

4 EXISTING FACILITIES EVALUATION

The City is served by a combination of wastewater collection, conveyance, and treatment systems. The City owns and operates the collection system that collects wastewater from the majority of property owners. In addition, a few private collection systems discharge into the City's sewers. This wastewater is conveyed by a network of collection lines, trunk sewers, pump stations, force mains, and interceptors to facilities owned and operated by two regional sewer districts. Most of the City is located within the natural boundaries of the Little Blue River and its tributaries. The Little Blue Valley Sewer District (LBVSD), a wholesale sewer district that provides conveyance and treatment for wastewater within its boundaries, meters the wastewater at the connection of the City's collection system to the District's conveyance system. The remaining portion of the City falls in the natural watershed boundaries of Big Creek and Middle Big Creek. The Middle Big Creek Sub-District (sub-district to the Little Blue Valley Sewer District) provides pump stations, forcemains, and interceptors to convey the City's wastewater that is generated in the Big Creek and Middle Big Creek Watersheds to the LBVSD's conveyance system for treatment. The City owns no wastewater treatment facilities.

4.1 EXISTING COLLECTION AND CONVEYANCE SYSTEM

The Study Area consists of 11 major drainage basins or watersheds. Drainage basins define areas within the City where wastewater may be collected and conveyed downhill by gravity. As shown in Figure 4-1, nine of these basins drain north to the Little Blue River and the East Fork Little Blue River (under Lake Jacomo and Blue Springs Lake). These include the following watersheds: Blue Springs, Bogg's Hollow, Cedar Creek, Jacomo, Little Cedar Creek, Maybrook, Mouse Creek, South Prairie Lee, and West Prairie Lee. Two watersheds, Big Creek and Middle Big Creek, drain south.

4.1.1 City Owned

Gravity Collection and Conveyance System

The City owns and operates a sewer collection system consisting of approximately 11,000 manholes and over 2.6 million linear feet of sewer. Several subdivisions are currently served by private low-pressure grinder pump systems that collect wastewater and pump to a city-owned sewer. Table 4-1 represents an inventory of the gravity sewer lines by watershed within the City.

**Table 4-1
Gravity Sewer Length by Watershed**

Pipe Length (Feet)																		
Pipe Size (Inches)	6	8	10	12	14	15	16	18	20	21	24	27	30	36	42	48	54	Totals
Big Creek	0	47,557	4,586	12,174	0	9,448	400	7,609	0	1,463	3,852	0	0	0	0	0	0	87,089
Blue Springs	0	27,854	1,988	5,645	0	0	0	0	0	0	0	0	0	0	0	0	0	35,487
Bogg's Hollow	0	13,375	1,452	2,994	0	4,167	0	2,537	0	932	145	0	0	0	0	0	0	25,602
Cedar Creek	4,621	497,893	19,678	33,798	0	4,806	343	13,374	0	5,458	1,965	3,502	4,659	0	1,139	0	0	591,235
Jacomo	0	10,238	741	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10,979
Little Cedar Creek	0	30,752	5,906	24,710	0	340	371	0	38	186	1,626	2,004	6,380	5,054	0	0	0	77,367
Maybrook	0	294,087	17,089	29,440	0	891	14,062	0	1,802	1,120	1,231	10,756	8,526	1,650	1,417	2,285	6,988	391,345
Middle Big Creek	0	422,257	14,468	15,721	3,369	5,147	2,695	8,791	9,464	0	5,119	873	0	0	0	0	0	487,903
Mouse Creek	1,127	100,720	1,972	12,465	0	7,517	161	1,469	0	0	3,162	0	5,378	5,187	15,766	0	0	154,924
South Prairie Lee	0	364,122	6,127	15,999	0	15,009	0	4,556	0	1,131	8,889	0	1,709	633	896	0	0	419,070
West Prairie Lee	8,269	280,135	16,656	26,812	0	7,463	0	5,478	1,243	284	8,489	0	4,056	0	0	0	0	358,884
Totals	14,017	2,088,990	90,663	179,756	3,369	54,789	18,031	43,813	12,546	10,575	34,478	17,135	30,708	12,524	19,218	2,285	6,988	2,639,886

Pump Station and Force Main Conveyance System

Although all of the major watersheds are served by gravity sewer systems, conveyance by gravity all the way to the LBVSD’s interceptor system for several watersheds is not possible. The Blue Springs, Jacomo, South and West Prairie Lee, Middle Big Creek and Big Creek Watersheds are conveyed to a downstream location and pumped to another watershed for conveyance by gravity to the Little Blue Valley Sewer District system.

