

APPENDIX D – DETERMINING COST-EFFECTIVENESS

D.1 Introduction

At its most basic level, benefit/cost analysis (BCA) determines whether the cost of investing in a mitigation project today (the “cost”) will result in sufficiently reduced damage in the future (the “benefits”) to justify spending money on the project. If the benefit is greater than the cost, then the project is cost-effective; if the benefit is less than the cost, then the project is not cost-effective. Thus, the benefit/cost ratio (BCR) should have a value of 1.0 or greater.

A BCA is conducted in the same way for each type of hazard mitigation project; the difference is in the types of data used in the calculations. Refer to the document *What is a Benefit*, located on FEMA’s Mitigation BCA Toolkit (currently Version 3.0), for additional information.

D.2 Process to Assess Cost-Effectiveness

There are two different methods for assessing cost-effectiveness: 1) a quick screening to determine whether the project is likely to be cost-effective and 2) a BCA using software available through FEMA.

Quick Screening to Determine Cost Effectiveness

With some experience, a community official can look at key project data, before doing any analysis, and determine whether the project is likely to be cost-effective. Table D-1 shows how to quickly screen a project for cost-effectiveness based on these attributes, as well as the damages expected from various types of floods. In Table D-1, the damages refer to losses to structures or residences, contents of these structures, displacement costs (temporary housing), and the loss of critical public services and infrastructure (e.g., hospitals, electricity, schools, roads, bridges, etc.). The more frequent the flood, the more damage can be expected, and the more cost-effective the project is likely to be, as it protects against those damages. It is important to understand that “quick screening” will not yield a conclusive cost-effectiveness determination and should be used only as a preliminary indicator of the appropriateness of the project.

Why should a BCA be conducted?

A determination of cost-effectiveness is required by FEMA if a proposed project is to be considered for Federal funding. If the proposed project is determined to be cost-effective (i.e., has a BCR of 1.0 or greater), funding from FEMA’s grant programs, such as the Hazard Mitigation Grant Program (HMGP), Flood Mitigation Assistance Program (FMA), Pre-Disaster Mitigation Program (PDM), Repetitive Flood Claims (RFC) Program, and others could be used to reduce the cost of the project to the property owner. For additional information on these programs and others that fund eligible projects, refer to Appendix E, Hazard Mitigation Assistance Programs.

Table D-1. Quick Screening to Determine the Likelihood of Cost-Effectiveness

Attribute	Likelihood of Cost-Effectiveness			
	Very High	High	Moderate	Low
Frequency of Flood	10-year flood	10- to 25-year flood	25- to 50-year flood	50- to 100-year flood
Level of Damage	Very high damage	High damage	Limited damage	Minor damage
Project Cost	Low relative to damages	Moderately-low relative to damages	Close to cost of damages in frequent floods	High relative to damages in frequent floods
Project Benefits	Very high	High	Moderate	Low
Criticality (impact or loss of function)	Very high, broad damages to community	High damages to key facility; community	Moderate loss of certain functions limited impact	Little or no loss of functions; minor impact

(Source: *How to Determine Cost-Effectiveness of Hazard Mitigation Projects*, Chapter 3 from FEMA's Mitigation BCA Toolkit Version 2.0)

Benefit/Cost Analysis

FEMA’s Mitigation Benefit/Cost Toolkit includes BCA modules, which address both riverine and coastal flooding. The riverine software includes three levels of BCA: Very Limited Data Module, Limited Data Module, and Full Data Module. These modules are described in detail in *How to Determine Cost-Effectiveness of Hazard Mitigation Projects* (also referred to as the “Yellow Book”) located on FEMA’s Mitigation BCA Toolkit. The toolkit itself may be obtained free of charge by contacting the BC Helpline at 1-(866) 222-3580 or bchelpine@dhs.gov.

The procedures required by FEMA for performing a BCA are specific and well defined. Without previous experience with FEMA-compliant BCAs, there are two options:

- **Get training.** FEMA offers extensive training opportunities through the Emergency Management Institute (EMI). Contact the State Hazard Mitigation Office or FEMA Regional Office for information on how to obtain training.
- **Get help.** Consultants with BCA experience are effective, especially with more complicated projects.