



NYS Division of Homeland Security & Emergency Services

Benefit Cost Analysis (BCA) for Hazard Mitigation Projects Section 404 HMGP – PDM – FMA

The Federal Emergency Management Agency (FEMA) requires that Mitigation projects be cost effective, or result in savings that exceed their cost. This can be found in 44 CFR Part 206.434(c)(5), and it is achieved by performing a Benefit-Cost Analysis (BCA) that results in a Benefit-Cost Ratio (BCR) of 1.0 or greater. BCAs are completed using FEMA software to inventory and document past damages and calculate the value of damages avoided or reduced if the project is implemented.

When compiling data for the BCA, it's helpful to think of mitigation benefits as future damages and losses that would be eliminated and/or reduced by implementing the proposed mitigation project. The following categories of avoidable or reducible damages---while not exhaustive---offer a good starting point and should be considered when gathering data for the BCA Information Worksheet:

- **Casualties:** deaths, injuries, and illnesses;
- **Physical Damages:** buildings, contents, infrastructure, landscaping, site contamination, vehicles, and equipment;
- **Loss of Function:** displacement costs, loss of rental income, loss of business income, lost wages, disruption time of residents, loss of public services, loss of utility services, and the impact of road and/or bridge closures;
- **Emergency Management:** costs for emergency operations centers, evacuations and rescues, security, temporary protective measures, and debris removal and cleanup.

New York State Division of Homeland Security and Emergency Services (DHSES) has prepared a worksheet to assist with the BCA portion of the mitigation application. While this is intended to address most mitigation challenges, your situation may be unique and worth discussing with DHSES program and technical staff to ensure all eligible damages are considered. We also may ask questions or request additional documentation to fully understand the existing problem and your proposed solution, capture all damages, and present your project to FEMA in the most positive light. In order for DHSES to prepare an accurate BCA, please remember that:

- Damages, losses and costs must be documented to be considered in the BCA;
- Information on damages or losses must be related directly to the particular problem the proposed project is intended to prevent or mitigate (e.g. in a culvert failure and flooding scenario, include your costs of emergency measures, clean-out, etc., as well as associated damages to surrounding private properties located off your right-of-way);
- FEMA recognizes only monetary losses, and events or activities that cannot be assigned a monetary value cannot be included in the BCA. However, dollar figures can be correlated with certain casualty situations, loss of service, and road closures, so you should contact us if you have any questions about the eligibility of your losses.

Instructions for Completing the Benefit Cost Analysis (BCA) Worksheet

Applicants must complete the BCA Worksheet for all hazard mitigation project (non-planning) grant requests, with few exceptions¹. Please remember that the BCA can include only **documented** losses and associated costs that will be avoided if your project is implemented. Therefore, your application should clearly link the damages and losses described to problems at the facility or infrastructure to be mitigated, and must include documentation of the costs associated with those damages or losses.

The following provides instructions on completing the worksheet pages that make-up a total of five (5) sections. Please read carefully as some sections need to be completed once and others will need to be completed for each event. Note: not all items may relate to the proposed project so be sure to only included information to items that the proposed project will reduce or eliminate when implemented.

Proposed Project Type: complete this section one time.

1. **Project Information:** Check the box that describes your proposed project and answer questions 1a through 1e.
2. **Stabilization Projects:** Provide the date(s) the erosion or slumping began and the annual rate of erosion. On a separate sheet document methodology used to determine the rate of erosion provided.

Damage Information: complete all applicable items. Complete this section separately for each event, even where multiple events occurred within one year. Be sure that narrative descriptions and estimated costs of these damages are provided in the application existing conditions section.

