



Regional Natural Hazard Mitigation Plan

2012 UPDATE - Approved by FEMA, July 30, 2012



Prepared by the:

Thomas Jefferson Planning District Commission

401 East Water Street • Charlottesville, VA 22902
(434) 979-7310 • info@tjpdcc.org
Virginia Relay Users Dial: 711



Regional Natural Hazard Mitigation Plan | Thomas Jefferson District 2012

Executive Summary	i
Introduction	13
Planning Process and Public Involvement	15
Method of Update	19
Monitoring and Maintenance	20
Community Profile	21
Hazard Identification and Analysis	35
Flood	37
Severe Winter Storms and Extreme Cold	45
Hurricanes	50
High Winds and Thunderstorms	56
Wildfire	60
Tornadoes	65
Drought and Extreme Heat.....	71
Landslides.....	74
Earthquake.....	79
Dam Failure	85
Karst.....	89
Other.....	91
Data Sources	94
Vulnerability Assessment.....	95
Population	96
Buildings	102
Land Use and Development Trends	102
Infrastructure.....	111
Critical Facilities.....	114
Estimating Potential Loss.....	121
Flood: Estimated Losses	121
Winter Storm: Estimated Losses	138
Hurricane: Estimated Losses	138
Tornadoes: Estimated Losses	142

Drought: Estimated Losses	142
Earthquake: Estimated Losses.....	143
Wildfire: Estimated Losses	147
Dam Failure: Estimated Losses	153
Capabilities Assessment	155
Mitigation Strategy	157
Goals and Objectives.....	157
Hazard-Specific Strategies	159
Mitigation Actions	164
Thomas Jefferson Region	172
Albemarle County	178
Town of Scottsville	184
City of Charlottesville	185
Fluvanna County	191
Town of Columbia	195
Greene County.....	197
Town of Stanardsville	204
Louisa County	205
Town of Louisa.....	211
Town of Mineral.....	212
Nelson County	213
Appendices.....	217
Appendix A: Hazard Mitigation Working Group Documentation	
Appendix B: Supplemental Information on Public Participation	
Appendix C: Changes from 2006 Regional Natural Hazard Mitigation Plan	
Appendix D: Resolutions of support from localities in the Thomas Jefferson Planning District	

Executive Summary

Background

The purpose of the Regional Natural Hazard Mitigation Plan is to prepare for natural disasters before they occur, thus reducing loss of life, property damage, and disruption of commerce. The Federal Emergency Management Agency (FEMA) requires such a plan as a condition for eligibility in certain mitigation grant programs. The plan applies to all jurisdictions in the Thomas Jefferson Planning District – Albemarle County, the City of Charlottesville, Greene County, Louisa County, Fluvanna County, Nelson County, and the Towns of Stanardsville, Louisa, Mineral, Scottsville, and Columbia. The original plan was adopted by all jurisdictions in 2006, and the plan has been updated in 2012.

Sections of Plan

The following sections are included in the plan:

1. Introduction – an overview of hazard mitigation generally and an outline of the plan
2. Planning Process – the process through which the plan was developed, including public input
3. Community Profile – general information about communities in the planning district
4. Hazard Identification and Analysis – general information about potential hazards in the planning district, the historic record of hazard events, and the probability of future events
5. Vulnerability Assessment – analysis of the human impact hazards could cause, with estimated potential losses for various hazard scenarios
6. Capabilities Assessment – a survey of current local capacity to mitigate natural hazards
7. Mitigation Strategy – goals, objectives, and action items selected to mitigate hazards identified in the region

Planning Process

The lead agency in the preparation of this plan is the Thomas Jefferson Planning District Commission. A Hazard Mitigation Working Group, consisting of representatives from the planning department and emergency management department or Administration from each locality, guided the preparation of this plan and will assume responsibility for monitoring the progress of implementation on an annual basis.

The following sources of stakeholder input were used:

- Regular meetings of the Hazard Mitigation Working Group
- Two public workshops
- An online survey and solicitation of public input from website
- Presentations to Local Emergency Planning Committees, Rural Technical Committee, Town of Columbia Task Force, and Town of Mineral Business Group
- Recommendations from existing plans and documents
- Informational presentations to elected bodies of all eleven localities in the region

- Posting document on website and 30-day public comment period for all draft plan elements

Hazard Identification and Analysis/Vulnerability Assessment

All hazards in the region are ranked by this plan according to overall relative threat, which combines the probability of occurrence with the potential impact of an event.

