

GETTING RIVERS CLEAN

Innovative Wastewater Management



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Analogy Of Pasig River's Present Situation: Open Fracture Wound

Removal of floating debris



Wound Dressing

Pouring in Enzymes or Bacteria Bioaugmentation



Painkiller administration

Mechanical Aeration



Brace installation

Case Study: Columbus GA

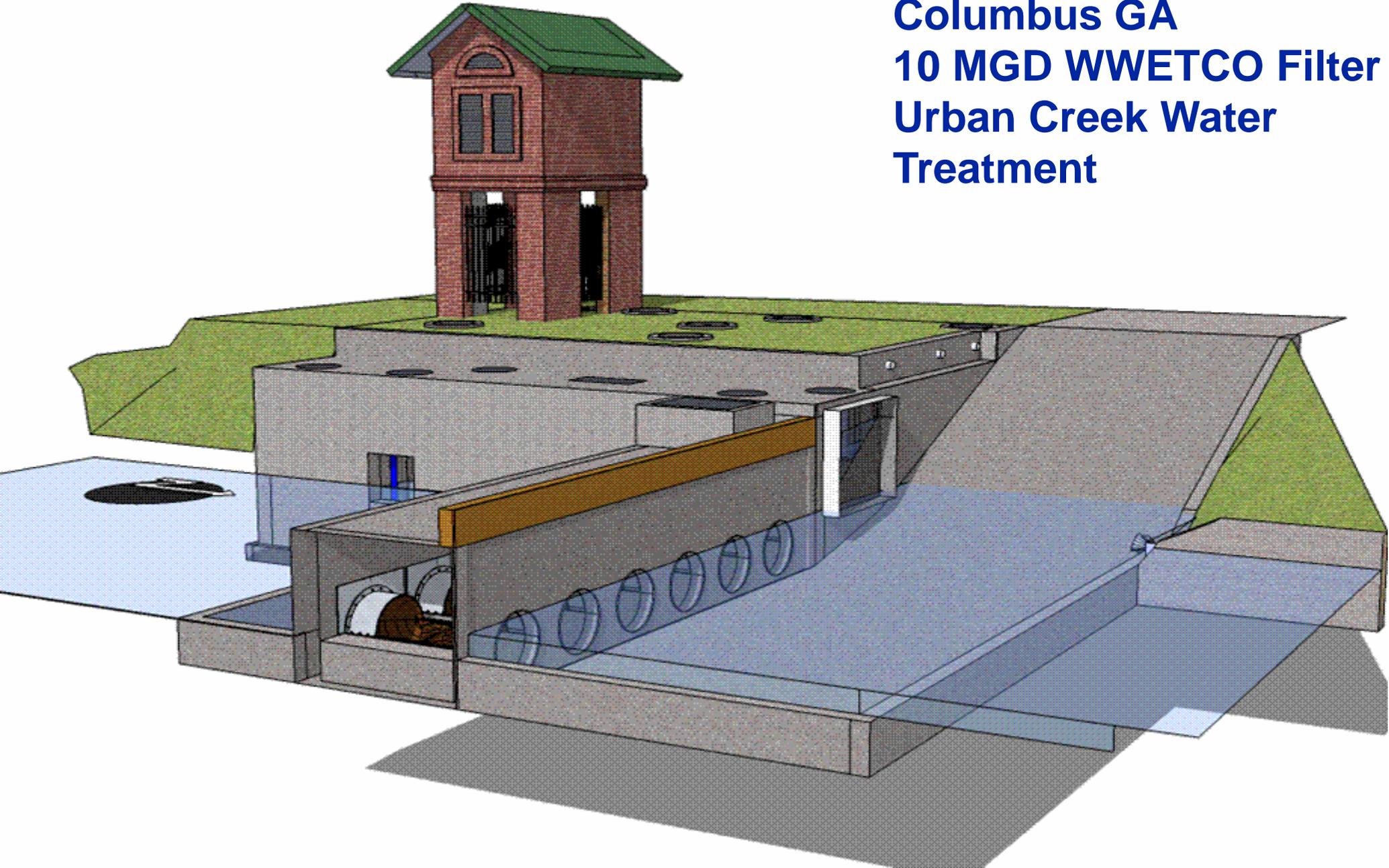
Preliminaries:

1. Volume: 38 Million Liters of Urban Creek Water
2. To satisfy TSS, BOD and Bacteria limit requirements
3. A secondary goal was to improve an aquatic biology impairment.

