

# Wildfire Technical Review

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This job aid supplement covers the requirements associated with the technical reviews for fuels management and structural protection wildfire mitigation projects funded by Hazard Mitigation Assistance. FEMA will also conduct an Environmental Planning and Historic Preservation review of each project. Refer to the Wildfire: Information Required for Environmental Review Job Aid.

The Disaster Recovery Reform Act (DRRA) Section 1205 states that recipients of hazard mitigation assistance provided under Stafford Act Sections 404 and 203 may use the assistance to conduct activities to help reduce the risk of future damage, hardship, loss or suffering in any area affected by wildfire. Section 1205 also lists 14 eligible activities that are currently eligible under the Hazard Mitigation Grant Program (HMGP) and Building Resilient Infrastructure and Communities (BRIC). This Technical Review Supplement provides additional information, examples and potential sources of documentation for items listed in the job aid to help communities applying for Hazard Mitigation Assistance grants comply with application requirements.

- All Hazard Mitigation Assistance (HMA) applications must comply with the requirements outlined in the HMA Guidance.
- According to the guidance, in addition to a general programmatic review, an EHP review and a technical review will be performed by FEMA for each proposed project.
- The technical review will verify that a project demonstrates feasibility, effectiveness and cost-effectiveness. This document is intended for technical reviews of applications only.
- For assistance completing EHP compliance reviews, see the EHP Supplemental Job Aids.

## Introduction

The following provides a review of the information that should be provided with the subapplication, including recommended documentation and a list of supplementary information, to assist FEMA when conducting technical reviews of the project application. Fuels management is addressed in this supplement (including establishing defensible space measures, reducing hazardous fuels, and removing standing burned trees) and structural protection through ignition-resistant construction. An application may include multiple mitigation types although ignition-resistant construction projects are required to include a defensible space component. The assistance of a wildfire expert may be necessary when developing a wildfire mitigation application. Technical resources are identified throughout this supplement to provide clarifying information on specific project application components. The final section provides a comprehensive list of resources identified throughout this supplement.

The project-specific guidance in this supplement does not provide all the information necessary to apply for funding through an HMA program and must be read in conjunction with all other relevant guidance documents.



## Additional Resources

- Hazard Mitigation Assistance Guidance (HMA Guidance)
- Hazard Mitigation Assistance Guidance Addendum
- Benefit-Cost Analysis Reference Guide and Supplement to the Benefit-Cost Analysis Reference Guide
- Hazard Mitigation Grant Program – Post Fire
- Wildfire Mitigation Resources
- Disaster Recovery Reform Act, Section 1205

A list of all resources referenced is provided on the last page of the supplement.

## Summary of Steps

- STEP 1: Provide a Scope of Work
- STEP 2: Provide Structure-Specific Details
- STEP 3: Provide a Project Schedule
- STEP 4: Provide a Project Cost Estimate
- STEP 5: Project a Project Site Map
- STEP 6: Provide Property Location Information
- STEP 7: Provide Structure Photographs
- STEP 8: Provide Maps to Demonstrate Wildfire Risk
- STEP 9: Provide Flood Insurance Rate Map
- STEP 10: Cost-Effectiveness Analysis
- STEP 11: Environmental and Historic Preservation Considerations

## Important Terms

**Defensible Space Measures:** The creation of perimeters around residential and non-residential buildings and structures through the removal or reduction of flammable vegetation.

**Hazardous Fuels Reduction:** Vegetation management to reduce hazardous fuels, vegetation thinning and the reduction of flammable materials to protect life and property beyond defensible space perimeters but proximate to at-risk structures.

**Ignition-Resistant Construction:** The application of non-combustible building envelope assemblies, the use of ignition-resistant materials and the use of proper retrofit techniques in new and existing structures.

**Removal of Standing Burned Trees:** Post-wildfire vegetation management to reduce burned trees that pose a residual risk to life and property by serving as fuel for future wildfires.

**Wildland-Urban Interface:** That geographical area where structures and other human development meet or intermingle with wildland or vegetative fuels.

## Technical Review Components

To complete a successful project application, a minimum amount of technical information is required for review. The following is a step-by-step approach addressing the major components of a wildfire project. Data collected in these steps will provide reviewers with the necessary information to determine whether a project is feasible and effective. The data requirements in the following steps should be compiled in an attachment to the project application. If the project impacts multiple structures, this information must be provided for each structure.

### STEP 1: Provide a Scope of Work

**Description:** Provide a project narrative identifying the proposed mitigation action and structures to be mitigated, including a description of the proposed activities and a clear explanation of how the project will mitigate risk. The SOW should include key milestones and correspond with the design information, project schedule and cost estimate.

**References:** When preparing the SOW, refer to the following:

- HMA Guidance Part IV, Section H: Scoping Narrative: Scope of Work, Schedule, and Cost Estimate
- Addendum to the HMA Guidance, Part B: Wildfire Mitigation
- HMA Application Development
- Bioengineering Wildfire Mitigation Job Aids

**Approach:** The following items should be included in the SOW; specific details and documentation required to support the narrative will be documented in the subsequent steps:

- Provide a narrative of the wildfire hazard being mitigated, including previous wildfires, damage history and the future potential wildfire risk of the project area(s).
- Describe the rationale for effectiveness within a project narrative. Eligible wildfire mitigation projects must demonstrate mitigation of the risk from wildfire to residential and non-residential buildings and structures, including public and commercial facilities. Projects must be in a Wildland-Urban Interface, must be adjacent to or intermingled with the built environment, and must provide protection to life and the built environment from future wildfires.
- Quantify the project area where the wildfire mitigation will occur (i.e., 100 acres of fuels reduction) or quantify the area for each type of treatment as it relates to the projected structures (i.e., a 30-foot buffer of defensible space around each identified structure).
- For standing burned trees removal and hazardous fuels reduction projects, describe the treatment plan or landscaping plan for all vegetation that would be removed or affected by the project. This information must be provided for each site.