In the very northern portion of the Blue Springs Watershed, the City operates a pump station to serve the Arbores Subdivision.

The Jacomo Watershed terminates at Lake Jacomo. Since there are no sewers under or around Lake Jacomo, wastewater collected in this watershed is pumped to the Blue Springs and Maybrook watersheds and then is conveyed by gravity to the LBVSD’s system. The only wastewater currently collected within this watershed is from the Post Office, library, and commercial buildings along Rice Road, just north of Colbern Road. This wastewater is collected in a pump station, which was constructed more than 40 years ago, and pumped south into the West Prairie Lee Watershed, where it is conveyed to the Tudor Road Pump Station for conveyance back to the Maybrook Watershed. Recently, another pump station was approved for construction in the Jacomo Watershed. This pump station will collect wastewater from the new Savannah Wood subdivision and future development property and convey it north to the Blue Springs Watershed and on to the LBVSD.

The West and South Prairie Lee Watersheds terminate at Prairie Lee Lake. Since there are no sewers under Prairie Lee Lake or Lake Jacomo, this wastewater is pumped to the Maybrook and Little Cedar Creek watersheds. Wastewater from Legacy Park, the new Legacy Wood development, and Woodland Shores subdivision have pump stations that convey wastewater west to the Scruggs Road Pump Station. This wastewater, along with wastewater from the South Prairie Lee Watershed, is collected and pumped by the Scruggs Road Pump Station northwest to the Tudor Road Pump Station. The Tudor Road Pump Station pumps this wastewater along with the wastewater collected in the West Prairie Lee Watershed to the west. Near the intersection of Scruggs Road and Highway 291, the pumped wastewater is split so that up to 16 million gallons per day can be pumped north to the Maybrook Watershed and up to 4 million gallons per day can be pumped west to the Little Cedar Creek Watershed. Excess flow holding basins at the Legacy Wood pump station, the Scruggs Road Pump Station, at the Tudor Road Pump Station and

the sites of several retired pump stations are used to temporarily store wastewater during wet weather events.

Within the Little Cedar Creek watershed, several gravity trunk lines pass through Unity Village for gravity conveyance to the Little Cedar Creek Interceptor. In addition, the Douglas Road and Lee's Summit Road Pump Stations convey wastewater to the Little Cedar Creek Interceptor. An excess flow holding basin is located at the Lee's Summit Road Pump Station.

Wastewater in the Big Creek and Middle Big Creek Watersheds is conveyed by gravity to pump stations owned by the Middle Big Creek Sub-District for conveyance to the Mouse Creek Interceptor and conveyance to LBVSD's facilities.

Finally, the City recently completed the construction of eight new pump stations in the very northern portion of the Maybrook Watershed to serve homes that are located below the hydraulic grade line of the LBVSD Interceptor in this area.

Figure 4-1 depicts the location of all of the City's existing pump stations. Table 4-2 summarizes all of the City's active pump stations and their capacities. The existing Summit Mill Pump Station will be retired when the sewers in the Legacy Wood subdivision extend to Summit Mill.