**Columbus GA
10 MGD WWETCO Filter
Urban Creek Water
Treatment**



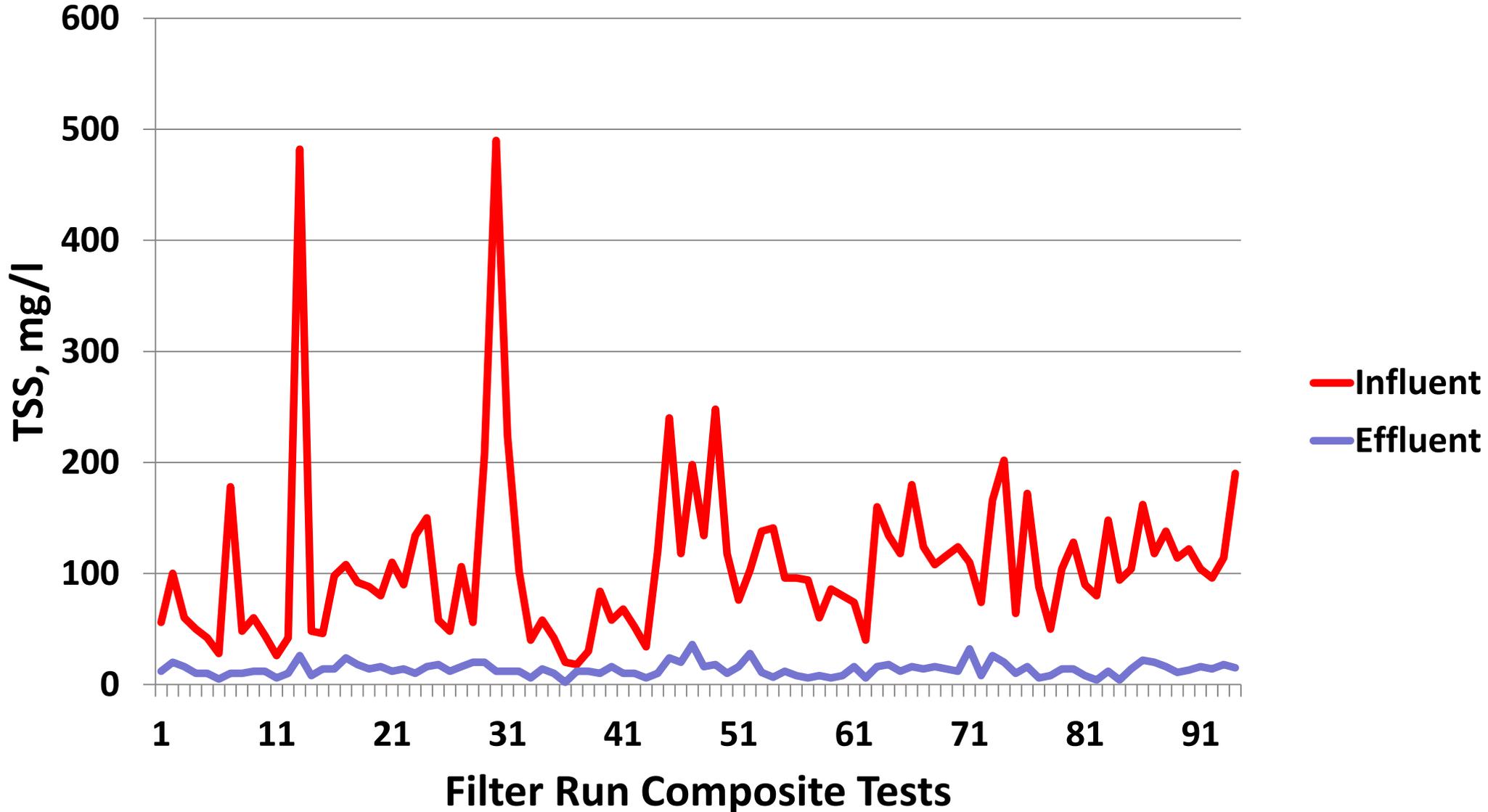
**Columbus GA
10 MGD WWETCO Filter
Urban Creek Water
Treatment**