- Include a description of the types of vegetation that would be removed, the method of removal (e.g., herbicide, hand tools, bulldozer) and the overall goal of the vegetation removal (e.g., decrease vegetation density, remove ladder fuels, create a level and vegetation-free site).
  - If vegetation would be planted, include details about the types of vegetation and the method of planting.
  - The description must include the distance from the treatment site to protected structures. A standing burned tree removal or hazardous fuels reduction project could protect numerous structures that are within 2 miles of the treatment area, and the risk reduction for the target community or buildings must be demonstrated in the scoping narrative and supporting documentation. Projects more than 2 miles from structures are ineligible.
- For **defensible space projects**, describe the treatment plan or landscaping plan for all vegetation that would be removed. In addition, describe any other facilities to be addressed, such as propane tanks, wood decks or fences and the method of mitigation. Provide the treatment radius around each structure receiving mitigation.
  - Defensible space projects for residential structures, commercial buildings, public facilities and infrastructure must be implemented in accordance with local code requirements for defensible space.
  - FEMA recommends that projects use the design guidance in FEMA P-737, Homebuilder’s Guide to Construction in Wildfire Zones or FEMA P-754, Wildfire Hazard Mitigation Handbook for Public Facilities if the guidance presents a stricter standard.
- For **ignition-resistant construction projects**, provide proposed conceptual designs, project plans and specifications.
  - FEMA recommends that applicants use FEMA P-737 or FEMA P-754, as appropriate.
- Ignition-resistant construction projects are required to include a defensible space component as part of the application, or each property owner must have previously created defensible space and agrees to maintain it in accordance with HMA Guidance Addendum, Part B.4.2.
- Describe how the project conforms to current codes and best practices. FEMA urges the community or any entity implementing wildfire mitigation to use the materials and technologies that are in accordance with International Wildland-Urban Interface Code (IWUIC), FEMA U.S. Fire Administration and the National Fire Protection Association (NFPA) Firewise recommendations, whenever applicable.
- Describe the equipment that will be used for the project. Include the likely maximum use of this equipment on at least an annual basis. If available, include details about known or planned restrictions to the construction equipment such as seasonal or daily restrictions.
- Describe all potential construction debris, including vegetation, which could be generated by the project. Provide details on the method of disposal of vegetation (such as grazing, chipping or mulching, or hauling to an off-site location; FEMA regulations do not permit on-site burning) and construction debris, including potential locations and the legal status of disposal sites (whether the site is a licensed landfill).
- Mitigation project alternatives are required as part of application development. Document at least two alternatives that were considered as part of the planning or design phase. Indicate which alternative is the preferred mitigation project and discuss why it is the most practical, effective and environmentally sound alternative. One alternative is often considered the “no-action alternative” and reflects conditions expected to

exist if a mitigation project is not completed. This is a key step to ensure an efficient EHP review process. For additional guidance, see the EHP Review Supplements.

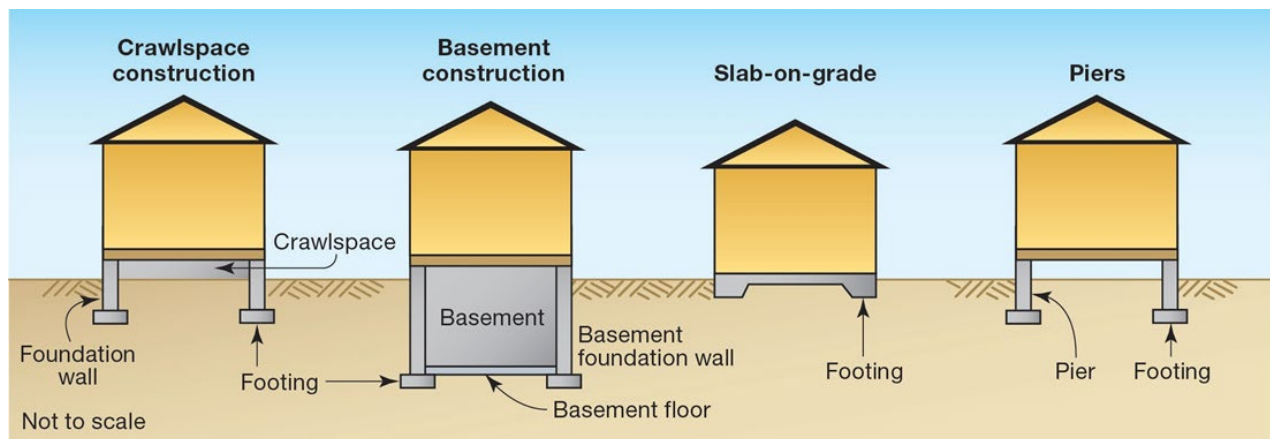
- Provide an operations and maintenance plan meeting the requirements of the HMA Guidance Addendum, Part B.5 or a statement acknowledging that a final operations and maintenance plan will be submitted before project closeout.

## STEP 2: Provide Structure-Specific Details

**Description:** It is necessary to demonstrate that a project is feasible and effective at reducing risk. As part of this demonstration, provide detailed information about each structure in the project.

**Approach:** Provide the following information about the existing structure(s). If the project is protecting multiple structures, this information must be provided, with supporting documentation, for each.

- For hazardous fuels reduction, standing burned tree removal, provide a list of the structure(s) and infrastructure to be protected within the two-mile radius of the treatment area. Indicate the property type (e.g., residential, police station, hospital, water treatment plant).
- For defensible space projects, provide a list of the structure(s) and infrastructure to be protected and indicate the property type.
- For ignition-resistant construction projects, in addition to the structure type, provide the following information about each structure:
  - Year structure was built
  - Structure type (e.g., elementary school, government building)
  - Construction type (e.g., wood framed, masonry/brick, concrete, steel)
  - Structure information, including the size of the structure and number of stories
  - Describe the foundation (as shown in **Figure 1**).



**Figure 1.** The four foundation types represented in this figure are crawlspace, basement construction, slab-on-grade and piers.

