THE UNIVERSITY *of* NEW MEXICO

PRE-DISASTER MITIGATION PLAN

December 2010

Prepared By:

BSV, LLC
4109 Whistler Ave NW
Albuquerque, NM 87114

Prepared For:

University of New Mexico
Scholes Hall
1 University of New Mexico
Albuquerque, NM 87131-0001

(This page intentionally left blank)

ADOPTION BY THE UNIVERSITY OF NEW MEXICO (UNM)

Upon recommendation of the UNM Pre-Disaster Mitigation (PDM) Plan Advisory Committee and, pending subsequent approval by the New Mexico Department of Homeland Security and Emergency Management, and the Federal Emergency Management Agency, I accept this PDM Plan and its content on the behalf of the UNM Regents. Furthermore, it is my intent that this plan will become the functional guidance for UNM to mitigate the deleterious effects that accompany natural and other hazards as detailed herein.

FOR

David J Schmidly, PhD.
President of the University

12/3/10
Date

(This page intentionally left blank)

EXECUTIVE SUMMARY

During the late 1990's, in partnership with six major universities, the Federal Emergency Management Agency (FEMA) developed the Disaster Resistant University (DRU) Program. At that time, FEMA officials recognized the major role universities played in both the structure and stability of the local economy within which they operated, and postulated that the result of a hazard impact that forced one of these institutions to close would have a dramatic negative effect on the surrounding community. Universities are unique organizations that not only serve their communities and states, but also the local government which has invested significant economic and social capital in them.

Hazard Mitigation is defined as any sustained action taken to reduce or eliminate long-term risk to human life and property from hazards. Hazard Mitigation Planning is the process through which natural hazards that threaten communities are identified, likely impacts of those hazards are determined, mitigation goals are set, and appropriate strategies that would lessen the impacts are identified, prioritized, and implemented. Hazard Mitigation Planning is required for state and local governments to maintain their eligibility for PDM and Hazard Mitigation Grant Programs (HMGP). More importantly, this plan and planning process lays out the strategy that will enable the University of New Mexico (UNM) to become less vulnerable to future disaster losses.

The University has prepared this PDM pursuant to the requirements of the Disaster Mitigation Act of 2000, PL 106-390 390 and established regulations at 44 CFR Part 201.6 (hereafter referred to as DMA 2000). This plan documents the UNM PDM planning process, identifies natural hazards and associated risks of concern to UNM, and identifies UNM's hazard mitigation strategy to make UNM less vulnerable and more disaster resistant and sustainable. Information in the plan can also be used to help guide and coordinate mitigation activities, local policy decisions and the direction of future land use for the University.

This PDM plan has been developed for the UNM main campus (Albuquerque), the four branch campuses (Gallup, Los Alamos, Taos, and Valencia) and the Sevilleta Long Term Ecological Research (LTER) Facility located in Socorro, New Mexico, to identify the hazards that each faces and assess the vulnerability to the potential event. Hazards, whether they are technological or natural, affect campuses with varying frequency sometimes causing death and injury, other times imposing monetary losses and disruption of the University's mission as an educational institution. Losses can be measured in missed educational class time, faculty and student departures, decreases in research activity and funding, and increases in insurance premiums. Losses can be substantially reduced or eliminated through comprehensive pre-disaster planning and mitigation actions.

Top hazards with the potential to affect the UNM Main and Branch Campuses (in order based on assessment) include:

- Thunderstorms/including lightning and hail
- Winter Storms
- High Wind
- Extreme Heat
- Tornado
- Flooding
- Wildland/Urban Interface Fires

Other hazards profiled in this plan, but deemed to be low risk with low probability are not addressed by mitigation actions at this time include:

- Earthquakes
- Drought
- Land Subsidence
- Expansive Soils
- Landslides
- Volcano
- Dam Failure

The PDM Advisory Committee (PDMAC) identified goals, objectives and projects to mitigate the effects natural hazards would have on the UNM campus and branch campuses. Important mitigation projects included:

- Provide assistance to other jurisdictions to support their mitigation efforts in the community in mitigating the effects of natural hazards.

- Identify and Prioritize Potential Stormwater Drainage Projects

- Emergency Management Mitigation Measures in response to a natural hazard – Evaluate Evacuation and Shelter-in-Place Planning and Conduct Evacuation Training and Drills

- Reduce Vulnerabilities of Main and Branch Campus Buildings and Utilities from severe weather - Reduce Impacts to Buildings from Trees and Landscaping

- Reduce fuel loads and create perimeter fire protection around all University facilities that are located in rural areas across New Mexico.

- Develop a mechanism to track natural hazard damage to determine trends and assess enhanced development on future projects

- Install seismic gas shut-off valves on University buildings with natural gas and propane connections that are determined “most vulnerable”.

- Install a comprehensive communication system with secure access for natural disaster notification.
- Provide assistance to New Mexico Department of Homeland Security and Emergency Management (NMDHSEM) with updating and enhancing the HAZUS-MH database for New Mexico
- Fund a Disaster Recovery-Site development and Construction Plan to develop a Disaster Recovery Site for UNM
- Form a committee that addresses campus-wide hazards and facilities mitigation needs and prioritizes capital facility needs for submittal to the Capital Planning Committee and inclusion in the UNM Capital Projects Plan
- Continue to define, identify and track hazardous materials and their locations across UNM to mitigate potential secondary damages caused by natural hazards
- Create a public awareness/education program, which identifies educational resources and training opportunities campus wide. Provide multi-lingual, multicultural and multi-media crisis communication and education designed to reduce hazard risk in formats readily accessible and available to all members of the UNM community

This PDM Plan will be adopted by the President of UNM, at which time UNM will be eligible for PDM grant funding for eligible mitigation projects through the State of New Mexico and FEMA. The campus PDM Plan will be updated every five years. The plan review will identify new mitigation projects and evaluate mitigation projects and existing programs at the University of New Mexico.

(This page intentionally left blank)

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

FIGURES

TABLES

(This page intentionally left blank)

DISTRIBUTION LIST

State
Director Homeland Security and Emergency Management, Department of

Federal
Regional Administrator FEMA, Region VI, Denton, Texas
U.S. Army Corps of Engineers, District Office, Emergency Management

Tribe/Pueblo
Governor Isleta
Governor Laguna
President Navajo Nation
Governor Sandia
Governor San Felipe
Governor Santa Ana
Governor Santa Clara
Governor Santo Domingo
Governor Taos
Governor Zuni

County
Emergency Manager Bernalillo County
Emergency Manager Cibola County
Emergency Manager Grant County
Emergency Manager Los Alamos County
Emergency Manager Sandoval County
Emergency Manager Santa Fé County
Emergency Manager Socorro County
Emergency Manager Taos County
Emergency Manager Valencia County

City
Emergency Manager City of Albuquerque
Emergency Manager City of Gallup
Emergency Manager Village of Los Lunas
Emergency Manager City of Red River
Emergency Manager City of Rio Rancho

Other Organizations
College of the Southwest
New Mexico Institute of Mining and Technology
New Mexico Association of Counties
New Mexico State Forestry
New Mexico Radioactive Waste Consultation Task Force
Clovis Community College
College of Santa Fé
New Mexico State University
New Mexico Military Institute
New Mexico Emergency Management Association
New Mexico Floodplain Managers Association
Native American Section NMEMA
Natural Resources Conservation Service
Community Representatives
Southwestern Indian Polytechnic Institute (SIPI)
Albuquerque/Bernalillo County Local Emergency Planning Committee (LEPC)
Albuquerque Citizen Corps Council

University of New Mexico
Office of the President
UNM Regents
UNM Police
Emergency Manager UNM
Emergency Preparedness Manager UNMH
Office of the Vice President of Research & Economic Development
UNM Safety and Risk Services
Planning and Campus Development
Physical Plant Department
University Communications
Student Services
Student Representative
Property Accounting
Human Services
Health Sciences Services
Information Technology Services
Industrial Security
University Libraries
Accessibility Resource Center
Athletics Department
Anderson School of Management
Academic Departments
School of Engineering
Institutional Support Services
Science and Technology Park
Gallup Branch Campus
Los Alamos Branch Campus
Taos Branch Campus
Valencia Branch Campus
Sevilleta LTER Field Station

(This page intentionally left blank)

INTRODUCTION

In the last decade, disasters have affected university and college campuses in the United States with high frequency, sometimes causing death and injury, but always imposing monetary losses and disruption of the institution's teaching, research, and public service missions. Depending on the degree of severity, natural disasters can result in loss of educational time for students and economic hardship for the university and community. Damage to campus buildings and infrastructure, as well as interruption of the institutional mission result in significant losses measured by faculty and student departures, decreases in research funding, and increases in insurance premiums. The effects from natural, human caused, and technological hazards directly impact the safety and well-being of university faculty, staff and students. While most hazards cannot be eliminated, the effects and losses can be substantially reduced through comprehensive pre-disaster planning and mitigation actions. This PDM plan has been developed for the UNM main campus (Albuquerque), the four branch campuses (Gallup, Los Alamos, Taos, and Valencia), and the Sevilleta Long Term Ecological Research (LTER) Field Station located in Socorro, New Mexico, to identify the hazards that each faces and assess the vulnerability to the potential event.

The leadership of UNM knows that mitigation actions in the form of projects and programs can become long-term, cost effective means for reducing the effects of natural hazards.

The goals of mitigation are to save lives and reduce injuries, property damage, and recovery times. Mitigation can reduce the enormous cost of disasters to UNM; in addition, mitigation can protect critical facilities, reduce exposure to liability, and minimize university and community disruption. Preparedness, response, and recovery measures support the concept of mitigation and may directly support identified mitigation actions.

The UNM PDM Plan identified those hazards that can affect the university and branches and devised mitigation strategies to reduce or eliminate the effects of those hazards. The UNM plan provides guidance to departments and branch locations by identifying potential natural hazards and prioritizing mitigation goals and objectives, proposing solutions to certain mitigation problems, and identifying possible funding sources for mitigation projects.

The UNM Plan was prepared in compliance with Section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act), 42 U.S. C. 5165, enacted under Sec. 104 the Disaster Mitigation Act of 2000, (DMA 2000) Public Law 106-390 of October 30th, 2000. This plan identifies hazard mitigation measures intended to eliminate or reduce the effects of future disasters throughout the State. DMA 2000 requires rigorous local and state mitigation planning as a condition of receiving grant funding for disaster recovery and mitigation.

The Hazard Identification/Risk Analysis portion of the UNM Pre-Disaster Mitigation Plan was prepared by B-Sting Ventures LLC, (BSV), of Albuquerque, NM for the 2009 plan. This work was partially funded by FEMA.

This plan does not necessarily represent the views, policies, and procedures of FEMA, although all attempts have been made to comply with common mitigation policies, procedures, and methods employed throughout the country.

The University of New Mexico will continue to comply with all applicable federal laws and statutes during the periods for which it receives grant funding, in compliance with 44 CFR 13.11(c), and will amend this plan whenever necessary to reflect changes in state or federal laws and statutes as required in 44 CFR 13.11(d).

It is important to note that this document is designed as an instrument of mitigation primarily for natural disasters. Although some human involvement is implied with many of the hazards profiled herein, this document is not intended to address the prevention or mitigation of the possible impacts of terrorist activity, hazardous materials, transportation accidents or any other human-caused hazard. During development of this plan data deficiencies where determined to exist and in the next 5 years, UNM will gather data to support occurrences and enhanced mitigation strategies and actions.

ACKNOWLEDGEMENTS

The University of New Mexico gratefully acknowledges the following offices, departments, and agencies, for their contributions, input and participation. Without their participation, completion of the University of New Mexico Pre-Disaster Mitigation Plan would have been impossible.

City of Albuquerque Office of Emergency Management
Bernalillo County Office of Emergency Management
Federal Emergency Management Administration Region VI
National Weather Service, Albuquerque Office
Native American Section NMEMA
Natural Resources Conservation Service
New Mexico Department of Indian Affairs
New Mexico Department of Homeland Security and Emergency Management
New Mexico Bureau of Geology and Mineral Resources
New Mexico Department of Transportation
New Mexico Emergency Management Association
New Mexico Energy, Minerals and Natural Resources Department
New Mexico Floodplain Managers Association
New Mexico Institute of Mining and Technology
New Mexico Military Institute
New Mexico Museum of Natural History and Science
New Mexico National Guard
New Mexico State Forestry
New Mexico State University
Office of the Medical Investigator
Office of the State Engineer
Tierra Geoscience
US Army Corps of Engineers
US Department of the Interior Bureau of Indian Affairs
Albuquerque Citizen Corps
Albuquerque Community Emergency Response Team
Silver Hill Neighborhood Association

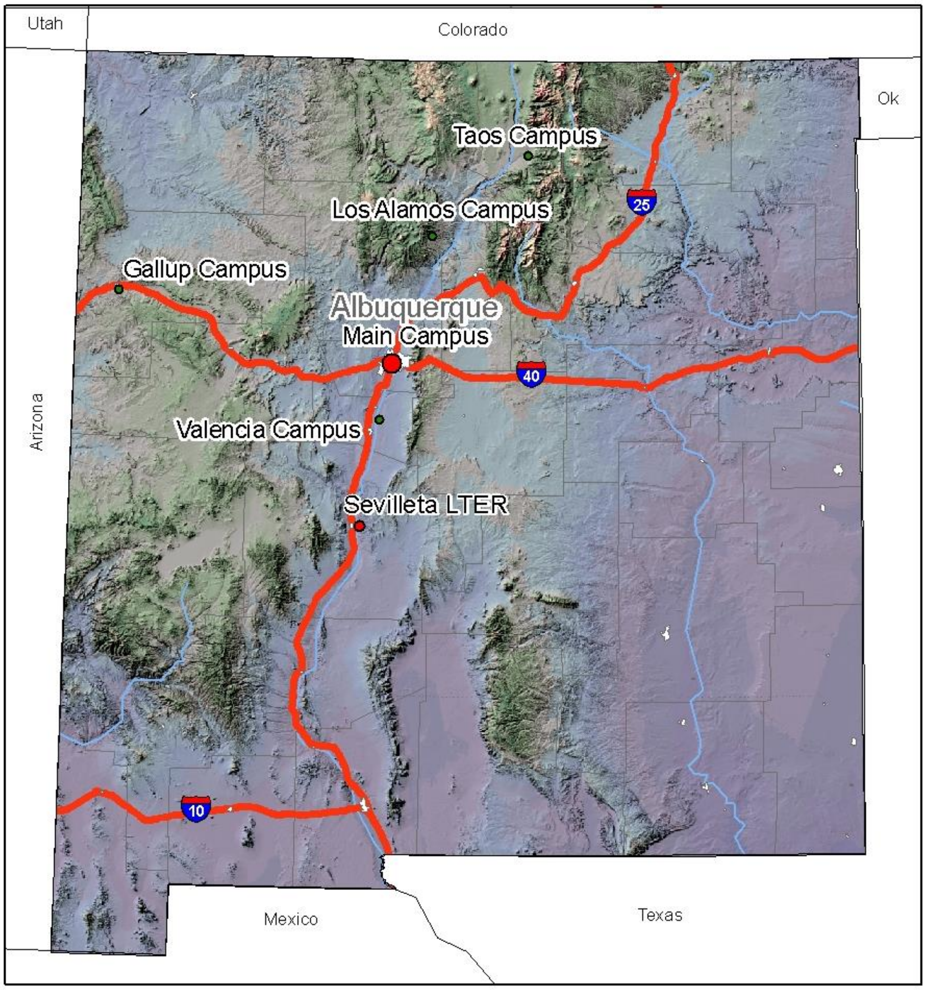
(This page intentionally left blank)

CHAPTER 1 - UNIVERSITY OF NEW MEXICO PROFILE

UNM Campus

The University of New Mexico (UNM) is a public university in Albuquerque, New Mexico. Founded in 1889, UNM offers multiple bachelor, master, doctoral, and professional degree programs in all areas of the arts and humanities, sciences, and engineering. The Albuquerque campus currently spreads over 600 acres (2.4 km²) and consists of the Main Campus, North Campus, Lands West, the South Campus and Athletics Complex. Located outside the Albuquerque area, UNM has four branch campuses in Gallup, Los Alamos, Taos, and Valencia and the Sevilleta LTER Field Station located in Socorro, New Mexico as shown in Figure 1.

Figure 1: Locations of UNM Campus and Branches in New Mexico



UNM Main Campus

The Main Campus for UNM is located in Albuquerque (Figure 2). With a grant from the Territory of New Mexico in 1889 the University started with 20 acres of land, which was in the southwest corner of the current day Main Campus. Today Main Campus' boundaries are University Blvd. on the west, Central Avenue on the South, Girard Blvd. on the East and Lomas Blvd. on the North, containing approximately 600 Acres (Figure 3). UNM Campus in Albuquerque consists of the Main, North and South Campus (Figure 3-5).

The UNM campus is noted for its unique Pueblo Revival architectural style, introduced when the university's third president, William G. Tight, plastered over the Victorian-style Hodgin Hall to create a monument to Pueblo Indian culture. Vilified for his primitivism, Tight soon found himself removed from office. History would eventually vindicate him, however, as his vision found new life under the regime of university architect John Gaw Meem. Meem, a famed Santa Fe architect, designed many university buildings in the pueblo style, including Zimmerman Library and Scholes Hall, and is credited with imbuing the campus with its distinctive Southwestern feel.

In recent years, UNM has undergone a comprehensive overhaul of many of its main campus buildings, including a $5.8 million renovation of the historic Communication and Journalism building. In addition to its remodeling efforts, UNM has added several new buildings to the campus such as the $42 million Centennial Engineering Center and a 108,000-square-foot Architecture and Planning building.

<u>UNM North Campus</u>
The North Campus (Figure 4) is located north of Lomas Avenue and is home for the nationally recognized Health Sciences Center (HSC) and University Hospital. UNM HSC is the largest academic health complex in the state and has four mission areas - education, research, patient care and community outreach. University Hospital is the only Level-1 trauma hospital in the State of New Mexico. Additionally, the Law School and North Campus Golf Course are located in this area. Lands West is home to the KNME-TV studios, UNMH Ambulatory Care, and many other UNM projects and programs.

<u>UNM South Campus</u>
The South campus (Figure 5) is centered around the intersection of University Boulevard and Avenida César Chavez and is home to the Science and Technology Park, Student Support and Services Center, UNM Student Family Housing and most of UNM's athletic facilities. The Athletics Complex – Section A*, includes* The PIT, Lobo Football Stadium, Tennis Courts, Baseball, Softball, and Soccer Fields. Additionally, the City of Albuquerque's AAA Baseball Team, the Isotopes, is also located in the Athletics Complex. The Science and Technology Park – Section B, is comprised of 163 acres, 41 of which were developed during Phase I. Phase II has begun with the development of an additional 42 acres. Future phases will encompass approximately 80 acres. Family Student Housing is dedicated to those students with families and consists of 200 apartment units on 12 acres.

The University of New Mexico is led by a President, who is responsible for UNM campuses in Gallup, Los Alamos, Taos, and Valencia, as well as at the UNM Health Sciences Center, which includes the nationally renowned UNM Cancer Center. The

UNM Board of Regents, composed of seven members who are appointed by the Governor of New Mexico, with the consent of the New Mexico State Senate, have fiduciary responsibility for the assets and programs of the University. The Regents establish goals and policies to guide the University and have oversight of the functioning of the University. The Board vests responsibility for the operation and management of the University in the President of the University

Figure 2: UNM Main Campus Location in Relation to City of Albuquerque, NM

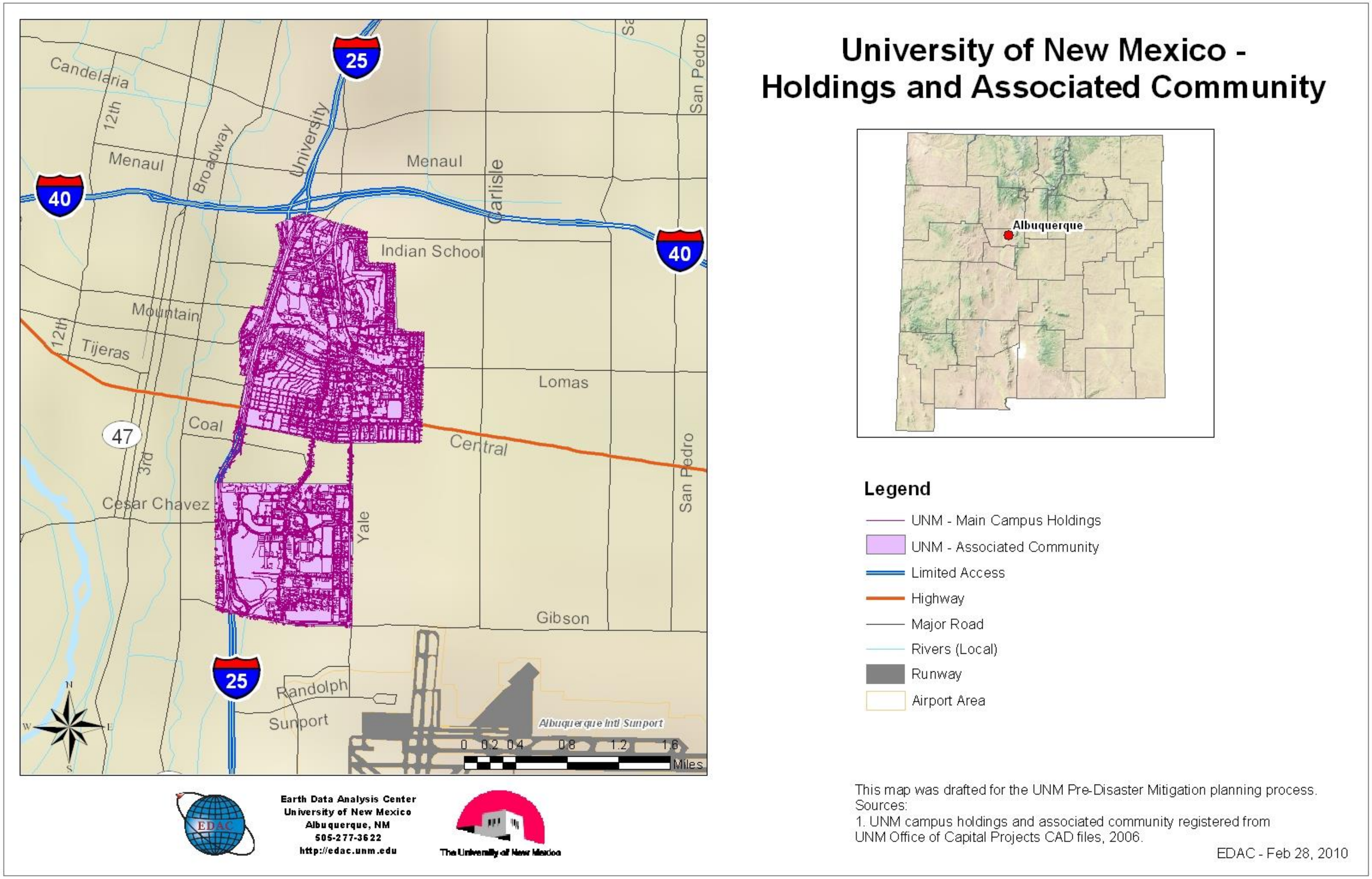


Figure 3: UNM Main Campus Construction Dates

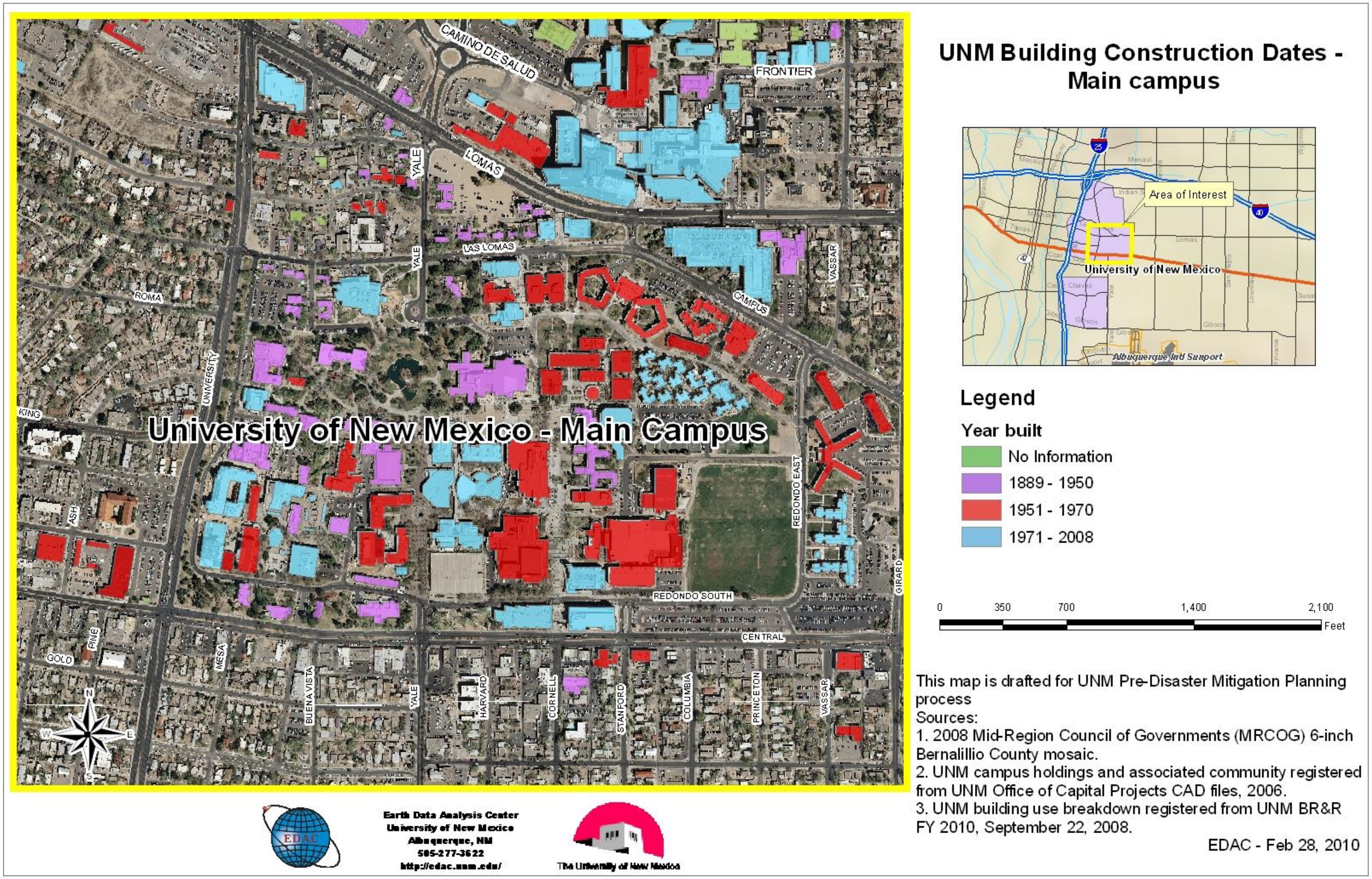


Figure 4: UNM Construction Dates - North Campus

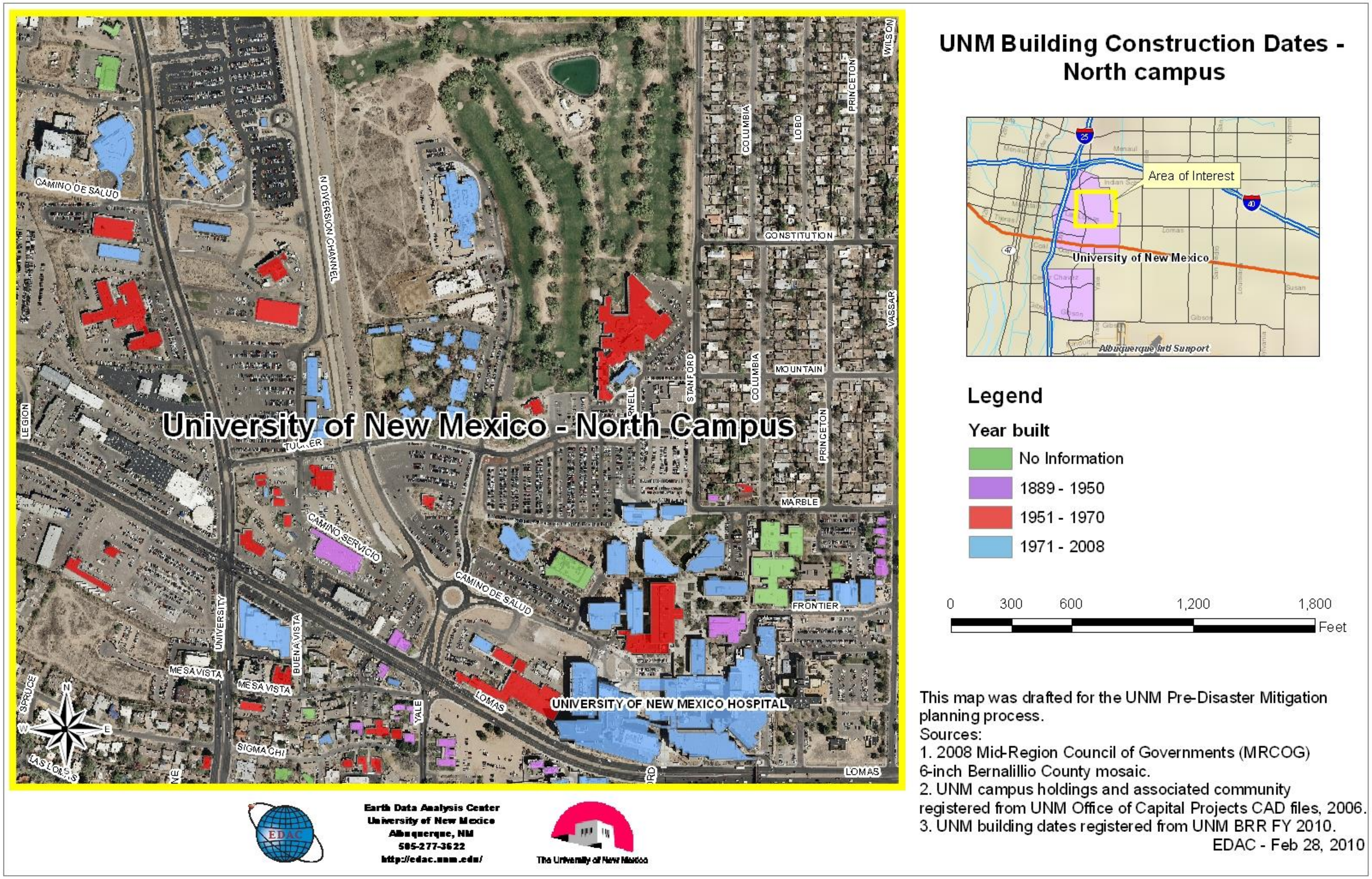
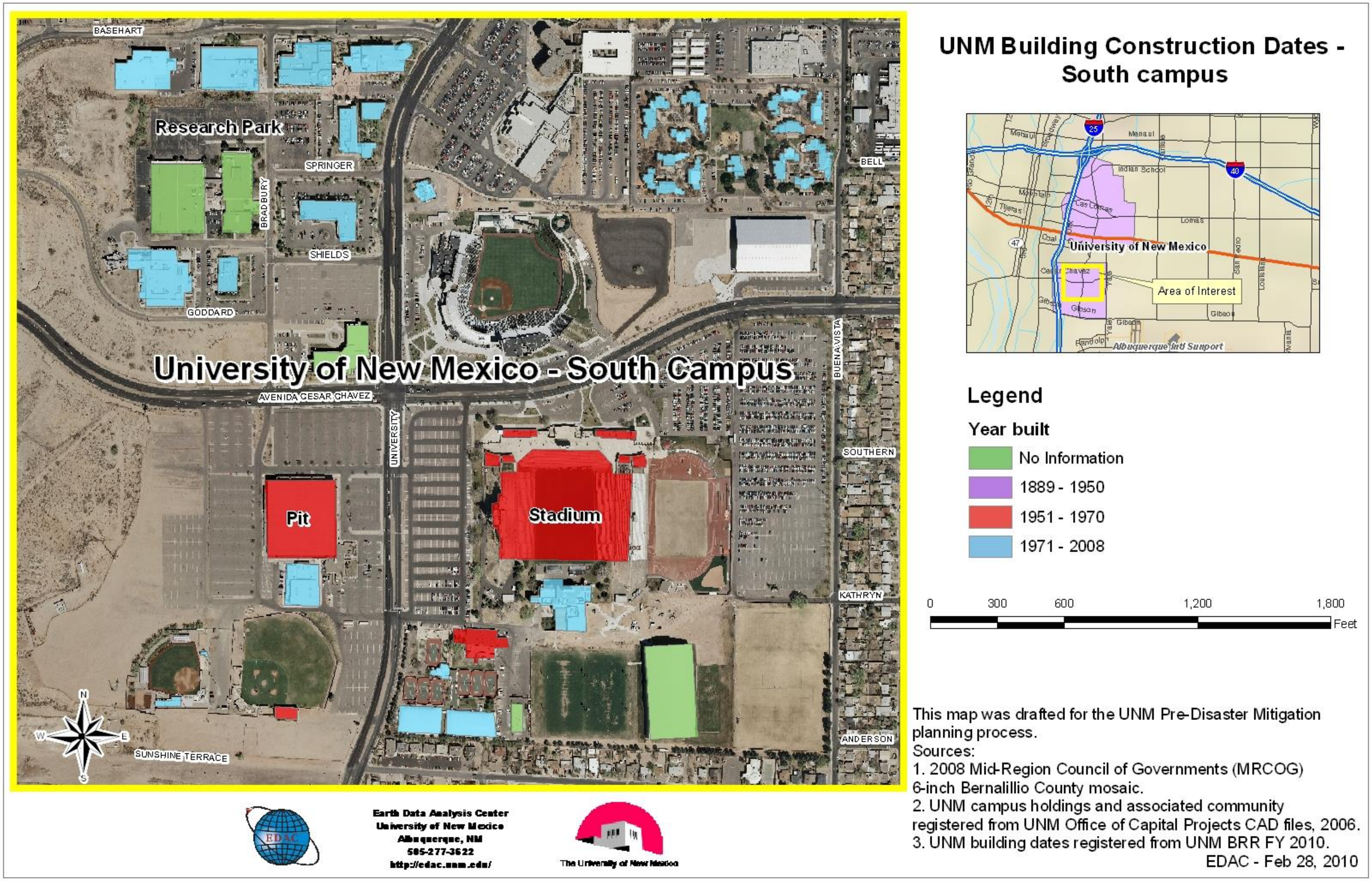


Figure 5: UNM Construction Dates - South Campus



UNM Branch Campuses

The University has established 2-year branch colleges to serve the citizens of New Mexico more fully and to provide the highest quality of education for students pursuing post-secondary education at different locations throughout the state. Branch colleges respond specifically to the unique needs and multicultural backgrounds of their respective communities by offering community education programs, career education, including certificate and associate degree programs, and transfer programs that prepare students for upper division entry into 4-year colleges and universities. Branch colleges utilize many resources in their service districts and therefore function as integral parts of their surrounding communities. They are thoroughly committed to assisting in the economic development of their service areas. In addition, they serve the needs of their respective communities in the manner of a comprehensive community college, offering a variety of academic, career, and community service programs. The University has branch campuses in Gallup, Los Alamos, Taos and Valencia. UNM offers graduate and upper division programs in Los Alamos and Santa Fe and throughout the state.

UNM – Gallup Branch Campus (Figure 6)

The Gallup Branch Campus spreads over 64 acres (.26 km^2) in New Mexico's High Desert Country to include learning sites at Ramah, Navajo and Smith Lake. Founded in 1968, it serves approximately 75,000 residents of the region, which includes the City of Gallup and McKinley County, and is the largest of the four UNM branch campuses. The adobe-style facilities sit amongst some of the most beautiful red rock country in the Southwest. The Gallup population, approximately 21,000, because of easy accessibility to the reservations, may balloon to 100,000 and more on holidays and festival occasions. UNM Gallup is home to over 3,000 students. Located near the Navajo, Zuni and Hopi Reservations, this campus has the largest Native American student body of any public college in the world, and receives close to $7,000,000 annually in tribal, federal and state grants as well as private, civic, and corporate grants and scholarships.

UNM – Los Alamos (UNM-LA) Branch Campus (Figure 7)

The Los Alamos Branch Campus spreads over 184 acres (.75 km^2) UNM began its presence in Los Alamos in 1956 with the establishment of the UNM–Los Alamos Center for Graduate Studies, which has been in continuous operation since that time. It has a distinguished history of offering graduate degrees in science, engineering, management, and health-related fields. The first UNM undergraduate offerings in Los Alamos began with the establishment of the UNM Residence Center there in the fall of 1970. In 1973, the UNM Northern Branch College came into existence with Los Alamos as one of its campuses. In 1977, as a result of Legislative action, the UNM Northern Branch College was absorbed into Northern New Mexico Community College (NNMCC). In 1980, the Los Alamos Branch Campus of the University of New Mexico was founded. It began operations on July 1st, 1980, in the Little Valley School on Orange Street.

In October 1980, the Branch campus moved from the Little Valley School to its present site, 4000 University Drive. In January 1981, the staff of UNM–LA assumed, under a contractual arrangement, the daily operations of the UNM–Los Alamos Center for Graduate Studies from the Training Office of the Los Alamos National Laboratory, and the Office of the Director of the Graduate Center was moved to UNM–LA. During 1982-83, the UNM–LA facilities were remodeled and expanded. In 1989, Mesa Gymnasium was acquired from the Los Alamos Schools and was remodeled to provide additional classrooms. This new, sixth building was opened in spring 1990. The Learning Resource Center, an addition to the existing facility, was completed in early 1996. It houses the Library, Tutorial Center and the Adult Basic Education Program. The remodeled Student Services Center was completed and opened in the summer of 2000. UNM Los Alamos also has two apartment buildings that are located off campus. The graduate and upper divisions programs offered in Los Alamos are part of the UNM's Extended University, the institution's distance education program. In cooperation with Los Alamos National Laboratory and the Albuquerque and branch campuses of UNM, The mission of the center is the delivery of instruction in traditional face-to-face teaching, as well as through a variety of technologies, including televised programming via satellite, video conferencing or the Internet.

UNM – Taos Branch Campus (Figure 8)

The Taos Branch Campus spreads over 45 acres (.18 km^2) UNM-Taos is a two-year higher education college located in north central New Mexico. It is the newest institution of higher education in Northern New Mexico. UNM-Taos became an affiliate of UNM in 1993, and is a Hispanic Serving Institution. The service area includes the 30,000 residents of Taos County living in the outlying villages within a 2,203 square mile service area, as well as the residents of two Native American Pueblos (Taos and Picuris). UNM-Taos has experienced remarkable growth and currently provides instructional opportunities to over 1,300 students.

UNM – Valencia Branch Campus (Figure 9)

The Valencia Branch Campus spreads over 150 acres (.61 km^2) of rural land overlooking the Rio Grande Valley to the west, the Manzano Mountains to the east, and historic Tome Hill to the north UNM-Valencia Campus is located in Tome, New Mexico, halfway between Belen and Los Lunas, the two main population centers of Valencia County. The campus includes nine buildings designed in a modern, southwestern style. UNM-Valencia received a prestigious award from the New Mexico Society of Architecture for its outstanding landscaping.

UNM – Sevilleta Long Term Ecological Research (LTER) Field Station (Figure 10)

The Sevilleta LTER Field station is approximately 220,000 acres (890.7 km^2) in size, consisting of two mountain ranges and the Rio Grande valley in between. The Sevilleta LTER is bounded on the east by the Los Pinos Mountains ("Mountains of the Pines") and on the west by the Sierra Ladrones ("Thieves Mountains," in reference to 17^{th}, 18^{th} and 19^{th} century bandit groups that would use these rugged mountains as hideouts).

The Sevilleta LTER Field Station is operated by the University of New Mexico's Department of Biology, in collaboration with the U.S. Fish and Wildlife Service's Sevilleta National Wildlife Refuge. The Sevilleta LTER Field Station is located near the Headquarters of the U.S. Fish and Wildlife Service on the Sevilleta National Wildlife Refuge (NWR), Socorro, NM. The Sevilleta NWR is approximately 60 miles south of Albuquerque and is dissected by Interstate 25.

The Sevilleta LTER Field Station supports research and educational programs in biology, ecology, geology, and anthropology. The field station also serves as a meeting facility for conferences, workshops, retreats and class field trips. Public access to the field station is permitted for scheduled activities; however, all field activities on the Sevilleta NWR (research projects or educational field trips) are required to have special use permits from the U.S. Fish and Wildlife Service.

The Sevilleta NWR was established in 1974 through a gift from the Campbell Family Foundation and The Nature Conservancy to the U.S. Fish and Wildlife Service. The Sevilleta NWR lies at the junction of several major biomes of the American Southwest; it is at the northern edge of the Chihuahuan Desert, the western edge of the Great Plains Short-grass Prairie, and the southeastern edge of the Colorado Plateau Shrub-Steppe. Along the Rio Grande are found gallery forests ("bosque") of cottonwood, Russian olive, and salt cedar. Above the riparian corridor are the grasslands/shrublands/deserts, while higher in the mountains are found the juniper savannas and piñon-juniper woodlands. Nearby mountain ranges (the Magdalena Mountains to the southwest, and the Manzano Mountains to the northeast) climb to nearly 10,800 feet elevation, and support old growth forests of ponderosa pine, limber pine, Douglas fir, Engleman spruce, and quaking aspen.

Sevilleta provides logistical support for the many field research and educational activities being conducted in the Middle Rio Grande Valley. The station's research facilities include general laboratories, specimen processing and storage facilities, reference collections of plant and animal specimens, a computer center, a library, and a large conference room/classroom for group meetings. In addition, the station has a shop and equipment storage facility, a fleet of four-wheel drive field vehicles, cargo trailers, and a 4 x 4 ATV. The Field Station can provide housing for up to 48 people for periods ranging from a single night to multiple months. The station has a total of 10 completely furnished residence buildings. Each residence is a 3-bedroom house, with two single beds in each room (total capacity of six persons/house).