**Table 4-2
Active Pump Stations
Summary**

Active Pump Stations		
Pump Station Name	No. of Pumps	Station Capacity (GPM)
Tudor Road	6	16,667
Scruggs Road	4	6,458
Rice Road	2	180
Arbores Road	2	83
Douglas Road	2	550
Lee's Summit Road	2	1,650
Woodland Shores	2	800
Summit Mill	2	325
Legacy Wood	2	694
Anderson	2	125
Legacy Park	2	175
Oaks Ridge Meadows Pump Station 1	2	317
Oaks Ridge Meadows Pump Station 2	2	59
Oaks Ridge Meadows Pump Station 3	2	332
Oaks Ridge Meadows Pump Station 4	2	25
Oaks Ridge Meadows Pump Station 5	2	10
Oaks Ridge Meadows Pump Station 6	2	448
Oaks Ridge Meadows Pump Station 7	2	47
Oaks Ridge Meadows Pump Station 8	2	18

Excess Flow Holding Basin Storage System

Another component of the City's wastewater collection and conveyance system is a series of excess flow holding basins (EFHB). These basins are utilized to provide flow equalization during periods of peak wet weather flow to minimize and/or eliminate overloading of pump stations and gravity interceptors. The EFHB is designed to either limit or eliminate the discharge from the conveyance system upstream of the basin during the wet weather peak flow event. After the wet weather wastewater flows subside, the flow is drained from the EFHB. Table 4-3 summarizes the existing EFHBs in the City. A summary of the methodology for evaluating capacity and sizing excess flow holding basins is provided in Appendix 9.3.

**Table 4-3
Excess Flow Holding Basins**

<i>Existing EFHB's</i>	
Description	Capacity (MG)
Lift Station 6 EFHB	1.5
Tudor Road Pump Station EFHB	0.65
Scruggs Road Pump Station EFHB	1.4*
5A/5B EFHB	5.3
Lee's Summit Road EFHB	1.846
Kensington EFHB	1.13
Arbores EFHB	0.038

*Expansion Proposed

4.1.2 Little Blue Valley Sewer District Owned

The LBVSD is a wholesale district that provides conveyance and treatment of wastewater from the cities of Kansas City, Independence, Raytown, Blue Springs, Lee's Summit, Grandview, Raymore, and Belton as well as Jackson and Cass Counties. In addition, the LBVSD provides service to the Fort Osage School District and Lake City Army Ammunition Plant. The LBVSD also provides conveyance and treatment for the Middle Big Creek Sub-District. Figure 4-2 depicts the boundaries of the LBVSD, the boundaries of the various municipalities served by the District, and the boundaries of the Middle Big Creek Sub-District. The LBVSD's conveyance system consists of an interceptor, several connection lines, and meter structures. Residential and commercial wastewater is collected in systems belonging to customers of the LBVSD. This wastewater is conveyed by the customers through meter structures and into the LBVSD's Interceptor system. The interceptor is a gravity sewer that ranges in size from 21 through 126 inches in diameter.

The LBVSD operates a 52-million gallon per day wastewater treatment plant at a site near the discharge of the Little Blue River to the Missouri River. The LBLVSD's conveyance system is an interceptor that transports wastewater from its wastewater customers by gravity. The interceptor is located so that collection systems from both sides of the Little Blue River can be connected without pump stations and/or siphons. Meter structures are located (see Figure 4-2) at the connection points of the drainage basin collection systems serving its customers. The LBVSD operates a total of 37 meter structures. For the City of Lee's Summit, the LBVSD measures the City's wastewater flows at the downstream end of the Blue Springs, Maybrook, Little Cedar Creek, Bogg's Hollow, Cedar Creek, and the Mouse Creek Watersheds.

The flow from the South and West Prairie Lee Watersheds are pumped to the Maybrook and Little Cedar Creek Watersheds for conveyance and metering. Flows from the Jacomo Watershed are pumped to either the Maybrook or the Blue Springs Watershed for conveyance to the District's system.

The LBVSD's interceptor has a peak flow capacity under non-surcharged conditions of approximately 300 million gallons per day at the downstream end. Under low pressure conditions, the capacity is approximately 340 million gallons per day. The LBVSD projects that peak flow in 2020 will exceed 400 million gallons per day. The District's conveyance system has already experienced peak wet weather flows in excess of 360 million gallons per day (May 2004) that have caused significant surcharging of its interceptor and backups into collection systems owned by municipalities, including Lee's Summit. By the time the City reaches ultimate build out, the peak wet weather flow entering the District's interceptor will be even greater. It is projected that the

City's wastewater will discharge to the Little Blue interceptor at a peak rate of (50-years return frequency) 138 million gallons per day at ultimate buildout. The LBVSD's capital improvement plans include the construction of excess flow holding basins along its interceptor to equalize these peak flows and eliminate excessive surcharging. These proposed EFHB's are shown on Figure 4-2. Future improvements, as recommended in the District's Master Plan, include the construction of peak flow pump stations that will effectively cause the interceptor to operate as a force main to the plant, allowing it to deliver 400 million gallons per day to the plant.

