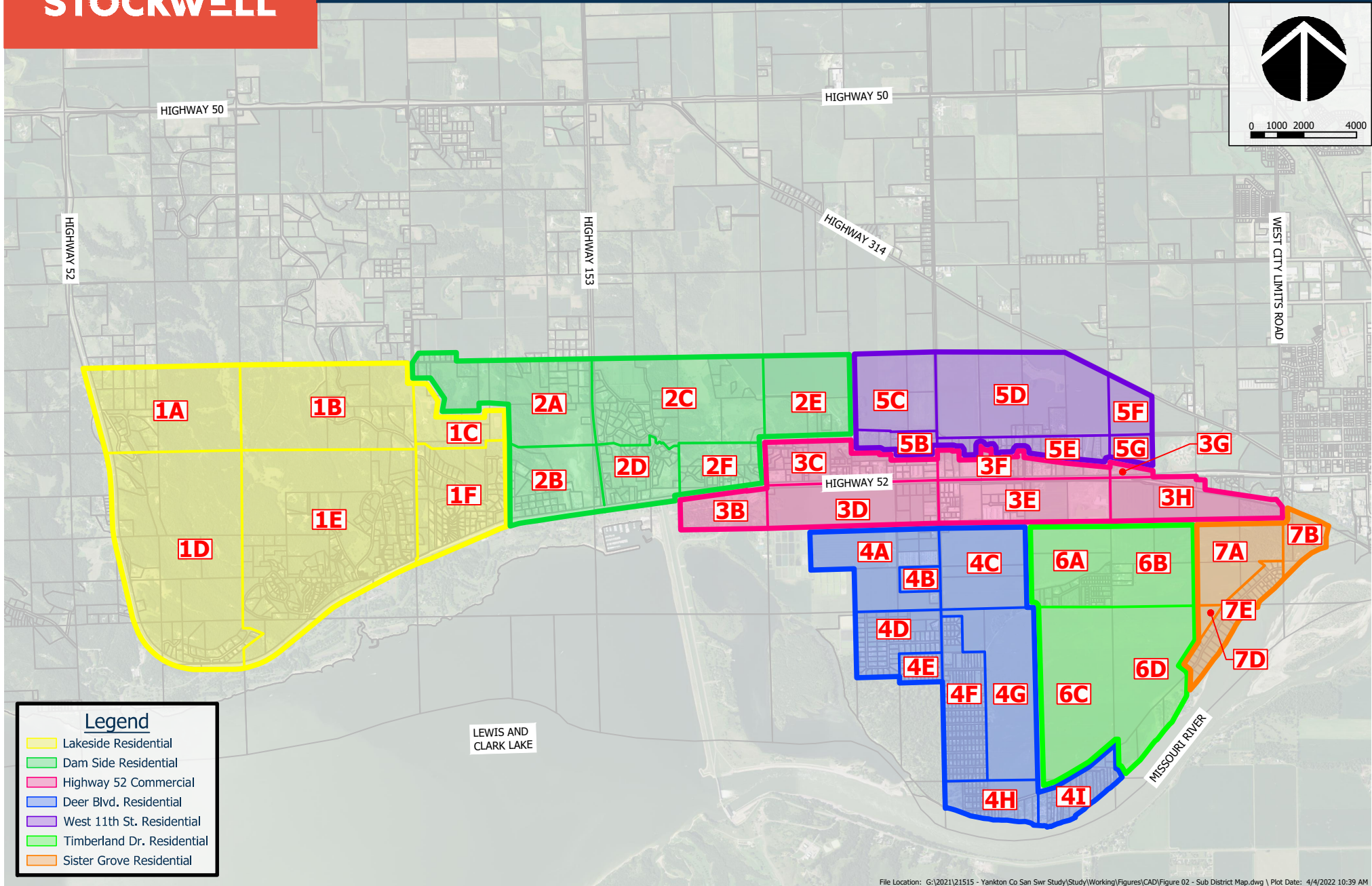


Figure 2
Update to “Figure 5. Overall Sub District Map”



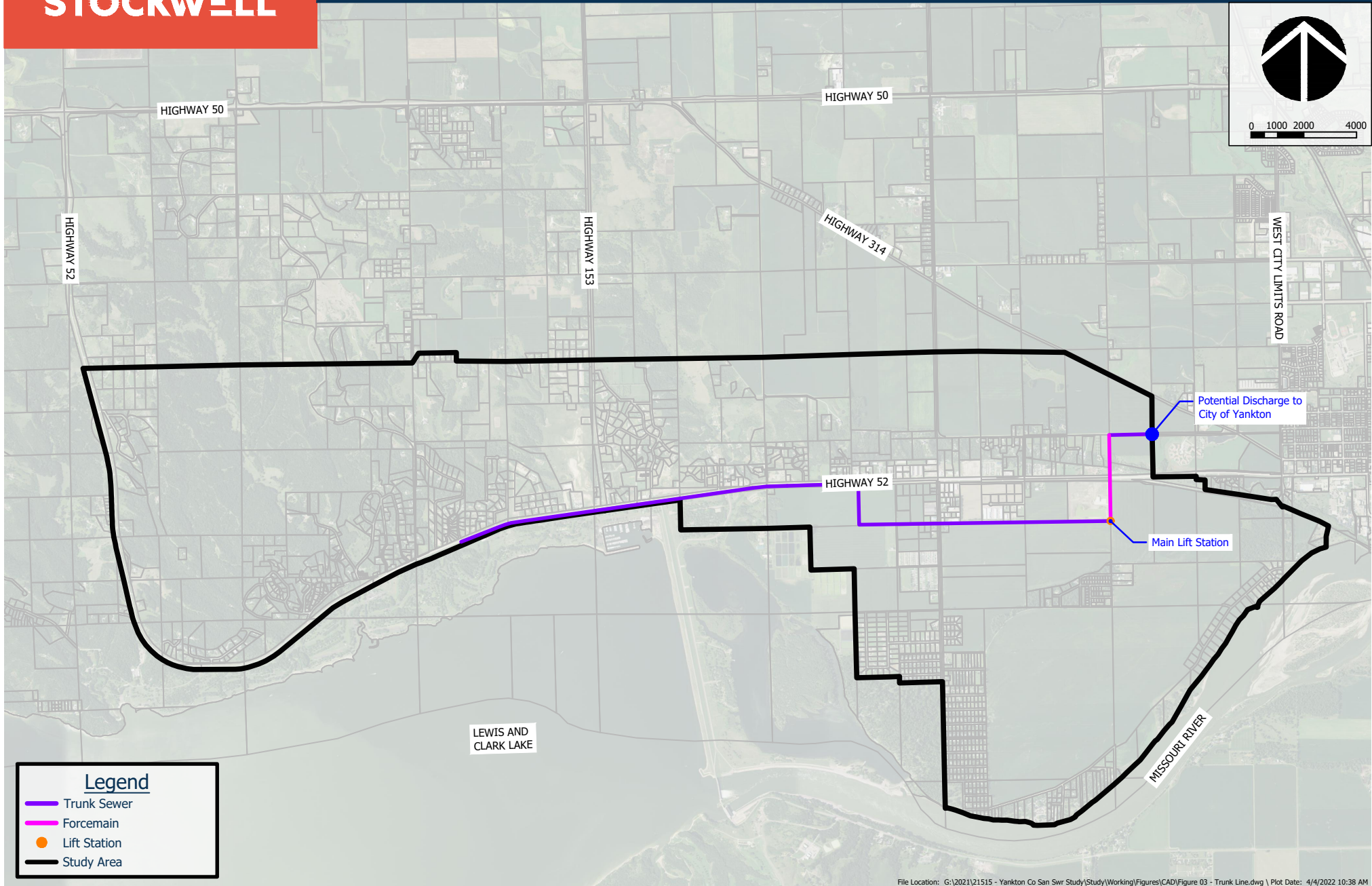


Figure 3
Update to "Figure 9. Sanitary Sewer Trunk Line Route"



Figure 4 – Update to “Appendix 1.1. Overall Sub District Map”

See Figure 2. Figure 4 is identical to Figure 2.

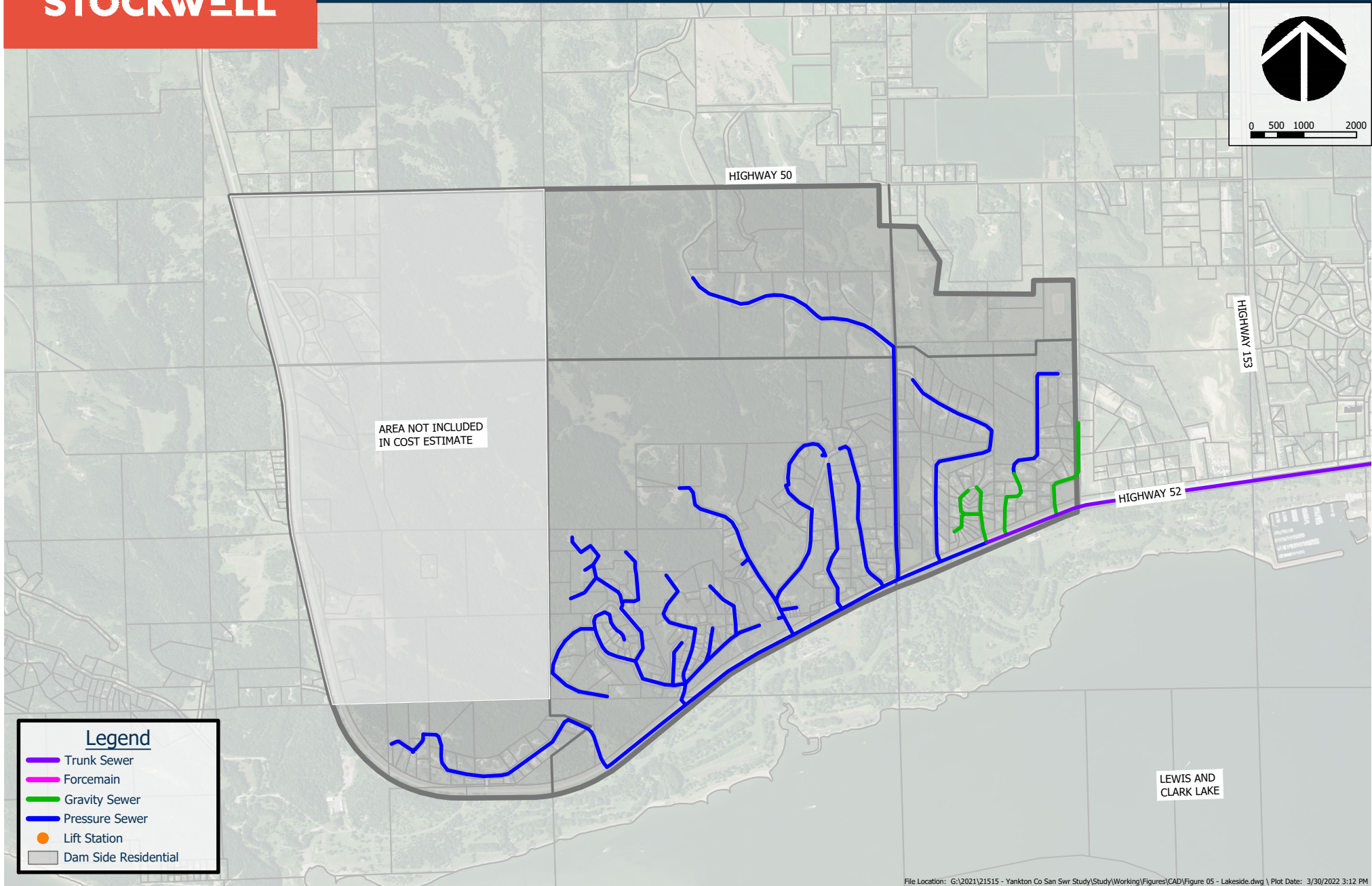


Figure 5
Update to "Appendix 1.2. Lakeside Residential Subbasin"



