

UPPER SOUTHWEST SALT CREEK BASIN

14.1 UPPER SOUTHWEST TRUNK SEWER SYSTEM

The Upper Southwest basin does not have City sanitary sewer service at this time and consists of Tier I, II, and III planning growth areas. The basin is located on the west side of Salt Creek on the southwesterly portion of the planning area as shown in Figure 14.1. This area includes the Cardwell Branch. Shown in Table 14.1 below are the areas and flows that have been included in the modeling effort.

Table 14.1 Service Areas and Flows - Upper Southwest Basin Wastewater Facilities Master Plan Update - 2007 City of Lincoln, Nebraska						
Upper Southwest Basin	Tier I		Tiers I & II		Tiers I, II & III	
	Area (ac)	Flow (cfs)	Area (ac)	Flow (cfs)	Area (ac)	Flow (cfs)
Model Input Values	2,078	14.02	8,405	49.02	18,041	97.98
1. Based on Information Provided by LWWS.						
2. As of July, 2006.						

14.2 MODELING RESULTS

The Upper Southwest Basin system was modeled using the Tier I, Tier II, and Tier III areas and flows shown in Table 14.1. Sewers were preliminary sized and added to the proposed system to convey Tier III sanitary flows.

14.2.1 Tier I Conditions

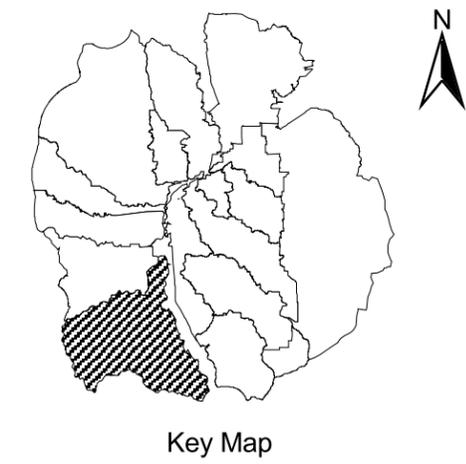
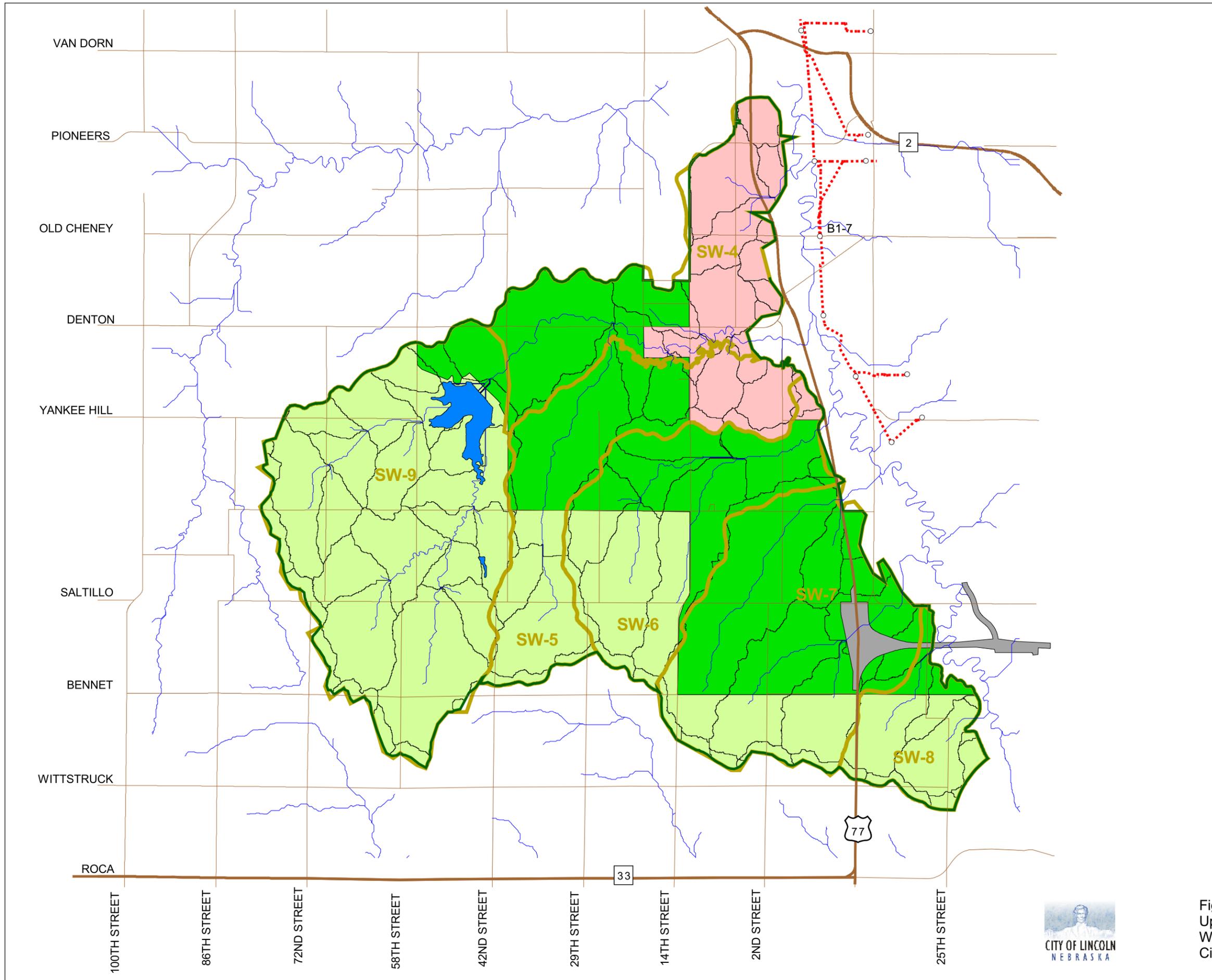
The Tier I conditions were modeled using a total area of 2,078 acres with a corresponding peak flow of 14.02 cfs.

