

Infiltration and Inflow Removal Cost or Benefit ?

Collection Systems 1 – Leaky System? Put a Cork In It!
NEWEA Annual Conference 2015
– Session 17

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WRIGHT-PIERCE 
Engineering a Better Environment

What I am not going to discuss

- How to quantify I/I rates
- Seasonal I/I
- Rehabilitation methodologies
- I/I banks
- I/I Based Connection Fees or Assessments

What I am going to talk about

- Cost Effective Analysis – definition
- Examples
 - MWRA
 - Direct Discharge
 - IMAs
- To Fix or Not to Fix
- Non-Cost Benefits

1993 MassDEP



COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
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- FINAL COST-EFFECTIVENESS ANALYSIS
- PURPOSE
- A separate cost-effectiveness analysis (C/E/A) must be performed for infiltration and inflow as part of an SSES to determine whether the I/I in the system is excessive.
- Infiltration/Inflow (I/I) in the system is defined as being excessive if the costs for the correction of I/I conditions are less than the costs for transportation and treatment of these flows.

Guidelines for Performing
Infiltration/Inflow Analyses

And
Sewer System Evaluation Surveys

Revised January 1993

Department of Environmental Protection

This information is available in alternate format. Call Debra Deberry, ADA Coordinator at 617-292-5965, TDD Service - 1-800-295-2297.

DEP on the World Wide Web: <http://www.mass.gov/dep>

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City of Somerville

- MWRA Community
 - Water and Sewer
- 128 miles of pipe
 - Gravity system
 - Significant portion of combined sewer

Example #1 - MWRA

- City of Somerville

Personal Services	\$	362,704
Ordinary Maintenance	\$	812,941
Capital Outlay	\$	2,049,000
Debt Service	\$	804,493
Special Items*	\$	15,356,054
Total Sewer Budget	\$	19,385,192
*Special items includes MWRA assessment, indirect costs paid to General Fund		

Annual Flow

Year	Total Flow	I/I Flow	Net Flow
2009	10.06	4.76	5.30
2010	11.85	6.53	5.32
2011	11.39	6.10	5.29
2012	9.41	4.11	5.30
2013	10.27	4.97	5.30
Average	10.60	5.29	5.30

Basic Method (not recommended)

- Sewer Rate
 - \$6.25 per hundred cubic feet or
 - \$0.00835 per gallon
- Given a leak of 1 gpm for 20 years
- 10,000,000 gallons
- Benefit \$88,000

Better Approach

- Sewer Budget
 - Total \$19.4
 - Total Annual Flow – 10.6 MGD
 - \$0.00127 per gallon
- Same leak
- Benefit \$13,400

Most Accurate

- Factors likely modified by decrease in flow
- Only MWRA Assessment
 - Portions of Assessment not related to Flow

Rate Apportionment	
Population	46.3%
Average Flow	25.1%
TSS	8.5%
BOD	6.8%
Max Flow	13.3%

Most Accurate cont.

- FY 2015 Assessment \$14.8M
 - MWRA Assessment about 50% for flow
- Somerville T&T Cost per year - \$7.4M

- Same Leak
- \$0.00048 / gallon
- Benefit \$5100

Example #2

- Dudley, MA
 - Discharge to Webster POTW
 - Total Budget \$1.1M
 - Annual POTW Assessment \$500,000
 - Annual Flow – 146,000,000 gallons
 - \$0.00342 per gallon

 - Benefit \$36,000

Example #3

- Rockport MA
 - Long Beach Area of Town
 - IMA with Gloucester
 - ◆ Pays City of Gloucester Rate
 - ◆ \$13.80 per thousand gallons
 - ◆ \$0.0138 per gallon
 - Benefit \$145,000

Typical Repair

- Liner Manhole to Manhole
- 250 linear foot segment
- \$50 per foot
 - SSES, Design, Bid, Build
 - \$12,500