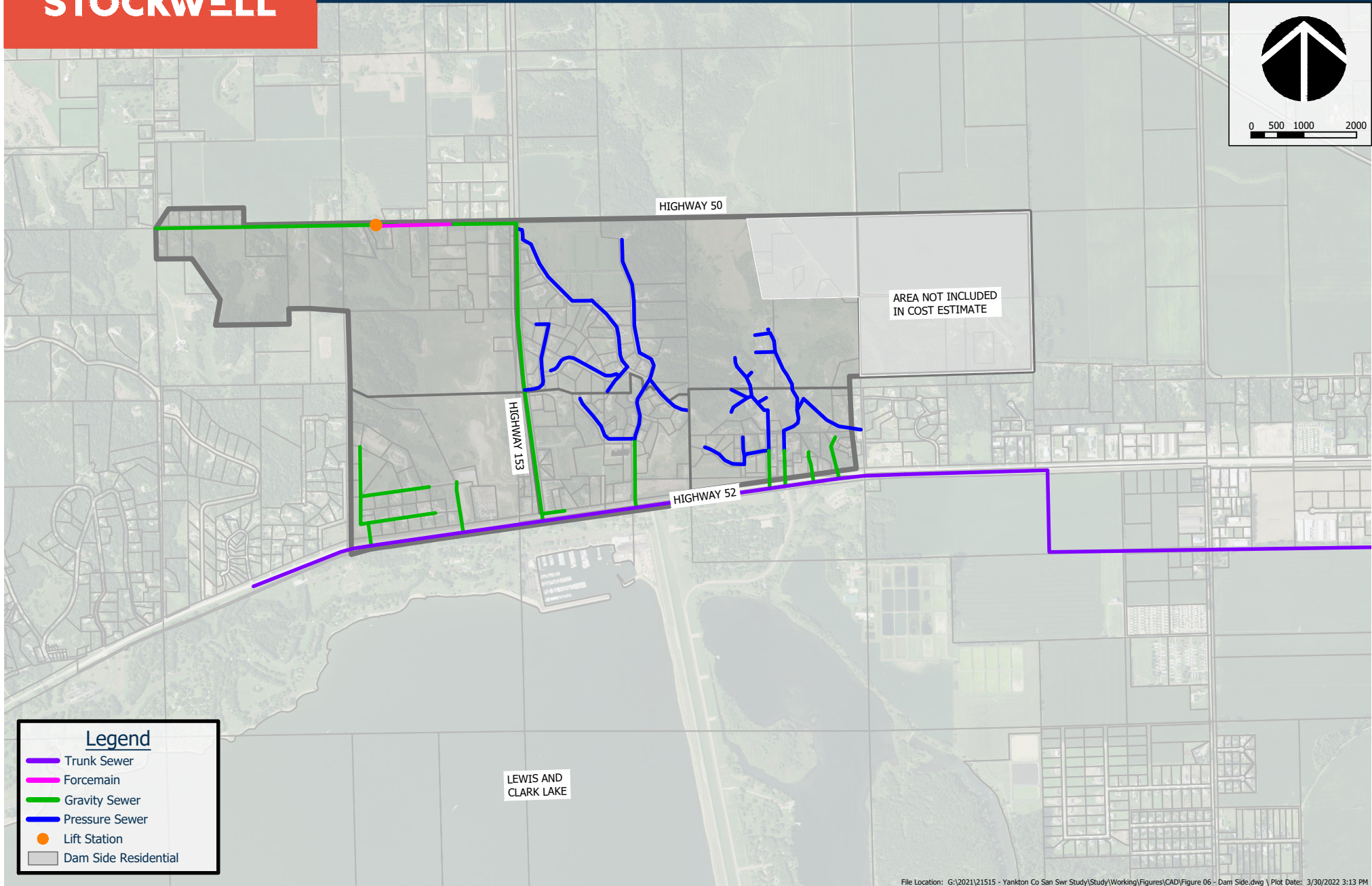
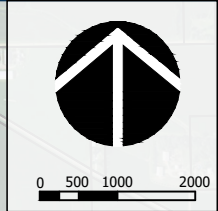
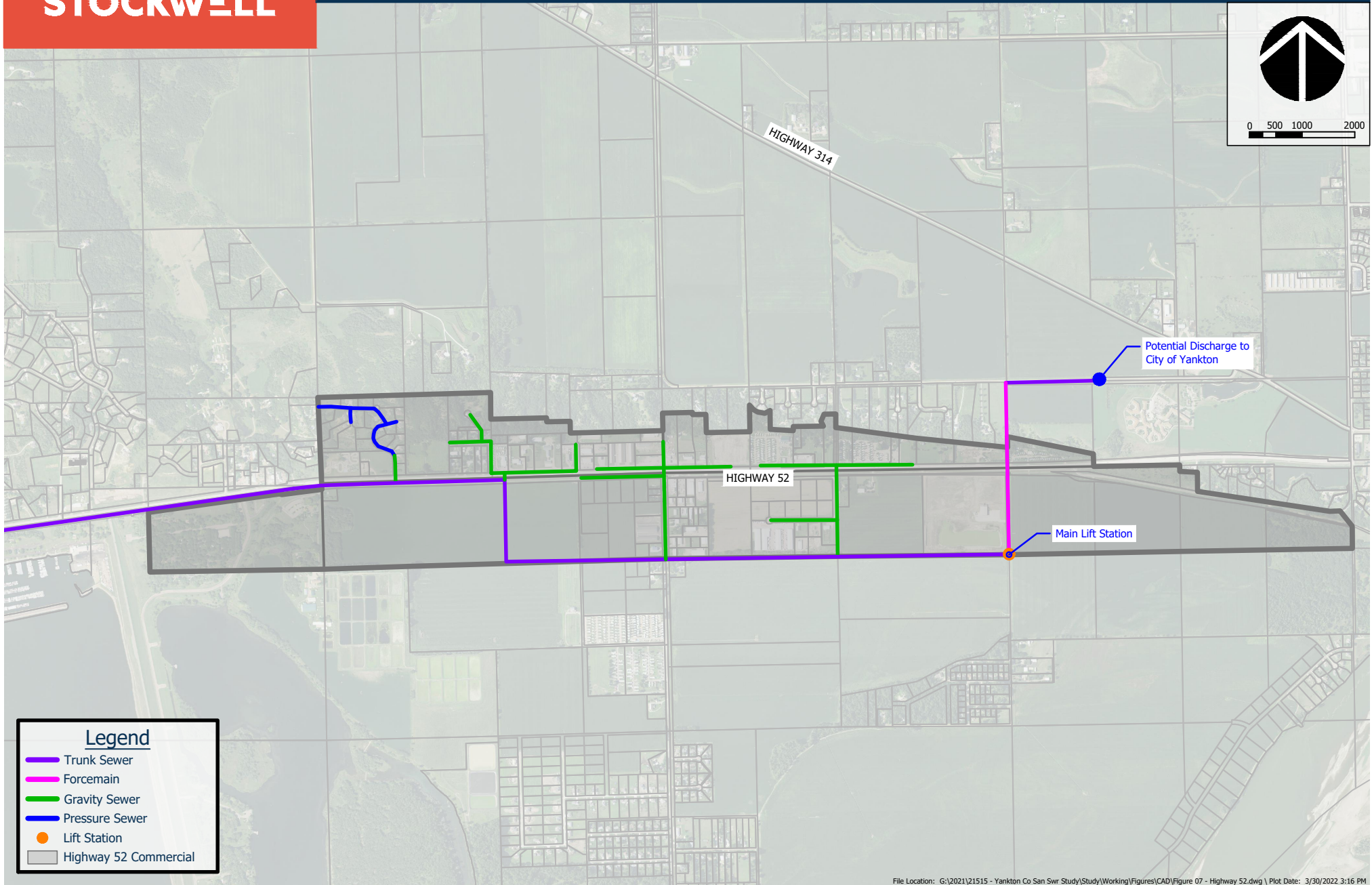


Figure 6
Update to "Appendix 1.3. Dam Side Residential Subbasin"





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Figure 7
Update to "Appendix 1.4. Highway 52 Commercial Subbasin"



3/28/2022 SEI#21515

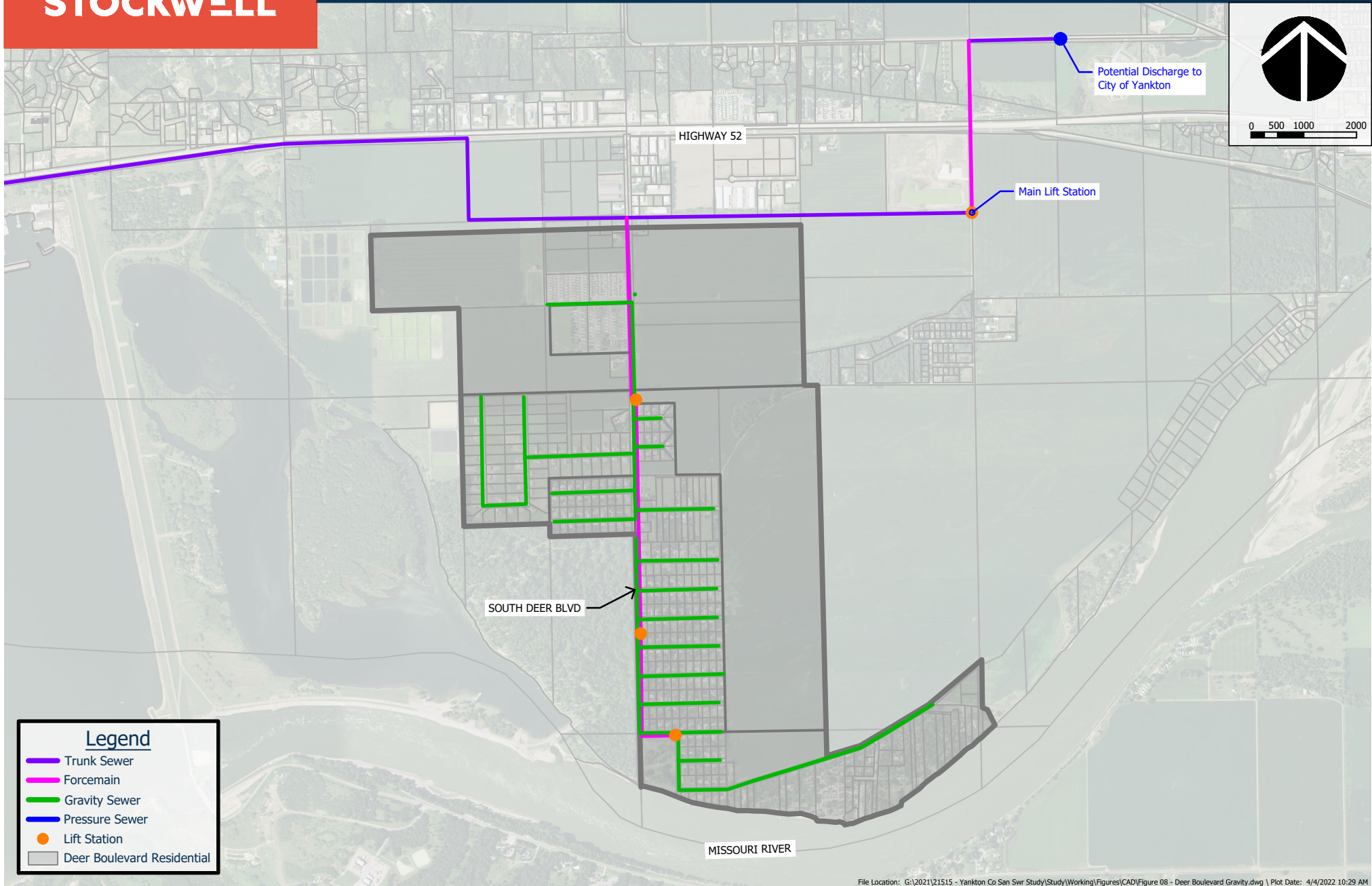


Figure 8
Update to "Appendix 1.5.a. Deer Boulevard Residential Subbasin Gravity System Alternative"



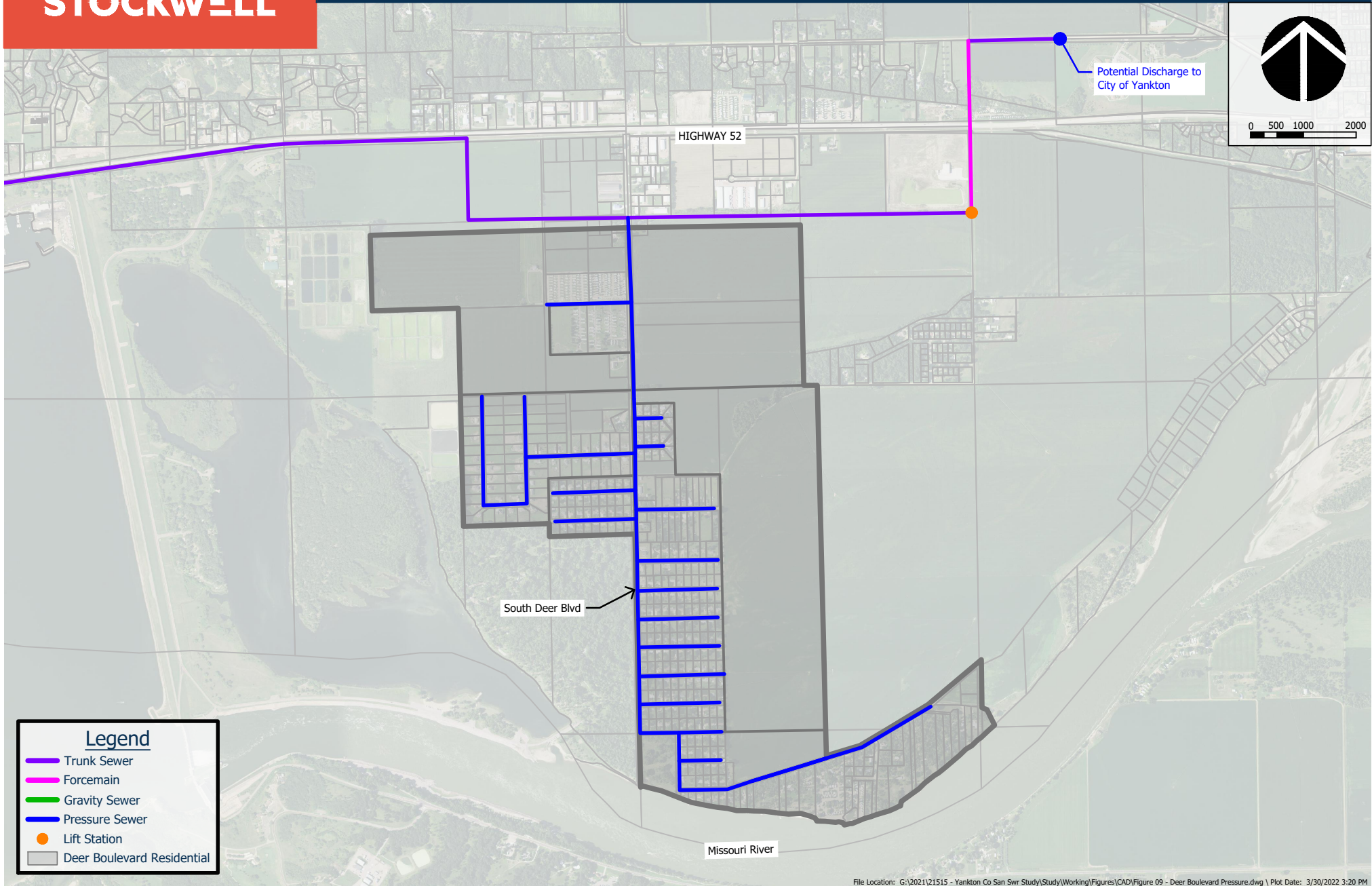


Figure 9
Update to "Appendix 1.5.b. Deer Boulevard Residential Subbasin Pressure System Alternative"



