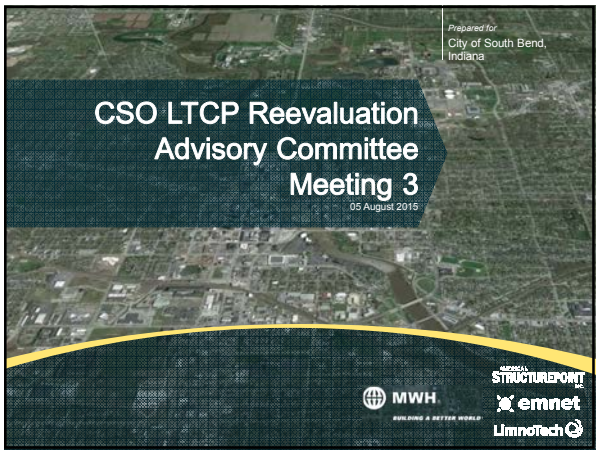

Agenda

- Welcome and Introductions
- Long Term Control Plan Fundamentals
- CSO Mitigation Alternatives
- LTCP Re-evaluation Schedule
- Questions and Comments

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Long Term Control Plan Fundamentals

3

What is a Long-Term Control Plan?

- Also called Master Plan, Facility Plan
- Long-Term: Planning facilities use for 20 to 50-years
- Control Plan: A "Road Map" that lays a course for improvement
- Compares alternate technical solutions and recommends a solution that meets improvement objectives at the lowest cost.

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Drivers and Timeline for South Bend

- City needs to meet water quality objectives for the St. Joseph River
  - E. Coli identified as contaminant of concern
- Water quality objectives met by reducing combined sewer overflows
- Improvement project deadlines
  - Sewer separation projects 12/31/2017
  - Leeper Park storage tank 12/31/2023
  - Upstream of East Race 12/31/2025
  - Downstream of East Race 12/31/2031

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LTCP Program – Consent Decree Costs

Project Category	Major Element	LTCP Budget (2015 Dollars)	Implementation Deadline
Wastewater Treatment Plant Upgrades	Upgrades to achieve peak capacity of 100 mgd	$64,530,000	2012 – 2027
Phase 1 CSO Collection System Controls	Separation and Green Infrastructure Projects (including projects completed before 2012)	$109,996,000	2004 – 2017
Other Collection System Projects	Extensions, Replacements, River Crossing #5, Engineering	$91,383,000	2012 – 2031
Phase 2 – CSO Controls U/S of East Race	Five Storage Tanks – 8.0 MG (minimum) with disinfection of overflows (incl. eng, legal, admin)	$133,285,000	2014 – 2025
Phase 2 – Leeper Park CSO Storage Tank	5.2 MG (minimum) Storage Tank with disinfection of overflows (incl. eng, legal, admin)	$72,324,000	2017 – 2023
Phase 2 – Other CSO Controls D/S of East Race	Brownsfield Tank (0.6 MG), Storage Conduit, Parallel Interceptor (incl. eng, legal, admin)	$155,685,000	2023 – 2031
Total		$627,203,000	

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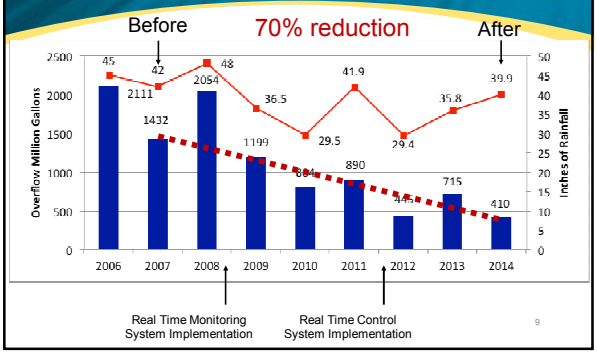
LTCP Program – Phase 2 CSO Controls