Figure 6: UNM Gallup Branch Campus

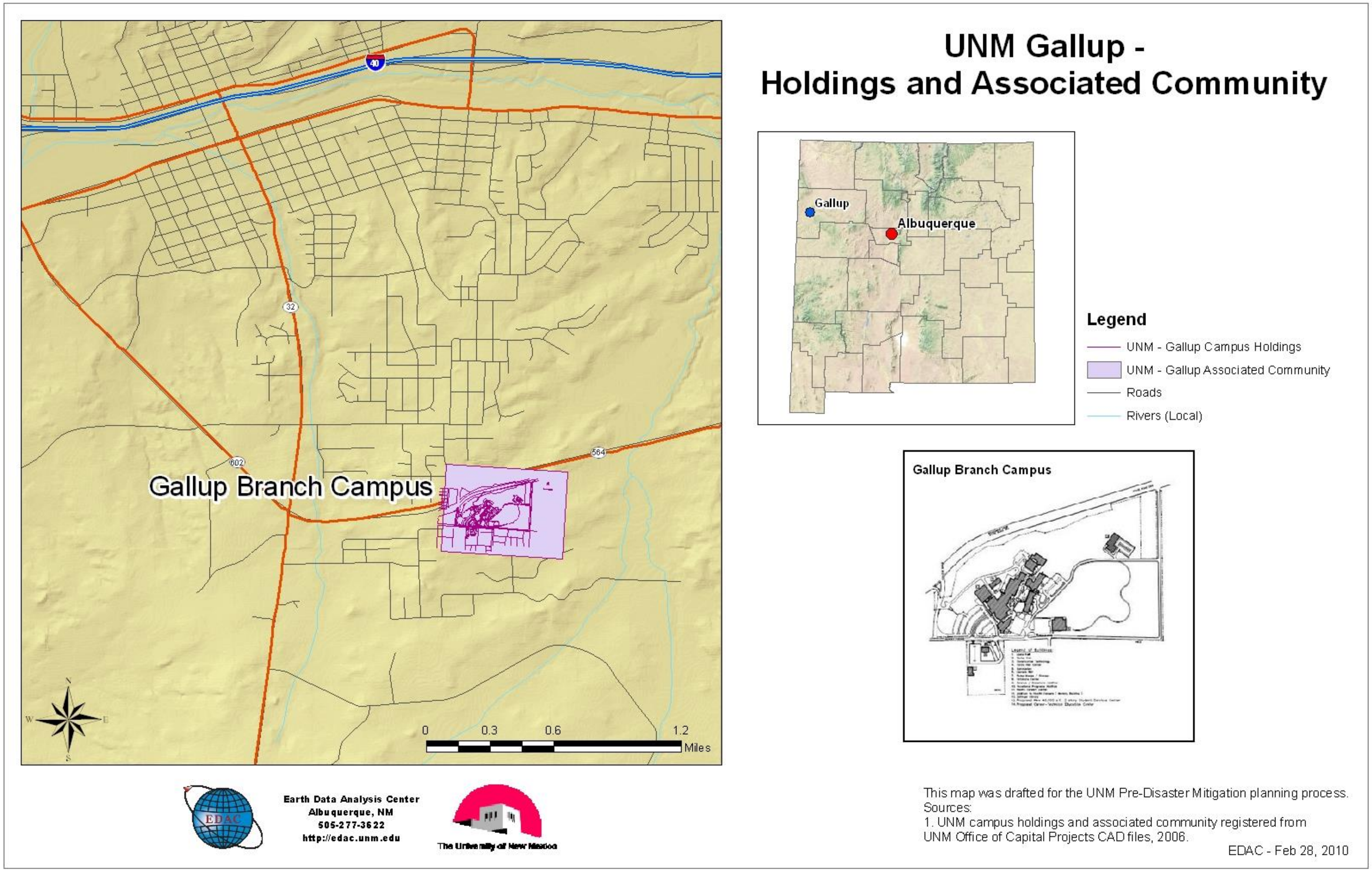


Figure 7: UNM Los Alamos Branch Campus

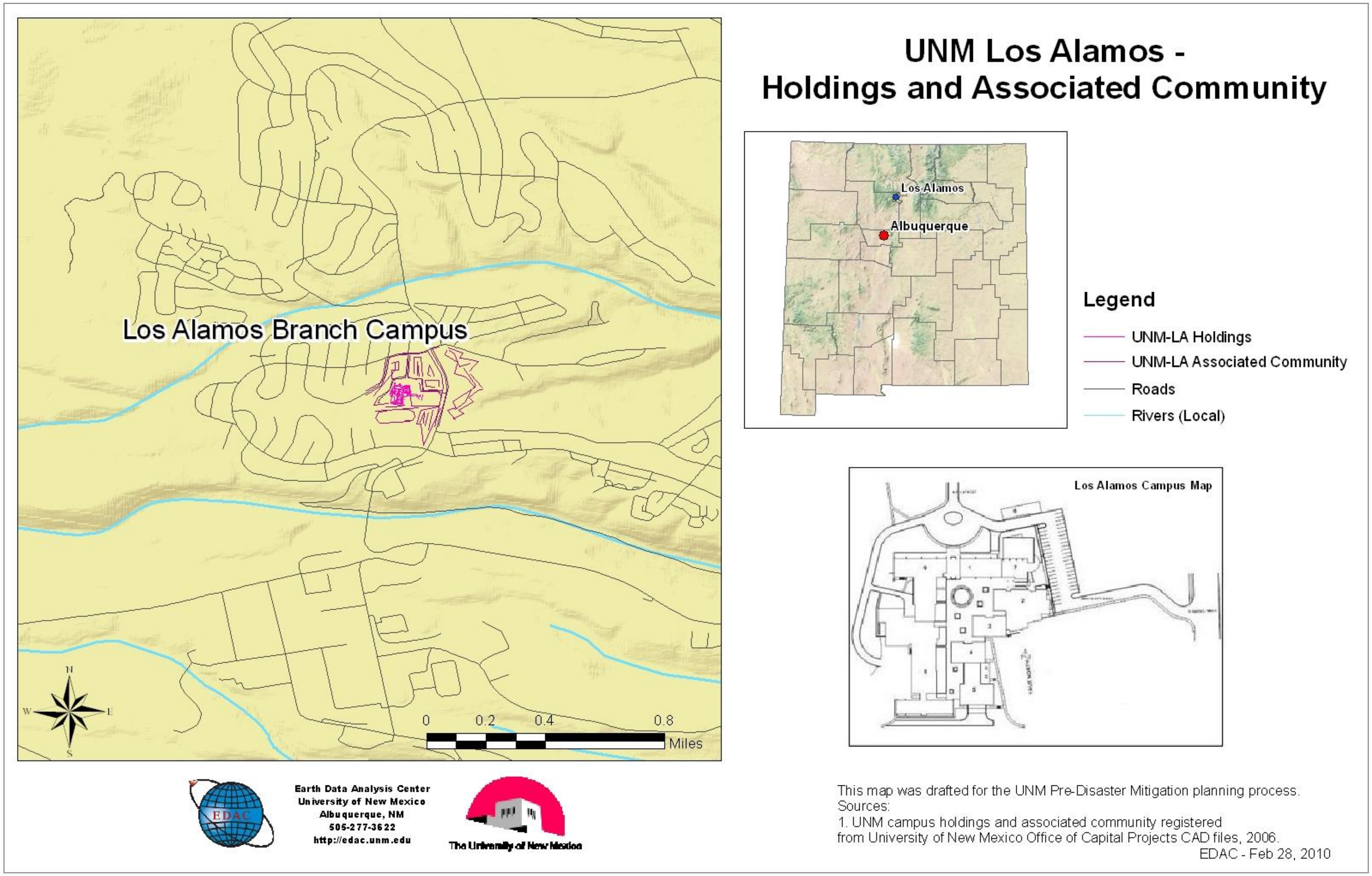


Figure 8: UNM Taos Branch Campus

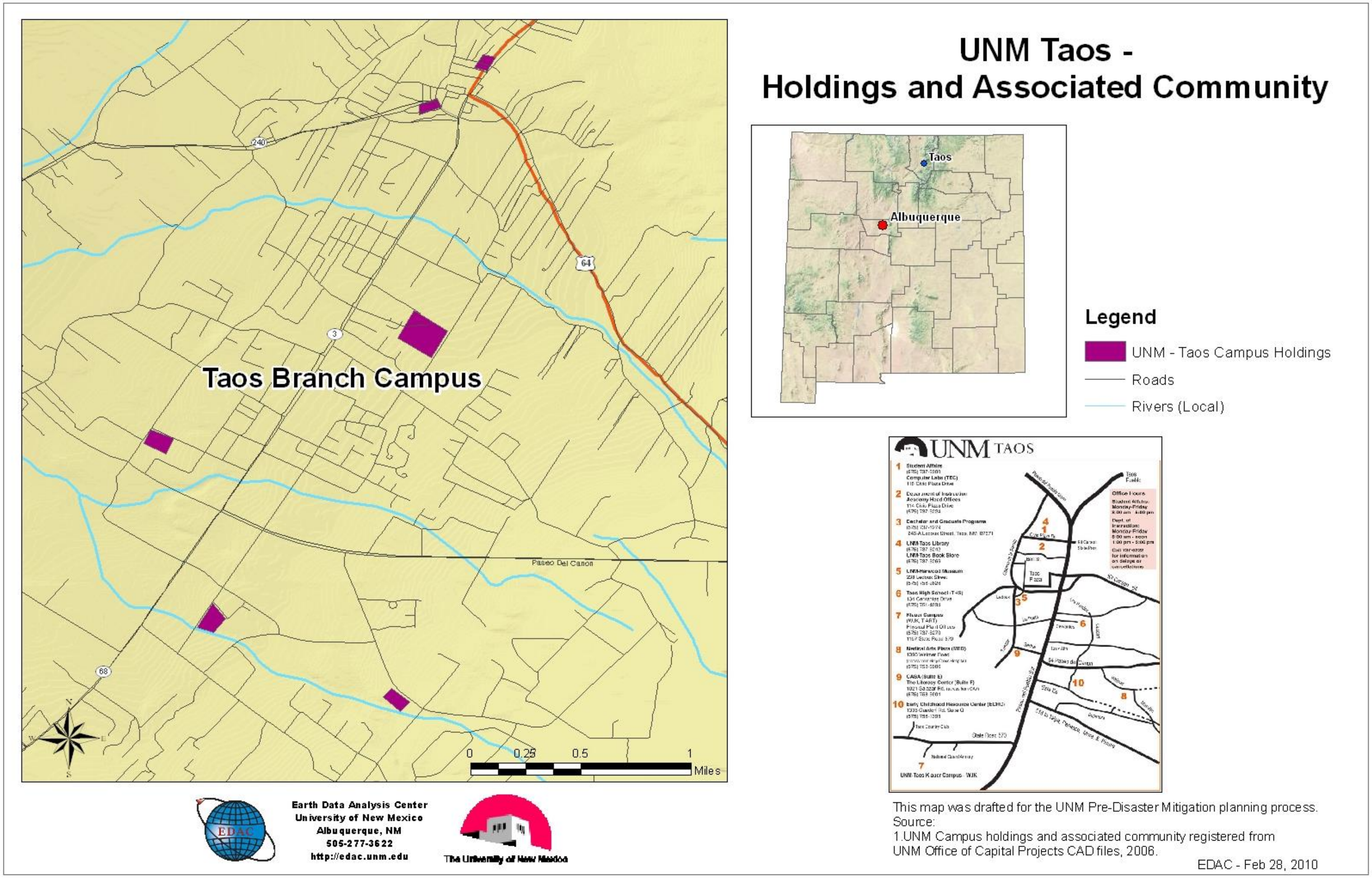


Figure 9: UNM Valencia County Branch Campus

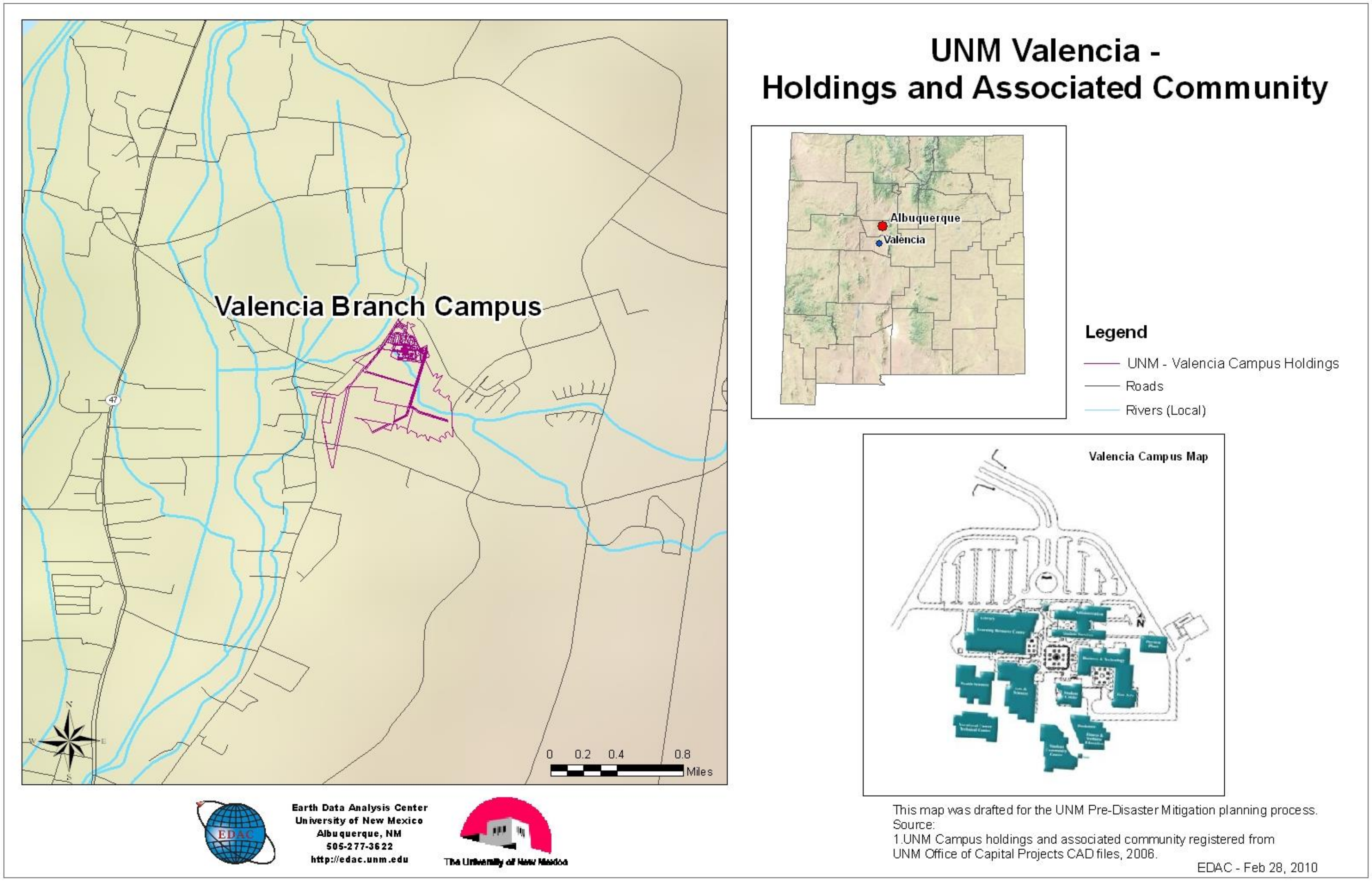
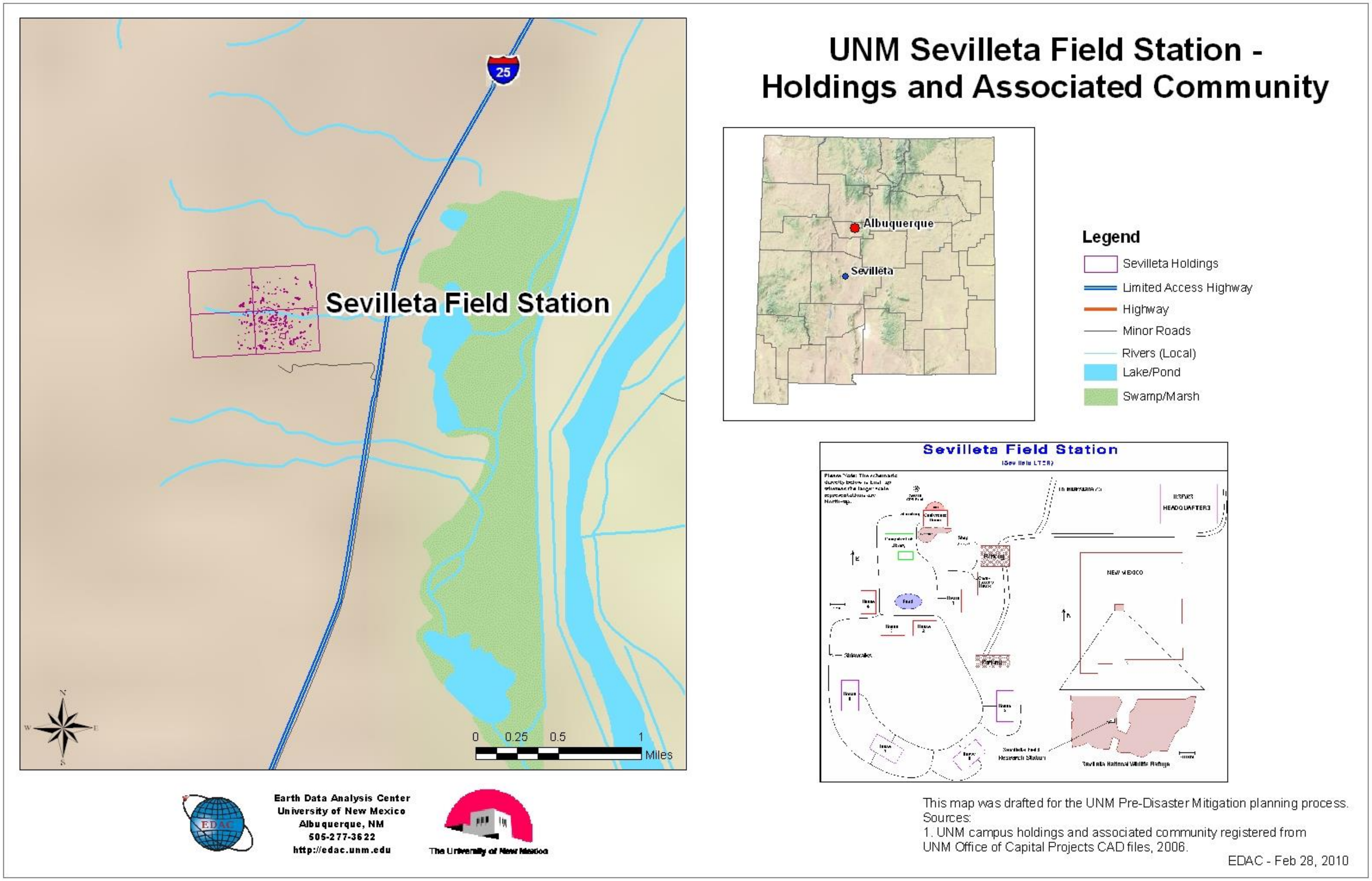


Figure 10: UNM Sevilleta Long Term Ecological Research (LTER) Field Station



Main and Branch Campus Population

UNM represents a cross-section of cultures and backgrounds. In spring of 2009, 24,449 students attended the main campus (Table 1) with another 6,950 students at branch campuses and education centers (Table 2).

Table 1: UNM Main Campus Population

UNM Main Campus Headcount by Enrollment Status

Enrollment Status	2005	2006	2007	2008	2009	1 yr. Chg.	5 yr. Chg.
Returning	21,921	21,766	21,471	21,395	21,609	1.00%	-1.42%
Readmit	1,606	1,720	1,509	1,414	1,463	3.47%	-8.90%
New Beg. Fresh.	64	67	58	92	86	-6.52%	34.38%
New Beg. Other	73	49	36	35	14	-60.00%	-80.82%
Ugrad Transfers							
from NM	382	406	358	380	428	12.63%	12.04%
from outside NM	229	210	170	183	187	2.19%	-18.34%
New NonDegree	361	296	314	293	278	-5.12%	-22.99%
New Graduate	392	340	260	297	380	27.95%	-3.06%
New First Prof.	3	2	1	3	4	33.33%	33.33%
Total Headcount	25,031	24,856	24,177	24,092	24,449	1.48%	-2.33%

Table 2: Branch Campus Population

BRANCHES
HEADCOUNT BY ENROLLMENT STATUS

	Spring Semesters						
BRANCH	**2005**	**2006**	**2007**	**2008**	**2009**	**1 yr. Chg.**	**5 yr. Chg.**
Gallup Branch							
New Freshmen	187	174	108	169	155	-8.28%	-17.11%
Concurrent	415	366	351	467	376	-19.49%	-9.40%
Transfer	142	127	100	96	76	-20.83%	-46.48%
Returning	1,729	1,703	1,655	1,620	1,676	3.46%	-3.07%
Readmit	463	467	436	405	343	-15.31%	-25.92%
Total Headcount	2,936	2,837	2,650	2,757	2,626	-4.75%	-10.56%
Los Alamos Branch							
New Freshmen	43	38	22	28	19	-32.14%	-55.81%
Concurrent	34	35	59	38	198	421.05%	482.35%
Transfer	71	61	55	56	52	-7.14%	-26.76%
Returning	565	498	465	369	366	-0.81%	-35.22%
Readmit	215	203	153	106	127	19.81%	-40.93%
Total Headcount	928	835	754	597	762	27.64%	-17.89%
Taos Branch							
New Freshmen	102	75	67	101	83	-17.82%	-18.63%
Concurrent	177	247	169	205	290	41.46%	63.84%
Transfer	82	77	86	105	106	0.95%	29.27%
Returning	615	592	675	616	684	11.04%	11.22%
Readmit	237	266	234	228	291	27.63%	22.78%
Total Headcount	1,213	1,257	1,231	1,255	1,454	15.86%	19.87%
Valencia Branch							
New Freshmen	114	130	118	131	127	-3.05%	11.40%
Concurrent	140	138	86	435	491	12.87%	250.71%
Transfer	73	68	72	69	72	4.35%	-1.37%
Returning	1,165	1,082	1,123	1,201	1,211	0.83%	3.95%
Readmit	163	242	238	213	207	-2.82%	26.99%
Total Headcount	1,655	1,660	1,637	2,049	2,108	2.88%	27.37%

(Data provided by official enrollment report spring 2009, office of the registrar Enrollments statistics as of the census date February 6th, 2009 http://www.unm.edu/~unmreg/state.html)

UNM employs more than 22,000 people statewide, including the employees of University Hospital. It has more than 120,000 alumni, with Lobos in every state and 92 foreign countries. Over half of all alumni choose to remain in New Mexico.

Populations on the main campus and all branches are dynamic. Most students are on the campus between the hours of 8:00 a.m. and 5:00 p.m. Daytime populations are spread out among all buildings. Night classes are held between 5:00 p.m. and 10:00 p.m. and have lower attendance than day classes. Faculty and staff are dispersed in various buildings around campus and generally have offices within their own departments. Senior administration staff (The President of UNM, the Regents, and Provost, as well as many other top administrative positions) are located in Scholes Hall. Many other administrative staff are scattered across the campus to include branch campuses.

Visitors come to tour the main and branch campuses, visit students, and attend various cultural, academic, and athletic activities. Athletic events such as football and basketball games often have a high attendance of students and visitors. On average, the Main University Campus population can swell to well over 150K plus during large sporting events, including current university daily population. Athletic and special events on campus are covered in detail in the Athletics section.

The majority (86%) of UNM's population resides off campus in non-university housing.
Student Housing facilities are located on UNM's main and south campuses. Housing facilities consist of 37 free-standing buildings which encompass nearly one million square feet of building space. On-campus living options vary and students and guests can choose to stay in traditional halls, suites, or apartment style buildings. Lodging and dining facilities include nine residence halls and one dining facility. The total building replacement costs for all Student Housing facilities combined is estimated to be $87M.

Student Housing provides lodging, community center and food service facilities to approximately 2,400 UNM student residents during each academic year. In addition, an estimated 200 administrators, staff, and students work in Student Housing and in the dining facilities year round. The La Posada dining facility occupancy varies in size, but peaks at traditional meal times. During the academic year, La Posada averages 380 for breakfast, 750 for lunch, and 850 residents for dinner. Peak occupancy period for both lodging and food service occurs during the academic school year. In the summer months, housing and dining facilities remain open to accommodate a smaller amount of conference guests and summer school residents.

Academic Programs

UNM is the state's flagship research institution and its research activities inject hundreds of millions of dollars into New Mexico's economy, funds new advancements in healthcare, and augment teaching – giving students' valuable hands-on training in state-of-the-art laboratories. Offering more than 210 degree and certificate programs, UNM has 94 bachelor's degrees, 74 master's degrees and 40 doctoral programs.

The Health Sciences Center is the state's largest integrated health care treatment, research and education organization. Through the Evening and Weekend Degree Program, nearly 40 degree programs are available with approximately 1,000 classes offered each semester after 4 p.m. or on weekends. About 12,000 non-traditional, working students attend UNM at night each semester. Among the University's outstanding research units are the High Performance Computing Center, Cancer Center, Center for High Technology Materials, Design Planning Assistance Center, Environmental Law and Policy, and the Center for Non-Invasive Diagnosis.

Athletics

UNM South Athletics Complex consists of six major athletic facilities, administration offices, practice fields and parking for students and athletic events. The athletic facilities include University Stadium, University Arena (“The Pit”), baseball and softball fields, two tennis bubbles and Lobo Tennis Club, soccer/track stadium and an indoor practice facility.

The Pit was voted 13th of the world’s top-20 sports venues of the 20th century by Sports Illustrated, June 7th, 1999. The Pit is home to UNM's men's and women’s basketball programs, as well as host to regional and NCAA championships. It is the largest arena in the State of New Mexico with a capacity of 18,018 and hosts an average of 40 men's and women’s basketball games each year. In the past 43 years, it has also hosted various events ranging from state basketball tournaments, World Wrestling Entertainment, Gathering of Nations ("Pow Wow") and UNM and high school graduations. The University of New Mexico ticket office also is housed in The Pit. All ticket sales, including online service, operate from the southeast section of the building. The mid-ramp section of The Pit houses the second major phone/internet room. This room acts as a go-between for University Stadium and the Rudy Davalos Basketball Center.

University Stadium is home to the Lobo Athletics' football program. It includes the press box and the L.F. "Tow" Diehm training complex. The press box stands approximately 70 feet above street level, with five levels of seating, sky suites, press area and coaches’ boxes. The building also houses one of two telecommunication hubs on the South Campus. Much of the internet and phone lines for South Campus run through the press level of this facility.

One of the University's student shuttle services is located in the Tailgate II parking lot, east of University Stadium. The shuttle service takes students from South Campus to Main Campus on a Monday-through-Friday schedule. It operates from 7:00 a.m. to 10:00 p.m. It is estimated that 70% of UNM's students park on South Campus, with approximately 1.7 million pickups/drop-offs yearly.

Both University Stadium and The Pit began extensive renovation projects in the first quarter of 2009.

Media

UNM owns and operates KUNM-FM, one of two National Public Radio stations in Albuquerque. In 2008, KUNM-FM won 16 Associated Press awards, including Station of the Year. KUNM provided critical communications during the Cerro Grande Wildfire (May 2000 near Los Alamos National laboratory) and in the weeks and months following the events September 11th, 2001. KUNM has a staff of 200 people, including students and volunteers, about 25% of conversationally fluent in Spanish. KUNM-FM has Nine hours of bilingual programming and nine hours of Native American programming are broadcast every week. Navajo and Tewa speakers also are on the staff. KUNM has a broadcast radius of more than 60 miles from Sandia Crest (the highest transmission point in all of public radio). One can hear KUNM for more than 100 miles as you head west on I-40 towards Gallup. UNM operates a network of five radio stations and three low-power translator stations to serve communities across central and northern New Mexico.

With Albuquerque Public Schools, UNM also operates KNME-TV, Albuquerque's public television station. In 2008, KNME-TV celebrated its 50 year anniversary. It currently broadcasts in High Definition Digital on two channels, and in English and Spanish.

KNME's network operations center, located at 1130 University Blvd NE in Albuquerque, includes the main studio and studio microwave buildings, built in 1970, and an annexed office building, acquired in about 1988. These combined facilities provide 28,000 square feet of office and studio space, to house its staff of 65 full-time employees (FTEs) and equipment necessary to provide services. The estimated cost to rebuild (excluding cost of land) is approximately $14M, with an additional $13.4M to replace equipment and furnishings.

KNME broadcasts on 5 channels--KNME 5.1, KNME 5.2 (Spanish), KNMD 9.1, KNMD 9.2, and Talnet (Teaching and Learning Channel on Comcast Cable), reaching an estimated 1.7 million viewers. KNME's annual budget of $10M is derived from donors and underwriters, grants from the Corporation for Public Broadcasting, in-kind support from the University of New Mexico, and appropriated funds from the State.

Transmission of KNME and KNMD signals requires mountaintop analog and digital transmitters, which are housed at Sandia Crest in the American Tower Building, to reach viewers in many areas in northern and central New Mexico, KNME operates and maintains 32 translators. The Sandia Crest site also houses transmitters for two FM Radio Stations (KUNM and KANW).

The Daily Lobo is UNM's student-run daily newspaper and is an award-winning publication serving the metro area. UNM also owns and operates the UNM Press, its publishing arm established in 1929.

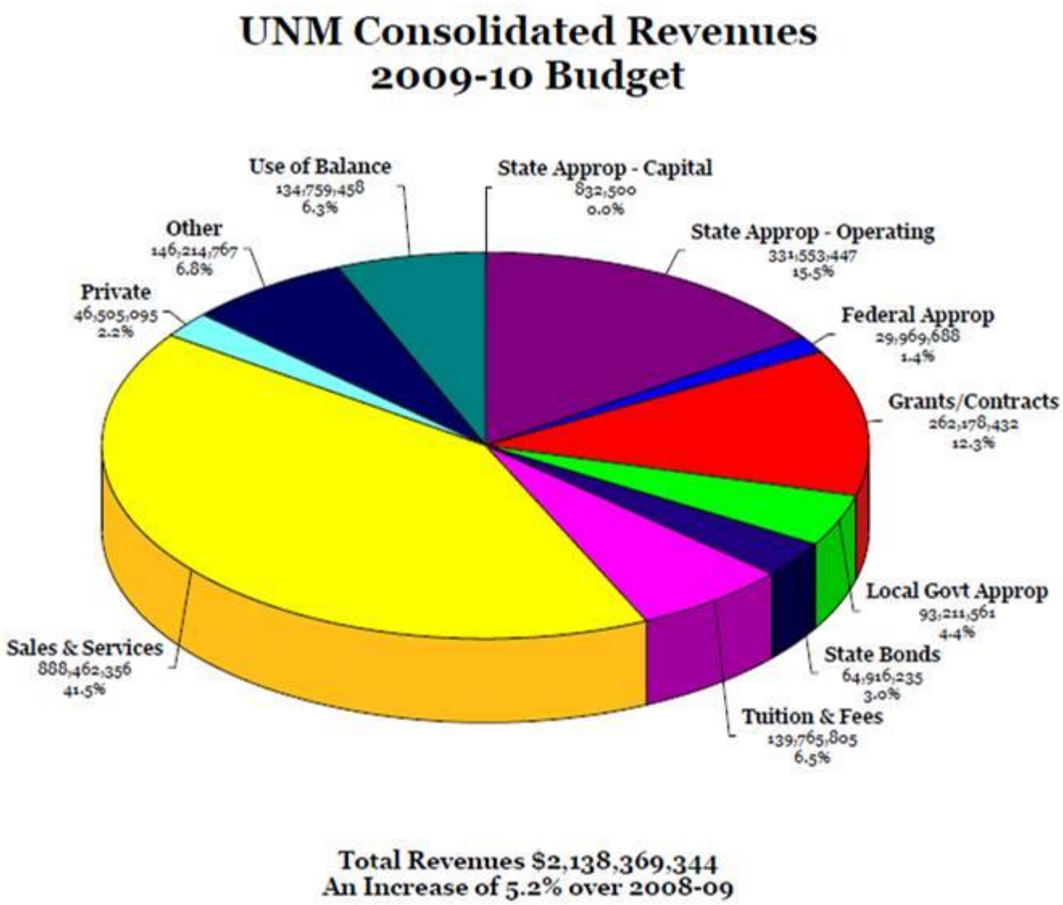
Campus Economy

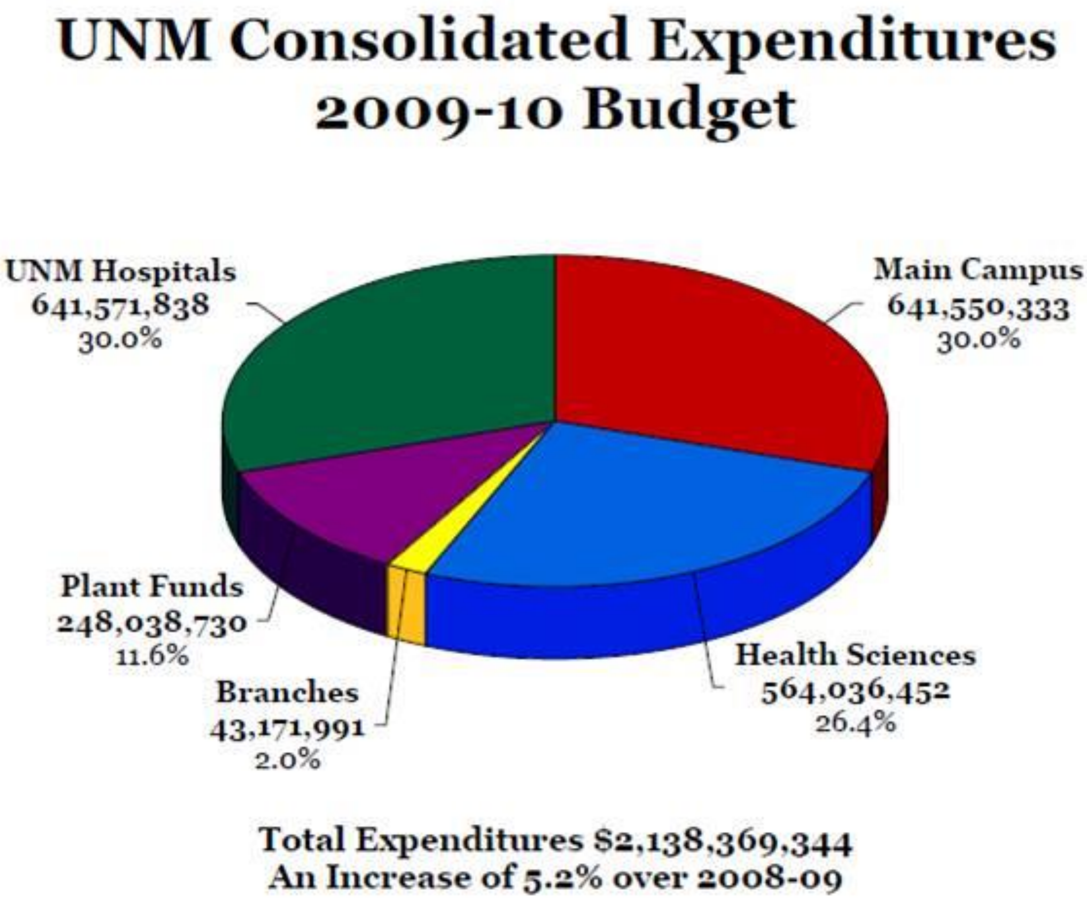
UNM is a major contributor to New Mexico's economy and has a significant impact resulting from its ability to attract hundreds of millions in out-of-state funds. For fiscal year 2007-2008, UNM received $85.5M in private support. Budgeted consolidated revenue for 2009-2010 is $2.1B. In fiscal year 2007-2008, UNM faculty and staff generated more than $303M in contracts and grants. Also, UNM doctors and nurses provided more than $370M in patient care services and $152.6M in uncompensated patient care.

As the state's flagship institution of higher learning, UNM serves more than 32,000 students on its five campuses. With nearly 50% of the state's undergraduates and over 80% of its graduate and professional students, UNM produces most of New Mexico's lawyers, doctors, nurses, teachers, engineers, business executives and other community leaders.

UNM's 2009 operating budget, released in April 2009, includes Operating Budgets for the Main Campus, Health Sciences Center and University Hospital, and the Gallup, Valencia, Los Alamos, and Taos Branch Campuses. This provides the planned revenues and expenditure levels for the various programs and activities of the University (Figure 11). The Board of Regents is required to determine budget category limits prior to approval of the budget plan by the Higher Education Department and the State of New Mexico Budget Division.

Figure 11: UNM Revenues and Expenditures





(Source: UNM Operating and Capital Budget Plans 2009-2010 – UNM Campuses)

UNM Utilities and Infrastructure

The Physical Plant Department (PPD) is responsible for the care and upkeep of the physical campus environment. This includes the indoor and outdoor environment of the north, main and south campuses. Additionally, the department maintains the University's district energy system providing electricity, steam, chilled water for cooling, compressed air, and domestic water through its own distribution systems while maintaining over 300 buildings and 350 acres of grounds.

Electricity is distributed underground from two electrical substations, while other utilities are primarily generated at four locations across campus. The Ford Utilities Center has the ability to generate 188,000 pounds per hour of steam, 4,000 tons of chilled water, six megawatts of electricity, and enough compressed air for the campus. The center also operates two remote chilled water plants—the Lomas Chilled Water Plant and the HSC Chilled Water Plant. These facilities have a combined chilled water capacity of 8,300 tons. The fourth location, the Cogeneration Plant, has the ability to generate 2.5 megawatts of electricity, 13,000 pounds per hour of steam, and 1,000 tons of chilled water.

Climate

Temperature – Mean annual temperatures range from 64° F in the extreme southeast to 40° F or lower in high mountains and valleys of the north. During the summer months, individual daytime temperatures quite often exceed 100° F at elevations below 5,000 feet; but the average monthly maximum temperatures during July, the warmest month, range within the low 90's at lower elevations to the upper 70's at high elevations. In January, the coldest month, average daytime temperatures range from the middle 50s in the southern and central valley's to the low 20's in the higher elevations of the north. Minimum temperatures below freezing are common in all sections of the State during the winter, but subzero temperatures are rare except in the mountains. The highest temperature recorded in New Mexico is 122° F on June 27th, 1994 at the Waste Isolation Pilot Plant (WIPP) site at Carlsbad. The lowest temperature recorded was -50° F, on February 1st, 1951 at Gavilan.

Precipitation – Average annual precipitation ranges from less than 10 inches over much of the southern desert and the Rio Grande and San Juan Valleys to more than 40 inches at higher elevations in the State. Summer rains fall almost entirely during brief, but frequently intense thunderstorms. July and August are the rainiest months over most of the State, with from 30-40% of the year's total moisture falling at that time. During the warmest 6 months of the year, May through October, total precipitation averages from 60% of the annual total in the Northwestern Plateau to 80% of the annual total in the eastern plains. Much of the winter precipitation falls as snow in the mountain areas, but it may occur as either rain or snow in the valleys. Average annual snowfall ranges from about 3 inches at the Southern Desert and Southeastern Plains stations to well over 100 inches at Northern Mountain stations. It may exceed 300 inches in the highest mountains of the north.

Sunshine –The average number of hours of annual sunshine ranges from near 3,700 in the southwest to 2,800 in the north-central portions.

Humidity –Relative humidity ranges from an average of near 65% about sunrise to near 30% in mid-afternoon; however, afternoon humidity in warmer months are often is less than 20% and occasionally may be as low as 4%. The low relative humidity during periods of extreme temperatures eases the effect of summer and winter temperature. (Source: http://www.wrcc.dri.edu/narratives/NEWMEXICO.htm)

These low humidity levels contribute to decreased winter temperatures, since the atmosphere is unable to retain heat in the evenings.

UNM Disaster History

Recent disaster costs at UNM Main and Sevilleta LTER Field Station are shown in Table 3. Note: No data is available for the UNM Branch Campuses (Gallup, Los Alamos, Taos and Valencia) on past natural hazard disasters exist. This will be identified as a mitigation strategy for action in Section 8.

Table 3: UNM Disaster History

UNM Disaster History			
Year	**Month**	**Hazard**	**Damage Costs**
2009	August	Wildfire - Sevilleta	$60,000
2009	April	Wind	Not Available
2008	May	Wind	Not Available
2008	March	Wind	Not Available
2007	December	Snow	Not Available
2007	July	Lightning	Not Available
2007	July	Lightning	Not Available
2006	December	Winter Weather/Flooding	$2M
2006	August	Lightning	Not Available
2006	August	Flooding	$34,202
2006	July	Lightning	Not Available
2004	April	Winter Weather	Not Available
2004	Not Available	Wind	$90,000
2003	Not Available	Wind	$369
2003	Not Available	Wind	$31,189
2003	Not Available	Hail - Sevilleta	$7,000
2003	Not Available	Lightning	$8,441
2002	Not Available	Wind	$42,643
2002	Not Available	Wind	$34,141
2002	Not Available	Hail	$100, 016
2001	Not Available	Wind	$2.488
2001	Not Available	Flooding	$24,866
2001	Not Available	Wind	$936
2000	Not Available	Hail	$400,000
2000	Not Available	Wind	$39,879
2000	Not Available	Lightning	$4,905
1999	Not Available	Thunder Storm	$27,100
Note: Between July 2001 and October 2008, UNM paid labor charges of over $373K for hail and thunderstorm-related damage, $151K for High wind-related damage, $15K for high wind-related hazards and over $247K for severe winter storm-related hazards.			

UNM does not report any loses under $1,000 to insurance as a claim. Many of the losses fall in this category. Maintenance issues identified above are not reported as an insurance claim based on standard insurance language.

CHAPTER 2 - THE PLANNING PROCESS

Review of Existing Plans and Studies

At the initiation of the project, all planning documents, studies, reports and technical information available for the campuses were reviewed and incorporated into the PDM document, as appropriate.

These plans and existing studies included:

- New Mexico Department of Homeland Security and Emergency Management (NMDHSEM) State Hazard Mitigation Plan, October 2007
- Albuquerque/Bernalillo County Hazard Mitigation Plan, May 2007
- City of Albuquerque All Hazards Plan, Vol. I and II, December 2005
- UNM Communication and Marketing Dept. (CAM) Emergency Plan, August 2008
- UNM Health Sciences Library and Informatics Center Area Emergency Plan with Special Emphasis on Disasters, March 2008
- UNM Center on Alcoholism, Substance Abuse, and Addictions (CASAA) Environmental Plan, March 2006
- UNM Department of Electrical & Computer Engineering Building Emergency Response Plan, November 2008
- UNM Art Museum and ITS Jonson Gallery Emergency/Disaster Response and Preparedness Plan, 2008
- UNM Mailing System Disaster Recovery Plan, May 2009
- UNM Libraries Emergency Preparedness and Recovery Plan, 2004
- UNM Animal Resource Facility Crisis Plan, March 2008
- UNM Taos Disaster Management Plan, March 2009
- Los Alamos County, NM Multi-Hazard Mitigation Plan, March 2001
- McKinley County and Gallup Mitigation Plan 2005
- Valencia County Natural Hazard Mitigation Plan 2006

Additional References are located in Appendix J of this PDM Plan**.**

Plan Preparation

Managing the efforts of plan preparation, the university stood up the PDM Planning Team (PDMT). The planning team, comprised of a Principle Investigator (PI) and Co-Principle Investigator (Co-PI) and appointed by the University President. The PDMT were responsible for meeting grant requirements, plan preparation, outreach and public meetings and other administrative requirements deemed necessary for plan development. On December 12th, 2007, The University of New Mexico received a sub-grant from NMDHSEM. The UNM sub-grant was reviewed by Sponsored Projects Services and upon UNM approval was sent to NMDHSEM for final signatures and returned to UNM on March 4th, 2008. The PDMT devoted a great deal of effort to assembling the right group of people to serve in an advisory capacity and move the plan development forward.

UNM's PDM Plan is a collaborative effort resulting from the work of many dedicated people who comprise the Pre-Disaster Mitigation Advisory Committee (PDMAC). The PDMAC, under the direction of the PI, was officially formed in June 2008, and met quarterly until February 2009. After February 2009, committee meetings were held monthly to finalize plan for submission to the NMDHSEM. Records of these meetings are in Appendix A.

Specific objectives achieved during these regularly held meetings included identifying expectations, roles and responsibilities; gathering and reviewing existing mitigation plans, studying vulnerability assessments and related documents provided by the UNM Hospital and UNM Branch Campuses; and developing the UNM Pre-Disaster Mitigation website. The most significant activity completed was an extensive review of the documents and plans provided by branch campus, UNM Hospital, State of New Mexico, Los Alamos County and Bernalillo County/City of Albuquerque. Following the review, the PDMT, with input from the PDMAC, focused on developing the tool to be used for the hazard, risk and vulnerability assessments.

As the project progressed, the Co-PI and the UNM Emergency Manager attended the G 318 Mitigation Planning Workshop for Local Governments that took place on July 16-17, 2008. The course was taken as a refresher to the elements required by the grant. In addition, on July 22nd, 2008 the State Hazard Mitigation Officer (SHMO) provided the recently issued new guidance about mitigation plans, and new crosswalks.

On November 3rd, 2008, the PDMT provided a briefing at a Branch Campus Luncheon meeting and on November 6th, 2008 provided a briefing at the University Deans' Council meeting. At each meeting, the PDMT presented the PDM goals and grant requirements. Questions were answered and full cooperation and support was assured by the University's top administrators. Both of these meetings were advertised throughout the campus population (faculty, staff, students, families and visitors) as well as the local community offering the public opportunity to attend and provide input and feedback.

Having finalized the process with the PDMAC, the PDMT completed the FEMA Pre-Disaster Mitigation Study Hazard and Vulnerability Analysis and Assessment Instrument document. Prior to sending out campus-wide, the assessment tool was reviewed by many of the most knowledgeable PDMAC members, to include the City of Albuquerque Emergency Manager who has been through the PDM grant process a number of years back. Modifications were made and the assessment was finalized. Subsequently, on November 7th, 2008 the PI emailed the assessment instrument to the PDMAC and other top University officials requesting a completion date of December 22nd, 2008 just prior the UNM winter break. When requested, the PDMT met with departments face-to-face and via email or telephone to answer any questions related to the assessment instrument. Additionally, the public was offered an opportunity to provide their comments and participate via email and telephone contact. Only one neighborhood association, the Silver Hill Neighborhood Association, which is adjacent to the university, responded to provide support for the PDM Planning effort. Silver Hill assigned a representative to participate with the UNM Plan development process and add input from a local community perspective. Valuable to the PDM was past occurrences that affected the surrounding neighborhood and UNM. The member was able to provide past occurrence information, like thunderstorm and winter events and offered ideas on mitigation strategies that would support both the campus and surrounding neighborhood where UNM is a community member. Also important to the mitigation plan development was student participation. Assigned to the PDMAC was a student representative who serves on the Associated Students of the University of New Mexico. This individual represented the governing body of students by attending meetings and provided valuable input to PDM development. Following the meetings, the student representative provided updates throughout the student population and shared what occurred during the scheduled meetings and encouraged feedback for presentation at future meetings.

Public outreach was very important to the UNM PDM process. Outreach initiatives included advertising in the UNM Press and the UNM Mitigation website which provided agenda for future meetings, minutes from those meetings and other relevant data and information related to PDM development process. Examples of this two outreach tools can be found in Appendix C of this PDM Plan.

In March 2009, a consultant, B-Sting Ventures, LLC (BSV), was hired to finalize the PDM development process and bring the PDM plan to a final draft for submission to NMDHSEM and FEMA Region VI. Upon contract execution, BSV established a timeline for completion and convened the PDMAC for a meeting to outline the next steps to plan completion. Issues addressed include:

- Department Data – Gaps remain in receiving information
- Update Maps with Current Data
- Update Hazard Statistics
- Past Hazards on Campus and Branch Locations
- Discuss Committee Role in Developing Mission Statement, Goals and Objectives
- Discuss Committee Role in Reviewing Department Hazard Submissions
- Discuss Committee Role in identifying Mitigation Actions
- Discuss Updating Mitigation Website

Following the kickoff meeting, five additional meetings were conducted to focus on each phase of the mitigation process for developing the PDM plan.

PDM Plan Development

During plan development, the consultant sent sections of the plan to the PDMT for review and additional data mining. BSV set up monthly meetings for PDMAC members to meet and work the many issues that needed to be addressed. Committee members who were unable to attend scheduled meetings, were provided agendas, meeting minutes and any relevant data for review and submission. All members of the PDMAC were kept informed via contact by email, telephone, monthly meetings, the mitigation website and personal visits. Their input was shared with the PDMAC membership through discussion at PDMAC meetings, by email, website and through personal contact. Meetings were advertised throughout the campus population (faculty, staff, students, visitors and families) as well as the local community offering the public opportunity to attend and provide input and feedback.

On July 2nd, 2009, the draft PDM Plan was submitted to the PDMT who introduced to the PDMAC for review and comment. A review period of 15 days (9 business days) was established and instructions on how to submit changes, additions or comments for updating the plan. Comments received were submitted to the PDMT who reconciled any contradictory comments and provided the contractor with a consolidated list of comments to incorporate in a final draft version of the plan.

BSV assembled the final draft of the PDM plan and delivered to the UNM PDMT on September 1st, 2009. A copy of the PDM plan on compact disc was distributed to the PDMAC for review and to begin implementing mitigation actions in to daily operations and projects. A complete draft was sent to NMDHSEM FEMA on September 28th, 2009, as requested by the SHMO. Once approved by the SHMO, the PDM plan will be forwarded to FEMA Region VI mitigation officers for review and approval. During the plan review process, the UNM PDMT will continue to engage the PDMAC in the mitigation process. Meetings are scheduled to discuss implementing mitigation actions, determine future meeting schedules, continue mitigation data collection on natural hazard occurrences and continue to engage senior administration to ensure a proactive mitigation program.

The DMA 2000 stipulates the minimum content of all hazard mitigation plans. The University of New Mexico Pre Disaster Mitigation Plan meets or exceeds the required content for a “standard” pre-disaster mitigation plan. The PDMT coordinated the Hazard Identification and Risk Assessment (HIRA) with PDMAC after receiving all inputs from UNM departments. The HIRA forms the basis upon which the rest of the plan is formulated.

Mitigation Planning Process Participants

The members of the PDMAC and other subject matter experts who consulted in the planning process brought to the table a wide variety of experience not necessarily related to their current job. Table 4 identifies the position representing on the PDMAC, the person(s) identified to represent and the data provided by each PDMAC member. Their institutional knowledge, along with the specific program experience of their current job positions, made all participants in the planning process uniquely qualified to assist the mitigation planning effort. These individuals, agencies, and interested groups participated by attending regular meetings, sharing information by email, reviewing the plan as it progressed through its various stages, and contributing general and specific information as needed. Each were encouraged to share this information with the other interested parties to enhance the awareness and involvement of not only university but the general population that included neighboring communities, other agencies and businesses, and non-profits (Local Emergency Planning Committee and local Citizen Corps Council).