TSS

Primary Influent Filtration - March to September 2011

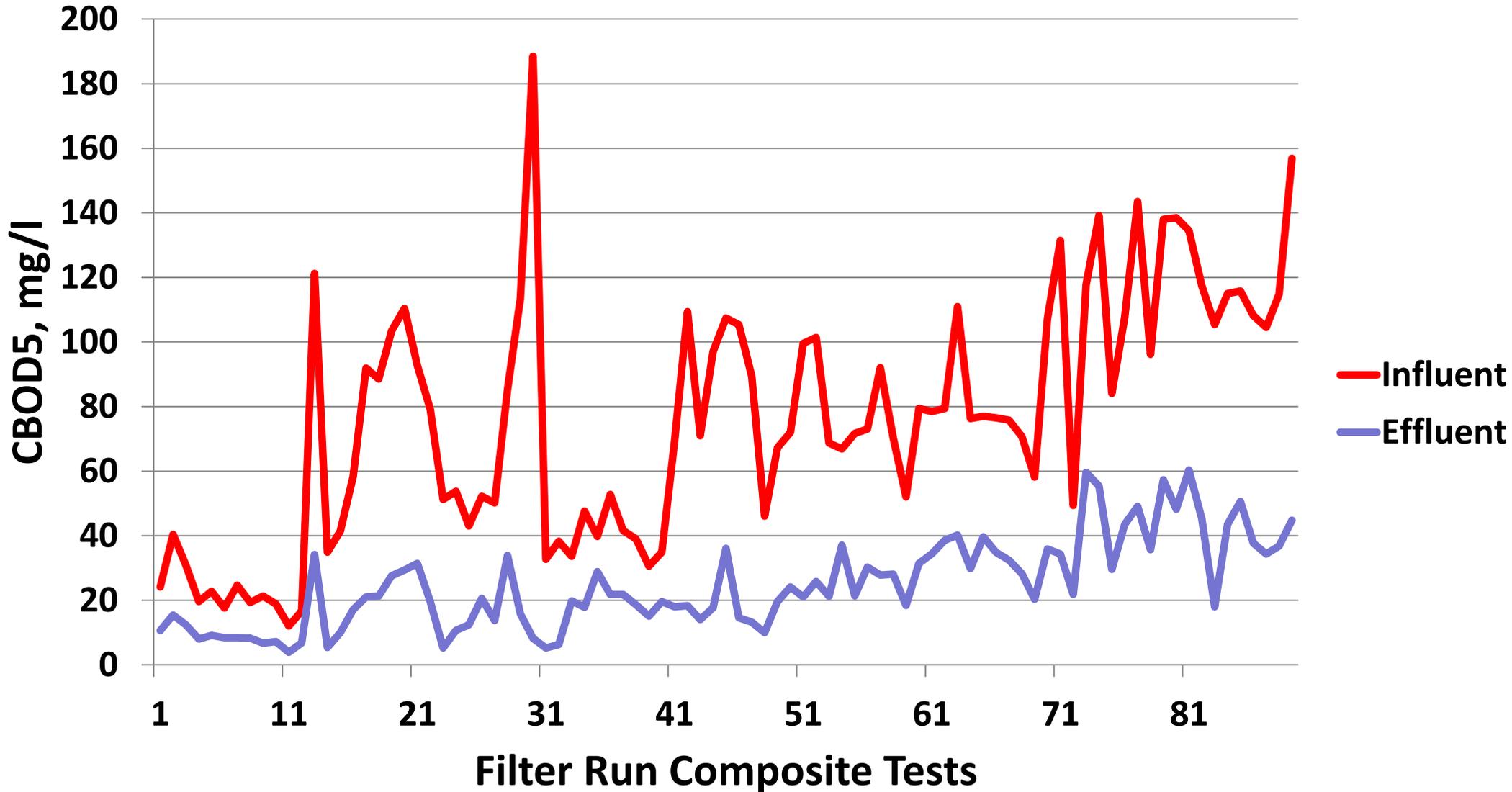
Average Filter Effluent 13 mg/l



CBOD₅

Primary Influent Filtration - March to September 2011

Average Filter Effluent 25 mg/l



Columbus GA Performance Summary

- 97-99% Reduction in TSS
- 69-96% Reduction in BOD
- Up to 80% Reduction in Fecal Coliform
- Significant Reduction in Trash and Debris

