Integrated Planning Opportunities Alternatives Analysis – Floatable Controls

Springfield, Missouri

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Introduction

The City of Springfield (City), Greene County, and City Utilities of Springfield have developed an approach for integrated planning to best protect local environmental resources in an evolving regulatory landscape. The Integrated Plan (IP), titled "A Citizen Focused Approach," provides a holistic plan designed to prioritize investments based on the most effective solutions to address the most pressing problems that matter most to the community. Implementation of the IP includes a four-phased approach, which is designed to be iterative: 1) Assessment (What is the current status of the environment?), 2) Vision (Where do we want to be?), 3) Tactical (How will we get there?), and 4) Adaptive Management (What adjustments need to be made?).

Identifying and prioritizing the most effective solutions using the Sustainable Return on Investment (SROI) approach is a critical component of the tactical phase. The SROI process is an economic analysis method for analyzing triple bottom-line (i.e., economic, social and environmental) outcomes of investments and policies. This approach provides a comparison between the general cost of a solution to the benefits achieved so that a more informed investment decision can be made.

The SROI process was used for estimating the sustainability value of floatable controls, including social and environmental benefits and financial costs. The methodology entailed projecting the value of impacts over a 25-year planning horizon and applying a discount rate to bring future values into today's dollars. A description of this opportunity and details of the SROI analysis are provided below.

Opportunity Description

Floatable controls are preventative measures to help reduce or eliminate urban litter and trash that might otherwise end up in area waterways. These can include a combination of structural and non-structural best management practices (BMPs) including trash racks, trash nets, trash receptacles, and litter pick up. The City already implements a number of such measures, but is interested in expanding its use of structural practices. Specifically, the City is considering retrofitting the existing storm sewer systems with trash racks and trash nets to collect runoff derived trash before it reaches local streams.

Trash racks are steel structures used to prevent debris from entering stormwater systems and are currently installed in approximately 15% of the City's flood control basins. For purposes of this SROI analysis, costs and benefits were assessed for installing trash racks in the remaining 85% of the City's flood control basins. Trash nets are a mesh material designed to capture trash at the end of pipes. Trash nets typically treat a larger catchment areas, but require heavier maintenance equipment such as a boom truck crane. The City identified a total of 36 potential trash net locations draining approximately 1,778 acres for purposes of this SROI analysis. Trash net locations were selected based on pipes and box culverts between 36" and 48" that would be easily accessible and drain runoff from more than one property.

Trash nets collecting runoff

Environmental and Social Benefits

The primary benefit of floatable control is improved water quality. Water quality improvements were determined using a water quality index (WQI) approach. The WQI is a composite scoring system that evaluates the conditions of a waterbody on a scale of 0 to 10 based on different community priorities and indicators. The economic value of a change in water quality is determined by the number of people that benefit and an individual's "willingness-to-pay" for that change. A one point change to the WQI is worth about $40 for a direct user and about $14 for in indirect user.

Changes to the WQI were determined from estimated reductions to trash loadings due to the installation of trash racks and trash nets (**Table 1**). These reductions will positively impact a number of community priorities including aquatic life, waterbody aesthetics, and recreation. In terms of the WQI, it was estimated that floatable controls will increase it by 0.296 points in Springfield urban streams and 0.015 points in Lake Springfield (**Figure 1**).

Table 1. Estimated Reductions in Trash from Trash Racks and Nets

	Springfield Urban Area		Lake Springfield Watershed	
	Trash Load (gallons/year)	Percent Reduction	Trash Load (gallons/year)	Percent Reduction
Estimated Existing Trash Load	230,000	--	47,900	--
Reduction from Trash Racks[1]	80,000	34.3%	7,100	14.9%
Reduction from Trash Nets[2]	7,600	3.3%	3,200	6.7%

1 Assumes trash racks will be installed in 100% of the City's flood control basins.
2 Based on installing trash nets at 36 locations draining approximately 1,778 acres.