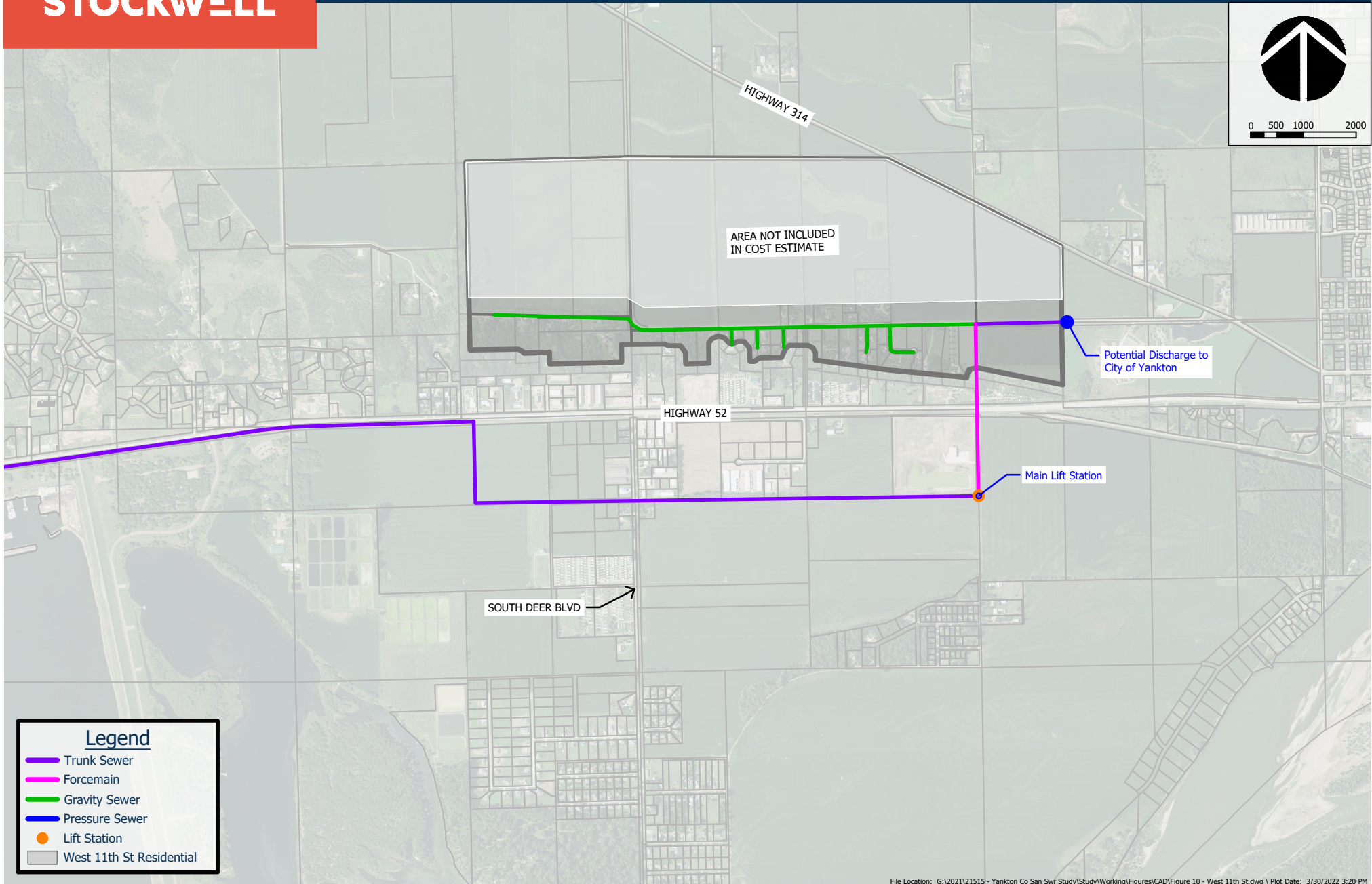


Figure 10

Update to "Appendix 1.6. West 11th Street Residential Subbasin"



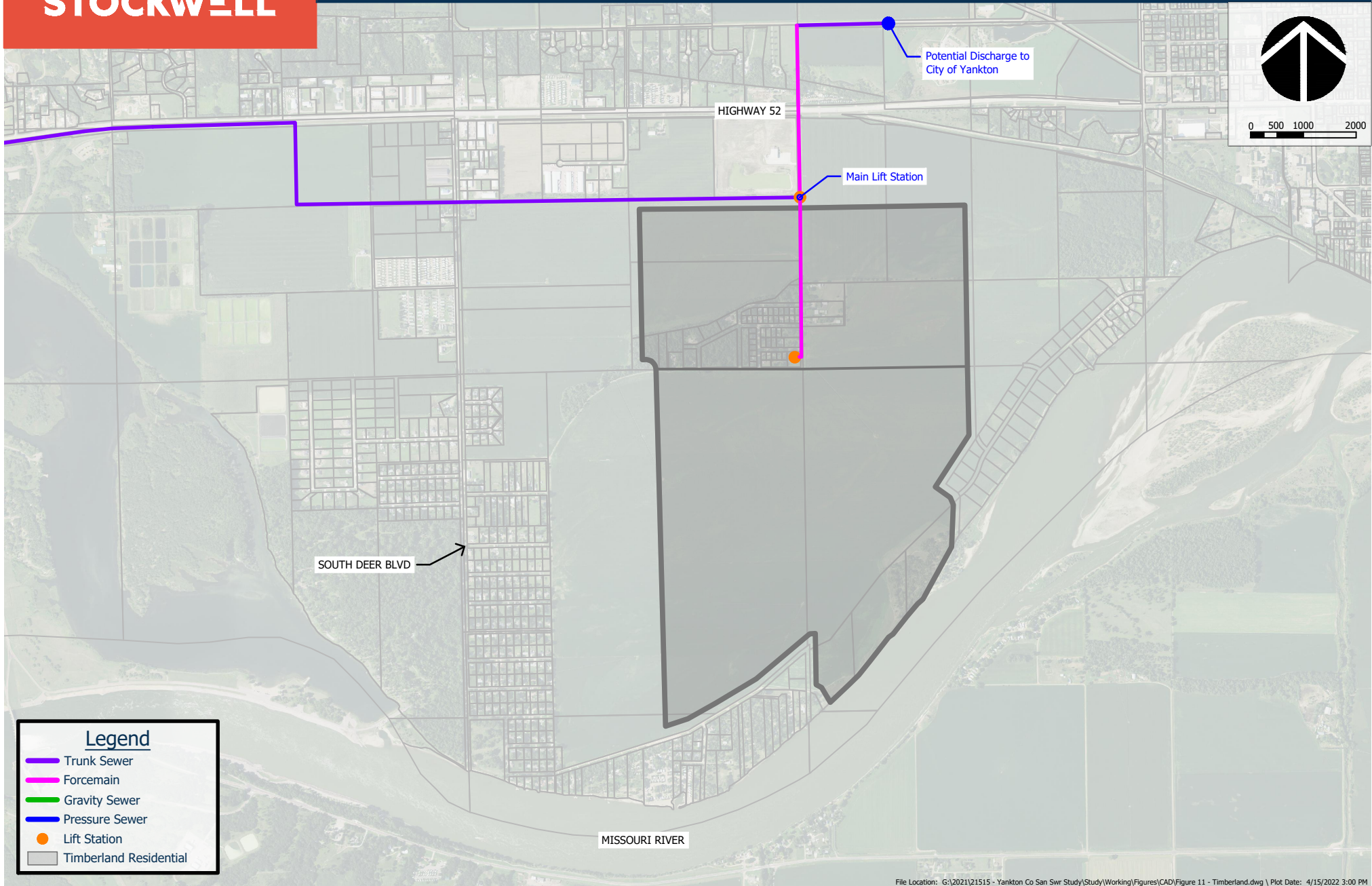


Figure 11
Update to "Appendix 1.7. Timberland Drive Residential Subbasin"



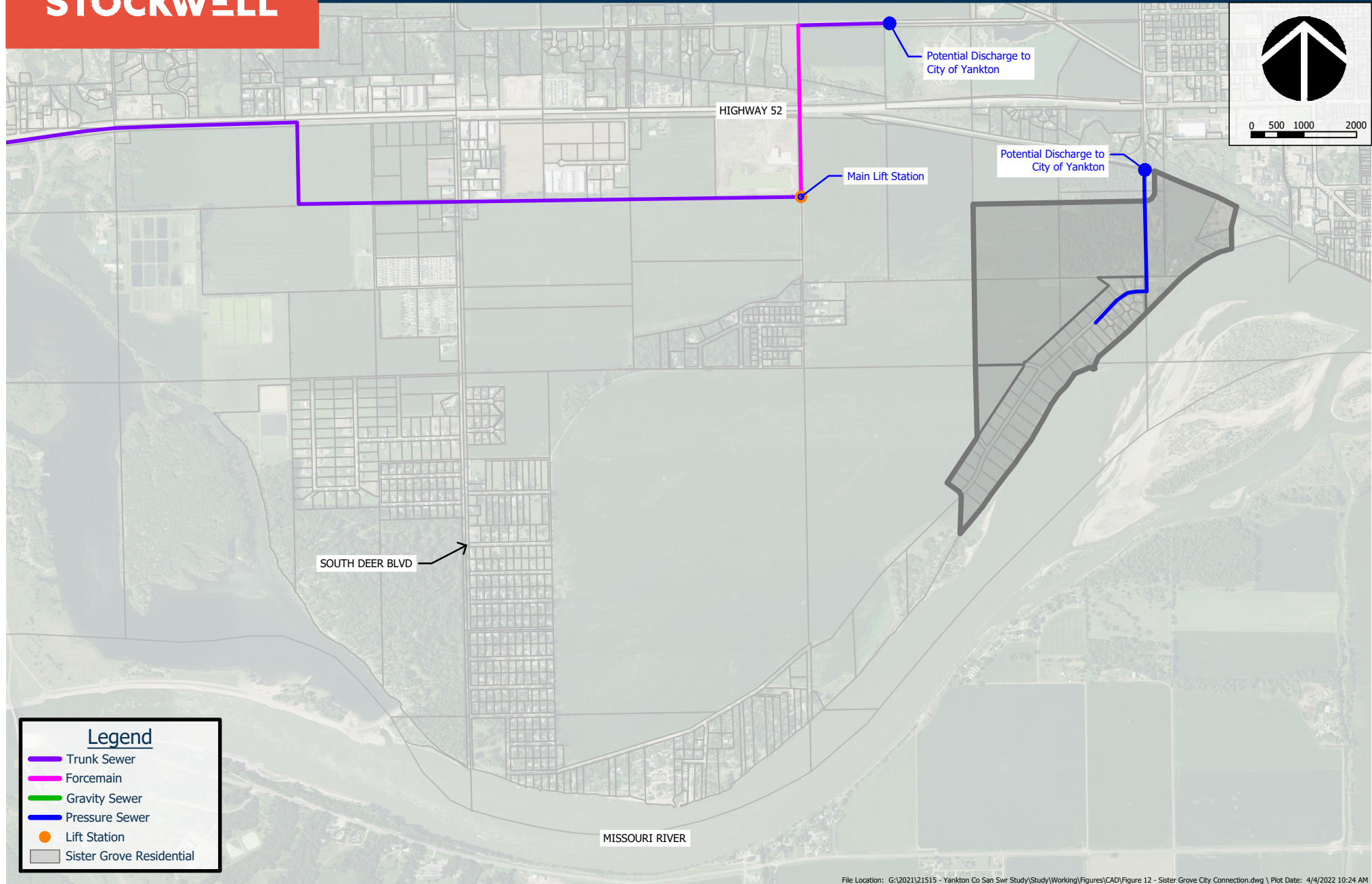


Figure 12

Update to "Appendix 1.8.a. Sister Grove Residential Subbasin Tie into City of Yankton Alternative"



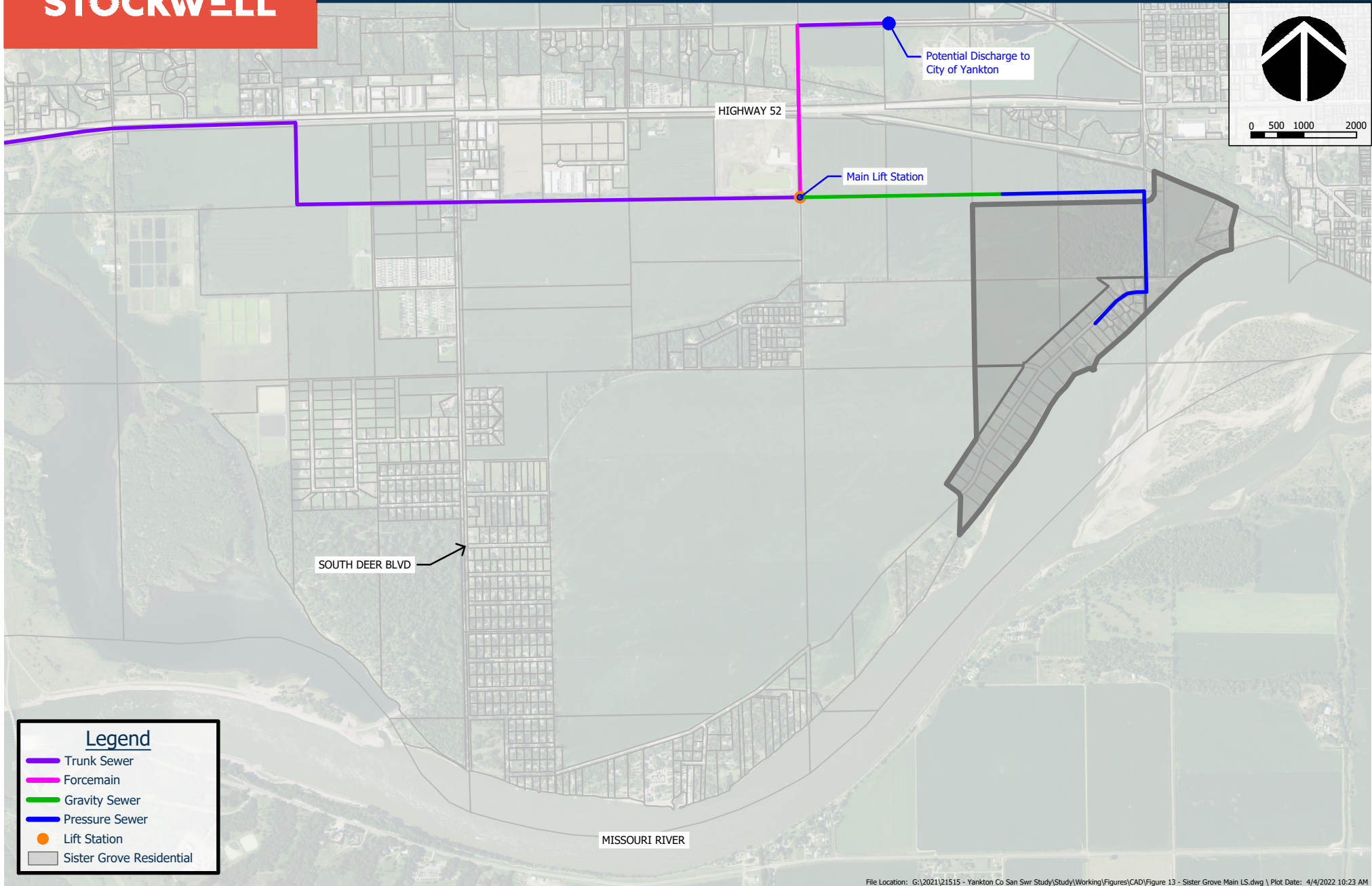


Figure 13

Update to "Appendix 1.8.b. Sister Grove Residential Subbasin Tie into Main Lift Station Alternative"



POPULATION ESTIMATE

INTRODUCTION

The 2008 Study based on population estimate in 2008 as well as a projected numbers in 2030 and the fully built (“ultimate”) study area. New population projections are made as part of this amendment. The updated population projections have the following key distinctions from the 2008 study:

- The projection population growth rate is approximately 2.3% per year. Actual population growth is from 2008 through 2020 is minimal.
- The West 11th St. Subbasins 5C, 5D, 5F naturally drain to the northeast and are no longer considered a part of the study area. An alternate collection and treatment method is proposed later in this study.
- Current development density in the Deer Boulevard subdistrict is approximately 0.6 acres per lot which is significantly denser than what is used in the “potential lots” determined in the 2008 study. 0.6 acres per lot is assumed for the Deer Boulevard, Timberland Drive and Sister Grove subdistricts.
- The population projections have been adjusted by changing the term from “Lots” (see Table 1 in 2008 Study) to “2022 Living Units”. The population per living unit is 2.43 which is the same value used in the 2008 study for population per lot. This has been done for two reason. First, there are numerous “existing lots” in the 2008 study that have no structure observed in aerial photography but were still assigned a population. These lots have changed to “Ultimate Living Units.” Second, there are a considerable number of RV parks constructed in the study area. The number of living units for an RV park to been assumed to be equal to one half of the estimated number of campsites at each park.