University of New Mexico Pre-Disaster Mitigation Advisory Committee (PDMAC)

Established June 7, 2008
Revised April 28, 2009

Table 4: UNM PDM Advisory Committee (PDMAC)

POSITION	MAIN	Data Provided
Principal Investigator	Debbie Kuidis Manager of Industrial Security **Pre-Disaster Mitigation Planning (PDMT) Team Lead**	Provided project management. Set up meetings and ensured campus was informed of the process and provided information and answered questions as required.
Co-Principal Investigator	Shirley V. Baros, GISP – GIS Project Manager, Earth Data Analysis Center **Pre-Disaster Mitigation Planning Team (PDMT) Co-Lead**	Provided co-project management. Set up meetings and ensured campus was informed of the process and provided information and answered questions as required. Provided GIS support and data.
Emergency Management Liaison	Byron Piatt – UNM Emergency Manager & Ted Arnett - Manager, Emergency Preparedness & Safety, UNMH	Provided Emergency Management information related to the project development
Risk Management	Robert Dunnington & Mike Tuttle – UNM Safety and Risk Services (SRS)	Information on past natural hazard damage and costs
President's Office	Donald W. Duszynski – Research Professor, Consultant, President's Office	Provided administration support, reviewed documents, kept President informed of all progress
Facilities Planning	Mary Kenney – Director, Facilities Planning, Administration	Provided a listing of UNM Facilities and other data relevant to the PDM project
Physical Plant	Joel Straquadine – Manager, Facilities Maintenance, PPD Administration	Provided a listing of UNM Facilities and other data relevant to the PDM project
Information Officer	Susan McKinsey – Director, University Comm	Provided data on communications
Student Services	Tim Gutierrez Associate VP, Student Svc. Tim Backes – SUB Bobby Ray Childers - Housing	Provided data related to UNM Students services and housing.
Student Representative	Ms. Theresa Rogers – ASUNM	Provided information related UNM Student issues and initiatives and disseminated information within the student population. Provided campus wide input to the PDMAC
Property Accounting	Pete Rieckmann – Property Accounting	Submitted data related to UNM Properties.
Human Resources	Denise Montoya – HR Consulting & Staff Employment Director, Human Resource Division	Submitted information on HR data.
UNM Health Sciences Center	Michael Richards, MD – Associate Professor, Chair, Dept Of Emergency Medicine, Medical Director, FEMA, National Disaster Medical System, New Mexico Disaster Medicine Assistance Team Laura Banks, and Judy Pointer	Provided information on UNM Health Science Research Facilities and other data for PDM project development.
IT Services	Mike Carr – UNM Computer Security Jeff Gassaway – UNM Computer Security	Submitted information on IT issues and initiatives.
Telecom Systems Unit Leader	George Thorning – Director-ITS – Com. Network Services	Submitted information on IT issues and initiatives.
Community Representative	Bill Cobb – Silver Hill Neighborhood Association	Represented the community and provided information relevant to the PDM development.
City Local Official	Greg Sanchez – City of Albuquerque Emergency Manager	Provided City overview, past history and data for developing the mitigation plan.
County Local Official	Rodger Tannen – Emergency Manager, Bernalillo County	Provided County overview, past history and submitted copy of mitigation plan for review and use in PDM development.

POSITION	MAIN	Data Provided
Office of the Vice President for Research and Economic Development Representative	Debbie Kuidis – Manager of Industrial Security	Provided project management. Set up meetings and ensured campus was informed of the process and provided information and answered questions as required.
UNM Branch Campus Representative	Dr. Paul Kraft – Dr. Paul Kraft, Director, Student Services	Represented the 4 branch campuses in providing data on each location.
Art Collections	Susan Thompson – Office Manager	Provided data on are collections, costs, location, etc.
University Libraries	Edward Padilla – University Libraries	Provided data on all libraries and the costs of materials and issues related to natural hazards.
Accessibility Resource Center	Joan Green – Director, Accessibility Services	Provided program information on special needs across the campus.
Athletics	Scott Dotson – Assoc AD/Facilities	Provided data on athletics relating to facilities, locations and issues with regards to natural hazards.
Office of the Provost	Donna Hoff – Project Manager	Provided university oversight on projects and processes.

Mitigation Planning Hazard Assessment

The process used to involve UNM departments and entities was for the PDMT to contact specific departments in UNM that were likely to have some interest in hazard mitigation. The PDMT sent letters and copies of the hazard analysis to 140 departments requesting their participation. Those initial contacts led to others, and the gradual result was a group of people who were able to provide useful information for the mitigation planning effort. A list of departments who participated in the hazard assessment is included in Appendix D. The assessment tool completed by UNM departments and entities is included in Appendix E.

The UNM PDM Plan endorses the efforts of other agencies, both state and federal, in addressing mitigation issues for specific hazards in their own strategic and operational plans, procedures, and regulations. The PDMT has asked, and will continue to ask, the PDMAC and other subject matter experts to provide input related to their specific agency plans, procedures, and regulations. Subsequent meetings of the PDMAC will discuss and possibly incorporate specific recommendations into future updates of the plan.

Project Website

A project website was developed to disseminate information on the PDM process (Appendix C). Included on the website are meeting notes, listing of PDMAC members, the Hazard Profiling Survey, survey results, and draft mitigation strategies. Draft versions of the campus PDM Plan was advertised on the website as available for review and anyone who would like to review and information on who to contact was provided. Reference materials such as relevant FEMA documents and county disaster plans are also available on the project website.

Pre-Disaster Mitigation Planning Public Awareness

To keep the university population and surrounding community aware of the mitigation project, UNM Today, the University's monthly newspaper, published articles on the ongoing planning process. This allowed for public awareness and offered the opportunity for public input and support for the mitigation process (Appendix C).

Pre-Disaster Mitigation Plan Public Comment

During the entire PDM development process, UNM provided opportunity for the public to participate and provide feedback. The following public meetings were held to solicit comments:

Date	Location	Discussion
November 3, 2008	UNM Main; Albuquerque	Branch Campus Luncheon meeting (All Branch Campus Directors attended); PDM project introduced, questions were answered and full cooperation and support was assured by the University's top administrators in supporting the PDM project.
November 6, 2008	UNM Main; Albuquerque	University Deans' Council meeting; PDM project introduced, questions were answered and full cooperation and support was assured by the University's top administrators. This meeting engaged the Dean's Council to help solicit support for developing the PMD plan and conduct research on past natural hazard events.
July 2009	All UNM Locations	1st Public Review Opportunity: Draft Pre-disaster Mitigation Plan for Review. Each location was offered an opportunity to review the document and provide any additional information to support the hazard assessments, discuss vulnerabilities and provide mitigation actions to support each hazard.
September 2009	All UNM Locations and website posting	2nd Public Review Opportunity: Final Draft Pre-disaster Mitigation Plan for Review (This is an ongoing opportunity while the plan is in review). All locations are to review the document and provide updates accordingly, determine how the PDM will be implemented in day-to-day operations and prepare for future updates and injects.
October 2009	Branch Campus Director Meeting	Meeting with Branch Campus directors to discuss contents of the PDM plan and request their official review and comment.
December 2009	Gallup Branch Campus	Meeting with campus director and administrative staff to discuss contents of the PDM plan and request their official review and comment.

All meetings were advertised throughout the campus population (faculty, staff, students, families and visitors) as well as the local community offering the public opportunity to attend and provide input and feedback. During the plan reviews, each PDMAC member was provided with a copy of the plan and encouraged to review and seek other comments internal and external to their department. One example is the Emergency Managers from both the county and city. These two agencies provided copies throughout their jurisdictions to seek additional comment on the contents of the plan. Another example is the ASUNM student representative offered to the student population an opportunity to provide comment. Further, the public was encouraged to participate through advertisement on the UNM Mitigation website and provide comment via the public comment section on the website.

CHAPTER 3 – PROGRAM INTEGRATION

Other Programs
The University's PDM planning process is closely integrated with other mitigation programs and initiatives on campus, as well as with local and state partners. The strategies and proposed actions within this plan conform to those presented in these other documents, and in many cases are the same actions. Several UNM departments participate in the groups that developed the following plans.

Report on Drought Conditions, New Mexico Drought Monitoring Work Group, Governor's Drought Task Force, January 2007.
Reference: http://www.nmdrought.state.nm.us/MonitoringWorkGroup/2007-01-11-dmwg-rpt.pdf

New Mexico Drought Plan, New Mexico Drought Task Force, December 2006.
Reference: http://www.nmdrought.state.nm.us/2006-NM-Drought-Plan.pdf

Strategic Plan, Office of the State Engineer and the Interstate Stream Commission, September 2006. Reference:
http://www.ose.state.nm.us/PDF/Publications/StrategicPlans/strategic_plan_2006.pdf

New Mexico State Water Plan, Office of the State Engineer and the Interstate Stream Commission, December 2003,
Reference: http://www.ose.state.nm.us/water-info/NMWaterPlanning/2003StateWaterPlan.pdf

Progress Report: State of New Mexico Water Plan, Office of the State Engineer and the Interstate Stream Commission, June 2006, Reference:
http://www.ose.state.nm.us/PDF/Publications/StateWaterPlans/swp-2006-06-progress-report.pdf

No Adverse Impact: A Toolkit for Common Sense Floodplain Management, Association of State Floodplain Managers. 2003.
Reference: http://www.floods.org/NoAdverseImpact/NAI_Toolkit_2003.pdf

New Mexico Communities at Risk Assessment Plan, New Mexico Energy, Minerals and Natural Resources Department, Forestry Division, 2006,
Reference: http://www.emnrd.state.nm.us/fd/FireMgt/documents/2006_CAR.pdf

New Mexico Fire Plan, New Mexico Energy, Minerals and Natural Resources Department, Forestry Division, December 2008.
Reference: http://www.emnrd.state.nm.us/FD/FireMgt/documents/2008CARPlan_000.pdf

Framework for a Comprehensive Statewide Municipal and Industrial Water Conservation Program, Office of the State Engineer. Nov. 2003.
Reference: www.ose.state.nm.us/water-info/conservation

Strategic Plan for the New Mexico Floodplain Managers Association, NM Floodplain Managers Association. April 2003. Reference: www.nmfma.org

Multi-Hazard Identification and Risk Assessment (MHIRA), Federal Emergency Management Agency, 1997.
Reference: www.fema.gov/library/file?type=publishedFile&file=mhira_in.pdf&fileid=09d3f850-97ab-11db-b057-000bdba87d5b

A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment, 10-Year Strategy Implementation Plan National Fire Plan. USFS December 2006.
Reference: http://www.fireplan.gov/reports/10-YearStrategyFinal_Dec2006.pdf

New Mexico 2000: Census 2000 Profile. US Census Bureau, US Department of Commerce, Economics and Statistics Administration, August 2002.
Reference: http://www.census.gov/prod/2002pubs/c2kprof00-nm.pdf

Planning Process and Funding Initiatives

The UNM natural hazard mitigation planning process is closely integrated with, and is in fact dependant on, FEMA’s mitigation programs and initiatives. The driving force behind the entire planning effort is the Disaster Mitigation Act 2000 (DMA 2000), which stipulates the necessity for a university (local) mitigation plan. DMA 2000 established a timeline for plan completion and describes penalties for non-compliance.

The UNM PDM Plan will serve as a resource from which other plans can expand or be updated. The natural hazard assessments and mitigation actions identified and developed will provide a foundation for future preparedness initiatives. Departments will have an opportunity to use the mitigation plan to develop internal Emergency Operation Plans (EOP) and the University Safety and Risk Services (SRS) have the opportunity to integrate this document into planning meetings.

CHAPTER 4 – HAZARD IDENTIFICATION AND RISK ANALYSIS

Overview

The Hazard Identification and Risk Assessment (HIRA) is the foundation upon which subsequent mitigation strategies are based. It is a fundamental requirement for the State Hazard Mitigation Plan to comply with the DMA 2000.

This chapter identifies the natural hazards that can occur within the state and provides a systematic analysis of risk and vulnerability to which the University of New Mexico's population and critical infrastructure of the state are subject.

In the past, the Stafford Act only provided funding for disaster response and recovery and the Hazard Mitigation Grant Program (HMGP). DMA 2000 stresses the importance of pre-disaster mitigation planning through the PDM program and establishes new requirements for HMGP and the Public Assistance Program.

DMA 2000 is intended to facilitate cooperation between the university, state and local authorities. It encourages and rewards state and local pre-disaster planning, and promotes sustainability as a strategy for disaster resistance. This enhanced planning network will better enable the university, state and local governments to project their mitigation needs, resulting in faster allocation of funding and more effective risk reduction projects.

The hazard identification and risk assessment study includes four stages: 1) identify hazards, 2) profile hazard events, 3) inventory assets, and 4) estimate losses.

DMA 2000 State Risk Assessment Requirements:

Identifying Hazards – The risk assessment shall include an overview of the type of all natural hazards that can affect the state.

Profiling Hazard Events – The risk assessment shall include an overview of the location of all natural hazards that can affect the state, including information on previous occurrences of hazard events as well as the probability of future hazards events, using maps where appropriate.

Assessing Vulnerability by Jurisdiction – The risk assessment shall include an overview and analysis of the state's vulnerability to the hazards based on estimates provided in local risk assessments. The state shall describe vulnerability in terms of the jurisdictions most threatened by the identified hazards, and most vulnerable to damage and loss associated with hazard events.

Assessing Vulnerability of State Facilities – The risk assessment shall include an overview and analysis of the state's vulnerability to the hazards based on estimates provided in the state risk assessment. State-owned critical or operated facilities located in the identified hazard areas shall also be addressed.

Estimating Potential Losses by Jurisdiction – The risk assessment shall include an overview and analysis of potential losses to identified vulnerable structures, based on estimates provided in local risk assessments.

Estimating Potential Losses of State Facilities – The risk assessment shall include an overview and analysis of potential losses to identified vulnerable structures, based on estimates provided in the state risk assessment. The state shall estimate the potential dollar losses to state-owned or operated buildings, infrastructure, and critical facilities located in the identified hazard areas.

Step 1 - Hazard Identification

The Hazard identification was compiled by investigating the various natural hazard occurrences within the state, as well as adjoining states, over the past several decades. The SHMO also included hazard information from local mitigation plans where UNM Main Campus and Branches are located. Because it is assumed that hazards that occurred in the state in the past may be experienced in the future, the hazard identification process includes a history and an examination of various hazards and their occurrences. Information of past hazards was obtained from historical documents and newspapers, state and county plans and reports, interviews with state agencies and local experts, and internet websites.

Step 2 - Hazard Profiling

This step involved determining the frequency or probability of future events, their severity, and factors that may affect their severity. Each hazard type has unique characteristics that can affect the state in different ways. For example, no two wildfires affect the state in the same manner. In addition, the same hazard event could affect different jurisdictions in unique manners depending on building type, age of buildings, demographics, and many other factors.

Step 3 – Vulnerability Assessment

The results of the hazard identification indicate that some of the hazards warrant a vulnerability assessment due to their frequency of occurrence or the fact that those hazards have caused major damage in the state. A vulnerability assessment was performed to determine the impact of frequently occurring hazards on the "built" environment and how they can affect the safety of the faculty, staff, students and visitors of the University of New Mexico.

The vulnerability assessment used the information generated in the hazard identification and hazard profile to identify locations where UNM and branch campuses could suffer the greatest injury or property damage in the event of a disaster. This assessment identified the effects of hazard events by estimating the relative exposure of people, buildings, and infrastructure to hazardous conditions.

Step 4 – Loss Estimation

The last step of the risk assessment is loss estimation. The loss estimation process provides the university with a relative ranking of risk to university-owned property and critical infrastructure from various hazards.

Incorporation of Local Data

To the extent practical, local and state mitigation plans were used when compiling information for the UNM plan. The relevant portions from local and state plans were incorporated into the write up for each hazard and the vulnerability assessments. State and local plans are not required to contain the same data as UNM plans. When local data was unavailable, additional outside sources such as Hazards U.S. Multi-Hazard (HAZUS-MH), Resource Geographic Information System (RGIS) Clearinghouse, National Climatic Data Center (NCDC), or other subject matter experts and websites were utilized. The consultant and PDM planning team wrote up and compiled the data, combined it with state and local statistics and then presented it the PDMAC. The PDMAC made comments as necessary.

HAZARD ANALYSIS

Overview

This section includes an identification of the natural hazards that could occur on UNM Main and Branch Campuses throughout the state, a description of those hazards, the damage they could cause, a historical review of hazard occurrences, and a discussion of the probability of future occurrences as integral to our risk assessment process.

UNM Main and Branch Campuses are exposed to natural hazards based upon the climate, topography, and geologic location within the jurisdictions they are located. As a preliminary step in planning the hazards that are identified in the *FEMA State and Local Mitigation Planning Guidelines and Disaster Resilient University* were reviewed for vulnerability in the each county. These hazards are listed below. In order to plan for most likely events to affect campuses, the PDMAC first identified historical occurrences of these hazards. With information regarding the frequency, extent, and exposure to these occurrences, the other aspects of the mitigation plan then focused on militating against high-risk hazards that are specific to each campus, based on the location. To identify the risks, a database search of natural hazards in the *FEMA State and Local Mitigation Planning Guidelines* was also conducted via internet web pages. Historical data was also reviewed to determine whether campuses were located in “high-risk” areas.

Natural Hazard Identification

Of the twenty-two natural hazards listed by FEMA in their guidelines, the following 14 natural hazards were identified as having the most significant potential impact on UNM Main and Branch Campuses and have been assessed as risks for the purpose of this study. Hazards are listed from most significant to least.

1. Thunderstorm/Hail/Lightning[1]
2. Winter Storm
3. High Wind
4. Extreme Heat
5. Tornado
6. Floods
7. Wildfire and Wildland/Urban Interface Fires
8. Earthquake
9. Drought
10. Land Subsidence
11. Expansive Soil
12. Landslide
13. Volcanoes
14. Dam Failure

[1] For the purpose of the UNM PDM Plan, thunderstorms, hail and lightning are combined for discussion and analysis.

Information about hazardous events was obtained by several means, including reviewing past state and federal declarations of disasters, conducting internet searches, reviewing historic records, reviewing local mitigation and Emergency Operations Plans (EOPs) and archived newspaper articles, and interviewing hazard experts with the National Weather Service (NWS), state government, as well as resources from the University of New Mexico. Historical data obtained through local sources also confirmed hazards do not pose a threat to life and safety of residents of the community or its assets. During the development of this PDM Plan data deficiencies where determined to exist and in the next 5 years, UNM will gather data to support occurrences and enhanced mitigation strategies and actions.

Future editions of this plan will contain information on the occurrence of any natural hazard that has a significant increase in the risk to human life and property.

Hazard Profile

Hazard profiles describe different hazard characteristics. In some cases, when hazards such as flooding and landslides affect only specific geographic areas, the hazard profile includes a map identifying areas where UNM Main and Branch Campuses are located where the hazard could occur. Non geographic specific hazards such as tornadoes can occur anywhere in the state thereby affecting any UNM campus location in the state.

The effects of severe weather vary according to the type of hazard. Tornadoes and wind storms can topple manufactured homes, destroy buildings, lift cars, snap trees (which create roadblocks), topple power lines (can cause an electrocution hazard and cripple local infrastructure), and cause injury and death. Thunderstorms can cause substantial rainfall leading to localized flash flooding. Additionally, thunderstorms cause lightning strikes which may start wildfires and lead to injury and death. Hailstorms are another potential result of thunderstorms. Hailstorms can damage agricultural crops and cause property damage.

Extreme temperatures generally affect “at risk” sectors of the population: the elderly, the young, the sick/infirmed, those living below the poverty level and outdoor laborers. Winter storms often have the effect of disrupting transportation and commerce. Injury to people and property result from heavy loads of snow and ice causing collapse of roofs of buildings, felling trees and telephone poles, knocking down electrical lines, and creating slippery conditions for pedestrians and vehicles.

Thunderstorms

Thunderstorms are produced when warm moist air is overrun by dry cool air. As the warm air rises, thunderheads form and cause strong winds, lightning, hail, and heavy rains. Atmospheric instability can be caused by surface heating or by upper tropospheric (>50,000 feet) divergence. Rising air parcels also can result from airflows over mountainous areas. Generally, “air mass” thunderstorms form on warm-season afternoons and are not severe. The latter “dynamically-driven” thunderstorms, which generally form in association with a cold front or other regional atmospheric disturbance, can become severe, thereby producing strong winds, frequent lightning, hail, downburst winds, heavy rain, and occasional tornadoes.

All areas of the state have thunderstorms. According to the NWS, the thunderstorm season in New Mexico begins over the high plains in the eastern part of the state in mid- to late April, peaks in May and June, declines in July and August, and then drops sharply in September and October. In the western part of the state, thunderstorms are infrequent during April, May, and June, increase in early July and August, and then decrease rapidly in September. Over the central mountain chain, thunderstorms occur almost daily during July and August, especially over the northwest and north central mountains.

Thunderstorms may have different characteristics in different regions of the state. Across the eastern plains, thunderstorms tend to be more organized, long-lived, and occasionally severe, producing large hail, high winds, and tornadoes. Thunderstorms in the western part of the state tend to be less severe on average, occasionally producing life-threatening flash floods and small hail accumulations. Most of the storms in western New Mexico are associated with the southwest monsoons, which mainly produce flash floods.

The NWS definition of a severe thunderstorm is a thunderstorm that produces any of the following: downbursts with winds of 58 MPH (50 knots) or greater (often with gusts of 74 MPH or greater), hail 0.75 of an inch in diameter or greater, or a tornado. Typical thunderstorms can be three miles wide at the base, rise to 40,000-60,000 feet into the troposphere, and contain half a million tons of condensed water. Severe thunderstorms are reported each year in nearly all New Mexico counties.

Thunderstorm frequency is measured in terms of incidence of thunderstorm days or days on which thunderstorms are observed. Any county may experience 10 or more thunderstorm days per year. According to the NWS Publication, *Storm Data*, in the past 30 years, New Mexico has experienced over 50 reported events 75 MPH or higher associated with thunderstorms, with a single occurrence of 115 mph winds. This means that winds similar to a Category 1 Hurricane (Saffir-Simpson Scale) are experienced briefly on about one day every 1.5 years on average in New Mexico.

In 1999, a SRS record identifies a severe thunderstorm caused over $27K in damages to the UNM Main Campus. No additional data exists for the other UNM branch campuses (Gallup, Los Alamos, Taos, Valencia and Sevilleta LTER Field Station).

Lightning is defined as a sudden and violent discharge of electricity, usually from within a thunderstorm, due to a difference in electrical charges. Lightning is a flow of electrical current from cloud to cloud or cloud to ground. Nationwide, lightning causes extensive damage to buildings and structures, kills or injures people and livestock, starts forest and wildfires, and disrupts electromagnetic transmissions. Lightning is extremely dangerous during dry lightning storms because people often remain outside rather than taking shelter. To the general public, lightning is often perceived as a minor hazard. However, lightning-caused damage, injuries, and deaths establish lightning as a significant hazard associated with any thunderstorm. Damage from lightning occurs four ways:

(1) Electrocution or severe shock of humans and animals;

(2) Vaporization of materials along the path of the lightning strike;

(3) Fire caused by the high temperatures (10,000-60,000° F); and

(4) A sudden power surge that can damage electronic equipment.

Large outdoor gatherings (e.g., sporting events, concerts) are particularly vulnerable to lightning strikes. New Mexico ranks sixth in the nation in lightning fatalities with 0.55 deaths per million people annually. UNM main campus (Albuquerque), the four branch campuses (Gallup, Los Alamos, Taos, and Valencia) and the Sevilleta LTER Field Station located in Socorro, New Mexico are at risk to a lightning strike. Most vulnerable is the UNM Main Campus outside sporting events when thousands of event attendees are exposed to a potential lightning strike.

(Source: National Weather Service http://www.lightningsafety.noaa.gov/lightning_map.htm)

UNM SRS reports that from 1999 – 2009, the main campus experienced six lightning strikes causing over $13K in university damages. Of the six, only damage amounts were available for two therefore the damage amount would be more than reported. Branch campuses have not maintained past records of lightning strikes but discussions with branch campus emergency management officials all branches have experienced a lightning strike but strikes had not damaged campus facilities.

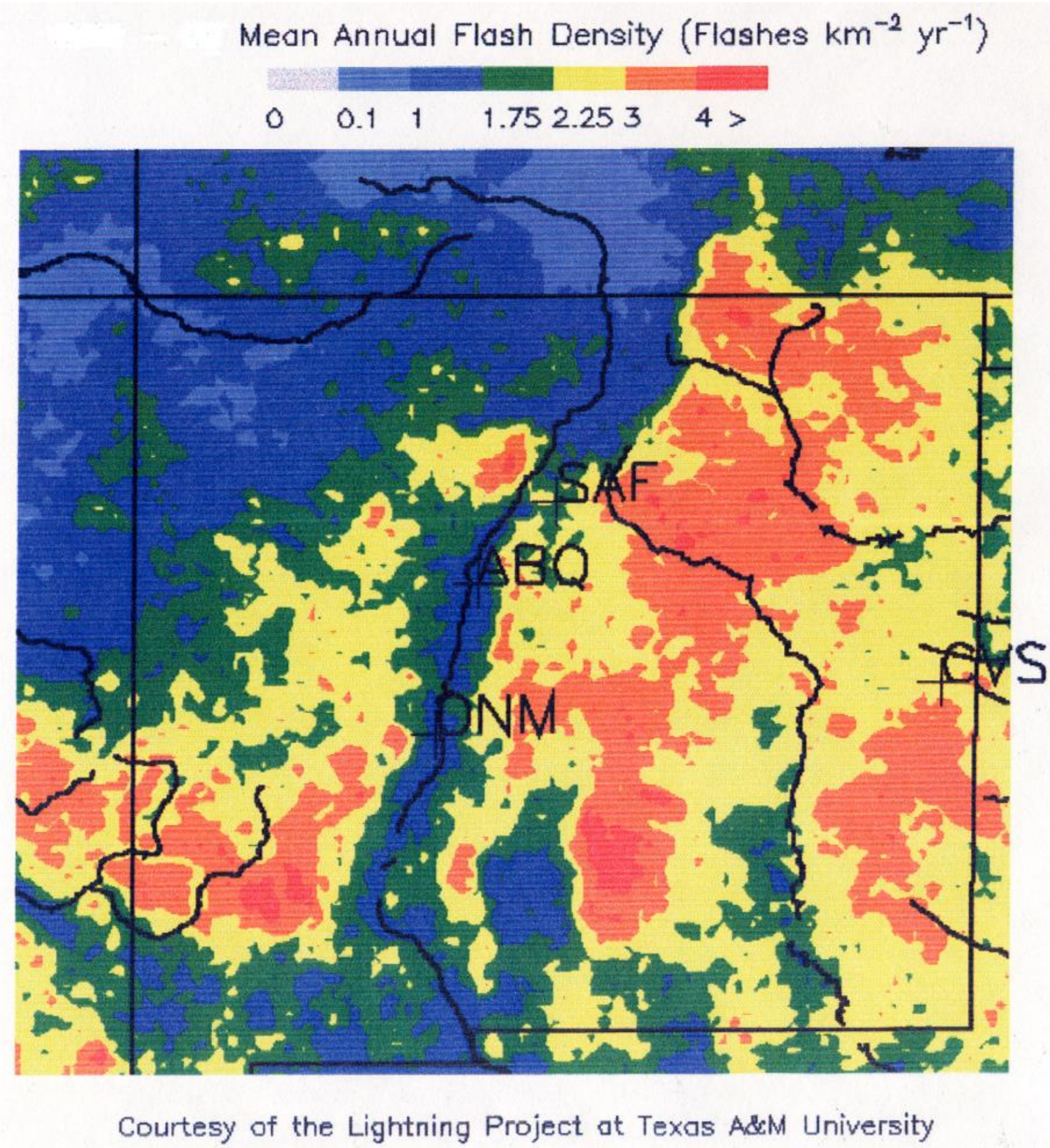
(Source: http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms)

According to National Centers for Health Statistics (NCHS) multiple-cause-of-death tapes and the Census of Fatal Occupational Injuries (CFOI), New Mexico had 374 lightning related fatalities between 1995 and 2000. New Mexico has a 100% probability of a lightning event every year. There is a 100% chance of a lightning fatality each year. It is difficult to determine just how extensive lightning can be. Recent storms monitored by New Mexico Tech University in Socorro, NM, produced between 65 and 1062 lightning flashes per minute. Additionally, lightning strikes the ground or objects on average once for every five to 10 cloud flashes.

(Source; http://ams.confex.com/ams/pdfpapers/103103.pdf)
(Source: http://www.bls.gov/iif/oshwc/cfoi/jeh5_05_45-50.pdf)

Based on the NM Tech studies, New Mexico routinely has thunderstorms that have between 13 and 106 lightning strikes per minute. Figure 12 shows areas of lightning density for the state. All UNM campuses lie within the higher concentration areas that make them vulnerable to lightning strikes.

Figure 12: Lightning Density



The Lightning Activity Level is a scale from 1-6, which describes frequency and character of cloud-to-ground (cg) lightning (Table 5).

Table 5: Lightning Activity Level

Lightning Activity Level				
	Cloud and Storm Development	**Counts cg / 5 min**	**Counts cg / 15 min**	**Average cg / min**
1	No thunderstorms	-	-	-
2	Cumulus clouds are common but only a few reach the towering stage. A single thunderstorm must be confirmed in the rating area. The clouds mostly produce virga but light rain will occasionally reach ground. Lightning is very infrequent.	1-5	1-8	<1
3	Cumulus clouds are common. Swelling and towering cumulus cover less than 2/10 of the sky. Thunderstorms are few, but 2 to 3 occur within the observation area. Light to moderate rain will reach the ground, and lightning is infrequent.	6-10	9-15	1-2
4	Swelling cumulus and towering cumulus cover 2-3/10 of the sky. Thunderstorms are scattered but more than three must occur within the observation area. Moderate rain is commonly produced, and lightning is frequent.	11-15	16-25	2-3
5	Towering cumulus and thunderstorms are numerous. They cover more than 3/10 and occasionally obscure the sky. Rain is moderate to heavy, and lightning is frequent and intense.	>15	>25	>3
6	Dry lightning outbreak. (LAL of 3 or greater with majority of storms producing little or no rainfall.)	-	-	-

Source: http://www.crh.noaa.gov/gid/?n=fwfintro

On this scale, all UNM campuses (UNM Main and Gallup, Los Alamos, Taos, Valencia Branch Campuses and Sevilleta LTER Field Station) consistently experience storms of LAL5 or higher; nothing indicates this trend will change.

Hail is frozen water droplets formed inside a thunderstorm cloud. Hail is formed during the strong updrafts of warm air and downdrafts of cold air, when the water droplets are carried well above the freezing level to temperatures below 32^{o} F, and then the frozen droplet begins to fall, carried by cold downdrafts, and may begin to thaw as it moves into warmer air toward the bottom of the thunderstorm. This movement up and down inside the cloud, through cold then warmer temperatures, causes each droplet to add layers of ice and they can become quite large, sometimes round or oval or sometimes irregularly shaped, before they finally fall to the ground as hail.

Hail usually occurs during severe thunderstorms, which also produce frequent lightning, flash flooding and strong winds, with the potential of tornadoes. The hail size ranges from smaller than a pea to as large as a softball, and can be very destructive to buildings, vehicles and crops. Even small hail can cause significant damage to young and tender plants. Hail usually lasts an average of 10 to 20 minutes but may last much longer in some storms. Hail causes $1 billion in damage to crops and property each year in the U.S. The costliest hailstorm in the United States was in St Louis in April 2001 with damage of $1.9 billion. (Source: http://www.crh.noaa.gov/lsx/?n=april_10_2001)

No UNM campus is immune from hailstorms. Once the summer monsoon starts, thunderstorms often develop in the afternoons and evenings. Mountainous areas usually see more storms than the plains and desert, although mountain storms tend to be less severe and produce smaller hail. In the plains and over the desert, monsoon thunderstorms sometimes reach severe levels and can produce large hail. Table 6 shows hail sizes and possible damages from hail events.

Table 6: Hail Scale

Combined NOAA/TORRO Hailstorm Intensity Scales

Size Code	Intensity Category	Typical Hail Diameter (inches)	Approximate Size	Typical Damage Impacts
H0	Hard Hail	up to 0.33	Pea	No damage
H1	Potentially Damaging	0.33-0.60	Marble or Mothball	Slight damage to plants, crops
H2	Potentially Damaging	0.60-0.80	Dime or grape	Significant damage to fruit, crops, vegetation
H3	Severe	0.80-1.20	Nickel to Quarter	Severe damage to fruit and crops, damage to glass and plastic structures, paint and wood scored
H4	Severe	1.2-1.6	Half Dollar to Ping Pong Ball	Widespread glass damage, vehicle bodywork damage
H5	Destructive	1.6-2.0	Silver dollar to Golf Ball	Wholesale destruction of glass, damage to tiled roofs, significant risk of injuries
H6	Destructive	2.0-2.4	Lime or Egg	Aircraft bodywork dented, brick walls pitted
H7	Very destructive	2.4-3.0	Tennis ball	Severe roof damage, risk of serious injuries
H8	Very destructive	3.0-3.5	Baseball to Orange	Severe damage to aircraft bodywork
H9	Super Hailstorms	3.5-4.0	Grapefruit	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open
H10	Super Hailstorms	4+	Softball and up	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open

(Sources: www.noaa.gov and www.torro.org)

According to the NWS, oversized and severe hailstorms occur most frequently in May, followed by June, July, and April. The mid- and southwest portions of the U.S. are exposed to the highest average number of hail days. New Mexico ranks 23rd among states in the frequency of severe hailstorms.

According to UNM SRS, between 1999 and 2009, UNM Main Campus experienced two (2) significant hail storm events and the Sevilleta LTER Field Station in Socorro, NM, experienced one (1) significant event with $400K in property damages. On average UNM Campuses experience 14 hail events every year, virtually a 100% probability. The only campus with record of damage is the UNM Main Campus. Discussion with the other four campuses concluded no records have been kept on past events, though in discussing hail events, staff stated campuses have experienced hail events with little to no damage. According to the National Climatic Data Center, New Mexico had 1,333 reported hail events between January 1st, 2000 and February 28th, 2009, totaling $71.5M in property and $1.43M in crop damage.

The UNM Main, branch campuses (Gallup, Los Alamos, Taos, Valencia) and Sevilleta LTER Field Station have limited or no thunderstorm, hail or lightning data documented, it is important to include occurrences from those counties where UNM campuses are located. Table 7 provides an overview of the number of events and costs based on the specific hazard. Recognizing UNM's data deficiency for collecting past natural hazard events, this information reinforces the fact that the probability of a thunderstorm, hail or lightning causing structure damage or risking life safety are of high and important to assess mitigation strategies.

Table 7: Hazard Events in Counties Where UNM Campuses are Located

Hazards	Bernalillo County (UNM Main)		McKinley County (UNM Gallup Branch Campus)		Los Alamos County (UNM Los Alamos Branch Campus)		Taos County (UNM Taos Branch Campus)		Valencia County (UNM Valencia Branch Campus)		Socorro County (Sevilleta LTER Field Station)	
	Events	**$**	**Events**	**$**	**Events**	**$**	**Events**	**$**	**Events**	**$**	**Events**	**$**
Thunderstorms	49	99K	17	15K	2	0	2	20K	18	1.476M	5	60K
Hail	74	0	7	0	20	50K	8	0	15	1.657M	28	40M
Lightning	13	71	1	0	0	0	1	0	0	0	0	0

Data is derived from the NCDC database (01/01/1950 and 02/28/2010)

Thunderstorms/Hail/Lightning Vulnerability

Severe weather is difficult to predict precisely in pattern, frequency, and degree of severity. The impact from severe weather events (thunderstorms to include hail and lightning) has been moderate, with localized flooding occurring from severe thunderstorms and minor damages to specific locations from hail and lightning. As with State and County jurisdictions, all UNM campuses can be equally affected by thunderstorm events to include hail and lightning. UNM Main Campus has maintained a limited list of past occurrences highlighting their vulnerabilities as high in damage from hail and lightning strikes. With regards to hail, all UNM campuses can be affected by a hail event up to 2.0 inches in diameter or referring to table 6, anywhere from H0 to H5. Data does not exist for the Gallup, Los Alamos, Taos, Valencia Branch Campuses and the Sevilleta LTER Field Station. Mitigation strategies will be identified to capture future events and enhance the identification of vulnerability at these locations. Data deficiencies do exist and in the next 5 years, UNM will gather data to support occurrences and enhanced mitigation strategies and actions.

Winter Storms

Winter storms can vary in size and strength and include heavy snowstorms, blizzards, ice storms, freezing drizzle or rain, sleet, and blowing and drifting snow. Extremely cold temperatures accompanied by strong winds result in potentially lethal wind chills.

A variety of weather phenomena and conditions can occur during winter storms. For clarification, the following are NWS approved definitions of winter storm elements:

- **Heavy snowfall** - the accumulation of six or more inches of snow in a 12-hour period or eight or more inches in a 24-hour period
- **Blizzard** - the occurrence of sustained wind speeds in excess of 35 MPH accompanied by heavy snowfall or large amounts of blowing or drifting snow
- **Ice storm** - an occurrence where rain falls from warmer upper layers of the atmosphere to the colder ground, freezing upon contact with the ground and exposed objects near the ground
- **Freezing drizzle/freezing rain** - the effect of drizzle or rain freezing upon impact on objects that have a temperature of 32° F or below
- **Sleet** - solid grains or pellets of ice formed by the freezing of raindrops or the refreezing of largely melted snowflakes. This ice does not cling to surfaces
- **Wind chill** - an apparent temperature that describes the combined effect of wind and low air temperatures on exposed skin

The Wind Chill temperature is a measure of how cold the wind makes real air temperature feel to the human body. Since wind can dramatically accelerate heat loss from the body, a blustery 30° F day would feel just as cold as a calm day with 0° F temperatures. The index (Figure 13) was created in 1870, but on November 1st, 2001, the NWS released a more scientifically accurate equation, which we use today. Here is a chart for calculating wind chill. (Please note that it is not applicable in calm winds or when the temperature is over 50° F.)

Figure 13: Wind Chill Chart

Wind (mph) \ Temperature (°F)	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
5	36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
10	34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
15	32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
20	30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
25	29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
30	28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
35	28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
40	27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
45	26	29	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
50	26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95
55	25	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68	-75	-82	-89	-97
60	25	17	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69	-76	-84	-91	-98

Frostbite Times: 30 minutes, 10 minutes, 5 minutes

$$\text{Wind Chill (°F)} = 35.74 + 0.6215T - 35.75(V^{0.16}) + 0.4275T(V^{0.16})$$

Where, T= Air Temperature (°F) V= Wind Speed (mph) *Effective 11/01/01*

Source: National Weather Service and NOAA

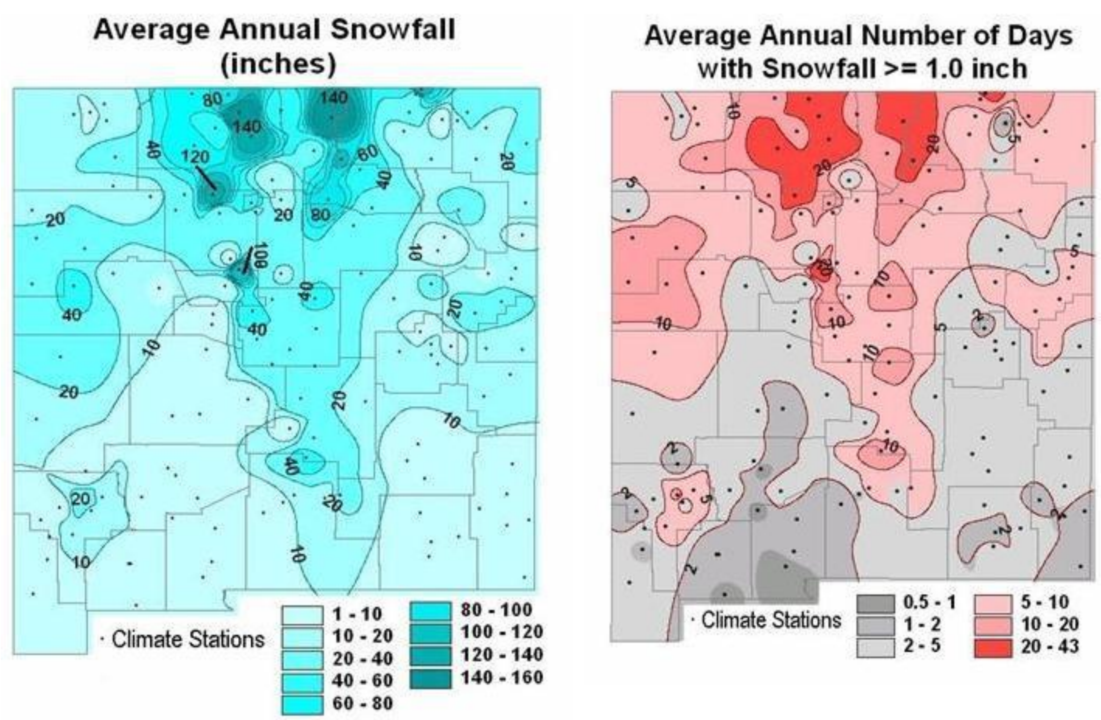
A severe winter storm for New Mexico as defined by the National Weather Service: four or more inches of snowfall below 7,500 feet or six or more inches of snowfall above 7,500 feet in a 12 hour period, or six or more inches of snowfall below 7,500 feet or nine inches of snowfall above 7,500 feet in a 24 hour period.

Most winter precipitation in New Mexico is associated with Pacific Ocean storms as they move across the state from west to east. As the storms move inland, moisture falls on the coastal and inland mountain ranges of California, Nevada, Arizona, and Utah. If conditions are right, the remaining moisture falls on the slopes of New Mexico's high mountain chains.

Much of the precipitation that falls as snow in the mountain areas may occur as either rain or snow in the valleys. The average annual snowfall ranges from about 3 inches in the southern desert and southeastern plains to over 100 inches in the northern mountains (Figure 14). It can, on rare occasions, exceed 300 inches in the highest mountains. January is usually the coldest month, with average daytime temperatures ranging from the middle 50s in the southern and central valleys to the middle 30s in the higher elevations. Minimum temperatures below freezing are common in all sections of the state during the winter. Subzero temperatures are rare, except in the mountains. The lowest temperature ever officially recorded was -50° F at Gavilan on February 1st, 1951. An unofficial low temperature of -57° F at Ciniza was reported by the press on January 13th, 1963.

(Source: http://www.wrcc.dri.edu/narratives/NEWMEXICO.htm)

Figure 14: Statewide Snowfall Distributions



Source: National Weather Service, Albuquerque Office

Overall, the State of New Mexico averages over three winter storm events every year, which equals an annual probability of 100%. UNM Main Campus RMSS reported that between 1999 and 2009, three winter weather events caused more than $2M in property damages. No official records were maintained describing the actual events.

The UNM Main, branch campuses (Gallup, Los Alamos, Taos, Valencia) and Sevilleta LTER Field Station have limited or no winter storm data documented, it is important to recognize past occurrences from those counties where UNM campuses are located. Table 8 provides an overview of the number of events and costs based on past winter storms recorded. As with State and County jurisdictions, all UNM campuses can be affected by winter storm events. Referencing figure 14, the average snowfall UNM campuses could receive range from 1 to 40 inches of snow. UNM Campuses located in higher elevations (Los Alamos and Taos UNM Campuses) could receive up to 60 inches in a given year. Recognizing UNM's data deficiency for collecting past natural hazard events, this information reinforces the fact that the probability of a winter storm causing structure damage or risking life safety are considered low. Data deficiencies do exist and in the next 5 years, UNM will gather data to support occurrences and enhanced mitigation strategies and actions. Future updates to the mitigation plan will include a more in-depth review of high wind events at branch campuses based on the mitigation strategies developed.

Table 8: Winter Storm Events in Counties Where UNM Campuses are Located

Hazards	Bernalillo County (UNM Main)		McKinley County (UNM Gallup Branch Campus)		Los Alamos County (UNM Los Alamos Branch Campus)		Taos County (UNM Taos Branch Campus)		Valencia County (UNM Valencia Branch Campus)		Socorro County (Sevilleta LTER Field Station)	
	Events	**$**	**Events**	**$**	**Events**	**$**	**Events**	**$**	**Events**	**$**	**Events**	**$**
Winter Storm	0	0	0	0	0	0	0	0	0	0	0	0

Data is derived from the NCDC database (01/01/1950 and 02/28/2010)

(This page intentionally left blank)

High Wind

Wind is defined as the movement of air relative to the earth's surface. In the mainland U.S., the mean annual wind speed is reported to be 8 to12 MPH, with frequent speeds of 50 MPH and occasional wind speeds greater than 70 MPH. Large-scale extreme wind phenomena are experienced over every region of the United States and its territories. High winds can result from thunderstorm inflow and outflow, or downburst winds when the storm cloud collapses, and can result from strong frontal systems, or gradient winds (high or low-pressure systems) moving across a region. High winds are defined as speeds reaching 50 MPH or greater, either sustained (continuous) or gusting.

While scales exist to measure the effects of wind, they can be conflicting or leave gaps in the information. For the purposes of this plan, we use the Beaufort Wind Scale (BWS) (Table 9) because it is specifically adapted to wind effects on land.

Table 9: Beaufort Wind Scale

Beaufort Wind Scale			
Beaufort Number	**Wind Speed mph**	**Description**	**Land Conditions**
0	0	Calm	Calm. Smoke rises vertically.
1	1-3	Light air	Wind motion visible in smoke.
2	4-7	Light breeze	Wind felt on exposed skin. Leaves rustle.
3	8-12	Gentle breeze	Leaves and smaller twigs in constant motion.
4	13-18	Moderate breeze	Dust and loose paper rises. Small branches begin to move.
5	19-24	Fresh breeze	Smaller trees sway.
6	25-31	Strong breeze	Large branches in motion. Whistling heard in overhead wires. Umbrella use becomes difficult.
7	32-38	Near gale	Whole trees in motion. Effort needed to walk against the wind.
8	39-46	Gale	Twigs broken from trees. Cars veer on road.
9	47-54	Strong gale	Light structure damage.
10	55-63	Storm	Trees uprooted. Considerable structural damage.
11	64-73	Violent storm	Widespread structural damage.
12	73-95	Hurricane	Considerable and widespread damage to structures.

All areas of the state can experience all 12 Beaufort categories. As used in this section, windstorms are both high velocity straight-line winds and violent wind gusts not associated with thunderstorms. Dust storms are strong windstorms that fill the air with thick dust, sometimes reducing visibility to resemble a dense fog. Other wind events include wet or dry microbursts that may produce damaging convective winds and dust devils even on a clear and otherwise calm day.

No UNM Campus is immune from damaging high winds. High wind is a fact of life, especially in the spring. Extremely high velocity wind over a prolonged period is rare.

Such occurrences can result in downed power lines, roof damage, trees being blown down, and difficulty in controlling high profile vehicles on the highways. Microburst wind damage is more common, since it is often associated with powerful downdrafts originating from thunderstorms. These winds are of relatively short duration. Certain areas of the state are subject to hazardous dust storms when high winds blow over terrain that is relatively devoid of vegetation. Localized dust storms can arise unexpectedly when high winds pick up dust and debris from construction sites.

One type of wind event is the gap or canyon wind. This occurs as the wind rushes over mountain passes, “gaps,” in the ridgeline of a mountain chain. Wind speeds are generally strongest at narrow canyon openings. Another type of wind event is referred to as the spillover wind, which occurs when cold air to the east of the mountains has a sufficient depth (approximately 10,000 feet above sea level) to overtop the Sandia and Manzano Mountain ranges and spill over to the west, typically down slope toward the UNM Main Campus (Albuquerque metropolitan area).

The central Rio Grande valley is occasionally subject to mountain wave-induced winds, which can become exceptionally strong. One such wave-induced windstorm occurred in December 1987 when surface winds with gusts between 50 and 70 MPH were reported at the airport in Albuquerque. Wind reports from around the Albuquerque metro area included a peak wind of 71 MPH at the airport, 97 MPH at the base of the Sandia Tramway and gusts between 80 and 90 MPH.

Between 1999 and 2009, UNM Risk Management and Safety reported 11 high wind events that caused over $242K in property damages on the main campus. As for UNM branch campuses (Gallup, Los Alamos, Taos, Valencia) and Sevilleta LTER Field Station no data exists for high wind damage. Though hazard data has not been consistently collected by UNM on the other branch campuses, it is important to include past occurrences from those counties where UNM campuses are located.