**Potential Sources:** This information can often be found from publicly available websites such as a tax assessor website, as shown in **Figure 2**. Some cities and counties have parcel databases with this information. Alternatively, online mapping programs with measuring features and high-quality aerial photos may be used to estimate the size of the building.

**Pineville, TX: Residential Property Record Card**

[\[ Back to Search Results \]](#)
[\[ Start a New Search \]](#) [\[ Help with Printing \]](#)

**Search for Properties**

Parcel ID:  Name:  Street Name:

Parcel ID	Card	Map-Block-Lot	Location	Zoning	State Class	Acres
1234-5678	1		23 River St	LA307	101 - n/1	0.106

**Owner Information**  
23 River St  
Pineville, TX 12345

**Property Picture**  
[ No Picture Available ]

**Deed Information**  
Book/Page: 9953/16  
Sale Date: 2009/09/01

**Dwelling Information**

<b>Living Units:</b>	1
<b>Style:</b>	Conventional
<b>Story Heights:</b>	1.5
<b>Exterior Wall:</b>	Alum/Vinyl
<b>Attic Living:</b> None	<b>Basement:</b> Part
<b>Year Built:</b>	1900
<b>Ground Floor Area:</b>	518
<b>Unfinished BSMT Area:</b>	0
<b>FIN BMST Living:</b>	n/a

**Figure 2. An example of a Residential Property Card, showing a 518-square foot, one-story residential building built in 1900 that can be used for documentation of the structure’s details.**

### STEP 3: Provide a Project Schedule

**Description:** Include a detailed project schedule for all tasks identified in the project cost estimate and SOW. The schedule identifies major milestones with start and end dates for each activity. Project schedules must show completion of all activities, including construction period, within the period of performance (POP) allowed by the relevant HMP program. Sufficient detail must be provided so FEMA can determine whether the proposed activities can be accomplished within the POP.

**References:** HMA Guidance Part VI, Section D.4: Program Period of Performance and Part IV, Section H: Scoping Narrative: Scope of Work, Schedule, and Cost Estimate

**Approach:** Verify that the information in the schedule supports the SOW and aligns with the project cost estimate.

## STEP 4: Provide a Project Cost Estimate

**Description:** Include a detailed line-item cost estimate for all tasks identified in the project schedule and SOW. Allowable costs included in the application should be reviewed to verify they are necessary, reasonable and allocable consistent with the provisions of 2 Code of Federal Regulations (CFR) Part 200. Include sufficient detail so that FEMA can determine whether costs are reasonable based on proposed activities and the level of effort. Costs incurred prior to award may be considered pre-award costs and may be eligible for reimbursement. Eligibility may depend on the date they occurred and the grant program. Refer to HMA Guidance and the Notice of Funding Opportunity for specifics.

**Reference:** HMA Guidance Part IV, Section H: Scoping Narrative: Scope of Work, Schedule, and Cost Estimate

**Approach:** Applications must include detailed, line-item costs in the project cost estimates for each mitigation item provided in the SOW. Well-documented project cost estimates contain quantities, unit costs and a source for each unit cost. Lump sum cost estimates are not acceptable. The assistance of a licensed engineer, architect or contractor (wildfire expert) may be required to help develop the project cost. As applicable, provide line-item costs using the following recommended line items:

- Engineering services for design, structural feasibility analysis, and cost estimate preparation
- Project administration and construction management
- Surveying and inspection
- Labor costs
- Management costs
- Permit costs
- List of equipment, including cost for each item
- Debris removal costs (e.g., hauling, chipping)
- List of construction materials, including cost for each item

A cost per structure should be provided for defensible space and ignition-resistant construction projects, and a cost per acre should be provided for standing burned tree removal and hazardous fuels reduction projects.

**Potential Sources:** Consult the project engineer, if necessary and if one was utilized. Additional resources for this information may include a forester assisting in project design and implementation or local firefighters who oversee fire response for the project area.

It is also important to verify that an annual maintenance cost has been determined using appropriate methods. The annual maintenance cost is necessary to address those costs associated with maintaining the effectiveness of the mitigation measures. Although the costs will not be funded by FEMA, they are required to be included in the benefit-cost analysis (BCA); requirements are further discussed in **Step 4A**.

## STEP 4A: Provide Maintenance Costs

**Description:** Maintenance costs should reflect the costs associated with mitigation being maintained for the entire project useful life (PUL). Maintenance costs will vary, depending on the following factors: project type, geographic location, climate and vegetation type. Maintenance for standing burned tree removal projects is not acceptable as this mitigation measure eliminates the hazard from the project area.

**Potential Sources:** Project-specific maintenance costs can be obtained from the project engineer, if necessary and if one was utilized. Additional resources for this information may include a forester assisting in project design and implementation or local firefighters who oversee fire response for the project area.

### Example:

- **Defensible space:** Grassland vegetation was mowed, and forested vegetation was removed within a 100-foot radius of the structure. At a minimum, to maintain the project effectiveness, the grassland regrowth must be mowed on a consistent basis (dependent on geographic location and precipitation) throughout the 1-year PUL. The forested regrowth must be hand trimmed at least every 3 years throughout the 20-year PUL.
- **Hazardous fuels reduction:** 150 acres of dense forested vegetation was thinned out by pruning the forested canopy. To maintain effectiveness, the forested regrowth must be hand trimmed at least every 3 years throughout the 20-year PUL.
- **Ignition-resistant construction:** Brush was removed within a 100-foot radius of the structure to create the required defensible space, and a fire-resistant roof was put on the structure. At a minimum, to maintain the project effectiveness, the brush regrowth must be trimmed on a consistent basis (dependent on drought conditions) throughout the 4-year PUL. Minimal roof maintenance should be required within the 10-year PUL.

## STEP 5: Provide a Project Site Map and Location

**Description:** Provide a map showing the project location. If the project includes multiple structures, show the project boundaries including staging area, if needed, and topographic information. **Figure 3** provides an example of a project site map.