Other Water Bodies Rehabilitation

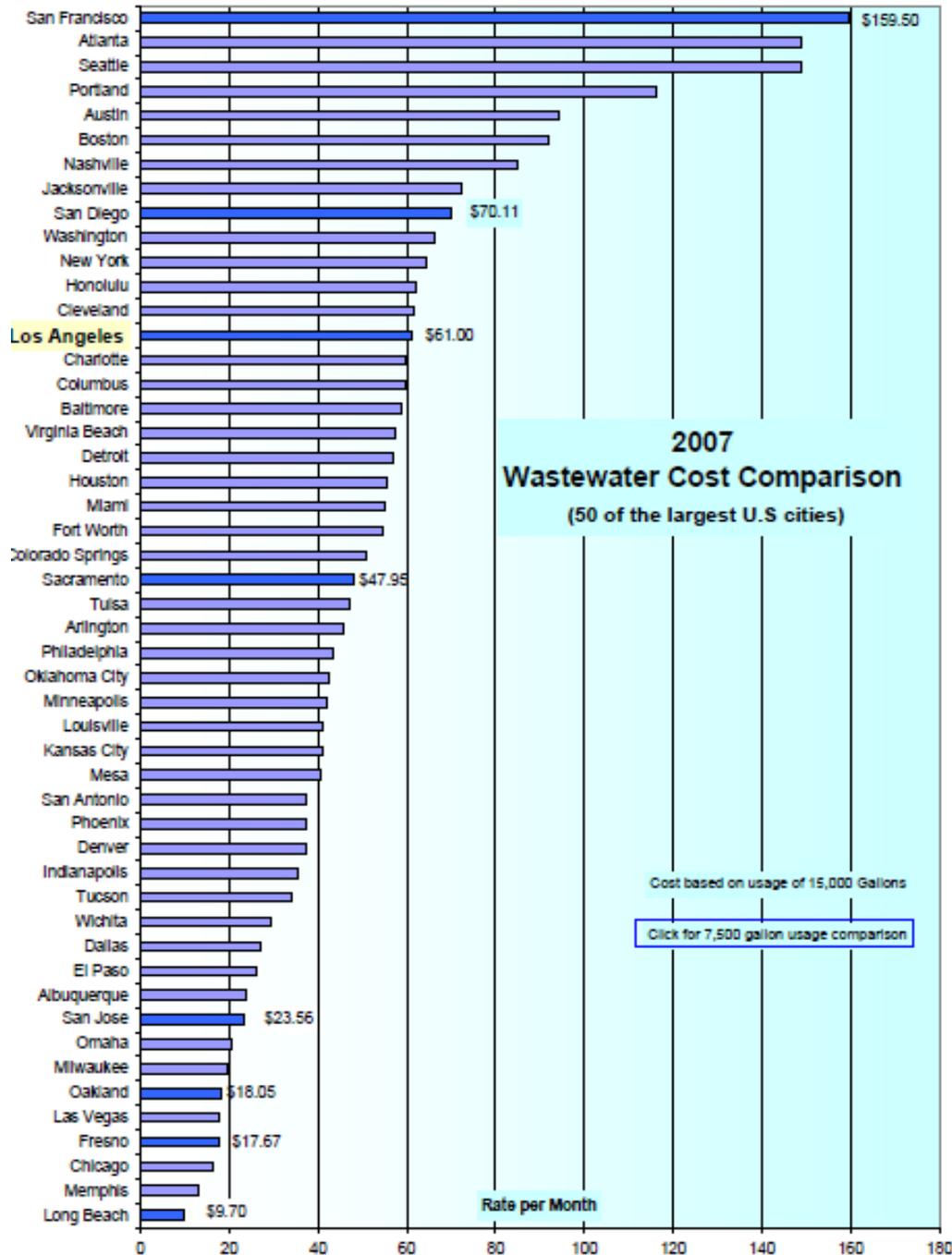
- **Atlanta, GA Combined Sewer and Storm Overflow**
- **Akron, OH Sewer - Storm Overflow and Tertiary Filtration**
- **Johnson County, KS Primary Influent and Effluent for Sewer and Storm Overflow(same as Pasig water quality)**
- **Columbus, GA Tertiary Filtration, High MLSS Overflow and Chemical Floc Removal for Phosphorous Reduction**
- **State of New Jersey for Combined Sewer and Storm Overflow Treatment Standard to Protect Beaches and Recreational Waterways; EPA ORD Participation**