Table 10: High Wind Events in Counties Where UNM Campuses are Located

Hazards	Bernalillo County (UNM Main)		McKinley County (Gallup Branch Campus)		Los Alamos County (Los Alamos Branch Campus)		Taos County (Taos Branch Campus)		Valencia County (Valencia Branch Campus)		Socorro County (Sevilleta LTER Field Station)	
	Events	**$**	**Events**	**$**	**Events**	**$**	**Events**	**$**	**Events**	**$**	**Events**	**$**
High Wind	1	0	0	0	0	0	0	0	1	0	0	0

Data is derived from the NCDC database (01/01/1950 and 02/28/2010)

As with State and County jurisdictions, all UNM campuses can be affected by high wind storm events. Referencing table 9, UNM campuses could experience high wind events between 0 and 63 mph. Table 10 provides an overview of the number of events and costs based on the specific hazard. Recognizing this data deficiency for collecting past high wind events, this information reinforces the fact that the probability of a high wind event causing some type of concern is identified as being low on the branch campuses and the Sevilleta LTER Field Station. UNM main campus identifies high winds as being medium based on past occurrence recorded. Data deficiencies do exist and in the next

5 years, UNM will gather data to support occurrences and enhanced mitigation strategies and actions. Future updates to the mitigation plan will include a more in-depth review of high wind events at branch campuses based on the mitigation strategies developed.

(This page intentionally left blank)

Extreme Heat

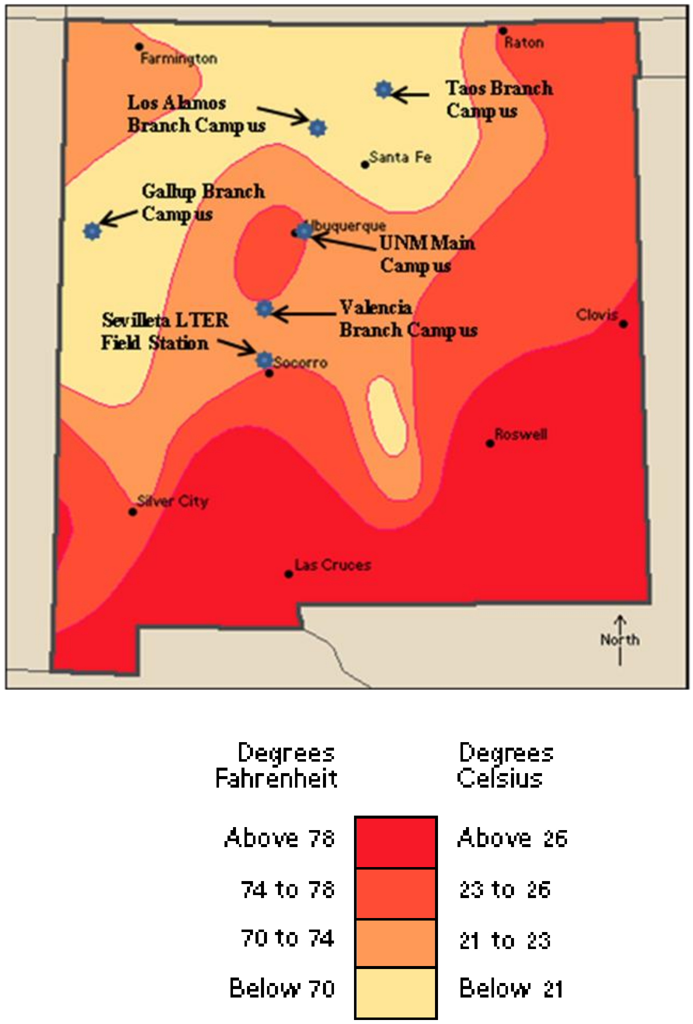
Extreme heat, or heat wave, is defined by the NWS as a temperature of 10° F or more above the average high temperature for the region, lasting for several weeks. This condition is definitely a public health concern. During extended periods of very high temperatures or high temperatures with high humidity, individuals can suffer a variety of ailments, including heatstroke, heat exhaustion, heat syncope, and heat cramps.

- **Heatstroke** is a life threatening condition that requires immediate medical attention. It exists when the body's core temperature rises above 105° F as a result of environmental temperatures. Patients may be delirious, stuporous, or comatose. The death-to-care ratio in reported cases in the U.S. averages about 15%
- **Heat exhaustion** is much less severe than heatstroke. The body temperature may be normal or slightly elevated. A person suffering from heat exhaustion may complain of dizziness, weakness, or fatigue. The primary cause of heat exhaustion is fluid and electrolyte imbalance. The normalization of fluids will typically alleviate the situation
- **Heat syncope** is typically associated with exercise by people who are not acclimated to exercise. The symptom is a sudden loss of consciousness. Consciousness returns promptly when the person lies down. The cause is primarily associated with circulatory instability because of heat. The condition typically causes little or no harm to the individual
- **Heat cramps** are typically a problem for individuals who exercise outdoors but are unaccustomed to heat. Similar to heat exhaustion, it is thought to be a result of a mild imbalance of fluids and electrolytes

The elderly, disabled, and debilitated are especially susceptible to heat stroke. Large and highly urbanized cities can create an island of heat that can raise the area's temperature by 3 to 5° F. Therefore, urban communities with substantial populations of elderly, disabled, and debilitated people could face a significant medical emergency during an extended period of excessive heat. The highest temperature recorded in New Mexico is 122° F on June 27th, 1994, at the WIPP site.

New Mexico is partially an arid desert state, and summer temperatures often exceed the 100° F mark under normal conditions. Nighttime temperatures are typically cool due to low humidity, and even though daytime temperatures may be high, people experience relief at night. Heat waves in which daily high temperatures exceed 110° F for many days in a row are rare. Such a heat wave in the higher altitudes would probably have a more damaging effect because people would not be expecting such hot conditions. However, anywhere in the state that experienced the humidity/temperature combination could suffer ill effects from the event. A heat wave would also have a drying effect on vegetation, facilitating the ignition of wildfires. If a heat wave were coupled with a power failure, the effect on the population would be much more severe due to a lack of air conditioning. In general, it is safe to say that there is no area of the state that is immune from the hazard of heat wave (Figure 15).

Figure 15: Temperature Map of New Mexico with UNM Main and Branch Campuses

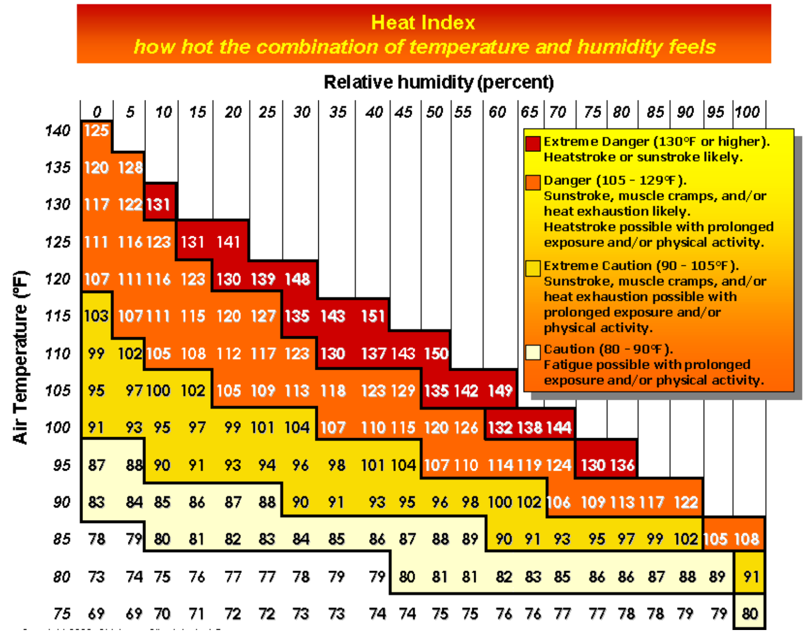


Source: www.worldbook.com

A unique aspect to extreme heat in New Mexico is the fact that UVB radiation also increases with increasing altitude, or distance above the surface of the earth. For every 1,000 feet of altitude, the UV radiation increases by about 4%. This means that approximately 20% more UV radiation reaches the earth's surface in Santa Fé, than in a city that is at similar latitude but at sea level. This can exacerbate heat effects at high altitude.

In 1979, meteorologist R.G. Steadman developed a heat index (Table 11) to illustrate the risks associated with extreme summer heat.

Table 11: Heat Index



Source: http://www.ima.army.mil/southwest/sites/divisions/Safety/Heat%20Index.gif

According to the Office of the Medical Investigator, there are no recorded events of extreme heat causing death or injury within the State of New Mexico. UNM Main and branch campuses (Gallup, Los Alamos, Taos, Valencia) and the Sevilleta LTER Field Station have not recorded past extreme heat events and consider this natural hazard as being low. Researching past extreme heat events in the jurisdictions where UNM campuses are located (Table12) those jurisdictions have not identified extreme heat events.

Table 12: Extreme Heat Events in Counties Where UNM Campuses are Located

Hazards	**Bernalillo County** (UNM Main)		**McKinley County** (UNM Gallup Branch Campus)		**Los Alamos County** (UNM Los Alamos Branch Campus)		**Taos County** (UNM Taos Branch Campus)		**Valencia County** (UNM Valencia Branch Campus)		**Socorro County** (Sevilleta LTER Field Station)	
	Events	**$**	**Events**	**$**	**Events**	**$**	**Events**	**$**	**Events**	**$**	**Events**	**$**
Extreme Heat	0	0	0	0	0	0	0	0	0	0	0	0

Data is derived from the NCDC database (01/01/1950 and 02/28/2010)

As with State and County jurisdictions who were to be affected by an extreme heat event the same would hold true for all UNM campuses as being equally affected by extreme heat events. Referencing the map in Figure 15, UNM Campus' can experience average summer temperatures from 70 to well over 78 degrees with some jurisdictions reporting up to 100 degrees. Data deficiencies do exist and in the next 5 years, UNM will gather data to support occurrences and enhanced mitigation strategies and actions. Future updates to the mitigation plan will include extreme heat events documented experienced by UNM campuses.

Tornadoes

A tornado is an intense rotating column of air, extending from a thunderstorm cloud system. Average winds in a tornado, although never accurately measured, are thought to range between 100 and 200 mph, but some may have winds exceeding 300 mph. The following are NWS definitions of a tornado and associated terms:

- **Tornado** - A violently rotating column of air that is touching the ground
- **Funnel cloud** - A rapidly rotating column of air that does not touch the ground
- **Downburst** - A strong downdraft, initiated by a thunderstorm, which induces an outburst of straight-line winds on or near the ground. They may last anywhere from a few minutes in small-scale microbursts to periods of up to 20 minutes in larger, longer macro-bursts. Wind speeds in downbursts can reach 150 MPH and therefore can result in damages similar to tornado damages

Tornadoes are classified by the degree of damage they cause (Table 13).

Table 13: Fujita Tornado Damage Scale

Fujita Scale

F-Scale Number	Intensity Phrase	Wind Speed	Type of Damage
F0	Gale tornado	40-72 mph	Some damage to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damages signboards.
F1	Moderate tornado	73-112 mph	The lower limit is the beginning of hurricane wind speed; peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off the roads; attached garages may be destroyed.
F2	Significant tornado	113-157 mph	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated.
F3	Severe tornado	158-206 mph	Roof and some walls torn off well constructed houses; trains overturned; most trees in forest uprooted
F4	Devastating tornado	207-260 mph	Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.
F5	Incredible tornado	261-318 mph	Strong frame houses lifted off foundations and carried considerable distances to disintegrate; automobile sized missiles fly through the air in excess of 100 meters; trees debarked; steel reinforced concrete structures badly damaged.
F6	Inconceivabl e tornado	319-379 mph	These winds are very unlikely. The small area of damage they might produce would probably not be recognizable along with the mess produced by F4 and F5 wind that would surround the F6 winds. Missiles, such as cars and refrigerators would do serious secondary damage that could not be directly identified as F6 damage. If this level is ever achieved, evidence for it might only be found in some manner of ground swirl pattern, for it may never be identifiable through engineering studies

(Source: http://en.wikipedia.org/wiki/Fujita_scale)

On February 1st, 2007, the Fujita scale was decommissioned in favor of the more accurate Enhanced Fujita Scale, shown in Table14, which replaces it. None of the tornadoes recorded on or before January 31st, 2007 will be re-categorized. Therefore maintaining the Fujita scale will be necessary when referring to previous events.

Table 14: Enhanced Fujita Scale

Enhanced Fujita (EF) Scale		
Enhanced Fujita Category	**Wind Speed (mph)**	**Potential Damage**
EF0	65-85	**Light damage.** Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over.
EF1	86-110	**Moderate damage.** Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.
EF2	111-135	**Considerable damage.** Roofs torn off well-constructed houses; foundations of frame homes shifted; mobile homes completely destroyed; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
EF3	136-165	**Severe damage.** Entire stories of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown; structures with weak foundations blown away some distance.
EF4	166-200	**Devastating damage.** Well-constructed houses and whole frame houses completely leveled; cars thrown and small missiles generated.
EF5	>200	**Incredible damage.** Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 m (109 yd); high-rise buildings have significant structural deformation; incredible phenomena will occur.
source: http://en.wikipedia.org/wiki/Enhanced_Fujita_Scale		

The **Enhanced Fujita Scale**, or **EF Scale**, now is the scale for rating the strength of tornadoes in the United States estimated via the damage they cause. The scale has the same basic design as the original Fujita scale, six categories from zero to five representing increasing degrees of damage. It was revised to reflect better examinations of tornado damage surveys, so as to align wind speeds more closely with associated storm damage. The new scale takes into account how most structures are designed, and is thought to be a much more accurate representation of the surface wind speeds in the most violent tornadoes.

(Source: http://en.wikipedia.org/wiki/Enhanced_Fujita_Scale)

Nearly 70% of the deaths from tornadoes occur inside residential structures. Of these, over 40% are located in mobile homes, which are easily overturned and destroyed due to the low wind resistance of the structure.

A tornado path averages four miles, but on rare occasions may reach up to 300 miles in length. Widths average 300-400 yards, but severe tornadoes have cut swaths a mile or more in width, or have formed groups of two or three funnels traveling together. On average, tornadoes move between 25 and 45 MPH, but speeds of up to 70 MPH over land have been reported. Tornadoes rarely last more than a couple of minutes over a spot, or more than 15-20 minutes in a 10-mile area.

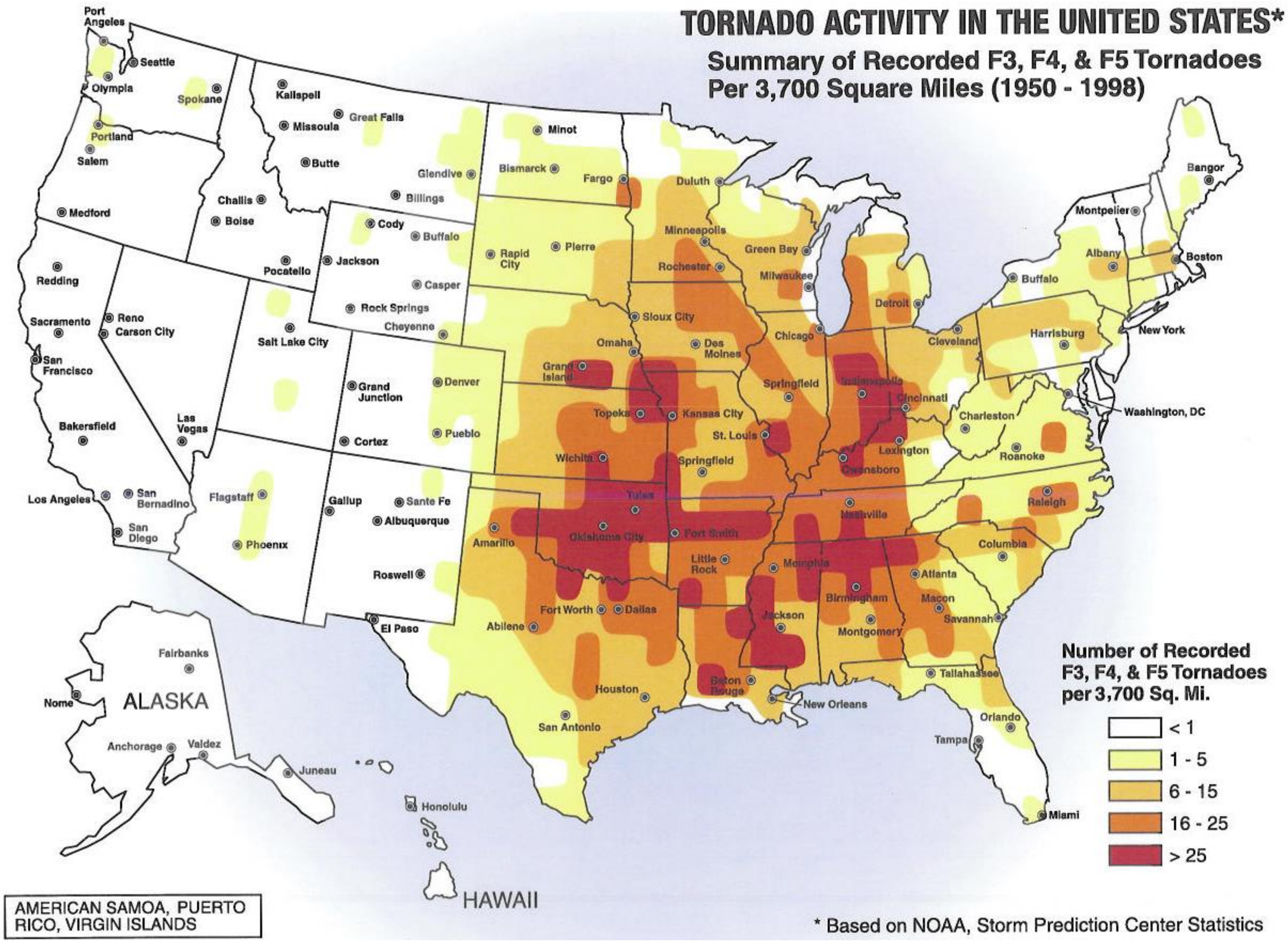
Damages from tornadoes result from extreme wind pressure and windborne debris. Because tornadoes are generally associated with severe storm systems, they are often accompanied by hail, torrential rain, and intense lightning. Depending on their intensity, tornadoes can uproot trees, bring down power lines, and destroy buildings. Flying debris is the main cause of serious injury and death.

The State of New Mexico lies along the southwestern edge of the nation's maximum frequency belt for tornadoes, often referred to as “tornado alley,” which extends from the Great Plains through the central portion of the U.S. (Figure 16). Broadly speaking, the eastern portions of New Mexico have a higher frequency of tornadoes; however, every county in the state has the potential to experience tornadoes making UNM Campus and Branches susceptible to being in the path of a tornado. The publication “FEMA 320 Taking Shelter from the Storm”, March 2004, presents a method whereby residents can determine their tornado risk (Table 15).

Table 15: Tornado Risk Table

		Wind Zone			
		I	**II**	**III**	**IV**
Number of Tornadoes per3,700 Square Miles (See Figure 6)	**<1**	**Low Risk**	**Low Risk**	**Low Risk**	**Moderate Risk**
	1-5	**Low Risk**	**Moderate Risk**	**High Risk**	**High Risk**
	6-10	**Low Risk**	**Moderate Risk**	**High Risk**	**High Risk**
	11-15	**High Risk**	**High Risk**	**High Risk**	**High Risk**
	>15	**High Risk**	**High Risk**	**High Risk**	**High Risk**
	Low Risk		**Moderate Risk**		**High Risk**
	High-wind Shelters are a matter of homeowner preference		Shelter should be considered for protection from high winds		Shelter is the preferred method of protection from high winds

Figure 16: Tornado Activity by Square Mile



(Source: htpp://www.fema.gov/plan/prevent/saferoom/tsfs02_torn_activity.shtm)

According to Figure 17, New Mexico has three different tornado risk zones. The far Eastern portion of the state along the Texas border is in Zone III. This means that the UNM Taos Branch Campus could see wind speeds of 200-250 MPH. This would correspond to an EF5. The central portion of the state including, UNM Main Campus, Los Alamos Branch Campus, Taos Branch Campus and Valencia Branch Campus are in Zone II, which corresponds to EF3-4. Meaning these campuses can experience winds of 160-200 MPH. The western portion of the state which accounts for UNM Gallup Branch Campus is located in Zone I. This area can experience tornadic winds of up to 120 MPH, which corresponds to EF0-2 levels. The numbers of tornadoes by county (with UNM Campuses Identified) are identified in the wind zone map in Figure 19.

Figure 17: New Mexico Wind Zones

NOTE: SPECIAL WIND ZONE denotes special wind regions, which along with mountainous terrain and gorges should be examined for unusual wind conditions.

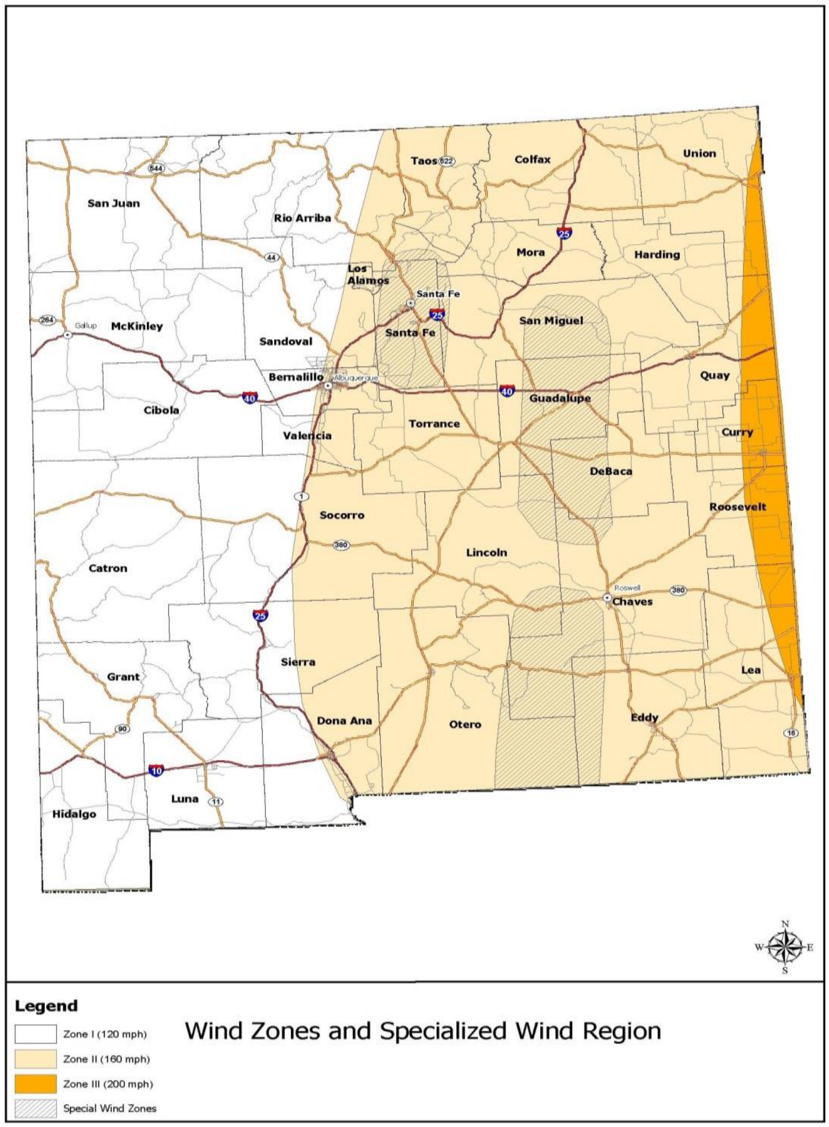
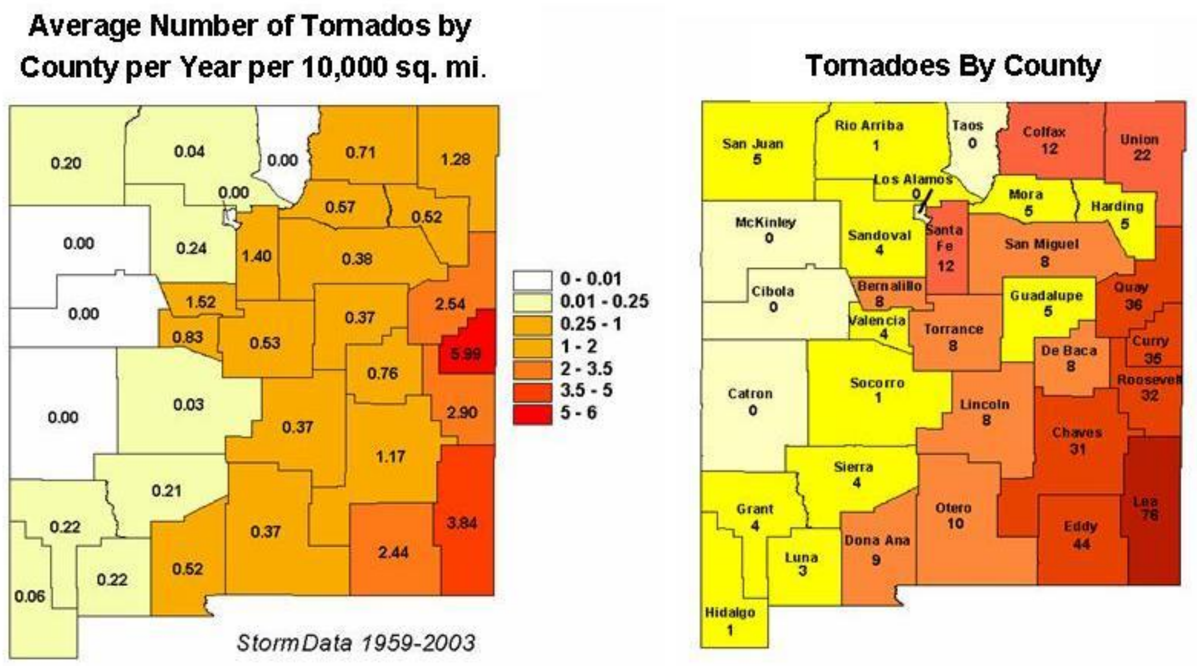


Figure 18: County Distribution of Tornadoes 1959-2003



Source: National Weather Service, Albuquerque Office

Based on Figure 18, UNM Campuses reside in counties that have anywhere from zero to 8 average events. There is no data for the physical range of intensity of a tornado event recorded on any UNM Campus. Hazard analysis responses concluded that no events have occurred on or near UNM main or branch campuses and this hazard is considered low.

(Source: http://www.tornadoproject.com/alltorns/worststs.htm#NM)

Table 16 provides an overview of the number of events and costs based on past tornado events recorded.

Table 16: Tornado Events in Counties Where UNM Campuses are Located

Hazards	Bernalillo County (UNM Main)		McKinley County (UNM Gallup Branch Campus)		Los Alamos County (UNM Los Alamos Branch Campus)		Taos County (UNM Taos Branch Campus)		Valencia County (UNM Valencia Branch Campus)		Socorro County (Sevilleta LTER Field Station)	
	Events	$	Events	$	Events	$	Events	$	Events	$	Events	$
Tornado	11	278K	0	0	0	0	1	10K	6	276K	4	25K

Data is derived from the NCDC database (01/01/1950 and 02/28/2010)

The UNM Main, branch campuses (Gallup, Los Alamos, Taos, and Valencia) and Sevilleta LTER Field Station have not experienced past tornado events. Though UNM has no past history, it is important to recognize past occurrences from those counties where UNM campuses are located.

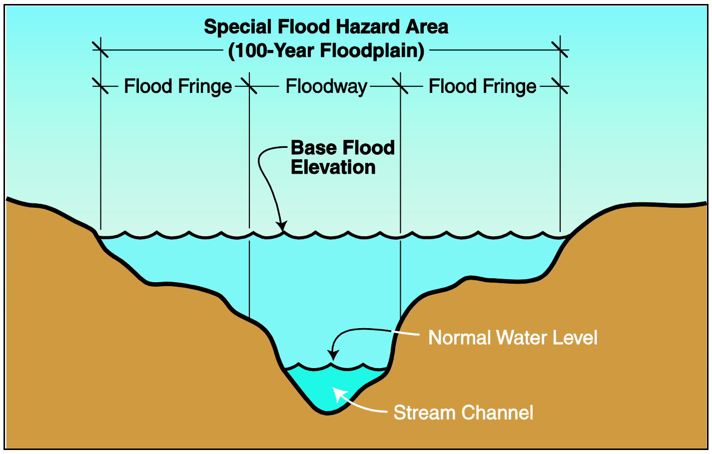
As identified in Figure 17, UNM Taos Branch Campus could see wind speeds of 200-250 MPH corresponding to an EF5. The central portion of the state including, UNM Main Campus, Los Alamos Branch Campus, Taos Branch Campus and Valencia Branch Campus are in Zone II, which corresponds to EF3-4. Meaning these campuses can experience winds of 160-200 MPH. The western portion of the state which accounts for UNM Gallup Branch Campus is located in Zone I. This area can experience tornadic winds of up to 120 MPH, which corresponds to EF0-2 levels.

Data deficiencies do exist and in the next 5 years, UNM will gather data to support occurrences and enhanced mitigation strategies and actions. Future updates to the mitigation plan will include extreme heat events documented experienced by UNM campuses. Future updates to the mitigation plan will include a more in-depth review of high wind events at all UNM campuses based on the mitigation strategies developed.

Floods

Flooding occurs when a river, stream, lake, or other body of water overflows its banks onto normally dry land or there is an excessive pooling of surface water. These events can be slow to develop or happen very quickly (Figure 19).

Figure 19: Flood Definition



Riverine floods are described in terms of their extent (including the horizontal area affected and the vertical depth of floodwaters) and the related probability of occurrence. Flood studies use historical records to determine the probability of occurrence for different extents of flooding. The probability of occurrence (Table 17) is expressed as the percentage chance that a flood of a specific extent will occur in any given year. Flash floods are usually the result of excessive precipitation or rapid snowmelt and can occur suddenly. On the other hand, flash floods cannot be predicted. Alluvial fans and alluvial fan flood hazards exist in the state. Alluvial fan flood hazard characteristics include heavy sediment/debris loads and high velocity flows. Statewide alluvial fan mapping and mitigation actions have been identified for inclusion into future statewide mitigation planning efforts.

Table 17: Flood Probability

Flood Recurrence	Chance of occurrence in any given year
10 year	10%
50 year	2%
100 year	1%
500 year	0.20%

In 1968, Congress created the National Flood Insurance Program (NFIP) in response to the rising cost of taxpayer funded disaster relief for flood victims and the increasing amount of damage caused by floods. The Mitigation Division, a component of the FEMA manages the NFIP, and oversees the floodplain management and mapping components of the Program.

Nearly 20,000 communities across the United States and its territories participate in the NFIP by adopting and enforcing floodplain management ordinances to reduce future flood damage. In exchange, the NFIP makes federally backed flood insurance available to homeowners, renters, and business owners in these communities.

The NFIP Community Rating System (CRS) was implemented in 1990 as a program to recognize and encourage community floodplain management activities that exceed minimum NFIP standards. The National Flood Insurance Reform Act of 1994 codified the CRS in the NFIP. Under the CRS, flood insurance premium rates are adjusted to reflect the reduced flood risk resulting from community activities that meet the three goals of the CRS: (1) reduce flood losses; (2) facilitate accurate insurance rating; and (3) promote the awareness of flood insurance.

Flood damage is reduced by nearly $1B a year through partnerships with NFIP and CRS communities, the insurance industry, and the lending industry. Buildings constructed in compliance with NFIP building standards also suffer approximately 80% less damage annually than those not built in compliance. Further, every $3 paid in flood insurance claims saves $1 in disaster assistance payments.

The NFIP is self-supporting for the average historical loss year, which means that operating expenses and flood insurance claims are not paid for by the taxpayer, but through premiums collected for flood insurance policies. The program has borrowing authority from the U.S. Treasury for times when losses were heavy; however, these loans are usually paid back with interest.

To obtain secured financing to buy, build, or improve structures in Special Flood Hazard Areas (SFHAs), flood insurance must be purchased. Lending institutions that are federally regulated or federally insured must determine if the structure is located in a SFHA and must provide written notice requiring flood insurance.

Flood insurance is available to any property owner located in a community participating in the NFIP. All areas are susceptible to flooding, although to varying degrees. In fact, 25% of all flood claims occur in low-to-moderate risk areas.

The most widely adopted design and regulatory standard for floods in the United States is the 1% annual chance flood and this is the standard formally adopted by FEMA. The 1% annual flood, also known as the base flood elevation, has a 1% chance of occurring in any particular year. It is also often referred to as the “100-year flood” since its probability of occurrence suggests it should only reoccur once every 100 years (although this is not the case in practice). Experiencing a 100-year flood does not mean a similar flood cannot happen for the next 99 years; rather it reflects the probability that over a long period of time, a flood of that magnitude should only occur in 1% of all years.

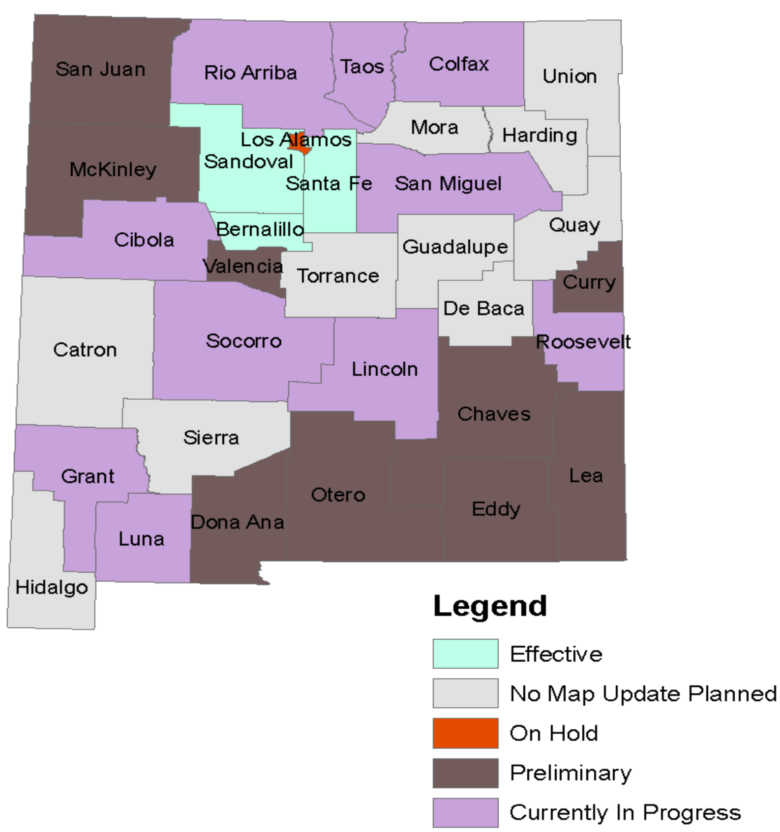
UNM is not a participant in the NFIP, but is insured by the State of New Mexico Property Certificate of Coverage. The policy of insurance is "all risk", subject to exclusions. "Flood" is not exclusion. Some property is excluded, but primary buildings and property are not. Coverage includes money and securities, valuable papers, and vehicles, now existing or hereafter acquired, owned by the Governmental Entity, in the care, custody and control of the Governmental Entity for which the Governmental Entity is legally liable, or for which the Governmental Entity has assumed liability prior to loss wherever situated, not otherwise excluded. The Pubic Property Reserve Fund covers against all risks of direct physical loss or damage not otherwise excluded occurring during the period of the Certificate to covered property, including the expense of removal of debris of covered property damaged by a covered peril.

(Source: State of New Mexico Property Certificate of Coverage, FY 2009, Certificate of Coverage No. 10003 P – Issued 07-01-2008)

Current Status of DFIRMs Maps

Most floodplain maps for the state are very old and in need of revision. Unfortunately, ten of the New Mexico countywide flood hazard maps will remain out outdated. In many cases, the older maps reflect outdated flood hazard information that limits their utility for insurance and floodplain management purposes. Additionally, most of the maps were prepared using road network information and manual cartographic techniques that are now outdated. This makes the maps difficult for State and local customers to use and expensive for FEMA and the State of New Mexico to maintain. However, as a result of the previous four years mapping of efforts New Mexico currently has three completed counties, nine preliminary studies completed and ten studies in process; no mapping activities are planned for ten counties, with one county's study on-hold as directed by the Regional Map Center, as shown below in the Figure 20. New Mexico's goal is to complete the remaining mapping activities in 2008/09.

Figure 20: DFIRMS Status Map



Source: State of New Mexico Flood Map Modernization Case Plan FY2008-9

To assess UNM's Main and Branch Campuses on flashflood vulnerabilities, UNM utilized the talents of EDAC's GIS Specialist who is a Certified Floodplain Manager (CFM). This plan provides flood plain maps of the UNM Main and Branch Campuses (Figures 21 – 25). Flood plain maps for Sevilleta LTER Field Station were unavailable due to the age current maps that exist.

The National Flood Hazard Layer (NFHL) data incorporates all Digital Flood Insurance Rate Map (DFIRM) databases published by FEMA, and any Letters of Map Revision (LOMRs) that have been issued against those databases since their publication date. The DFIRM Database is the digital, geospatial version of the flood hazard information shown on the published paper Flood Insurance Rate Maps (FIRMs). The primary risk classifications used are the 1% annual-chance flood event, the 0.2% annual-chance flood event, and areas of minimal flood risk. The NFHL data are derived from Flood Insurance Studies (FISs), previously published FIRMs, flood hazard analyses performed in support of the FISs and FIRMs, and new mapping data where available. The FISs and FIRMs are published by FEMA. The specifications for the horizontal control of DFIRM data are consistent with those required for mapping at a scale of 1:12,000. The NFHL data contain layers in the Standard DFIRM datasets except for S_Label_Pt and S_Label_Ld. The NFHL is available as State or US Territory data sets. Each State or Territory data set consists of all DFIRMs and corresponding LOMRs available on the publication date of the data set. Special Flood Hazard Boundaries were created from County dFirms where no NFHL coverage was available.

Purpose: The FIRM is the basis for floodplain management, mitigation, and insurance activities for the NFIP. Insurance applications include enforcement of the mandatory purchase requirement of the Flood Disaster Protection Act, which "... requires the purchase of flood insurance by property owners who are being assisted by Federal programs or by Federally supervised, regulated or insured agencies or institutions in the acquisition or improvement of land facilities" (Section 2 (b) (4) of the Flood Disaster Protection Act of 1973). In addition to the identification of Special Flood Hazard Areas (SFHAs), the risk zones shown on the FIRMs are the basis for the establishment of premium rates for flood coverage offered through the NFIP. The NFHL data present the flood risk information depicted on the FIRM in a digital format suitable for use in electronic mapping applications. The NFHL database is a subset of the information created for the FIS and serves as a means to archive a portion of the information collected during the FIS."