3. **Flooding Event:** To establish frequency, provide the date and year of the events (be sure to include **any size** event that produced damages or losses). Provide the magnitude of the event if known (e.g. “this was determined to be a 50-year event” or “3 inches of rain in two hours,” etc.).
4. **Residential Property Damage:** List damages and/or losses to all buildings, contents, landscaping, site contamination, vehicles, and equipment for each individual residential property. Documentation could include receipts of repairs completed or estimates for work to be done, insurance claims paid, and surveys completed by the homeowner. (Note: homeowner’s time for cleanup and/or repairs may be included.) If residents were displaced from the home, include duration of displacement, all costs related to accommodating persons during and after the event (e.g., hotel costs). Provide the depth of water in the structure and if this was basement level or first above grade floor level.
5. **Business Property:** In addition to the items requested in #4 (Residential Property Damage), where applicable also specify the number of days any business was closed, the net income lost, and the wages of hourly employees lost. Salaried employees are not included unless they were laid off and not paid during the shutdown.
6. **Crop Losses:** Monetary losses resulting from crop damages *may* be eligible in the context of a larger project that protects improved property or infrastructure.
7. **Public Buildings:** Document damages and repair costs. If required to close, note the duration of the closure and the annual budget(s) for department(s) housed in that facility. If relocated, provide days of displacement and costs.

¹ The removal and demolition or relocation of structures in a 100-year floodplain deemed substantially damaged by a local floodplain administrator is presumed to be cost effective.

8. Schools: Document damages and repair costs. If required to close, note the duration of the closure and any resulting loss of State aid. Provide the annual budget associated to the damaged facility (structure, staffing, etc.). If relocated, provide number days of displacement and costs.
9. Municipal Services: Provide costs for all municipal services required to respond to the event. Examples include Fire and Police Department staff, and EMS and Public Works personnel activities such as pumping out cellars, directing traffic, setting up detours, cleaning culverts, overtime, etc. If costs are not available, provide the person-hours required.
10. Debris Cleanup & Removal: Include all costs and/or man-hours associated with debris cleanup for both public entities and private owners.
11. Casualties, Illnesses, or Injuries: Include all that were caused by the event, specifying the type of illness and/or injury.

Loss of Services: complete all applicable items separately for each event, even where multiple events occurred within one year.

12. Roadways & Bridges: Document damages and repair costs to restore to pre-event condition. If roadways or bridges were closed or travel was restricted, include the duration, daily traffic count, and costs involved in closing and re-opening each road or bridge. Where detours are established, include the costs involved in establishing and demobilizing them. (If costs are not available, provide the number of person-hours involved.) Specify the additional mileage and travel time required by the closure. (Example: normal travel from A to B is 20 minutes and 10 miles: the detour requires 30 minutes and 14 miles; additional travel time is 10 minutes and 4 miles.) Finally, specify the cost for any additional inspections or increased maintenance required as a result of the event.
13. Electric Service: If service was interrupted, note the number of *people* (not customers) affected by the loss of service. Include the duration without service in days and/or hours. Provide costs associated for any repairs.
14. Water and/or Wastewater Services: If either service was interrupted, note the number of *people* (not customers) affected by the loss of service. Include the duration without service in days and/or hours. For wastewater services, indicate whether the loss of treatment was full or partial and cite any remedial actions, regulatory requirements, or resulting fines. Provide costs associated for any repairs.
15. Police Station: If service was interrupted, the following information should be provided; what is the type of area served (metropolitan, city, rural), how many people served, how many police officers work at location, how many officers would serve same location if the station were shut down due to disaster? Provide costs associated for any repairs. Include the duration without service in days and/or hours. If service remained but displaced to new location, provide the number of days displaced and costs.
16. Fire Station: If service was interrupted, the following information should be provided; what is the type of area served (urban, suburban, rural, wilderness), how many people served, what is distance between this station and the next station that would provide protection to this area, does this state provide EMS services, what is the distance between this EMS service and the next that would provide EMS to this area? Provide costs associated for any repairs. Include the duration without service in days and/or hours. If service remained but displaced to new location, provide the number of days displaced and costs.

17. Hospital: If service was interrupted, the following information should be provided; how many people served, what is distance between this hospital and the hospital that would treat patients if this hospital was inoperative, how many people served by alternative hospital? Provide costs associated for any repairs. Include the duration without service in days and/or hours. If service remained but displaced to new location, provide the number of days displaced and costs.
18. Other Facility Type: For other facilities that are not included above, provide the annual budget(s) for the department(s) that are affected by loss of that facility. Provide costs associated for any repairs. Include the duration without service in days and/or hours. If service remained but displaced to new location, provide the number of days displaced and costs.