Application to Pasig River Rehabilitation

Considerations:

1. Energy Requirements
2. Space Requirements
3. Investment Requirements

US WWT COST (2007)



San Francisco and Seattle

\$2.65/m³

Sacramento and Miami

\$0.80/m³

Chicago and Las Vegas

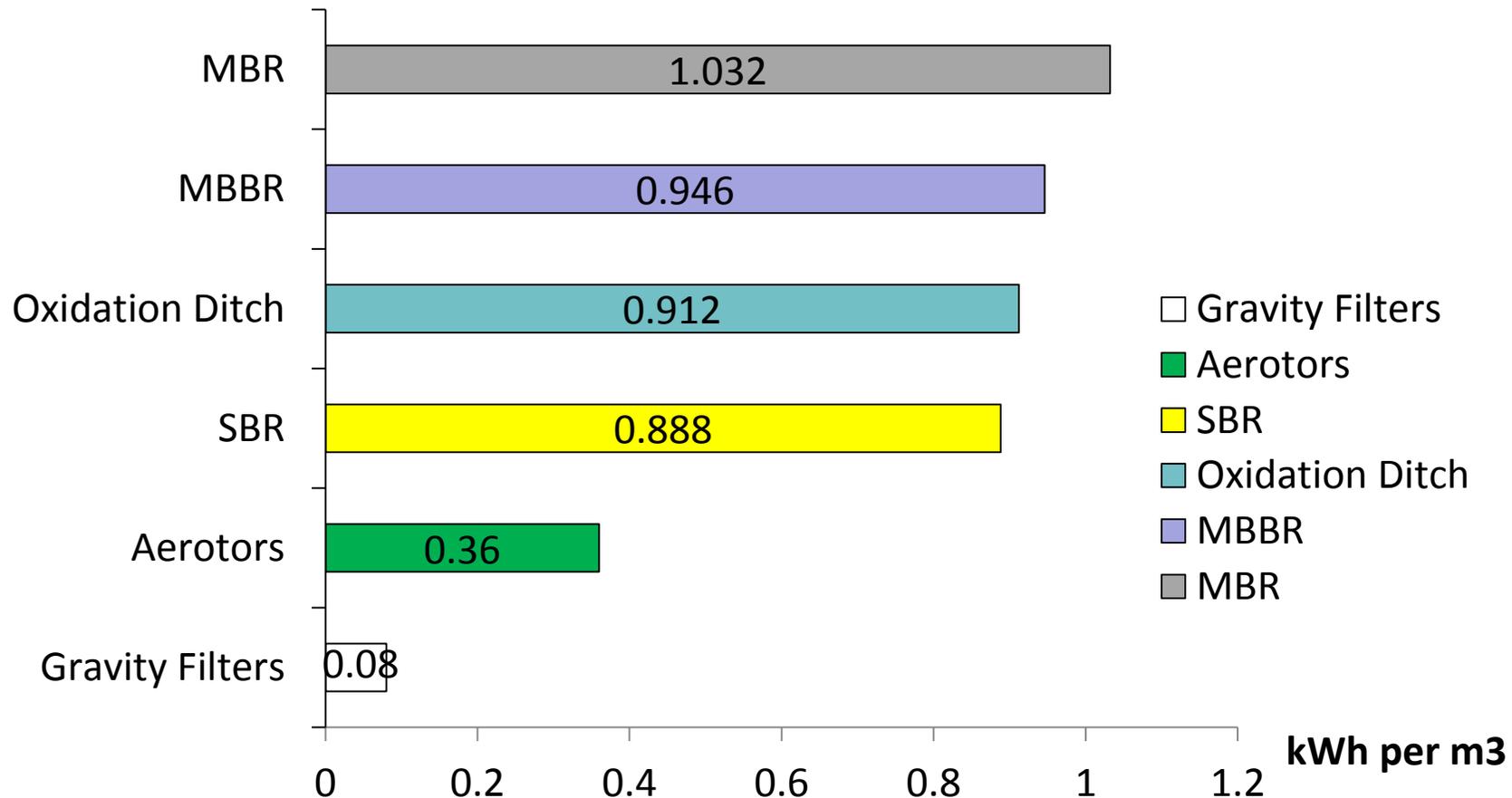
\$0.25/m³ (about the same as China)