**Reference:** Supplement to the Benefit-Cost Analysis Reference Guide, Section 5: Available Technology Aids

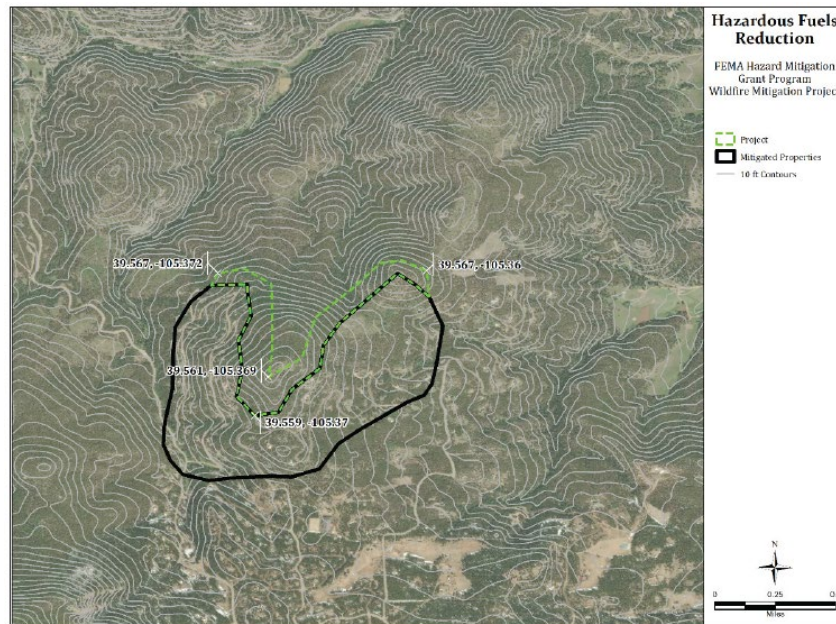
**Approach:** Provide a map showing the project location, including structures, map scale and location information. For any maps provided, verify that a scale bar is shown, and the map is labeled to identify the project boundaries.

- Show contour data on the map or provide an additional map with project boundary and contours.
- Defensible space and ignition-resistant construction: Identify the location of each structure to be mitigated on the map. If the project includes multiple structures, show the overall project boundary.
- Standing burned tree removal and hazardous fuels reduction: Identify on the map the boundaries of the project area and the location of the structures proposed to be protected by the project. The distance between the project area and the structures must be demonstrated.



**Potential Sources:** Official site survey, assessor maps, topographic maps obtained from the project engineer or planner, maps created using a web-based service such as Google Maps

**Example:**



**Figure 3. Example of a project site map for a hazardous fuels reduction project. The map clearly identifies the project area, and the structures to be mitigated can be seen in the satellite image. The proposed mitigation will reduce risk to structures within 1 mile south of the project area, which can be determined by comparing the locations of the structures to the project area using the scale bar.**

## STEP 6: Provide Property Location Information: Address and Latitude and Longitude

**Description:** Provide both the physical address(es) and the latitude and longitude of each structure in the project application. For projects with multiple properties, tables containing all relevant information by property can be helpful.

### PROPERTY ADDRESS

**Approach:** Provide property address(es) of each structure involved in the mitigation project. This includes street name and number; city, county or parish; state; and zip code. A post office box number is not an acceptable address. If the address provided does not match up with the structure(s) to be mitigated, provide photos or a site map with the structure(s) footprint(s) identified.

**Potential Sources:** Property owner, local building inspector, tax assessor records, deed to the property, engineering plans

**Example:** 123 Desert Road, Winnemucca, Washoe County, NV 89445

## LATITUDE AND LONGITUDE

**Approach:** Provide the latitude and longitude for all corners of the project area so the outline of the treatment area can be determined by the reviewer. The latitude and longitude can be provided in either decimal degrees (e.g., 27.9807, -82.5340) or degrees, minutes and seconds (e.g., 27° 58' 50.5" N, 82° 32' 2.4" W).

If your global positioning system (GPS) or mapping application provides degrees, minutes, and seconds, you will need to convert this into decimal degrees to enter it into FEMA GO (BRIC applications only). Free conversion tools are available online.

### Potential Sources:

- GPS device
- Free online map tools or search engines that generate latitude and longitude when an address is supplied

### Example:

- Corner 1: 40.921259, -117.547607
- Corner 2: 40.870508, -117.562102
- Corner 3: 40.955265, -117.670441
- Corner 4: 40.961791, -117.627031

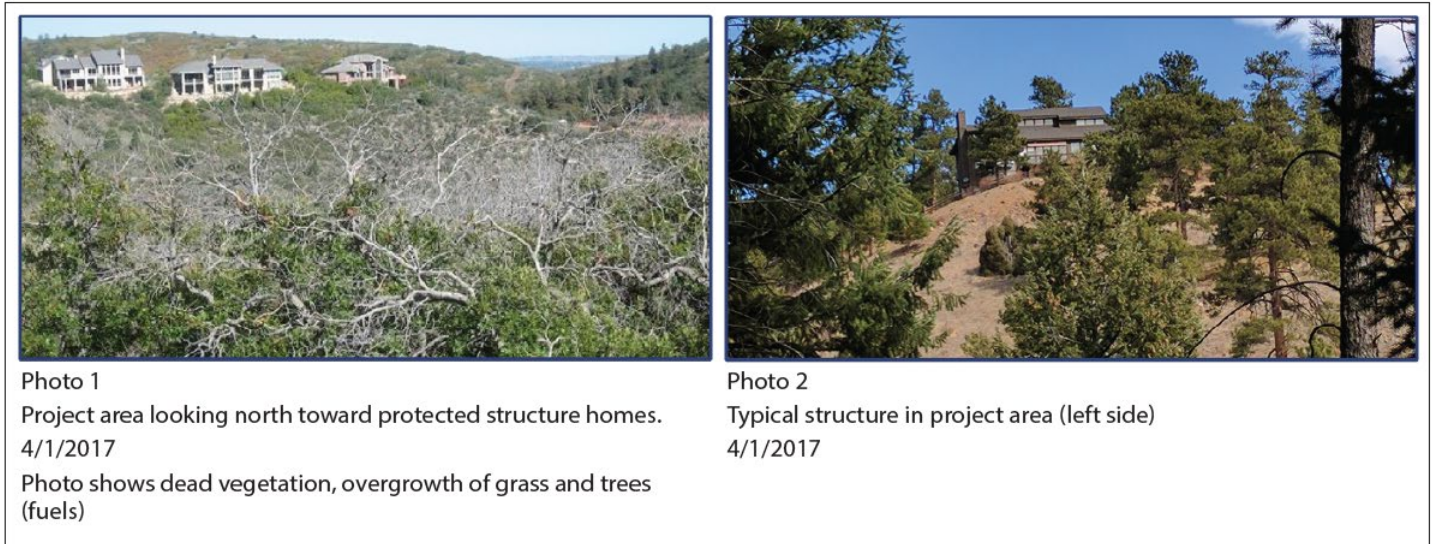
## STEP 7: Provide Structure Photographs