Property Information: The property information must be completed for acquisition, relocation, elevation, flood proofing, or flood barrier type projects. Please complete items 19 and 20 for each property being submitted for this project type.

19. Property Owner Information: items are self-explanatory.
20. Structure Information: items are self-explanatory. Be sure to include a copy of the property information card (real property information) showing the type of structure and square footage.
21. Structure Floor Elevations: required to be provided only if FIS or similar data asked for in item number 23 is available. (Method of how these were obtained must be provided)

Flood Insurance Rate Map (FIRM) and Flood Insurance Study (FIS): If the property is located in a Special Flood Hazard Area (SFHA) that has a Flood Insurance Study (FIS) or similar data available, please provide the information requested in item numbers 22 and 23. This information may differ for properties not adjacent or contiguous. Therefore, other FIRMs and FISs may be required for the other individual structures/properties. Please include a copy of the FIRM with the property site and Community Panel Number identified along with a copy of the Applicant's local law for flood damage prevention. Also include the Profile(s) with property location marked on profile, or the Transect(s) data from the FIS that were used for ascertaining elevations.

22. Flood Insurance Rate Map (FIRM): items are self-explanatory.
23. Flood Insurance Study (FIS): items are self-explanatory.

Remember to include:

- Sources of Information
- **Documentation** supporting the supplied information
- One BCA information Worksheet completed for **each** event as requested above

Benefit Cost Analysis (BCA) Information Worksheet

Proposed Project Type: Please complete items one and two once.

1. Project Information: Check the appropriate project type:

Generator (*permanent or portable*)

Removal from Flood Plain (*acquisition, relocation*)

Structural Elevation (*NYS will not process applications to elevate structures in FEMA mapped riverine floodways, coastal V zones, or Coastal Barrier Resource System Units*)

Barriers (*flood proofing and flood barrier*)

Structural (*culverts, drainage, bridges*)

Minor Flood Control (*stream bank stabilization, retention basins, etc.*)

Non-Structural (*securing appliances, hot water heaters, etc.*)

Other: _____

- a) For project types other than Non-Structural, what is the age in years of the structure(s) to be mitigated? _____
- b) Specify your project's effectiveness as a function of year and level: _____
(*e.g., "this culvert project will be designed to handle the 100-year flood."*)
- c) Total Project Cost \$ _____ (*costs should be calculated to anticipate escalation of costs based on proposed construction time frame as well as application review and approval time*)
- d) What are your current documented annual maintenance costs? \$ _____
- e) What are your estimated annual after-project maintenance costs? \$ _____

2. Stabilization Projects:

- a) For stabilization projects, what year did the erosion or other changes begin to take place? _____ mm/dd/yr
- b) For stabilization projects involving eroding land, what is the annual rate of erosion: _____ ft/yr (*e.g., 0.5 ft/yr or 2 ft/yr*) (On a separate sheet document the methodology used to determine the rate of erosion and label it with this item number & title.)

Damage Information: complete all applicable items for each event, even where multiple events occurred within one year.

3. **Flooding Events:** Provide the following information:

a) Date of Event _____ mm/dd/yr

b) Magnitude of Event _____ (*if known, e.g., 25yr, 3 inches of rain in two hours*)

4. **Residential Property Damages:** List each individual property and the damages/losses that occurred there. Refer to the instruction sheet for types of items to include. (If you need more space, please provide the information for all properties on a separate sheet and label it with this item number & title.)

5. **Business Properties:** List each individual property and the damages/losses that occurred there. Refer to the instruction sheet for items to include. (If you need more space, please provide the information for all properties on a separate sheet and label it with this item number & title.)

6. **Crop Losses:** List all crop losses resulting in monetary loss to any person(s) and the amount of that loss. (If you need more space, please provide the information for all properties on a separate sheet and label it with this item number & title.)

