

# City of Columbia Sewer Utility Master Plan Update

## SEWER UTILITY HISTORY

- The City's Sewer Utility provides sewer service for the entire Columbia metro area through a sewer collection and treatment system that consists of approximately 600 miles of sewer, 16,000 manholes, 20 pump stations and one WWTP.

## SEWER UTILITY HISTORY

- The City's current treatment facility was completed in 1983.
- Through the construction of the current facility, the City was able to eliminate 6 City owned WWTP plus numerous privately owned WWTPs.

## Columbia Regional WWTP History

- Existing WWTP was completed in 1983 and had a design capacity of 13 mgd.
- 1990 – Wet weather and biosolids improvements completed, design capacity of 16.7 mgd.
- 1994 – Wetland treatment units #1 -3 were completed, design capacity of 17.7 mgd.
- 2000 – Wetland treatment unit #4 was completed, design capacity of 20.6 mgd.

## Collection System Design Philosophy for Small to Medium Watersheds

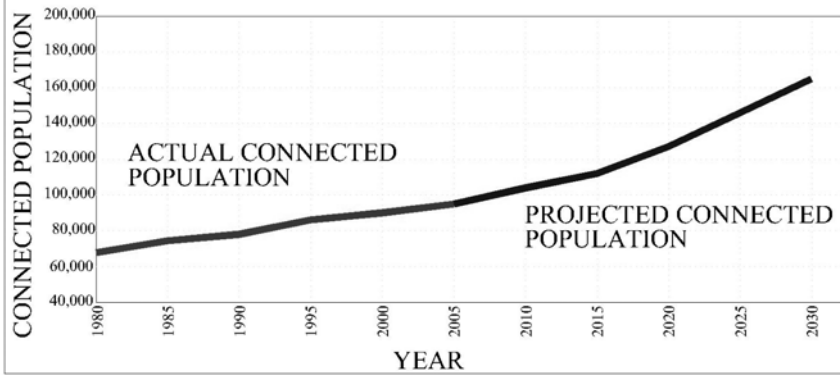
These trunk sewers are typically designed to accommodate ultimate watershed development.

Potential land uses are factored into the sewer design.

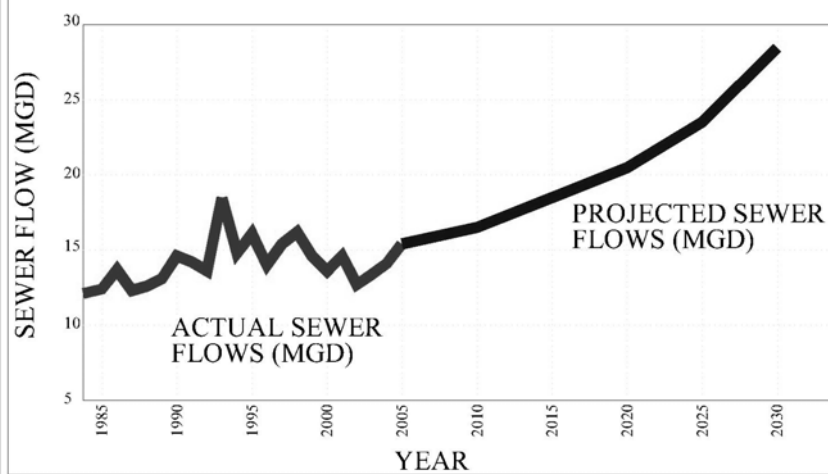
## Collection System Design Philosophy for Large Watersheds

These trunk sewers are typically designed to accommodate one-half of the ultimate watershed development. Staff recognizes that a future relief sewer may be required depending upon the actual development densities. This design philosophy is used because there is often uncertainty on how quickly development will occur. It is also more difficult to predict future land uses over a large area.