14.2.2 Tier II Conditions

The Tier II system was modeled using a total area of 8,405 acres, which resulted in a peak flow of 49.02 cfs. Additional sewers were preliminary sized and added to the proposed Tier I system to convey sanitary from the Tier II reaches of the basin.

14.2.3 Tier III Conditions

The Tier II system was modeled using a total area of 18,401 acres, which resulted in a peak flow of 97.98 cfs. Additional sewers were designed and added to the existing, Tier I, and Tier II system to convey sanitary from the upper reaches of the basin.



- LEGEND**
- ⋯ Salt Valley - Existing Pipes
 - ~ Streams
 - Streets
 - Upper Southwest Basin Boundary
 - Utility Planning Zones
 - Beltway
 - Tier I Area
 - Tier II Area
 - Tier III Area



Figure 14.1 Basin Map
 Upper Southwest Basin Trunk Sewer
 Wastewater Facilities Master Plan Update - 2007
 City of Lincoln, Nebraska



14.3 IMPROVEMENTS

The improvements for the Upper Southwest Basin are shown graphically in Figure 14.2 and summarized in Tables 14.2 and 14.3 below.

14.3.1 Tier I Improvements

Based on Tier I flow, approximately 13,900 feet of 60-inch and 48-inch diameter sewers were identified. As shown in Table 14.3, the d/D varied between 0.27 and 0.60 at these flows. The Tier I sanitary sewer system layout is presented in Figure 14.2. This schematic drawing shows the major basin boundaries and stream network. The basin boundaries and stream network were derived from the City contour data. The alignment of the proposed sewers follows the natural drainage network. The pipe design was adjusted to eliminate surcharging throughout the system for Tier III flows. The proposed sewer improvements discharge to the Salt Valley Trunk Sewer System at manhole B1-7 (east of 1st St and Old Cheney Rd) and includes a siphon under Salt Creek. Sewer pipe design parameters are shown in Table 14.2 for the system.

14.3.2 Tier II Improvements

14.3.2.1 Pipelines

The proposed sewer alignment identified in Figure 14.2 were added to the Tier I SWMM model and evaluated to verify the anticipated Tier II flows. The results of the model run are summarized Table 14.3. As indicated in the table, the proposed sewers have adequate capacity to convey the Tier II flows with a d/D ratio ranging from 0.29 to 0.76.

14.3.2.2 Storage

As shown in Table 14.1, the Upper Southwest basin will contribute 49.02 cfs to the Salt Valley Trunk Sewer under Tier II design conditions. In order to minimize the identified surcharged conditions of the Salt Valley Trunk Sewer system under Tier II design conditions, it is recommended that a storage basin be utilized to store the peak Tier II flows. Based on the model results, this storage basin is estimated to have a volume of 4 MG, to store 22 cfs of the peak flow. Based on the model results, the peak flows would need to be stored for approximately 6 to 8 hours before they could begin to be discharged back into the Salt Valley Trunk Sewer System. It has been assumed that a pump station would be required to transfer the storage wastewater to the Salt Valley Trunk Sewer. The location where the storage has been included in the model is shown in Figure 14.2 (southwest of W. Denton Rd and 1st St). The actual location and features of the storage facility should be determined with a detailed site study.