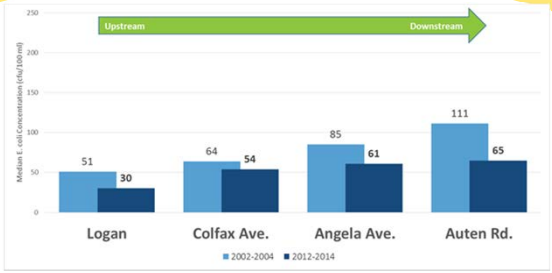
LTCP Program – Potential for Savings

Project Category	LTCP Budget (2015 Dollars)	Spent to Date (2015 Dollars)	Remaining Budget (2015 Dollars)
Wastewater Treatment Plant Upgrades	$64,530,000	$22,369,000	$42,161,000
Phase 1 CSO Collection System Controls	$201,379,000	$113,817,000	$87,562,000
Other Collection System Projects			
Phase 2 – CSO Controls U/S of East Race	$133,285,000	$0	$133,285,000
Phase 2 – Leeper Park CSO Storage Tank	$72,324,000	$0	$72,324,000
Phase 2 – Other CSO Controls D/S of East Race	$155,685,000	$0	$155,685,000
Total	$627,203,000	$136,186,000	$491,017,000

Overflow History



Water Quality Improvements E. coli Concentrations – All Samples



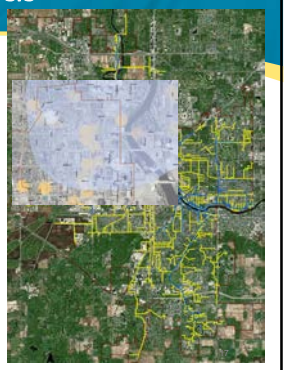
CSO Mitigation Alternatives

Analysis Overview

- Collection System Analysis
  - Hydrologic and Hydraulic Collection System Modeling
  - Analysis of Practical Green Stormwater Infrastructure
  - Water Quality Modeling
- Conveyance System Control and Optimization
  - Focus on use of system controls to reduce overflows
  - Enhanced calibration and validation of models
- Wastewater Treatment Considerations
  - Hydraulics: Quantity of treatment
  - Process: Quality of treatment

Collection System Analysis

- Take advantage of more-sophisticated tools
- Impacts of green infrastructure
- Analysis of other electronic data that impacts hydrology
- Solutions in "real space"



Green Infrastructure Opportunities

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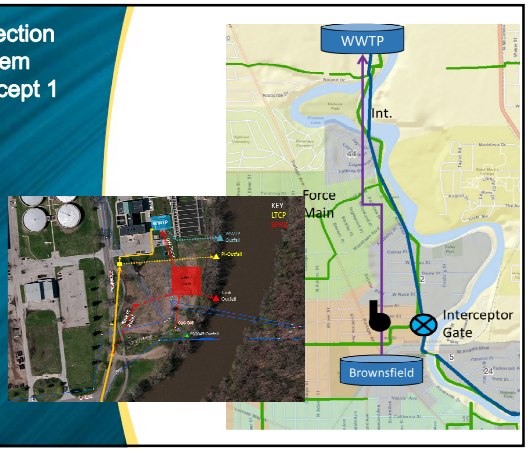
Collection System Concept 1



Collection System Concept 2

Water Quality Modeling

- Model of St. Joe River from Elkhart to State Line
- Water Quality Model used to evaluate impact of LTCP
  - Provide a consistent endpoint for comparison of project impacts
  - Evaluate localized impacts and effects
- Calibrate model to new in-stream data
  - New (reduced) overflow volumes
  - Incorporate Mishawaka and Elkhart control programs into upstream boundary