4.1.3 Middle Big Creek Sub-District Owned

Prior to early 1990, the Cities of Lee's Summit, Raymore, Lake Winnebago, and Greenwood were served by a sewer district that operated a lagoon treatment system downstream of Lake Winnebago. The Middle Big Creek Sub-District (MBC) was formed in the early 1990's by petition as a sub-district of the Little Blue Valley Sewer District. This sub-district, which is ultimately governed by the Little Blue Valley Sewer District Board of Trustees, serves the cities of Lee's Summit, Greenwood, Raymore, and Lake Winnebago. It also serves two Cass County sewer district's, Dikeland and Mullendike. MBC has a Board of Trustees that provides recommendations to the LBVSD Board of Trustees for approval. LBVSD provides operation and maintenance to the MBC facilities. The boundaries of MBC are shown on Figure 4-3.

Wastewater collected in the cities and sewer districts served by the Middle Big Creek Sub-District are ultimately conveyed to the LBVSD for treatment at its wastewater treatment plant. The Middle Big Creek Sub-District facilities include:

- A. Greenwood Pump Station and Force main: These facilities convey wastewater collected by Lee's Summit and Greenwood within the Big Creek Watershed and pump it to the Raintree Pump Station.
- B. Lake Winnebago Pump Station and Excess Flow Holding Basin: This excess flow holding basin is the old Middle Big Creek Lagoons converted to serve as wet weather wastewater storage. Wastewater that exceeds the capacity of the Raintree Pump Station is diverted through the Lake Winnebago Interceptor, combines with the flow from Lake Winnebago and is stored in this basin until the wet weather subsides. The stored wastewater is then pumped by the Lake Winnebago Pump Station to the Raintree Pump Station for conveyance to the LBVSD's conveyance and treatment system. During dry weather, the Lake Winnebago Pump Station serves Lake Winnebago only by pumping its flow to the Raintree Pump Station.
- C. Raintree Pump Station and Force main: The Raintree Pump Station and force main convey wastewater collected from the Middle Big Creek, Alexander Creek, and Big Creek Watersheds north and west to the Mouse Creek Interceptor in Lee's Summit.
- D. Mouse Creek Interceptor: The Mouse Creek Interceptor conveys the wastewater plus wastewater collected from the Mouse Creek Watershed in Lee's Summit to the LBVSD's Interceptor under Longview Lake. Although the Mouse Creek Interceptor is a Middle Big Creek facility, Lee's Summit contributed to the upsizing of the line to serve growth areas in the Mouse Creek Watershed. The capacity of this interceptor is limited at the discharge to the LBVSD due to the size of the District's interceptor under Longview Lake.
- E. Raintree Lake and Lake Winnebago Interceptors: These interceptors are located under Raintree Lake and Lake Winnebago. They are used to convey wastewater collected by the Cities of Lee's Summit and Lake Winnebago to the pumping facilities owned by MBC. Both of these interceptors will operate under surcharge conditions to be able to serve future growth of the area served by Middle Big Creek Sub-District.

- F. Alexander Creek Interceptor (City of Raymore): The City of Raymore owns the Alexander Creek Interceptor, which conveys wastewater from Raymore and from the Dikeland Sewer District to the Raintree Pump Station. This interceptor also conveys wastewater from a section of the collection system (owned by Lee's Summit) in the Raintree Lake Subdivision to the Raintree Pump Station.

MBC and LBVSD are currently evaluating the feasibility of expanding the Middle Big Creek facilities to address the growth in its member communities and to include the City of Pleasant Hill. Alternatives include: 1) expansion of the existing pumping facilities, and 2) construction of a regional wastewater treatment plant to serve the Sub-District.