Figure 21: UNM Main Campus Flood Zone Map

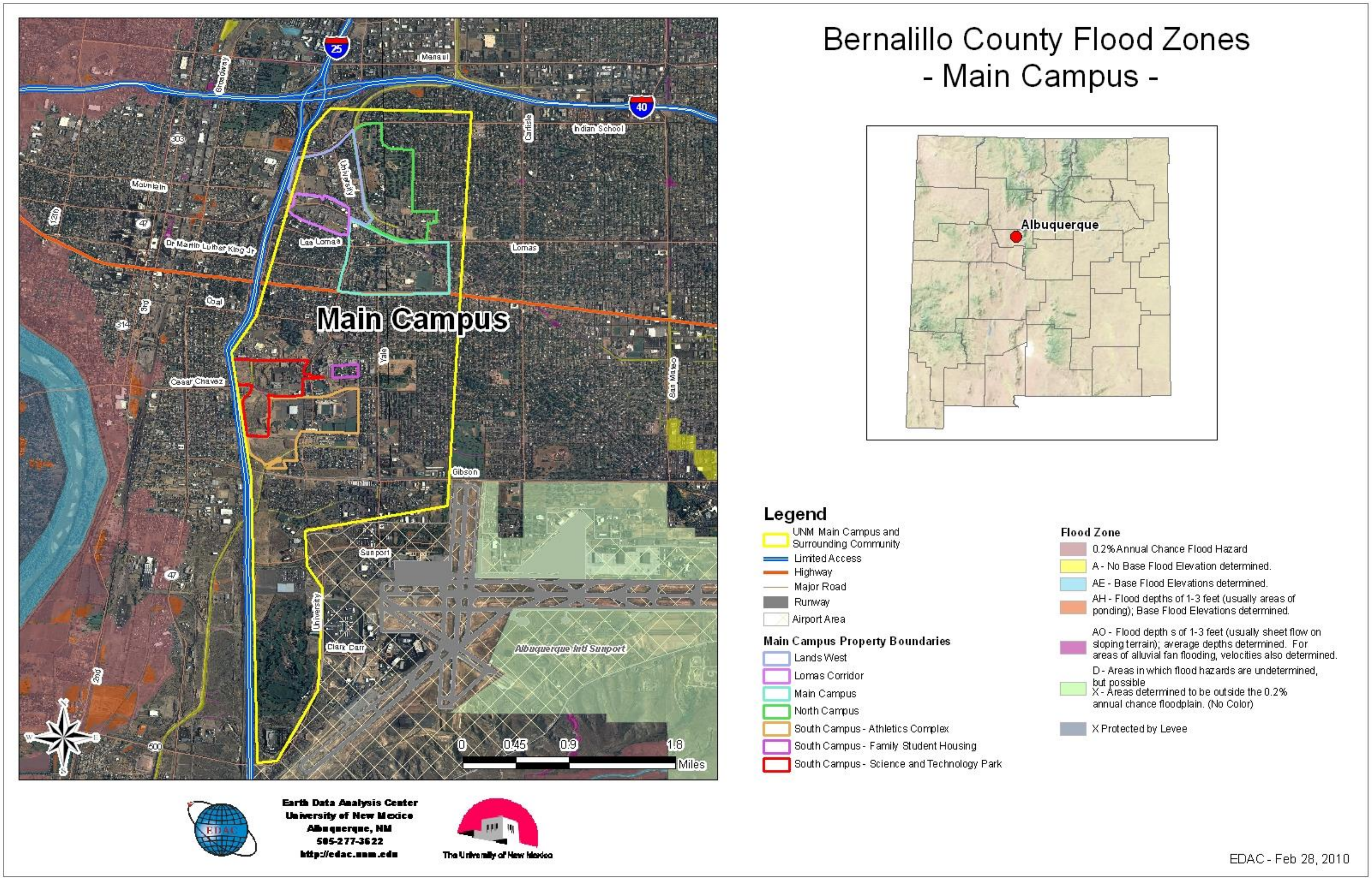


Figure 22: UNM Gallup Campus Flood Zone Map

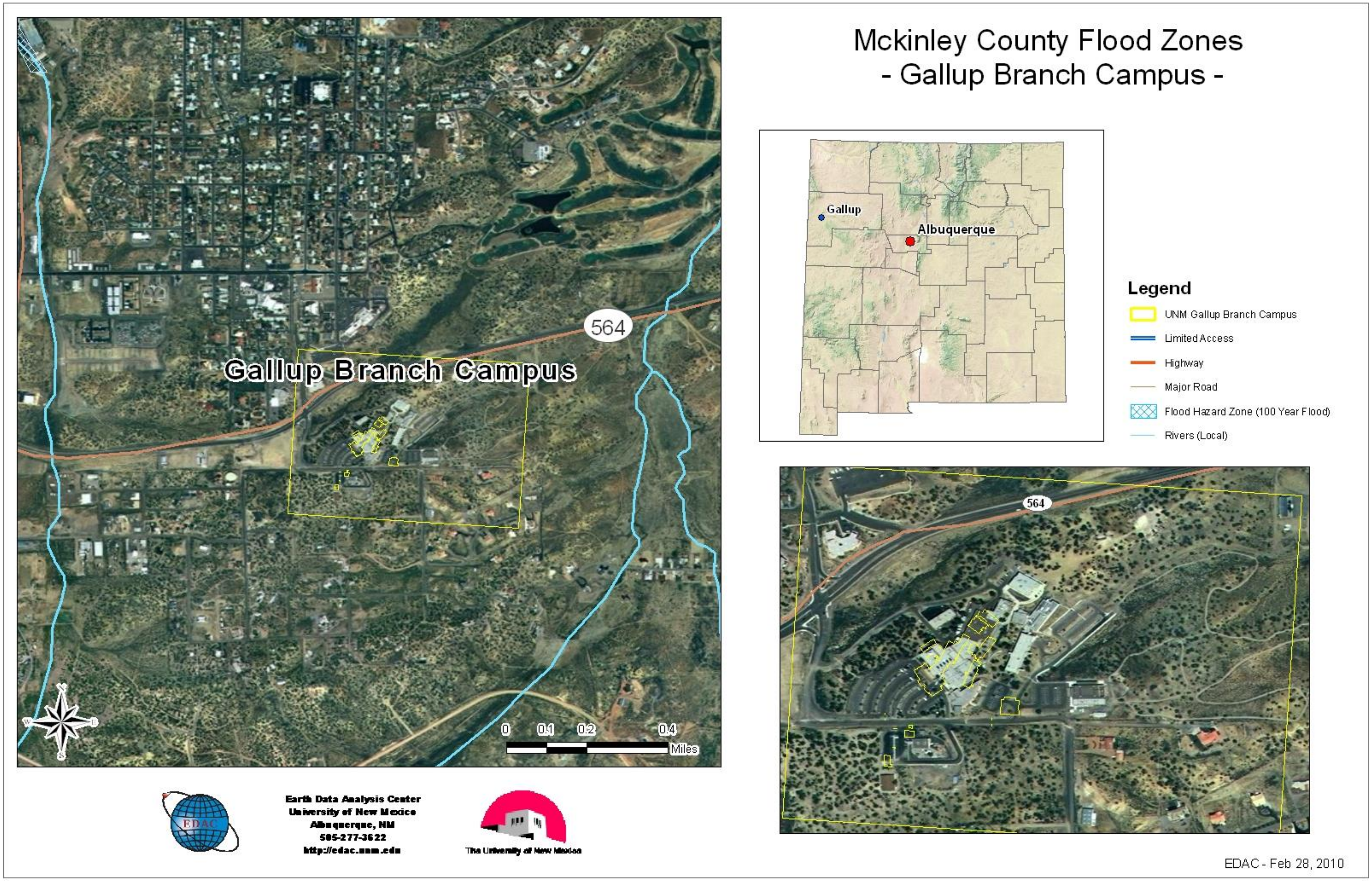


Figure 23: UNM Los Alamos Campus Flood Zone Map

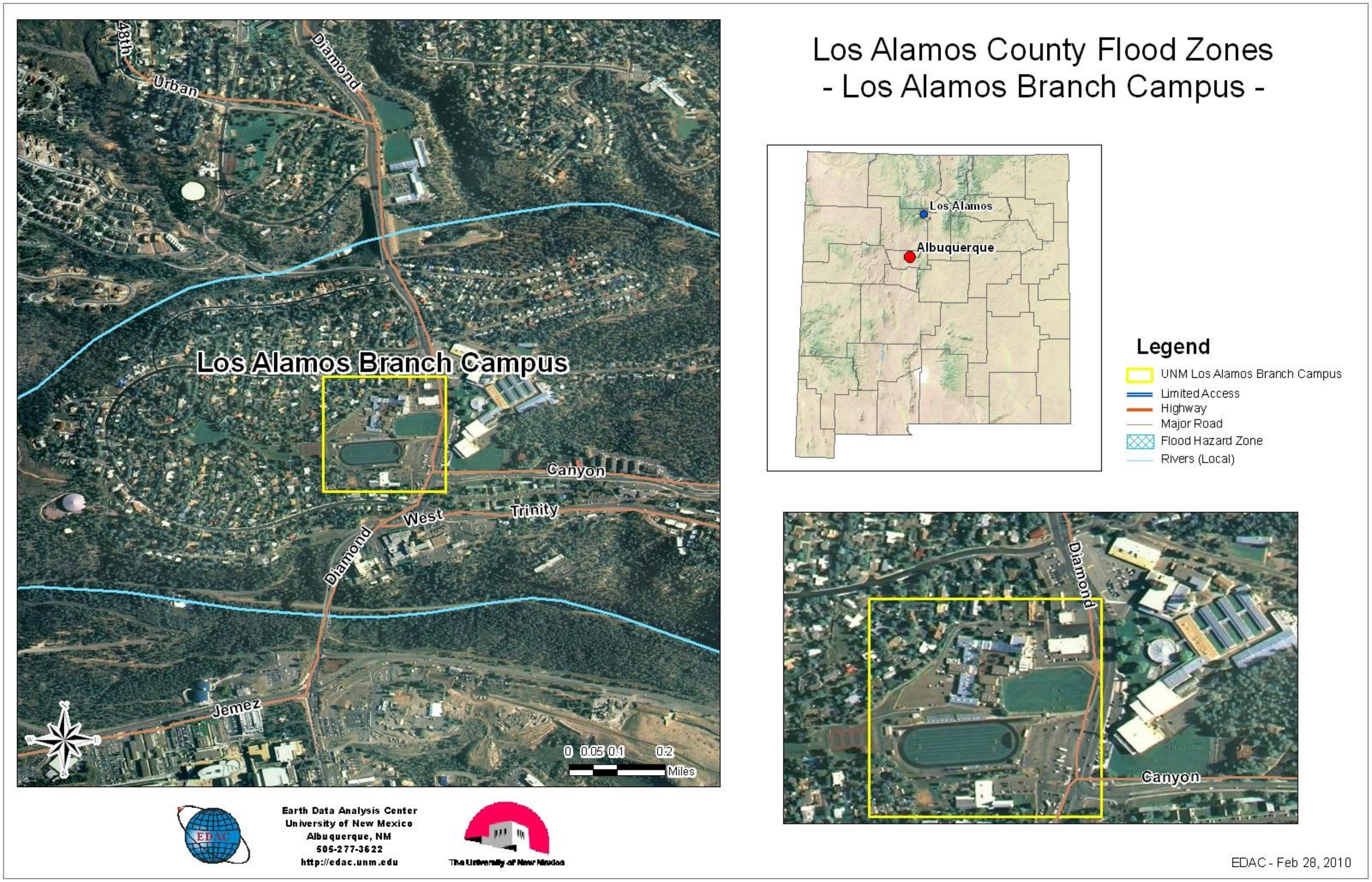


Figure 24: UNM Taos Campus Flood Zone Map

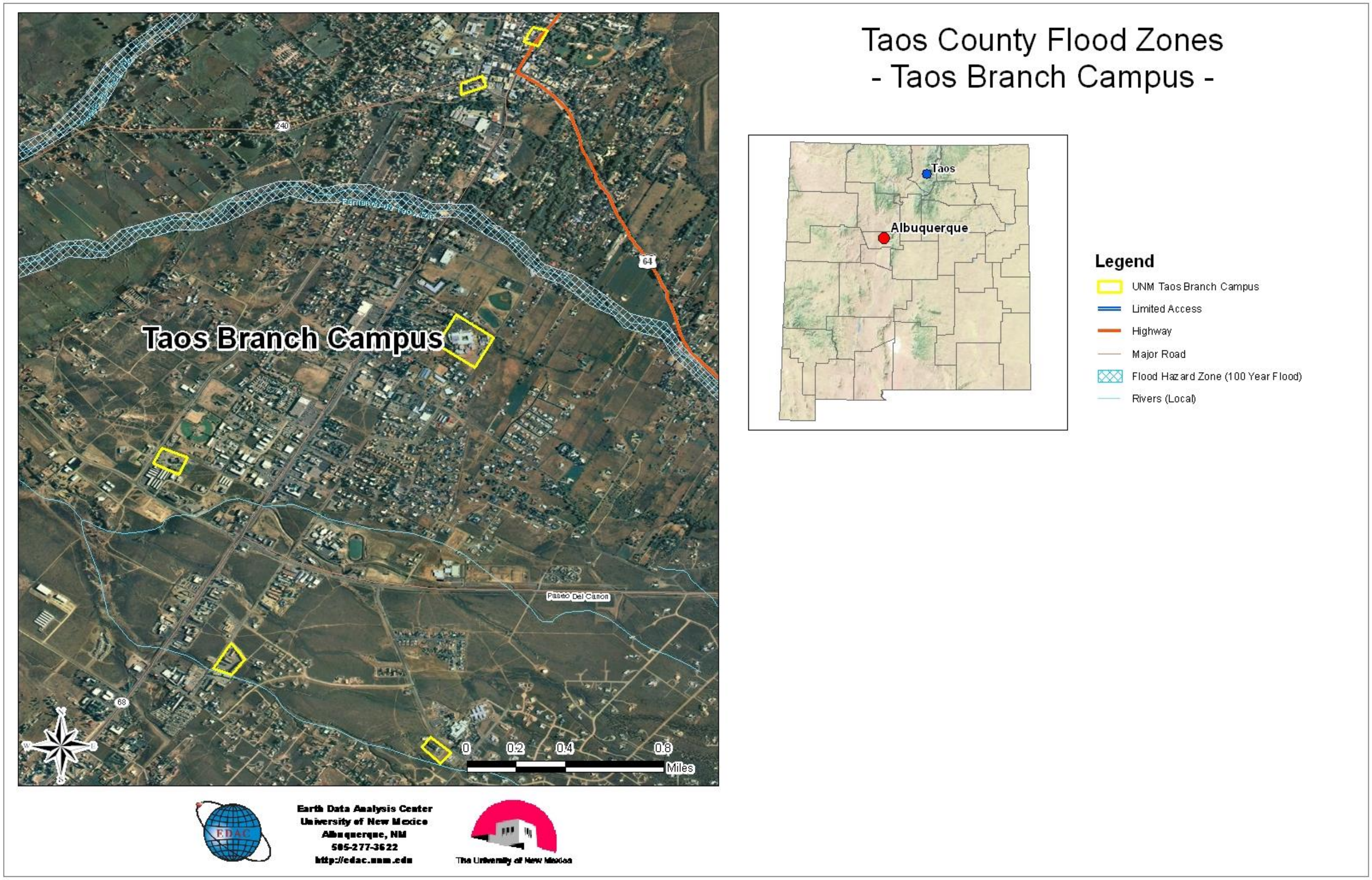


Figure 25: UNM Valencia Campus Flood Zone Map

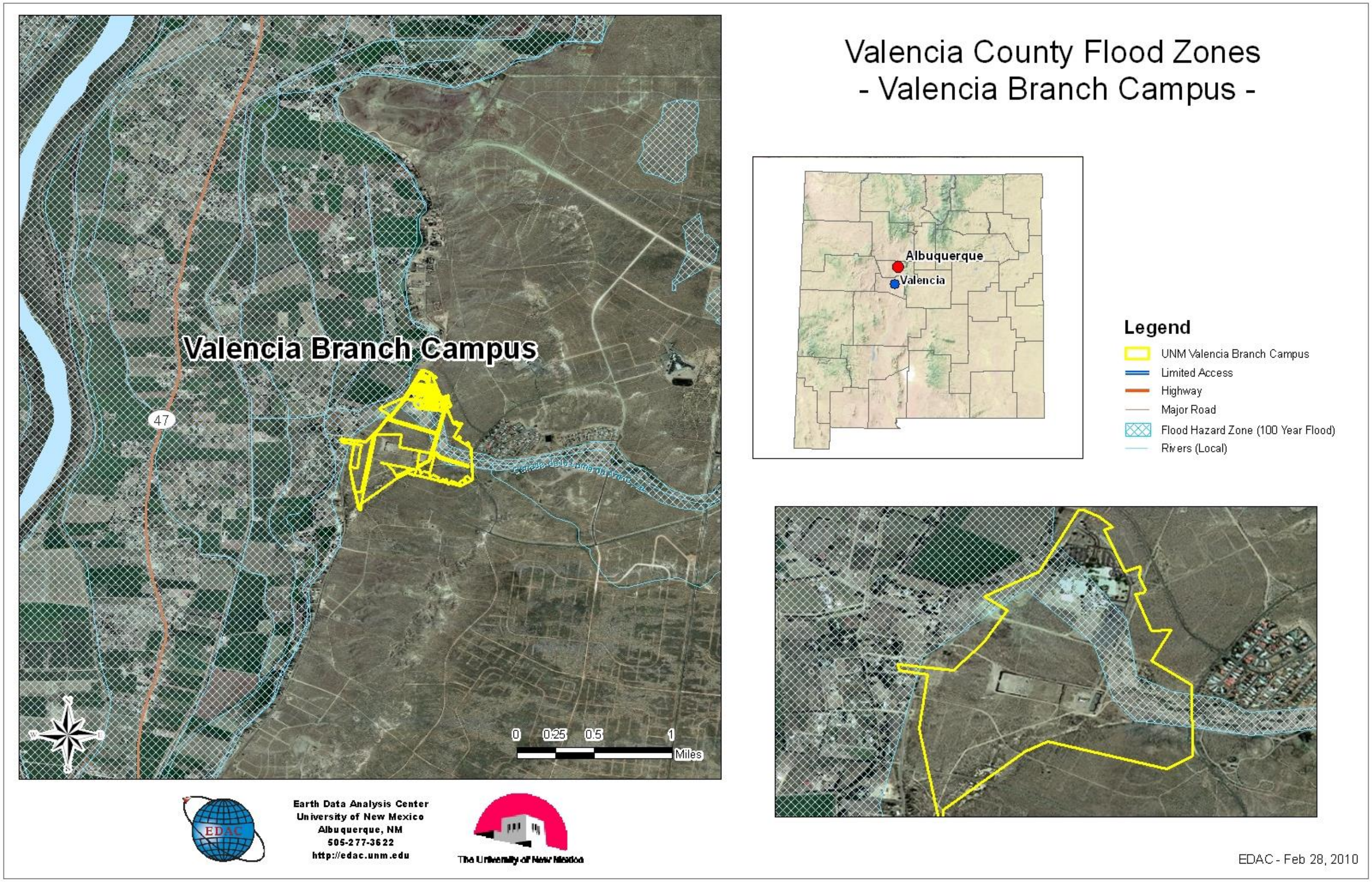


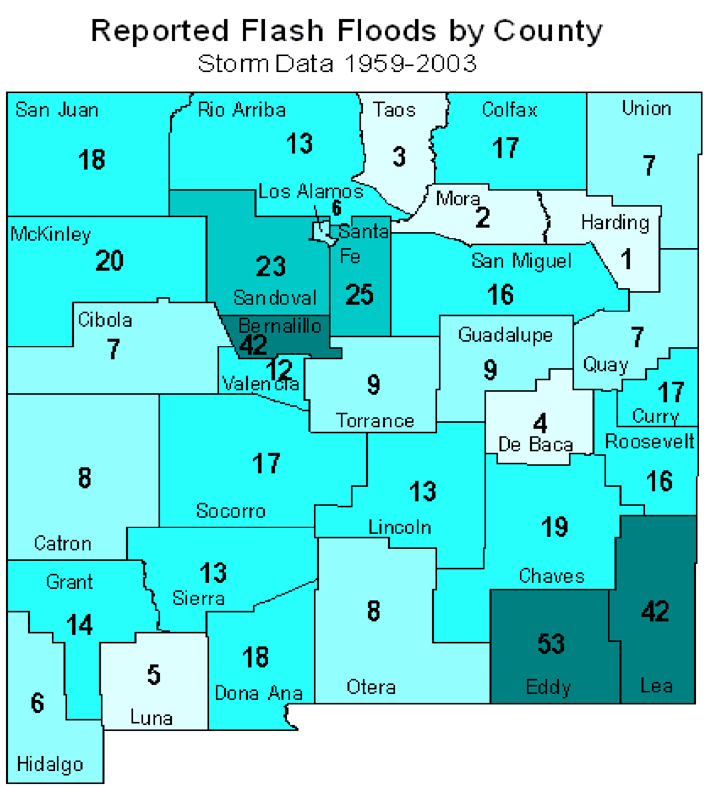
Table 18 lists the major causes of riverine flooding vs. flash flooding. Flash flooding is the second greatest weather hazard in New Mexico. New Mexico ranks 10th in the nation in flash flood deaths per capita, using statistics based on storm data for 1959-2006. The flash flooding problem stems from a number of factors.

Table 18: Flooding vs. Flash Floods - Causes

Riverine Floods	Flash Floods
Low lying, relatively undisturbed topography	Hilly/mountainous areas
High season water tables	High velocity flows
Poor drainage	Short warning times
Excess paved surfaces	Steep slopes
Constrictions – filling	Narrow stream valleys
Obstructions – bridges	Parking lots and other impervious surfaces
Soil characteristics	Improper drainage

During the summer (June through August period), thunderstorm frequency in certain parts of New Mexico is among the highest in the nation. Excessive moisture during the summer can lead to large volume runoffs enhanced by the terrain. Most of the flash floods in New Mexico are associated with the summer monsoon season. Figure 26 identifies flash flooding reported by New Mexico counties. Approximately 60% of all flash floods in the state occur in July and August. The monsoon season generally dissipates in the northern part of the state in early September.

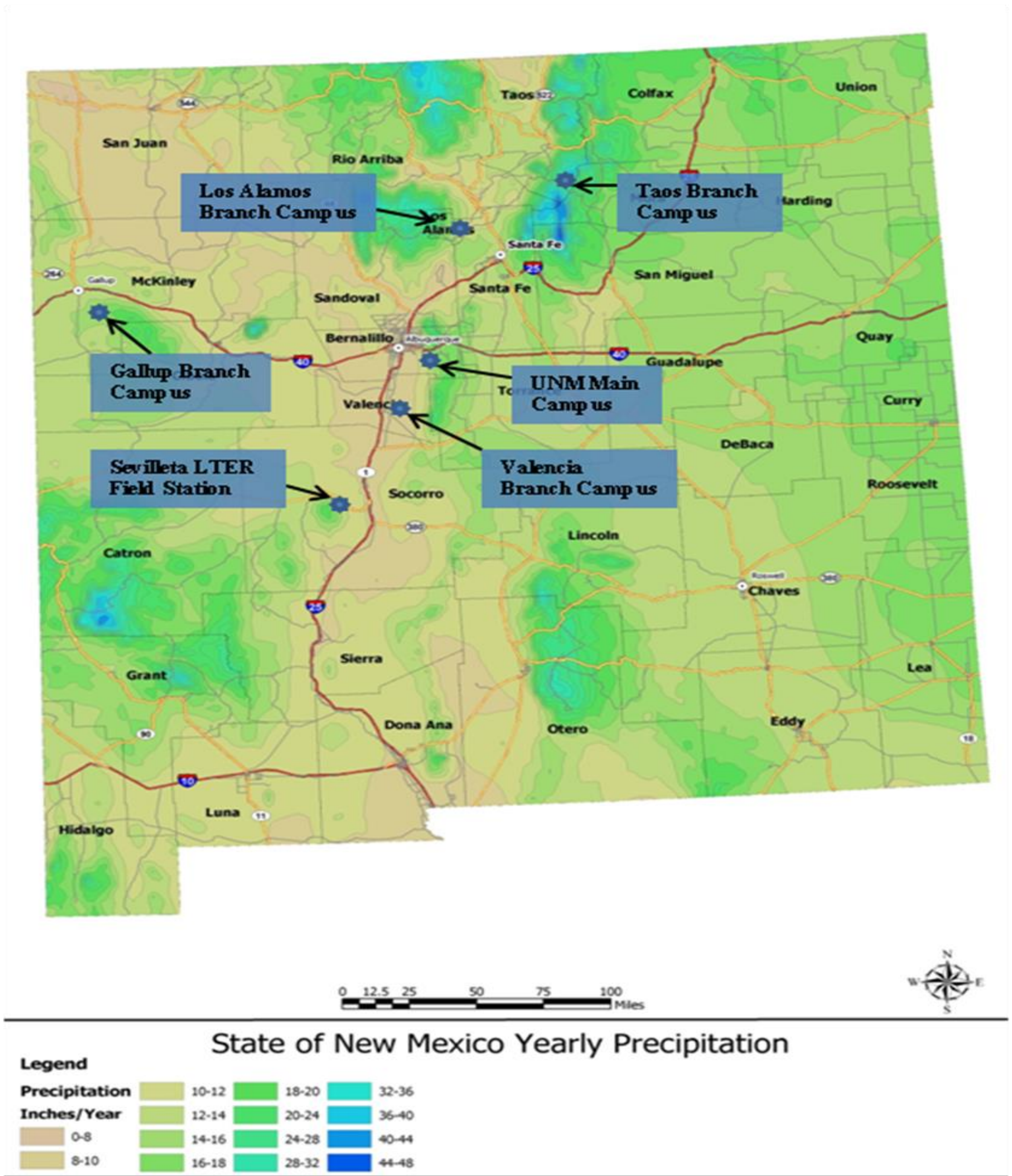
Figure 26: Flash Floods Reported by County, 1959-2003



Source: National Weather Service, Albuquerque Office

In mid to late summer, the pacific winds bring humid subtropical air into the state. Solar heating triggers afternoon thunderstorms that can be devastating. Because of too much rain, in too small an area, in too short a time, flash flooding may result. These flash floods generally travel down arroyos (normally dry streambed) and can involve a rapid rise in water level, high velocity, and large amounts of debris, which can lead to significant damage that includes the uprooting of trees, undermining of buildings and bridges, and scouring new channels. Figure 27 identifies the average annual precipitation received in New Mexico.

Figure 27: Average Annual Precipitation for UNM Main and Branch Campuses



Source: New Mexico Maps and Weather, http://www.nmsu.edu/~linda/weather.htm

The intensity of flash flooding is a function of the intensity and duration of rainfall, steepness of the watershed, stream gradients, watershed vegetation, natural and artificial flood storage areas, and configuration of the streambed and floodplain. Dam failure and ice jams may also lead to flash flooding. Urban areas are increasingly subject to flash flooding due to the removal of vegetation, replacement of ground cover with impermeable surfaces, and construction of drainage systems. Local drainage floods may occur outside of recognized drainage channels or delineated floodplains due to a combination of locally heavy precipitation, a lack of infiltration, inadequate facilities for drainage and storm water conveyance, and increased surface runoff.

Winter flash flood events usually result from unseasonably high-level rain on top of a snow pack. Excessive runoff allows the combined release of the water in the snow pack along with the rain. These can be flash flood events lasting less than a day, or they can evolve into longer-term flooding events lasting from one day to a couple of weeks. Winter flooding occurs between November and February. Most spring flooding events occur between April and June. They vary between winter type events where the rain falls over an old snow pack in or near the mountains to events in the eastern plains, which are often associated with cold fronts, abundant moisture from the Gulf of Mexico, and upslope conditions.

Late summer floods can occur due to hurricane remnants and tropical storms that move over the state from both the Gulf of Mexico and the Pacific Ocean. By the time these remnants reach New Mexico, however, usually the only feature remaining is an abundance of moisture. Hurricane-force winds have long since dissipated. Flash floods frequently occur on alluvial fans with devastating results.

Flash floods have been and will continue to be a significant threat to the State of New Mexico. Though not a specific threat to UNM, faculty and students reside in these areas were local flooding may be of concern. Much has been done over the years to divert the flow of water around the Los Lunas, New Mexico area where the UNM Valencia County Branch Campus is located. Since the construction of the riverside levees, the river has not caused any flooding. Before the construction of levees on the Rio Grande, the river caused extensive flooding. *Hells Canyon Wash* has a drainage area of approximately 165 square miles and caused minor flooding. The Rio Grande Levees from Isleta Pueblo to Belen provide protection against floods to 7,500 cubic feet per second (cfs), which is approximately a 26-year flood event. The 100-year flood in this reach varies from 12,800 cfs at Belen to 14,800 at the Village of Bosque Farms. Though not addressed in the Valencia County Mitigation Plan, the UNM Valencia Branch Campus may have the potential to experience a flood event of 100-year event or worse.

Between 1999 and 2000, UNM Risk Management and Safety reports that the university has experienced two (2) flood events causing more than $59K in damage. Records indentified this flooding was caused by pipes bursting due to age or from freezing due to cold weather events. Discussion with UNM Branch Campuses (Gallup, Los Alamos, Taos and Sevilleta LTER) determined no records exist from a significant flood event. Additionally these locations are not at risk to flood events. Reviewing flood zone maps, Valencia Branch Campus is located very near a flood zone and could risk severe consequences in the event of a 100 year flood. Valencia County is currently going through a floodplain review. Based on the flood risk profile (http://www.floodsmart.gov) UNM Valencia Branch Campus is identified as High. Figures 22 – 23 conclude flood event hazards are a low risk to UNM Campuses with the exception of the Valencia Branch Campus Figure 24. Though a data deficiency on the potential losses does not exist on Valencia Branch Campus, in referencing the Figure 24 map, the campus risks flooding on the west end and through the middle of the campus. A mitigation action will be identified for the branch campus to determine those areas vulnerable to flood losses (mitigation action #50).

Data deficiencies do exist and in the next 5 years, UNM will gather data to support occurrences and enhanced mitigation strategies and actions. Future updates to the mitigation plan will include flood events experienced by UNM campuses. Future updates to the mitigation plan will include a more in-depth review of the risks to the UNM Valencia Branch Campus, strategies and associated mitigation actions.

It is important to recognize past occurrences from those jurisdictions where UNM campuses are located. Table 19 provides an overview of the number of events and costs based on past tornado events recorded. Future updates to the mitigation plan will include a more in-depth review of flood events at branch campuses based on the mitigation strategies developed.

Table 19: Flood Events in Counties Where UNM Campuses are Located

Hazards	Bernalillo County (UNM Main)		McKinley County (UNM Gallup Branch Campus)		Los Alamos County (UNM Los Alamos Branch Campus)		Taos County (UNM Taos Branch Campus)		Valencia County (UNM Valencia Branch Campus)		Socorro County (Sevilleta LTER Field Station)	
	Events	**$**	**Events**	**$**	**Events**	**$**	**Events**	**$**	**Events**	**$**	**Events**	**$**
Flood	31	1.85M	20	209K	7	3.6M	2	5K	6	653K	16	635K

Data is derived from the NCDC database (01/01/1950 and 02/28/2010)

Wildland/Urban Interface Fires

Population increase in New Mexico has resulted in rapid expansion in the periphery of metropolitan areas and in rural areas with visual or recreational appeal. This is increasing the size of the wildland-urban interface (WUI), defined as the area where structures and other human development meet or intermingle with undeveloped wildland. Undeveloped wildland may include brush, marshes, grasslands, forests, or field lands. The expansion of the WUI in recent decades has significant implications for wildfire management. The WUI creates an environment in which fire can move readily between structural and vegetative fuels. Its expansion has increased the likelihood that wildfires will threaten structures and people.

Wildfires can occur at any time of day and during any month of the year, but the peak fire season in New Mexico is normally from March through June. The length of the fire season and the peak months vary appreciably from year to year. Land use, vegetation, amount of combustible materials present, and weather conditions such as wind, low humidity, and lack of precipitation are the chief factors in determining the number of fires and acreage burned. Generally, fires are more likely when vegetation is dry from a winter with little snow and/or a spring and summer with sparse rainfall.

The risk from a wildland fire also depends on the type of fire that occurs. Generally wildland fires involve ground/surface fires or crown fires. A surface fire normally uses debris and grasses on the forest floor for fuel. Types of debris vary, but generally include such things as fallen leaves and needles, twigs, bark, and low to medium shrubs, as well as fallen branches and logs. Historically surface fires are less intense and actually helped keep the forest floor clean thereby reducing the risk of a major fire (Figure 28). Fire suppression, along with other changes in wildland management, has resulted in a higher fuel load on the forest surface and a denser overall forest area.

Figure 28: Changes in Forest Stand Structure

Figure 2—Representation of changes in vertical arrangement and horizontal continuity in forest stand structure. Today's forests tend to have more fuel strata, higher densities of fire-sensitive species and suppressed trees, and greater continuity between surface and crown fuel.

Source: Diagrams from USDA publication "Forest Structure and Fire Hazard in Dry Forest of the Western United States," PNW-GTR-628.

As the surface fuel load has increased, ladder fuels have also increased. Ladder fuel includes small trees and under story shrubs that allow fire to burn into the forest canopy of the larger trees. As fires move into the forest canopy, there is a greater risk of crown fire. A crown fire is considered the most dangerous type of fire to both the forest and human life. Once a fire moves into the tree crowns, it spreads more quickly by wind and jumps from tree to tree. While surface fires can be effectively fought by firefighting efforts at ground level, a crown fire requires a more complicated approach (Figure 29).

Figure 29: Fuelbed Strata of a Forest Environment

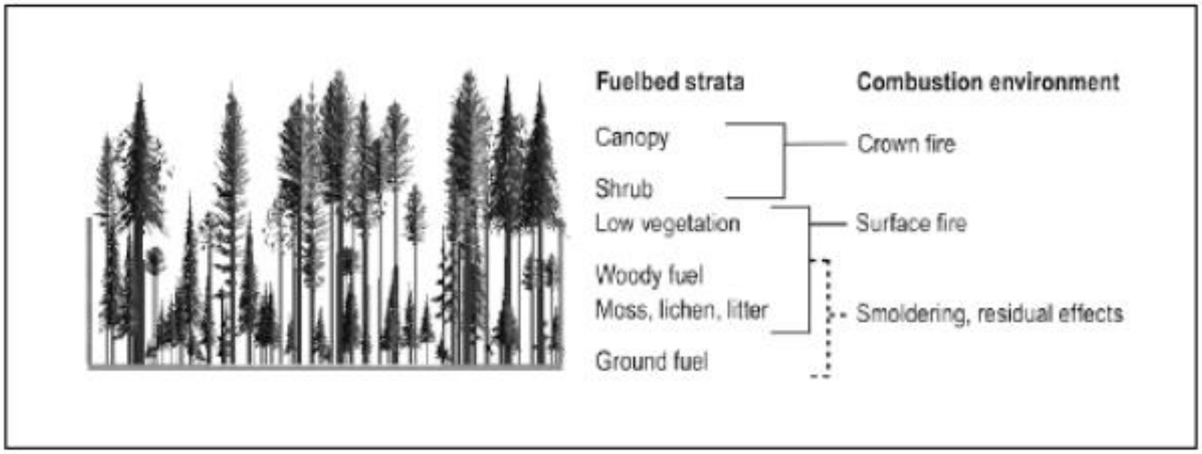


Figure 4—Fuelbed strata affect the combustion environment, fire propagation and spread, and fire effects. Note that woody surface fuel can also contribute to crown fires.

Source: Diagrams from USDA publication "Forest Structure and Fire Hazard in Dry Forest of the Western United States," PNW-GTR-628.

The presence of a crown fire also increases the potential development of a fire storm. According to the U.S. Forest Service, a fire storm is "[v]iolent convection caused by a large continuous area of intense fire. Often characterized by destructively violent surface indrafts, near and beyond the perimeter and sometimes by tornado-like whirls. The occurrence of a fire storm increases the speed and destructive nature of a forest fire, thereby increasing the danger to structures in its path.

Wildfires are capable of causing significant injury, death, and damage to property. The potential for property damage from fire increases each year as more recreational properties are developed on forested land and increased numbers of people use these areas. Fires can extensively affect the economy of an affected area, especially the logging, recreation, and tourism industries, upon which many counties depend. Major direct costs associated with wildfires are the salvage and removal of downed timber and debris and the restoration of the burned area. The indirect effects of wildfires can also be catastrophic. In addition to stripping the land of vegetation and destroying forest resources, large, intense fires can harm the soil, waterways and the land itself. Soil exposed to intense heat may lose its capability to absorb moisture and support life. If burned-out woodlands and grasslands are not replanted quickly, widespread soil erosion, mudflows and siltation of rivers could result, thereby enhancing flood potential, harming aquatic life and degrading water quality. Lands stripped of vegetation by wildfires are also subject to increased landslide hazards. The only natural cause of wildfire is lightning; however, human carelessness and arson account for a large portion of all wildfires.

Firefighters use several methods to express fire potential. Some of the indicators are:

Relative Humidity (RH) is the ratio of the amount of moisture in the air to the amount of moisture necessary to saturate the air at the same temperature and pressure. Relative humidity is expressed in percent. RH is measured directly by automated weather stations or manually by wet and dry bulb readings taken with a psychrometer and applying the NWS, psychrometric tables applicable to the elevations where the reading were taken.

Fuel moisture: is measured for live Herbaceous (annual and perennial), Woody (shrubs, branches and foliage) fuels, and Dry (dead). These are calculated values representing approximate moisture content of the fuel. Fuel moisture levels are measured in 1, 10, 100 and 100-hour increments.

The Lower Atmosphere Stability Index or Haines Index is computed from the morning (12-Zulu) soundings from Radiosonde Observation (RAOB) stations across North America. The index is composed of a stability term and a moisture term. The stability term is derived from the temperature difference at two atmosphere levels. The moisture term is derived from the dew point depression at a single atmosphere level. This index has been shown to correlate with large fire growth on initiating and existing fires where surface winds do not dominate fire behavior. Haines Indexes range from two to six for indicating potential for large fire growth:

2 Very Low Potential (Moist Stable Lower Atmosphere)

3 Very Low Potential

4 Low Potential

5 Moderate Potential

6 High Potential (Dry Unstable Lower Atmosphere)

The Keetch-Byram Drought Index (KBDI) is used to measure the affects of seasonal drought on fire potential. The actual numeric value of the index is an estimate of the amount of precipitation (in 100ths of inches) needed to bring soil back to saturation (a value of zero being saturated). The index deals with the top eight inches of soil profile so the maximum KBDI value is 800 (eight inches), the amount of precipitation needed to bring the soil back to saturation. The index's relationship to fire is that as the index values increase, the vegetation is subjected to greater stress because of moisture deficiency. At higher values, living plants die and become fuel, and the duff/litter layer becomes more susceptible to fire.

KBDI = 0–200
Soil moisture and large class fuel moistures are high and do not contribute much to fire intensity. This is typical of spring dormant season following winter precipitation.

KBDI = 200–400
Typical of late spring, early growing season. Lower litter and duff layers are drying and beginning to contribute to fire intensity.

KBDI = 400–600
Typical of late summer, early fall. Lower litter and duff layers actively contribute to fire intensity and will burn actively.

KBDI = 600–800
Often associated with more severe drought with increased wildfire occurrence. Intense, deep burning fires with significant downwind spotting can be expected. Live fuels can also be expected to burn actively at these levels.

The Energy Release Component (ERC) is the estimated potential available energy released per unit area in the flaming front of a fire. The day-to-day variations of the ERC are caused by changes in the moisture contents of the various fuel classes, including the 1,000-hour time lag class. The ERC is derived from predictions of the rate of heat release per unit area during flaming combustion and the duration of flaming.

The Ignition Component is a number that relates the probability that a fire will result if a firebrand is introduced into a fine fuel complex. The ignition component can range from zero, when conditions are cool and damp, to 100 on days when the weather is dry and windy. Theoretically, on a day when the ignition component registers a 60 approximately 60% of all firebrands that encounter wildland fuels will require suppression action.

The Spread Component is a numerical value derived from a mathematical model that integrates the effects of wind and slope with fuel bed and fuel particle properties to compute the forward rate of spread at the head of the fire. Output is in units of feet per minute. A Spread Component (SC) of 31 indicates a worst-case, forward rate of spread of approximately 31 feet per minute. The inputs required in to calculate the SC are wind speed, slope, fine fuel moisture (including the effects of green herbaceous plants), and the moisture content of the foliage and twigs of living, woody plants. Since the characteristics through which the fire is burning are so basic in determining the forward rate of spread of the fire front, a unique SC table is required for each fuel type.

(Source: http://www.nps.gov/nifc/public/pub_und_understandingfire.cfm)

Another is the International Fire Code Institute susceptibility index (Table 20), which combines slope and fuel levels:

Table 20: Wildfire Susceptibility Matrix

FEMA/IFCI Wildfire Susceptibility Matrix									
	Critical Fire Weather Frequency								
	<1 day per year			2-7 days per year			8+ days per year		
	Slope %			Slope %			Slope %		
Fuel Class	**<40**	**41-40**	**61+**	**<40**	**41-40**	**61+**	**<40**	**41-40**	**61+**
Light	M	M	M	M	M	M	M	M	H
Medium	M	M	H	H	H	H	E	E	E
Heavy	H	H	H	H	E	E	E	E	E
Note: M = Medium, H = High, E = Extreme.									
Source: International Fire Code Institute, January 2000									

All these indicators are taken into account when determining the fire danger for a specific area. These indicators can change daily, which is why the Fire Danger Rating System (Table 21) was created. It is a method of conveying in a simple way the relative danger level to the public.

Table 21: Fire Danger Rating System

Fire Danger Rating System		
Rating	**Basic Description**	**Detailed Description**
CLASS 1: Low Danger (L) COLOR CODE: **Green**	fires not easily started	Fuels do not ignite readily from small firebrands. Fires in open or cured grassland may burn freely a few hours after rain, but wood fires spread slowly by creeping or smoldering and burn in irregular fingers. There is little danger of spotting.
CLASS 2: Moderate Danger (M) COLOR CODE: **Blue**	fires start easily and spread at a moderate rate	Fires can start from most accidental causes. Fires in open cured grassland will burn briskly and spread rapidly on windy days. Woods fires spread slowly to moderately fast. The average fire is of moderate intensity, although heavy concentrations of fuel – especially draped fuel -- may burn hot. Short-distance spotting may occur, but is not persistent. Fires are not likely to become serious and control is relatively easy.
CLASS 3: High Danger (H) COLOR CODE: **Yellow**	fires start easily and spread at a rapid rate	All fine dead fuels ignite readily and fires start easily from most causes. Unattended brush and campfires are likely to escape. Fires spread rapidly and short-distance spotting is common. High intensity burning may develop on slopes or in concentrations of fine fuel. Fires may become serious and their control difficult, unless they are hit hard and fast while small.
CLASS 4: Very High Danger (VH) COLOR CODE: **Orange**	fires start very easily and spread at a very fast rate	Fires start easily from all causes and immediately after ignition, spread rapidly and increase quickly in intensity. Spot fires are a constant danger. Fires burning in light fuels may quickly develop high-intensity characteristics - such as long-distance spotting - and fire whirlwinds, when they burn into heavier fuels. Direct attack at the head of such fires is rarely possible after they have been burning more than a few minutes.
CLASS 5: Extreme (E) COLOR CODE: **Red**	fire situation is explosive and can result in extensive property damage	Fires under extreme conditions start quickly, spread furiously and burn intensely. All fires are potentially serious. Development into high-intensity burning will usually be faster and occur from smaller fires than in the Very High Danger class (4). Direct attack is rarely possible and may be dangerous, except immediately after ignition. Fires that develop headway in heavy slash or in conifer stands may be unmanageable while the extreme burning condition lasts. Under these conditions, the only effective and safe control action is on the flanks, until the weather changes or the fuel supply lessens.
source: http://www.wfas.net/content/view/34/51/		

Along the Rio Grande and other major rivers in the state occurs what is known as the “Bosque,” which is a riparian forest ecosystem consisting largely of cottonwoods, willows, salt cedar, and other native and invasive species. When these areas are stressed by drought, as has happened in recent years, they become tinderboxes. New Mexico experiences on average 1,649 wildland fires each year that burn on average 133.3 acres apiece (235K acres per year), however few of those events are recorded in national databases (Figure 30).

Figure 30: New Mexico Fire History

SOUTHWEST AREA

Fires and Acres (By State)

NEW MEXICO

	FIRES					ACRES				
	HUMAN	LIGHTNING	TOTAL FIRES	% HUMAN	% LIGHTNING	HUMAN	LIGHTNING	TOTAL ACRES	% HUMAN	% LIGHTNING
1990	472	554	1,026	46%	54%	52138	12748	64,886	80%	20%
1991	397	445	842	47%	53%	7,375	6,558	13,933	53%	47%
1992	834	505	1,339	62%	38%	63,080	58,506	121,586	52%	48%
1993	1,431	1,012	2,443	59%	41%	136,756	236,000	372,756	37%	63%
1994	1,204	1,526	2,730	44%	56%	81,000	328,246	409,246	20%	80%
1995	855	635	1,490	57%	43%	36,786	54,349	91,135	40%	60%
1996	960	1,110	2,070	46%	54%	101,912	62,811	164,723	62%	38%
1997	718	621	1,339	54%	46%	6,819	7,109	13,928	49%	51%
1998	1,138	549	1,687	67%	33%	77,914	50,321	128,235	61%	39%
1999	1,064	1,385	2,449	43%	57%	399,445	114,954	514,399	78%	22%
2000	1,011	1,455	2,466	41%	59%	403,773	115,404	519,177	78%	22%
2001	631	1,018	1,649	38%	62%	9,458	29,432	38,890	24%	76%
2002	966	1,220	2,186	44%	56%	100,612	324,098	424,710	24%	76%
2003	708	1,450	2,158	33%	67%	15,018	307,527	322,545	5%	95%
2004	453	723	1,176	39%	61%	25,967	11,052	37,019	70%	30%
2005	550	749	1,299	42%	58%	63,626	7,560	71,186	89%	11%
2006	1,133	1,681	2,814	40%	60%	365,745	186,438	552,183	66%	34%
2007	464	686	1,150	40%	60%	71,970	47,238	119208	60%	40%
2008	754	381	1,135	66%	34%	277,599	199,944	477,543	58%	42%
TOTAL	15,743	17,705	33,448			2,296,993	2,160,294	4,457,287		
AVERAGE	829	932	1,760	48%	52%	120,894	113,700	234,594	53%	47%
MEDIAN	834	749	1,649	44%	56%	71,970	58,506	128,235	58%	42%

Source:
http://gacc.nifc.gov/swcc/predictive/intelligence/ytd_historical_data/historical/suppression/average/average_per_year_suppression.pdf

UNM Wildland/WUI History

On August 5th, 2009, lightning strikes, fueled by brisk winds and dry gramma grass, started a wildfire burning over 12,000 acres on UNM’s Long Term Ecological Research (LTER) Site on the Sevilleta National Wildlife Refuge Black Butte area (Figures 31-33). Though no major buildings were in the area, many experiments were damaged or destroyed by the wildfire, including:

- Drought and irrigation plots

- Monsoon Rainfall Manipulation Experiment – damaging a kilometer of wires, some batteries for solar panels, several CO_2 probes, irrigation hoses and sprinklers
- Rain shelters: a total of 20 roofs were either damaged or destroyed
- Water Tank
- Warming Experiment: 13 Plots
- UV decomposition Experiment
- NutNet Experiment - fertilization experiment burned
- Small Mammal Exclosures in grassland habitat were all burned

Damage from this fire is estimated to exceed $60K. Unknown and difficult to assess is the lasting impact this fire will have on these experiments and the current use of the area for further experiments. An assessment is currently being conducted to determine overall damage and use for the future. As information is provided, this plan will be updated as outlined in the plan maintenance section.

Figure 31: Sevilleta LTER Field Station 2009 Wildfires

Figure 32: Sevilleta LTER Field Station Post WIldfire

Figure 33: Sevilleta LTER Field Station Equipment Destroyed by WIldfire

Figure 31 – 33 Source: Scott Collins, Sevilleta LTER Field Station

TRIGO WILDFIRE: On April 15th, 2008, this wildfire began on the west slopes of the Manzano Mountains and was initially spread by southwest wind gusts to 35 MPH. The fire reached Osha Peak during the evening of April 16th. On the 20th, the fire spread rapidly northeast due to 40 MPH winds. It entered flatter terrain on the east side of the Manzanos, and by April 21st, 3,750 acres were burned including nine homes, nine outbuildings and two recreational vehicles. The 4,800 acre fire was 95% contained by April 29th, but was fanned by strong southwest winds of 40 to 50 MPH on the 30th, forcing the evacuation of Sufi and Apple Mountain Campgrounds and the Sherwood Forest subdivision, west of Torreon. Over 50 additional homes and one communications tower were damaged or destroyed, mainly in the Sherwood Forest area as the fire grew to more than 11,000 acres. The fire continued to be uncontained into the month of May. A human caused fire turned into a large wildfire during several days of strong winds. Very dry conditions were present prior to the wildfire due to a lack of precipitation in the preceding weeks. The Trigo fire came within feet of UNM's Capilla Peak Observatory in the Manzano Mountains.

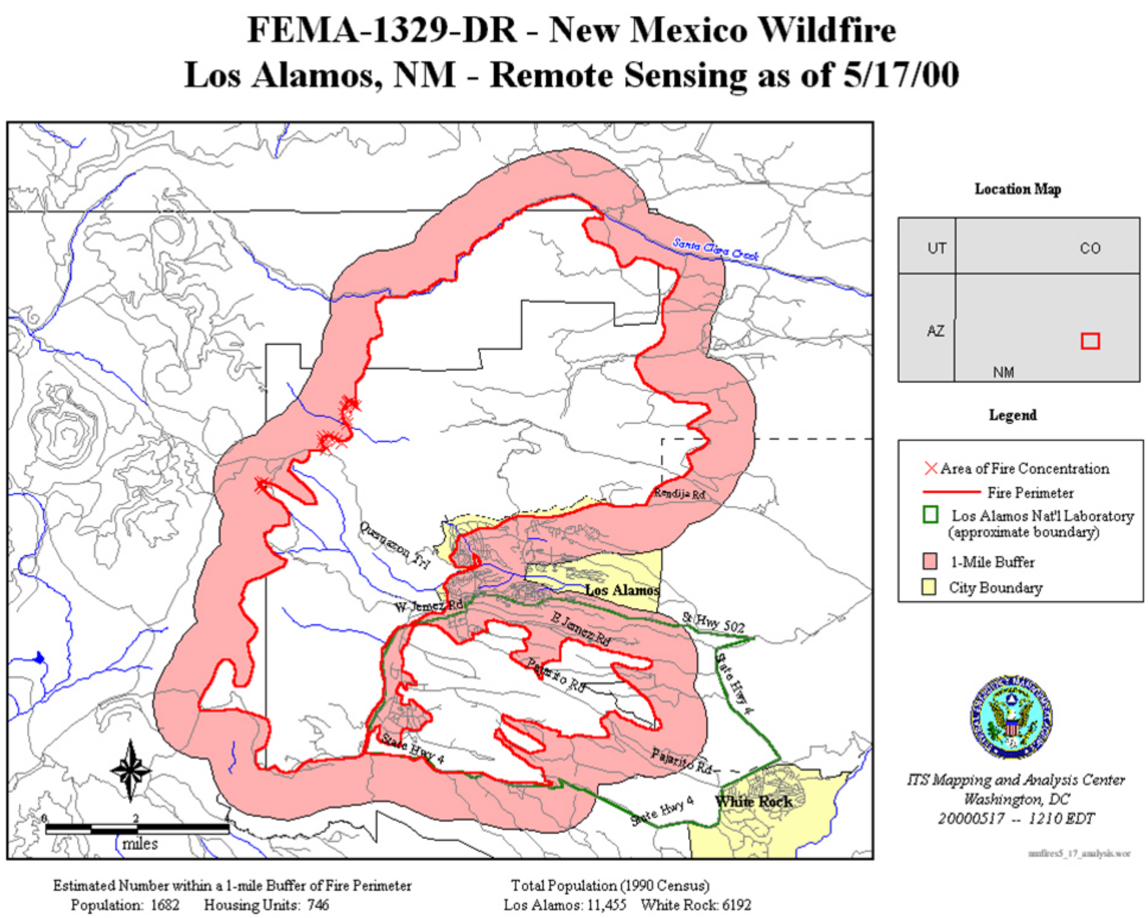
In June 2003, fireworks ignited the Bosque Fire in Albuquerque, which burned hundreds of acres. The threat to surrounding residences, businesses, and infrastructure was very high, response costs and losses were approximately $1M. Smoke from the fire was of concern to the UNM Main Campus population and facilities.

The Cerro Grande Fire, shown in Figure 34 and 35, occurred in early May 2000 and was the costliest fire in the state's history. The entire county of Los Alamos was evacuated when a prescribed burn, which was ignited May 4th on property of the Bandelier National Monument quickly, escaped its project area (Los Alamos Canyon) and entered the city's western perimeter. Although there was considerable warning, the city's 11,000 residents had not headed the evacuation warnings. Over 400 residences were destroyed, with many more damaged by smoke and prolonged power outages. The fire burned nearly 47,000 acres and hundreds of structures in Los Alamos and the adjacent Los Alamos National Laboratory (LANL), before it was completely contained in July 2000. The event resulted in a Federal Disaster Declaration, FEMA-1329.

