District of Columbia

Water and Sewer Authority

Federal Water Quality Association (FWQA)
Briefing on

Sustainable Infrastructure:
Synergystic Solutions to
Enhanced Nutrient Removal and CSO Control

presented by

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January 17, 2008

Blue Plains Advanced Wastewater Treatment Plant

- Serves over 2 million people in DC, MD, VA
- Largest advanced wastewater treatment plant in the world
- 370 million gallons per day capacity
- Services combined & separate sewer systems

Blue Plains Advanced Wastewater Treatment Plant

U.S. Environmental Protection Agency (EPA) *Sustainable Infrastructure Initiative*

Sustainable infrastructure **defined as development that "meets the needs of the present generation without compromising the ability of future generations to meet their needs."** (*1)

Four Pillars of Sustainable Infrastructure

1. Better Management
2. Full Cost Pricing
3. Efficient Water Use
4. Watershed Approaches

(*1) 1987 Bruntland Report from the World Commission on Environment and Development

District of Columbia Sustainable Infrastructure Initiative

Two Major DCWASA Water Quality Programs

1. The Combined Sewer Overflow Long Term Control Plan: $2 billion, 20 years
2. Enhanced Nutrient Reduction: TN (Total Nitrogen) $1 billion, 7 years

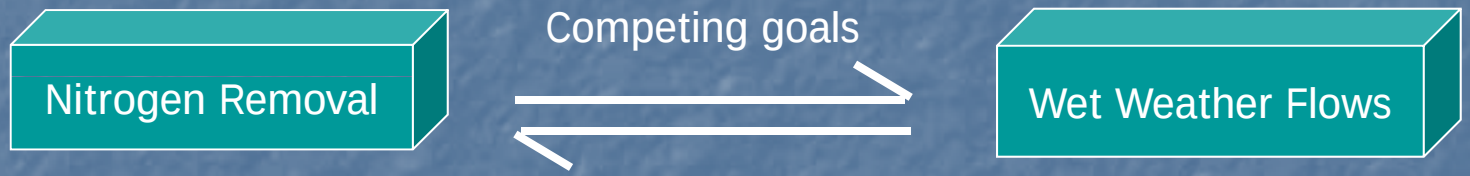
Approximately one-half of WASA's $6 billion (lifetime budget) Capital Program

Regulatory Requirements and Approach

1. Federal Clean Water Act
   a. Combined Sewer Overflow (CSO) Control Policy
   b. Chesapeake Bay Program (Watershed Approach to Water Quality)
2. District of Columbia Water Quality Standards
3. Regulators' Consideration of Innovative Approaches to support infrastructure sustainability

Challenge of Meeting New Nitrogen Limit

- **Massive size of Blue Plains**
- **Wet weather flows from Combined Sewer System**



- **Blue Plains improvements – $2.3 B capital program over 10 years**
  - Total nitrogen enhanced nutrient removal: $950 M
  - Other Blue Plains projects: $1.4 B
- **Large 10-yr CIP budget**
  - CSO Long Term Control Plan: $2.209 B
  - Wastewater collection & transmission: $302 M
  - Water programs: $1.016 B
  - Total: $5.9 B

The Solution: Innovative Approach to Handling Wet Weather Flows in Nutrient Reduction Process

- Expand CSO tunnel storage to even out flow peaks
- Construct wet weather treatment system (new European technology-enhanced clarification)
- Operate Blue Plains at steadier flow rates during storms – design nitrogen removal for these flows