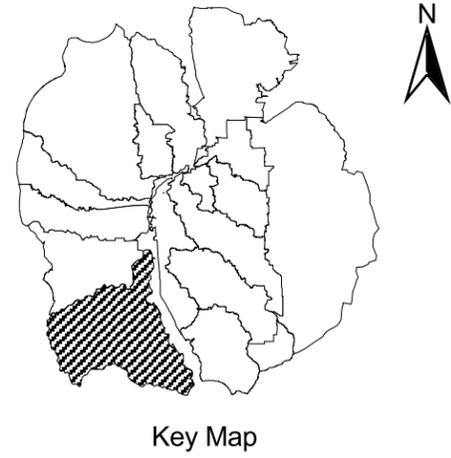
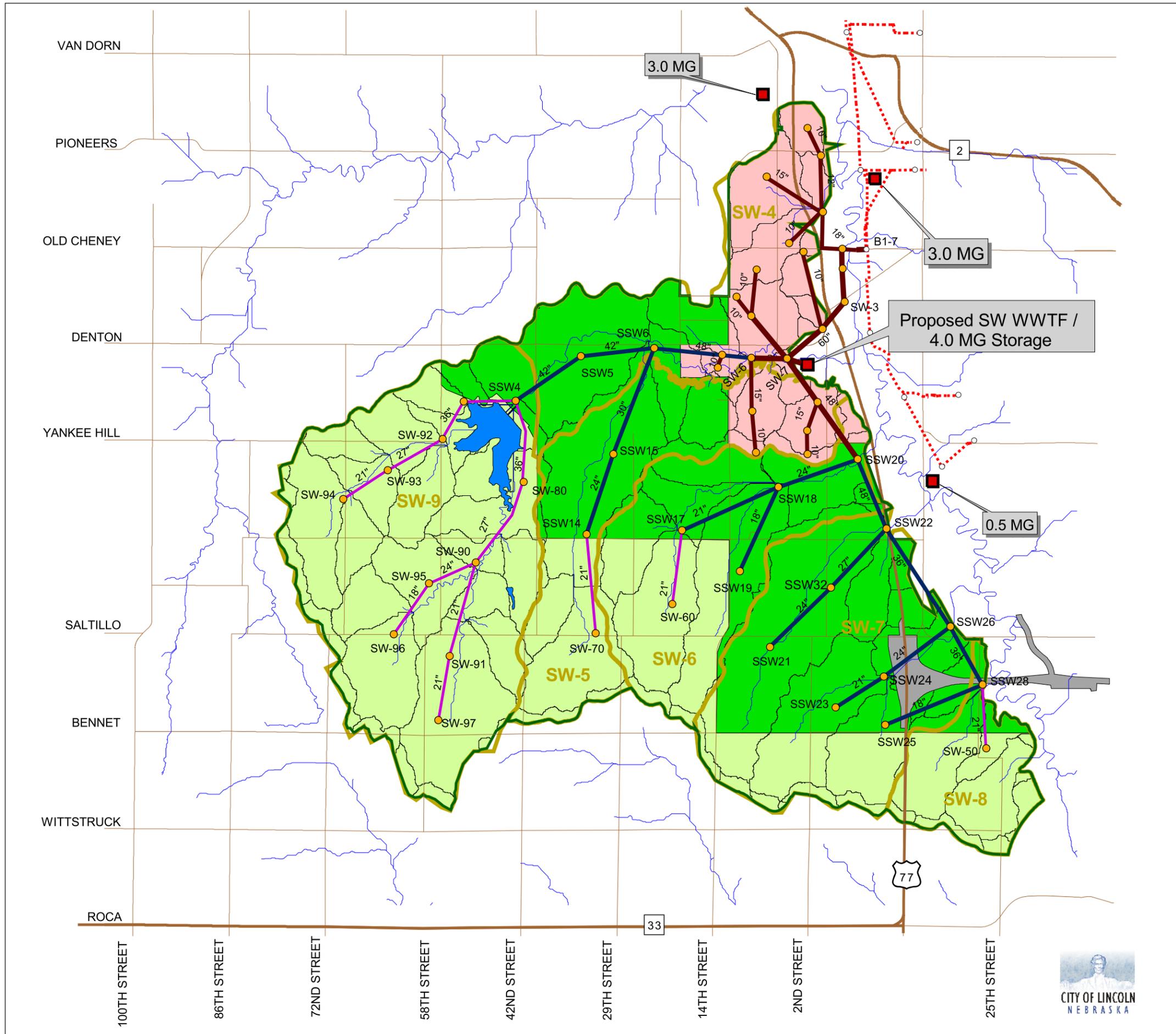
Table 14.2 Design Characteristics of Proposed Sewers - Upper SW Basin Wastewater Facilities Master Plan Update - 2007 City of Lincoln, Nebraska							
Pipe ID	US Manhole	DS Manhole	Diameter (ft)	Length (ft)	Slope (%)	Design Capacity (cfs)	Tier
SWP8	SW-6	SW-7	4.00	1,958	0.25	71.82	I
SWP1	SSW20	SW-7	4.00	6,744	0.25	71.82	
SWP2	SW-7	SW-3	5.00	5,309	0.15	100.87	
SWP3	SW-3	SW-2	5.00	1,528	0.15	100.99	
SWP4	SW-2	SW-1	5.00	1,064	0.15	101.05	
SWP5	SW-1	B1-7	5.00	536	0.15	101.05	
SWL16	SSW14	SSW15	2.00	4,621	0.26	11.55	II
SWL17	SSW15	SSW6	2.50	6,223	0.25	20.37	
SWL22	SSW4	SSW5	3.50	4,331	0.25	50.31	
SWL23	SSW5	SSW6	3.50	4,043	0.25	50.30	
SWL24	SSW6	SSW-6	4.00	5,336	0.25	71.82	
SWL8	SSW25	SSW28	1.50	5,777	0.25	5.25	
SWL2	SSW28	SSW26	3.00	3,626	0.25	33.35	
SWL7	SSW23	SSW24	1.75	3,124	0.25	7.92	
SWL9	SSW24	SSW26	2.00	4,564	0.25	11.31	
SWL3	SSW26	SSW22	3.00	6,408	0.25	33.35	
SWL60	SSW32	SSW21	2.00	4,651	0.25	12.25	
SWL6	SSW21	SSW22	2.25	4,444	0.25	15.49	
SWL4	SSW22	SSW20	4.00	4,098	0.25	71.83	
SWL11	SSW19	SSW18	1.50	5,073	0.25	5.27	
SWL14	SSW17	SSW18	1.75	5,793	0.25	7.92	
SWL12	SSW18	SSW20	2.00	4,601	0.21	10.47	
L1587	SW-50	SSW28	1.75	3,499	0.27	8.23	III
L1600	SW-60	SSW17	1.75	4,076	0.27	8.23	
L1599	SW-70	SSW14	1.75	5,430	0.25	7.98	
L1590	SW-97	SW-91	1.75	3,575	0.27	8.23	
L1591	SW-91	SW-90	1.75	5,300	0.27	8.23	
L1594	SW-96	SW-95	1.50	3,387	0.27	5.46	
L1595	SW-95	SW-90	2.00	2,796	0.27	11.75	
L1592	SW-90	SW-80	2.25	4,610	0.27	16.09	
L1593	SW-80	SSW4	3.00	4,611	0.27	34.66	
L1596	SW-94	SW-93	1.75	2,916	0.27	7.64	
L1597	SW-93	SW-92	2.25	3,458	0.27	16.09	
L1598	SW-92	SSW4	3.00	4,533	0.27	34.65	

