

The Future Ain't What It Used To Be

Wastewater Management and Climate Change

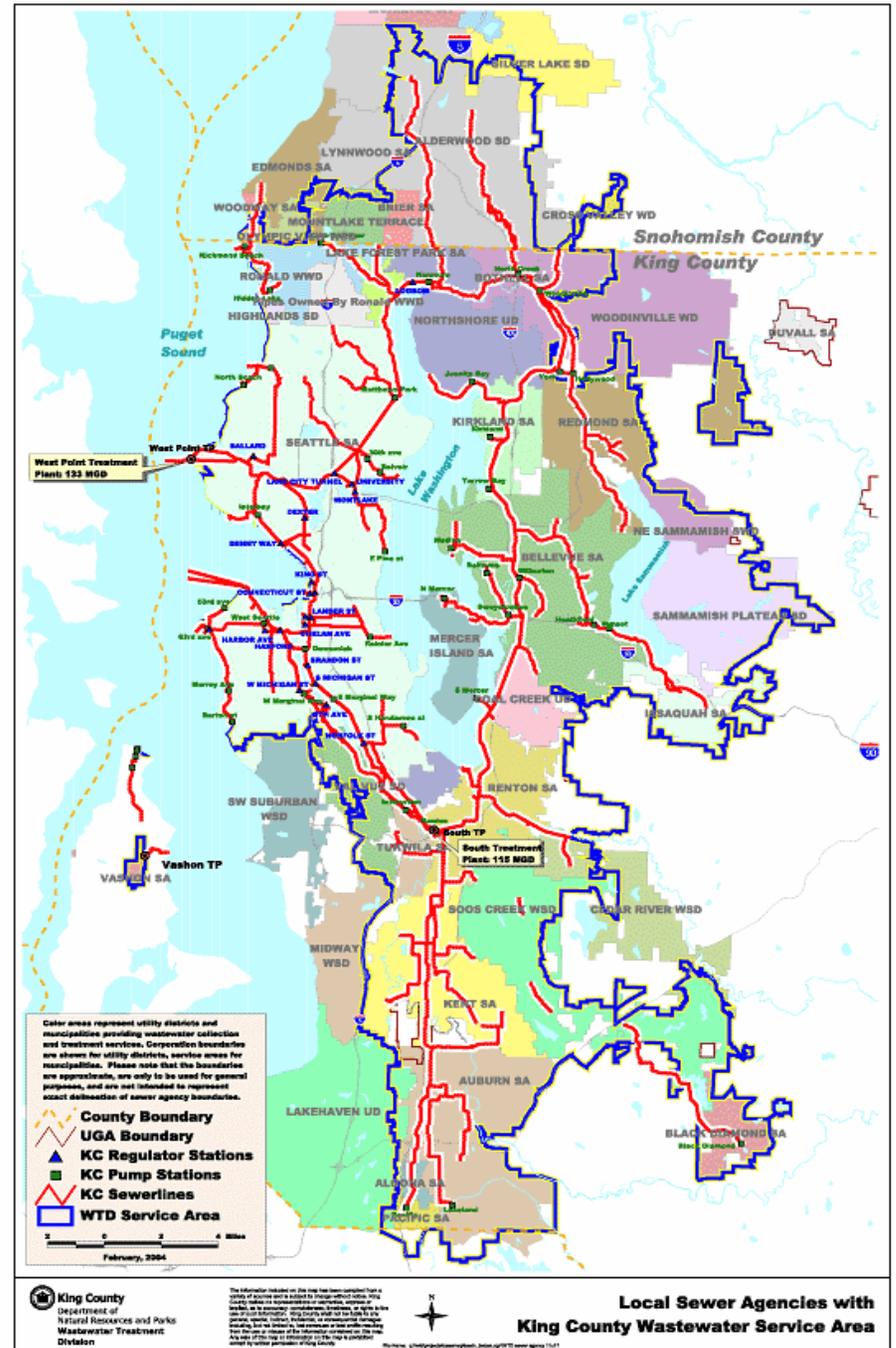
Greg Bush
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Purpose of Wastewater System

-  To Protect Water Quality and Prevents Water Pollution by Treating the Region's Wastewater

King County's Service Area

-  34 Local Agencies
-  Two Regional Treatment Plants
-  Serves 1.4 million
-  Service Area: 414 square miles
-  Combined: 70 square miles
-  King County Sewers: 335 miles
-  Local Agency Separated Sewer: 3,300 miles



The Treatment Plants



South Treatment Plant, Renton

West Point Treatment Plant, Seattle



Conveyance Facilities



York Pump Station, Redmond



Combined Sewer Overflow Storage Tunnel, Seattle

Why is a Wastewater Utility Concerned About Climate Change?