7. **Public Buildings:** Were public buildings closed as a result of the event? If yes, how long were they closed (in days)? What is the annual budget associated to the structure(s) and department(s) affected by the event(s)? Document any damages and repair costs. (If you need more space, please provide the information for all properties on a separate sheet and label it with this item number & title.)

Loss of Services: complete all applicable items for each event, even where multiple events occurred within one year.

12. **Roadways and Bridges:** Were there any road and/or bridge closures as a result of the event? If yes *and a detour was established*, please provide the following information. (If you have more than one road or bridge affected or damaged, provide the information for all facilities on a separate sheet and label it with this item number & title.)

- a) What is the name of the road or bridge? _____
- b) What was the cost for set-up and take-down of establishing a detour? \$ _____
- c) What was the duration of closure? _____ Days _____ Hours
- d) What is the daily one-way traffic count? _____ (vehicles/day)
- e) What was the additional distance in miles? _____ (refer to instruction)
- f) What was the additional travel time in minutes? _____ (refer to instructions)
- g) If damages occurred, what were repair costs? \$ _____ (emergency repairs)
\$ _____ (restore to pre-disaster condition)

13. **Electric Service:** If electric service was disrupted:

- a) What was the duration of the outage in hours? _____
- b) How many **people** (not customers) were without service? _____
- c) If damages occurred, what were repair costs? \$ _____ (emergency repairs)
\$ _____ (restore to pre-disaster condition)

14. **Water and Wastewater Treatment:** If Services were disrupted and/or damaged:

- a) What was the duration without **water** treatment, in hours? _____
- b) How many **people** (not customers) were affected? _____
- c) If damages occurred, what were repair costs? \$ _____ (emergency repairs)
\$ _____ (restore to pre-disaster condition)
- d) What was the duration without **wastewater** treatment, in hours? _____
- e) How many **people** (not customers) were affected? _____
- f) Was the loss of treatment _____ full or _____ partial?
- g) If damages occurred, what were repair costs? \$ _____ (emergency repairs)
\$ _____ (restore to pre-disaster condition)
- h) If fines were imposed, what was their total? \$ _____

15. **Police Station:** If Services were disrupted and/or damaged:

- a) What was the duration without services? _____ Days _____ Hours
- b) If service remained but displaced to new location, how many days? _____ Days
- c) What were the costs associated to be displaced to new location? \$ _____
- d) How many people are served by this station? _____
- e) How many police officers work at this police station? _____
- f) How many police officers would serve the same area if the station were shut down due to a disaster? _____
- g) Indicate the type of area served by this police station
Metropolitan City Rural
- h) If damages occurred, what were repair costs? \$ _____ (emergency repairs)
\$ _____ (restore to pre-disaster condition)

16. Fire Station: If Services were disrupted and/or damaged:

- a) What was the duration without services? _____ Days _____ Hours
- b) If service remained but displaced to new location, how many days? _____ Days
- c) What were the costs associated to be displaced to new location? \$ _____
- d) How many people are served by this station? _____
- e) What is the distance between this fire department and the fire department that would provide fire protection to the geographical area normally served by this fire station? _____ Miles
- f) Does the fire station provide emergency medical services? Yes No
 - a. If yes, what is the distance between this fire department and the fire department that would provide EMS to the geographical area normally served by this fire station? _____ Miles
- g) Indicate the type of area served by this police station
 Urban Suburban Rural Wilderness
- h) If damages occurred, what were repair costs? \$ _____ (*emergency repairs*)
\$ _____ (*restore to pre-disaster condition*)

17. Hospitals: If Services were disrupted and/or damaged:

- a) What was the duration without services? _____ Days _____ Hours
- b) How many people are served by this Hospital? _____
- c) What is the distance between this hospital and the hospital that would treat people in the event this hospital was inoperative? _____ Miles
- d) How many people are served by the alternative hospital? _____
- e) If damages occurred, what were repair costs? \$ _____ (*emergency repairs*)
\$ _____ (*restore to pre-disaster condition*)

18. Other Facility Types: If Services were disrupted and/or damaged:

- a) What was the duration without services? _____ Days _____ Hours
- b) If service remained but displaced to new location, how many days? _____ Days
- c) What were the costs associated to be displaced to new location? \$ _____
- d) What is the total annual budget(s) for the department(s) associated to the particular facility? _____
- e) If damages occurred, what were repair costs? \$ _____ (*emergency repairs*)
\$ _____ (*restore to pre-disaster condition*)

Property Information: complete only for acquisition, relocation, elevation, flood proofing, or flood barrier type projects. Complete items number 19 and 20 for each property and number 21 – 23 as appropriate.