4.2 EXISTING WASTEWATER TREATMENT FACILITIES

There are no wastewater treatment facilities located within the City. All wastewater collected in Lee's Summit is conveyed by City-owned, MBC-owned, and/or LBVSD-owned facilities to the LBVSD Wastewater Treatment Plant.

4.2.1 Little Blue Valley Sewer District

LBVSD recently completed the expansion of its wastewater treatment facilities to an average daily flow capacity of 52 million gallons per day and a peak wet weather flow capacity of 400 million gallons per day. It is anticipated, based on a facility plan completed in 2001, that this capacity, along with scheduled improvements in 2011, will be capable of meeting the District's growth plans through the Year 2020. A major component of the scheduled 2011 improvements is to provide improvements to the interceptor system, such as the proposed excess flow holding basins, so that peak flows will not result in backups into city-owned collection systems or become overflows to the Little Blue River. Another component is to upgrade the sludge disposal facilities. The Missouri Department of Natural Resources (MDNR) has promulgated new regulations that require all wastewater treatment facilities meet disinfection limits by 2013. This may require LBVSD to add these facilities to their plant in their 2011 project. Efforts are ongoing by LBVSD to obtain a waiver for this requirement since LBVSD discharges to the Missouri River. MDNR is also considering new limits for ammonia, which could impact future improvements to the District's treatment facility.

Future expansion of the LBVSD's wastewater treatment plant will be necessary to address growth beyond 2020. Recent growth planning by the District appears to indicate that growth, especially in MBC, is exceeding previous projections. With the growth anticipated in MBC, expansion prior to 2020 may be necessary unless separate treatment facilities are constructed in the MBC.

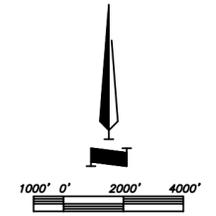
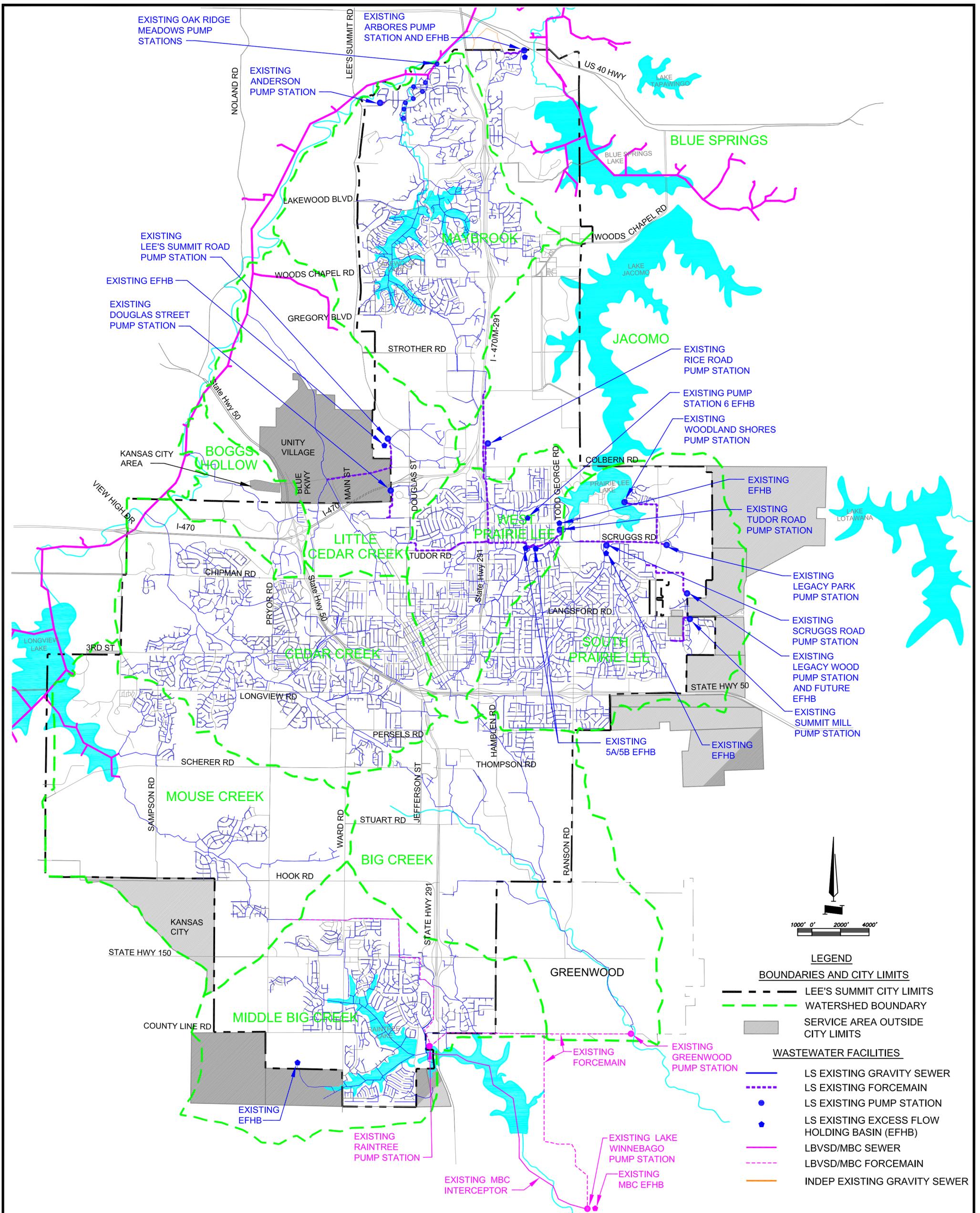
4.3 EVALUATION OF UNSEWERED AREAS