**Description:** Provide photographs of the structure(s) to be protected by the wildfire mitigation project (for example, see **Figure 4**). Provide a descriptive caption explaining what each photo shows, the direction it was taken, and side of the structure shown (e.g., "east side of structure, looking west"). Additional recommendations for photographs submitted for the project application are as follows:

- **Defensible space and ignition-resistant construction:** Provide photographs of all sides of each structure (show foundation, wall entrances and roof, as appropriate) and photographs of the surrounding areas from all directions.
- **Standing burned tree removal and hazardous fuels reduction:** Provide photographs of structures and the project area(s) from all directions. If there are numerous structures, take representative photographs of typical structures used to evaluate cost-effectiveness of the project. If there are minimal or no structures, photographs of the landscape of the project area should be provided to support the SOW and method of treatment.
- **Standing burned tree removal, hazardous fuels reduction, and defensible space projects:** Provide photographs that are representative of the treatment area showing current vegetation and cover conditions.

**Potential Sources:** Use a cell phone, tablet or camera to take clear, good quality photos for inclusion in the application.

### Example:



**Figure 4. Example of the type of photos and corresponding captions to be included with the application.**

## STEP 8: Provide Maps to Demonstrate Wildfire Risk

**Description:** According to the Addendum to the HMA Guidance, Part B.3, “property-level rating of a wildfire risk for each home or community and the scale used to measure the ratings levels (if applicable)” must be included in a wildfire mitigation application.

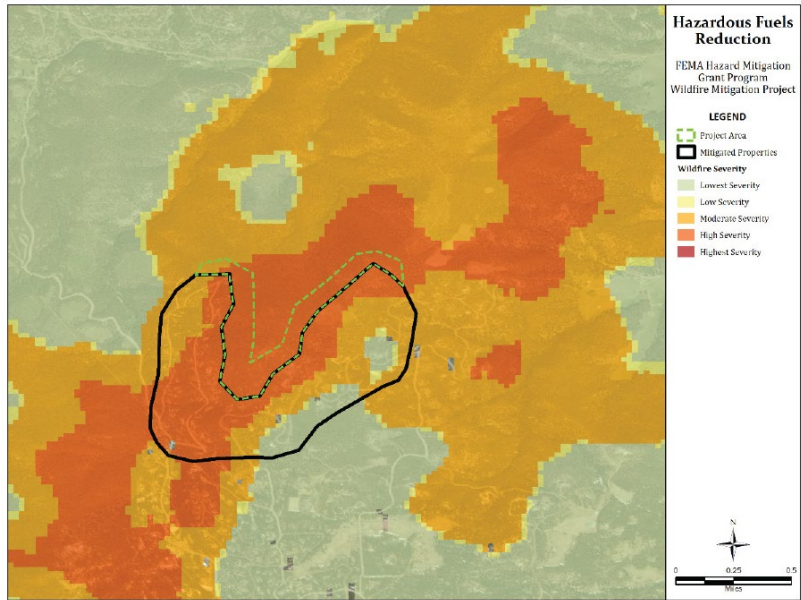
The term “wildfire risk” has varying definitions, depending on the referenced dataset, as several are available across the nation. One way to accurately fulfill the wildfire risk technical review requirement is to include information and maps about the wildfire severity and wildfire frequency with the project application. The maps should include the following elements:

- **Defensible space and ignition-resistant construction:** All structures within the project area(s) should be highlighted on the map.
- **Standing burned tree removal and hazardous fuels reduction:** Specific treatment polygons should be identified on the map. Maps should also include the location of the structures proposed to be protected by the project.

**Potential Sources:** This information can be obtained from the project engineer, the local fire department, local or state forest service office, the National Fire Protection Association – NFPA 1144: Standard for Reducing Structure Ignition Hazards from Wildland Fire or through Landfire website. Additional resources by state can be found in the resources section of this supplement.

### WILDFIRE SEVERITY

**Approach:** Provide a map of the wildfire severity within the project area(s), as shown in **Figure 5**. Wildfire severity, also referred to as wildfire intensity, is influenced by fuels, climate and topography. Identifying the wildfire severity within a project area will demonstrate the potential for dangerous wildfires to occur.