Pipe ID	US Manhole	DS Manhole	Cap. (cfs)	Tier I Conditions		Tier I & II Conditions		Tier I, II, & III Conditions		Tier
				Q, cfs	d/D	Q, cfs	d/D	Q, cfs	d/D	
SWP8	SW-6	SW-7	71.82	3.73	0.27	24.13	0.40	66.37	0.76	I
SWP1	SSW20	SW-7	71.82	7.43	0.23	29.38	0.45	37.43	0.68	
SWP2	SW-7	SW-3	100.87	11.49	0.23	53.50	0.52	103.76	0.84	
SWP3	SW-3	SW-2	100.99	11.48	0.26	53.50	0.55	103.82	0.82	
SWP4	SW-2	SW-1	101.05	11.41	0.46	53.50	0.61	104.34	0.78	
SWP5	SW-1	B1-7	101.05	11.79	0.60	53.50	0.61	104.34	0.78	
SWL16	SSW14	SSW15	11.55	NA	NA	5.37	0.58	12.17	0.92	II
SWL17	SSW15	SSW6	20.37			8.04	0.47	14.85	0.94	
SWL22	SSW4	SSW5	50.31			5.48	0.29	41.04	0.73	
SWL23	SSW5	SSW6	50.30			8.91	0.46	44.38	0.87	
SWL24	SSW6	SSW-6	71.82			24.14	0.40	66.38	0.76	
SWL8	SSW25	SSW28	5.25			3.99	0.75	3.99	0.75	
SWL2	SSW28	SSW26	33.35			3.98	0.42	9.88	0.53	
SWL7	SSW23	SSW24	7.92			3.71	0.73	3.71	0.73	
SWL9	SSW24	SSW26	11.31			8.33	0.64	8.33	0.79	
SWL3	SSW26	SSW22	33.35			12.31	0.51	18.20	0.58	
SWL60	SSW32	SSW21	12.25			6.84	0.66	6.84	0.66	
SWL6	SSW21	SSW22	15.49			10.04	0.68	10.04	0.77	
SWL4	SSW22	SSW20	71.83			22.33	0.45	28.22	0.52	
SWL11	SSW19	SSW18	5.27			3.82	0.64	3.82	0.84	
SWL14	SSW17	SSW18	7.92			3.25	0.76	5.44	0.95	
SWL12	SSW18	SSW20	10.47	7.05	0.66	9.23	0.83			
L1587	SW-50	SSW28	8.23	NA	NA	NA	NA	5.91	0.64	III
L1600	SW-60	SSW17	8.23					2.20	0.61	
L1599	SW-70	SSW14	7.98					6.83	0.93	
L1590	SW-97	SW-91	8.23					6.20	0.77	
L1591	SW-91	SW-90	8.23					7.73	0.87	
L1594	SW-96	SW-95	5.46					3.70	0.80	
L1595	SW-95	SW-90	11.75					7.90	0.76	
L1592	SW-90	SW-80	16.09					16.63	0.90	
L1593	SW-80	SSW4	34.66					21.40	0.80	
L1596	SW-94	SW-93	7.64					5.88	0.70	
L1597	SW-93	SW-92	16.09					9.21	0.59	
L1598	SW-92	SSW4	34.65					14.11	0.80	