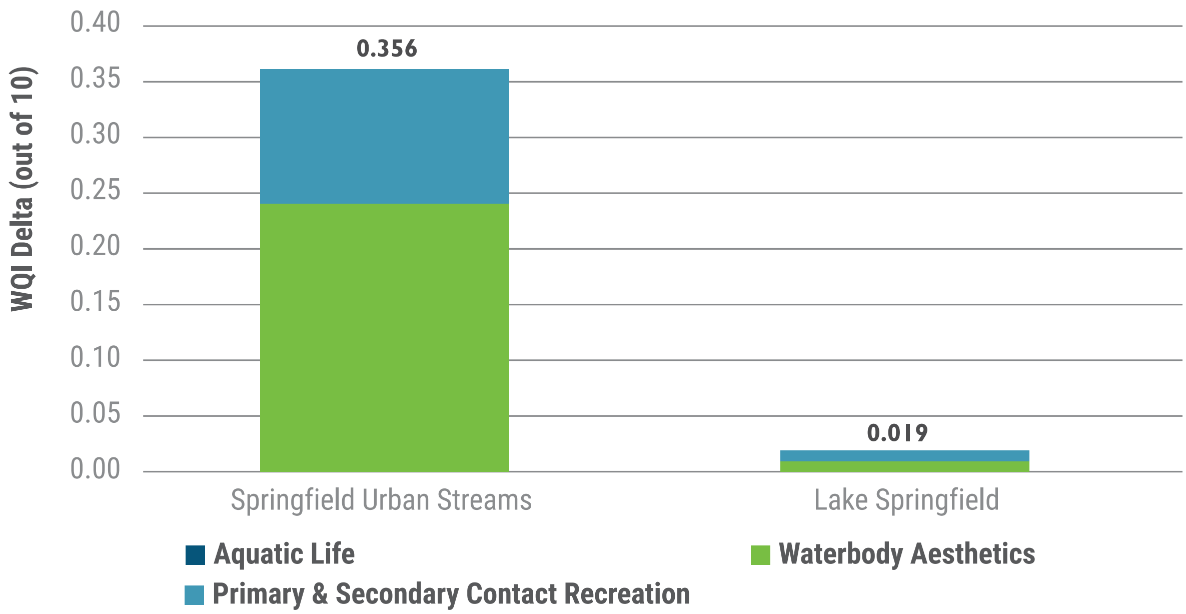

Figure 1. Change to the Water Quality Index from Floatable Control Measures

Cost Considerations

Total capital costs were estimated at about $898,000 based on installing 834 trash racks and 36 trash nets. Trash racks were estimated to vary in cost between about $400 and $600 per installed unit with a median cost of $500. Trash nets were estimated to range in cost between approximately $6,100 and $17,340 per installed unit with a median cost of $13,350. Annual operation and maintenance (O&M) costs were estimated based on funding two crews of four people that would service the trash racks on a quarterly basis and the trash nets twice per month. Including equipment costs, annual O&M was estimated at about $643,000.

Table 2. Estimated Floatable Control Capital and O&M Costs

Floatable Control	Capital Costs	Annual O&M
Trash Racks	$481,000	$643,000
Trash Nets	$417,000	

Note: Based on installing and servicing 834 trash racks and 36 trash nets.

SROI Results

Table 3 presents final results of costs and benefits of floatable controls. The present value operation and maintenance costs amount to about $11.8 million. However, the monetized water quality benefits are estimated at $27.1 million resulting in a total value of $15.3 million and a benefit-cost ratio of 2.3.

Table 3. Summary of Present Value Costs of Floatable Controls ($2018, Millions)

Types of Benefits and Costs	Present Value of Impact
Environmental	
Water Quality Improvements	$27.1
Social	
(No monetized benefit categories)	—
Costs	
Capital Expenditures	($0.9)
Operations & Maintenance Impacts	($10.9)
Totals	
Financial Lifecycle Cost	($11.8)
Total Social, Environmental Benefits	$27.2
Total Value - All Costs and Benefits	$15.3
Benefit-Cost Ratio	2.3

Figure 2 provides the best estimate of value created relative to cost by accounting for several uncertainties that can raise or lower the perspective on total value. Taking into account these uncertainties, it is estimated that the benefit-cost ratio could range from about 1.3 to 4.0 with a 20% chance of it being above or below this range.

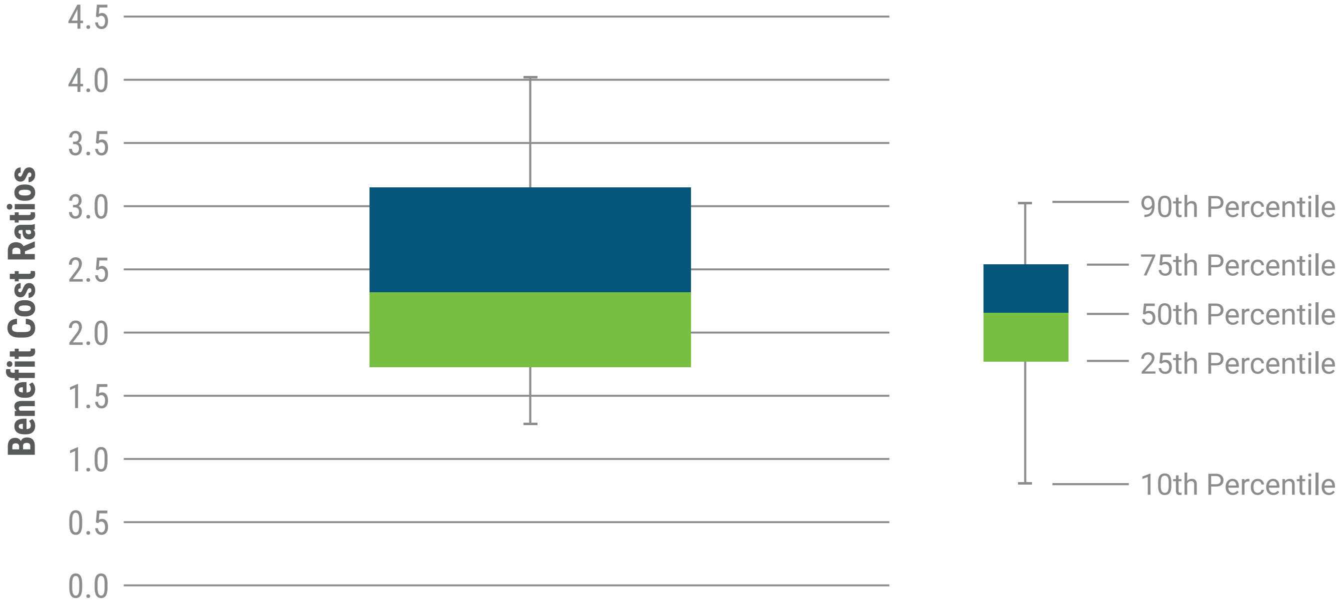

Figure 2. Range of Potential Benefit Cost Ratios for Floatable Controls

Summary

Floatable controls including trash racks and trash nets will likely realize benefits that significantly outweigh the costs. The water quality benefits associated with floatable controls are estimated at approximately 2.3 times the estimated costs with a total value of about $15.3 million. Accounting for uncertainty, the benefit-cost ratio could be as high as 4.0 and is likely no lower than 1.3.