Figure 34: FEMA Photographs of the 2000 Cerro Grande Fire

Source: FEMA

Figure 35: Cerro Grande Fire Burn Area

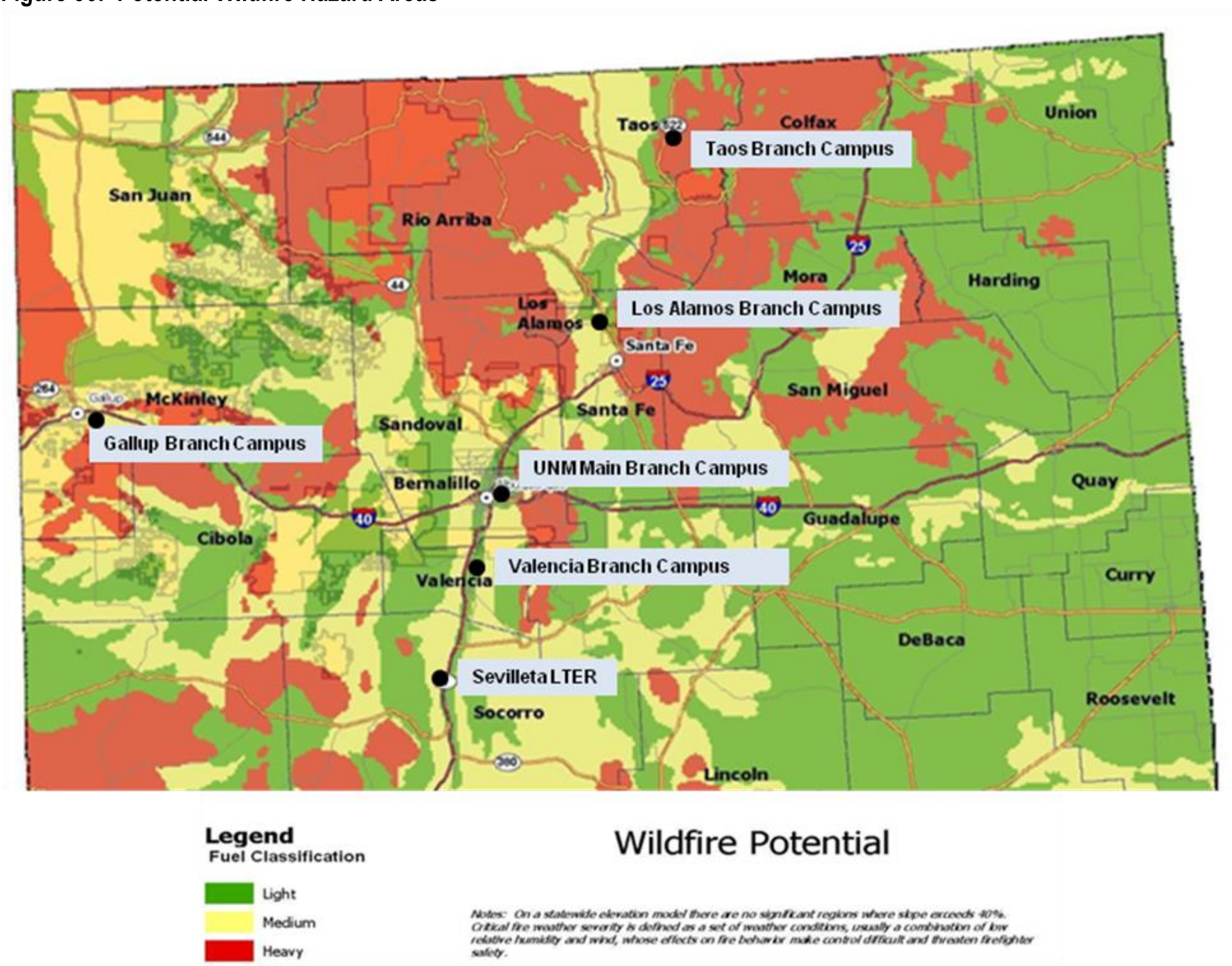


Source: www.fema.gov

In May 1996 in Taos County, the Hondo Fire swept through the unincorporated community of Lama, south of Questa. This community was built in the forest and did not stand a chance against the fire that burned over 4,000 acres in the first afternoon. Luckily, no one was injured, but the destruction was nearly total. Approximately 32 homes were destroyed, and the fire burned into the high country until it was finally extinguished by summer rains.

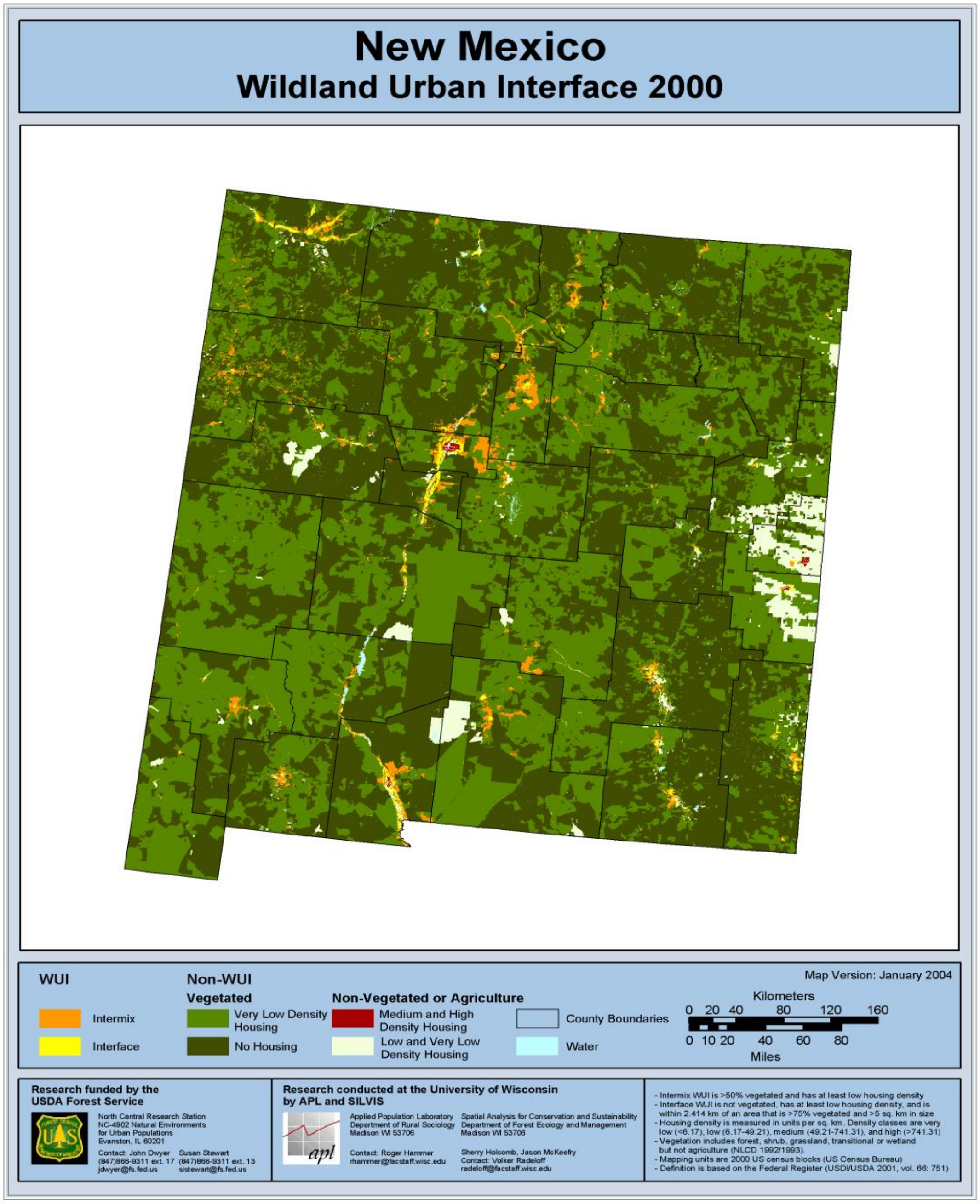
The threat of wildland/urban interface (WUI) fires continues to be the number one natural hazard facing the state. The annual probability of a large fire event is 100%. UNM Branch Campuses (Gallup, Los Alamos, and Taos) and Sevilleta LTER are located in these areas and are vulnerable. The US Forest Service estimates that approximately 942K acres are in the New Mexican WUI. With drought conditions persisting it seems inevitable that more areas will become susceptible, more fires will occur, and that some of them will have dire consequences (Figures 36 and 37).

Figure 36: Potential WIldfire Hazard Areas



Source: New Mexico Resource Geographic Information System Program, http://rgis.unm.edu/intro.cfm

Figure 37: Wildland Urban Interface Potential Hazards



Source: Univ. of Wisconsin, Madison SILVIS Lab http://www.silvis.forest.wisc.edu/projects/WUI_Main.asp

Table 22 provides an overview of the number of wildfire events and associated costs in the counties where UNM campuses are located.

Table 22: Wildfire Hazard in Counties Where UNM Campuses are Located

Hazards	Bernalillo County (UNM Main)		McKinley County (UNM Gallup Branch Campus)		Los Alamos County (UNM Los Alamos Branch Campus)		Taos County (UNM Taos Branch Campus)		Valencia County (UNM Valencia Branch Campus)		Socorro County (Sevilleta LTER Field Station)	
	Events	**$**	**Events**	**$**	**Events**	**$**	**Events**	**$**	**Events**	**$**	**Events**	**$**
Wildfire	0	0	0	0	1	1.5B	1	1.5M	0	0	1	0

Data is derived from the NCDC database (01/01/1950 and 02/28/2010)

Referencing New Mexico's Fire History, Figure 30, this data alerts UNM to the fact that one or all campuses could experience the effects of wildland fire in any given year. Figure 36 provides an overall state view where UNM Campuses are located in potential wildfire areas. Zooming in on each of the campus locations provides an association of the risks to each campus. UNM Branch Campus (City of Albuquerque) and the UNM Los Alamos Branch Campus (Los Alamos, NM) reside in urban settings and are considered in a medium/low fire hazard area (Figure 38 and 39).

Figure 38: UNM Main Wildfire/WUI Potential Risk

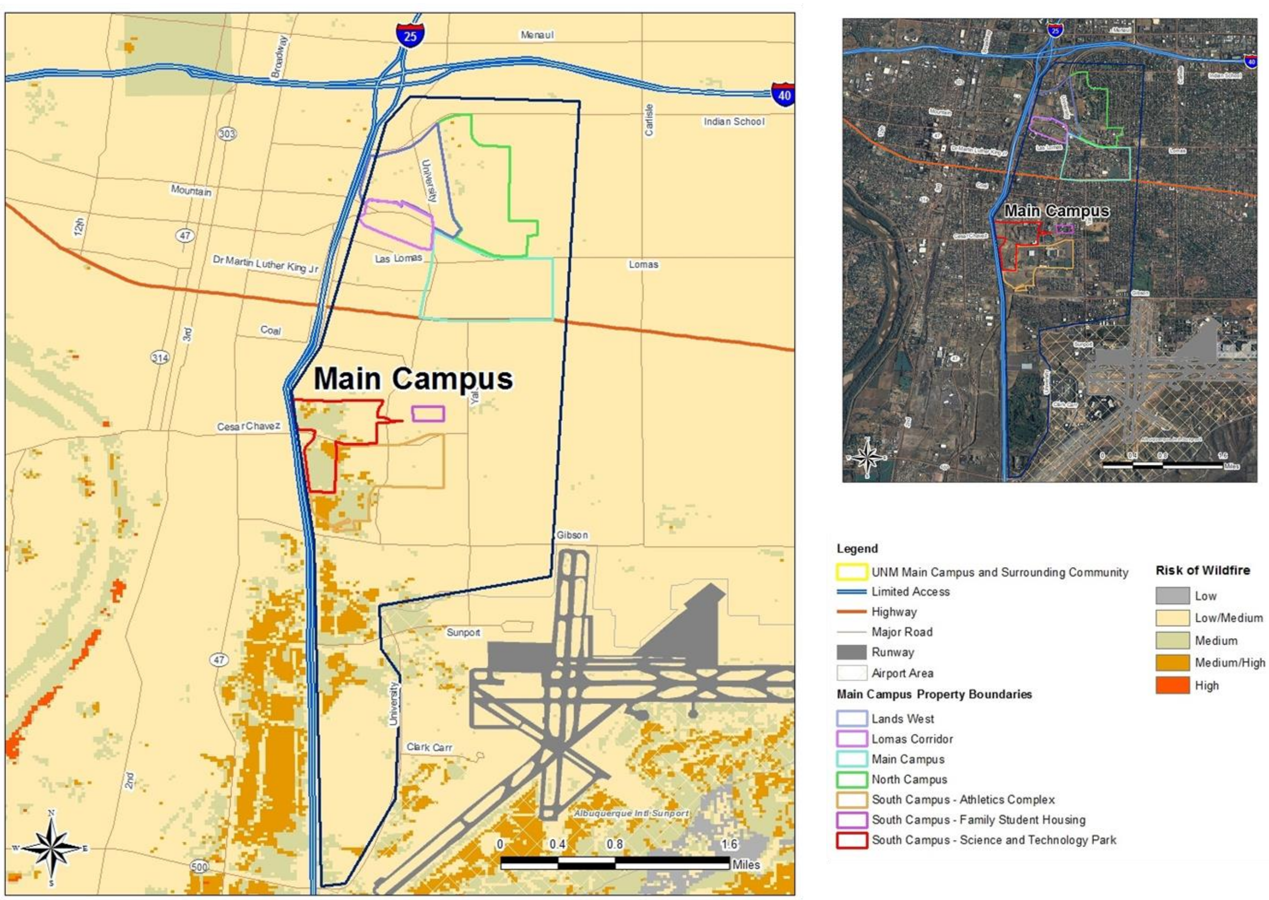
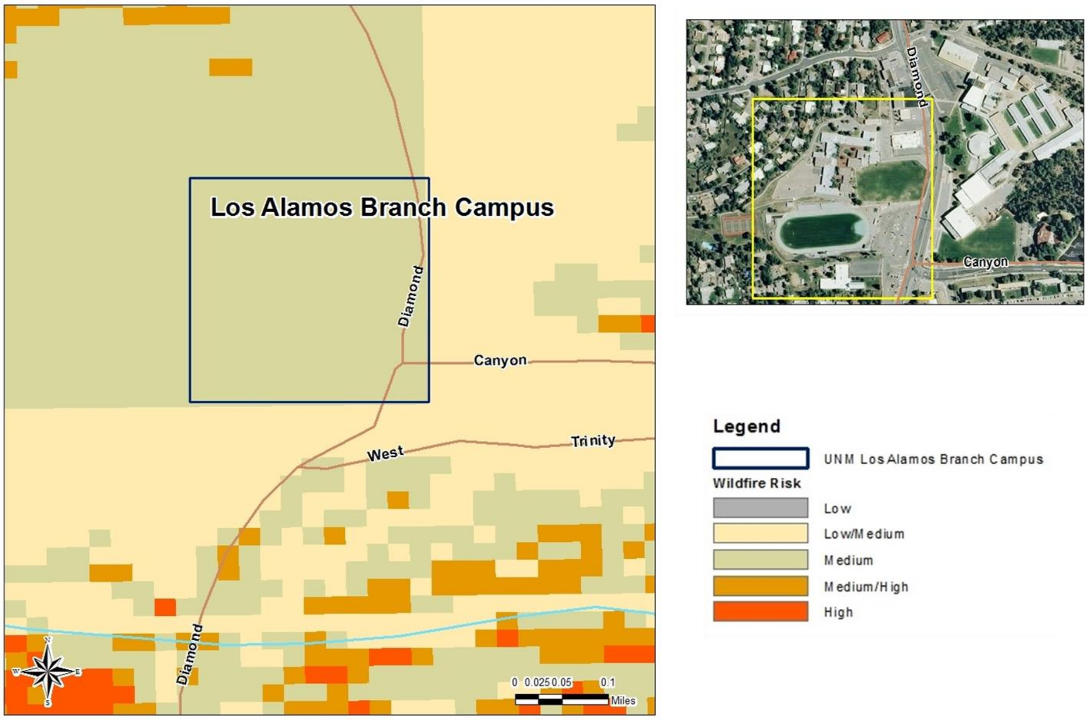
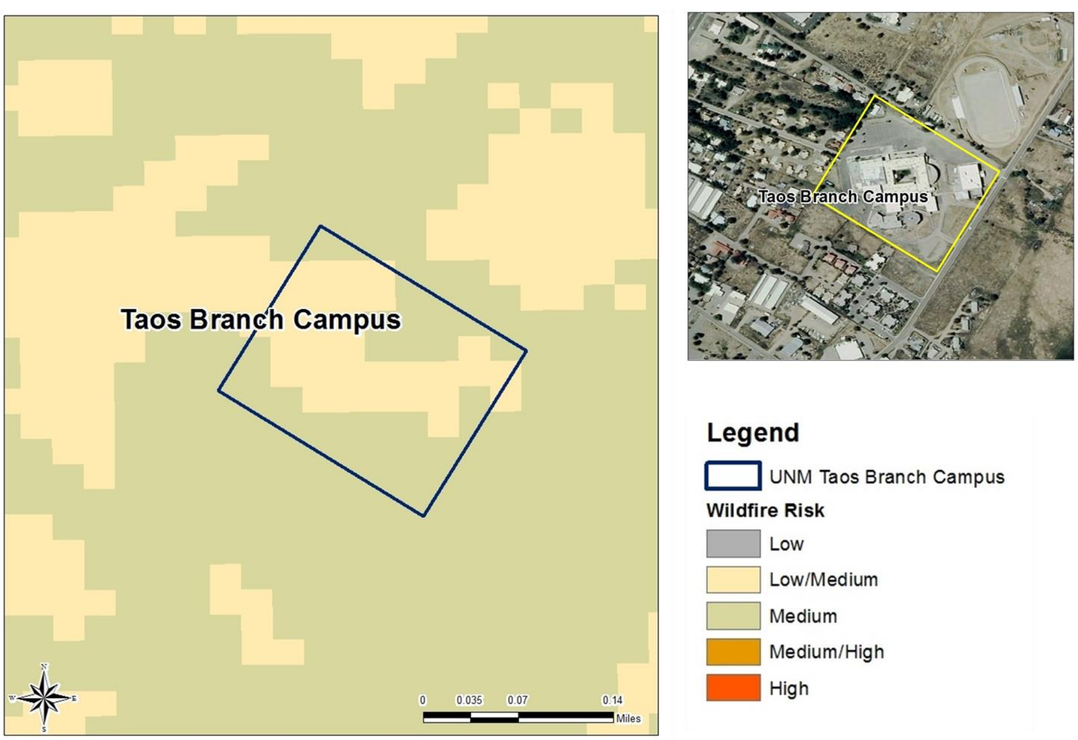


Figure 39: UNM Los Alamos Branch Campus Wildfire/WUI Potential Risk



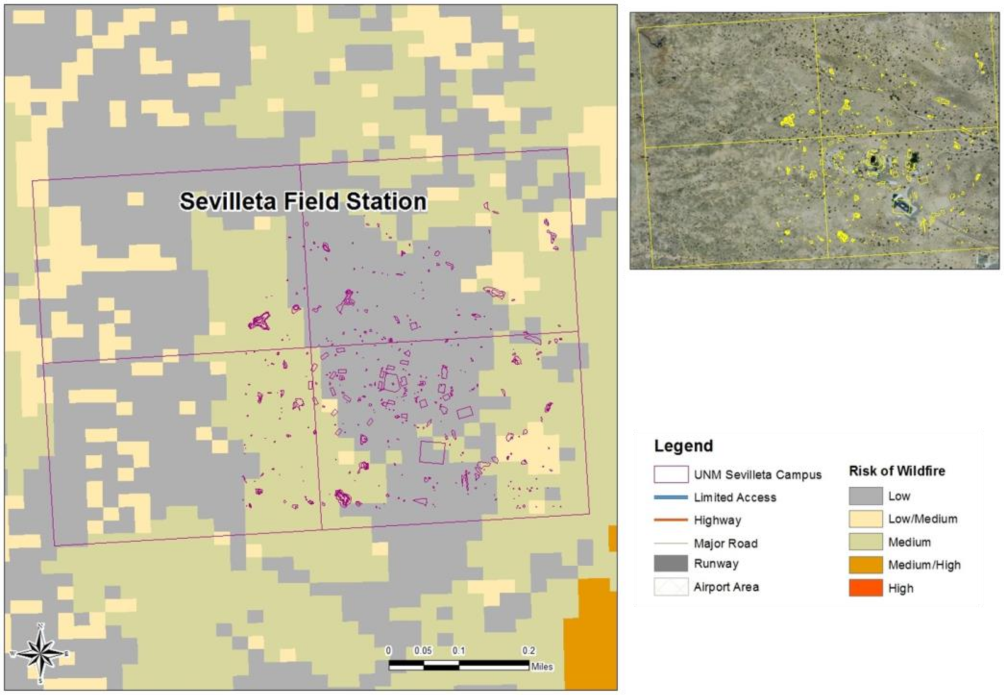
The UNM Taos Branch Campus is located in the northern part of the state and based on the location has a potential low to medium risk to wildfire hazards (Figure 40).

Figure 40: UNM Taos Branch Campus Wildfire/WUI Risk Potential



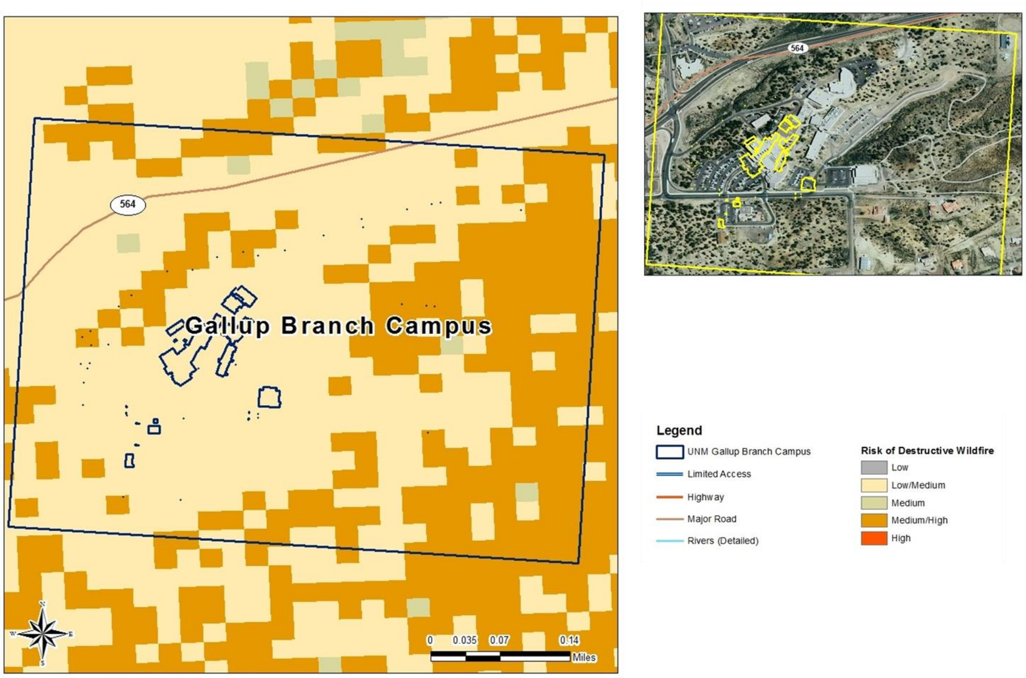
The UNM Sevilleta LTER Field Station is located just north of Socorro, NM and has been identified as having a low to medium risk to wildfire hazards (Figure 41).

Figure 41: UNM Sevilleta LTER Field Station Wildfire Risk Potential



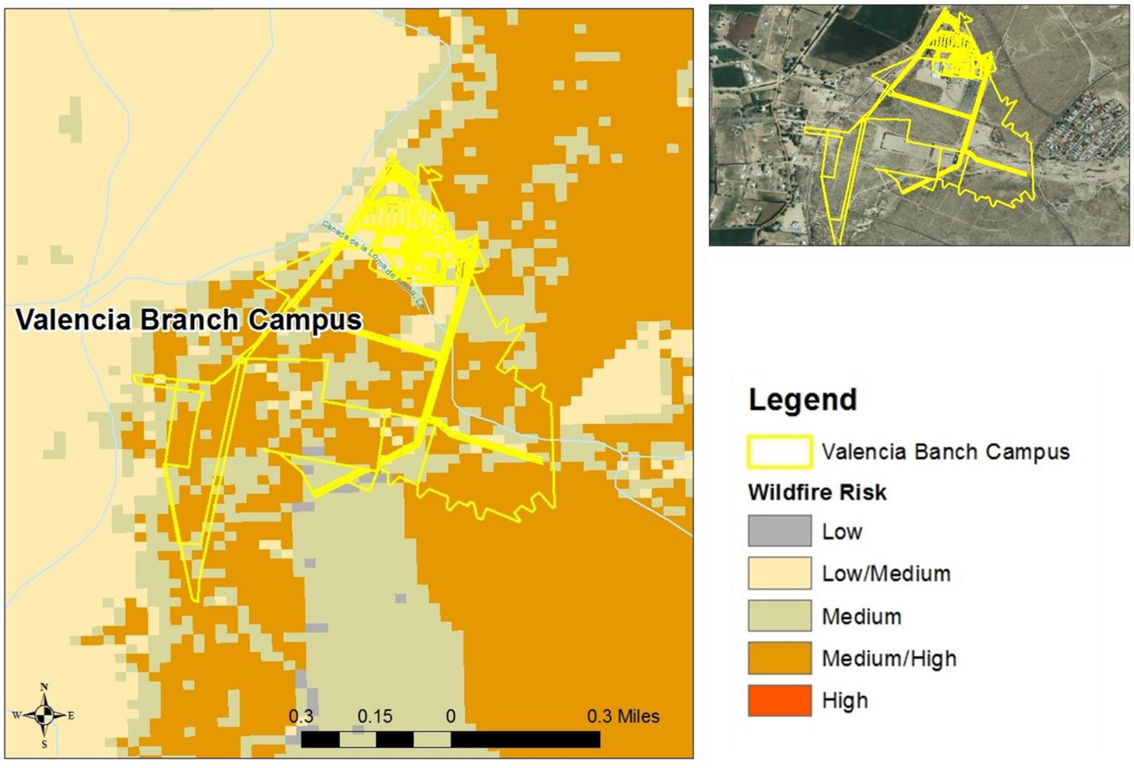
The UNN Gallup Branch Campus is located in the western part of the state, south east of the city of Gallup and has a medium/low to medium high risk to wildfires (Figure 42).

Figure 42: UNM Gallup Branch Campus Wildfire Risk Potential



The UNM Valencia Branch Campus is south of Albuquerque located in the town of Los Lunas, NM and has a low to medium high wildfire risk potential (Figure 43).

Figure 43: UNM Valencia Branch Campus Wildfire Risk Potential



This wildfire/WUI data concludes that all UNM campuses must be proactive in educating campus populations on wildfire facts and determine mitigation steps that are proactive in protecting infrastructure resources and safe guarding campus populations.

Data deficiencies do exist and in the next 5 years, UNM will gather data to support occurrences and enhanced mitigation strategies and actions at each university location. Future updates to the mitigation plan will include wildfire events experienced by UNM campuses. Future updates to the mitigation plan will include a more in-depth review of the risks to each Campus and mitigation strategies will be developed to increase awareness of wildland fire and protect UNM facilities throughout each campus.

(This page intentionally left blank)

Earthquakes

An earthquake is a shaking of the earth that results from the release of energy due to a sudden slip along a fault, which initiates at the earthquake hypocenter. This energy release propagates as elastic seismic waves that transport energy to the earth's surface. Earthquakes typically strike without warning and may range in intensity from tiny motions only detectable by sensitive instruments, to slight tremors, to highly damaging shocks. The perceived motion in felt earthquakes can last from a few seconds to over five minutes, and damaging earthquakes ubiquitously produce aftershocks that persist from weeks to years. The actual movement of the ground in an earthquake is seldom the direct cause of injury or death. Casualties typically result from falling objects and debris, or from forces that damage or demolish buildings and other structures. Disruption of communications, electrical power supplies, and gas, sewer, and water lines should be expected in a large earthquake. Earthquakes can trigger fires, dam failures, landslides, or releases of hazardous material, compounding their hazards.

The vibration or shaking of the ground during an earthquake is described by the time history of its ground motion (when recorded, this history is called a seismogram). The severity of ground motion generally increases with the amount of energy released and decreases with distance from the earthquake hypocenter. Earthquakes generate elastic waves, both in the earth's interior (body waves), and along the earth's surface (surface waves). P (primary) waves in the earth's interior are physically similar in character to sound waves in air. P waves have a back-and-forth (longitudinal) motion along their direction of travel. They move through the shallow earth at speeds between approximately 1 to 4 km/s (roughly 2,000 to 9,000 miles/hour). P waves typically produce predominantly vertical forces on buildings. S (secondary) waves, also known as shear waves, have a side-to-side motion relative to their direction of travel, and. S waves are slower (by about a factor of 0.6) than P waves. S waves can cause significantly more damage than P waves because their amplitudes are typically larger and their shear motion produces horizontal forces on buildings, which they are typically much less able to sustain without damage. Surface waves generate both shear and vertical forces, and can be highly damaging in areas where development has occurred in low-seismic velocity basins (Mexico City is one type example of this).

Earthquakes are commonly described in terms of magnitude and intensity. Magnitude is a fixed property of the earthquake source estimated from seismograms, and is proportional to the logarithm of the total energy released (an increase of one in earthquake magnitude indicates an approximately 32-fold increase in energy). Intensity, in contrast, varies spatially and with local geology, and describes the effects of ground motion at specific locations. Thus, a large, distant earthquake can generate the same intensity at a given site than a much smaller, local earthquake.

There are several generally consistent magnitude scales in use by the scientific and hazard community, based on different observable characteristics of seismic waves. The oft-noted Richter Scale is the original magnitude scale, and is technically applicable only to southern California. The three extensively quoted scales are the body wave magnitude, $m_{b,}$ the surface wave magnitude, M_s, and the moment magnitude, m_w. Body and surface wave magnitudes vary because they are based on the amplitudes of observed body and surface waves, respectively, which can vary in relative size for a given earthquake (for example, earthquakes with shallower hypocenters generally produce corresponding larger surface waves than those with deeper hypocenters). The moment magnitude is based on the fundamental forces produced by the earthquake fault motion, and is coming into increasing use as the de facto measure of earthquake size. All three magnitudes usually agree to within 0.5 of a magnitude unit, with large departures only commonly occurring for very large earthquakes (magnitudes in excess of 7.5).

The commonly used Modified Mercalli Intensity (MMI) Scale is expressed in Roman numerals. It is based on the amount of shaking and specific kinds of damage to man-made objects or structures. This scale has twelve classes and ranges from I (not felt) to XII (total destruction).

A quantitative method of expressing an earthquake's severity is to compare its acceleration history (commonly the peak acceleration) to the normal acceleration due to gravity (g=9.8 meters per second squared, or 980 cm/sec/sec). Peak ground acceleration (PGA) measures the rate of change of motion relative to the rate of acceleration due to gravity and is proportional to the forces exerted on a structure. For example, an acceleration of the ground surface of 244 cm/sec/sec equals a PGA of 25.0%. A higher PGA means a higher level of ground acceleration and a higher probability of structural damage. Ordinary structures typically begin to be damaged structurally at about 10% PGA. Table 23 illustrates the comparison for scales of magnitude and intensity.

Table 23: PGA and Mercalli Comparison

Peak Ground Acceleration/Modified Mercalli Intensity Comparison		
Mercalli Scale	**PGA (g)**	**Full Description**
I.	**<0.17**	Not felt. Marginal and long period effects of large earthquakes.
II.	**0.17 – 1.4**	Felt by persons at rest, on upper floors, or favorably placed.
III.		Felt indoors. Hanging objects swing. Vibration like passing of light trucks. Duration estimated. May not be recognized as an earthquake.
IV.	**1.4-3.9**	Hanging objects swing. Vibration like passing of heavy trucks. Standing motor cars rock. Windows, dishes, doors rattle. Glasses clink the upper range of IV, wooden walls and frame creak.
V.	**3.9-9.2**	Felt outdoors; direction estimated. Sleepers wakened. Liquids disturbed, some spilled. Small unstable objects displaced or upset. Doors swing, close, open. Pendulum clocks stop, start.
VI.	**9.2-18**	Felt by all. Many frightened and run outdoors. Persons walk unsteadily. Windows, dishes, glassware broken. Books, etc., off shelves. Pictures off walls. Furniture moved. Weak plaster and masonry D cracked. Small bells ring. Trees, bushes shaken.
VII.	**18-34**	Difficult to stand. Noticed by drivers of motor cars. Hanging objects quiver. Furniture broken. Damage to masonry D, including cracks. Weak chimneys broken at roofline. Fall of plaster, loose bricks, stones, tiles, cornices. Some cracks in masonry C. Waves on ponds. Small slides and caving in along sand or gravel banks. Large bells ring. Concrete irrigation ditches damaged.

Mercalli Scale	PGA (g)	Full Description
VIII.	**34-65**	Steering of motor cars affected. Damage to masonry C; partial collapse. Some damage to masonry B. Fall of stucco and some masonry walls. Twisting, fall of chimneys, factory stacks, monuments, towers, elevated tanks. Frame houses moved on foundations. Decayed piling broken off. Branches broken from trees. Changes in flow or temperature of springs and wells. Cracks in wet ground and on steep slopes.
IX.	**65-124**	General panic. Masonry D destroyed; masonry C heavily damaged, sometimes with complete collapse; masonry B seriously damaged. (General damage to foundations.) Serious damage to reservoirs. Underground pipes broken. Conspicuous cracks in ground. In alluvial areas sand and mud ejected, earthquake fountains, sand craters.
X.	**>124**	Most masonry and frame structures destroyed with their foundations. Some well-built wooden structures and bridges destroyed. Serious damage to dams, dikes, embankments. Large landslides. Water thrown on banks of canals, rivers, lakes, etc. Sand and mud shifted horizontally on beaches and flat land. Rails bent slightly.
XI.		Rails bent greatly. Underground pipelines completely out of service.
XII.		Damage nearly total. Large rock masses displaced. Lines of sight and level distorted. Objects thrown into the air.
Masonry A: Good workmanship, mortar, and design; reinforced, especially laterally, and bound together by using steel, concrete.		
Masonry B: Good workmanship and mortar; reinforced, but not designed in detail to resist lateral forces.		
Masonry C: Ordinary workmanship and mortar; no extreme weaknesses like failing to tie in at corners, but neither reinforced nor designed against horizontal forces.		
Masonry D: Weak materials, such as adobe; poor mortar; low standards of workmanship; weak horizontally.		
Source: http://www.abag.ca.gov/bayarea/eqmaps/doc/mmigif/m10.html		

Historic and Prehistoric Earthquakes in New Mexico

The Rio Grande rift is a major tectonic feature of western North America (Wilson et al., 2005), and is expressed on the surface of the Earth as a series of elongated north-south trending basins that run from central Colorado, through the central parts of New Mexico, into northern Mexico where it blends with the greater Basin and Range Province. Because the rift defines the path of the Rio Grande in New Mexico, it is the most highly populous sector of the state and much of New Mexico's historical seismicity has been concentrated in the Rio Grande Valley between Socorro and Albuquerque. About half of the earthquakes of intensity VI or greater (MMI) that occurred in the state between 1868 and 1973 were centered in this region. Los Alamos lies near several major boundary faults of the Rio Grande rift in north-central New Mexico. The margin of the Rio Grande rift in the Los Alamos area is locally defined by the Rio Grande rift-related Pajarito fault system. UNM Main, Los Alamos, Taos, Valencia and Sevilleta all reside within this rift area.

Historic earthquakes in the southern Basin and Range Province include a magnitude 7.2 earthquake in northern Mexico in 1887 (which is probably a good analogue for a large Rio Grande rift earthquake in New Mexico), numerous magnitude 4 to 6 earthquakes in the Socorro areas throughout the 20th Century. The net earthquake threat to UNM Campuses is considered low, with the exception of Sevilleta that is considered medium. This location is the center of minor, more frequent seismic activity increasing the risk of an earthquake with a higher magnitude. Table 24 lists the locations and dates of the strongest earthquakes that have occurred where UNM campuses reside since the turn of the century.

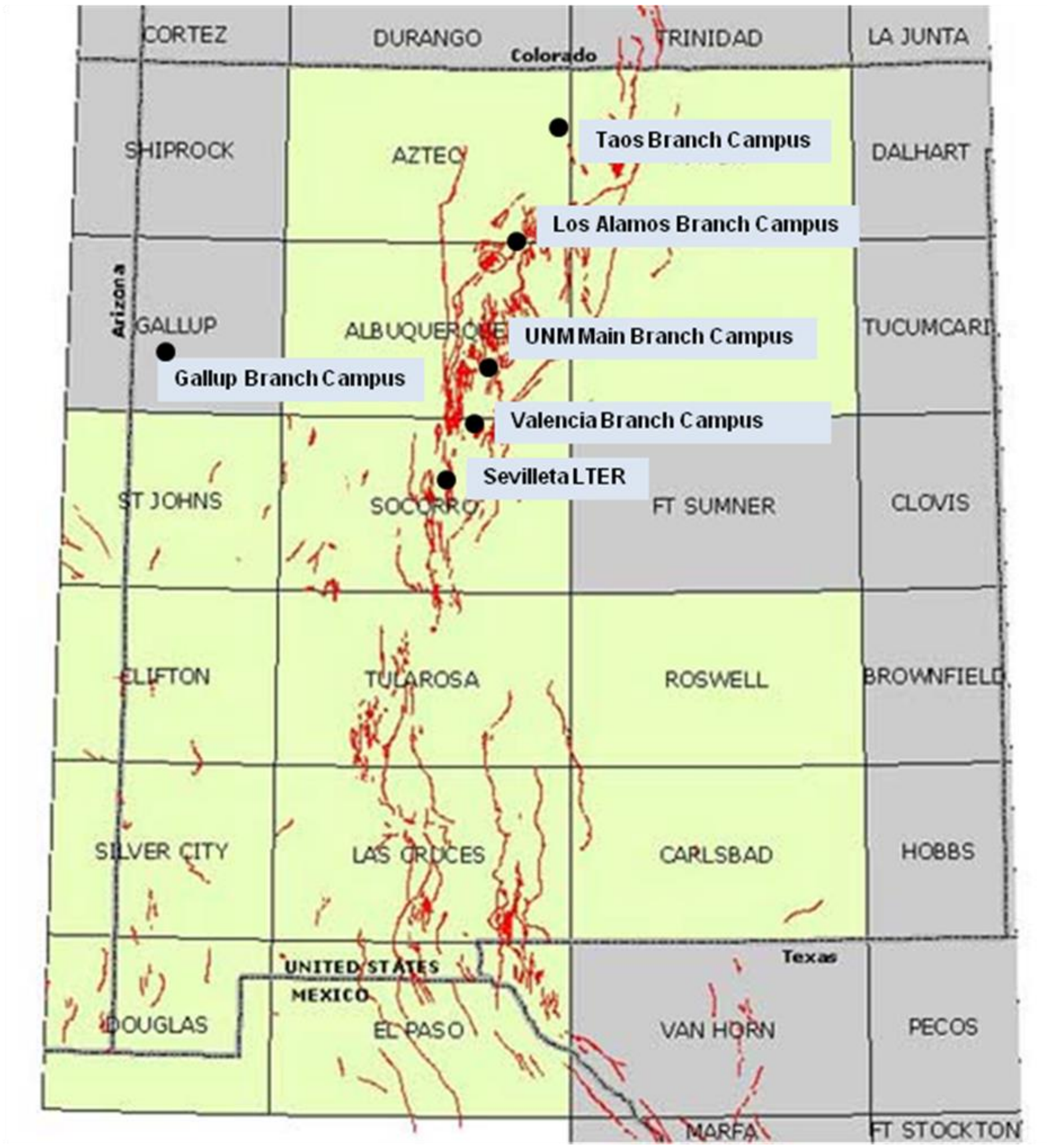
Table 24: Strongest Earthquakes equal or greater than 4.5 in New Mexico (1869-2006)

Date	Time			Approx Location		MMI	Moment Magnitude	Nearby City
	Hr	Min	Sec	Lat.	Long.			
1869	-	-	-	34.1	106.9	VII	5.2	Socorro
7-Sept-1893	-	-	-	34.7	106.6	VII	5.2	Belen
31-Oct-1895	12	-	-	34.1	106.9	VI	4.5	Socorro
1897	-	-	-	34.1	106.9	VI	4.5	Socorro
10-Sep-1904	-	-	-	34.1	106.9	VI	4.5	Socorro
2-Jul-1906	10	15	-	34.1	106.9	VI	4.5	Socorro
12-Jul-1906	12	15	-	34.1	106.9	VII to	5.5	Socorro
16-Jul-1906	19		-	34.1	106.9	VII	5.8	Socorro
15-Nov-1906	2	15	-	34.1	106.9	VII	5.8	Socorro
19-Dec-1906	12		-	34.1	106.9	VI	4.5	Socorro
5-Feb-1931	4	48	-	35	106.5	VI	4.5	Albuquerque
22-Dec-1935	1	56	-	34.7	106.8	VI	4.5	Belen
6-Nov-1947	16	50	-	35	106.4	VI	4.5	Albuquerque
3-Jul-1961	7	6	-	34.2	106.9	VI	4.5	Socorro
5-Jan-1976	6	23	29	35.9	108.5	VI	4.7	Gallup

Source: Sanford et al., Earthquake Catalogs for New Mexico and Bordering Areas: 1869-2005, http://earthquake.usgs.gov/regional/states/historical_state.php#new_mexico

Figures 44 and 45 clearly shows the earthquake hazard to be most likely in the region extending from south of Socorro, north into Rio Arriba County. This area includes most of New Mexico's major population and transportation centers. The historic occurrence of damaging earthquakes in the state does not support extreme earthquake mitigation measures, as are common in states like California. However, the lack of serious earthquake damage in the past should not be interpreted as evidence that such damage will not occur in the future, and if a major basin and range earthquake similar to the 1887 Sonoran earthquake were to occur in New Mexico, the state would suffer an extremely damaging event with general losses ranging from 10s to 100s of millions of dollars. Furthermore, the area most subject to seismic activity, the Socorro-to-Albuquerque segment of the Rio Grande valley is rapidly developing. Along this segment, UNM's Main Campus in Albuquerque, Valencia Branch Campus and the Sevilleta LTER Field Station would experience the effects of an earthquake.

Figure 44: Machette et al., Indentified Fault Lines In and Near New Mexico (Quadrangles Map)



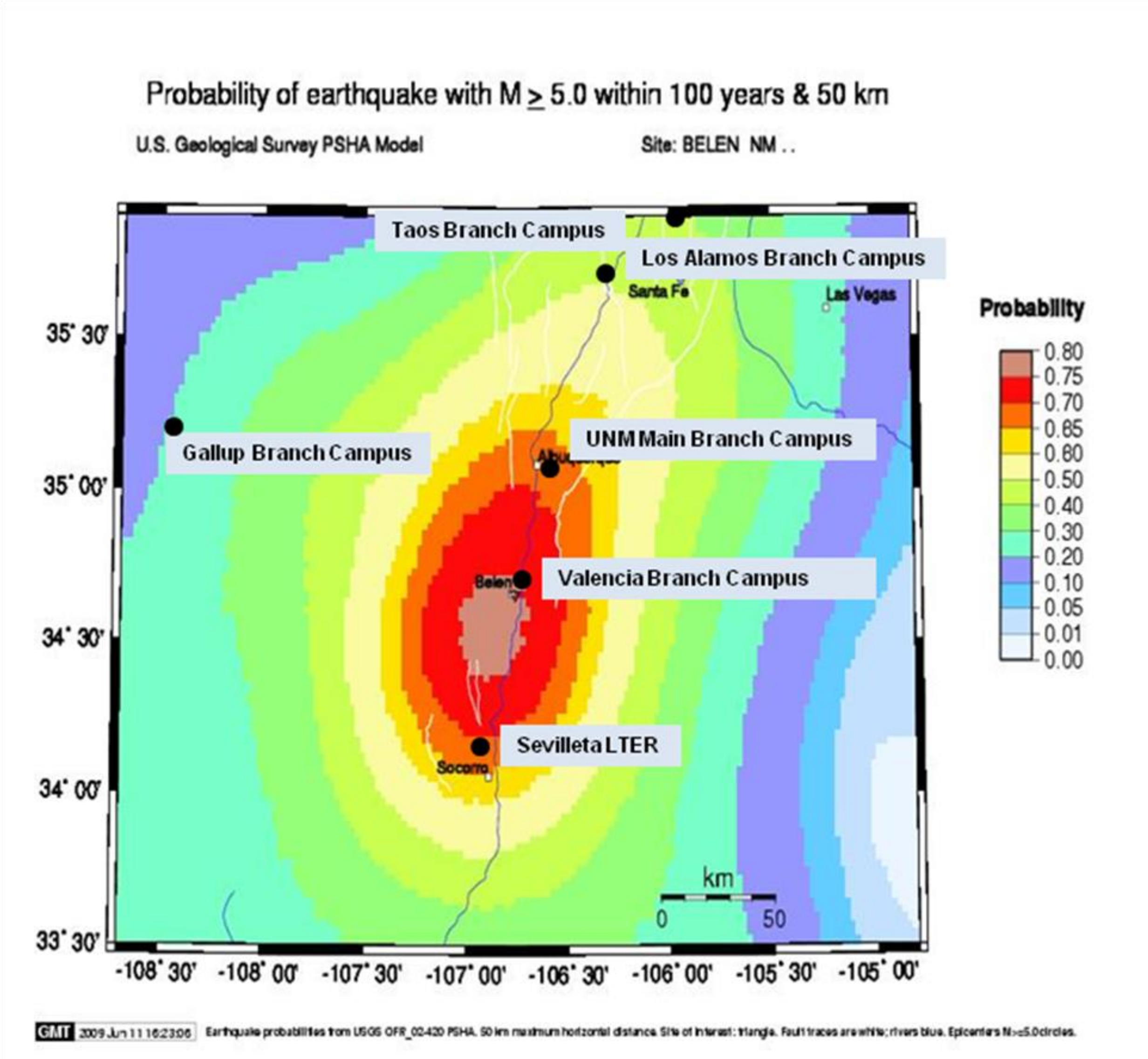
Source: http://earthquake.usgs.gov/regional/qfaults/nm/

Present building codes require construction of certain occupancies (schools, hospitals, public buildings) to high earthquake resistance standards, although seismic mitigating construction is not required for residential buildings.

According to the United States Geological Service (USGS; Frankel et al., 2002) the highest risk for an Earthquake in New Mexico is in the area along the Rio Grande between Socorro and Albuquerque where UNM's Main Campus, Valencia County

Branch Campus and Sevilleta LTER Field Station are located (Figure 45). This area has a 1% chance of a magnitude 5.0 or larger earthquake within 50 km any given year. In a three-year period, the life of the mitigation plan, that probability increases to 4.5%.

Figure 45: New Mexico Earthquake Probability



Source: http://eqint.cr.usgs.gov/eqprob/2002/index.php

The most striking feature of New Mexican seismicity is the tight cluster of earthquakes in the Rio Grande valley near Socorro, a feature referred to as the Socorro Seismic Anomaly (SSA; Sanford et al., 1995). The area within the SSA occupies 1.6% of the total area of the state but accounts for 37% of the earthquakes of magnitude 2.0 or greater, or 47% of the earthquakes of magnitude 4.5 or greater. The SSA is the result of shallow crustal extension over an inflating mid-crustal magma body. Researchers at New Mexico Tech have determined that the magma body is ~150 meters thick over much of its extent, ~19 kilometers deep, and has a lateral extent of approximately 3,400 square kilometers (Balch et al., 1997). Surveys of benchmarks, local geomorphology, and satellite measurements indicate that the surface above the magma body is rising at a ~2 millimeters/year, presumably because of injection of new magma into this thin, extensive mid-crustal chamber (Fialko and Simons, 2001).

A large number of the earthquakes in northern New Mexico appear to be related to a northeast trending lineation, the Jemez lineament (Sanford et al., 2002). This geologic feature extends from southwest of Grants to Los Alamos and Española in the Rio Grande valley, and then on along an east-northeast track to beyond the northeast corner of the state. The Jemez lineament is believed to be a leaky fracture arising from the assembly of the North American continent approximately 1.7 billion years ago. It is illuminated by both earthquakes and by hundreds of eruptive centers, including the very large, but presently seismically quiet, Jemez volcanic complex just west of Los Alamos.

The earthquake data accumulated over the past 40 years of research provides an estimate of the probable earthquake activity in New Mexico during the next 50 to 100 years. Based on 37 years of instrumental studies, the expected number of magnitude 2.0 or greater earthquakes each year is 16, and the expected number of magnitude 3.0 or greater shocks each year is about three. Between 30% and 40% of these quakes will occur within the 5,000-square-kilometer region near Socorro defining the SSA. Based on the 130-year history of felt and instrumentally recorded earthquakes, a magnitude 4.5 or greater earthquake will occur on average once every 4.3 years. From this same history, we know that a magnitude 5.8 or greater earthquake has not occurred in New Mexico since 1906. However, we cannot be certain that the level of seismic activity in New Mexico in the future will be the same as in the past. A possibility exists that it could increase, and if so, the increase is most likely to occur in the Rio Grande rift where nearly all faults with known movement in the past 15,000 years are located and where the majority of New Mexico’s population resides.