19. Property Owner Information:

- a) Property Owner name: _____
Type of property: Public Private
- b) Is this a rental property? Yes No If yes: how many units? ____
Is the structure owner occupied? Yes No

20. Structure Information:

- a) What is the year of construction? _____
- b) What is the square footage of the enclosed principal structure? _____ s.f.
(Include area for finished basement along with documentation to support, but not garages, porches, etc.)
- c) For Non-Residential structures, what is square footage of the **first floor** only?
_____ s.f.
- d) What is the Building Replacement Value of structure (BRV)? _____ \$/s.f.
(from building inspector, code officer, contractor estimate, RS Means, etc.)
- e) For Elevation Project only, provide number of feet finished first floor is being raised
_____ ft. (Provide a copy of Local Floodplain Law showing how determined.)
- f) For Acquisition only, provide the area of the property lot _____ sqft or _____ acres
- g) Foundation Type:
 Slab on-grade Pier Pile Concrete/CMU
- g) Building Type:
1-story w/ basement/crawl space 1-story w/o basement/crawl space
2-story w/ basement/crawl space 2-story w/o basement/crawl space
Split Level w/basement/crawl space Split level w/o basement/crawl space
Manufactured/Mobile Home Other _____

21. Structure Floor Elevations: **Provide only if Flood Insurance Study (FIS) or similar data requested in item number 23 is available.** (Please explain the method for obtaining the structure elevations.)

- i. First Floor Elevation (FFE): top of lowest finished floor _____(ft.)
If Coastal V Zone: bottom of lowest horizontal structural member _____ (ft.)
- ii. If FFE is basement level then also provide the Elevation of lowest opening that allows water to enter _____ (ft.)
- iii. If FFE is basement level then also provide the Elevation for the next finished floor _____ (ft.)

NOTE: Be sure to include a copy of the property information card (real property information) showing the type of structure and square footage that can be obtained from the local Tax Assessor to support data entered above.

Flood Insurance Rate Map (FIRM) – Flood Insurance Study (FIS) – (Riverine and/or Coastal):

22. Flood Insurance Rate Map (FIRM):

- a) FIRM Panel Number: _____ Effective date: _____
- b) Flood Insurance Study (FIS) effective date: _____
- c) Community ID Number: _____
- d) Is the structure located in the 100-year floodplain? Yes No

23. Flood Insurance Study (FIS):

a. Complete the following for **Riverine Flooding:**

- i. Provide the streambed elevation: _____ (ft)
- ii. Flood Profile Number: _____

Riverine Flood Table		
Flood Frequency	Discharge (cfs)	Water Elevation NGVD (ft)
10-year event		
50-year event		
100-year event		
500-year event		

b. Complete the following for **Coastal Data:**

Transect Description Elevation		
Transect #	1% Annual Chance Stillwater	Maximum 1% Annual Chance Wave Crest

Transect Data Stillwater Elevations						
Transect #	10 Percent (10 yr)	2 Percent (50 yr)	1 Percent (100 yr)	0.2 Percent (500 yr)	Zone	Base Flood Elevation

NOTE: The information requested above may differ for properties not adjacent or contiguous. Therefore, other FIRMs and FISs may be required for the other individual structures/properties. Please include a copy of the FIRM with the property site and Community Panel Number identified along with a copy of the Applicant’s local law for flood damage prevention. Also include the Profile(s) with property location marked on profile, or the Transect(s) data from the FIS that were used for ascertaining elevations.