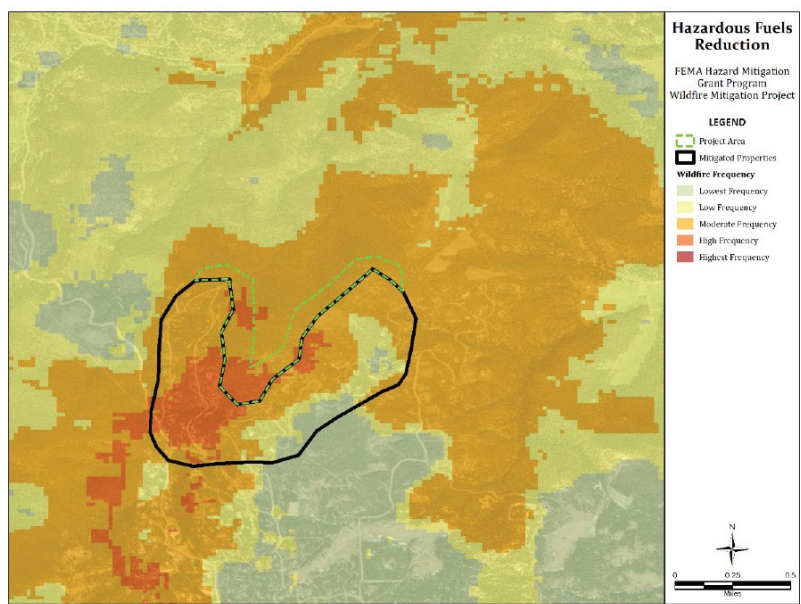


**Figure 5. Example of a map demonstrating wildfire severity. The severity of the risk is identified within the specific treatment polygon.**

## WILDFIRE FREQUENCY

**Approach:** Provide a map for the wildfire frequency within the project area(s), as shown in **Figure 6**. Wildfire frequency, also referred to as wildfire burn recurrence or wildfire return interval, is determined using historical fire report data. Identifying the wildfire frequency within a project area will demonstrate how often a wildfire is likely to occur.

**Example:**

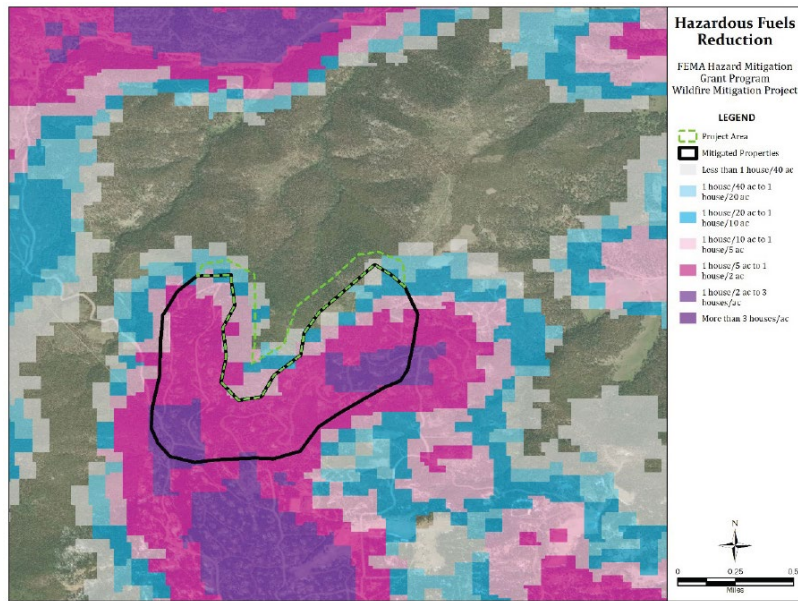


**Figure 6. On this example, the wildfire frequency of the project area is identified within the specific treatment polygon.**

## WILDLAND-URBAN INTERFACE

**Approach:** Provide maps demonstrating the relationship of the structure(s) to the Wildland-Urban Interface or forested, range or grassland area, as shown in **Figure 7**.

**Example:**



**Figure 7. On this example, the relationship of the project area and treatment polygon to the Wildland-Urban Interface is identified.**

## STEP 9: Provide Flood Insurance Rate Map

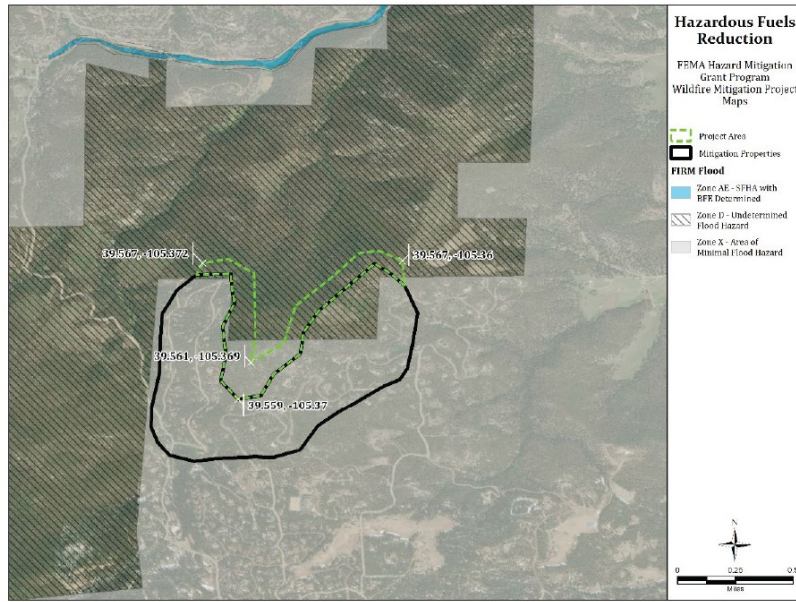
**Description:** Provide a Flood Insurance Rate Map (FIRM) showing project location and demonstrating the flood zone in which the project is located.

### Resources:

- FEMA's How to Find Your FIRM and Make a FIRMette
- FEMA's Flood Map Service Center

**Approach:** If a FIRM is available for the project area, provide a copy of the map with the project boundary outlined, to scale and in the current location. Include a description of the flood zone in which the existing structure is located and whether the site is in a regulatory floodway, as shown in **Figure 8**.

**Example:**



**Figure 8. The FIRM demonstrates that the project is located outside of a Special Flood Hazard Area.**

## STEP 10: Cost-Effectiveness Analysis

**Description:** Cost-effectiveness must be demonstrated to obtain FEMA funding. A BCA is a quantitative procedure that assesses the cost-effectiveness of a hazard mitigation measure over the useful life of the project by comparing the potential avoided damages (benefits) associated with the mitigation measure to the cost of a project in current dollars. This section provides guidance on the following:

- **Step 10A:** Benefit-Cost Analysis Tool – Modeled Damages
- **Step 10B:** Additional Benefits for a Benefit-Cost Analysis
- **Step 10C:** Cost-Effectiveness Analysis for Post-Wildfire Mitigation

All BCA inputs must be **justified and documented**. When appropriate FEMA standard values are used, it should be clearly stated.