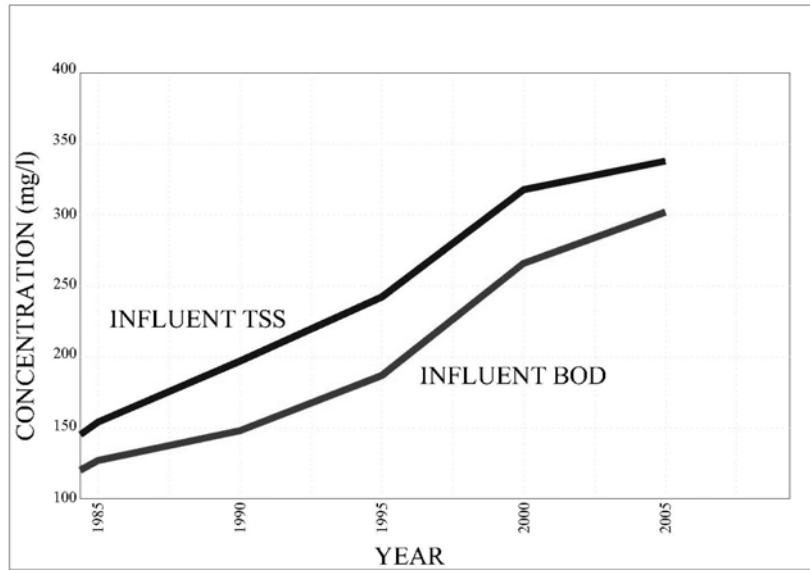
### CONNECTED POPULATION HISTORY



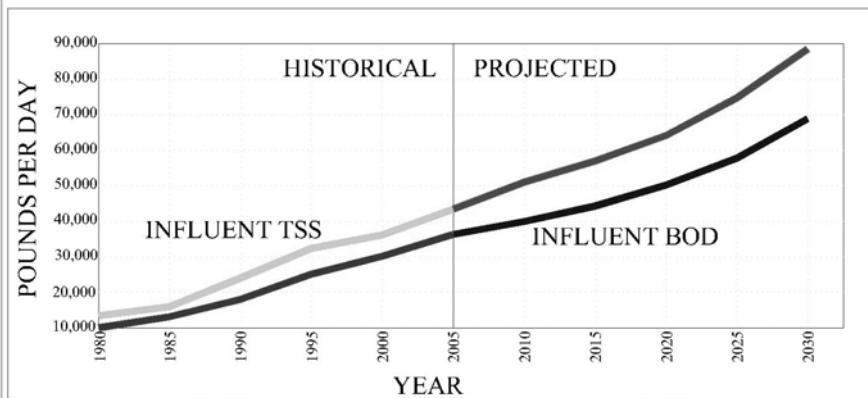
### SANITARY SEWER FLOW HISTORY



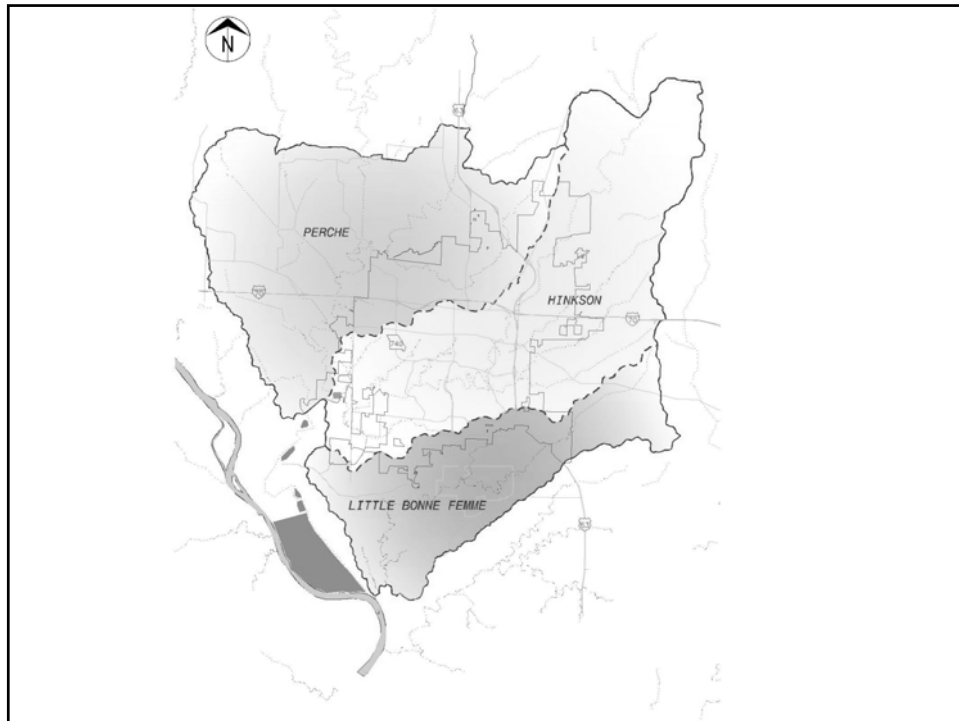
### SANITARY SEWER STRENGTH HISTORY



### WWTP LOADING HISTORY & PROJECTIONS



Influent TSS & BOD levels have tripled over the past 25 years.  
Influent TSS & BOD levels are anticipated to double over the next 25 years.



## Master Plan Scope

### WASTEWATER TREATMENT

- Project population of study area in Year 2030.
- Project the Year 2030 wastewater flows and loads from study area.
- Evaluate condition of existing WWTP.
- Determine the most desirable solution for meeting the City's future treatment needs.

# Master Plan Scope

## COLLECTION SYSTEM

- Establish design flow criteria for sizing collection system improvements
- Develop a preliminary plan for sewer extensions to handle future growth.

# Master Plan Scope

## FINANCIAL CONSIDERATIONS

- Assess the impact of financing the collection and treatment system improvements.
- Prepare user rate and connection fee increase recommendations