	PROBABILITY 2011	HUMAN IMPACT 2011	PROPERTY IMPACT 2011	BUSINESS IMPACT 2011	RISK 2011
	<i>Likelihood this will occur</i>	<i>Possibility of death or injury</i>	<i>Physical losses and damages</i>	<i>Interruption of services</i>	<i>Relative threat (increases with Percentage)</i>
EVENT	0 = N/A 1 = Low 2 = Low-Moderate 3 = Moderate 4 = Hi-Moderate 5 = High	0 = N/A 1 = Low 2 = Moderate 3 = High			0 - 100%
Flooding	5	3	3	2	89%
Winter Storms	5	2	2	2	67%
Hurricanes	3	2	2	2	40%
High Wind / Windstorms	3	2	2	1	33%
Wildfire	3	1	2	1	27%
Lightning	4	1	1	1	27%
Tornadoes	2	2	2	2	27%
Drought	3	0	2	2	27%
Extreme Heat	3	2	0	1	20%
Dam Failure	1	3	3	2	18%
Landslides	2	1	1	1	13%
Earthquake	2	1	1	1	13%
Extreme Cold	1	2	1	1	9%
AVERAGE SCORE	2.64	1.57	1.57	1.36	26%

Risk = Probability * Severity

Risk	Probability	Severity
.26	.53	.50

The Hazard Identification section includes a description of all natural hazards that affect the region and provides analysis on their location, extent, severity, and probability of occurrence. The impact of a hazard can be thought of as the intersection between natural events and human settlement. Therefore, the Vulnerability Assessment considers both hazard patterns and current and future development patterns in the region, in order to fully measure vulnerability of human life and property to natural disasters. Mapping software developed by FEMA is used to quantify financial losses of various events deemed probable by the most current scientific consensus. Special attention is paid to critical facilities and infrastructure essential to disaster response and the continuity of crucial community services after a disaster.

Most data on hazards are derived from federal and state government sources, and data on development and critical facilities are derived primarily from local government sources. Results are presented in a series of maps and charts.

Mitigation Strategy

The following goals and objectives, grouped into five broad categories, are recommended by the plan:

Education and Outreach

- **GOAL:** Increase awareness of hazards and how to prepare for them through education and training
 - **OBJECTIVE:** Educate families and individuals on household techniques for disaster preparedness
 - **OBJECTIVE:** Train key agency staff and volunteer groups in disaster mitigation and preparedness, with an emphasis on emergency respondents, building inspectors and code officials
 - **OBJECTIVE:** Encourage and equip employers to adopt emergency action plans for their workplace
 - **OBJECTIVE:** Maintain a consistent message across agencies and providers for hazard mitigation and disaster response activities using clear language

- **GOAL:** Encourage individual action to reduce the impacts of hazards
 - **OBJECTIVE:** Encourage water conservation
 - **OBJECTIVE:** Encourage property owners to design and maintain buildings and grounds to reduce risks of damage
 - **OBJECTIVE:** Protect sensitive areas through conservation easements
 - **OBJECTIVE:** Encourage residents to provide adequate access to property for emergency services

Infrastructure and Buildings

- **GOAL:** Reduce the short and long-term impact of hazard events on regional infrastructure
 - **OBJECTIVE:** Diversify the energy system to provide multiple power source and fuel supply options

- OBJECTIVE: Diversify the communications system to provide alternative lines for use during loss of capacity
- OBJECTIVE: Diversify the transportation system by increasing connectivity and providing modal options
- GOAL: Identify and implement physical projects that will directly reduce impacts to structures from hazards
 - OBJECTIVE: Elevate, retrofit and relocate existing structures and facilities in vulnerable locations
 - OBJECTIVE: Maintain and/or augment critical facilities and infrastructure necessary for emergency response during and after a hazard event

People and Vulnerable Populations

- GOAL: Prepare to meet the immediate needs of population during natural hazards
 - OBJECTIVE: Identify and record concentrations of vulnerable populations, especially in high-risk areas
 - OBJECTIVE: Train staff to effectively communicate with and transport vulnerable populations
 - OBJECTIVE: Install devices and signage to improve communication and warning systems, ensure operations of emergency shelters, and reduce response time in the event of a natural hazard
 - OBJECTIVE: Ensure that facilities and equipment are in place to transport, shelter and serve vulnerable populations