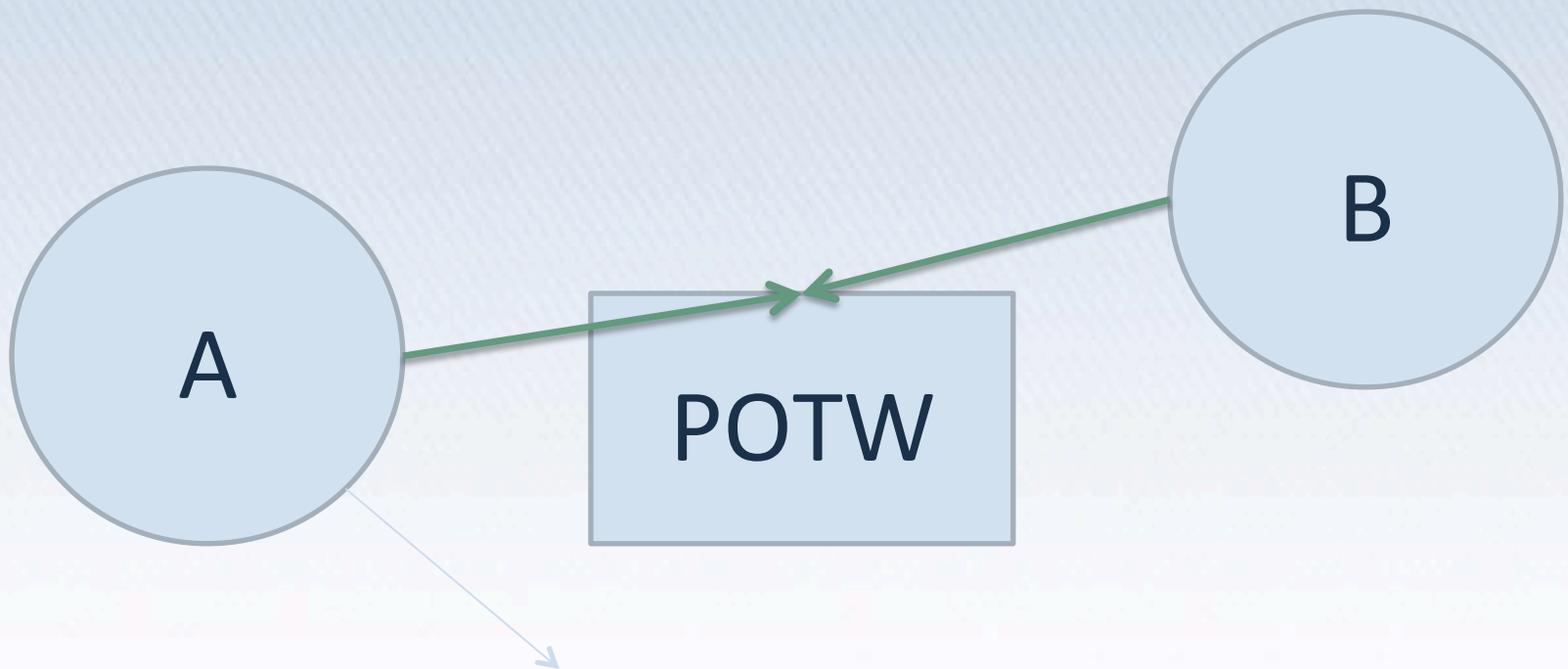
Cost Effective?

- \$12,500 for 1 gpm
- Assume 20 year project life

Example	Benefit	YES/NO
Somerville - Sewer Rate	\$88,000	YES?
Somerville – Sewer Budget	\$13,400	Probably
Somerville – MWRA Asst.	\$5,100	No
Dudley	\$36,000	YES
Rockport	\$145,000	YES!