UPDATED POPULATION PROJECTION

US Decennial Census lists a population total for Yankton County of 22,438 in 2010 and 23,310 in 2020. This is a 10-year growth of 872 persons. The population for the City of Yankton was 14,454 in 2010 and 15,411 in 2020. This is a 10-year growth of 957 persons. The population growth in the City of Yankton is greater than the population for the rest of Yankton County. This suggests that the population in Yankton County is declining; however, there are several other communities within Yankton County that can be compared. These communities include Yankton City, Irene, Gayville,

Lesterville, Mission Hill Utica and Volin. The 2010 and 2020 census data are summarized in the following table.

Table 1 – Yankton County Community Census Data

Census Year	Population							
	Yankton City	Irene	Gayville	Lesterville	Mission Hill	Utica	Volin	Total
2010	14,454	2	407	127	386	859	233	16,468
2020	15,411	4	382	115	379	746	261	17,298
Total Change	957	2	-25	-12	-7	-113	28	830

The total population change for all the communities within Yankton County is 830 whereas the total population change for the entire Yankton County is 872. In reviewing aerial photography between 2010 and 2020, some additional development has occurred; however, the growth has been minimal. Given the proximity of the study area to the City of Yankton and the fact that the City of Yankton is growing, it is reasonable to anticipate some growth within the study area. It is also important to consider that constructing a sanitary sewer collection and treatment system is a significant investment with an expected life of over 50 years. Projecting no growth will essentially leave the system at capacity on day one and severely restrict any future development in the basin. Future development will reduce operation and maintenance costs on a per person basis. Therefore, it is our recommendation to project a 25-year design life at an annual growth rate of 1.5%. Cost estimates for the trunk sewer lines are based on the ultimate basin population whereas costs for the main lift station and forcemain are based on the 25-year design life.

The updated population project is shown in the following table.

POPULATION ESTIMATE

Table 2 – Updated Population and Flow Projections

Subdistrict Name	Sub Basin	2022 Living Units	2022 Population	2022 Flow (gpd)	2047 Living Units	2047 Population	2047 Flow (gpd)	Ultimate Living Units	Ultimate Population	Ultimate Flow (gpd)
Lakeside Residential	1A	15	36	3,645	22	53	5,289	27	66	6,561
Lakeside Residential	1B	9	22	2,187	13	32	3,173	21	51	5,103
Lakeside Residential	1C	1	2	243	1	4	353	1	2	243
Lakeside Residential	1D	39	95	9,477	57	138	13,751	51	124	12,393
Lakeside Residential	1E	168	408	40,824	244	592	59,233	233	566	56,619
Lakeside Residential	1F	63	153	15,309	91	222	22,213	101	245	24,543
Subtotal		295	717	71,685	428	1,040	104,011	434	1,055	105,462
Dam Side Residential	2A	16	39	3,888	23	56	5,641	36	87	8,748
Dam Side Residential	2B	48	117	11,664	70	169	16,924	120	292	29,160
Dam Side Residential	2C	63	153	15,309	91	222	22,213	123	299	29,889
Dam Side Residential	2D	80	194	19,440	116	282	28,206	101	245	24,543
Dam Side Residential	2E	3	7	729	4	11	1,058	148	360	35,964
Dam Side Residential	2F	103	250	25,029	149	363	36,316	117	284	28,431
Subtotal		313	761	76,059	454	1,104	110,357	645	1,567	156,735
Highway 52 Commercial	3A	NA	NA	NA	NA	NA	NA	NA	NA	NA
Highway 52 Commercial	3B	1	2	243	1	4	353	1	2	243
Highway 52 Commercial	3C	46	112	11,178	67	162	16,219	69	168	16,767
Highway 52 Commercial	3D	6	15	1,458	9	21	2,115	172	418	41,796
Highway 52 Commercial	3E	26	63	6,318	38	92	9,167	79	192	19,197
Highway 52 Commercial	3F	85	207	20,655	123	300	29,969	129	313	31,347
Highway 52 Commercial	3G	20	49	4,860	29	71	7,052	20	49	4,860
Highway 52 Commercial	3H	0	0	0	0	0	0	61	148	14,823
Subtotal		184	447	44,712	267	649	64,875	531	1,290	129,033
Deer Boulevard Residential	4A	77	187	18,711	112	271	27,149	364	885	88,452
Deer Boulevard Residential	4B	65	158	15,795	94	229	22,918	99	241	24,057
Deer Boulevard Residential	4C	2	5	486	3	7	705	269	654	65,367
Deer Boulevard Residential	4D	45	109	10,935	65	159	15,866	83	202	20,169
Deer Boulevard Residential	4E	40	97	9,720	58	141	14,103	40	97	9,720
Deer Boulevard Residential	4F	156	379	37,908	226	550	55,002	190	462	46,170
Deer Boulevard Residential	4G	0	0	0	0	0	0	350	851	85,050
Deer Boulevard Residential	4H	45	109	10,935	65	159	15,866	86	209	20,898
Deer Boulevard Residential	4I	63	153	15,309	91	222	22,213	90	219	21,870
Subtotal		493	1,198	119,799	715	1,738	173,822	1,571	3,818	381,753
West 11th Residential	5A	NA	NA	NA	NA	NA	NA	NA	NA	NA
West 11th Residential	5B	4	10	972	6	14	1,410	4	10	972
West 11th Residential	5C	NA	NA	NA	NA	NA	NA	NA	NA	NA
West 11th Residential	5D	NA	NA	NA	NA	NA	NA	NA	NA	NA
West 11th Residential	5E	26	63	6,318	38	92	9,167	32	78	7,776
West 11th Residential	5F	NA	NA	NA	NA	NA	NA	NA	NA	NA
West 11th Residential	5G	0	0	0	0	0	0	48	117	11,664
Subtotal		30	73	7,290	44	106	10,577	84	204	20,412
Timberland Drive	6A	47	114	11,421	68	166	16,571	255	620	61,965
Timberland Drive	6B	3	7	729	4	11	1,058	253	615	61,479
Timberland Drive	6C	0	0	0	0	0	0	460	1,118	111,780
Timberland Drive	6D	0	0	0	0	0	0	387	940	94,041
Timberland Drive	6E	NA	NA	NA	NA	NA	NA	NA	NA	NA
Subtotal		50	122	12,150	73	176	17,629	1,355	3,293	329,265
Sister's Grove Residential	7A	0	0	0	0	0	0	207	503	50,301
Sister's Grove Residential	7B	3	7	729	4	11	1,058	36	87	8,748
Sister's Grove Residential	7C	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sister's Grove Residential	7D	0	0	0	0	0	0	16	39	3,888
Sister's Grove Residential	7E	13	32	3,159	19	46	4,584	48	117	11,664
Subtotal		16	39	3,888	23	56	5,641	307	746	74,601
Totals		1,381	3,356	335,583	2,004	4,869	486,913	4,927	11,973	1,197,261

MEETING WITH THE CITY OF YANKTON

MEETING ON FEBRUARY 9, 2022

Stockwell held a meeting with City of Yankton staff on February 9th, 2022, to discuss the study and the possibility of sending wastewater to the City of Yankton for treatment. The following persons were in attendance:

- Kyle Goodmanson, Director of Environmental Services – City of Yankton
- Adam Haberman, Public Works Director – City of Yankton
- Dave Mingo, Community Development Director – City of Yankton
- Aaron Moen, PE – Stockwell Engineers
- Ryan Truax, PE – Stockwell Engineers
- Eric Derickson, PE – Stockwell Engineers

Stockwell provided a PowerPoint summary of the 2008 Study and the scope of the 2022 amendment. The key conclusions from the meeting are as follows:

- The City of Yankton staff are generally supportive of the idea for Yankton County to send wastewater to the City of Yankton.
- Depending on the wastewater flows and loading, the City of Yankton may need to upgrade infrastructure to effectively convey and treat the wastewater.
- City Staff's position is that any costs incurred for these infrastructure upgrades must be "cost-neutral" between Yankton County and the City of Yankton.
- The City of Yankton is currently pursuing wastewater treatment facility upgrades. A collection system capacity study is also ongoing. The collection system capacity study must be completed before costs of sending wastewater to the City of Yankton can be fully evaluated.
- All proposed connections to the City of Yankton proposed in this study are into 15-inch diameter trunk sewers.

COST EVALUATION

INTRODUCTION

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. It should be noted that these are only estimates and are not a guarantee of the actual construction costs. Actual field measurements will be taken during the design phase to complete a more accurate estimate. Contract prices can be affected by project location, contractor workload, 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. Construction prices are currently experiencing significant inflation and the current estimates reflect publicly bid projects in the spring of 2022.

EQUIVALENT UNIFORM ANNUAL COST

When choosing the most cost-effective solution to a problem, you must consider the initial cost and the long-term cost. The alternative with the cheapest initial cost may not be the most cost effective alternative when operation and maintenance cost are considered. The capital cost and equivalent uniform annual cost (EUAC) are both provided for all 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% except for land which will be salvaged at 100%. For annual operation and maintenance costs, it is assumed costs will increase annually at the rate of inflation. Therefore, the net present worth of these costs is simply the annual cost times the 20-year period. The EUAC will provide the owner with the best long-term solution.

COLLECTION SYSTEM ALTERNATIVES

This section contains updated cost estimates for the collections system alternates in each subdistrict from the 2008 Study. It also includes two phases of trunks sewer installation as well as main lift station. The cost estimates are summarized at the end of this section.

Table 3: 2.1 - Lakeside Residential Area - Updated Cost Estimate

ITEM	QUANTITY	UNIT PRICE	PRICE
2.5" Pressurized Sewer Main	LF 27,364	\$30.00	\$820,928
3" Pressurized Sewer Main	LF 13,860	\$35.00	\$485,097
4" Pressurized Sewer Main	LF 2,752	\$37.00	\$101,833
6" Pressurized Sewer Main	LF 7,611	\$42.00	\$319,644
2.5" - 4" Isolation Valve w/ box	Each 61	\$2,500.00	\$152,500
6" Isolation Valve w/ box	Each 20	\$3,600.00	\$72,000
Pressure Sewer Service Package	Each 295	\$14,500.00	\$4,277,500
Vacuum / Air Release Valve	Each 20	\$3,500.00	\$70,000
Clean-out	Each 28	\$2,500.00	\$70,000
Gravel Surfacing	Ton 280	\$26.00	\$7,280
Subtotal			\$6,376,782
Contingencies (30%)			\$1,913,100
Total Estimated Construction Costs			\$8,289,882
Design & Construction Admin			\$1,658,000
TOTAL PROJECT COSTS			\$9,947,882

Table 4: 2.1 - Lakeside Residential Area – EUAC

ITEM	PRICE	SALVAGE VALUE	PRESENT WORTH OF SALVAGE	NET PRESENT WORTH
2.5" Pressurized Sewer Main	\$820,928	\$492,557	\$272,717	\$548,212
3" Pressurized Sewer Main	\$485,097	\$291,058	\$161,152	\$323,945
4" Pressurized Sewer Main	\$101,833	\$61,100	\$33,829	\$68,004
6" Pressurized Sewer Main	\$319,644	\$191,787	\$106,188	\$213,457
2.5" - 4" Isolation Valve w/ box	\$152,500	\$91,500	\$50,661	\$101,839
6" Isolation Valve w/ box	\$72,000	\$43,200	\$23,919	\$48,081
Pressure Sewer Service Package	\$4,277,500	\$2,566,500	\$1,421,009	\$2,856,491
Vacuum / Air Release Valve	\$70,000	\$42,000	\$23,254	\$46,746
Clean-out	\$70,000	\$42,000	\$23,254	\$46,746
Gravel Surfacing	\$7,280	\$0	\$0	\$7,280
Remaining Capital Costs	\$3,571,100	\$0	\$0	\$3,571,100
Total Construction Cost	\$9,947,882	\$3,821,701	\$2,115,983	\$7,831,899

Annual Operation and Maintenance Cost

Description	Annual Cost	Net Present Worth
Equipment	\$2,500	\$50,000
Supplies	\$1,000	\$20,000
Utilities	\$0	\$0
Labor	\$10,000	\$200,000
Total Annual Cost	\$13,500	\$270,000
Total Net Present Worth		\$8,101,899
EUAC		\$544,575

COST EVALUATION

Table 5: 2.2 – Dam Side Residential Area - Updated Cost Estimate

ITEM	QUANTITY	UNIT PRICE	PRICE
2" Force Main	LF 19,500	\$30.00	\$585,000
2" Isolation Valve w/ box	Each 24	\$1,500.00	\$36,000
Pressure Sewer Service Package	Each 200	\$14,500.00	\$2,900,000
Vacuum / Air Release Valve	Each 16	\$3,500.00	\$56,000
Clean-out	Each 32	\$2,500.00	\$80,000
8" PVC Sewer Main	LF 18,000	\$80.00	\$1,440,000
48" RCP Manhole	Each 51	\$6,500.00	\$331,500
Gravity Sewer Service Connection	Each 113	\$8,200.00	\$926,600
Package Lift Station	Each 1	\$180,000.00	\$180,000
4" Force Main	LF 1,150	\$37.00	\$42,550
Back-up Generator	LS 1	\$20,000.00	\$20,000
Gravel Surfacing	Ton 280	\$26.00	\$7,280
Subtotal			\$6,604,930
Contingencies (30%)			\$1,981,500
Total Estimated Construction Costs			\$8,586,430
Design & Construction Admin			\$1,717,000
TOTAL PROJECT COSTS			\$10,303,430