Mitigation Capacity

- GOAL: Incorporate mitigation concepts into existing and future policies and plans
 - OBJECTIVE: Reduce property risks through zoning, ordinances and building codes
 - OBJECTIVE: Increase storage capacity of streams and rivers and reduce flow rates of stormwater through mitigation policies and best management practices.
 - OBJECTIVE: Link community planning and mitigation planning together to achieve common goals
 - OBJECTIVE: Incorporate mitigation planning concepts into building codes
- GOAL: Pursue funding to implement identified mitigation strategies
 - OBJECTIVE: Identify appropriate funding sources
 - OBJECTIVE: Create or strengthen partnerships to develop integrated grant proposals and coordinated implementation plans
 - OBJECTIVE: Increase staffing to implement mitigation strategies

Information and Data Development

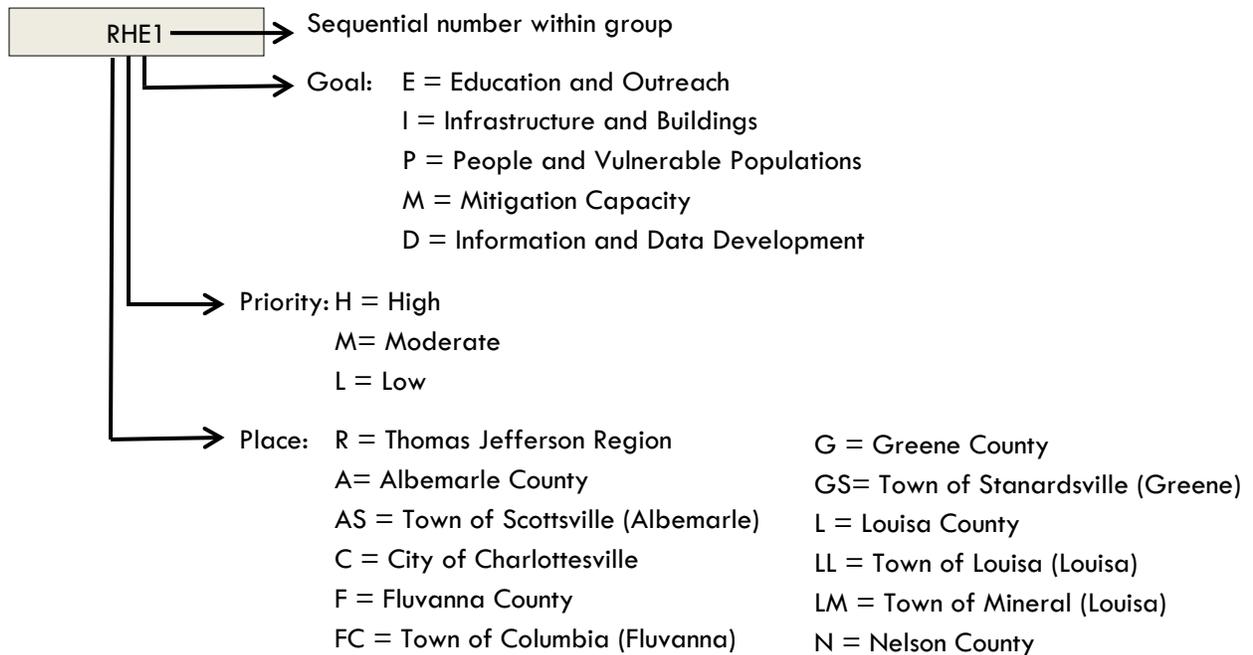
- GOAL: Build capacity with information and data development to refine hazard identification and assessment, mitigation targeting and funding identification
 - OBJECTIVE: Identify data and information needs and develop methods to meet these needs
 - OBJECTIVE: Ensure that critical facilities meet disaster preparedness requirements

Mitigation Action Items

A set of mitigation action items are designated for each locality to substantively further the objectives of the plan. The detailed list of action items includes the supporting goal, hazard to be mitigated, party responsible for implementation, timeframe of implementation, estimated cost, and potential funding sources. Furthermore, all action items are prioritized and listed in order from high, moderate, to low priority.