Energy Rates

Seattle	(\$0.06/kWh)
San Francisco	(\$0.08/kWh)
Ho Chi Minh City	(\$0.08 /kWh)
Beijing	(\$0.10/kWh)
<u>Manila</u>	<u>(\$0.33/kWh)</u>

ENERGY CONSUMPTION OF DIFFERENT TECHNOLOGIES

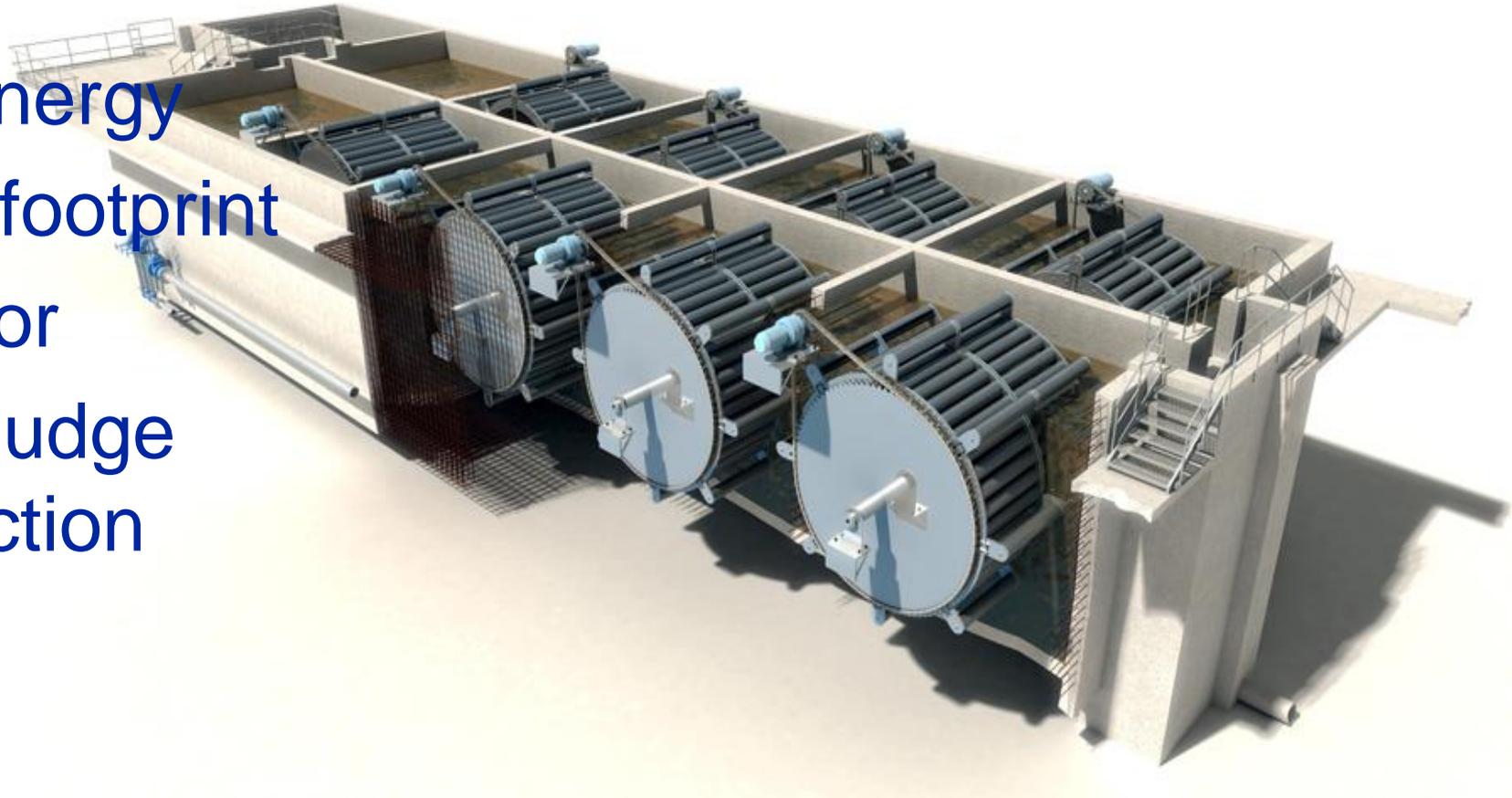
kWh per cu.m Wastewater (BOD and TSS Removal Only)