14.3.3 Tier III Improvements

14.3.3.1 Basin Pipelines

The proposed sewer alignment identified in Figure 14.2 were added to the Tier II SWMM model and evaluated to verify the anticipated Tier II flows. The results of the model run are summarized Table 14.6. As shown in Table 14.6, the proposed sewers have adequate capacity to convey the Tier III flows, with the d/D ratio ranging from 0.52 to 0.94.



- LEGEND**
- Tier I Pipes
 - Tier II Pipes
 - Tier III Pipes
 - Salt Valley - Existing Pipes
 - Streams
 - Streets
 - Upper Southwest Basin Boundary
 - Utility Planning Zones
 - Beltway
 - Storage Basins
 - Tier I Area
 - Tier II Area
 - Tier III Area



Notes:
 Pipes less than 15-in are shown for planning purposes.
 Additional 10-in, 12-in, or 15-in pipes may be required depending on the actual land use and development.

Figure 14.2 Proposed Tier I, II, and III Sewer Improvements
 Upper Southwest Basin Trunk Sewer
 Wastewater Facilities Master Plan Update - 2007
 City of Lincoln, Nebraska



14.3.3.2 Other Improvements

As discussed in Chapter 10, the Salt Valley Trunk Sewer is inadequate to convey the Tier III flows from the Upper Southwest Salt Creek Basin to the Theresa Street WWTF. For the purpose of the hydraulic modeling and analysis of the collection system, a WWTF was included in the model near West Denton Rd and 1st Street. This is the same location where Tier II storage was included in the hydraulic collection system model. A WWTF in the hydraulic collection system model removes the upstream flow at this point from entering the downstream collection system. This feature was included in the model to ascertain the capability of the downstream collection system to convey the Tier III flows. It should be noted that this chapter is dedicated to collection capacity and improvements. For a more detailed discussion on a SW WWTF and other options refer to Chapter 24.

14.4 SUMMARY OF RECOMMENDED IMPROVEMENTS

Recommendations for maintenance and improvements of the Upper Southeast Basin Sewer System include:

- Tier I Flows:
 - Construct new sewer lines to service the Tier I area.
- Tier II Flows:
 - Construct new sewer lines to service the Tier II area.
- Tier III Flows
 - Construct new sewer lines to service the Tier III area.
 - Construct a major capacity improvements.