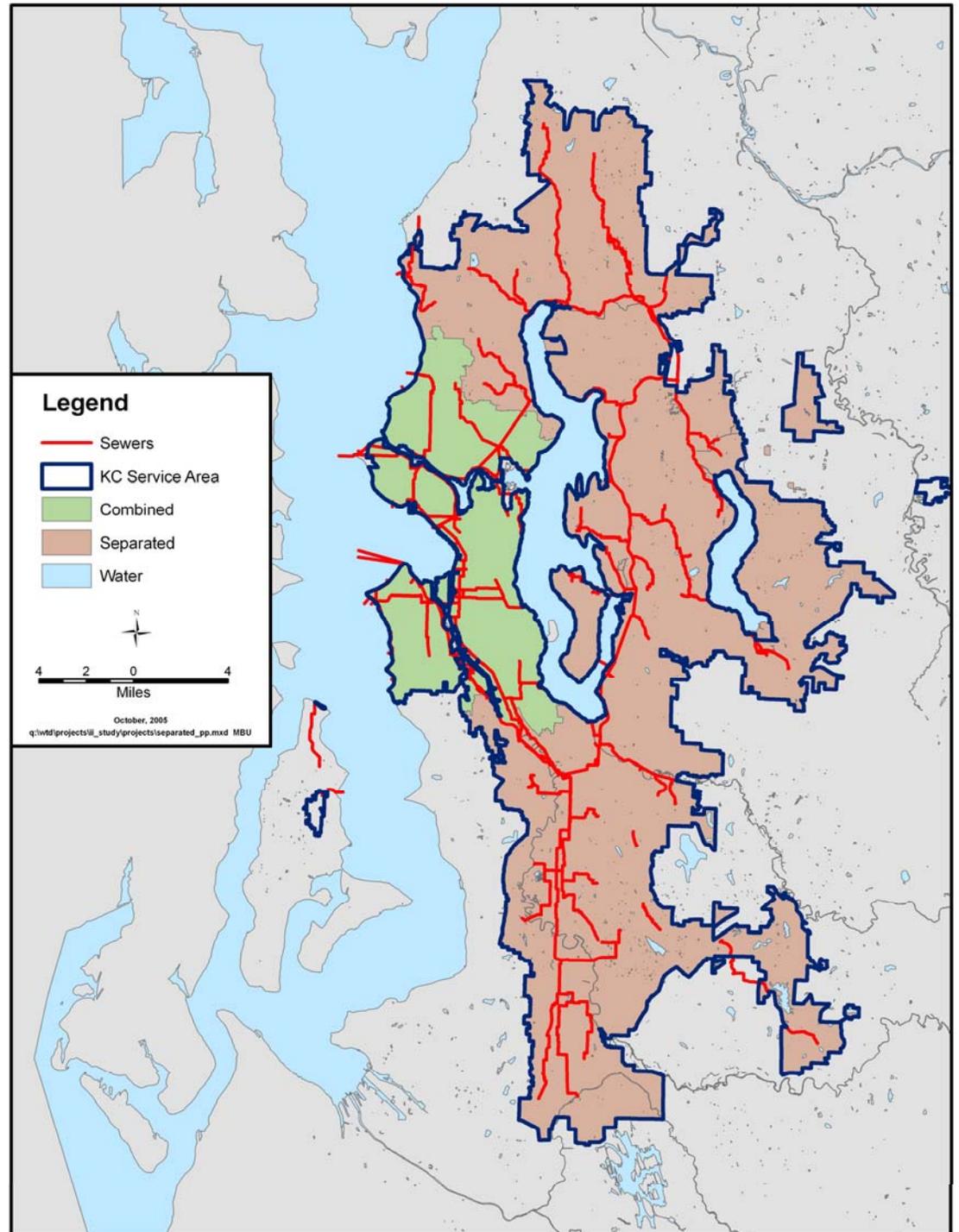
King County's Wastewater System Structure