The City of Lee's Summit has several areas within the City that have developed but are not served by sewers.

One of these areas is the Prairie Lee Lake area. Homes were constructed prior to annexation by the City. Wastewater service is provided by septic tanks. As these septic tanks and lateral fields start to fail, leachate will eventually seep into the lake. The City is currently in discussions with the homeowners around Prairie Lee Lake in an effort to provide wastewater service to this area.

Another developed, unsewered area is the industrial area along Highway 291, south of 50 Highway. Septic tanks and temporary storage tanks are used for wastewater in this area. Property owners are responsible for hauling and final disposal of stored wastewater. The City has worked with property owners in this area in an effort to form a Neighborhood Improvement District to help finance collection system improvements. The effort has been unsuccessful.

Other unsewered areas include large estate lots in remote areas where collection system facilities are not available. Providing sewers to these areas as well as the undeveloped land left in the City will most likely become the responsibility of the developers of these areas. This Master Plan will provide the plan for location and sizing of these future collection system improvements.

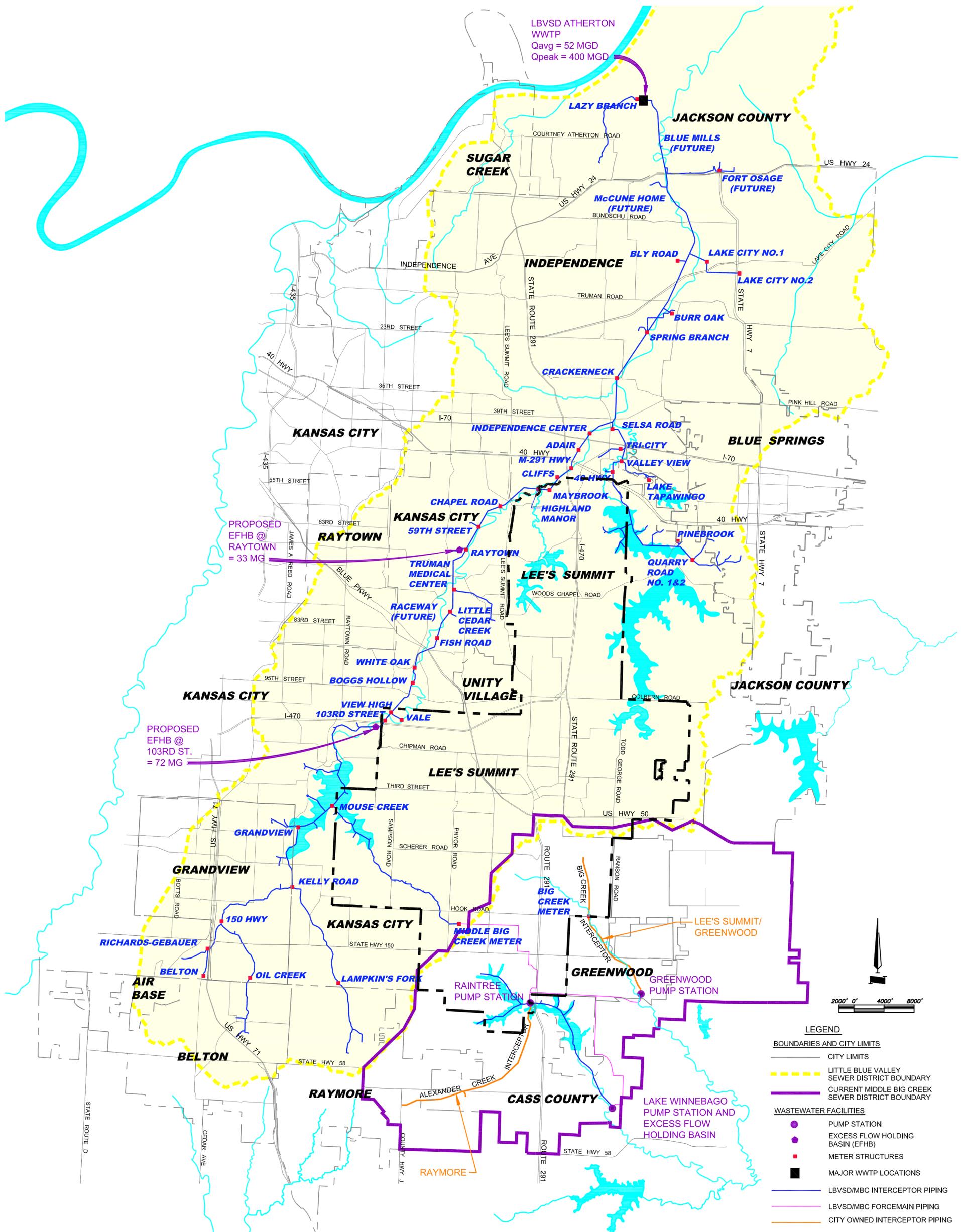


- LEGEND**
- BOUNDARIES AND CITY LIMITS**
- LEE'S SUMMIT CITY LIMITS
 - - - WATERSHED BOUNDARY
 - SERVICE AREA OUTSIDE CITY LIMITS
- WASTEWATER FACILITIES**
- LS EXISTING GRAVITY SEWER
 - - - LS EXISTING FORCEMAIN
 - LS EXISTING PUMP STATION
 - LS EXISTING EXCESS FLOW HOLDING BASIN (EFHB)
 - LBVSD/MBC SEWER
 - - - LBVSD/MBC FORCEMAIN
 - INDEP EXISTING GRAVITY SEWER



