

Facilities Plan Update Springfield Water & Sewer Commission Springfield, Kentucky

Chapter 2 - Project Background

Purpose

The purpose of this chapter is to:

- Provide a description of the planning area.
- Identify the local governmental entities involved in the Facilities Plan Update.
- Discuss population trends and present socio-economic conditions.
- Describe existing land use.
- Discuss the area's hydrology, land features and flood plains.
- Address climate, precipitation, air quality, and biotic communities.
- Consider the possibility of archaeological sites within the planning area.
- Present water quality objectives.

Planning Area

The City of Springfield is located in central Kentucky, as illustrated by Figure 2-1. Springfield is located in south Washington County, at the intersections of Highways 55, 150, 152 and 555. Springfield is the largest city in Washington County.

The planning area identified by the Facilities Plan Update, illustrated by Figure 2-2, includes the entire City of Springfield and adjacent portions of the county, covering an area of approximately 12,030 acres. The planning area identifies a region which should be served by the city's wastewater treatment plant (WWTP). It does not identify boundaries of legal entities.

Figure 2-1

Figure 2-2

Entities Involved

The City of Springfield and Washington County Fiscal Court are the sole entities involved in the Facilities Plan process. Upon completion of the Facilities Plan Update, copies of the report will be provided to the city, as well as the county, which makes up a large part of the planning area. Subsequently, it is expected that the city and county will pass resolutions approving the proposed planning area boundary and concurring with the recommendations in the report. The resolutions will be included in Appendix A. The Facilities Plan Update will be submitted to the Kentucky Natural Resources and Environmental Protection Cabinet, Division of Water (DOW), for their review and approval. Public meeting documentation will be inserted in Appendices B and C.

Population Trends

Table 2-1 summarizes historical and projected population trends in the City of Springfield and Washington County from 1970 to 2020. The city experienced moderate population growth from 1970 to 1980, and then experienced a 17 percent decline between 1980 and 2000. Washington County experienced a modest increase in population of 188 persons from 1970 to 2000, which equates to 1.8 percent over 30 years.

Population projections made by the Kentucky State Data Center and the Lincoln Trail Area Development District indicate that both the city and the county will experience slow growth through the year 2020.

Table 2-1
Population Trends
Springfield Facilities Plan Update

Year	Population		Springfield's Population as a Percent of Washington County's Population
	Springfield^{1, 2}	Washington County³	
1970	2,961	10,728	27.6
1980	3,179	10,764	29.5
1990	2,875	10,441	27.5
2000	2,634	10,916	24.1
2010	2,829	11,378	24.9
2020	2,993	11,644	25.7

Notes: ¹1970-2000 figures from Kentucky State Data Center, University of Louisville, KY

²2010 and 2020 projections based on 7.4 percent increase from 2000 to 2010, and 5.8 percent increase from 2010 to 2020 (Springfield Comprehensive Plan, 2001)

³All figures from Kentucky State Data Center, Louisville, KY

Socio-Economic Conditions

Employment and Economic Development

Springfield employment has been dominated by manufacturing , services and trade sectors. The manufacturing and services sectors accounted for 61 percent of all jobs in 1990, and the trade sector accounted for an additional 16 percent of all employment in 1980.

In the period 1980-1990, employment in all sectors decreased by a total of 95 jobs, from 1,275 jobs in 1980 to 1,118 jobs in 1990. During that same time frame, jobs in the manufacturing sector increased from 315 to 350.

Table 2-2 summarizes the number of jobs and average weekly salaries for various employment categories.

Table 2-2
Springfield and Washington County Employment
and Wages by Category
Springfield Facilities Plan Update

<i>Category</i>	<i>Number of Jobs, Springfield, 1990¹</i>	<i>Average Weekly Wage (\$), Washington, 1998²</i>
Agriculture, Fisheries, Forestry, Mining	56	Unknown
Construction	45	457.30
Manufacturing	350	493.53
Transportation/Communication/Public Utilities	58	362.00
Wholesale Trade	25	192.31
Retail Trade	159	
Finance, Insurance and Real Estate	79	528.59
Services	370	327.41
Government	38	401.38
County Totals	1,180	N/A

Notes: ¹ Workers covered by unemployment insurance. Source: Springfield Comprehensive Plan, 2001
² Kentucky Cabinet for Economic Development

Major manufacturing firms in the planning area are listed in Table 2-3.