(Source: http://geoinfo.nmt.edu/publications/periodicals/litegeology/24/lite-geo_24_2002.pdf)

UNM Earthquake History

In August 2009, Seismicity within the Socorro region (UNM Sevilleta LTER Field Station) has been very active. A felt earthquake of magnitude (M_L) 2.3 occurred on August 19, 2009 approximately 3 km NE of Socorro near Escondida. Small events continued to occur during this time with activity beginning near the Lemitar area on August 24, 2009. These events have been numerous and fairly shallow depth of 5.5-6 km. The largest event was M_L=2.5 on August 29, 2009 at 18:31:01 MDT (August 30, 2009 at 01:31:01 UTC) and was felt by many residents of Lemitar and Socorro. Preliminary locations on the largest 53 events (M_L range of 0.5 to 2.5); however, over 400 smaller events have also occurred since August 19, 2009. The locations of 53 of the largest earthquakes are very similar, suggesting that this is an earthquake swarm. Earthquake swarms are usually caused in response to tectonic or hydrological pressure changes in the crust. Minor felt earthquakes in this region are not uncommon, and have been documented by Dr. Allan Sanford in the past (Figure 41, blue squares). However, this was a swarm with unusually frequent, large earthquakes (14 earthquakes with M_L > 1.4). For a size comparison, felt reports were noted for 4 events with M_L 1.9 and greater (Figure 46).

(Source: Press Release (updated). 9/1/2009 8:40 am MDT: August 2009 Earthquake Swarm)

Other recently felt earthquakes at the time of this writing included a 2.5 magnitude quake on August 11th, 2009, located 25 miles NW of UNM Main Campus, 3.0 magnitude on July 17th, 2009, located 50 miles NW UNM Main Campus and a 3.4 magnitude quake on May 23rd, 2007, located 5 miles WNW of UNM Sevilleta LTER Field Station.

Figure 46: Earthquake Swarm Locations

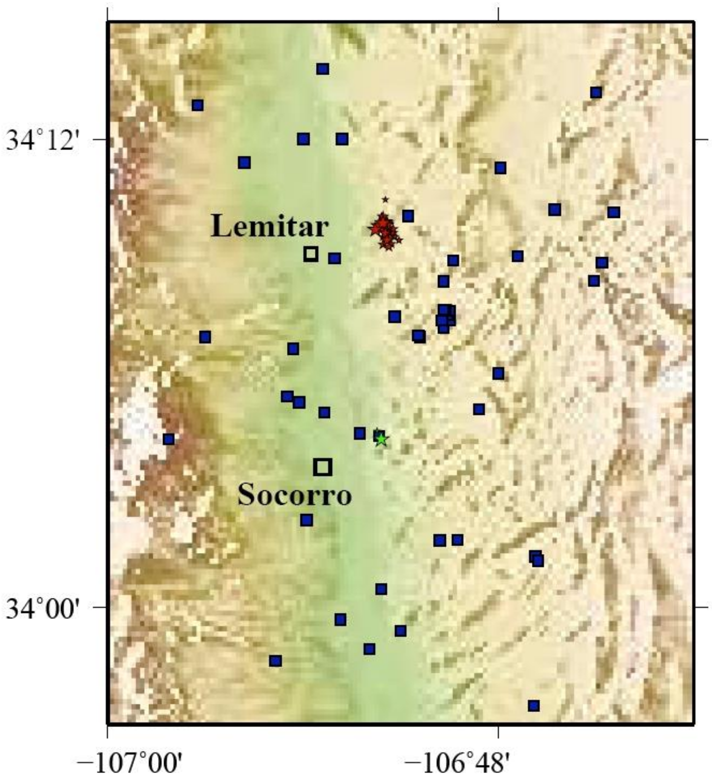


Figure 46 Caption: August 2009 swarm locations (red stars) in proximity to Socorro and Lemitar (open squares). The first, August 19, 2009 earthquake and couple of its aftershocks (green stars, close to Socorro) located south of the rest of the swarm. Also shown are locations of earthquakes that occurred near Socorro and Lemitar between 1962 – 1998 (blue squares, Sanford et al., 2002).

What Can Be Mitigated?

Damage from earthquakes can be mitigated for existing buildings by structural retrofits. Structures erected before standard building codes, such as un-reinforced masonry buildings, are typically more vulnerable to earthquake damage. More detailed information on structures in the State is required to identify those that are highly vulnerable. New buildings can be built stronger, according to the most recent seismic design specifications found in contemporary building codes, to minimize their vulnerability to earthquake damage. Additional strategies for mitigating damage from a possible earthquake are identified in Appendix F.

Data Limitations

The information on the probability and severity of a possible earthquake event is based on the relationship between Peak Ground Acceleration (PGA), magnitude, and intensity, which is approximate and depends upon such specifics as the distance from the epicenter and the depth of the epicenter. With very few damaging tremblers in the past one hundred years, there is not much historical data to suggest which areas and specific structures would be most susceptible to damage. More information on the type and number of vulnerable buildings would help the PDMAC assess specific vulnerability and risk issues more accurately. Referencing Figure 45, UNM Main, Valencia Branch Campus and the Sevitteta LTER have a 1% chance within the next 100 years to experience a 5.0 or larger earthquake. The UNM Gallup, Los Alamos and Taos Branch Campuses have less than 1% within the next 100 years of experiencing a 5,0 or larger earthquake.

Based on peak acceleration values presented in Appendix G, it is apparent that the region roughly along the Rio Grande from southern Socorro County north into Rio Arriba County is where seismic activity would be expected. Mitigation strategies for collecting earthquake data over the next 5 years will be reviewed and as the PDM plan is updated, information will be provided accordingly (mitigation action #53).

(This page intentionally left blank)

Drought

Drought is a condition of climatic dryness that reduces soil moisture, water or snow levels below the minimum necessary for sustaining plant, animal, and economic systems. Drought conditions are usually not uniform over the entire state. Local and regional differences in weather, soil condition, geology, vegetation, and human influence need to be considered when assessing the impact of drought on any particular location.

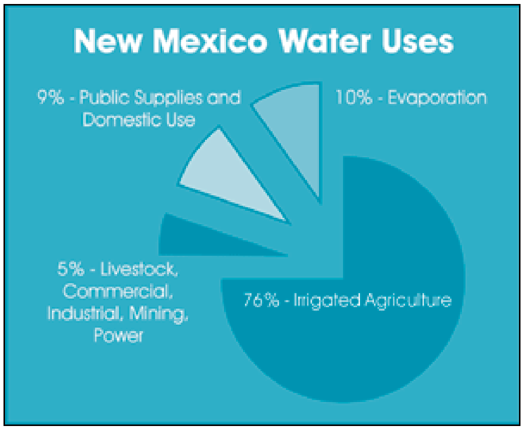
The most commonly used drought definitions are based on meteorological, agricultural, hydrological, and socio-economic effects.

- **Meteorological** drought is defined by a period of substantially diminished precipitation duration and/or intensity. The commonly used definition of meteorological drought is an interval of time, generally on the order of months or years, during which the actual moisture supply at a given place consistently falls below the climatically appropriate moisture supply
- **Agricultural** drought occurs when there is inadequate soil moisture to meet the needs of a particular crop at a particular time. Agricultural drought usually occurs after or during meteorological drought, but before hydrological drought and can affect livestock and other dry-land agricultural operations
- **Hydrological** drought refers to deficiencies in surface and subsurface water supplies. It is measured as stream flow, snow pack, and as lake, reservoir, and groundwater levels. There is usually a delay between lack of rain or snow and less measurable water in streams, lakes, and reservoirs. Therefore, hydrological measurements tend to lag behind other drought indicators
- **Socio-economic** drought occurs when physical water shortages start to affect the health, well-being, and quality of life of the people, or when the drought starts to affect the supply and demand of an economic product

Although different types of drought may occur at the same time, they can also occur independently of one another. Drought differs from other natural hazards in three ways. First, the onset and end of a drought are difficult to determine due to the slow accumulation and lingering of effects of an event after its apparent end. Second, the lack of an exact and universally accepted definition adds to the confusion of its existence and severity. Third, in contrast with other natural hazards, the impact of drought is less obvious and may be spread over a larger geographic area. These characteristics have hindered the preparation of drought contingency or mitigation plans by many governments.

Water in New Mexico is distributed among a variety of users, as the following pie chart indicates (Figure 41). About 5% goes to livestock, commercial, industrial, mining and power companies; about 9% goes to public supplies and domestic use; about 10% is lost to evaporation; and about 76% goes to irrigated agriculture.

Figure 47: New Mexico Water Uses



Drought is nature's way of reminding us that we live in a desert. New Mexico is entering the fifth year of a drought, which magnifies the challenge of balancing our limited water supplies with growing demand. A drought is caused by a variety of factors. Scientists who study climate changes believe that conditions in the North Atlantic Ocean and the Eastern Pacific Ocean play a significant role in determining the amount of precipitation that New Mexico and the rest of the country receive. Studies show current conditions in those two oceans are similar to conditions that existed during the severe drought of the late 1940s and 1950s in New Mexico.

Drought is a regular event in all areas of New Mexico. It visits the state in recurring cycles. Experts predict that drought conditions are likely to continue for the foreseeable future. According to the New Mexico Drought Plan, the state has experienced droughts since prehistoric times. Extended drought conditions in the region evidently led to the collapse of many early civilizations. Periods of drought since 1950 have been documented during 1950-1957, 1963-1964, 1976-1978, 1989, 1996, 1998-1999, 1999-2003, 2003-2006. A short term drought has been identified that lasted from October 2005 to July 2006. Areas of the north part of the state are still experiencing effects of the long-term drought, albeit dramatically diminished.

Over the past 10 years (120 months), New Mexico has had 50 months of drought. Based on this it's anticipated at least some areas of the state to have drought conditions every other year (42% probability). UNM Campuses have no record of drought events. As this plan is updated in the future, recorded events will be added to the PDM Plan.
If one were to look at a 2,000-year snapshot of rainfall and snowpack in New Mexico, drought is more the norm for this area than it is an anomaly. This is confirmed by tree-ring data, which indicates drought is a normal part of the cycle and that we may be headed for another extended drought period. During the 1980s, when New Mexicans enjoyed abnormally wet years, is when the state experienced tremendous growth in population.

It will take several years of good snowpack and precipitation to restore reservoir levels to where they were six years ago (2003). This presents a challenge for the State Engineer, whose job it is to manage water supplies for all New Mexicans. In a worst-case scenario, the State Engineer would have to make a priority call on certain river basins. Since New Mexico is a priority administration state, that means the first water users to put the water to beneficial use in the state or the more senior water rights have priority use over the more junior water rights. Water users need to be actively involved in the problem-solving process to find a way to share in the shortages and to discover other options during this time of drought.

(Source: http://www.seo.state.nm.us/faq_index.html)

In every drought agriculture is adversely impacted, especially in non-irrigated areas such as dry land farms and rangelands. Droughts impact individuals (farm owners, tenants, and farm laborers), the agricultural industry, other agriculture-related sectors, and other industries such as tourism and recreation. There is increased danger of forest and wildland fires. Loss of forests and trees increases erosion, causing serious damage to aquatic life, irrigation, and power development by heavy silting of streams, reservoirs, and rivers.

Drought status is calculated using several indices that measure how much precipitation for a given period of time has deviated from historically established norms. The Palmer Drought Severity Index (PDSI) is used by the U.S. Department of Agriculture to determine allocations of grant emergency drought assistance (Table 25).

In 1965, Palmer developed an index to "measure the departure of the moisture supply." Palmer based his index on the supply-and-demand concept of the water balance equation, taking into account more than only the precipitation deficit at specific locations. The objective of the PDSI, as this index is now called, was to provide a measurement of moisture conditions that were "standardized" so that comparisons using the index could be made between locations and between months.

Table 25: Palmer Drought Severity Index

PDSI Classifications	
4.00 or more	Extremely wet
3.00 to 3.99	Very wet
2.00 to 2.99	Moderately wet
1.00 to 1.99	Slightly wet
0.50 to 0.99	Incipient wet spell
0.49 to -0.49	Near normal
-0.50 to -0.99	Incipient dry spell
-1.00 to -1.99	Mild drought
-2.00 to -2.99	Moderate drought
-3.00 to -3.99	Severe drought
-4.00 or less	Extreme drought

Source: http://drought.unl.edu/whatis/indices.htm

According to the New Mexico Drought Plan, the latest predictions call for a likely deepening of the drought in the next few years, even thought 2006 was one of the wettest years on record (Table 26):

Table 26: 2006 Weather Data

Month	Percent of Normal	Comment
January	28	10th driest of 112 years
February	15	3rd driest of 112 years
March	71	49th driest of 112 years
April	47	25th driest of 112 years
May	36	22nd driest of 112 years
June	96	2nd driest Jan-June of 112 years
July	139	27th wettest of 112 years
August	184	Wettest of 112 years, wettest Jul-Aug of 112 years
September	131	25th wettest of 112 years, 2nd wettest Jul-Sep of 112 years
October	168	21st wettest of 112 years, 3rd wettest Jul-Oct of 112 years

Source: http://www.srh.weather.gov/abq/climate/Monthlyreports/Annual/2008/index.php

Drought Summary of Hazard Identification and Vulnerability Assessment

A majority of New Mexico is currently in a severe drought situation. Given that drought is a slow moving hazard without an event to mark its arrival, a one-time drought can be difficult to define.

The consequences of a moderate to severe drought in any county, especially where UNM resources are posted, pose significant challenges. A prolonged drought also increases the probability of other hazards. Forests become more susceptible to wildfires and native vegetation dies, leaving exposed soils susceptible to erosion, flash flooding, and dust storms. Table 27 identifies drought events and costs of those counties where UNM campuses are located. UNM campuses have not identified any drought related events. The PDMAC has identified drought as a low hazard for UNM Main and Branch Campuses, but a hazard that cannot be overlooked for the potential threat it can cause.

As with State and County jurisdictions, all UNM campuses can be affected by drought related events. Each would experience the effects of water rationing as one example. Those campuses located in wildfire areas of medium to high would risk increased opportunity for fires. To date, no UNM campuses have not identified any significant impacts from a drought event. Using the Palmer Drought Severity Index in Table 25, All UNM Campuses risk to drought could be in the range of near normal (0.49 to -0.49) to a moderate drought (-2.00 to -2.99). Data deficiencies do exist at UNM and in the next 5 years, UNM will gather data to support drought occurrences and enhanced mitigation strategies and actions at each university location (mitigation action #47). Future updates to the mitigation plan will include updates to drought events experienced by UNM campuses.

Table 27: Drought Event in Counties Where UNM Campuses are Located

Hazards	Bernalillo County (UNM Main)		McKinley County (UNM Gallup Branch Campus)		Los Alamos County (UNM Los Alamos Branch Campus)		Taos County (UNM Taos Branch Campus)		Valencia County (UNM Valencia Branch Campus)		Socorro County (Sevilleta LTER Field Station)	
	Events	**$**	**Events**	**$**	**Events**	**$**	**Events**	**$**	**Events**	**$**	**Events**	**$**
Drought	0	0	0	0	0	0	0	0	0	0	2	30K

Data is derived from the NCDC database (01/01/1950 and 02/28/2010)

What Can Be Mitigated?

The best practices include early assessment, public education, water conservation programs, and diversifying sources of water. Identifying the first phases of the drought and reacting with water conservation at the earliest time will help to mitigate drought later in the disaster. Mitigation management for drought is a proactive process. However, most of the process has been at the local level since there is no federal water conservation or drought policy. UNM as a partner in the community will help lead the way in water conservation for the future.

(This page intentionally left blank)

Land Subsidence

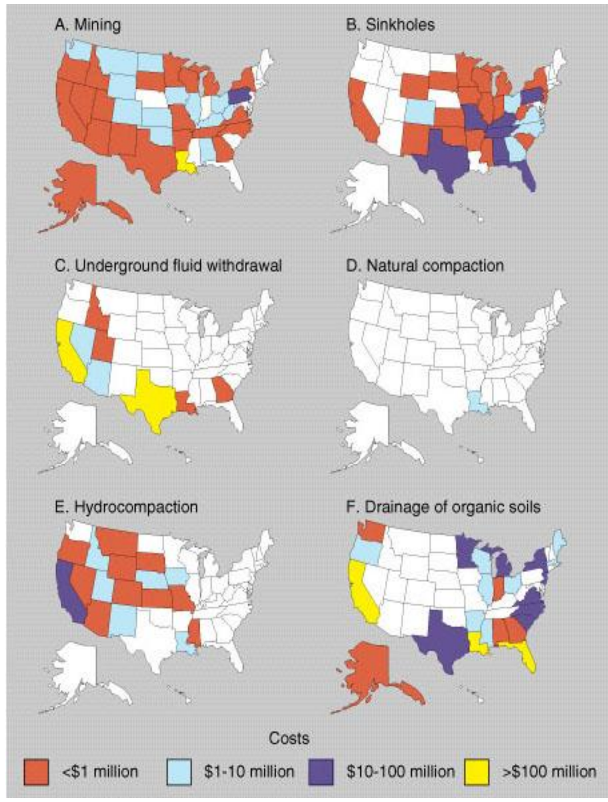


Figure 48: Land Subsidence Problems in the U.S.

Land subsidence is the loss of surface elevation and affects nearly every U.S. state (Figure 48). Land subsidence occurs when large amounts of groundwater have been withdrawn from certain types of rocks, such as fine-grained sediments. The rock compacts because the water is partly responsible for holding the ground up. When the water is withdrawn, the rock falls in on itself. Subsidence may occur abruptly or over many years. It can occur uniformly over large areas or as localized sinkholes.

Common causes of land subsidence from human activity are pumping water, oil, and gas from underground reservoirs; dissolution of limestone aquifers (sinkholes); collapse of underground mines; drainage of organic soils; and initial wetting of dry soils (hydro compaction). Land subsidence occurs in nearly every state of the United States Land subsidence is usually not observable because it occurs over a large area. When land subsidence is isolated in a small area, it appears as sinkholes. Land subsidence comprises major events in California, Texas, and Florida, all of which have experienced hundreds of millions of dollars of damage over the years.

In many areas of the southwest, earth fissures, which can be over 100 feet deep, are associated with land subsidence. They begin as narrow cracks and can erode to widths of over 10 feet. In areas where communities pump the majority of the groundwater, such as New Mexico, Colorado, Arizona, Utah, Nevada, and California, major aquifers include compressible clay and silt that can compact when the groundwater is pumped. Increased groundwater demand from population growth may likely accelerate land subsidence in areas already subsiding. (Leake, S. A. 1997).

Collapsible Soils

Another type of land subsidence, are soils that compact and collapse after they get wet. The soil particles are originally loosely packed and barely touch each other before moisture soaks into the ground. As water is added to the soil in quantity and moves downward, the water wets the contacts between soil particles and allows them to slip past each other to become more tightly packed.

Collapsible soils develop on valley margins where soil particles move from the foothills toward the valleys. They commonly accumulate to tens of feet thick. As New Mexico's population has moved out of the well-watered and irrigated valleys with compact soils to develop the valley margins and foothills, the collapsible soils have made their presence known as the newcomers add water to the drier soils.
(Source: http://geoinfo.nmt.edu/geoscience/hazards/collabsible.html)

Table 28: Land Subsidence Events in Counties Where UNM Campuses are Located

Hazards	Bernalillo County (UNM Main)		McKinley County (UNM Gallup Branch Campus)		Los Alamos County (UNM Los Alamos Branch Campus)		Taos County (UNM Taos Branch Campus)		Valencia County (UNM Valencia Branch Campus)		Socorro County (Sevilleta LTER Field Station)	
	Events	$	Events	$	Events	$	Events	$	Events	$	Events	$
Land Subsidence	0	0	0	0	0	0	0	0	0	0	0	0

Data is derived from the NCDC database (01/01/1950 and 02/28/2010)

Land Subsidence Summary of Hazard Identification and Vulnerability Assessment
Land Subsidence can result in serious structural damage to roads, buildings, irrigation channels, utilities and pipelines. Table 28 identifies those counties (local jurisdictions) where UNM campus' reside. Data obtained concludes those jurisdictions have not recorded any significant land subsidence events and where UNM Main and Branch Campuses reside, land subsidence would not affect UNM campus'.

Data Limitations
Information on expansive soils in general is limited. Although research on land subsidence have been conducted by several different government agencies, little research has been conducted at the state, county and local government level and is lacking at the UNM Main and Branch Campus locations. Upon examination by Subject Matter Experts (SMEs), this section does not require an update unless event or incident warrants further action.

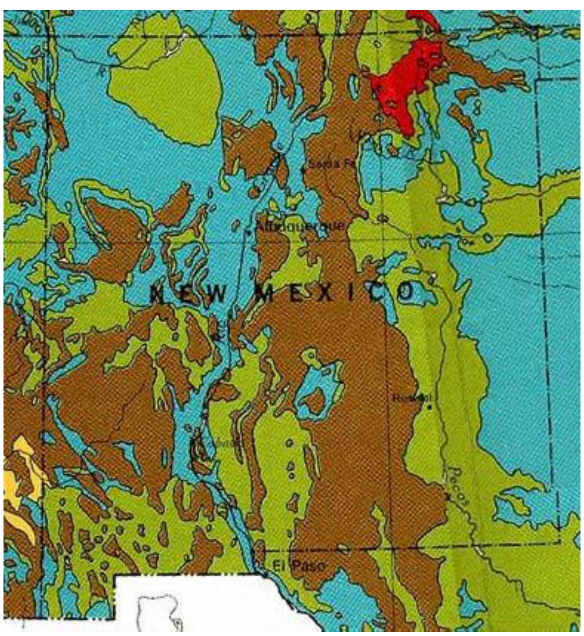
Expansive Soils

Expansive soil is also called adobe or clay. It is fine-grained clay that is generally found in areas that historically were a floodplain or lake area. Expansive soil is subject to swelling and shrinkage, varying in proportion to the amount of moisture present in the soil. As water is absorbed into the soil (by rainfall or watering), an expansion takes place. If dried out, the soil will contract, often leaving small fissures or cracks. Excessive drying and wetting of the soil will progressively deteriorate structures over the years. The soil volume may increase by as much as 10% or more and can exert 20,000 psi on foundations.

Expansive soil is found in all states, although the highest concentrations are found in Texas, Colorado, Virginia, North Dakota, Oklahoma, and Montana. One of the most expansive soils, known as adobe, is found in Texas and Colorado. The expansion and contraction of soil beneath a structure tends to exert tremendous pressure and stress, causing severe structural damage. In some cases, entire sidewalks and streets have been lifted, resulting in severe cracking and distortion. In a 1987 document, entitled "Foundations in Expansive Soils" from the Office of the Chief of Engineers, U.S. Army, New Mexico has four physiographic provinces. The northwest corner of the state is within the Colorado Plateau, The far north central portion of the state is within the southern Rocky Mountains. The central and southwestern portions of the state lie in the basin and range province, and the eastern third of the state is classified as the Great Plains. (Source: http://www.scribd.com/doc/14758141/Foundation-in-Expansive-SoilnoPW)

UNM Campuses are spread throughout the state. Figure 49 shows the areas of expansive soils in New Mexico. The red area in the northeast portion of the state around Taos (UNM Taos Branch Campus) is an area that contains abundant clay with high swelling potential.

Figure 49: New Mexico Expansive Soils



- Unit contains abundant clay having high swelling potential
- Part of unit (generally less than 50%) consists of clay having high swelling potential
- Unit contains abundant clay having slight to moderate swelling potential
- Part of unit (generally less than 50%) consists of clay having slight to moderate swelling potential
- Unit contains little or no swelling clay
- Data insufficient to indicate clay content of unit and/or swelling potential of clay (Shown in westernmost of state only)

Source: http://www.inspection1.com/types/soils/newmex.htm

The blue areas generally have less than 50% clay and also have high swelling potential. The yellow area, of which there is only a very small portion on the Arizona border, indicates areas with abundant clay having slight to moderate swelling potential. The green areas generally have less than 50% clay with slight to moderate swelling potential and the brown areas have little or no swelling clay.

In researching those counties where UNM campuses are located, Table 29 identifies those counties have not recorded any significant land subsidence events.

Table 29: Expansive Soil Events in Counties Where UNM Campuses are Located

Hazards	Bernalillo County (UNM Main)		McKinley County (UNM Gallup Branch Campus)		Los Alamos County (UNM Los Alamos Branch Campus)		Taos County (UNM Taos Branch Campus)		Valencia County (UNM Valencia Branch Campus)		Socorro County (Sevilleta LTER Field Station)	
	Events	**$**	**Events**	**$**	**Events**	**$**	**Events**	**$**	**Events**	**$**	**Events**	**$**
Expansive Soil	0	0	0	0	0	0	0	0	0	0	0	0

Data is derived from the NCDC database (01/01/1950 and 02/28/2010)

Expansive Soil Summary of Hazard Identification and Vulnerability Assessment

While damages due to expansive soils have occurred in New Mexico, the fact that the onset takes a very long time, damages are cumulative rather than instantaneous. UNM considers this a low risk and will not profile this hazard further, unless and until future conditions or events justify it. UNM Campuses have no record of damages due to expansive soils. Hazard analysis and discussions with UNM Risk and Safety Department concluded there have not been any expansive soil issues affecting UNM campuses to date. As this plan is updated in the future, recorded events will be added to the PDM Plan. As there have been no past expansive soil events identified in the jurisdictions where UNM Main and Branch Campuses reside, expansive soils would not affect UNM campuses. To date, UNM has not experienced expansive soil events of any kind but during normal planning maintain vigilance when developing new structures concurrent with tracking those areas on UNM that may be vulnerable to any type of land changes.

Data Limitations

Information on expansive soils in general is limited. Although research on expansive soils have been conducted by several different government agencies, little research has been conducted at the state, county and local government level and is lacking at the UNM Main and Branch Campus locations. Upon examination by Subject Matter Experts (SMEs), this section does not require an update unless event or incident warrants further action.

Landslides

Landslides are the downward and outward movement of slopes. Landslides include a wide range of ground movement, such as rock falls, deep failure of slopes, and shallow debris flows. Although gravity acting on and over steepened slopes is the primary reason for a landslide, landslides are often prompted by the occurrence of other disasters. Other contributing factors include the following:

- Erosion by rivers, glaciers, or ocean waves creating over-steepened slopes
- Rock and soil slopes weakened through saturation by snowmelt or heavy rains
- Earthquakes creating stresses that make weak slopes fail
- Earthquakes of magnitude 4.0 and greater shaking the ground
- Volcanic eruptions producing loose ash deposits, heavy rain, and debris flows
- Excess weight from accumulation of rain or snow, stockpiling of rock or ore, from waste piles, or from manmade structures stressing weak slopes
- Floods or long duration precipitation events creating saturated, unstable soils that are more susceptible to failure

Slope material often becomes saturated with water and may develop a debris or mudflow. If the ground is saturated, the water weakens the soil and rock by reducing cohesion and friction between particles. Cohesion, which is the tendency of soil particles to "stick" to each other, and friction affect the strength of the material in the slope and contribute to a slope's ability to resist down slope movement. Saturation also increases the weight of the slope materials and, like the addition of material on the upper portion of a slope, increases the gravitational force on the slope. Undercutting of a slope reduces the slope's resistance to the force of gravity by removing much-needed support at the base of the slope.

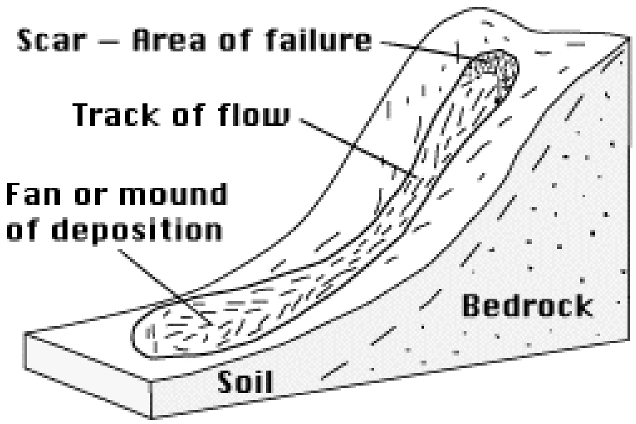
Alternating cycles of freeze and thaw can result in a slow, virtually imperceptible loosening of rock, thereby weakening the rock and making it susceptible to slope failure. The resulting slurry of rock and mud can pick up trees, houses, and cars, and block bridges and tributaries, causing flooding along its path. Additionally, removal of vegetation can leave a slope much more susceptible to superficial landslides because of the loss of the stabilizing root systems.

Geologists identify active landslides and areas subject to slope instability so that they may be avoided or mitigated. Together, geologists and civil engineers develop and implement measures to improve the stability of slopes, repair existing landslides, and prevent damage from future landslides. Slope stability can be improved by removing material from the top of the slope, adding material or retaining structures to the base of the slope, and reducing the degree of saturation by improving drainage within the slope.

Types

Debris Flows (Figure 50) – a mixture of rock fragments, soil, vegetation, water and, in some cases, entrained air that flows downhill as a fluid. Debris flows can range in consistency from that of freshly mixed concrete to running water. Debris flows can be further classified as mudflows and earth flows depending on the ratio of water to soil and rock debris. Lahars are a special form of debris flow caused by volcanic eruptions.

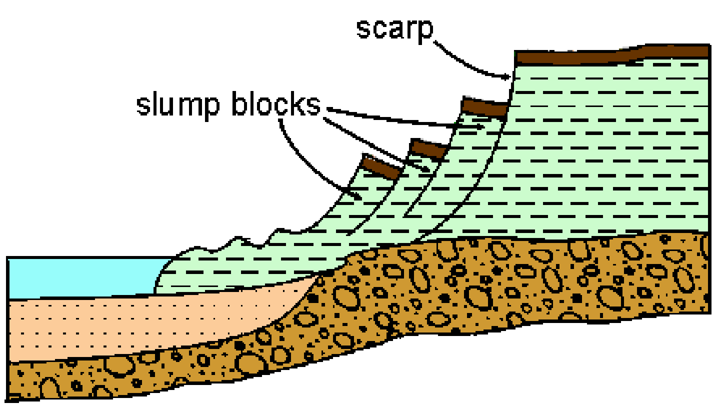
Figure 50: Debris Flow



Above: Schematic of debris flow. Image courtesy of USGS.

Slump (Figure 51) – a landslide consisting of a mass of material moving down slope as a unit, usually along a curved plane of failure. The removed mass of soil and rock leave an abrupt drop-off at the top of the landslide known as a scarp. Repeated slumping can often result in terracing, or series of scarps, as secondary failures occur within the landslide mass.

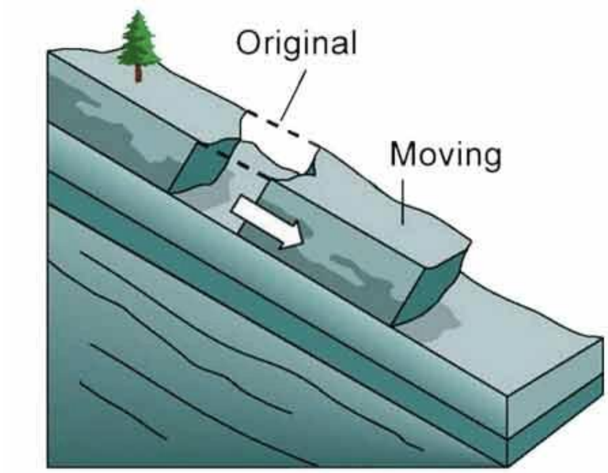
Figure 51: Slump



Above: Schematic of slump. Image courtesy of Maine Geological Survey.

Rock Slide (Figure 52) – the rapid movement of a large mass of rock along a plane of weakness, such as a bedding plane or joint. In general, rockslides occur on steep mountain faces, but have been known to occur on slopes as low as 15 degrees.

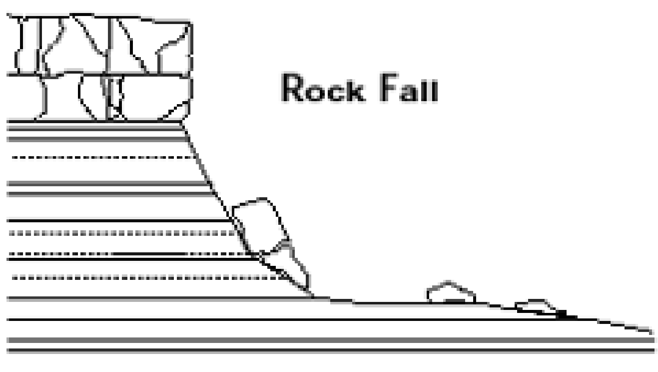
Figure 52: Rock Slide



Above: Schematic of rock slide. Image courtesy of Geoscience Australia.

Rock Fall (Figure 53) – the freefall of rock from a cliff. Rock falls are often the result of physical weathering such as ice wedging. The rock typically accumulates at the base of the cliff in the form of talus (loose rock). Rock falls are often triggered by earthquakes.

Figure 53: Rock Fall



Above: Schematic of rock fall. Image courtesy of Utah Geological Survey.

Source: http://www.aegweb.org/i4a/pages/index.cfm?pageid=4073

Landslides can be classified by using the Alexander Scale (Table 30):

Table 30: Alexander Scale for Landslide Damage

Alexander Scale for Landslide Damage

Level	Damage	Description
0	None	Building is intact.
1	Negligible	Hairline cracks in walls or structural members; no distortion of structure or detachment of external architectural details
2	Light	Buildings continue to be habitable; repair not urgent. Settlement of foundations, distortion of structure, and inclination of walls are not sufficient to compromise overall stability.
3	Moderate	Walls out of perpendicular by one or two degrees, or there has been substantial cracking in structural members, or the foundations have settled during differential subsidence of at least 15 cm; building requires evacuation and rapid attention to ensure its continued life.
4	Serious	Walls out of perpendicular by several degrees; open cracks in walls; fracture of structural members; fragmentation of masonry; differential settlement of at least 25 cm compromising foundations; floors may be inclined by one or two degrees or ruined by heave. Internal partition walls will need to be replaced; door and window frames are too distorted to use; occupants must be evacuated and major repairs carried out.
5	Very Serious	Walls out of plumb by five or six degrees; structure grossly distorted; differential settlement has seriously cracked floors and walls or caused major rotation or slewing of the building [wooden buildings are detached completely from their foundations]. Partition walls and brick infill will have at least partly collapsed; roofs may have partially collapsed; outhouses, porches, and patios may have been damaged more seriously than the principal structure itself. Occupants will need to be re-housed on a long-term basis, and rehabilitation of the building will probably not be feasible.
6	Partial Collapse	Requires immediate evacuation of the occupants and cordoning of the site to prevent accidents with falling masonry.
7	Total Collapse	Requires clearance of the site.

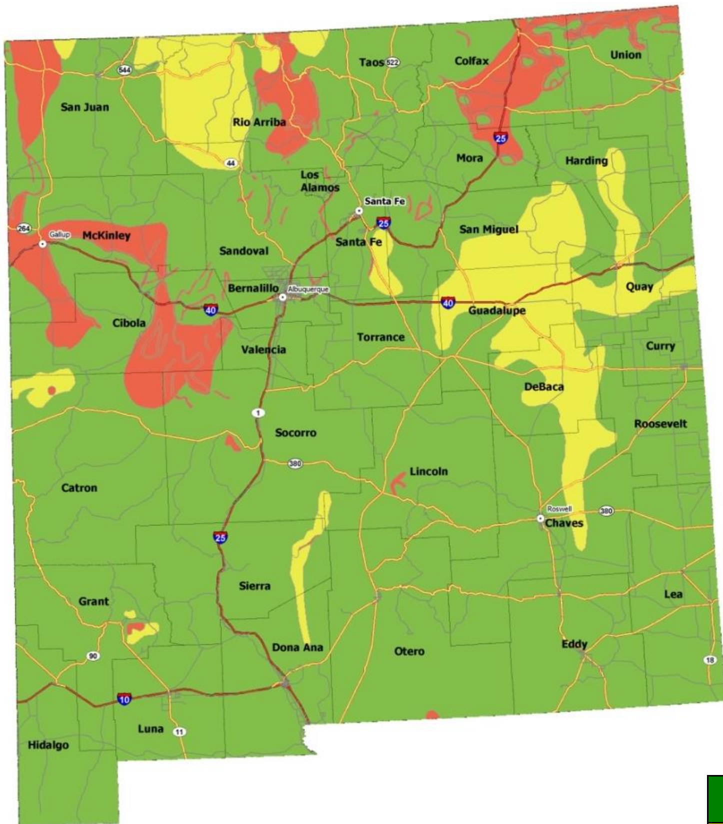
Source: http://www.es.mq.edu.au/NHRC/web/scales/scalespage14.htm

Landslides occur in every state and U.S. territory. The Appalachian Mountains, the Rocky Mountains, the Pacific Coastal Ranges, and some parts of Alaska and Hawaii experience severe landslide problems. Any area composed of very weak or fractured materials resting on a steep slope may experience landslides.

Although frequently associated with areas of high rainfall, landslides are a potential hazard in arid or semi-arid states like New Mexico. Landslides in New Mexico range from large, slow-moving, deep-seated masses, which can destroy structures by gradual movement, to shallow, fast-moving debris flows that threaten life and property.

The USGS National Landslide Hazards Program has mapped the landslide risk for the entire conterminous U.S. Most of New Mexico is mapped in the lowest risk zone where there is a low landslide incidence that involves less than 1.5% of the land area (Figure 54).

Figure 54: Landslide Susceptible Areas



Low:	≤ 1.5% of land area
Moderate:	1.5% -15% of land area
High:	≥ 15% of land area.

Source: USGS
http://landslides.usgs.gov/learning/nationalmap/

Referencing Figure 54, the UNM Main and Los Alamos, Taos and Valencia Branch Campuses and the Sevilleta LTER Field Station reside in the green areas indicating a low susceptibility and a low incidence of past landslides that involves less than or equal to 1.5% of the land area. UNM's Gallup Branch Campus resides in the red area, indicate a high susceptibility and low incidence of past landslides that involves more than 15% of the land area. In researching those counties where UNM campuses are located, Table 31 identifies those counties have not recorded any significant landslide events.

Table 31: Landslide Events in Counties Where UNM Campuses are Located

Hazards	Bernalillo County (UNM Main)		McKinley County (UNM Gallup Branch Campus)		Los Alamos County (UNM Los Alamos Branch Campus)		Taos County (UNM Taos Branch Campus)		Valencia County (UNM Valencia Branch Campus)		Socorro County (Sevilleta LTER Field Station)	
	Events	**$**	**Events**	**$**	**Events**	**$**	**Events**	**$**	**Events**	**$**	**Events**	**$**
Landslide	0	0	0	0	0	0	0	0	0	0	0	0

Data is derived from the NCDC database (01/01/1950 and 02/28/2010)

UNM Campuses have no record of damages due landslide events. Hazard analysis and discussions with UNM Risk and Safety Department concluded that there have not been any landslide issues affecting UNM campuses to date. Continued groundwater pumping lowers the water table and increases the potential for ground subsidence. To date, UNM has not experienced a landslide event of any kind but during normal planning maintain vigilance when developing new structures concurrent with tracking those areas on UNM that may be vulnerable to any type of land changes. As this plan is updated in the future, recorded events will be added to the PDM Plan.

Landslide Summary of Hazard Identification and Vulnerability Assessment
Landslides and sinkholes are possible in the State of New Mexico and specifically in the jurisdictions where UNM Main and Branch Campus' reside; landslides would not affect UNM campuses.

Data Limitations
Information on landslides in general is limited. Although research on landslides has been conducted by several different government agencies, little research has been conducted at the state, county and local government level and is lacking at the UNM Main and Branch Campus locations. Upon examination by Subject Matter Experts (SMEs), this section does not require an update unless event or incident warrants further action.

What Can Be Mitigated?
Mitigation options for landslides should address the lack of specific information on these hazards as they relate to UNM Main and Branch Campuses. A possible mitigation action may be for UNM to participate in the USGS Landslide Hazard Program and conduct mapping and delineation of landslide and land subsidence areas in the county.

Vulnerability to landslides can be addressed through land-use regulations, zoning, and building codes. Through enforcement of the building codes, new buildings can be built stronger, according to the most recent seismic design specifications found in contemporary building codes, to minimize their vulnerability to land subsidence damage.

Volcanoes

A volcano is a vent through which molten rock escapes to the earth's surface. Unlike other mountains, which are pushed up from below, volcanoes are built by surface accumulation of their eruptive products (e.g., layers of lava, pyroclastic flows, and ash). When pressure from gases within the molten rock becomes too great, an eruption occurs. Volcanic hazards include gases; lava and pyroclastic flows; airborne ash; landslides; earthquakes; and explosive eruptions.

Figure 55: Albuquerque Westside Volcanoes

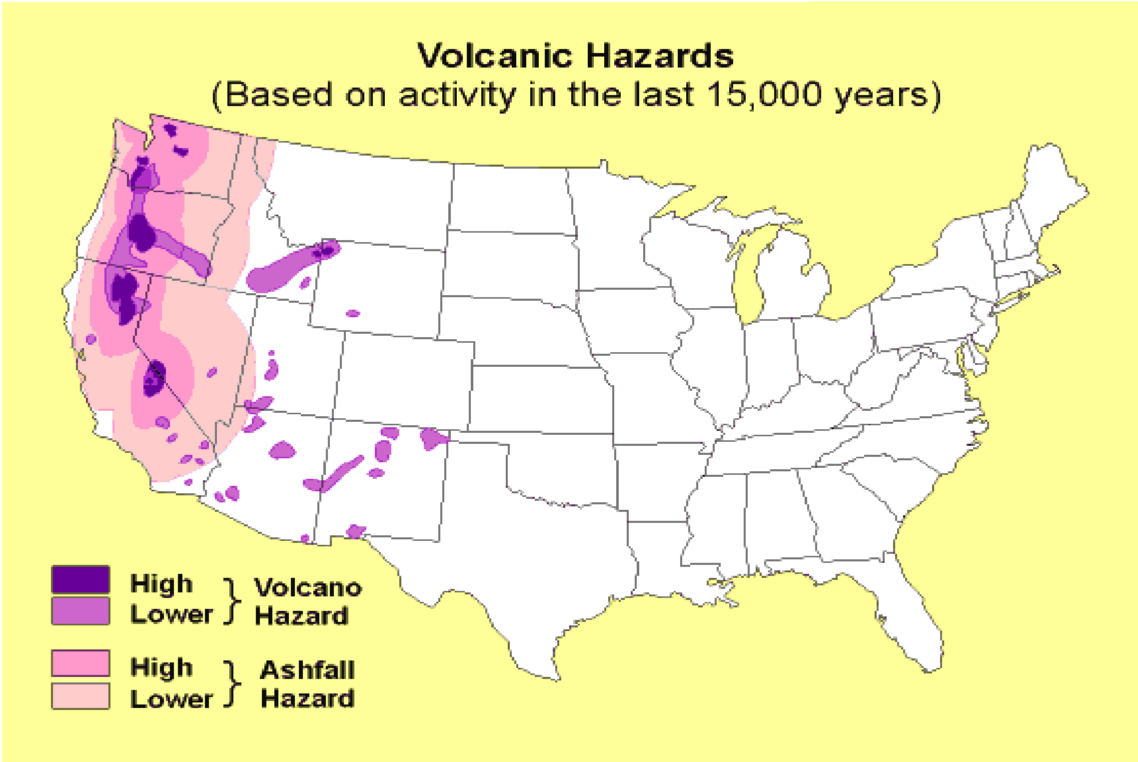
Eruptions can be relatively quiet; producing lava flows that creep across the land at 2 to 10 MPH. Explosive eruptions can shoot columns of gases and rock fragments tens of miles into the atmosphere, spreading ash hundreds of miles downwind.

Lava flows are streams of molten rock that either pour from a vent quietly or explosively by lava fountains. Because of their intense heat, lava flows are also great fire hazards. Lava flows destroy everything in their path, but most move slowly enough that people can move out of the way. The speed at which lava moves across the ground depends on several factors, including the type of lava erupted, the steepness of the ground, and the rate of lava production at the vent.

The United States is third in the world, after Japan and Indonesia, for the number of active volcanoes. Since 1980, as many as five volcanoes have erupted each year in the United States. Eruptions are most likely to occur in Hawaii and Alaska. For the Cascade Range in Washington, Oregon, and California, volcanoes erupt on the average of once or twice each century. Volcanoes produce a wide variety of hazards that can kill people and destroy property. Large explosive eruptions can endanger people and property hundreds of miles away and even affect global climate.

Figure 56 illustrates the volcanic hazard areas in the Continental United States based on events over the last 15,000 years. Areas in blue or purple show regions at greater or lesser risk of local volcanic activity, including lava flows, ashfalls, lahars (volcanic mudflows), and debris avalanches. Areas in pink show regions at risk of receiving 5 cm or more of ashfall from large or very large explosive eruptions, originating at the volcanic centers (shown in blue). These projected ashfall extents are based on observed ashfall distributions from an eruption ("large") of Mt. St. Helens that took place 3,400 years ago, and the eruption of Mt. Mazama ("very large") that formed Crater Lake, Oregon, 6,800 years ago.

Figure 56: Volcanic Hazards in the Continental U.S.



Source: http://dma.mt.gov/des/Library/PDM/PDM-Final%20Draft/Volcanic%20Eruptions%20Hazard%20Profile.pdf

New Mexico has one of the greatest concentrations of young, well-exposed, and un-eroded volcanoes on the continent. The last episode in the state occurred approximately 3,000 years ago with the eruption of several cubic kilometers of basalt (McCarty's lava flow, El Malpais). New Mexico has one of only three large mid-crustal active magma bodies (Socorro) in the continent; the others are Long Valley, California, and Yellowstone, Wyoming. The Socorro area is one of the few areas where there is a dearth of young volcanoes (Table 32).