Table 6: 2.2 – Dam Side Residential Area – EUAC

ITEM	PRICE	SALVAGE VALUE	PRESENT WORTH OF SALVAGE	NET PRESENT WORTH
2" Force Main	\$585,000	\$351,000	\$194,340	\$390,660
2" Isolation Valve w/ box	\$36,000	\$21,600	\$11,959	\$24,041
Pressure Sewer Service Package	\$2,900,000	\$1,740,000	\$963,396	\$1,936,604
Vacuum / Air Release Valve	\$56,000	\$33,600	\$18,604	\$37,396
Clean-out	\$80,000	\$48,000	\$26,576	\$53,424
8" PVC Sewer Main	\$1,440,000	\$864,000	\$478,376	\$961,624
48" RCP Manhole	\$331,500	\$198,900	\$110,126	\$221,374
Gravity Sewer Service Connection	\$926,600	\$555,960	\$307,822	\$618,778
Package Lift Station	\$180,000	\$108,000	\$59,797	\$120,203
4" Force Main	\$42,550	\$25,530	\$14,135	\$28,415
Back-up Generator	\$20,000	\$12,000	\$6,644	\$13,356
Gravel Surfacing	\$7,280	\$0	\$0	\$7,280
Remaining Capital Costs	\$3,698,500	\$0	\$0	\$3,698,500
Total Construction Cost	\$10,303,430	\$3,958,590	\$2,191,775	\$8,111,655

Annual Operation and Maintenance Cost

Description	Annual Cost	Net Present Worth
Equipment	\$2,500	\$50,000
Supplies	\$1,000	\$20,000
Utilities	\$0	\$0
Labor	\$10,000	\$200,000
Total Annual Cost	\$13,500	\$270,000
Total Net Present Worth		\$8,381,655
EUAC		\$563,379

COST EVALUATION

Table 7: 2.3 – Highway 52 Commercial Area - Updated Cost Estimate

ITEM	QUANTITY	UNIT PRICE	PRICE
8" PVC Sewer Main	LF 14,000	\$80.00	\$1,120,000
Gravity Sewer Service Connection	Each 164	\$8,200.00	\$1,344,800
48" RCP Manhole	Each 40	\$6,500.00	\$260,000
2" Force Main	LF 2,500	\$30.00	\$75,000
2" Isolation Valve w/ box	Each 3	\$1,500.00	\$4,500
Pressure Sewer Service Package	Each 20	\$14,500.00	\$290,000
Gravel Surfacing	Ton 400	\$26.00	\$10,400
Subtotal			\$3,104,700
Contingencies (30%)			\$931,500
Total Estimated Construction Costs			\$4,036,200
Design & Construction Admin			\$807,000
TOTAL PROJECT COSTS			\$4,843,200

Table 8: 2.3 – Highway 52 Commercial Area – EUAC

ITEM	PRICE	SALVAGE VALUE	PRESENT WORTH OF SALVAGE	NET PRESENT WORTH
8" PVC Sewer Main	\$1,120,000	\$672,000	\$372,070	\$747,930
Gravity Sewer Service Connection	\$1,344,800	\$806,880	\$446,750	\$898,050
48" RCP Manhole	\$260,000	\$156,000	\$86,373	\$173,627
2" Force Main	\$75,000	\$45,000	\$24,915	\$50,085
2" Isolation Valve w/ box	\$4,500	\$2,700	\$1,495	\$3,005
Pressure Sewer Service Package	\$290,000	\$174,000	\$96,340	\$193,660
Gravel Surfacing	\$10,400	\$0	\$0	\$10,400
Remaining Capital Costs	\$1,738,500	\$0	\$0	\$1,738,500
Total Construction Cost	\$4,843,200	\$1,856,580	\$1,027,943	\$3,815,257

Annual Operation and Maintenance Cost

Description	Annual Cost	Net Present Worth
Equipment	\$0	\$0
Supplies	\$1,000	\$20,000
Utilities	\$0	\$0
Labor	\$5,000	\$100,000
Total Annual Cost	\$6,000	\$120,000
Total Net Present Worth		\$3,935,257
EUAC		\$264,511

COST EVALUATION

Table 9: 2.4.a – Deer Boulevard Residential Area - Updated Cost Estimate

ITEM	QUANTITY	UNIT PRICE	PRICE
Dewatering	LS 1	\$250,000.00	\$250,000
Gravity Sewer Service Connection	Each 455	\$8,200.00	\$3,731,000
Pressure Sewer Service Package	Each 38	\$14,500.00	\$551,000
8" PVC Sewer Main	LF 33,500	\$80.00	\$2,680,000
48" RCP Manhole	Each 96	\$6,500.00	\$624,000
Package Lift Station	Each 3	\$180,000.00	\$540,000
Back-up Generator	Each 3	\$20,000.00	\$60,000
3" Force Main	LF 5,700	\$35.00	\$199,500
4" Force Main	LF 2,800	\$37.00	\$103,600
Subtotal			\$8,739,100
Contingencies (30%)			\$2,621,800
Total Estimated Construction Costs			\$11,360,900
Design & Construction Admin			\$2,272,200
TOTAL PROJECT COSTS			\$13,633,100

Table 10: 2.4.a – Deer Boulevard Residential Area – EUAC

ITEM	PRICE	SALVAGE VALUE	PRESENT WORTH OF SALVAGE	NET PRESENT WORTH
Dewatering	\$250,000	\$0	\$0	\$250,000
Gravity Sewer Service Connection	\$3,731,000	\$2,238,600	\$1,239,459	\$2,491,541
Pressure Sewer Service Package	\$551,000	\$330,600	\$183,045	\$367,955
8" PVC Sewer Main	\$2,680,000	\$1,608,000	\$890,311	\$1,789,689
48" RCP Manhole	\$624,000	\$374,400	\$207,296	\$416,704
Package Lift Station	\$540,000	\$324,000	\$179,391	\$360,609
Back-up Generator	\$60,000	\$36,000	\$19,932	\$40,068
3" Force Main	\$199,500	\$119,700	\$66,275	\$133,225
4" Force Main	\$103,600	\$62,160	\$34,416	\$69,184
Remaining Capital Costs	\$4,894,000	\$0	\$0	\$4,894,000
Total Construction Cost	\$13,633,100	\$5,093,460	\$2,820,125	\$10,812,975

Annual Operation and Maintenance Cost

Description	Annual Cost	Net Present Worth
Equipment	\$3,000	\$60,000
Supplies	\$1,000	\$20,000
Utilities	\$2,000	\$40,000
Labor	\$10,000	\$200,000
Total Annual Cost	\$16,000	\$320,000
Total Net Present Worth		\$11,132,975
EUAC		\$748,311

COST EVALUATION

Table 11: 2.4.b – Deer Boulevard Residential Area - Updated Cost Estimate

ITEM	QUANTITY	UNIT PRICE	PRICE
2.5" Pressurized Sewer Main	LF 2,230	\$30.00	\$66,900
3" Pressurized Sewer Main	LF 23,225	\$35.00	\$812,875
4" Pressurized Sewer Main	LF 2,935	\$37.00	\$108,595
6" Pressurized Sewer Main	LF 7,500	\$42.00	\$315,000
2.5" - 4" Isolation Valve w/ box	Each 19	\$2,500.00	\$47,500
6" Isolation Valve w/ box	Each 17	\$3,600.00	\$61,200
Pressure Sewer Service Package	Each 493	\$14,500.00	\$7,148,500
Vacuum / Air Release Valve	Each 8	\$3,500.00	\$28,000
Clean-out	Each 25	\$2,500.00	\$62,500
Subtotal			\$8,651,070
Contingencies (30%)			\$2,595,400
Total Estimated Construction Costs			\$11,246,470
Design & Construction Admin			\$2,249,300
TOTAL PROJECT COSTS			\$13,495,770

Table 12: 2.4.b – Deer Boulevard Residential Area - EUAC

ITEM	PRICE	SALVAGE VALUE	PRESENT WORTH OF SALVAGE	NET PRESENT WORTH
2.5" Pressurized Sewer Main	\$66,900	\$40,140	\$22,225	\$44,675
3" Pressurized Sewer Main	\$812,875	\$487,725	\$270,042	\$542,833
4" Pressurized Sewer Main	\$108,595	\$65,157	\$36,076	\$72,519
6" Pressurized Sewer Main	\$315,000	\$189,000	\$104,645	\$210,355
2.5" - 4" Isolation Valve w/ box	\$47,500	\$28,500	\$15,780	\$31,720
6" Isolation Valve w/ box	\$61,200	\$36,720	\$20,331	\$40,869
Pressure Sewer Service Package	\$7,148,500	\$4,289,100	\$2,374,771	\$4,773,729
Vacuum / Air Release Valve	\$28,000	\$16,800	\$9,302	\$18,698
Clean-out	\$62,500	\$37,500	\$20,763	\$41,737
Remaining Capital Costs	\$4,844,700	\$0	\$0	\$4,844,700
Total Construction Cost	\$13,495,770	\$5,190,642	\$2,873,933	\$10,621,837

Annual Operation and Maintenance Cost

Description	Annual Cost	Net Present Worth
Equipment	\$2,500	\$50,000
Supplies	\$1,000	\$20,000
Utilities	\$0	\$0
Labor	\$10,000	\$200,000
Total Annual Cost	\$13,500	\$270,000
Total Net Present Worth		\$10,891,837
EUAC		\$732,103

COST EVALUATION

Table 13: 2.5 – West 11th Street Residential Area - Updated Cost Estimate

ITEM	QUANTITY	UNIT PRICE	PRICE
8" PVC Sewer Main	LF 9,500	\$80.00	\$760,000
Gravity Sewer Service Connection	Each 36	\$8,200.00	\$295,200
48" RCP Manhole	Each 28	\$6,500.00	\$182,000
Gravel Surfacing	Ton 1,720	\$26.00	\$44,720
Subtotal			\$1,281,920
Contingencies (30%)			\$384,600
Total Estimated Construction Costs			\$1,666,520
Design & Construction Admin			\$333,300
TOTAL PROJECT COSTS			\$1,999,820

Table 14: 2.5 – West 11th Street Residential Area – EUAC

ITEM	PRICE	SALVAGE VALUE	PRESENT WORTH OF SALVAGE	NET PRESENT WORTH
8" PVC Sewer Main	\$760,000	\$456,000	\$252,476	\$507,524
Gravity Sewer Service Connection	\$295,200	\$177,120	\$98,067	\$197,133
48" RCP Manhole	\$182,000	\$109,200	\$60,461	\$121,539
Gravel Surfacing	\$44,720	\$0	\$0	\$44,720
Remaining Capital Costs	\$717,900	\$0	\$0	\$717,900
Total Construction Cost	\$1,999,820	\$742,320	\$411,005	\$1,588,815

Annual Operation and Maintenance Cost

Description	Annual Cost	Net Present Worth
Equipment	\$0	\$0
Supplies	\$1,000	\$20,000
Utilities	\$0	\$0
Labor	\$5,000	\$100,000
Total Annual Cost	\$6,000	\$120,000
Total Net Present Worth		\$1,708,815
EUAC		\$114,859

COST EVALUATION

TIMBERLAND RESIDENTIAL AREA

During conversations with County and City of Yankton staff, it has been revealed that the existing Timberland lift station is in poor condition. It is assumed that the lift station and forcemain will be replaced.

Table 15: 2.6 – Timberland Drive Residential Area - Updated Cost Estimate

ITEM	QUANTITY	UNIT PRICE	PRICE
Connect to Main Lift Station	Each 1	\$7,500.00	\$7,500
4" Force Main	LF 2,700	\$37.00	\$99,900
Package Lift Station	Each 1	\$180,000.00	\$180,000
Back-up Generator	Each 1	\$20,000.00	\$20,000
Subtotal			\$307,400
Contingencies (30%)			\$92,300
Total Estimated Construction Costs			\$399,700
Design & Construction Admin			\$79,940
TOTAL PROJECT COSTS			\$479,640

Table 16: 2.6 – Timberland Drive Residential Area – EUAC

ITEM	PRICE	SALVAGE VALUE	PRESENT WORTH OF SALVAGE	NET PRESENT WORTH
Connect to Main Lift Station	\$7,500	\$0	\$0	\$7,500
4" Force Main	\$99,900	\$59,940	\$33,187	\$66,713
Package Lift Station	\$180,000	\$108,000	\$59,797	\$120,203
Back-up Generator	\$20,000	\$12,000	\$6,644	\$13,356
Remaining Capital Costs	\$172,240	\$0	\$0	\$172,240
Total Construction Cost	\$479,640	\$179,940	\$99,628	\$380,012

Annual Operation and Maintenance Cost

Description	Annual Cost	Net Present Worth
Equipment	\$1,000	\$20,000
Supplies	\$0	\$0
Utilities	\$1,000	\$20,000
Labor	\$5,000	\$100,000
Total Annual Cost	\$7,000	\$140,000
Total Net Present Worth		\$520,012
EUAC		\$34,953

COST EVALUATION

Table 17: 2.7.a – Sisters Grove Residential Area - Updated Cost Estimate

ITEM	QUANTITY	UNIT PRICE	PRICE
3" Pressurized Sewer Main	LF 3,000	\$35.00	\$105,000
2.5" - 4" Isolation Valve w/ box	Each 10	\$2,500.00	\$25,000
Pressure Sewer Service Package	Each 16	\$14,500.00	\$232,000
3" Force Main Bore	LF 525	\$60.00	\$31,500
Connect to Existing Force Main	Each 1	\$2,500.00	\$2,500
Vacuum / Air Release Valve	Each 2	\$3,500.00	\$7,000
Clean-out	Each 4	\$2,500.00	\$10,000
Subtotal			\$413,000
Contingencies (30%)			\$123,900
Total Estimated Construction Costs			\$536,900
Design & Construction Admin			\$107,400
TOTAL PROJECT COSTS			\$644,300

Table 18: 2.7.a – Sisters Grove Residential Area – EUAC

ITEM	PRICE	SALVAGE VALUE	PRESENT WORTH OF SALVAGE	NET PRESENT WORTH
3" Pressurized Sewer Main	\$105,000	\$63,000	\$34,882	\$70,118
2.5" - 4" Isolation Valve w/ box	\$25,000	\$15,000	\$8,305	\$16,695
Pressure Sewer Service Package	\$232,000	\$139,200	\$77,072	\$154,928
3" Force Main Bore	\$31,500	\$18,900	\$10,464	\$21,036
Connect to Existing Force Main	\$2,500	\$0	\$0	\$2,500
Vacuum / Air Release Valve	\$7,000	\$4,200	\$2,325	\$4,675
Clean-out	\$10,000	\$6,000	\$3,322	\$6,678
Remaining Capital Costs	\$231,300	\$0	\$0	\$231,300
Total Construction Cost	\$644,300	\$246,300	\$136,370	\$507,930

