

# Indianapolis North Flood Reduction Project Benefits vs Cost

## Cost Benefit Analysis

As a responsible custodian of federal tax dollars, the Corps of Engineers must ensure every dollar it invests not only yields more than one dollar in return, but also yields more in its designated use than it could in other potential uses. This determination is often made on the basis of a benefit-cost analysis, which results in, among other things, a “benefit-to-cost ratio”.

## Benefit-to-Cost Ratio

Costs in this ratio are the allocation of resources, measured in monetary terms, required to yield a return. Benefits are the monetary measurement of that return as a contribution to national economic development (NED).

## National Economic Benefits

When these NED benefits – increases in the economic value of the national output of goods and services – exceed the costs, the action is considered to be economically justified. When the *net increase* in benefit to the nation (benefit minus cost) is the greatest of all available opportunities, the action is considered to be the optimal action (often referred to as the NED plan or alternative).

## Determination of the Recommended Action (NED Plan or Alternative)

The determination of the recommended alternative for completion of the Indianapolis White River North project from a benefit/cost standpoint is an incremental one. For each additional area to be included within the leveed area, there are additional implementation costs. Whether or not the benefits to these areas, in terms of annualized flood damages reduced (damages expected to result from a representative range of possible flood events, weighted by their annual probability of occurrence), exceed the additional implementation costs necessary to provide these benefits answers the question of benefit/cost feasibility. Three alternatives (with one additional variation) for completing the project are addressed here, and their individual, incremental costs and benefits separately discussed.

## What is compared within each alternative to reach the feasibility cost?

Construction and maintenance costs versus expected annual flood damages reduced.

## Comparison of Three Alternatives

Among these alternatives, the one that provides the least amount of flood risk management benefits can be considered the baseline, and its benefits and costs treated as zero. Each of the remaining alternatives/variations can be incrementally evaluated on the basis of benefits and costs relative to this baseline.

As these alternatives linearly add increments of increased benefit for increased cost, they have been analyzed in pairs, with each alternative compared against its nearest, less costly and less beneficial neighbor used as the baseline. The 56<sup>th</sup> Street alternative was then compared against its Illinois Street variation (the baseline), the Westfield Boulevard alternative compared likewise against 56<sup>th</sup> Street, and Rocky Ripple compared against the baseline of Westfield Boulevard. All costs and benefits North of Illinois Street are identical across all analyzed scenarios, and thus can be considered a net-zero.

#### **The Alternatives and Benefits at a Glance: The 56<sup>th</sup> Street Alternative – Illinois Street variation**

- Least costly
- Least benefits
- Any benefits/costs included in any of the other alternatives

The alternative that provides the least benefit (independent of cost) among all alternatives is the 56<sup>th</sup> Street alternative – Illinois Street variation. It is both the least costly of all alternatives/variations, and provides the least benefit. Additionally, all benefits provided by the Illinois Street variation would also be provided by any other alternative, and likewise all implementation costs incurred. The alternative to be evaluated against this baseline then is the 56<sup>th</sup> Street alternative.

#### **The Alternatives and Benefits at a Glance: The 56<sup>th</sup> Street Alternative**

- Additional cost: \$1,478,000
- Annual benefit: \$51,655
- Annual cost: \$73,574
- Cost benefit ratio: 0.7 –does not meet the cost benefit ratio requirement

Relative to its Illinois Street variation, the 56<sup>th</sup> Street alternative provides protection for eight additional structures, at an additional cost of \$1,478,000. The added protection amounts to an annualized NED (National Economic Development) benefit of \$51,655, which represents a probability, weighted annualized value of future flood damages prevented. When the incremental cost of \$1,478,000 is similarly annualized for comparison on even terms with benefits, it equals \$73,574, yielded a benefit-to-cost ratio of 0.7. This indicates that every extra dollar invested in the 56<sup>th</sup> Street alternative will result in 70 cents worth of benefit to the nation in terms of the “national output of goods and services”.

#### **The Alternatives and Benefits at a Glance: The Westfield Boulevard Alternative**

- Additional cost: \$364,000
- Annual benefit: \$123,689
- Annual cost: \$17,224
- Cost benefit ratio: 7.18—exceeds the cost benefit ratio requirement

Spending a further \$364,000 (over the 56<sup>th</sup> Street alternative) provides additional flood risk management benefit to the Butler Tarkington neighborhood. This is the Westfield Boulevard alternative. The incremental increase in annualized benefit here is \$123,689. The comparable

annualized value of incremental cost is \$17,224. The yields of benefit-to-cost ratio of 7.18 for the Westfield Boulevard alternative.

#### **The Alternatives and Benefits at a Glance: The Rocky Ripple Alternative**

- Additional cost: \$33,481,000
- Annual benefit: \$1,379,435
- Annual cost: \$1,666,658
- Cost benefit ratio: 0.83—does not meet the cost benefit ratio requirement

The Rocky Ripple alternative costs an additional \$33,481,000 (over the costs of the Westfield Boulevard alternative), which annualizes to \$1,666,658. The additional annual NED benefits in terms of flood risk management in the Rocky Ripple neighborhood are \$1,379,435 (incremental benefits over those provided by Westfield Boulevard), yielding a benefit-cost-ratio of 0.83. This indicates that every additional dollar invested in the Rocky Ripple alternative will result in 83 cents worth of benefit to the nation in terms of the “national output of goods and services”.