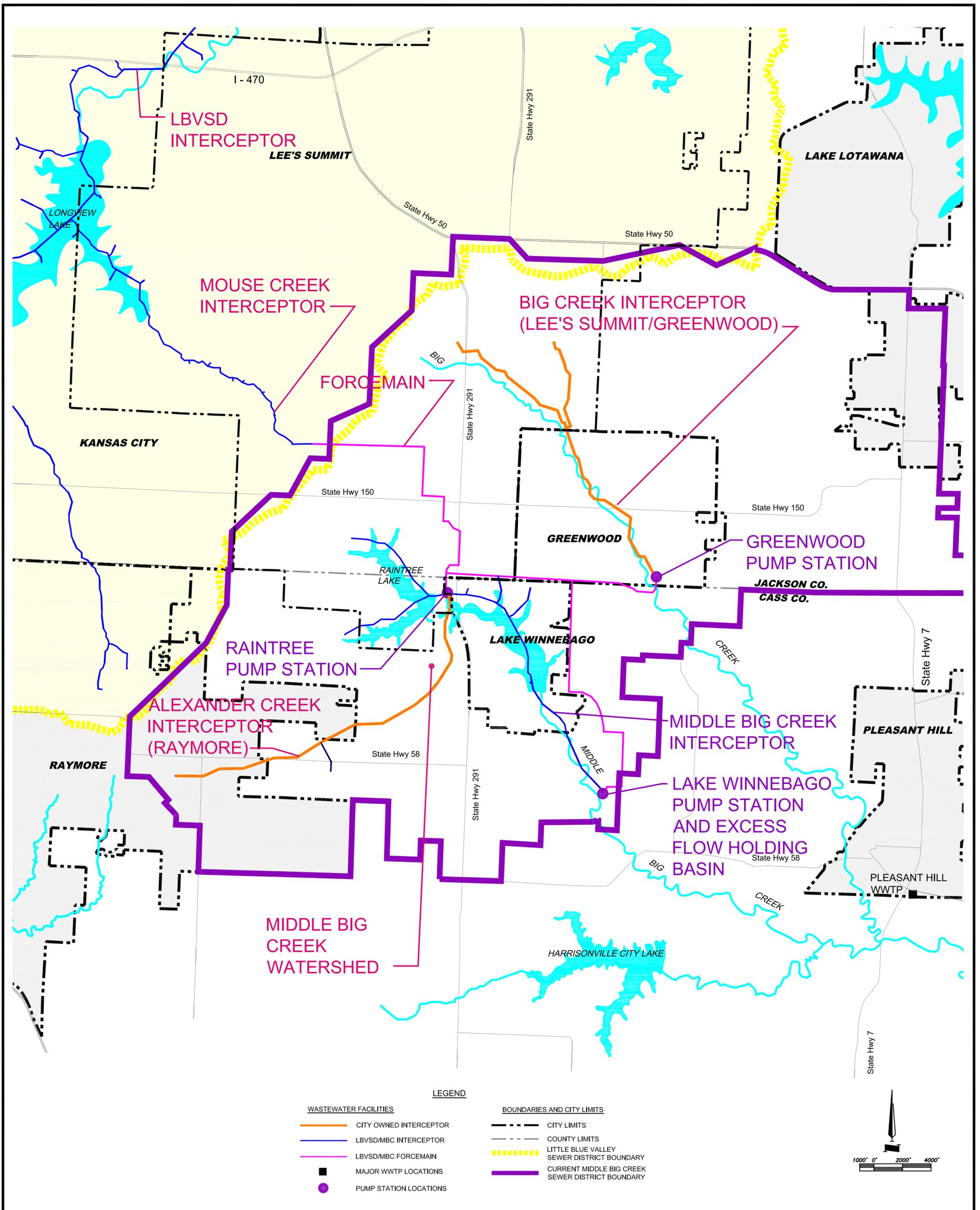
CITY OF LEE'S SUMMIT WASTEWATER MASTER PLAN
EXISTING COLLECTION AND CONVEYANCE SYSTEM
FIGURE 4-1





**LITTLE BLUE VALLEY SEWER DISTRICT
WASTEWATER CONVEYANCE SYSTEM
FIGURE 4-2**





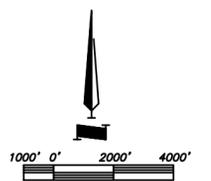
LEGEND

WASTEWATER FACILITIES

- CITY OWNED INTERCEPTOR
- LBVSD/MBC INTERCEPTOR
- LBVSD/MBC FORCEMAIN
- MAJOR WWTP LOCATIONS
- PUMP STATION LOCATIONS

BOUNDARIES AND CITY LIMITS

- CITY LIMITS
- - - COUNTY LIMITS
- ▬▬▬ LITTLE BLUE VALLEY SEWER DISTRICT BOUNDARY
- ▬▬▬ CURRENT MIDDLE BIG CREEK SEWER DISTRICT BOUNDARY



**MIDDLE BIG CREEK SUB-DISTRICT
EXISTING FACILITIES
FIGURE 4-3**