Annual Operation and Maintenance Cost

Description	Annual Cost	Net Present Worth
Equipment	\$2,500	\$50,000
Supplies	\$1,000	\$20,000
Utilities	\$0	\$0
Labor	\$5,000	\$100,000
Total Annual Cost	\$8,500	\$170,000
Total Net Present Worth		\$677,930
EUAC		\$45,568

COST EVALUATION

Table 19: 2.7.b – Sisters Grove Residential Area - Updated Cost Estimate

ITEM	QUANTITY	UNIT PRICE	PRICE
Dewatering	LS 1	\$110,000.00	\$110,000
8" PVC Sewer Main w/ dewatering	LF 3,100	\$80.00	\$248,000
48" RCP Manhole w/ dewatering	Each 9	\$6,500.00	\$58,500
3" Pressurized Sewer Main	LF 5,000	\$35.00	\$175,000
2.5" - 4" Isolation Valve w/ box	Each 15	\$2,200.00	\$33,000
Pressure Sewer Service Package	Each 16	\$14,500.00	\$232,000
Vacuum / Air Release Valve	Each 2	\$3,500.00	\$7,000
Clean-out	Each 4	\$2,500.00	\$10,000
Subtotal			\$873,500
Contingencies (30%)			\$262,100
Total Estimated Construction Costs			\$1,135,600
Design & Construction Admin			\$227,100
TOTAL PROJECT COSTS			\$1,362,700

Table 20: 2.7.b – Sisters Grove Residential Area – EUAC

ITEM	PRICE	SALVAGE VALUE	PRESENT WORTH OF SALVAGE	NET PRESENT WORTH
Dewatering	\$110,000	\$0	\$0	\$110,000
8" PVC Sewer Main w/ dewatering	\$248,000	\$148,800	\$82,387	\$165,613
48" RCP Manhole w/ dewatering	\$58,500	\$35,100	\$19,434	\$39,066
3" Pressurized Sewer Main	\$175,000	\$105,000	\$58,136	\$116,864
2.5" - 4" Isolation Valve w/ box	\$33,000	\$19,800	\$10,963	\$22,037
Pressure Sewer Service Package	\$232,000	\$139,200	\$77,072	\$154,928
Vacuum / Air Release Valve	\$7,000	\$4,200	\$2,325	\$4,675
Clean-out	\$10,000	\$6,000	\$3,322	\$6,678
Remaining Capital Costs	\$489,200	\$0	\$0	\$489,200
Total Construction Cost	\$1,362,700	\$458,100	\$253,639	\$1,109,061

Annual Operation and Maintenance Cost

Description	Annual Cost	Net Present Worth
Equipment	\$2,500	\$50,000
Supplies	\$1,000	\$20,000
Utilities	\$0	\$0
Labor	\$5,000	\$100,000
Total Annual Cost	\$8,500	\$170,000

Total Net Present Worth \$1,279,061

EUAC \$85,973

COST EVALUATION

Table 21: 4.2 – West Yankton Sanitary Sewer Trunk Line Phase 1 - Updated Cost Estimate

ITEM	QUANTITY	UNIT PRICE	PRICE
12" PVC Sewer Main	LF 3,750	\$95.00	\$356,250
15" PVC Sewer Main	LF 1,400	\$115.00	\$161,000
18" PVC Sewer Main	LF 5,250	\$140.00	\$735,000
48" Lined Manhole	Each 30	\$9,500.00	\$285,000
12" Sewer Boring w/ Casing Pipe	LF 100	\$340.00	\$34,000
18" Sewer Boring w/ Casing Pipe	LF 250	\$360.00	\$90,000
12" Force Main Bore w/ Casing Pipe	LF 300	\$340.00	\$102,000
12" Force Main	LF 2,840	\$75.00	\$213,000
Main Lift Station	LS 1	\$2,500,000.00	\$2,500,000
Back-up Generator	LS 1	\$100,000.00	\$100,000
Seeding	Acre 24	\$700.00	\$16,800
Subtotal			\$4,593,050
Contingencies (30%)			\$1,378,000
Total Estimated Construction Costs			\$5,971,050
Design & Construction Admin			\$1,194,200
TOTAL PROJECT COSTS			\$7,165,250

Table 22: 4.2 – West Yankton Sanitary Sewer Trunk Line Phase 1 – EUAC

ITEM	PRICE	SALVAGE VALUE	PRESENT WORTH OF SALVAGE	NET PRESENT WORTH
12" PVC Sewer Main	\$356,250	\$213,750	\$118,348	\$237,902
15" PVC Sewer Main	\$161,000	\$96,600	\$53,485	\$107,515
18" PVC Sewer Main	\$735,000	\$441,000	\$244,171	\$490,829
48" Lined Manhole	\$285,000	\$171,000	\$94,679	\$190,321
12" Sewer Boring w/ Casing Pipe	\$34,000	\$20,400	\$11,295	\$22,705
18" Sewer Boring w/ Casing Pipe	\$90,000	\$54,000	\$29,898	\$60,102
12" Force Main Bore w/ Casing Pipe	\$102,000	\$61,200	\$33,885	\$68,115
12" Force Main	\$213,000	\$127,800	\$70,760	\$142,240
Main Lift Station	\$2,500,000	\$1,500,000	\$830,514	\$1,669,486
Back-up Generator	\$100,000	\$60,000	\$33,221	\$66,779
Seeding	\$16,800	\$0	\$0	\$16,800
Remaining Capital Costs	\$2,572,200	\$0	\$0	\$2,572,200
Total Construction Cost	\$7,165,250	\$2,745,750	\$1,520,255	\$5,644,995

Annual Operation and Maintenance Cost

Description	Annual Cost	Net Present Worth
Equipment	\$2,500	\$50,000
Supplies	\$1,000	\$20,000
Utilities	\$1,500	\$30,000
Labor	\$10,000	\$200,000
Total Annual Cost	\$15,000	\$300,000
Total Net Present Worth		\$5,944,995
EUAC		\$399,597

COST EVALUATION

Table 23: 4.2.a – West Yankton Sanitary Sewer Trunk Line Phase 2 - Updated Cost Estimate

ITEM	QUANTITY	UNIT PRICE	PRICE
8" PVC Sewer Main	LF 4,600	\$75.00	\$345,000
10" PVC Sewer Main	LF 4,500	\$85.00	\$382,500
48" RCP Manhole	LF 30	\$7,700.00	\$231,000
8" Sewer Boring w/ Casing Pipe	LF 400	\$230.00	\$92,000
Seeding	Acre 16	\$700.00	\$11,200
Subtotal			\$1,061,700
Contingencies (30%)			\$318,600
Total Estimated Construction Costs			\$1,380,300
Design & Construction Admin			\$276,100
TOTAL PROJECT COSTS			\$1,656,400

Table 24: 4.2.b – West Yankton Sanitary Sewer Trunk Line Phase 2 – EUAC

ITEM	PRICE	SALVAGE VALUE	PRESENT WORTH OF SALVAGE	NET PRESENT WORTH
8" PVC Sewer Main	\$345,000	\$207,000	\$114,611	\$230,389
10" PVC Sewer Main	\$382,500	\$229,500	\$127,069	\$255,431
48" RCP Manhole	\$231,000	\$138,600	\$76,739	\$154,261
8" Sewer Boring w/ Casing Pipe	\$92,000	\$55,200	\$30,563	\$61,437
Seeding	\$11,200	\$0	\$0	\$11,200
Remaining Capital Costs	\$594,700	\$0	\$0	\$594,700
Total Construction Cost	\$1,656,400	\$630,300	\$348,982	\$1,307,418

Annual Operation and Maintenance Cost

Description	Annual Cost	Net Present Worth
Equipment	\$2,500	\$50,000
Supplies	\$1,000	\$20,000
Utilities	\$1,500	\$30,000
Labor	\$10,000	\$200,000
Total Annual Cost	\$15,000	\$300,000
Total Net Present Worth		\$1,607,418
EUAC		\$108,044

Table 25: Collection System Cost Evaluation Summary

Description	Cost Estimate		EUAC	
	Alternate		Alternate	
	a	b	a	b
Lakeside Residential	\$9,947,882		\$544,575	
Dam Side Residential	\$10,303,430		\$563,379	
Highway 52 Commercial	\$4,843,200		\$264,511	
Deer Boulevard Residential	\$13,495,770	\$13,633,100	\$732,103	\$748,311
West 11th Street Residential	\$1,999,820		\$114,859	
Timberland Drive Residential	\$479,640		\$34,953	
Sisters Grove Residential	\$644,300	\$1,362,700	\$45,568	\$85,973
Trunk Sewer Phase 1	\$7,165,250		\$399,597	
Trunk Sewer Phase 2	\$1,656,400		\$108,044	
SUM OF LOWEST COST ALTERNATIVES	\$50,535,692		\$2,807,588	

TREATMENT ALTERNATIVES

This section contains updated cost estimates for the treatment system alternates from the 2008 Study. It includes a total retention lagoon, treatment at the City of Yankton, and a mechanical facility. The cost estimates are summarized at the end of this section.

For the Treatment Alternatives, it is assumed that the West 11th Street Residential will be sent to the City of Yankton for Treatment. This is because the subdistricts readily gravity flow to the proposed connection point with the City of Yankton. An additional lift station and forcemain is needed for the two other treatment alternatives. This is not cost-effective approach and is therefore not included in the cost evaluation to ensure a fair cost comparison.

TOTAL RETENTION LAGOON

The estimate for the land required for total retention has been significantly increased. The land required has been estimated per South Dakota Wastewater Design Criteria which includes an allowance for seepage, which is flow through the liner of the lagoon. The maximum allowable seepage is 1/16 inches of water per day which it appears the original estimate is based upon. In our opinion, this amount of seepage is unlikely to be achieved during construction. A more conservative seepage value is 1/32 inches of water per day which increases the land required to 362 acres. Furthermore, an additional 25% of land space is assumed for the construction of berms. Another significant assumption is that clay will need to be hauled from offsite to construct a liner. Treatment site locations can be restricted by environmental regulations, constructability and ability to purchase suitable land. Evaluating potential treatment sites are outside of the scope of this study; however, they may have a significant impact on the overall cost.

COST EVALUATION

Table 26: 3.1 – Total Retention Wastewater Lagoon - Updated Cost Estimate

ITEM	QUANTITY	UNIT PRICE	PRICE
Land Acquisition	Acre 429	\$30,000.00	\$12,862,500
Unclassified Exvacation	CY 950,000	\$5.00	\$4,750,000
Clay Liner	CY 830,000	\$15.00	\$12,450,000
Class I Riprap	Ton 30,000	\$40.00	\$1,200,000
Control Manholes	Each 6	\$10,000.00	\$60,000
Inlet Structure	LS 1	\$20,000.00	\$20,000
15" DI Influent Pipe	LF 100	\$250.00	\$25,000
Concrete Headwall with Apron	LS 1	\$5,000.00	\$5,000
Control Structures	LS 1	\$25,000.00	\$25,000
10" DI Intracell Pipe	LF 1,000	\$200.00	\$200,000
Fencing	LF 17,000	\$15.00	\$255,000
Monitoring Wells	Each 20	\$5,000.00	\$100,000
Subtotal			\$31,952,500
Contingencies (30%)			\$9,586,000
Total Estimated Construction Costs			\$41,538,500
Design & Construction Admin			\$8,308,000
TOTAL PROJECT COSTS			\$49,846,500

Table 27: 3.1 – Total Retention Wastewater Lagoon – EUAC

ITEM	PRICE	SALVAGE VALUE	PRESENT WORTH OF SALVAGE	NET PRESENT WORTH
Land Acquisition	\$12,862,500	\$12,862,500	\$7,121,654	\$5,740,846
Unclassified Exvacation	\$4,750,000	\$2,850,000	\$1,577,976	\$3,172,024
Clay Liner	\$12,450,000	\$7,470,000	\$4,135,958	\$8,314,042
Class I Riprap	\$1,200,000	\$720,000	\$398,647	\$801,353
Control Manholes	\$60,000	\$36,000	\$19,932	\$40,068
Inlet Structure	\$20,000	\$12,000	\$6,644	\$13,356
15" DI Influent Pipe	\$25,000	\$15,000	\$8,305	\$16,695
Concrete Headwall with Apron	\$5,000	\$3,000	\$1,661	\$3,339
Control Structures	\$25,000	\$15,000	\$8,305	\$16,695
10" DI Intracell Pipe	\$200,000	\$120,000	\$66,441	\$133,559
Fencing	\$255,000	\$153,000	\$84,712	\$170,288
Concrete Headwall with Apron	\$5,000	\$3,000	\$1,661	\$3,339
Remaining Capital Costs	\$17,894,000	\$0	\$0	\$17,894,000
Total Construction Cost	\$49,751,500	\$24,259,500	\$13,431,897	\$36,319,603

Annual Operation and Maintenance Cost

Description	Annual Cost	Net Present Worth
Equipment	\$2,500	\$50,000
Supplies	\$5,000	\$100,000
Utilities	\$0	\$0
Labor	\$75,000	\$1,500,000
Total Annual Cost	\$82,500	\$1,650,000
Total Net Present Worth		\$37,969,603
EUAC		\$2,552,154

TREATMENT AT CITY OF YANKTON

The following assumptions are made for the cost evaluation for treatment at City of Yankton:

1. The sewer rates charged to Yankton County are equal to the current City of Yankton Rates
2. The sewer rates increase at 3% annual
3. Population growth in Yankton County is 1.5% annually
4. There are no additional costs to connect and use City of Yankton's infrastructure.

The current sewer charges and capital infrastructure cost to City of Yankton will need to be further studied. The City of Yankton is currently pursuing funding to rehabilitate their wastewater treatment facility and a significant rate increase is anticipated. Furthermore, in discussing with City staff, it is likely that the City of Yankton will need to invest in their collection system and/or treatment infrastructure to fully receive the flows listed in this study. The City of Yankton is currently undergoing a collection system capacity study which provide more detailed information. Staff has indicated that any improvements need to be cost-neutral between the City of Yankton and Yankton County.

Table 28: 3.2 – Treatment at City of Yankton – EUAC

	2022	2047	Average
User Count	1,351	1,960	1,625
Average Gallons Per Day	328,293	476,335	394,779
User Rates (Monthly Flat)	\$11.22	\$23.49	\$16.36
User Rates (per 1,000 gallons)	\$6.80	\$14.24	\$9.92
Annual Costs	\$996,722	\$3,027,934	\$1,748,050
EUAC	\$996,722	\$1,446,158	\$1,198,632

MECHANICAL FACILITY

The mechanical facility is assumed to be an activated sludge type treatment facility. The cost estimate is largely based on a greenfield site construction in Harrisburg, SD which finished construction in 2021 and is of similar capacity proposed in this study.