Technology Selection

Aerotors

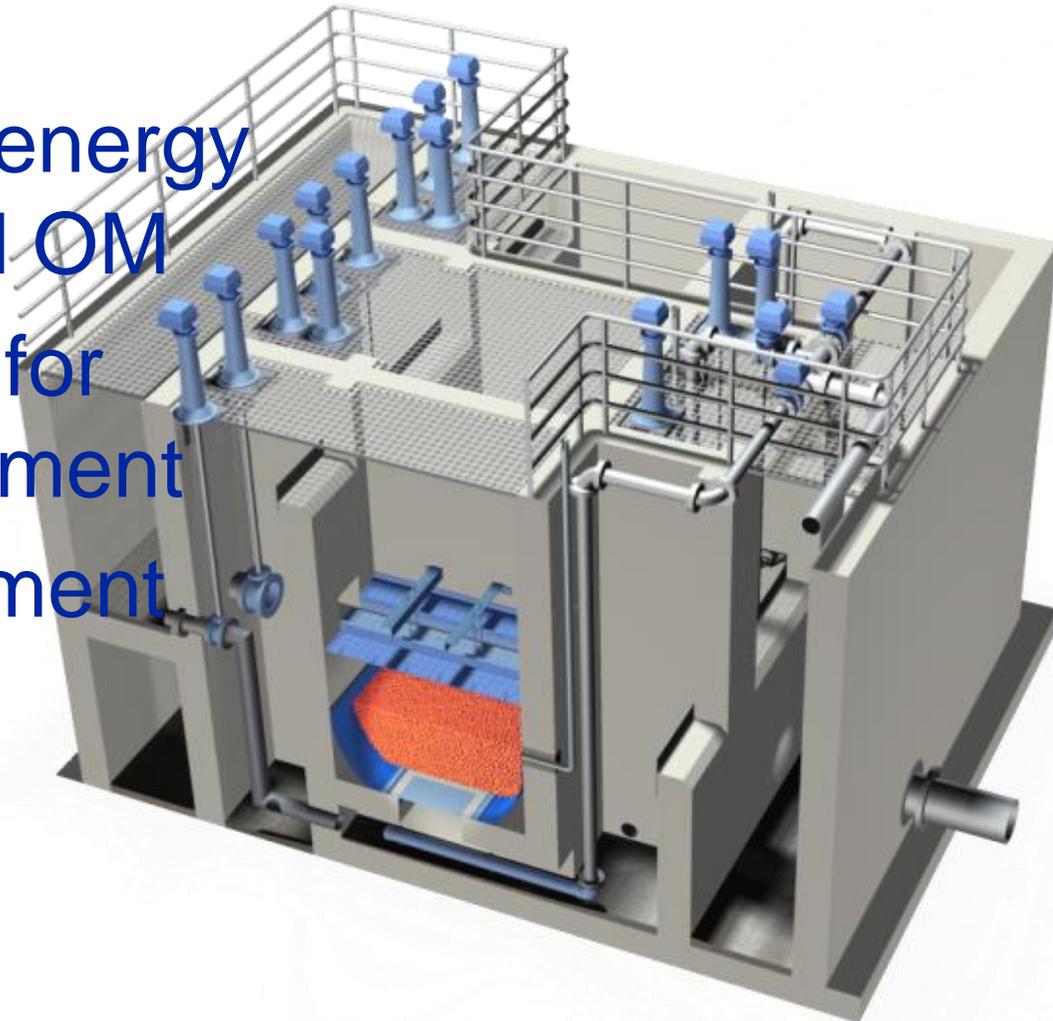
- Low energy
- Small footprint
- No odor
- Low sludge production



Technology Selection

Gravity Filters

- Extremely low energy use and limited OM
- Small footprint for large flow treatment
- Minimal investment



Gravity Filters Available In The Market

- Multi Function Uses
 - Raw Sewage Filtration (85% TSS)
 - Biological Treatment (68% BOD₅)
 - Chemical Floc Filtration (TP < 0.1)
- Low Backwash Water
(1% to 10%)
- Low Power Requirements
(0.003 to 0.024 KWHr/m³ treated)
- Low Capital Costs
(< PHP 3,000.00/cubic meter).

BEFORE



AFTER



AFTER



BEFORE



THANK YOU