On the following page is an abridged list of action items for each jurisdiction and the Thomas Jefferson region:

*Activity Code Key



Activity Code Activity Description

Thomas Jefferson Region	
RHE1	Create a hazards library and information toolkit
RHE2	Provide a copy of the Regional Natural Hazard Mitigation Plan to each library in the Jefferson-Madison Regional Library system
RHI1	Adopt a cooperative agreement between localities to set a single code to alter traffic signals for use by emergency response vehicles from each jurisdiction
RHP1	Establish a registry of individuals with specialized needs, including their location, and their requirements for transportation assistance
RHP2	Ensure that emergency shelters meet accessibility requirements, have back-up power, and are capable of housing caretakers, medical equipment and service animals for the elderly and those with disabilities
RHD1	Update addresses in Repetitive Loss Properties database
RME1	Create a website and app that allows members of public to report potentially hazardous situations as they are observed
RME2	Conduct a public education program on disaster preparedness, leveraging existing materials and sharing resources regionally
RME3	Encourage all property owners of commercial, industrial, and multifamily housing facilities to have an Emergency Action Plan, including evacuation, sheltering, and communications protocol
RME4	Encourage all businesses and congregate housing facilities to have an Emergency Action Plan that is coordinated with plans for the facility
RME5	Encourage major businesses to adopt a Business Continuity Plan, especially businesses that provide critical services in the aftermath of a natural disaster
RMP1	Incorporate training on how to effectively communicate with people with disabilities during an emergency event into existing education for transit drivers, first responders and emergency management staff
RMD1	Identify locations for deposit of debris after a hazard
RLE1	Add emergency preparedness and response information into local phone books
RLE2	Establish a "Hazard Awareness Week" with local media to educate public about natural hazards
RLE3	Identify, engage and coordinate with amateur radio operators to prepare for communications during an event
RLP1	Coordinate with Neighborhood Associations to establish a point person within each neighborhood for communications and assisting vulnerable populations
RLP2	Coordinate with local churches to distribute necessary resources to households and assist in evacuation
RLM1	Plan for facilitating affordable housing in the aftermath of a disaster, in cases where the regional housing supply is temporarily reduced

Activity Code Activity Description

RLM2	Adopt a Regional Recovery Plan that provides a blueprint for the restoration of business operations and rebuilding of communities and infrastructure
RLD1	Identify potential locations for temporary housing for use after a hazard

Albemarle County

AHE1	Create educational campaign about the benefits of open space protection
AHE2	Provide educational information about the burn permit process
AHI1	Retrofit Observatory Hill Dining Facilities with generator quick connects to enable generator hook-up to support the provision of ongoing food service for state shelter and local needs
AHI2	Partner with utility companies to keep power lines free of vegetation
AHI3	Implement recommendations from the Community Water Supply Plan
AHI4	Conduct structural evaluations of all current and proposed shelters
AHP1	Add or modify paratransit routes to serve the new Martha Jefferson hospital site
AHM1	Incorporate hazard mitigation plan into community plans
AHM2	Increase number of trained emergency responders
AHD1	Assess resistance of existing critical facilities to natural hazards
AME1	Conduct FireWise workshops
AMI1	Build or repair bridges so as to not impede floodwaters
AMI2	Upgrade all area bridges to support emergency vehicles
AMP1	Ensure that all schools have regular disaster response drills
AMM1	Implement recommendations from Drought Management Plan
AMM2	Continue to pursue conservation easements in sensitive areas, including flood-prone areas.
AMD1	Expand GIS data for use in mitigation planning, preparedness planning, and response activities
ALE1	Encourage residents and agencies to clear storm drain inlets, ditches, and channels
ALI1	Encourage property owners to clear creek beds or dredge creeks to remove debris where flooding has increased
ALI2	Reduce pollution discharge via stormwater systems
ALI3	Install more dry hydrants in high wildfire risk areas
ALI4	Adopt a policy to create safe interior spaces in county-owned buildings for protection during tornados and high wind events
ALM1	Use recreational trails as fire breaks and access lines
ALM2	Maintain and add more fire rings in camping areas for controlled fires

Town of Scottsville

ASMM1	Ensure all houses have clear address signs that are visible during snowstorms
ASLM2	Incorporate hazard mitigation plan into community plans