Combined System
– Established Prior to
1950



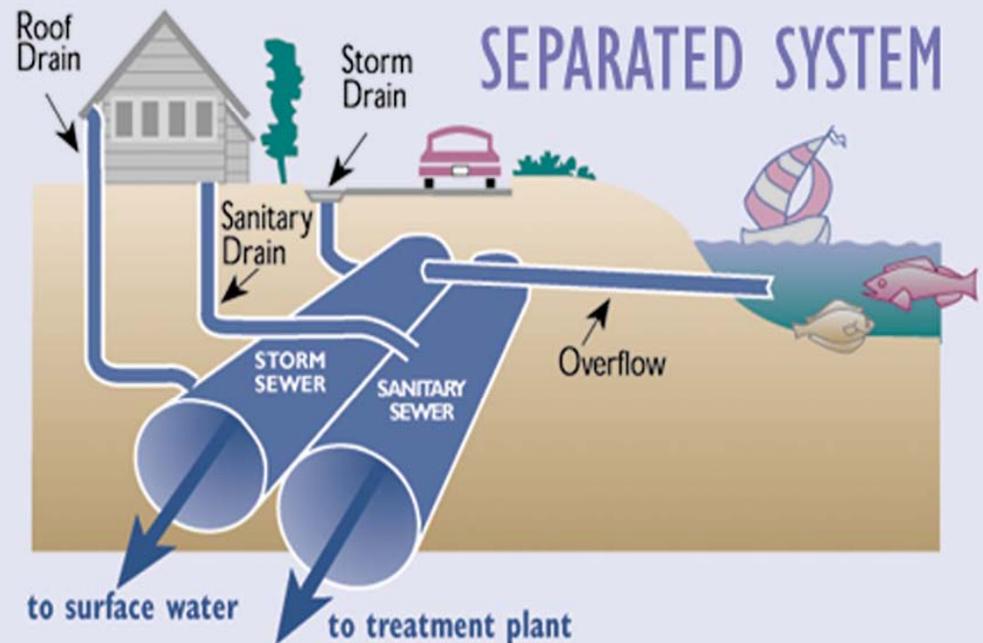
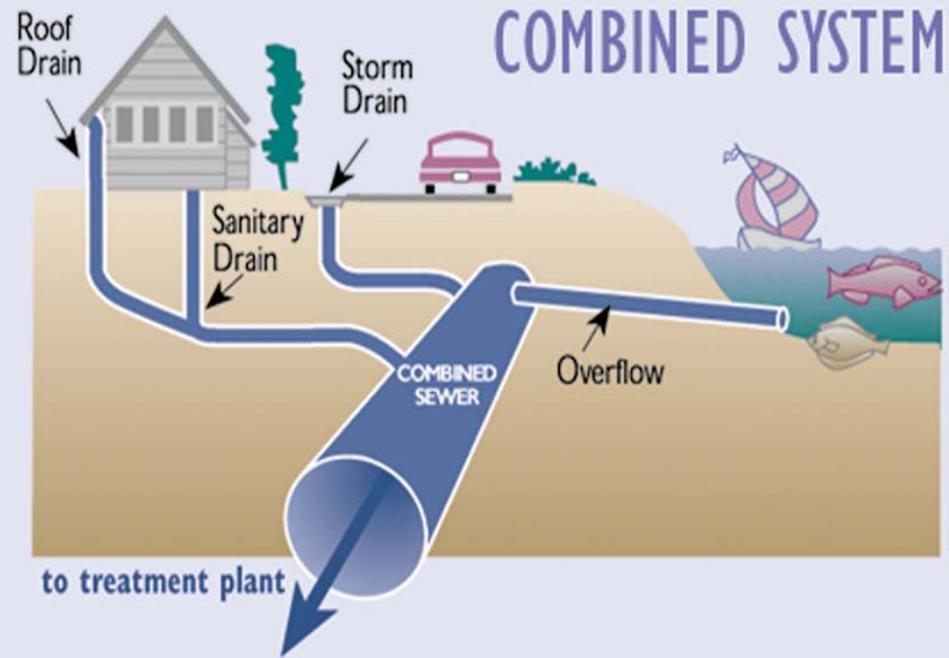
Separated System