FEMA will only consider applications that use a FEMA-approved methodology to demonstrate cost-effectiveness. FEMA provides BCA software that allows applicants to calculate a project benefit-cost ratio (BCR). The BCR is a calculation of the project benefits divided by the project costs. Projects for which benefits exceed costs (a BCR of 1.0 or greater) are considered cost-effective. FEMA requires the use of the BCA Tool to verify calculations are consistent with Office of Management and Budget Circular A-94 Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs. The BCA must be performed using the most current version of the BCA Tool. Benefits may include avoided damage, loss of function and displacement. In the case of wildfire mitigation projects, these include:

- Avoided physical damage to structures, contents and infrastructure
- Avoided displacement costs – the costs required to move and stay in a temporary location while repairs are performed on the structure

- Avoided losses to timber to be sold within proposed project area
- Avoided fire suppression costs for a typical fire event in the project area
- Avoided volunteer labor time that typically supports cleanup and repair work
- Avoided loss of revenue (for commercial properties)
- Avoided loss of public services (for public properties)
- Added environmental benefits

This supplement only provides a recommended approach to documenting cost-effectiveness. For detailed guidance on using the FEMA BCA Tool, refer to FEMA BCA Reference Guide and FEMA Supplement to the BCA Reference Guide. For additional questions, contact the BC Helpline at [bchelp@dhhs.gov](mailto:bchelp@dhhs.gov) or at **1-855-540-6744**. If the FEMA BCA Tool is used, provide a .pdf of the BCA report and an export of the BCA as a .zip file.

## STEP 10A: Benefit-Cost Analysis Tool – Modeled Damages

**Description:** Using modeled damages is suitable when the project does not qualify for using pre-calculated benefits. The Wildfire module within the BCA Tool accounts for both structures and infrastructure at-risk owing to wildfires within the project area. The Wildfire module analyzes proposed mitigation projects using structure-specific data gathered in **Step 2**.

**References:** FEMA’s Benefit-Cost Analysis Reference Guide, Supplement to the Benefit-Cost Analysis Reference Guide, FEMA BCA Tool (including Help Content within the tool)



The FEMA BCA Tool includes embedded Help Content. Click on the information button within the tool to access the Help Content.

**Approach:** The following describes the essential wildfire data required to estimate avoided damages using modeled damages in the BCA Tool. If **Step 1** through **Step 9** of this supplement are followed and all data gathered, there should be minimal additional data collection needed to complete the Modeled Damages BCA. To verify the information entered in the BCA software, the following supporting information must be provided.

1. **Project useful life (PUL):** The PUL is determined by the type of mitigation project and characteristics of the vegetation, environmental conditions and materials. The effectiveness of wildfire mitigation is dependent on performing required maintenance on a continuous basis throughout the entire PUL. Depending on the mitigation action type selected, the BCA Tool may automatically estimate the PUL; however, other FEMA-approved values can be found in the BCA Tool Help Content and the BCA Reference Guide
2. **Project cost:** Refer to **Step 4**.
3. **Annual maintenance cost associated with maintaining the effectiveness of the wildfire mitigation:** Refer to **Step 4A**.
4. **Average burn recurrence interval:** Used to calculate the potential losses over the PUL in the BCA. There are two methods for determining the average burn recurrence interval for a project area:
  - a. **FEMA standard value:** The FEMA BCA Tool will generate a burn recurrence interval when creating a new structure within the tool. Once the zip code of the project location is entered, a new wildfire project can be

created within the BCA Tool using information from the structure being protected (**Figure 9** and **Figure 10**). A FEMA standard average burn recurrence interval default value is calculated in years using the structure information.

- b. **User defined:** An average burn recurrence interval may be available from a credible source such as a state forestry agency. Documentation must be provided, and the value must be provided in terms of years. Potential sources include state forestry agencies, local fire protection districts, and the Landfire website.

**Figure 9. The Project Configuration window access through the BCA Tool where the latitude and longitude for the wildfire mitigation project is entered. For the BCA Tool, using the centroid of the project area is acceptable to determine the wildfire recurrence interval.**

**Figure 10. FEMA BCA Tool-generated hazard properties for wildfire projects.**

5. Structural information: Refer to **Step 2**.
  - a. Provide the number of buildings protected by the project.
6. Provide the total building replacement value (BRV) for all buildings protected by the project. The BRV should be determined for each structure based on the use and construction type.
  - a. The BVR should be based on the cost per square foot to replace the building with a functionally equivalent building, which is determined using current costs of labor and materials. The BRV is different from the current market value of the building. The default value of \$100 per square feet can be used without further documentation.



- b. The BRV can be documented with a letter from a construction or contracting firm or local building inspector, reputable construction estimation data (e.g., RSMeans) or a photocopy of pages from a standard cost reference manual. If tax records are used, the source must be an assessor.
  - c. For projects that protect many buildings, a spreadsheet can be developed and used as documentation if supporting documentation is provided for sample buildings to demonstrate how the values were determined.
7. Provide the number of residents within the mitigated project area. The BCA Tool will use this information to automatically estimate the avoided injuries, casualties and displacement costs.
- a. Estimate the number of residents based on residential properties determined to be protected by the project. Federal per diem rates used to calculate displacement in the BCA Tool can be adjusted based on location-specific values.
  - b. Data can be collected from current residents or estimated from local census data.

## STEP 10B: Additional Benefits for a Benefit-Cost Analysis

**Description:** There are several benefits that could be counted for a wildfire project. Any or all benefits can be used to demonstrate that a project is cost-effective or, in other words, has a BCR greater than 1.0. It is recommended that an initial BCA be run based on information about the structures and number of residents protected by the project. If the BCR is not greater than 1.0, data can be collected and additional benefits analyzed, as needed.