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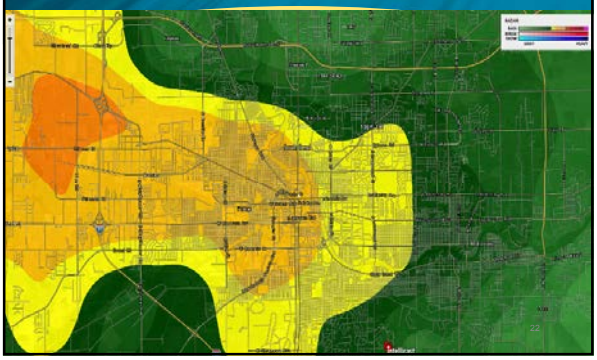
Precipitation Temporal and Spatial Variability



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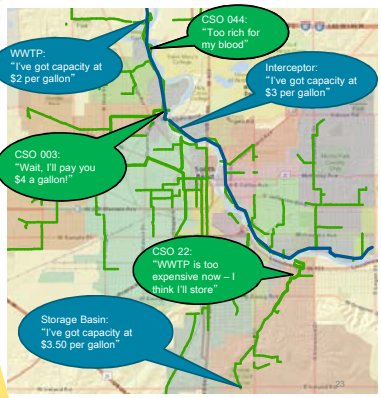
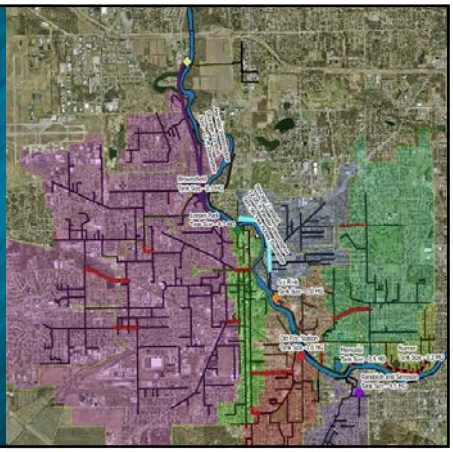
How Optimization Works



Control Concept 1

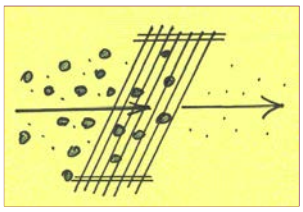


Control Concept 2

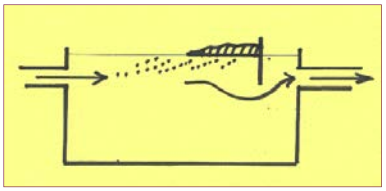
Wastewater Treatment Basic Concepts

- Physical treatment
- Biological treatment
- Chemical treatment

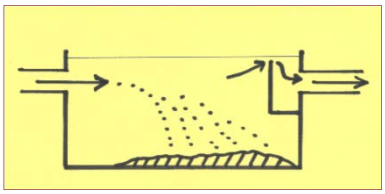
Screening



Flotation



Settling



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Biological Treatment

- Carbonaceous removal
- Ammonia removal
  - Nitrification
  - Denitrification
- Phosphorus removal

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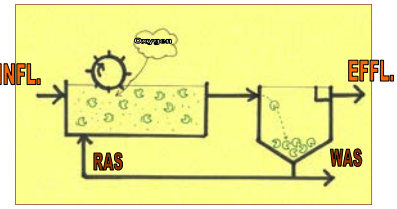
Activated Sludge Process



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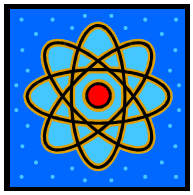
Chemical Treatment



- Chemical Addition
- Disinfection

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Excellent Effluent Quality

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Wastewater Treatment Considerations

- South Bend WWTP is a Class IV activated sludge treatment facility.
  - Average flow 35 MGD
  - Peak flow 65 MGD
- Treatment units include:
  - 3 Mechanical Fine Bar Screens
  - 2 Grit Removal Tanks
  - 8 Primary Clarifiers
  - 4 Aeration Tanks
  - 7 Final Clarifiers
  - Chlorination
  - Dechlorination
  - Solids Thickening Tank
  - Dissolved Air Floatation Units
  - Sludge Blending Tank
  - Anaerobic Digesters
  - 4 Belt Filter Presses