Table 2-3
Major Manufacturing Firms in Planning Area
Springfield Facilities Plan Update

<i>Firm</i>	<i>Product</i>	<i>No. of Employees in 1997¹</i>
GSAFI (formerly Armour Food Ingredient Company)	Dairy products	116
Bluegrass Dairy and Food	Dairy products	Unknown
Midwest Stamping	Welding	Unknown
North American Pipe Corporation	Plastic pipe	80
Springfield Products, Inc.	Automotive armrest	275
Springfield Redrying Corporation	Tobacco processing	215
Toyotomi America Corporation	Automotive body parts	Unknown
Western Development	Storage/marketing	Unknown
Wheaton Plastic Company	Molded containers, auto parts	Unknown
Parker-Keeper, Inc. (formerly Wynn's)	Plastic auto parts	150

Note: ¹ Springfield Comprehensive Plan, 2001

Income Levels

The 2000 U.S. Census Bureau data for Washington County residents indicates a per capita income of \$22,100, with a median household income of \$33,136. Approximately 13.5 percent of Washington County's non-institutionalized residents lived below federally defined poverty levels in 1999.

Land Use

The land use pattern of an area is one of the major factors in determining potential water quality problems. Typical water quality problems that can arise from improper land use patterns are as follows:

- Poor distribution of point source waste discharges.
- Non-point discharges from urban and rural uses.
- Reduction in ground cover, flood plains, and wetlands.

The City of Springfield covers approximately 5 square miles of land in Washington County. Table 2-4 provides a breakdown of land use categories within the City. Residential use account for the largest percentage of the total developed area.

Table 2-4
Land Use in Springfield, 1992¹
Springfield Facilities Plan Update

<i>Land Use Category</i>	<i>Acres</i>	<i>% of Total Area²</i>	<i>% of Developed Area²</i>
Residential	1080	9	48
Commercial	470	4	21
Industrial	307	3	14
Public/Quasi-Public	412	3	18
Agriculture/Open ³	9,761	81	0
Total Acreage	12,030	100	100

Notes: ¹Comprehensive Plan for Springfield, Kentucky, Lincoln Trail Area Development District, 1993. Assumes the planning area outside the area included in the Comprehensive Plan is categorized as Agriculture/Open.

²Rounded to nearest whole percent

³Adjusted to include the entire planning area

Figure 2-3 illustrates general land use concepts developed in the City's 1993 comprehensive plan (Comprehensive Plan for Springfield, Kentucky, Lincoln Trail Area Development District, September 1993). According to this plan, the city will be divided into three large land use categories: residential, industrial, and commercial. The vast majority of the city is planned for residential development. The north/northwest arc is planned for industrial development; and commercial development is planned for the south, center, and northwest parts of the city.

Hydrology

Figure 2-4 illustrates the significant surface water features of the Springfield planning area. The planning area lies entirely in the Salt River watershed, and encompasses two significant impoundments: the Springfield Reservoir, in the southwest part of the planning area; and the City Reservoir, which is located along the west boundary of the city limits. Significant streams include Shay Branch; Haydon Branch; Poorhouse Branch; Road Run Creek; Booker Branch; and Allen Branch. No streams in this basin located in the planning area are listed in the 303(a) List of Waters for Kentucky (1998). Therefore, no sources of contamination are identified. Cartwright Creek, Mill Creek, Frog Hollow and Pleasant Run are minor streams located in the planning area. All major creeks run to the northwest.

Figure 2-5 illustrates the planning area divided into 20 drainage basins. Sixty-nine percent of the planning area is included in Drainage Area Basins No. 5, No.6 and No.7, which drain to Road Run Creek and include a majority of all flows.

Figure 2-3

Figure 2-4

Figure 2 - 5

Land Features

Topography

Washington County lies in the southern part of the Outer Bluegrass physiographic region of central Kentucky, just north of the Mississippian Plateau region. The Outer Bluegrass region is located near the center of the state and is bordered by the Ohio River in the north and west, and a ring of hills known as the Knobs in the west, south, and east. It is a rolling plateau that becomes more rugged near the edges. The underlying limestone is often visible at the surface in road cuts and where eroded by streams, most dramatically in the Kentucky River Palisades.