**Approach:** If possible, provide any or all the following information, with supporting documentation:

1. Estimate the value of infrastructure that would be protected by the proposed project.
2. Estimate the value of timber protected by the project that could be sold.
3. Estimate the value of fire suppression costs for one typical fire event within the proposed project area.
4. Environmental benefits refer to projects that provide ecosystem benefits that enhance or improve natural environmental or floodplain functions. Vegetation management projects: 1) enhance/restore/improve the natural environment, 2) are at least one contiguous acre and 3) do not involve chemical treatment.

**Potential Sources:** Values may be provided by local utility or fire protection agencies.

## STEP 10C: Cost-Effectiveness Analysis for Post-Wildfire Mitigation

**Description:** Wildfires can increase secondary hazards and leave areas prone to floods, erosion and mudflows for many years. To streamline the implementation of mitigation actions in wildfire-impacted area and reduce the risk from related hazards such as floods and landslides, FEMA has provided pre-calculated benefits for post-wildfire mitigation measures such as soil stabilization, flood diversion and reforestation. If the project cost is under \$5,250 per acre, the project is determined to be cost-effective, and no further BCA is required. These pre-calculated benefits are based on the risk reduction and ecosystem service benefits that are provided by forest and other vegetation, with primary emphasis on the reduced flood risk these systems provide.

**References:** Hazard Mitigation Grant Program Post Fire and Benefit-Cost Analysis Tools for Drought, Ecosystem Services, Post-Wildfire Mitigation for Hazard Mitigation Assistance

**Approach:** To use the post-wildfire pre-calculated benefits, the applicant would multiply the number of acres being mitigated by the total benefits per acres (\$5,250). Post-wildfire mitigation projects that demonstrate they are cost-effective using the pre-calculated benefits do not need to submit a separate BCR. If the pre-calculated benefits are not enough to cover the mitigation activity, the applicant would have to utilize the BCA Toolkit to perform the BCA.

**Example:** A project is to provide ground over, soil stabilization and replanting for 1,000 acres after the project area was impacted by wildfire. The project benefits can be estimated as \$5,250,000 (1,000 x \$5,250). By using the pre-calculated benefits, the application does not require any further BCR calculations to prove cost-effective.

## STEP 11: Environmental and Historic Preservation Considerations

**Description:** Environmental and, particularly, historical preservation compliance will be considered as part of the application review process for wildfire mitigation. The assistance of a licensed professional engineer, architect or contractor may be required to obtain the necessary information about EHP compliance. Refer to the EHP Supplement Job Aids.

## References

Below is a comprehensive list of resources identified throughout this supplement. Not all these resources are necessary for every wildfire mitigation project but are provided to ease identification of source material.

### PROGRAM AUTHORITIES

- [The Robert T. Stafford Disaster Relief and Emergency Assistance Act, As Amended, 42 U.S.C. 4001 et seq.](#)
- [44 Code of Federal Regulations, Part 206, Subpart N](#)
- [2 Code of Federal Regulations, Part 200](#)

### PROGRAM GUIDANCE

- FEMA Hazard Mitigation Assistance Guidance and Hazard Mitigation Assistance Guidance Addendum
- Benefit-Cost Analysis Reference Guide and Supplement to the Benefit-Cost Analysis Reference Guide

### TECHNICAL GUIDANCE AND STANDARDS

- The NFPA Firewise program provides resources for communities and property owners to use in the creation of defensible space and in making building modifications
- FEMA Bioengineering Wildfire Mitigation Job Aids
- FEMA Hazard Mitigation Grant Program Post Fire
- FEMA P-737: Homebuilders Guide to Construction in Wildfire Zones
- FEMA P-754: Wildfire Hazard Mitigation Handbook for Public Facilities
- International Wildland-Urban Interface Code (IWUIC) 2018, or most recent version

- Landfire Program
- NFPA 703: Standard for Fire-Retardant Treated Wood and Fire-Retardant Coatings for Building Materials
- NFPA 914; Code for Fire Protection of Historic Structures
- NFPA 1141: Standard for Fire Protection Infrastructure for Land Development in Suburban and Rural Areas
- NFPA 1144: Standard for Reducing Structure Ignition Hazards for Wildland Fire

## **California**

- CALFIRE – Ready for Wildfire
- California Wildfires Statewide Recovery Resources
- California Office of Emergency Services – Fire & Rescue
- Prevent Wildfire CA

## **Colorado**

- Colorado State Forest Service (CSFS) Wildfire Publications
- Colorado Wildfire Risk Assessment Portal
- Ready Colorado: Wildfire Preparedness Page

## **Montana**

- Montana Department of Natural Resources and Conservation: Fire Protection
- Let's Mitigate Montana

## **North Dakota**

- North Dakota Forest Service (NDFS): Wildfire Resources
- NDFS: Identifying Resources and Options to Mitigate the Risk of Wildland Fires in North Dakota

## **South Dakota**

- South Dakota Department of Agriculture: Wildland Fire Prevention Information

## **Utah**

- Utah Wildfire Info

## **Wyoming**

- Living with Wildfire in Wyoming – guide produced by the University of Wyoming

## **ADDITIONAL TOOLS AND RESOURCES**

- FEMA's How to Find Your FIRM and Make a FIRMette
- FEMA's Map Service Center

- FEMA Benefit-Cost Analysis (BCA) Tool
- Cost Estimating Principles for Hazard Mitigation Assistance Applications
- FEMA's National Flood Hazard Layer
- FEMA's Disaster Recovery Reform Act, Section 1205 Additional Wildfire and Wind Implementation under Hazard Mitigation Assistance Programs
- FEMA Wildfire Mitigation Toolkits and Resources
- FEMA Wildfire Mitigation Tools and Resources: I am a Homebuilder, Developer or HOA HMA
- Hazard Mitigation Assistance Application Development Scope of Work Examples
- Hazard Mitigation Assistance Application Development Engineering Case Studies
- EHP Review Supplements
- FEMA Hazard Mitigation Assistance Job Aids