Cost = $800 Million
vs.
$1.3 billion for conventional approach

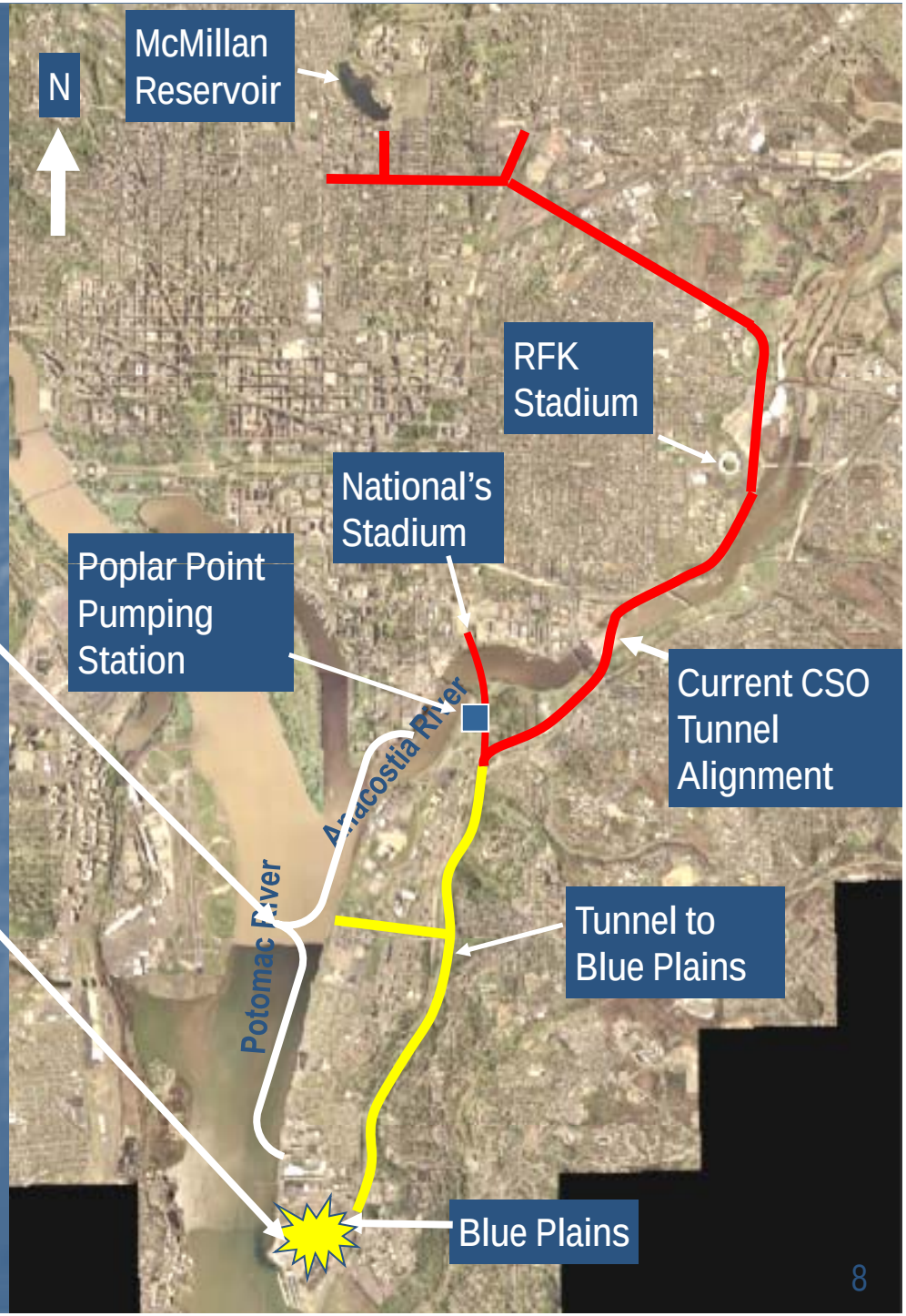
Total Nitrogen/Wet Weather Plan

Extend CSO Tunnel by 3.5 miles:
- **23 feet diameter**
- **"Metro-sized"**

Construct nitrogen removal & innovative wet weather treatment system at Blue Plains

Red is approved LTCP Tunnel System

Yellow is proposed Tunnel Plan



Sustainable Elements

Long Term Control Plan

1. Tunnel system lessens impact on the community above
2. Built with provisions to expand the system if it doesn't meet objectives / standards
3. Addresses overall wet weather issues
4. Passive hydraulic control
   a. Uses gravity and wiers rather than gates, valves or other mechanical devices
   b. Less need for power, hardware, maintenance and manpower

Sustainable Elements cont.

Enhanced Nutrient Removal – TN Program

1. Physical Treatment rather than Biological
   a. Instant on-off: run **only** during storm events
   b. Yields reduced O&M costs
2. New Technology-Enhanced Clarification
   a. Greatly reduced site space required-conserves limited wastewater treatment plant site space
   b. Greatly reduced capital cost

Summary

Synergystic Approach-Broad Based Wet Weather Management

Nutrient Control

- Savings in capital cost = $500 million
- Significant savings in operations and maintenance costs of both systems

Long Term Control Plan

- Seven years savings in time for attainment of LTCP performance in the Anacostia River Basin
- Savings in Land Area
  - Underground tunnels preserve the land above
  - Smaller footprint conserves space