Fix or Wait

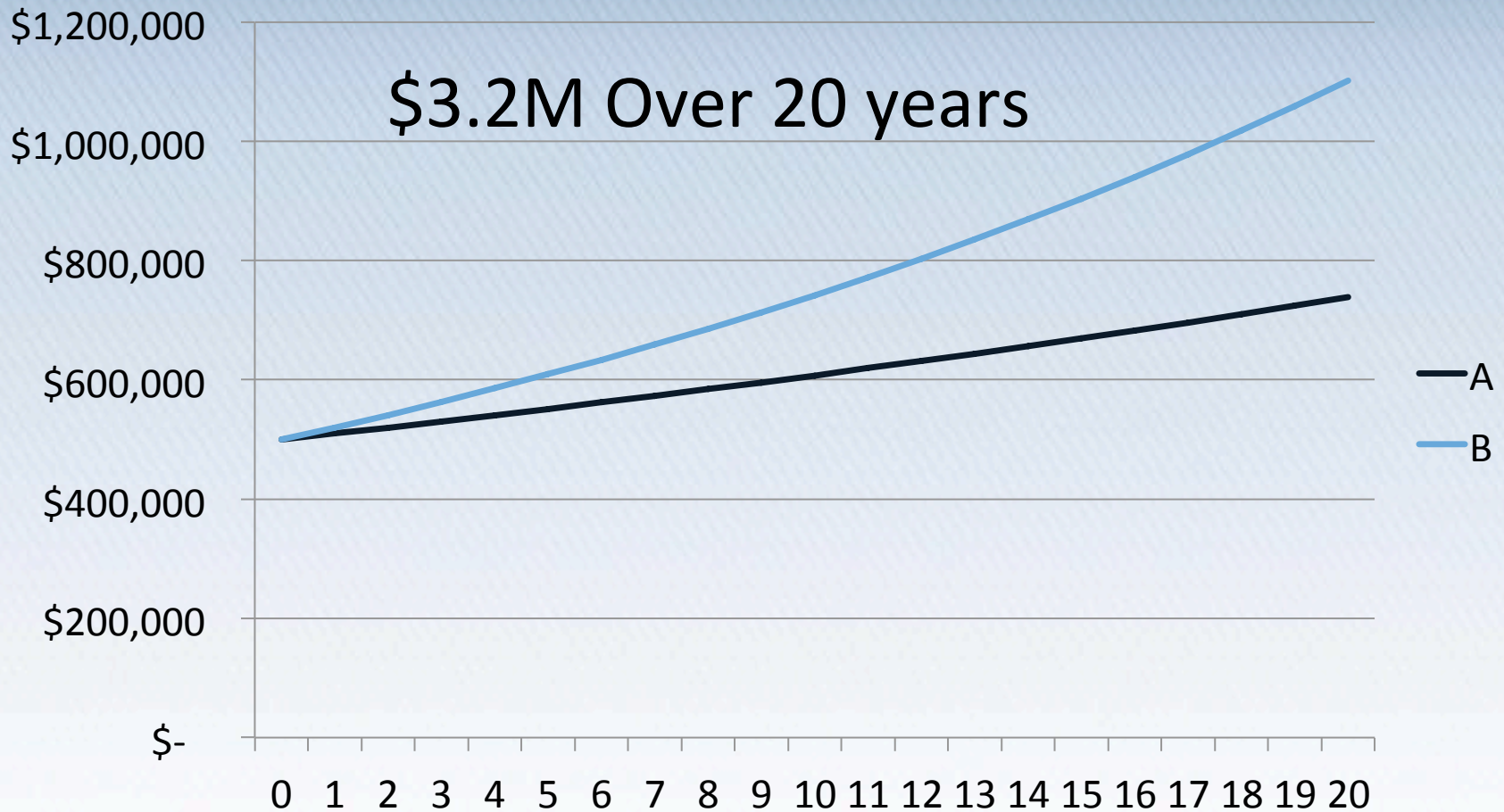
- Two Communities
 - Evenly Share a POTW



