Chapter 1-Executive Summary/Introduction

Objective

The objective of the Facilities Plan Update for the Springfield Water & Sewer Commission (SWSC) is to achieve the following:

- Develop a cost-effective, environmentally sound strategy for construction of wastewater collection and treatment facilities to accommodate SWSC's existing needs and projected growth.
- Minimize the financial impact on wastewater system customers.
- Comply with all current and pending water quality regulations.

The scope of this Facilities Plan Update includes: a discussion of the project background, a review of existing environmental conditions, an evaluation of existing wastewater system facilities, projection of future population and wastewater flows, development and evaluation of wastewater system alternatives, selection of a cost-effective improvements plan, and development of an implementation strategy.

Project Background

The project background and planning area environment were reviewed to gain an understanding of factors that could impact the development of wastewater system alternatives. Some factors considered include current population, socio-economic conditions, land use, hydrology, land features, floodplains, and biotic communities. Population trends indicate moderate growth for the City of Springfield and Washington County. The City of Springfield presently accounts for approximately 24 percent of the county's population.

Existing Wastewater System Facilities

The Springfield sewer system served an estimated population of 3,200 in the year 2000. Most of the service population resides within the city limits. The sewer system consists of a conventional gravity sanitary sewer collection system and wastewater treatment plant owned and operated by the SWSC. SWSC maintains approximately 123,970 linear feet of sanitary sewer lines and 6 pump stations.

The wastewater treatment plant (WWTP) is located adjacent to Road Run Creek in the northeast part of the city. The plant was originally constructed in the 1950s, and upgraded several times. The most recent upgrade was completed in 1999, when the plant was converted from an oxidation ditch WWTP to a 0.88 MGD sequencing batch reactor (SBR) WWTP. The plant is functioning well and permit requirements are met on a consistent basis. Review of operating data and on-site observations indicates that the Springfield WWTP is well-operated and maintained.

Waste solids generated at the WWTP are dewatered and disposed of at the Nelson County landfill.

Future Conditions

Based on information from previous planning studies and the Kentucky State Data Center at the University of Louisville, population projections were made for the City of Springfield and Washington County. It is estimated that by year 2020, the planning area service population will reach 4,255. The 20-year projected design flow for the WWTP is 1.8 MGD, with a peak flow rate of 6.0 MGD.

Wastewater strength is projected to be moderate, and it is assumed that some form of pretreatment of high-strength industrial wastes will be provided by SWSC (with costs recovered by SWSC); or, that the industries producing high strength wastewater will be required to provide pretreatment prior to discharging their wastes to the sewer system.

Analysis of Alternatives

The analysis of alternatives for the collection system and WWTP is summarized below.

Interceptor Sewer System

It was determined that all major interceptor sewers should be conventional based on general topography of the planning area. No construction is anticipated within the floodplain.

WWTP Alternatives

The following alternatives were developed for expanding and upgrading the treatment plant capacity to 1.8 MGD, with a peak flow capacity of 6.0 MGD:

1. Upgrade the existing SBR WWTP with new headworks; increased peak flow capacity; biological and chemical phosphorus removal capability; ultraviolet disinfection; and upgraded post aeration. Waste solids will be stored in an aerated holding basin, dewatered with the existing belt filter press, and disposed of at the landfill.

2. Construct a new SBR WWTP at a site approximately one mile northwest of the existing plant site, on US 55. The new WWTP would have identical processes and sludge disposal as Alternative No. 1. In addition, a new raw sewage transfer pump station and force main would be constructed to transfer raw sewage from the existing WWTP site to the new WWTP.

3. Construct a new oxidation ditch WWTP at the same site as Alternative No. 2.The new WWTP would have identical processes as Alternative No. 1, with the exception of oxidation ditches and secondary clarifiers in lieu of the SBR reactors. The raw sewage transfer pump station and force main required for Alternative No. 2 would also be required for this alternative.

4. Construct a new deep cell lagoon WWTP at the same but larger site as Alternative No. 2. The new WWTP would have identical processes through the headworks. Flow would be divided evenly to two deep cell lagoons, followed by two packed towers and two secondary clarifiers. Effluent would then flow to a UV contact basin for disinfection, and an aeration channel for re-aeration prior to discharge into Road Run Creek. Waste solids would be stored in the deep cell lagoons and in sludge lagoons. Sludge from sludge lagoons would be dewatered using the existing relocated belt filter press, and disposed of at the landfill.

Based on an economic and non-economic analysis of the alternatives, Alternative 1, Expand Existing SBR WWTP, is recommended. This alternative includes the following new and modified facilities:

- Influent pump station.
- Headworks consisting of mechanical screens, upgraded existing grit removal, and flow measurement.
- Sequencing batch reactor tanks and equipment.
- Blowers and blower building.
- Chemical feed equipment and chemical building.
- Conversion of one existing sequencing batch reactor tank to two aerobic digesters.
- Modifications to the post equalization pump station.

- Addition of a mechanical aerator to the existing post equalization basin.
- Replacement of chlorine and sulfur dioxide disinfection/dechlorination systems with an ultraviolet disinfection system.

The opinion of probable project cost for the recommended 20-year, 1.8 MGD WWTP improvements is $5,688,000, which includes administrative, legal, interest during construction, engineering, and contingencies. This is almost $3 million less than the opinion of probable project cost of the next lowest cost alternative.

It is recommended that improvements to the WWTP be implemented in phases. Phase I (3 to 10 years) WWTP expansion would increase the WWTP permitted capacity to 1.3 MGD, covering the initial 10 years of the planning period. The project cost to implement this phase is $4,436,000. Phase II (11 to 20 years) WWTP expansion would increase the WWTP permitted capacity to 1.8 MGD, covering the final 10 years of the planning period. The project cost to implement this phase is $1,881,000.

Project Implementation

Important implementation steps recommended to cost-effectively proceed with the wastewater system improvements include:

- Public hearing
- Review and approval of Facilities Plan Update by DOW
- Grant and/or load funding applications
- Preliminary and final design
- DOW review and approval of construction documents
- Advertise and receive competitive bids
- Construct project
- Complete facility start-up