# WASTEWATER TREATMENT

## WASTEWATER TREATMENT RECOMMENDATIONS OVERALL

Description of Improvement	Cost
Expand capacity of existing WWTP by 12.6 MGD & upgrade wet weather pumping & treatment capabilities.	\$54.3 million
Add biosolids dewatering and heat drying facilities.	\$21.8 million
Repair & Rehab of Existing Facility with a priority on odor control improvements	\$13.5 million
<b>Total Cost of Improvements</b>	<b>\$89.6 million</b>



## WASTEWATER TREATMENT RECOMMENDATIONS – PHASE 1

Description of Improvement	Cost
Expand capacity of existing WWTP by 6.3 MGD & upgrade wet weather pumping & treatment capabilities.	\$40.0 million
Install two thickening centrifuges & add biosolids dewatering facilities.	\$7.7 million
Initiate repair & rehab of existing WWTP with a priority on odor control improvements	\$5.4 million
<b>Total Cost of Improvements</b>	<b>\$53.1 million</b>

## WASTEWATER TREATMENT RECOMMENDATIONS – PHASE 2

Description of Improvement	Cost
Expand capacity of WWTP by 6.3 MGD	\$14.3 million
Add biosolids heat drying facilities.	\$14.1 million
Complete repairs & Rehab of existing WWTP.	\$8.1 million
<b>Total Cost of Improvements</b>	<b>\$36.5 million</b>