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WWTP Challenges

- Hydraulic Restrictions
  - Primary Clarifier effluent
  - Aeration Tank effluent
  - Final Clarifier effluent
- Aging Equipment
- Space Constraints
- Biological Treatment of Dilute Waste
- Settling During High Flow

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WWTP Completed Projects

- Primary Scum and Final Clarifier Gates #6 and 7
- Raw Sewage Pump Upgrades
- Blower Replacements
- Disinfection Gate and Mixer Replacement
- Ferric Chloride Feed System Pump Station
- Secondary Clarifier Rehab
- Wastewater Treatment Plant Rehab

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WWTP Projects in Construction/Design

- Primary Clarifier Upgrades
- Digester 2 Upgrade
- Influent Screenings Removal Modifications
- Grit Removal Modifications
- Final Clarifier Rehab
- Final Clarifier 6/7 Effluent Pipe Modifications
- RAS Piping Modifications
- Aeration Tank Effluent Modifications

- Peak Flow = 77 MGD

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Future WWTP Projects

No.	Projects
1	Electrical and Pump Upgrades
2	Disinfection Upgrades
3	Recycle Stream Treatment
4	Secondary Bottleneck Improvements
5	Aeration Influent Channel and Tank Modifications
6	Secondary Digester Rehabilitation/Upgrade
7	Primary Sludge Thickener Rehabilitation
8	Primary Effluent Modifications
9	Primary Effluent Disinfection
10	Parallel Screenings and Grit Train
11	Aeration Tank No. 5, Blower Standby Power, Recycle Stream Equalization Tank, and DAF Unit

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WWTP Hydraulics and Process Models – Quantity and Quality of Treatment

- Hydraulic and Process Models have been developed and are being calibrated
- Wet weather sampling plan established, will provide inputs for model

GOAL → Determine the maximum amount of flow that the plant can treat while meeting permit limits requirements

- Use information from the collection system models
- Minimize construction projects
- Operation and control modifications

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LTCP Schedule and Timeline

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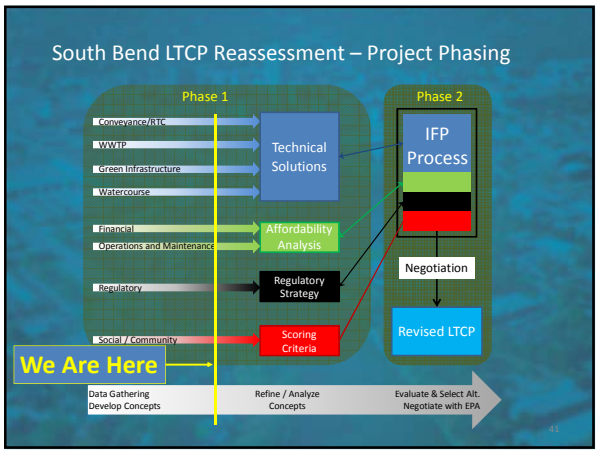

What Is Being Done – Phase 1

(Get the tools, fill the toolbox)

- Assess and quantify technical, economic and social impact of current LTCP
- Establish financial and water quality baseline for City
- Develop tools for IFP process:
  - Conveyance, WWTP and Watercourse Models
  - EPA 1997 Phase 1 and Phase 2 Affordability Analyses
  - Financial Rate & Affordability Models
  - Green Infrastructure opportunities
- Develop City-specific evaluation criteria
- Develop City-specific regulatory negotiation strategy

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What Will be Done – Phase 2

(Build a better plan)

- Utilize tools from Phase 1 to conduct IFP process
  - Achieve water quality goals in a manner that is affordable to the City and its residents
- Evaluate alternatives to find best solution for City
- Take preferred alternative to negotiate with EPA
- Develop new LTCP and modify Consent Decree
  - Project phasing and schedule
  - Identify milestone dates for EPA compliance
  - Cash flow & rate projections

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Questions and Comments

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