Treatment site locations can be restricted by environmental regulations, constructability and ability to purchase suitable land. Evaluating potential treatment sites are outside of the scope of this study; however, they may have a significant impact on the overall cost. Included in the annual costs are an equipment replacement reserve fund contribution, supplies, utilities and staffing up to four full time employees.

COST EVALUATION

Table 29: 3.7 – New Mechanical Wastewater Treatment Facility - Updated Cost Estimate

ITEM	QUANTITY	UNIT PRICE	PRICE
Sitework	LS 1	\$750,000	\$750,000
Land Acquisition	Acre 5	\$30,000	\$150,000
Headworks Building and Equipment	LS 1	\$1,500,000	\$1,500,000
Site Piping and Splitter Structures	LS 1	\$500,000	\$500,000
Equalization Earthen Basin	LS 1	\$500,000	\$500,000
Biological Treatment Basin and Equipment	LS 1	\$6,000,000	\$6,000,000
Operations Building and Equipment	LS 1	\$3,500,000	\$3,500,000
Effluent Lift Station and Outfall	LS 1	\$3,500,000	\$3,500,000
Subtotal			\$16,400,000
Contingencies (30%)			\$4,920,000
Total Estimated Construction Costs			\$21,320,000
Design & Construction Admin			\$4,264,000
TOTAL PROJECT COSTS			\$25,584,000

Table 30: 3.7 – New Mechanical Wastewater Treatment Facility – EUAC

ITEM	PRICE	SALVAGE VALUE	PRESENT WORTH OF SALVAGE	NET PRESENT WORTH
Sitework	\$750,000	\$450,000	\$249,154	\$500,846
Land Acquisition	\$150,000	\$150,000	\$83,051	\$66,949
Headworks Building and Equipment	\$1,500,000	\$900,000	\$498,308	\$1,001,692
Site Piping and Splitter Structures	\$500,000	\$300,000	\$166,103	\$333,897
Equalization Earthen Basin	\$500,000	\$300,000	\$166,103	\$333,897
Biological Treatment Basin and Equipment	\$6,000,000	\$3,600,000	\$1,993,233	\$4,006,767
Operations Building and Equipment	\$3,500,000	\$2,100,000	\$1,162,719	\$2,337,281
Effluent Lift Station and Outfall	\$3,500,000	\$2,100,000	\$1,162,719	\$2,337,281
Remaining Capital Costs	\$9,184,000	\$0	\$0	\$9,184,000
Total Construction Cost	\$25,584,000	\$9,900,000	\$5,481,390	\$20,102,610

Annual Operation and Maintenance Cost

Description	Annual Cost	Net Present Worth
Equipment	\$50,000	\$1,000,000
Supplies	\$50,000	\$1,000,000
Utilities	\$75,000	\$1,500,000
Labor	\$400,000	\$8,000,000
Total Annual Cost	\$575,000	\$11,500,000
Total Net Present Worth		\$31,602,610
EUAC		\$2,124,192

Table 31: Treatment Cost Evaluation Summary

Description	Capital Cost	EUAC
Total Retention Lagoon	\$49,846,500	\$2,552,154
Treatment by City of Yankton	TBD	\$1,198,632
Mechanical Facility	\$25,584,000	\$2,124,192
LOWEST COST ALTERNATIVE: Treatment by City of Yankton		

CONCLUSION

The capital costs for the proposed collection and treatment improvements are included in the following table. Further coordination and study with the City of Yankton is needed to accurately evaluate future costs for treatment by the City of Yankton. Significant unknown factors include future sewer rates for ongoing treatment improvements by the City as well as a collection system capacity study that is ongoing. A phased approach to the project may be beneficial for both parties to maximize the existing capacity in the City of Yankton's system.

Table 32: Total System Cost Estimate Summary

Description	Capital Cost
Lakeside Residential	\$9,947,882
Dam Side Residential	\$10,303,430
Highway 52 Commercial	\$4,843,200
Deer Boulevard Residential	\$13,495,770
West 11th Street Residential	\$1,999,820
Timberland Drive Residential	\$479,640
Sisters Grove Residential	\$644,300
Trunk Sewer Phase 1	\$7,165,250
Trunk Sewer Phase 2	\$1,656,400
Treatment by City of Yankton	TBD
TOTAL	\$50,535,692

ADDITIONAL STUDY AREAS

INTRODUCTION

This study includes two additional study areas within Yankton County. This includes Napa Junction/Highway 50, which is an Industrial Park northwest of the City of Yankton that will discharge to a proposed trunk sewer along Highway 50 as well as Highway 314 which runs west of Yankton, north of the 2008 study area yet south of Highway 50. Both areas exist in separate sewer basins. These basins are shown in the following figure. The scope of the study areas includes providing cost estimates for installing infrastructure capable of conveying wastewater to the City of Yankton for treatment. The proposed discharge points for these basins are to existing trunk sewer systems in the City of Yankton; however, the City of Yankton is currently performing a collection system capacity study to determine the available capacity of their collection system. The feasibility of sending wastewater to the City of Yankton for treatment will depend on the results of the City's collection system capacity study.

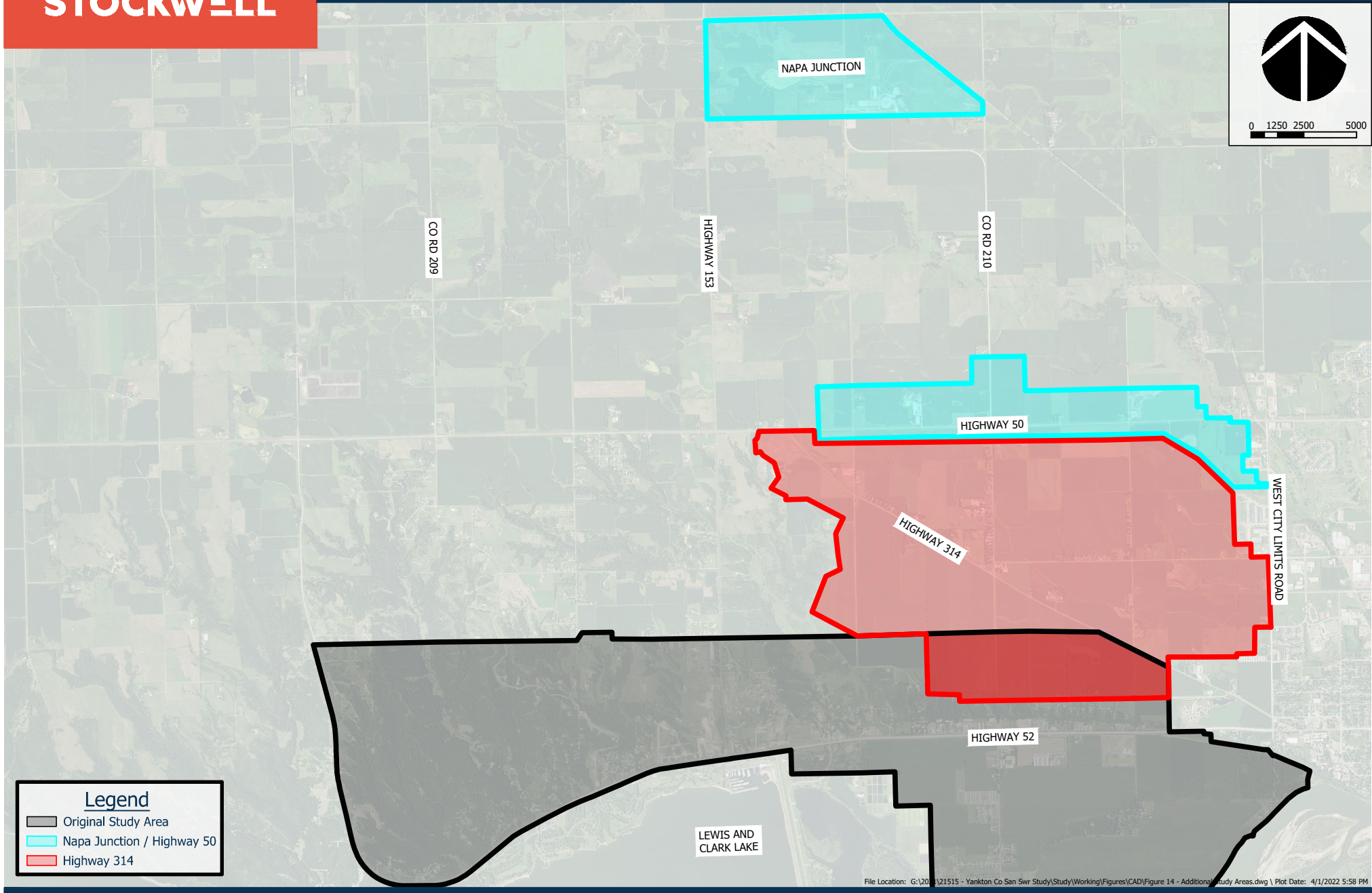


Figure 14
Additional Study Areas

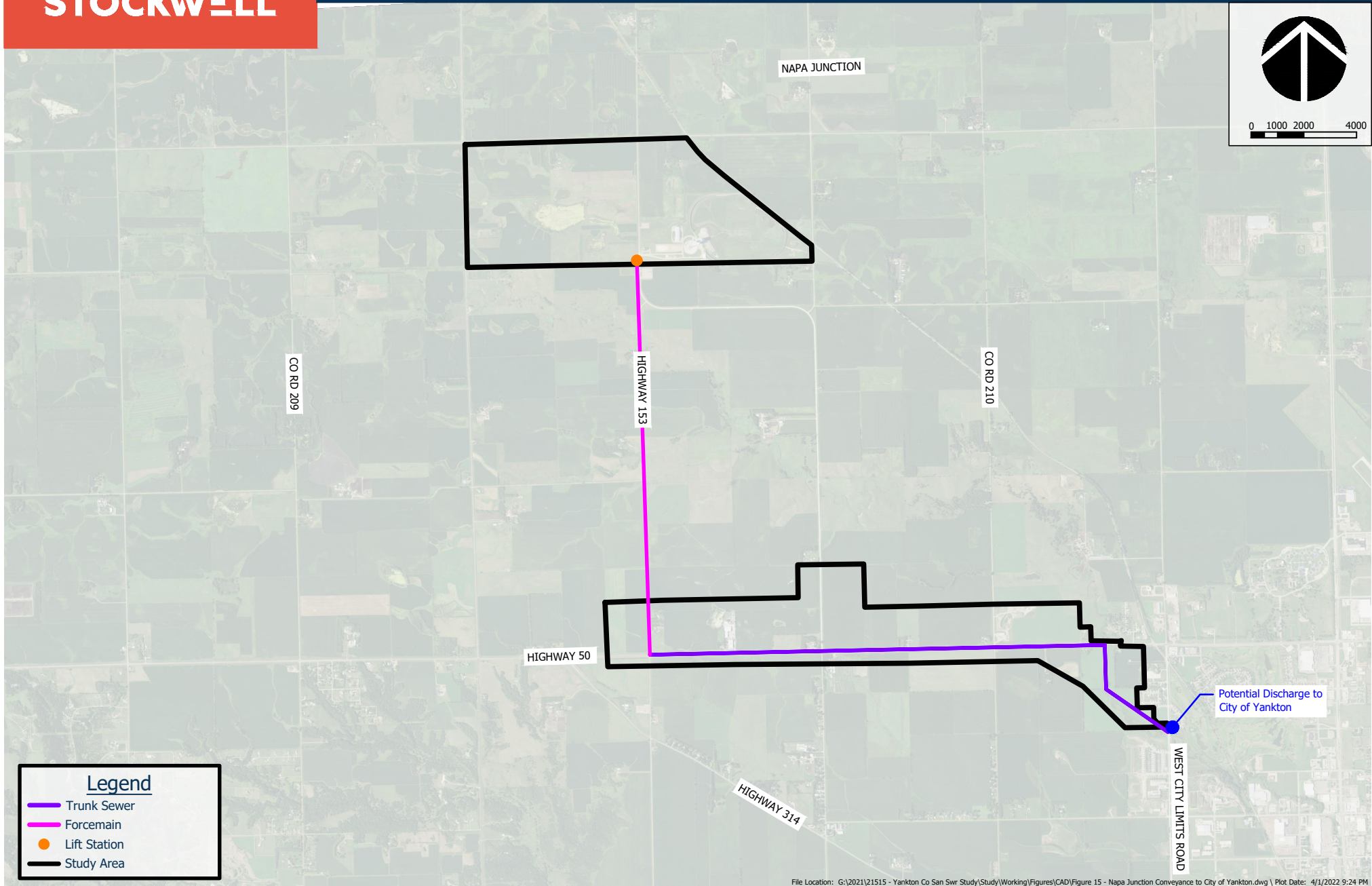


NAPA JUNCTION AND HIGHWAY 50

Napa Junction consists of approximately 775 acres of land. The land naturally drains from west to east into the James River Basin. Wastewater flows and loading in Industrial Parks can vary dramatically depending on the type of industries present. For example, warehousing facilities will have relatively low flows and loading whereas a meat processing plant can use up to millions of gallons per day with wastewater strengths over ten times that of typical residential waste. It is challenging to provide feasible and cost-effective treatment infrastructure for industrial parks that want to install wastewater treatment infrastructure to attract industries.

Wastewater treatment alternatives for this area were previously studied by Stockwell Engineers. The general conclusions are that discharging onsite to an unnamed tributary to the James River will have strict discharge limits and require the use of mechanical treatment equipment. This type of treatment will be cost prohibitive to operate and maintain in the initial stages of development. The other options including constructing a total retention lagoon system, a discharging system to Marne Creek or to pump the wastewater for treatment by the City of Yankton. The total retention lagoon system provides effective treatment during the initial stages of development; however, it requires too much land for the fully developed site. A discharging system into Marne Creek is generally undesirable due to negative public perception because the creek flows through the City of Yankton. Pumping to the City of Yankton for treatment is beneficial because it more flexible in providing effective treatment during stages of development and can manage a fully developed site assuming the City of Yankton has the collection and treatment capacity. Pumping to the City of Yankton creates a kind of pay-as-you-go approach to the park. It can also provide sewer collection opportunities for future development along Highway 50.

The proposed collection system for Napa Junction is shown in the following figure. A trunk sewer is proposed along Highway 50 that allow development along this corridor. The natural drainage along the highway is generally from northwest to southeast. This means that a significant area can gravity flow into the trunk sewer north of the highway; however, only a limit area can gravity flow from south of the highway. For cost estimating purposes, an average daily flow of 1,500 gallons per acre is assumed for the Industrial Park and future development along Highway 50.