The maximum elevation in the planning area is 920 feet above mean sea level. It is located in the southern part of the planning area, east of Jimtown Road. The minimum elevation in the planning area is 650 feet above mean sea level. It is located at the northern edge of the planning area along Road Run Creek. The planning area consists of moderately to heavily rolling topography except near major stream beds where the topography is dissected and rugged.

Geology

The planning area is located within the Outer Bluegrass subregion of the Eden Shale Belt. The Outer Bluegrass consists of dominating formations which consist of alluvium, Great Lake Limestone, Ashlock and rocks of the Fairview-McMillian Formation.

Generally, these formations display the following characteristics:

- Alluvium - Silt, clay and gravel 0-40 feet in thickness occupying floodplains with small terraces along rivers and tributaries.
- Great Lake Limestone and Ashlock Formation - Limestone and shale, medium gray, cryptograined, with large fossils. Shale is dark gray, carbonaceous. Both the limestone and shale contain brachiopods. Average thickness is 35-65 feet, occupying somewhat dissected upland areas; moderately steep slopes where the shale predominates; moderately undulating to gently rolling service where the limestone predominates. Slopes are steep to cliffy and dissected along large streams.
- Fairview-McMillian Formation - Thin to medium-thick beds of gray limestone, scrubby in places and some interbedded shale averaging 75-100 feet in thickness. This formation occupies gently to moderately rolling uplands away from major streams. Thick limestone beds stand out as ledges along steep hillsides and bluffs.

The rock formations underlying the soils played a key role in setting the environmental conditions currently present in the planning area. The structural makeup and density of the rock has produced significant cause-and-effect conditions and processes. This includes the potential for failures of on-site wastewater collection and treatment systems.

Soils

Soils within any area may be classified into separate and distinct soil associations. Each association consists of a combination of distinct soils in specified fractions, constant throughout a defined geographic area.

Characteristics defining soil associations are: drainage, permeability, slope, depth, type, and amounts of soils in the association. The composition of each association will have an effect on groundwater recharge, drainage, construction methods, and ultimately, development costs.

The U.S. Soil Conservation Service publishes soil surveys for every county. The survey for Washington County indicates that the predominant soil type is the Lowell-Fairmont-Shelbyville Association, which encompasses the Springfield urban area. These soils are well drained and have a clayey or loamy subsoil, and are primarily used for cultivated crops, pasture and hay.

The Lowell-Fairmont-Shelbyville Association is typically characterized by undulating to rolling uplands bordered by moderately steep to steep hillsides and narrow to moderately broad valleys. These soils were developed chiefly of materials weathered from thin-bedded limestones and shales capped in some places by a thick blanket of loess (fine grained wind blown silt). The Lowell soils, for the most part, are on the narrow ridges and upperside slopes below the Shelbyville soils which are located on the broader ridges. The Fairmont soils dominate the hillsides. Lowell soils make up about 50 percent of the association, Fairmont about 24 percent and Shelbyville about 12 percent. Various minor soils make up the remaining 14 percent of this association.

The ridges of this association area are used for the production of row crops, hay and pasture. Erosion hazards and shallow soil depths limit the use of the land in this association area for crops. The main limitations for urban developments are shallowness to rock in the Fairmont soil areas, the narrow ridges and steep slopes.

These soils typically have moderate to no permeability, and therefore have the potential to cause on-site wastewater collection and treatment systems to fail.

Climate and Precipitation

The Springfield area has a mild and moist climate. Monthly average temperatures range from 32 degrees in January, to 79 degrees in July. The growing season (above 32 F) is typically around 200 days per year.

The Springfield area normally receives about 48 inches of precipitation per year. The mean annual snowfall is about 16 inches. The area receives precipitation on an average of 125 days of the year (34%). Of these rainy days, 45 are (on average) classified as having at least one thunderstorm.

Floodplain

Appendix D includes the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps for the planning area. Within the planning area, only Road Run Branch is indicated on FEMA floodplain maps as a designated flooding area. Typically, the flood prone area includes a 100-foot width strip of land encompassing the branch.

Wetland maps for the planning area are provided in Appendix E as attachments.