The proposed alignments of the sanitary sewers are preliminary and developed for planning purposes. It is recommended that a detailed study be performed prior to designing the improvements to make certain conformance with existing and proposed development and to determine project phasing. In most cases, the alignments shown closely follow natural drainage ways. Until full development of the system, some pipes will be oversized with regard to interim flows. These sewers should be periodically inspected to determine if deposition is occurring.

To maximize the use of the recommended storage facilities it is recommended that they also be designed, constructed and operated to dampen the diurnal peaks throughout the trunk sewer system. Dampening the diurnal peaks will result in maximizing the trunk infrastructure and deliver a more constant flow to the WWTF's. A summary of the improvement projects identified with planning costs is outlined in Table 14.7.

**Table 14.7 Recommended Improvements - Upper Southwest Salt Valley Basin
Wastewater Facilities Master Plan Update - 2007
City of Lincoln, Nebraska**

Tier	ID	Description	Location ⁽¹⁾	Parameters	Unit Price	Planning Cost ⁽²⁾
I	USW-1	Extend Trunk Sewer USW (CIP 3.d)	S 7th and Old Cheney to near S 1st and W Denton Road			\$3,610,000 ⁽³⁾
I	USW-2	Sub Basin Sewer USW (CIP 3.e)	NW of SW 1st and Denton Road			\$600,000 ⁽³⁾
I	USW-3	60-inch	SW-7 to B1-7	8,439	\$600.00	\$5,063,000
I	USW-4	48-inch	SW-6 to SW-7, SSW20 to SW-7	8,702	\$480.00	\$4,177,000
I	USW-5	18-inch	See Figure 14.2.	2,796	\$180.00	\$503,000
I	USW-6	15-inch	See Figure 14.2.	8,168	\$150.00	\$1,225,000
I	USW-7	12-inch	See Figure 14.2.	3,080	\$120.00	\$370,000
I	USW-8	10-inch	See Figure 14.2.	16,483	\$150.00	\$2,472,000
I	USW-9	Siphon	Under Salt Creek	1	\$1,000,000	\$1,000,000
II	USW-10	48-inch	SSW22 to SSW20, SSW6 to SW-6	9,191 lf	\$480.00	\$4,412,000
II	USW-11	42-inch	SSW4 to SSW6	7,905 lf	\$420.00	\$3,320,000
II	USW-12	36-inch	SSW28 to SSW22	9,682 lf	\$360.00	\$3,486,000
II	USW-13	30-inch	SSW15 to SSW6	5,913 lf	\$300.00	\$1,774,000
II	USW-14	27-inch	SSW32 to SSW22	4,447 lf	\$270.00	\$1,201,000
II	USW-15	24-inch	SSW14 to SSW15, SSW18 to SSW20, SSW21 to SSW32, SSW24 to SSW26	18,484 lf	\$240.00	\$4,436,000
II	USW-16	21-inch	SSW17 to SSW18, SSW23 to SSW24	9,024 lf	\$210.00	\$1,895,000
II	USW-17	18-inch	SSW19 to SSW18, SSW25 to SSW28	10,990 lf	\$180.00	\$1,978,000
II	USW-18	Storage Basin	West of MH SW-2	4,000,000 gal	\$4.00/gal	\$16,000,000

**Table 14.7 Recommended Improvements - Upper Southwest Salt Valley Basin
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Tier	ID	Description	Location ⁽¹⁾	Parameters	Unit Price, \$/lf	Planning Cost ⁽²⁾
III	USW-19	36-inch	SW-92 to SSW4, SW-80 to SSW4	9,135 lf	\$360.00	\$3,289,000
III	USW-20	27-inch	SW-90 to SW-80, SW-93 to SW-92	8,059 lf	\$270.00	\$2,176,000
III	USW-21	24-inch	SW-95 to SW-90	2,794 lf	\$240.00	\$671,000
III	USW-22	21-inch	SW-94 to SW-93, SW-97 to SW-90, SW-70 to SSW14, SW-60 to SSW17, SW-50 to SSW28	24,786 lf	\$210.00	\$5,205,000
III	USW-23	18-inch	SW-96 to SW-95	3,384 lf	\$180.00	\$609,000

Notes:

1. Upstream and downstream nodes for each pipe section.
2. ENR CCI for Kansas City = 8512 (July 2006).
3. Costs are from current City CIP.