



### The Acquisition and Relocation or Demolition of Structures on or near Sinkholes

April 24, 2015

**Purpose:** The purpose of this policy clarification is to better explain the eligibility of acquisition, and relocation or demolition projects, for Hazard Mitigation Assistance (HMA) when the structure is subject to sinkhole hazards.

**Background:** FEMA has determined that the acquisition and relocation or demolition of structures (residential or non-residential) subject to sinkhole hazards is an eligible activity under the Hazard Mitigation Grant Program (HMGP) and the Pre-Disaster Mitigation (PDM) program. This policy clarification applies to HMGP funding for Presidential major disasters declared on or after April 24, 2015. It applies to PDM projects for which the application period opened on or after April 24, 2015. The eligible activity is only applicable for structures that show signs of damage determined to have been caused by sinkhole activity, or for structures that have already descended or have begun to descend into a sinkhole.

The U.S. Geological Survey (USGS) defines a sinkhole as a depression in the ground that has no natural external surface drainage and that retains rainwater that typically drains into the subsurface. Sinkholes are caused by removal (usually dissolution) of material from the local subsurface. Sinkholes are most common in what geologists call “karst terrain.” However, the presence of this type of underlying geology (most often limestone) is not an automatic predictor of sinkhole activity. The USGS has developed detailed geologic maps of the United States showing the locations of karst regions. These are regions where the type of rock below the land surface can naturally be dissolved by groundwater. Sinkholes can develop from either natural or human causes, or a combination of both. Sinkhole collapses can occur from leaks in municipal water lines, structural failure of public sewers, groundwater pumping, and construction, and at the site level, from leaky faucets or other faulty plumbing in a structure.

**Eligibility Considerations:** Structures that show signs of damage determined to have been caused by sinkhole activity, or structures that have moved or have begun to move downward into a sinkhole, are eligible for consideration for acquisition, relocation or demolition under HMGP and PDM.

Examples of indicators of sinkhole damage on, or related to the structure, when accompanied by evidence of a sinkhole include:

- The descending of the structure below the original grade of construction.
- Doors and windows that fail to close properly or exhibit changed behavior, when they had previously closed without problem.
- Cracks in walls, floors, adjacent pavement, and the ground surface, most noticeable in a concrete block structure and different from a few hairline cracks normally seen between blocks.
- Floors with sloping or unevenness that had not been apparent previously.

Sinkhole development may also be determined by observing disturbances around the affected structure. These site disturbances can support a determination that a sinkhole may be the cause of the structural damage listed above.

To be eligible for funding, the Applicant must submit supporting documentation that the cause of structural damage is sinkhole-related and at least partially due to a natural geologic process. The documentation must be prepared and signed by an appropriately registered, certified, or licensed State or local professional engineer, architect, landscape architect, or geologist. Documentation of disturbances around the structure may also be included; however, the primary eligibility factor must be evident from structural damage from a sinkhole. All other applicable eligibility considerations described in the Hazard Mitigation Assistance Guidance (dated February 27, 2015) also apply.

**Benefit-Cost Analysis (BCA):** FEMA has developed a methodology for calculating the benefit-cost ratio (BCR) for the acquisition of residential and non-residential properties in sinkhole hazard areas. This methodology is demonstrated by using a spreadsheet tool; it does not incorporate a recurrence interval because once a sinkhole event occurs, failure would be catastrophic, and a total loss would result. Residential acquisition benefits are based on replacement cost value of the structure and contents, displacement costs, and 5 percent of the value of human life. Benefits for non-residential acquisitions are based on the building replacement value, relocation costs, and business losses. For either type of acquisition, project costs include demolition and disposal or relocation. The spreadsheet tool calculates all the other values automatically based on FEMA standard values and methodologies. This spreadsheet tool is not included in the Version 5.0 BCA Tool and can be found at <https://www.fema.gov/benefit-cost-analysis>.

**Contact Us:** If you have any questions on details of the BCA, contact the BCA Helpline at 1-855-540-6744 or [bchelp@fema.dhs.gov](mailto:bchelp@fema.dhs.gov). For policy-related questions, contact the HMA Helpline at 1-866-222-3580 or [hmagrants@fema.dhs.gov](mailto:hmagrants@fema.dhs.gov).