Water Supply

The city owns and operates a 2.0-mgd water treatment plant (WTP) located off of W. Main Street in the northwest part of town. The WTP has two reservoir impoundments, the City Reservoir located adjacent to the WTP; and Willisburg Lake, located northeast of the planning area. A third reservoir, Springfield Reservoir, is located in the southwest part of the planning area. This reservoir is not currently in use.

The Springfield water treatment plant serves the entire planning area. There are no known homes which currently use wells, but there are 25 to 30 homes which are not on the public water system. They use cisterns, where rainwater is collected and disinfected prior to use.

Groundwater

Groundwater is contained in limestone of the Ordovician system. Groundwater levels are generally low, and wells drilled outside of major stream terraces typically will not produce adequate domestic water supplies. Groundwater can be very hard (high in calcium carbonate) and can also contain relatively high levels of salt and hydrogen sulfide.

Typically, since groundwater levels are quite low, no impact is foreseen on wastewater treatment and collection systems. Groundwater in subsurface solution is negligible. Only in stream terrace alluvium will groundwater travel close to the surface.

Air Quality

Any improvements to the wastewater collection and treatment system recommended in this Facilities Plan Update are not expected to adversely affect the area's air quality.

Biotic Communities

The Springfield planning area supports a diverse assortment of wildlife. The United States Department of the Interior, Fish and Wildlife Service, has identified species in Washington County that are endangered and/or threatened. The listing of species and letters from the Department and the Kentucky Department of Fish and Wildlife Resources are included in Appendix F. Before the implementation of any project related to the Facilities Plan Update, the Fish and Wildlife Service shall be contacted with detailed information on construction activities on a case by case basis.

Archaeology

The Kentucky Heritage Council has been notified of the potential for construction within the Springfield planning area boundary. If land is acquired for expanding the Springfield WWTP, a professional archaeologist will determine if any archaeological sites are eligible for listing in the National Register of Historic Places.

Water Quality Objectives

The water quality objectives for this Facilities Plan Update are the same as mandated by the Federal Clean Water Act, which are to prevent degradation and maintain the quality of the area's surface waters. Pursuant to the Kentucky Revised Statutes (KRS) 224.034, the Springfield WWTP must comply with its Kentucky Pollutant Discharge Elimination System (KPDES) permit. A copy of the current permit is included in Appendix G. The current KPDES permit discharge limits are listed in Table 2-5.

Table 2-5
Springfield WWTP KPDES Effluent Limits and Monitoring
Requirements
Springfield Facilities Plan Update

<i>Parameter</i>	<i>Effluent Limits</i>				<i>Monitoring Requirements</i>
	<i>Lbs/d</i>		<i>Other Units</i>		
	<i>Monthly Average</i>	<i>Weekly Average</i>	<i>Monthly Average</i>	<i>Weekly Average</i>	
Flow Design (0.88 MGD ¹)	N/A	N/A	Report	Report	Continuous
BOD ₅ ²	220	330	30 mg/L	45 mg/L	1/week composite
TSS ⁶	220	330	30 mg/L	45 mg/L	1/week composite
Fecal Coliform (N/100 ml)	N/A	N/A	200	400	1/week, grab
NH ₃ -N ⁷	29 73	44 110	4 mg/L ⁴ 10 mg/L ⁵	6 mg/L ⁴ 15 mg/L ⁵	1/week composite
Dissolved Oxygen	N/A		7.0 mg/L (minimum)		1/week, grab
Total Residual Chlorine	N/A		0.010 mg/L	0.019 mg/L	1/week, grab
pH	N/A		6.0-9.0		1/week grab
Biomonitoring	N/A		1.0 TU ⁸ (maximum)		
Lead, Copper, Zinc, Cadmium, Hardness (as CaCO ₃)	N/A		Report		Less than 1/week composite

Notes: ¹MGD - Million gallons per day
²BOD₅ - Five-day biochemical oxygen demand
³mg/L - Milligrams per liter
⁴Effective May 1- October 31
⁵Effective November 1- April 30
⁶TSS - Total suspended solids
⁷NH₃-N - Ammonia nitrogen
⁸Chronic toxicity unit

Environmental Justice

The City of Springfield has an approximately 25 percent minority population based on the 2000 U.S. Census. The remainder of the planning area has only a very small percentage of the remaining minority population. No environmental justice issues are known with the recommended plans. All existing customers will continue to receive service.