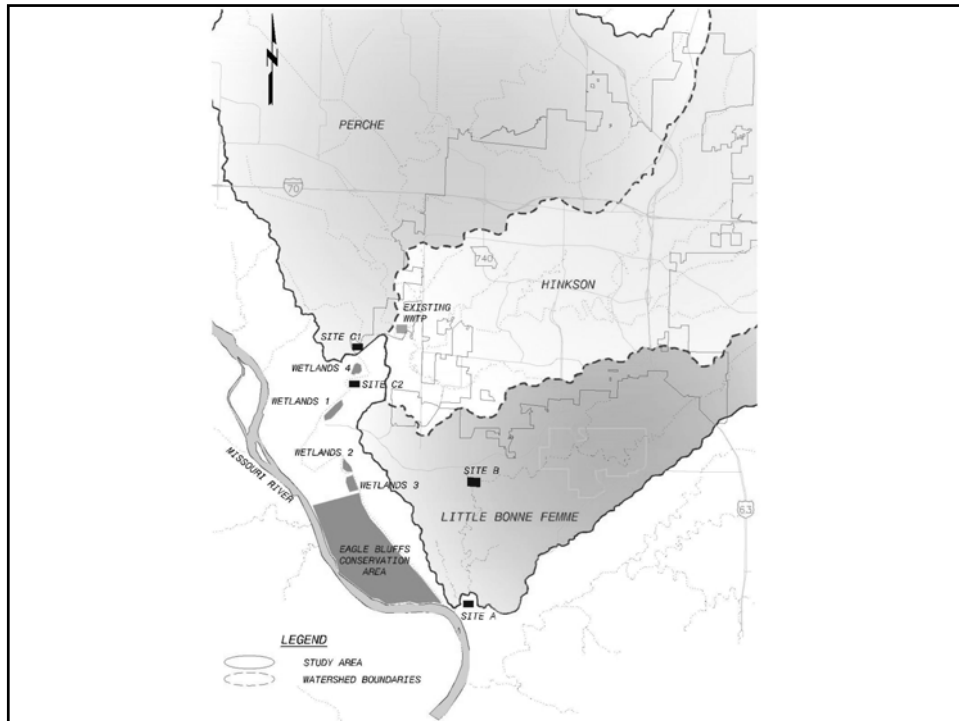
## WASTEWATER TREATMENT IMPLEMENTATION PLAN

Two step process was used to determine the best solution for meeting future wastewater treatment needs.

## WASTEWATER TREATMENT IMPLEMENTATION PLAN

Step 1 – Site Selection:

3 alternatives for the future location of treatment facilities were evaluated. These alternative sites are shown as follows.



## WASTEWATER TREATMENT IMPLEMENTATION PLAN

### Site Selection (cont.)

It was determined that the best location for future wastewater treatment facilities is at the existing plant site for the following reasons:

## WASTEWATER TREATMENT IMPLEMENTATION PLAN

### Step 2 – Treatment Method Selection:

The two alternatives that were evaluated for expanding the treatment capacity of the existing facility include expanding the wetlands or upgrading the mechanical treatment plant.

## WASTEWATER TREATMENT IMPLEMENTATION PLAN

### Treatment Method Selection (cont.)

Expanding the wetlands treatment to meet Year 2030 needs would require an additional 210 acres of wetlands (340 acres total) and would still require additional mechanical plant improvements.

## WASTEWATER TREATMENT IMPLEMENTATION PLAN

### Treatment Method Selection (cont.)

The sewer utility owns approximately 485 acres near the existing WWTP, which might provide sufficient space to build the 210 acres of wetlands. However placing the wetlands here would require additional pumping stations and piping to move the water through the wetlands.

## WASTEWATER TREATMENT IMPLEMENTATION PLAN

### Treatment Method Selection (cont.)

The 485 acres near the plant is currently utilized for land application of biosolids. Removing the property from the biosolids program would increase the operating cost of the existing facility.

## WASTEWATER TREATMENT IMPLEMENTATION PLAN

### Treatment Method Selection (cont.)

Given the operating challenges with the existing wetlands, construction and possible land acquisition costs for additional wetland units, it was determined that expanding the wetlands was not the most desirable option.

## WASTEWATER TREATMENT IMPLEMENTATION PLAN

### Treatment Method Selection (cont.)

It was determined that the best option for meeting the future treatment needs is to upgrade the existing mechanical treatment facility.

# COLLECTION SYSTEM

## COLLECTION SYSTEM RECOMMENDATIONS OVERALL

- Install approx. 25 miles of relief sewer by year 2030 at an estimated cost of \$30.5 million.
- Eliminate three existing City owned pump stations with gravity sewer extensions by year 2020.
- Install pump stations in the Little Bonne Femme Watershed to serve future growth.

## COLLECTION SYSTEM RECOMMENDATIONS OVERALL

- Continue with city-wide sewer line rehabilitation to reduce inflow and infiltration.

## COLLECTION SYSTEM RECOMMENDATIONS OVERALL

Description of Improvement	Cost
Additional I&I Investigations	\$3.3 million
Relief Sewer Improvements	\$30.5 million
Sewer Extensions	\$30.0 million
Future Pump Stations	\$7.3 million
Inflow & Infiltration Removal	\$13.0 million
<b>Total Cost of Improvements</b>	<b>\$84.1 million</b>