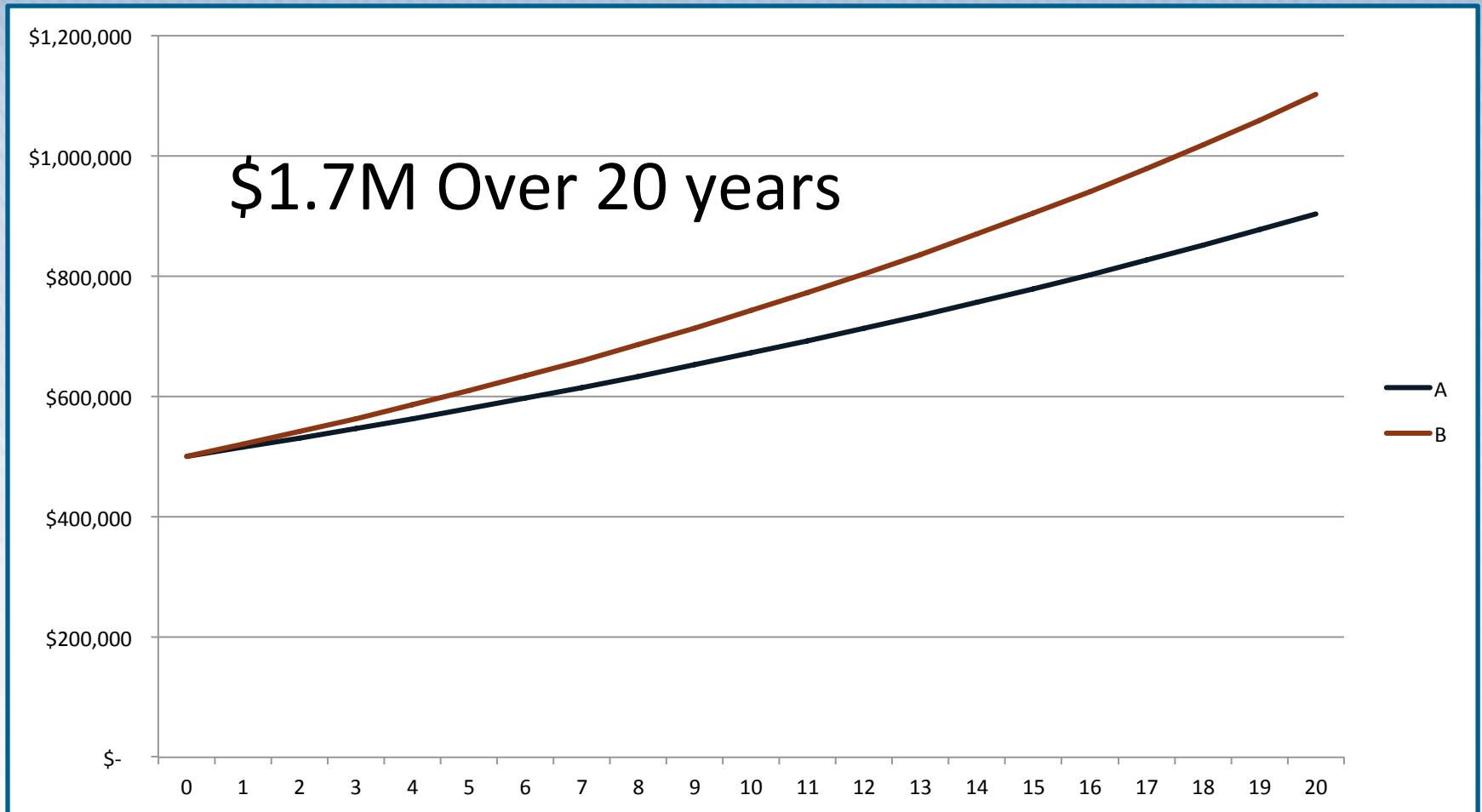
Two Approaches

- Community A
 - Actively Reduces I/I
 - 1% reduction per year in flow per year
- Community B
 - No Action on I/I
 - 1% Increase in sewer system flow per year
- 3% inflation per year

48% Or 120%



I/I Rehab - No Reduction



Recent Regulatory Change

- Significant Modification of the Sewer Extension/Connection Program
- Communities are Self-regulating
- Develop an I/I Control Plan by 12/31/17
- Communities with SSOs may be subject to increased requirements (enforcement)

Transport and Treatment Costs (Draft Revisions)

The total cost to transport and treat the flow from an I/I source is the sum of:

- (1) the capital costs required to improve the sewer collection system and/or the wastewater treatment facility (WWTF) so that they can accommodate the flow from the I/I source (e.g., pump station upgrades, WWTF expansion, etc.) and
- (2) the additional operation and maintenance costs related to the flow from the I/I source (e.g., additional chemical costs at the treatment facility, additional electricity usage at the WWTF, additional labor by operations staff, additional electricity usage at pump stations downstream of the I/I source, etc.)

Other Cost and Non-Cost Benefits

- Emergency Repairs
 - Excavated Spot Repair - \$10,000+
 - Limited Length 5 feet +/-
 - ◆ \$2,000/foot
 - Lining costs \$50/foot +/-



Non-Cost Benefits

- Sanitary Sewer Overflows
- Service Disruption
- Public Perception
- Compliance
- Enforcement
- Growth (paying users and tax base)



Summation

- Can't solely look at Cost-Benefit
- Cost Recovery
 - Determine true value
 - Value your system
- Non-Cost Benefits have value

Questions / Discussion