Activity Code Activity Description

City of Charlottesville	
CHE1	Provide training for building inspectors and code officials on mitigation techniques and hazard-resistant building
CHI1	Implement recommendations from the Community Water Supply Plan
CHP1	Ensure that all schools have regular disaster response drills
CHM1	Incorporate hazard mitigation plan into community plans
CHM2	Conduct Community Emergency Response Team (CERT) classes to equip individuals and groups to assist in the event of a disaster
CHM3	Provide incentives to institutions and homeowners for use of low-flow appliances
CHM4	Continue and expand use of citizen alert systems
CHM5	Implement recommendations from Drought Management Plan
CHM6	Ensure that all shelters and public buildings have a battery-powered emergency radio and flashlight
CME1	Support purchase of rain barrels
CMI1	Build or repair bridges so as not to impede floodwaters
CMI2	Add signage to roads in locations that frequently flood
CMI3	Retrofit emergency service buildings for hazard resistance
CMM1	Support volunteer groups and encourage collaboration on public outreach and education programs on hazard mitigation
CMM2	Create a strategy for using existing media outlets for communications during a hazard event
CLE1	Provide citizens with literature about flood and drought-smart landscaping
CLE2	Create educational campaign about the benefits of open space and sensitive area protection
CLI1	Improve the maintenance of stormwater conveyance systems
CLI2	Reduce pollution discharge via stormwater systems
CLI3	Retrofit stormwater management basins
CLM1	Hire a floodplain management official and enforce floodplain regulations.

Fluvanna County	
FHI1	Conduct structural evaluations and study of resistance to hazards of all current and proposed shelters
FHI2	Implement recommendations from Water Supply Plan
FHI3	Implement recommendations from the Wireless Telecommunications Facility Master Plan to enhance emergency communications
FHI4	Retrofit emergency services building for hazard resistance
FHI5	Install backup generators in shelters and critical facilities
FHP1	Ensure that all schools have regular disaster response drills

Activity Code Activity Description

FHM1	Improve local capabilities to perform earthquake building safety evaluations and enforce building codes in high seismic hazard areas
FME1	Create a community toolbox with tools and information for local homeowners
FMM1	Ensure all houses have clear address signs that are visible during snowstorms
FMM2	Provide training for building inspectors and code officials on mitigation techniques and hazard-resistant building
FLE1	Develop an all-hazard resource center at libraries or other public office, including a copy of the Regional Natural Hazard Mitigation Plan
FLE2	Create an educational program to help residents understand the benefits and costs of earthquake insurance
FLI1	Retrofit existing public buildings to meet contemporary standards for earthquake resistance
FLI2	Equip owners of historic properties that may be more susceptible to earthquake damage with information about retrofitting structures to improve earthquake resistance
FLI3	Update building codes to improve earthquake resilience
FLM1	Require protective stormwater mitigation measures such as reducing impervious surfaces, stilling and infiltration basins, and restoring wetlands in growth areas

Town of Columbia	
FCHI1	Acquire existing structures within the floodplain and either demolish or relocate
FCHM1	Create a relocation plan for residents currently living within the floodplain to offer housing choices outside of a hazard area
FCMI1	Enhance emergency communications to provide reliable mobile coverage within the Town, per the adopted Fluvanna County telecommunications plan
FCMI2	Repurpose the properties within the floodplain to serve the Town of Columbia without imposing risks from future flooding
FCLI1	Expand cell phone coverage to provide reliable service to the whole Town
FCLI2	Maintain an evacuation route out of town with proper signage
FCLI1	Repair, replace or relocate septic and drainage fields that leak sewage into the river during flooding
FCLM1	Incorporate hazard mitigation plans into community plans

Greene County	
GHI1	Partner with utility companies to keep power lines free of vegetation
GHI2	Conduct structural evaluations of current and proposed shelters
GHI3	Install backup generators in shelters and critical facilities
GHP1	Ensure that all schools have regular disaster response drills
GHM1	Continue and expand use of citizen alert systems

