**Benefit Cost Analysis Template Example**

**Brief Instructions:**

- The Benefit Cost Analysis (BCA) Memo may vary in length, typically 1-2 pages.
- Important items to include are:
  - Name, version, and description of BCA tool used for calculations
  - Overview of assumptions made for each input
  - Description of sources for those assumptions (Red = Examples)
- NOTE: This analysis constitutes a minimum eligibility standard that must be met by all projects seeking funding consideration.

**Glossary/Relevant Terms**

- **Benefit-Cost Analysis (BCA):** A method for determining the potential positive effects of a mitigation measure and comparing them to the cost of the measure. With the FEMA BCA modules, the positive effect is a reduction in future damage from natural hazards. This is the benefit of mitigation. The BCA can also be used to compare alternative projects to determine the best alternative from a fiscal standpoint.
- **Benefit-Cost Ratio (BCR):** This ratio is the present value of net project benefits divided by the project costs and is the result of a BCA. A ratio of 1.0 or greater indicates the project is cost effective; a ratio of less than 1.0 indicates the project is not cost effective.
- **Benefits:** Future losses prevented or reduced by a mitigation project. The benefits counted in a BCA are the present value (in dollars) of the sum of the expected annual avoided damages over the project's useful life.
- **Cost Effective**: A project is generally considered to be cost-effective when the BCR is 1.0 or greater, indicating the benefits of a prospective hazard mitigation project are sufficient to justify the costs (i.e., BCR ≥ 1.0).
- **Direct Benefits:** The reduction or prevention of future losses to buildings, contents, or public facilities from natural hazards.
- **Discount Rate:** Used in FEMA Benefit-Cost Analysis to determine the "Net Present Value" of benefits. Discounting facilitates accurate comparisons of benefits that may occur in the future to the costs of a project that most often occur immediately or in the near term. For FEMA-funded projects, the rate is set by the Office of Management and Budget (OMB).
- **HAZUS:** Hazards-United States. FEMA software for hazard analyses based on GIS mapping.
- **Indirect Benefits:** In the context of hazard mitigation, the reduction in damages from natural hazard events that are not directly caused by the event itself.
- **Project Cost:** The total cost of a mitigation project, including an applicant's share. These costs include such items as land or right-of-way acquisitions, construction and materials, design, testing, permits, project management, and equipment. In most Benefit-Cost Analysis, all future benefits are counted, so all project costs should be counted as well.
- **USACE:** United States Army Corps of Engineers

Adapted from:

- https://www.fema.gov/sites/default/files/2020-04/fema_bca_reference-guide.pdf
- https://www.fema.gov/grants/mitigation/guide/part-5

## Cost-Effectiveness Example No. 1:

The BCA for this project was completed in the flood module for one property and in the Damage-Frequency Assessment (DFA) module for five properties using the Federal Emergency Management Agency (FEMA) BCA Tool Version 6.0. Based on the documentation used, the project is cost-effective. The following assumptions were made in the BCA:

- *Project Useful Life:*
  - The project useful life utilized was: 30 years, which is consistent with the FEMA standard value for the project.
- *Project Cost:*
  - The total project cost indicated in the BCA was $1,250,000.
  - The total project cost in the BCA includes O&M and engineering fees.
- *Annual Maintenance Cost:*
  - The annual maintenance cost is estimated at $0. The homeowners are responsible for long-term maintenance of their properties following the elevation project.
- *Lowest Floor Elevations:*
  - Lowest Floor Elevations (LFEs) were determined from the elevation certificates for four properties and an engineer report for two properties.
- *Flood Hazard Data:*
  - The Base Flood Elevation (BFE) for 100-year was obtained from the elevation certificate. The streambed elevation, water surface elevations, and discharges for the 10-, 50-, 100-, and 500-year events were obtained from the preliminary Flood Insurance Study (FIS) for Travis County, Texas (effective revised date of June 2018). The streambed elevations and discharges were confirmed to be correct. However, the water surface elevations varied slightly from the FIS profiles.
- *Building Information:*
  - The building sizes and building types were supported by property appraiser reports. The default values for building replacement and analysis period were applied. The default building replacement value of $100/square foot was used for the structures analyzed in the flood module.
- *Building Occupancy:*
  - The building occupancy in the BCA varied from one to five persons. The owners of the properties provided homeowner participation forms to support these numbers.
- *Before-Mitigation Damages:*
  - For the five properties analyzed using the DFA module, before-mitigation damages were based on the provided flood claims data and confirmed to be entered correctly.
- *After-Mitigation Damages:*
  - For the five properties analyzed using the DFA module, the after-mitigation damages were assumed to be the lowest value of flood claims to account for residual risk from flood.
- *Social Benefits:*

  - For properties with a BCR greater than 0.75, social benefits were applied. Homeowner participation forms were used to support the number of residents for each structure.
- *Add/remove parameters specific to your project*

**Cost-Effectiveness Example No. 2:**

In order to provide enough data to estimate the project BCR, applicants should ensure they address the following questions (Red = Examples):

- How often does the hazard being mitigated occur?
  - Power outages occur at the Hazardtown fire station about once every 3-5 years.
- How many people benefit from the proposed mitigation project, and how was this number determined?
  - The proposed mitigation project, installing a generator at the Hazardtown fire station, benefits the fire station's service population of 700 residents.
- What structures, infrastructure, and/or building contents, if any, will be damaged if the project is not implemented?
  - If the proposed mitigation project is not implemented, Hazardtown Middle School will continue to experience flooding in the auditorium and classrooms on the north side of the building, damaging school equipment and resulting in costly mold remediation.
- What public services (including public safety, transportation, and utilities) and/or businesses, if any, would lose function during future hazard events if the project is not implemented?
  - If the culvert under Overflow Road at Muddy Creek is not upsized, Overflow Road will continue to flood during intense rainfall events and impede access to the Muddy Creek Shopping Center.
- Are there any additional benefits directly attributable to the proposed project not captured elsewhere in the cost-effectiveness narrative? Would the project result in avoided injuries or deaths; reduced emergency management costs; reduced maintenance costs; protection of cultural, historical, or agricultural resources; reduced carbon emissions; or other economic benefits to the community?
  - This project has some additional benefits to the health of Hazardtown with reduced mold exposure and improved quality of life with reduction in flooding. These items are difficult to quantify in BCA.
- Example above from FEMA Cost Effective Narrative. Please note the less than $1 million cost effective memo does not apply to the SFY 2024-2025 Flood Infrastructure Fund (FIF) Intended Use Plan (IUP). A BCA is required for all FMP construction-oriented projects, except for FME and FMS Category projects.