Typical System Structures

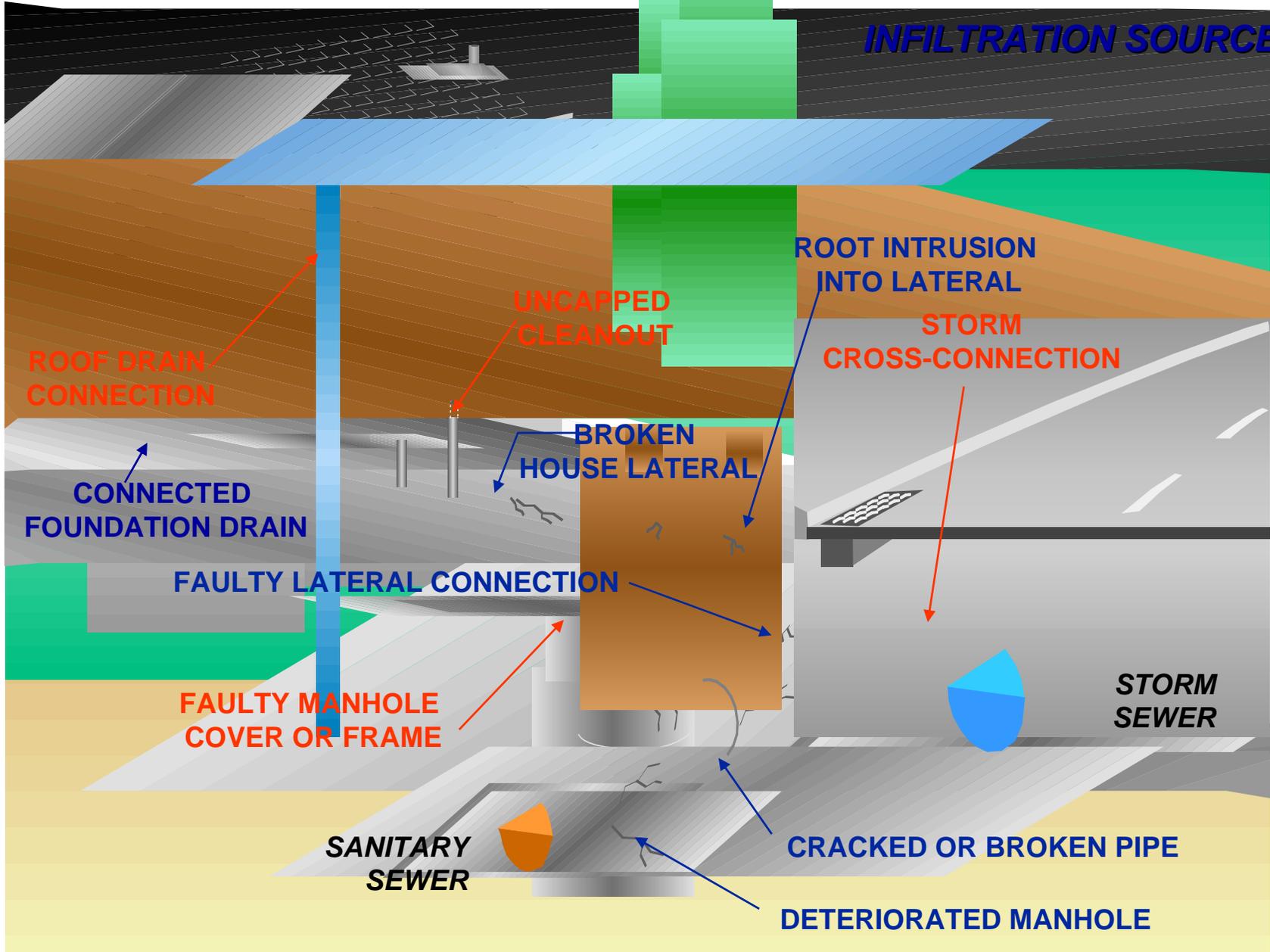
☁️ Combined System Capacity Is Directly Affected by Precipitation Volumes by Design

☁️ Separated System Is Directly Affected by Precipitation Volumes Due To Infiltration & Inflow