File Location: G:\2021\21515 - Yankton Co San Swr Study\Study\Working\Figures\CAD\Figure 15 - Napa Junction Conveyance to City of Yankton.dwg \ Plot Date: 4/1/2022 9:24 PM

Figure 15
Napa Junction Conveyance to City of Yankton

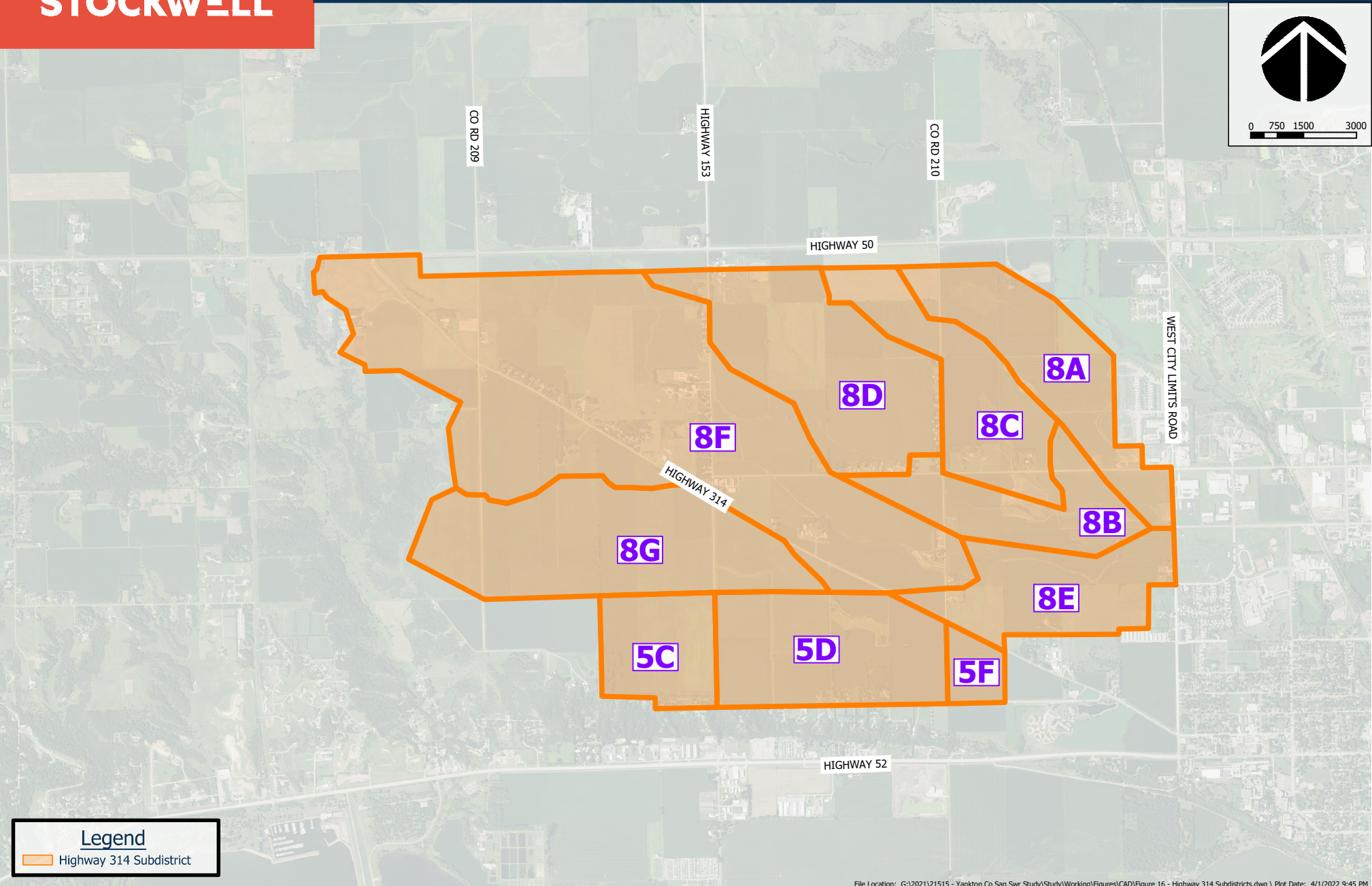
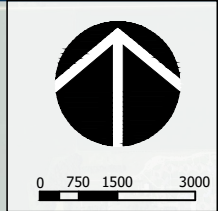


Table 33 – Napa Junction and Highway 50 Cost Estimate

ITEM	QUANTITY		UNIT PRICE	PRICE
15" PVC Sewer Main	LF	1,250	\$115.00	\$143,750
18" PVC Sewer Main	LF	16,750	\$140.00	\$2,345,000
48" Lined Manhole	Each	51	\$9,500.00	\$484,500
15" Force Main	LF	2,840	\$75.00	\$213,000
Lift Station	LS	1	\$2,500,000	\$2,500,000
Back-up Generator	LS	1	\$100,000	\$100,000
Subtotal				\$5,786,250
Contingencies (30%)				\$1,735,900
Total Estimated Construction Costs				\$7,522,150
Design & Construction Admin				\$1,504,400
TOTAL PROJECT COSTS				\$9,026,550

HIGHWAY 314

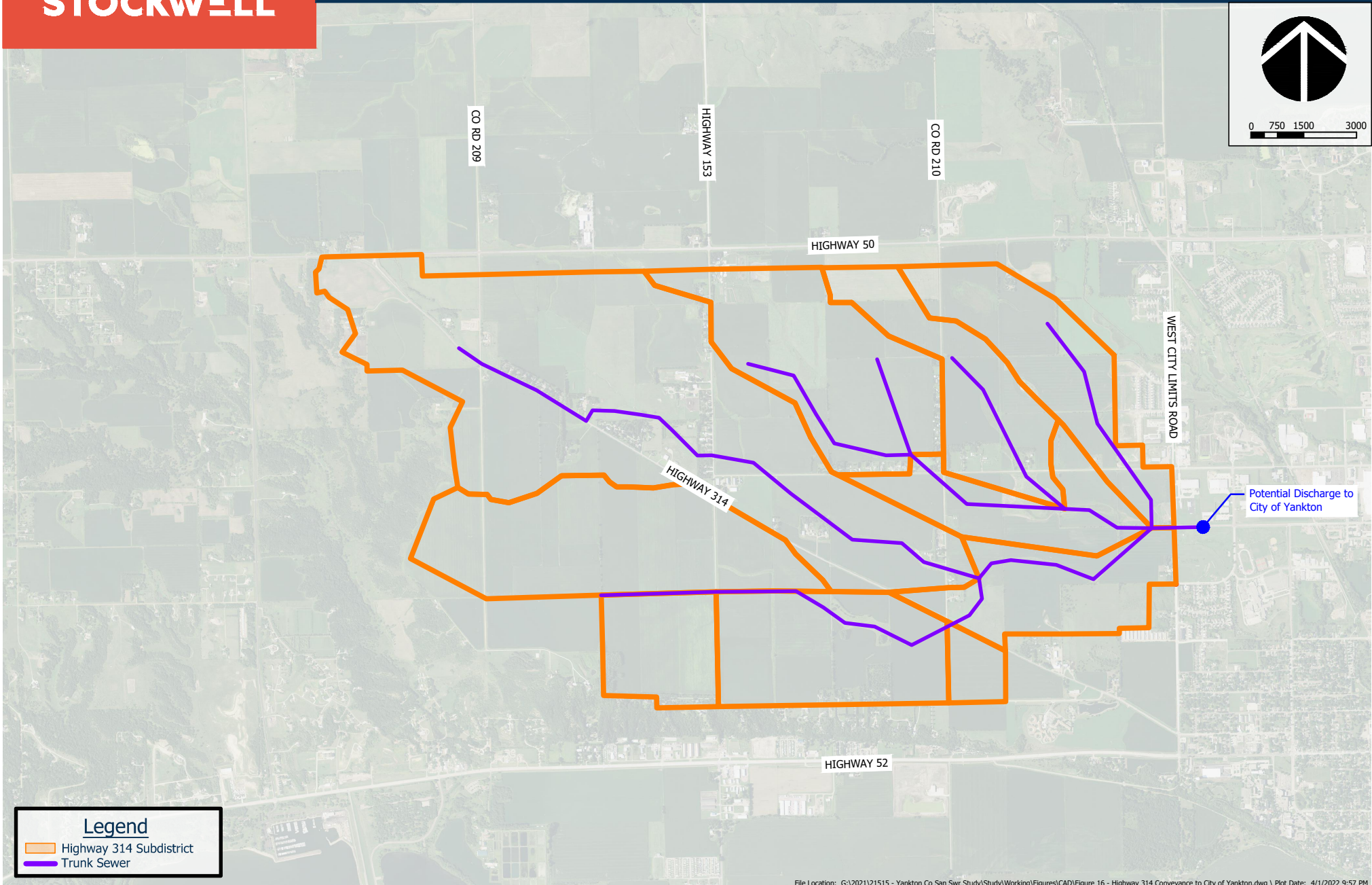
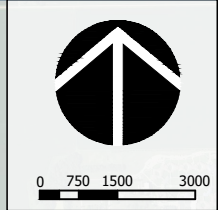
The Highway 314 Basin encompasses approximately 3,400 acres of mostly undeveloped agricultural land. It also includes subbasins 5C, 5D and 5F from the existing study area. Subbasins were delineated based on existing drainage patterns and should be considered preliminary. A more detailed analysis should be performed prior to detailed design. For cost estimating purposes, an average daily flow of 1,200 gallons per acre is assumed which is typical of single-family residential development. A final cost estimate is included which consists of the final 1,200 feet of trunk sewer to connect all subdistricts into the City of Yankton.



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Figure 16
Highway 314 Subdistrict Map





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Figure 17
Highway 314 Conveyance to City of Yankton



ADDITIONAL STUDY AREAS

Table 34 – Highway 314 Subdistrict 8A Cost Estimate

ITEM	QUANTITY		UNIT PRICE	PRICE
10" PVC Sewer Main	LF	5,500	\$80.00	\$440,000
48" Lined Manhole	Each	16	\$9,500.00	\$152,000
Subtotal				\$592,000
Contingencies (30%)				\$177,600
Total Estimated Construction Costs				\$769,600
Design & Construction Admin				\$153,900
TOTAL PROJECT COSTS				\$923,500

Table 35 – Highway 314 Subdistrict 8B Cost Estimate

ITEM	QUANTITY		UNIT PRICE	PRICE
10" PVC Sewer Main	LF	4,000	\$80.00	\$320,000
12" PVC Sewer Main	LF	2,500	\$95.00	\$237,500
48" Lined Manhole	Each	19	\$9,500.00	\$180,500
Subtotal				\$738,000
Contingencies (30%)				\$221,400
Total Estimated Construction Costs				\$959,400
Design & Construction Admin				\$191,900
TOTAL PROJECT COSTS				\$1,151,300

Table 36 – Highway 314 Subdistrict 8C Cost Estimate

ITEM	QUANTITY		UNIT PRICE	PRICE
10" PVC Sewer Main	LF	4,500	\$80.00	\$360,000
48" Lined Manhole	Each	13	\$9,500.00	\$123,500
Subtotal				\$483,500
Contingencies (30%)				\$145,100
Total Estimated Construction Costs				\$628,600
Design & Construction Admin				\$125,700
TOTAL PROJECT COSTS				\$754,300

Table 37 – Highway 314 Subdistrict 8D Cost Estimate

ITEM	QUANTITY		UNIT PRICE	PRICE
10" PVC Sewer Main	LF	7,000	\$80.00	\$560,000
48" Lined Manhole	Each	20	\$9,500.00	\$190,000
Subtotal				\$750,000
Contingencies (30%)				\$225,000
Total Estimated Construction Costs				\$975,000
Design & Construction Admin				\$195,000
TOTAL PROJECT COSTS				\$1,170,000

ADDITIONAL STUDY AREAS

Table 38 – Highway 314 Subdistrict 8E Cost Estimate

ITEM	QUANTITY		UNIT PRICE	PRICE
24" PVC Sewer Main	LF	5,000	\$240.00	\$1,200,000
60" Lined Manhole	Each	15	\$15,000.00	\$225,000
Subtotal				\$1,425,000
Contingencies (30%)				\$427,500
Total Estimated Construction Costs				\$1,852,500
Design & Construction Admin				\$370,500
TOTAL PROJECT COSTS				\$2,223,000

Table 39 – Highway 314 Subdistrict 8F Cost Estimate

ITEM	QUANTITY		UNIT PRICE	PRICE
12" PVC Sewer Main	LF	6,000	\$95.00	\$570,000
15" PVC Sewer Main	LF	6,000	\$115.00	\$690,000
18" PVC Sewer Main	LF	2,000	\$140.00	\$280,000
48" Lined Manhole	Each	40	\$9,500.00	\$380,000
Subtotal				\$1,920,000
Contingencies (30%)				\$576,000
Total Estimated Construction Costs				\$2,496,000
Design & Construction Admin				\$499,200
TOTAL PROJECT COSTS				\$2,995,200

Table 40 – Highway 314 Subdistricts 8G, 5C, 5D, 5F Combined Cost Estimate

ITEM	QUANTITY		UNIT PRICE	PRICE
12" PVC Sewer Main	LF	5,000	\$95.00	\$475,000
15" PVC Sewer Main	LF	5,000	\$115.00	\$575,000
48" Lined Manhole	Each	29	\$9,500.00	\$275,500
Subtotal				\$1,325,500
Contingencies (30%)				\$397,700
Total Estimated Construction Costs				\$1,723,200
Design & Construction Admin				\$344,600
TOTAL PROJECT COSTS				\$2,067,800

Table 41 – Highway 314 Connection to City of Yankton Cost Estimate

ITEM	QUANTITY		UNIT PRICE	PRICE
30" PVC Sewer Main	LF	5,000	\$400.00	\$2,000,000
60" Lined Manhole	Each	15	\$15,000.00	\$225,000
Subtotal				\$2,225,000
Contingencies (30%)				\$667,500
Total Estimated Construction Costs				\$2,892,500
Design & Construction Admin				\$578,500
TOTAL PROJECT COSTS				\$3,471,000

Table 42 – Highway 314 Basin Cost Estimate Summary

Subdistrict	Cost Estimate
8A	\$923,500
8B	\$1,151,300
8C	\$754,300
8D	\$1,170,000
8E	\$2,223,000
8F	\$2,995,200
8G, 5C, 5D 5F	\$2,067,800
Connection to Yankton City	\$3,471,000
TOTAL	\$14,756,100