Activity Code Activity Description

GHM2	Provide training for building inspectors and code officials on mitigation techniques and hazard-resistant building
GHM3	Ensure all critical facilities have updated shelter-in-place plans
GHM4	Update driveway codes to allow access for emergency vehicles
GHM5	Routinely inspect fire hydrants
GHM6	Update local stormwater ordinances to be in compliance with statewide regulations
GME1	Develop cooperative agreement between all agencies involved in emergency management, provide methods of communication between agencies responsible for being present at Emergency Communication Center following disaster, and conduct joint emergency exercises
GMM1	Incorporate hazard mitigation plan into community plans
GMM2	Conduct Community Emergency Response Team (CERT) classes to equip individuals and groups to assist in the event of a disaster
GMM3	Investigate safety and maintenance of roads in private communities
GMD1	Standardize GIS data for use in mitigation planning
GMD2	Conduct channel improvement study
GMD3	Create needs survey identifying special populations
GMD4	Ensure evacuation routes are upgraded to proper standards
GLE1	Develop all-hazard resource center
GLI1	Retrofit emergency services building for hazard resistance
GLI2	Build and repair bridges so as not to impede floodwaters
GLI3	Ensure culverts, streams, channels, storm drains, and gutters remain clear of debris
GLP1	Update Greene County Emergency Operations Plan
GLM1	Adopt more stringent policy to discourage floodplain development
GLM2	Provide paid fire and rescue staff
GLM3	Ensure all houses have clear address signs that are visible during snowstorms

Town of Stanardsville	
GSHM1	Increase water capacity and pressure for the Town of Stanardsville to enable optimal emergency response
GSMP1	Partner with Greene County to provide a mobile pet shelter for use during hazard events
GSMM1	Ensure all houses have clear address signs that are visible during snowstorms
GSLM1	Incorporate Hazard Mitigation Plan into community plans

Louisa County	
LHI1	Enhance access to broadband internet in rural areas
LHI2	Install backup generators in shelters and critical facilities
LHI3	Implement recommendations from Water Supply Plan

Activity Code Activity Description

LHI4	Ensure all shelters and public buildings have a battery-powered emergency radio & flashlight
LHP1	Ensure that all schools have regular disaster response drills
LHM1	Provide training for building inspectors and code officials on mitigation techniques and hazard-resistant building
LHM2	Continue and expand use of citizen alert systems countywide, including within Towns
LHM3	Increase number of trained emergency responders
LHM4	Improve local capabilities to perform earthquake building safety evaluations and enforce building codes in high seismic hazard areas
LMI1	Put high water marks on bridges
LMP1	Create a needs survey that identifies special need homes or facilities needing attention in case of emergencies or evacuations
LMM1	Investigate safety and maintenance of roads in private communities
LMM2	Conduct Community Emergency Response Team (CERT) classes to equip individuals and groups to assist in the event of a disaster
LMM3	Ensure all houses have clear address signs that are visible during snowstorms
LMM4	Incorporate hazard mitigation plans into community plans
LMM5	Incorporate special needs populations into Hazard Mitigation and Emergency Operations Plans
LLE1	Provide more education about the burn permit process
LLE2	Create an educational program to help residents understand the benefits and costs of earthquake insurance
LLI1	Equip owners of historic properties that may be more susceptible to earthquake damage with information about retrofitting structures to improve earthquake resistance
LLI2	Add signage to roads in locations that frequently flood
LLD1	Track and map space available for pets at local SPCA and other animal shelters

Town of Louisa	
LLHM1	Incorporate hazard mitigation plans into community plans
LLMM1	Ensure all houses have clear address signs that are visible during snowstorms
LLLI1	Bury utilities underground in town of Louisa

Town of Mineral	
LMHM1	Incorporate hazard mitigation plans into community plans
LMMM1	Ensure all houses have clear address signs that are visible during snowstorms
LMLI1	Bury utilities underground in town of Mineral

Nelson County	
NHI1	Install backup generators in shelters and critical facilities
NHM1	Continue and expand use of citizen alert systems
NHM2	Provide training for building inspectors and code officials on mitigation techniques and hazard-resistant building
NHM3	Conduct Community Emergency Response Team (CERT) classes to equip individuals and groups to assist in the event of a disaster
NME1	Conduct Firewise Workshops
NME2	Provide educational instruction and materials to school age youth and their teachers on proper procedures for responding to natural disasters
NMI1	Investigate safety and maintenance of roads in private communities
NMM1	Ensure all houses have clear address signs that are visible during snowstorms
NLE1	Ensure that all homeowners and businesses located in areas prone to landslides are aware of the risks and appropriate responses to an event
NLI2	Maintain and add more fire rings in camping areas for controlled fires