INFLOW SOURCES

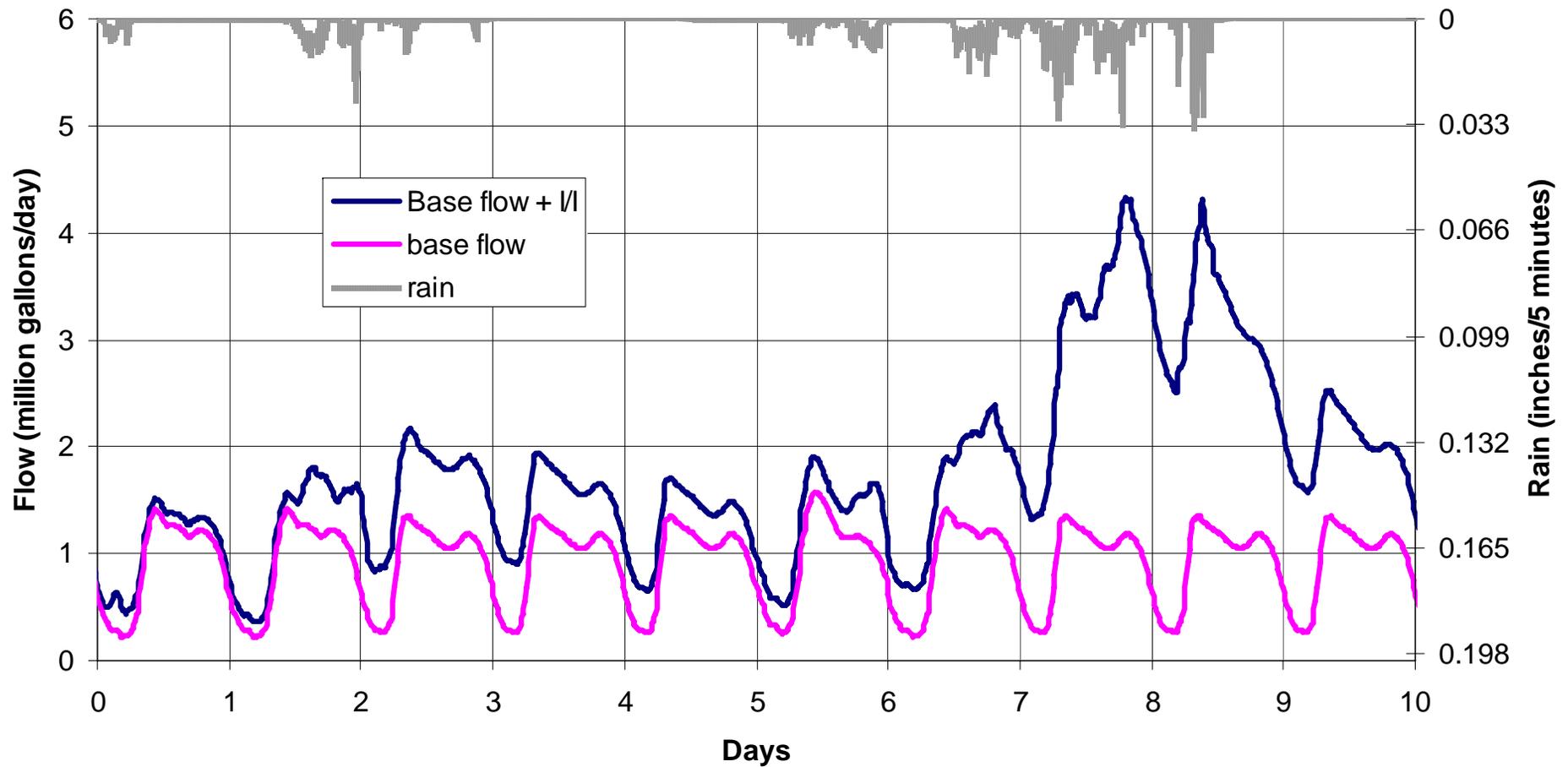
INFILTRATION SOURCES



What are the Impacts of Climate Change on the Wastewater System?

Typical Hydrograph

How I/I impacts Conveyance Facilities



CSOs Influenced by Tide

Combined Sewer Outfalls
(CSOs) Influenced By
Tide



Elevation of CSO Outfalls
Determined by Highest
Observed Tide



Major System Impacts

- ☁️ 75% of Peak Flows in King County's *Separated System* is I/I
- ☁️ 90% of Peak Flows in King County *Combined System* is I/I
- ☁️ Peak Flows Determine the Needed Capacity of the Wastewater System
- ☁️ Combined Sewer Outfalls Influenced by Tides
 - Higher Tides Can Cause Back Ups in System
 - Can Also Cause Saltwater Intrusions that Damage Equipment

How Do We Estimate Future Flows?

Primary Steps for Estimating Flow

Future Wastewater Flows

- Population/Employment Growth
- Septic System Conversions

Future I/I Flows

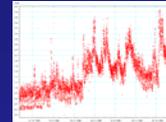
- ***Historic Rainfall Projected Into the Future***
 - I/I Flows from Existing System I/I
 - I/I Flows from New Construction I/I

Combined Result: Project 20 –Year Peak Design Flow

Major Data Sources



Measured Flow Data



Basin Information



- Sewered Area
- Dry Weather Flow Pattern



Historic Rainfall



- 60-Year Rainfall Record
- Historic Radar Tracking of Storm Intensity

What is at Stake?

Capacity Needs for the County's *Combined and Separated* Conveyance Systems

- ☁️ Over 60 Separate Projects for the *Combined Sewer System*
 - Approximately \$780-Million for Projects Through 2050 (Projected System Build-out)
- ☁️ About 20 Separate Projects for the *Separated Sewer System*
 - Approximately \$400-Million Over Next 30-Years

What Are Our Major Climate Change Issues?

Climate Change Issues

-  Rainfall is the most significant contributor to projected peak wastewater volumes
-  The wastewater system must be designed to meet peak volumes in order to achieve its mission of protecting human health and the environment
-  The methods currently available for projecting rainfall volumes are based on historical records and do not account for future changes in climatic conditions.