Table 32: Principle Types of Volcanoes in New Mexico

Large	Intermediate	Small
Ash-flow calderas • Mid-Tertiary (Mogollon-Gila) • Jemez Mountains **Composite volcanoes** • Sierra Blanca • Agua Fria • Mount Taylor	**Scoria cone/silicic dome fields** • Raton-Clayton • Taos Plateau • Mount Taylor field • Bandera • Red Hill • Cerros del Rio • Potrillo	**Small shield volcanoes** • Cerro Verde • San Felipe volcano • Jornada del Muerto **Large lava flows** • McCartys • Carrizozo **Isolated cones/domes**

Source: http://www.nmnaturalhistory.org/sci_volcanoes.html

Although there are currently no active volcanoes in New Mexico, many dormant and extinct volcanoes are preserved in the state; they include:

- **Calderas:** The type example and one of the largest young calderas in the world (Valles Caldera) is in New Mexico
- **Cinder Cones:** Several of the largest concentrations of young cinder cones are in New Mexico
- **Fissure Eruptions:** Best young examples of a fissure eruption (Albuquerque Volcanoes) are found in New Mexico
- **Lava Flows:** Two of the largest young basaltic lava flows in the world (Carrizozo and McCarty's) are in New Mexico
- **Maars - Steam Explosion Craters:** One of the greatest concentrations of young volcanic steam explosion craters (referred to as "maars" by geologists) occur in New Mexico. Zuni Salt Lake Crater and Kilbourne Hole Crater are two maars in New Mexico often used as type examples in textbooks. The remains of maars literally fill White Rock Canyon and they pepper the surfaces of many of the other volcanic fields, like the Mount Taylor and Potrillo fields. A significant eruption occurred from Isleta Volcano near Albuquerque. They are more abundant, better preserved, and more diversely exposed than those in the type area (Eifel district of Germany)
- **Resurgent Calderas**: The Datil-Mogollon region of New Mexico is one of the largest concentrations of resurgent calderas. These are more eroded than the Valles Caldera, but they are in the same state of exposure as the San Juan Mountains of Colorado, another collection of mid-Tertiary resurgent calderas
- **Volcanic Fields**: The greatest diversity of young volcanic rock types and classic suites of volcanic rocks (for example, the Mount Taylor and the Raton-Clayton volcanic fields) occur in New Mexico
- **Volcanic Necks**: The greatest concentration and best-exposed examples of young volcanic necks in the world are in New Mexico (Rio Puerco Valley)

(Source: http://www.nmnaturalhistory.org/sci_volcanoes.html)

One way to measure the potential magnitude of a volcanic eruption is the Volcanic Explosivity Index (VEI) (Table 33):

Table 33: Volcanic Explosivity Index

Volcanic Explosivity Index

VEI	Description	Plume	Ejecta volume	Frequency
0	non-explosive	< 100 m	> 1000 m³	daily
1	gentle	100-1000 m	> 10,000 m³	daily
2	explosive	1-5 km	> 1,000,000 m³	weekly
3	severe	3-15 km	> 10,000,000 m³	yearly

Volcanic Explosivity Index continued				
VEI	**Description**	**Plume**	**Ejecta volume**	**Frequency**
4	cataclysmic	10-25 km	> 0.1 km^3	≥ 10 yrs
5	paroxysmal	> 25 km	> 1 km^3	≥ 50 yrs
6	colossal	> 25 km	> 10 km^3	≥ 100 yrs
7	super-colossal	> 25 km	> 100 km^3	≥ 1000 yrs
8	mega-colossal	> 25 km	> 1,000 km^3	≥ 10,000 yrs

Source: http://volcano.und.edu/vwdocs/eruption_scale.html

With respect to volcanic activity, New Mexico has one of the largest number, largest range of ages, largest diversity of types, largest range of preservation, and some of the best types of examples in North America. The question remains as to how likely an eruption will actually occur in New Mexico in the near future. There have been more than 700 volcanic eruptions in New Mexico in the last 5 million years.

Prior to an eruption, magma (molten rock) migrates into a magma chamber, or reservoir, beneath a volcano. As magma moves toward the surface, it (1) releases gases such as sulfur dioxide and carbon dioxide, (2) produces small earthquakes, and (3) causes subtle swelling of the flanks of the volcano. Scientists can watch for these warning signs by monitoring gases emitted by the volcano, determining the size and frequency of small earthquakes under the volcano by using seismographs, and measuring changes on the slopes of the volcano using tiltmeters and geodetic methods especially using permanent and temporarily deployed Global Positioning System (GPS).

(Source: http://geoinfo.nmt.edu/faq/volcanoes/home.html)

The eruptive styles range from dangerously explosive to passive. Based on past occurrence of volcanism in the state (Figures 57 and 58), it is estimated that there is roughly a 1% chance that some type of volcanic eruption could occur somewhere in New Mexico in the next 100 years, and a 10% chance that an eruption will occur in the next 1,000 years.

Volcano Summary of Hazard Identification and Vulnerability Assessment

Due to the antiquity of known volcanism and the absence of related historical seismic activity in the State of New Mexico, the PDMAC concludes that the near-term risk of volcanic eruption where main and branch campuses reside is low. Referencing Figure 57, UNM Gallup and Valencia Branch Campuses are not affected by volcanoes. The UNM Main Campus is located on the east side of Albuquerque and the volcanoes are located about 12 miles west of UNM on the far west side of the city boundry. In the next update, addressing the direct relation of volcanic activity to seismic activity is a priority. Data deficiencies do exist and in the next 5 years, UNM will gather data to support occurrences and enhanced mitigation strategies and actions at each university location (mitigation action #52).

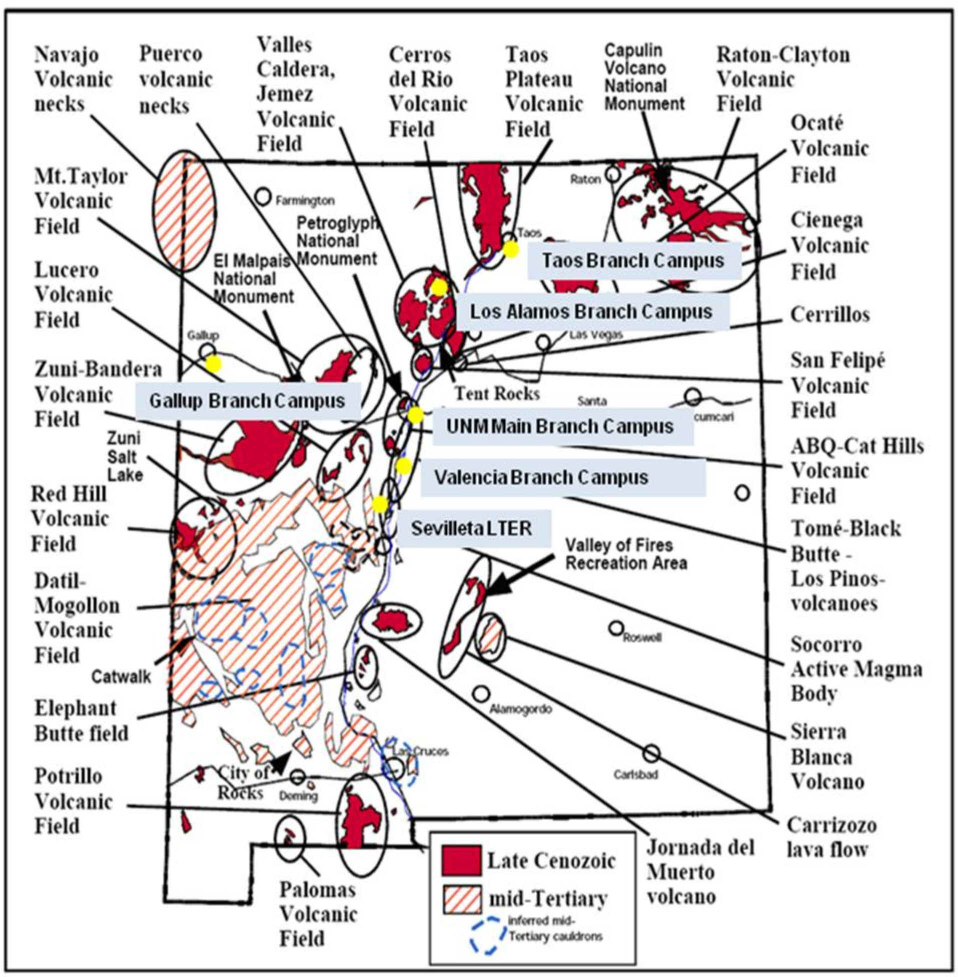
Data Deficiencies

Due to the prolonged inactivity of the volcanic fields in New Mexico, it is believed that they are not likely to erupt in the foreseeable future. Studies of the fields center more around their formation and past events, rather than focusing on potential future events. Future updates to the mitigation plan will include a more in-depth review of the risks to each Campus and mitigation strategies will be developed.

What Can Be Mitigated?

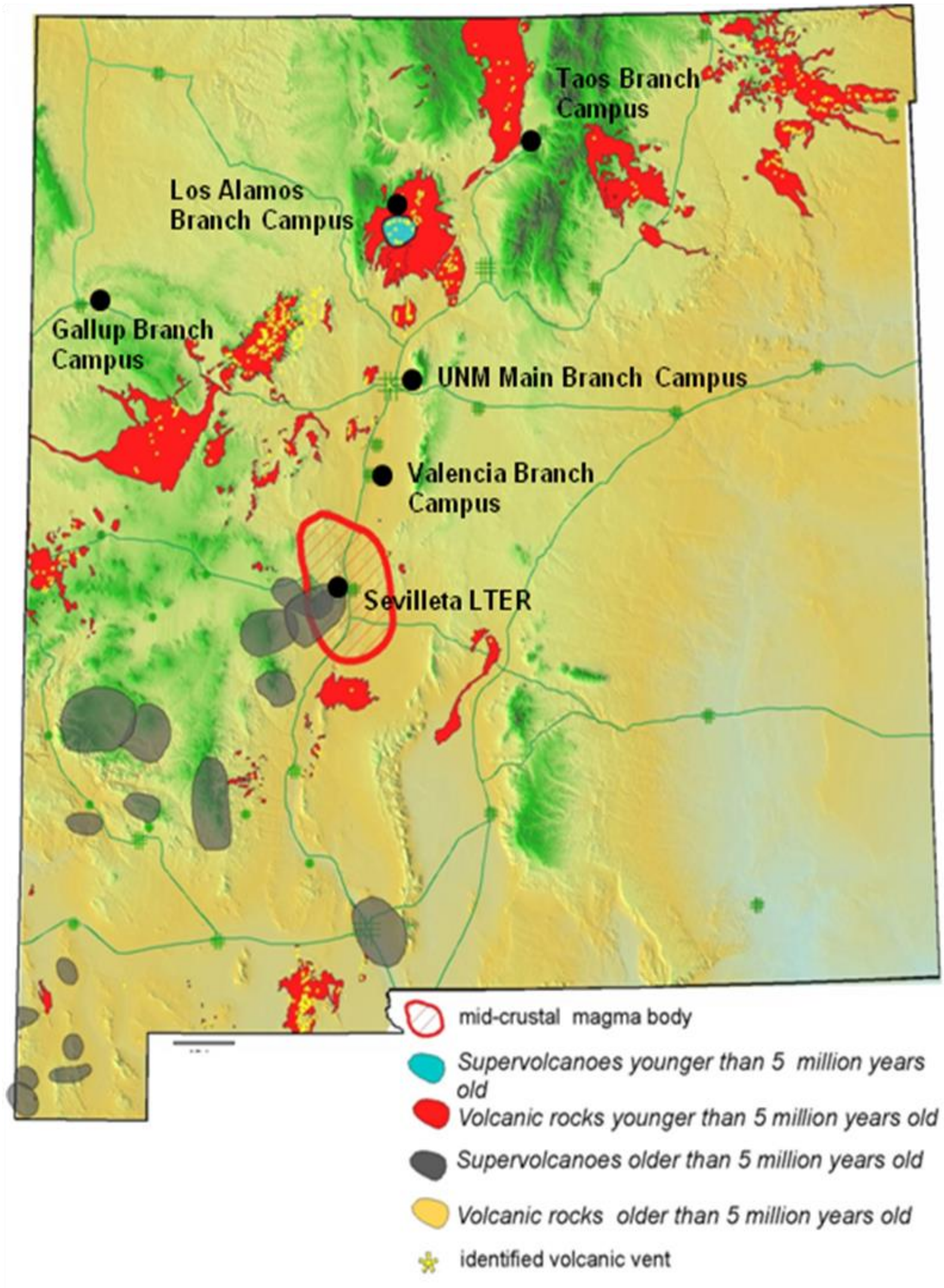
Mitigation options for volcano eruptions should address the lack of specific information on these hazards as they relate to State and Local jurisdictions. A possible mitigation action may be to assist in conducting mapping and delineation of areas vulnerable to volcano eruption in and around the state. Educating main and branch campuses population (faculty, staff, students and visitors) about the volcano alert system and the aviation color code warning systems is another possible mitigation action item.

Figure 57: Volcanic Areas of New Mexico



Source: http://nmnaturalhistory.org/sci_volcanoes.html

Figure 58: New Mexico Volcanic Activity



Source: http://nmnaturalhistory.org/sci_volcanoes.html

Dam Failure

Another flood hazard that can affect parts of the state is dam failure. A dam is defined as a barrier constructed across a watercourse or off-channel for the purpose of storage, control, or diversion of water. A dam impounds water in the upstream area, or reservoir. The amount of water impounded is measured in acre-feet, referring to the volume of water that covers an acre of land to a depth of one foot.

Any malfunction or abnormality outside the design assumptions and parameters that adversely affects a dam's primary function is considered a dam failure. A catastrophic dam failure is characterized by a sudden, rapid, and uncontrolled release of impounded water. The sudden release of water may result in downstream flooding affecting life, property, or both. Flooding, earthquakes, blockages, landslides, lack of maintenance, improper operation, poor construction, vandalism, or acts of terrorism can cause dam failures. The sudden release of the impounded water can occur during a flood that overtops or damages a dam, or it can occur on a clear day if the dam has not been properly constructed or maintained.

Dam failures can occur anywhere there is a dam, but the threat from dam failures increases as existing dams get older. In recent times, many dams are built as retention basins and amenity ponds in new developments. Many small dams are on streams or drainages that are not mapped as floodplains or subject to floodplain regulations. Even when the stream is mapped, the floodplain is usually not based on a dam breach inundation map, leaving downstream residents unaware of the potential dangers.

The Office of the State Engineer Dam Safety Bureau regulates the design, construction, reconstruction, modification, removal, abandonment, inspection, operation, and maintenance of dams over 10 feet high or dams that store more than 10 acre-feet of water. Federal dam owners are required to obtain a permit for a new dam; however, the Office of the State Engineer regulates the continued safety of federal dams by law. Dams 10 feet or less in height or dams that store 10 acre-feet or less, are generally not regulated and are considered non-jurisdictional dams. However, if a non-jurisdictional dam threatens life and property due to an unsafe condition, the state engineer can issue a safety order to the owner requiring action to remove the threat.

Standard practice among federal and state dam safety offices is to classify a dam according to the potential impact a dam failure (breach) or mis-operation (unscheduled release) would have on downstream areas. The hazard potential classification system categorizes dams based on the probable loss of human life and the impacts on economic, environmental and lifeline facilities. The Dam Hazard Potential Classification definitions are shown in Table 34.

Of the 495 dams in the state, 395 dams come under the jurisdiction of the Office of the State Engineer Dam Safety Bureau. Of these, 178 dams are classified as high hazard potential and 88 dams are classified as significant hazard potential. The remaining 100 dams are under federal jurisdiction, including Bureau of Indian Affairs, Bureau of Reclamations, and US Army Corps of Engineers.

Table 34: Dam Hazard Potential Classification

Category	Loss of Life	State Ranking
Low	None Expected	Low economic or environmental losses. Losses Principally Limited to Dam Owner's property
Significant	None Expected	Economic Loss, Environmental Damage and disruption of lifeline facilities. Predominantly located in rural areas
High	Expected	Based only on Loss of Life

In 2005, the Office of the State Engineer adopted new regulations for dams. The regulations address the requirements for design and construction of new dams, modifications or alterations to existing dams and the continued safe operation and maintenance of existing dams. A new requirement for owners of dams classified as high or significant hazard potential is preparation, maintenance and exercise of an Emergency Action Plan (EAP). The EAP identifies defensive action to prevent or minimize property damage, injury or loss of life due to an emergency at the dam.

Each EAP has an inundation map based on modeling the dam failure under various operation conditions. An evacuation map is then prepared from the inundation map. There is no state map showing all inundation zones. The lack of adequate maps is being addressed in the NMDHSEM Mitigation Strategies. Local mitigation plans will contain information on dams classified as high and significant hazard potential and inundation maps within their jurisdictions as the information becomes available. An example EAP is listed on the Office of the State Engineer website to assist owners in preparing their EAP.

DAM Emergency Action Plans

In an effort to profile the dam failure hazard for the State of New Mexico that are threats to UNM Campuses. Existing Dam Emergency action plans are summarized below for those areas that possibly could affect UNM Campuses. These plans are out of date and do not conform to the template utilized by the Office of the State Engineer. They do however; have inundation zone descriptions if not the maps themselves. Existing Emergency Action plans are summarized below:

Cochiti Lake, New Mexico (Project operational in 1976)

The dam is located near Pueblo de Cochiti, approximately 50 miles upstream from Albuquerque, New Mexico (Table 35). The project consists of an earthfill dam about 5.4 miles long with a maximum height of 251 feet above streambed. The project extends generally in an east-west line across the Rio Grande to a point about 2 miles east of the Rio Grande and then southward across the Santa Fé River. The project controls floodwaters from an 11,695 square mile drainage area. According to Army Corps of Engineers inundation maps from April 1982 inundation maps the flowing could occur:

Table 35: Cochiti Dam Inundation

Distance	Time	Location
1.7	0:15	Cochiti Pueblo
4.2	0:30	Pena Blanca
7.7	1:15	Santo Domingo Pueblo
8.5	1:30	
16	2:30	San Felipe Pueblo
19.4	2:45	Algodones Power Plant
27.7	4:45	Rt. 44
28.5	5:45	Bernalillo
33.5	7:00	Sandia Pueblo
39.1	10:15	Alameda Bridge
46	18:45	I-40
58.7	30:00	I-25 Bridge
61.9	32:00	Isleta Pueblo

In the event of a dam failure, UNM Main Campus is elevated enough not to be affected by flood waters. Not identified on Table 35, Valencia Branch Campus resides roughly 15 miles south of Isleta Pueblo and is located in a flood zone. The probability of Valencia Branch Campus inundated by the Cochiti Dam failure would likely be moderate to high. Depth information for the Cochiti Dam was not available. Overall damage or loss to the Valencia Campus from a dam failure is unknown at this time. This data deficiency requires further study/research to determine the potential losses the campus may experience. Mitigation action will be identified to determine those risks on campus associated with a dam failure and determine strategies to the campus should implement to enhance the safety of students, staff, faculty and visitors (mitigation action #51).

Galisteo Dam

Galisteo Dam is located along Galisteo Creek on the Santa Fé/Sandoval County line on the Santo Domingo Pueblo. It was constructed in 1970 is 158 ft high and impounds 89,800 acre feet of water. The dam comes under the jurisdiction of the US Army Corps of Engineers. The dam is rated High hazard because of potential damages to many communities (Table 36):

Table 36: Galisteo Dam Inundation

Location	Mileage from Dam	Peak Flood time (hr)	Flood Depths (ft)
Galisteo Dam	.58	0	39.6
	2.71	1.2	33.3
	6.08	1.4	33
Santo Domingo Pueblo	11.17	1.8	32.1
San Felipe Land	14.77	2.8	33.2
San Felipe Pueblo	19.94	3.6	33.7
Algodones	23.4	4.1	25.5
	26.94	5.1	28
Bernalillo	31.25	5.8	16.8
Corrales	35.62	6.8	16

Alameda/Bernalillo Co Line	40.61	7.8	13.8
Los Ranchos De Albuquerque	42.73	8.3	13.6
Albuquerque city Limit	45.33	9.1	13.7
4th St. @ I-40	50.02	10.6	16.8
Bridge Blvd.	52.44	11.3	18.7
Rio Bravo Blvd	56.8	12.8	19.3
I25 @ Rio Grande	61.83	15.2	17
Isleta Village	64.79	15.7	16.2
Bosque Farms	68.16	16.7	10
E Main St.	73.02	18.2	7.3
Reinekin Ave	84.18	22	11.2
Hwy 60	85.68	23	10.6
Valencia/Socorro County Line	94	26	13
Hwy 346	102.52	29.5	11.2
Socorro	117.34	35.6	10.5
Hwy 380	142.98	42.7	10
Limit of Study	172.28	65.9	18

In the event of a dam failure, UNM Main Campus is elevated enough not to be affected by flood waters. As identified on Table 36, Valencia Branch Campus is located in a flood zone and the probability of Valencia Branch Campus inundated by the Galisteo Dam failure would likely be high. Overall damage or loss to the Valencia Campus from a dam failure is unknown at this time. This data deficiency requires further study/research to determine the potential losses the campus may experience. Mitigation action will be identified to determine those risks on campus associated with a dam failure and determine strategies to the campus should implement to enhance the safety of students, staff, faculty and visitors (mitigation action #51).

Jemez Canyon Dam, New Mexico (Project operational in 1953)
The project is located in Sandoval County, New Mexico, on the Jemez River about two miles upstream of the confluence of the Jemez River and the Rio Grande, about 5 miles northwest of Bernalillo, New Mexico. The project consists of an earth fill dam 780 feet long with a maximum height of 146.6 feet above streambed, an off-channel uncontrolled saddle spillway 400 feet wide and a 13-foot diameter gated outlet in the left abutment. According to Army Corps of Engineers inundation maps from 1982 the following flooding could occur (Table 37):

Table 37: Jemez Canyon Dam Inundation

Distance	Time	Location
2.8	:30	
5.7	:30	Algodones Power Plant
7.1	2:00	Rt. 44
8.1	2:30	Bernalillo
12.8	4:30	Sandia Pueblo
18.5	10:00	Alameda Bridge
25.8	21:45	I-40

29.1	28:15	Barelas Bridge
38.1	36:45	I-25
41.3	41:45	Isleta Pueblo
49.2	51:45	Rt. 49
60.2	66:15	Rt. 6

The three dams identified are north of UNM Main Campus and Valencia Branch Campus. In the event of a dam failure, UNM Main Campus is elevated enough not to be affected by flood waters. Not identified on Table 37, Valencia Branch Campus resides roughly 15 miles south of Isleta Pueblo and is located in a flood zone. The probability of Valencia Branch Campus inundated by the Cochiti Dam failure would likely be medium to high. Depth information for the Cochiti Dam was not available. Overall damage or loss to the Valencia Campus from a dam failure is unknown at this time though the risk is considered medium to high. This data deficiency requires further study/research to determine the potential losses the campus may experience and in the next 5 years, UNM will gather data to support those risks associated with dam failure and develop mitigation strategies and actions (mitigation action #51).

Based on the locations of UNM Main and Gallup, Los Alamos, Taos Branch Campuses and the Sevilleta LTER Field Station, these locations are not at risk to the effects of a dam failure.

(This page intentionally left blank)

UNM Risk Assessment

The University risk assessment is partially composed of risk assessments and vulnerability analyses from each department and branch campuses. It identifies the jurisdictions most threatened by the principal hazards and most vulnerable to damage and loss associated with the hazards. Table 38 provides outlines those hazards by UNM location and the availability of data to support the identified hazard risk.

Table 38: UNM Hazard Risk Assessment and Data Availability

Hazards	UNM Main		UNM Gallup Branch Campus		UNM Los Alamos Branch Campus		UNM Taos Branch Campus		UNM Valencia Branch Campus		Sevilleta LTER Field Station	
Non Geographical	**Risk**	**D/A**	**Risk**	**D/A**	**Risk**	**D/A**	**Risk**	**D/A**	**Risk**	**D/A**	**Risk**	**D/A**
Thunderstorms, Hail & Lightning	High	Limited	High	No	High	No	High	No	High	No	High	No
Winter Storm	Low	Limited	Low	No	Low	No	Low	No	Low	No	Low	No
High Wind	Low	Limited	Low	No	Low	No	Low	No	Low	No	Low	No
Tornado	Low	No	Low	No	Low	No	Low	No	Low	No	Low	No
Drought	Low	No	Low	No	Low	No	Low	No	Low	No	Low	No
Extreme Heat	Low	No	Low	No	Low	No	Low	No	Low	No	Low	No
Geographical												
Flood	Low	No	Low	No	Low	No	Low	No	Low	No	Low	No
Wildfire	Low	No	Low	No	Med	No	Low	No	Med	No	Med	Yes
Earthquake	Low	No	Low	No	Low	No	Low	No	Low	No	Med	Yes
Land Subsidence	Low	No	Low	No	Low	No	Low	No	Low	No	Low	No
Expansive Soil	Low	No	Low	No	Low	No	Low	No	Low	No	Low	No
Landslide	Low	No	Low	No	Low	No	Low	No	Low	No	Low	No
Volcano	Low	No	Low	No	Low	No	Low	No	Low	No	Low	No
Dam Failure	Low	No	Low	No	Low	No	Low	No	Med	No	Low	No

Hazard risk assessment was based on the following tiered assessment:

- *High*: Extreme Probability to hazard, 75% chance of occurrence in any given year. Widespread potential impact with threat to the general population and/or built environment. Hazards in this category may have already occurred in the past.
- *Medium*: Average probability to hazard, 50% chance occurrence in any given year
- *Low*: Small probability to hazard, 25% chance of occurrence in any given year

Past natural hazard occurrence data availability is an important part of the risk assessment. Information to support past hazards included, past insurance claims, newspaper reports, internet research, formal databases (NCDC) and personal experience just to identify a few. Data availability (D/A) was based on the following tiered assessment:

- Yes: University data exists to support natural hazard risk assessment
- Limited: University data exists but information is limited in details

- No: University natural hazard data does not exist or has been maintained and no other data is available

In order to determine the natural hazard risk, 134 UNM Main Campus departments (Table 39) and five UNM branch locations (Table 40) self-assessments were completed. The breakdown provides a general overview of the natural hazard risks assessed by each department based on their location. A copy of the hazard assessment used is located in Appendix E.

Reviewing both the Main Campus and Branch Campuses finds that natural hazards assessed are almost consistent across the board. All locations assessed thunderstorms and associated hazards have the highest probability and vulnerability to creating hazardous conditions. When assessing wildfires, the Branch Campuses identified the probability / vulnerability as being higher due to their rural locations within the State of New Mexico. Comparing UNM Main and Branch Campuses against the local jurisdictions where they reside (Table 41), assessments were consistent across many of the natural hazards ranked as being high (thunderstorm, winter storm, wind storm and extreme heat). Local jurisdictions assessed drought, wildfire and flooding highest, taking in consideration the large area of responsibility, followed by the same natural hazards assessed by UNM.

Table 39: UNM Main Campus and Branch Hazard Assessment

	T-storm / hail	Winter Storms	Wind / Dust	Heat	Tornado	Flood	Wildfire	Earthquake	Drought	Land sub	Ex. soil	Landslide	Volcano	Dam Failure
Anderson School of Management	3	2	3	2	1	2		1					1	
Architecture and Planning	3	1	1	1	1	2	1	1	1					
Arts and Sciences, Dept. of	3	2	3	2	1	2	1	1	1				1	
Academic Departments:														
- American Studies	1													
- Anthropology	1	1	1	1	1	1		1					1	
- Biology	1	1	1	2	1	1	2	1	1	2	1		1	
- Chemistry	3	2	3	2	1			1					1	
- Communication & Journalism	2	1	1					1						
- Earth & Planetary Sciences	3	2					1	1	2					
- Economics	2	3	1	1	1			1						
- English	3	2	2		1									
- Foreign Language & Literatures	3	3	1	1	1		1	1						
- Geography	1	3	1					1						
- History	1	3												
- International Studies Institute	3	2	1	1	1		1	1						
- Linguistics	1	2	3		1			1						
- Math & Statistics	3	3	1	1	1	1		1					1	
- Philosophy	3	3												
- Physics & Astronomy	3	3	1	3	1	1	3							
- Political Science	3		1		1									
- Psychology	3	1	1		1									
- Sociology	3	1	3	3	1	1	1	1			1			
- Spanish and Portuguese	1	3	1											
- Speech and Hearing Sciences	1							1						
Programs:														
- Africana Studies	1	3	1		1									
- Center for Science, Tech and Policy	3	1	1	1	1		1	1		1				
- Earth Data Analysis Center	3	1	2	2	1	1		1						
- Institute for Medieval Studies	1		1					1						
- Maxwell Museum	3	2	3			2				1			1	1
Museum of Southwestern Biology:														
• Division of Amphibians & Reptiles	3	3	2	3	1	1		1	1	1	1	1		
• Division of Arthropods	3	3	2	3	1	1		1	1	1	1	1		
• Division of Birds	3	3	2	3	1	1		1	1	1	1	1		
• Division of Fishes	3	3	2	2	1	1	1	1	1	1	1	1		
• Division of Genomic Resources	3	3	2	2	1	1		1	1	1	1	1		
• Division of Herbarium	3	3	2	2	1	1		1	1	1	1	1		
• Division of Mammals	3	3	2	2	1	1		1	1	1	1	1		
• LTER (Long Term Ecological Research Network)	3	3	2			1								
• Sevilleta LTER (program office)	3	3	2	2	1	1		1	1	1	1	1		

Table 39 Continued.

	T-storm / hail	Winter Storms	Wind / Dust	Heat	Tornado	Flood	Wildfire	Earthquake	Drought	Land sub	Ex. soil	Landslide	Volcano	Dam Failure
- Religious Studies	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Athletics	3	2	3	3	1	2	2	1	1	1	2	1	1	
Branch Campuses														
- Gallup	3	3	1	1	1		1	1	2	1		1		
- Los Alamos	3	3	3	2	2	1	3	1	1	1	2	1	1	
- Taos	3	3	1	1		1	3	1						
• Harwood Museum of Art	3	2	2				1			1				
- Valencia	3	1	2	3	1	2	3	1	1					
- West Side	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Continuing Education	3													
Education, College of	3	3	3							2	2	2		
Engineering, School of:														
Academic Departments:														
- Chemical and Nuclear Engineering	3								1					
- Nuclear Engineering Laboratory	3	3	1	1	1	1								
- Civil Engineering														
- Computer Science	3	2	3	2	1	1	1	1	1	1	1	1	1	1
- Electrical and Computer Engineering														
- Mechanical Engineering	3	3		3				1						
- Office of the Dean, School of Engineering	2													
Programs:														
- Center for Biomedical Engineering	3		1		1									
- Center for Emerging Technologies	3	3	3	2	1	1	2	1	2	1	1	1	1	
- Center for High Technology Materials	3	3	3	2	1	1	2	1	2	1	1	1	1	
- Center for Micro-Engineered Materials	3	3	3	2	1	1	2	1	2	1	1	1	1	
- Center for Nuclear Nonproliferation Science and Technology	3	3	3	2	1	1	2	1	2	1	1	1	1	
- Institute for Space & Nuclear Power	3	3	3	2	1	1	2	1	2	1	1	1	1	
- Manufacturing Engineering Program and MTTC	1	1		1	1			1						
- Mailing Systems	3	3	3	2	1		1	1	1		1			
- Property Accounting	1			1	1					1				
Fine Arts, College of	3	2	2	2		1	1	1	1					
Academic Departments:														
- Department of Art and Art History	3	1	2	1	1	1	1	1						
- Department of Cinematic Arts	3	1	1	1	1	1	1	1			2			
- Department of Music	3	1	1	2	1	1	1	1	1	1	1	1	1	1
- Department of Theater and Dance	3	2	3	1	1	1								1
Programs:														
- Art Museum	3	2												
- Bunting Visual Resource Library	3	1	2	1	1			1	1					1
- Tamarind Institute	3	1	1	1	1									

Table 39 Continued.

	T-storm / hail	Winter Storms	Wind / Dust	Heat	Tornado	Flood	Wildfire	Earthquake	Drought	Land sub	Ex. soil	Landslide	Volcano	Dam Failure
Human Resources Division	3	1	2	1	1	1	1	1	1	1	1	1	1	1
Information Technology Services (ITS/CNS)	2	2	1	1	1	1	1	1	1	1	1	1	1	1
Institute for Applied Research Services (IARS)	3	2	3		1									
- Bureau of Business and Economic Research (BBER)	3	2	3		1									
- Data Bank	3	2	3		1									
- Division of Government Research	3	2	3		1									
Institutional Support Services														
Alumni Chapel	3	1	1		1									
- ARES Corp.	1			1										
- Bookstore	3	3	1	3	1	2								
- Ensign-Bickford A&D/SCBT Operations	1													
Golf Course	3	1	1	1		2	1		1			1		
Planning and Campus Development	2	1	1	1	1	1			1					
- Real Estate Management	2	1	1		1	1			1					
- JOA Software and Services LLC	3	1	3	1	1									
- KNME-TV	2	3		2		1	1	1						
- KUNM-FM Radio	2	3	3	2	1	1		1		1		1		
- Parking and Transportation Services	3	1	1		1	1					1			
- PhDx Systems Inc.	1													
- Physical Plant Department	3	3	3	1	1		2	1		1	1	1	1	
- Automotive/Fuel	3	3	3	1	1		2	1		1	1	1	1	
- Popejoy Hall	3	2	1		1									
Science and Technology Park														
- Sharp Informatics														
- Technologies Venture Corp.	3	3		3	1									
- TruTouch Technologies Inc.				3		1								
Law, School of	3	1	3	1	1			1		1	1	1	1	
- Law Library	3	3	2		1	3		1	1					1
The Lobo Daily Student Newspaper	3	1	1	1										
UNM Press	3	2		1		1	1	1		2	2	1		
President, Office of the	3	2		2	1	2		1						
- Office of the Vice President of Research and Economic Development														
• Center on Alcohol and Substance Abuse (CASAA)	3	2	3	2	1		2	1						
• EPSCOR	3	3	2	2	1		2	1		1	1			
• Long Wavelength Array	3	2	3	2	1	1	2	1						
• VPR Strategic Projects Office	3	3	3	3	2		2	1	2	1		1	1	
• Sevilleta Field Station	2		3	1		2	3	1					1	
Financial Services Dept	3	3	2	1	1	1	1	1	1					
Risk Management Dept.														
- Safety and Risk Services	2	2	2	1	1	1	1	1					1	
School of Public Administration	1	1	1	1	1		1	1		1				
Student Affairs														
- Accessibility Resource Center	3	2	3	2	1		1	1	1	1	1	1	1	

Table 39 Continued.

	T-storm / hail	Winter Storms	Wind / Dust	Heat	Tornado	Flood	Wildfire	Earthquake	Drought	Land sub	Ex. soil	Landslide	Volcano	Dam Failure
- Children's Campus (Child Care)	3	3	3	1	1	2	3	1						
- College Enrichment and Outreach Programs	3	2	2	2									1	
Student Services and Support	3	1	1	1	1	1	1	1						
- Mentoring Institute	3	3	3	2	1		1	1	1					
- Recreational Services														
• Getaway Adventures	2	2	1	1			3							1
• Johnson Center	3	3	3	1	1		1	1	1					1
• Open Recreation	2		1				1							
- ROTC														
• Army			3	3	3			1	3				1	
• Navy/Naval Science Dept.	2	1		1				1						
- Student Activities Center	3	3	3	3	1	3	1	1	1					
- Student Government (ASUNM)	3	2		1	1		1	1	1					1
- Student Health Center	3	2	3	2	1			1	3					
- Student Housing and Dining	3	2	2	2	1	2	1	1	3	1	2			
• Student Family Housing (off campus)	3	2	3	3	1	2	1	1	1				1	
- Student Union Building (SUB)	3	3	3	3	1	3	1	1	1					
- Women's Resources Center	3	1		1	1	1		1		1	1			
University College	3	3	3	3	1	2		1		1	1			
- The N.M. Musical Heritage Project	3	3	3	3	1	2		1		1	1			
- Native American Studies program	3	3	3	3	1	2		1		1	1			
University Libraries														
- Centennial Science and Engineering Library	3	2	3	2	1	2	2	1	1	1	1	1		
- Zimmerman Library	3	2	3	2	1	2	2	1	1	1	1	1		
- Parish Memorial Library	3	3	3	2	1	2	1	1		1	1	1		
- Fine Arts and Design Library	3	3	3	2	1	2	1			1	1	1		
University Communications and Marketing	2	1	1	1	1	1	1	1	1					
UNM Police	3	2	2	1	1	1		1						
UNMH (UNM Hospital)	2	1	1	1	1	1	1	1	1					
- Health Sciences Center BSL3 Labs	3		2		1	2	1	1	1	1	1			
- Animal Research Facilities	3	2	2		1			1		1	1			
- Health Sciences Library and Informatics Center	3	3	1	1	1	1	1	1	2					
UNM Policy Office	3							1	1					1
Total Score	342	252	230	170	105	98	92	91	67	49	48	34	28	12
Average	2.5	1.81	1.65	1.25	0.76	0.71	0.66	0.65	0.48	0.35	0.35	0.25	0.20	0.09
total votes	130	115	114	98	102	72	63	91	52	43	43	33	28	12
high=3														
med=2				Based on the scores: High Hazards have an average score over 1.00, Medium Hazards are from 0.65-0.99, and Low Hazards are up to 0.64.										
low=1														
none-n/a-rare=blank														

Each department ranked the hazards according to their own definition. However all rankings were based on probability and vulnerability.
Some departments combined hazards in their analysis. Each assessment had unique formats making the breakdown difficult. Risk levels shown are those that were determined from each departments risk analysis.

Table 40: UNM Branch Campus Hazard Assessment

	T-storm / hail	Winter Storms	Wildfire	Wind / Dust	Heat	Tornado	Flood	Earthquake	Drought	Land sub	Ex. soil	Landslide	Volcano	Dam Failure
Branch Campuses														
- Gallup	3	3	1	1	1	1		1	2	1		1		
- Los Alamos	3	3	3	3	2	2	1	1	1	1	2	1	1	
- Taos	3	3	3	1	1		1	1						
• Harwood Museum of Art	3	2	1	2						1				
- Valencia	3	1	3	2	3	1	2	1	1					
- West Side	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total Score	3.0	12	11	9	7	4	4	4	4	3	2	2	1	0
Average	2.5	2.4	2.2	1.8	1.4	0.8	0.8	0.8	0.8	0.6	0.4	0.4	0.2	0
total votes	5	5	5	5	4	3	3	4	3	3	1	2	1	0
high=3														
med=2			Based on the scores: High Hazards have an average score over 1.00, Medium Hazards are from 0.65-0.99, and Low Hazards are up to 0.64.											
low=1														
none-n/a-rare=blank														

Each department ranked the hazards according to their own definition. However all rankings were based on probability and vulnerability.
Some departments combined hazards in their analysis. Each assessment had unique formats making the breakdown difficult. Risk levels shown are those that were determined from each departments risk analysis.

Table 41: New Mexico County Assessment

New Mexico Counties	Drought	Wildfire	Flood	T-storm / hail	Wind / Dust	Winter Storms	Earthquake	Tornado	Heat	Dam Failure	Landslide	Land sub	Volcano	Ex. soil
Bernalillo County / Albuquerque	3	3	2	2	2	2	1	1	2	1	1	1	1	
Los Alamos County	2	3	2	2	2	3	2			2	2		1	
McKinley County	3	3	2			2	1			1				
Valencia County	2	3	3	3	3	2	1		1	1	1	1		1
high=3 ; med=2; low=1; none-n/a-rare=blank		Based on the scores: High Hazards have an average score over 1.00, Medium Hazards are from 0.65-0.99, and Low Hazards are up to 0.64.												

Hazards Identified in Other Plans (EOP, Draft Mitigation Plans, etc.)

	Drought	Wildfire	Flood	T-storm/hall	Wind/ Dust	Winter Storms	Earthquake	Tornado	Heat	Dam Failure	Landslide	Land sub	Volcano	Ex. soil
Taos County	High	High	High	High		High	High	Med					Low	
Taos Pueblo (Taos County)	Med	Med	Low	Low	Low	Med	Med				Med			
Total Votes	11	16	16	10	11	17	16	10	4	6	3	4	5	1
Rankings shown if available														
X=Identified, not ranked Blank=Not Identified		High Hazards, Medium Hazards, and Low Hazards are the rankings as determined from the mitigation plan analysis.												

Legend

Bernalillo County – UNM Main Campus; Los Alamos – UNM Las Alamos Branch Campus; McKinley County – UNM Gallup Branch Campus; Valencia County – UNM Valencia Branch Campus; Taos County – UNM Taos Branch Campus; Socorro County - Sevilleta LTER Field Station

CHAPTER 5 – UNM MAIN AND BRANCH CAMPUS VULNERABILITY

Social Vulnerability

UNM Main and Branch Campuses are disbursed throughout the state at six locations; Bernalillo (Albuquerque), Gallup, Los Alamos, Socorro, Taos and Valencia Counties each with vulnerable subgroups of populations. Table 42 shows those vulnerable subgroups in specific counties to include:

- Families below the poverty level
- Population age 18 and under
- Population age 65 and over
- Female population
- Nonwhite population

Each of these subgroups is discussed below pertaining to its vulnerability or dependency. UNM campuses are a major employer throughout the state in addition to providing a valued education to those attending.

Table 42: Vulnerable Subgroups in the Counties Where UNM Campuses are Located

County	Population 2005 est.	Families Below Poverty	Children 18 Years and Under	Persons 65 Years and Over	Female	Non-White
NEW MEXICO	**1,928,384**	**341,324**	**489,810**	**235,263**	**979,619**	**298,900**
Bernalillo - (UNM Main)	30.6%	21.2%	27.6%	30.1%	30.8%	26.9%
Los Alamos – (Los Alamos Branch Campus)	1.0%	0.1%	0.9%	1.1%	1.0%	0.3%
McKinley – (Gallup Branch Campus)	4.1%	7.8%	5.6%	2.4%	4.2%	10.3%
Socorro – (Sevilleta LTER)	1.0%	1.6%	1.0%	0.9%	1.0%	1.1%
Taos – (Taos Branch Campus)	1.6%	1.8%	1.5%	1.7%	1.7%	1.8%
Valencia – (Valencia Branch Campus)	3.6%	3.4%	3.9%	3.2%	3.6%	3.7%

Source: 2000 U.S. Census

The number of families below the poverty level can indicate areas in the state that may be impacted more severely by disaster events due to a lack of resources (for example, not owning a vehicle that would enable them to immediately evacuate the area). The number of families below the poverty level in 2000 in Bernalillo County was greater than any other county in the state, representing 3% of their total population, whereas McKinley County, where Gallup Branch Campus is located, indicated 7% of their population of families living below the poverty level. The population that is under 18 and over 65 years old are more likely to need additional assistance during a disaster, so large concentrations of populations in either of these subgroups could pose complications during a disaster.

Physical and Economic Vulnerability

While social vulnerability is dependent on factors such as population trends and ethnicity, physical vulnerability relates to structures that could be damaged. Economic vulnerability of an area or community relates to the extent of dollar exposure of its buildings. For example, downtowns and central business districts may be considered vulnerable areas of a community due to the concentration of commercial structures and public buildings. Similarly, large cities and counties with dense populations are considered vulnerable because they house a large number of people and structures (residential, commercial, and industrial) and have very high building stock exposure (high economic vulnerability). This is the case for UNM Main Campus located in the center of Albuquerque. Branch Campuses (Gallup, Los Alamos, Taos and Valencia) are located in less populated locations where the physical vulnerability is lessoned.

UNM Main Campus was founded in 1889 in Albuquerque, New Mexico. Structures on campus include a mix of building stock constructed between 1889 to 2009 which is an important factor to consider with natural occuring hazards. An important factor is how likely are older structures likely are to fail when they are subjected to wind pressure that exceeds their design. In general, building damages can range from cosmetic to complete structural failure, depending on wind speed, movement and location of the building. Strong winds can rip roofs off structures or cause total failure of poorly constructed structures. Unreinforced masonry buildings typically fail under severe earthquake conditions and gable-ended roofs are especially vulnerable to strong winds.

UNM Branch Campuses are newer locations with building construction meeting more stringent construction design and codes that are less vulnerable to natural hazard events. Though no building is 100 percent safe from geographic or non-geographic hazards, ensuring appropriate mitigation actions are in place to support safety of faculty, staff, students and visitors and the protection of resources is essential.

Development Changes

New Mexico is one of the fastest growing states in the nation. Albuquerque, Rio Rancho and Las Cruces are listed in several studies as some of the fastest growing communities. Many other communities in the state are growing as well. According to the Bureau of Business and Economic Research, UNM, (www.unm.edu/~bber), Bernalillo County has had 10.6% growth since 2000, with Albuquerque leading the way with a 12.4% (55,809 people) increase in population. Rio Rancho is increasing by more than 19,356 people (37% population increase).

Overall between April, 2000, and July, 2006, New Mexico grew by 7.5%, adding 135,553 new residents. This development change in the state means the population at UNM will also increase. More buildings may have to be constructed and changes to infrastructure to meet the increase may be needed. UNM must be cognizant of the new risks, and work towards ensuring that design and construction of new building meet zoning requirements and meet if not exceed codes to reduce the exposure.

Analysis of Vulnerability by UNM Main and Branch Campuses

Hazard analysis by each UNM location determined a commonality that each shares the same natural hazard vulnerabilities. Based on the information presented in this section, university facilities for each UNM location (main, four branches and one field research location) were assessed to determine the vulnerability of structures, value of contents and the number of people (staff, faculty, students and visitors). Hazard analysis for each location was based on the highest hazard determined in the hazard assessment identified in Tables 39 and 40 and identified accordingly for each location.

UNM Main Campus (Table 43)

Hazards used for analysis include: Thunderstorm to include lightning and hail, high winds, and tornado. In determining this data, many assumptions can be made based on the time of day and season. For example, campus population fluctuates based on class schedules, athletic events and other events hosted by UNM.

Table 43: UNM Main Campus Hazard Event Vulnerabilities

Type of Building	Number of Structures			Value of Structures			Number of People		
	# on Campus	# in Hazard Area	% in Hazard Area	$ on Campus	$ in Hazard Area	% in Hazard Area	# on Campus	# in Hazard Area	% in Hazard Area
Residential	37	29	80	$81M	$65M	80	2,600	2,080	80
Classroom Buildings / Auditoriums	151	38	75	$23M	$17M	75	24,000	18,000	75
Administration	333	55	75	$34M	$25M	75	20,000	15,000	75
Research	16	10	65	$25M	$16M	65	12,000	9,000	75
Recreational Use / Athletics	32	27	85	$43M	$36M	85	47,000	37,600	80
Libraries / Bookstore	6	4	60	$25.6M	$15M	60	200	160	80
Medical Facilities	37	30	80	$129M	$103M	80	52,000*	13,000	25
Dining Facilities	1	1	100	$7M	$7M	100	500	400	80
Utilities	9	6	75	$8M	$5M	75	30	24	80
TV Production	2	2	100	$2.4M	$1.2M	50	25	20	80

*Source: http://hsc.unm.edu/about/community/docs/Community%20Perspectives_%20corrected_FINAL.pdf

UNM Gallup Branch Campus (Table 44)

Hazards used for analysis include: Thunderstorm to include lightning and hail, high winds, and tornado. In determining this data, many assumptions can be made based on the time of day and season. For example, campus population fluctuates based on class schedules, athletic events and other events hosted by UNM.

Table 44: UNM Gallup Branch Campus Hazard Event Vulnerabilities

Type of Building	Number of Structures			Value of Structures			Number of People		
	# on Campus	# in Hazard Area	% in Hazard Area	$ on Campus	$ in Hazard Area	% in Hazard Area	# on Campus	# in Hazard Area	% in Hazard Area
Classroom Buildings	11	11	100	$12.5M	65	$8.1M	3,260	1,630	50
Administration	11	11	100	2.5M	65	$1.6M	260	195	75
Research	11	11	100	3.5M	65	$2.3M	1,530	765	50
Libraries / Bookstore	1	1	100	1.2M	65	$780,000	50	37	75

Hazards used for analysis include: Thunderstorm to include lightning and hail) and WUI fires. In determining this data, many assumptions can be made based on the time of day and season. For example, campus population fluctuates based on class schedules and other events hosted by the Branch Campus.

Table 45: UNM Los Alamos Branch Campus Hazard Event Vulnerabilities

Type of Building	Number of Structures			Value of Structures			Number of People		
	# on Campus	# in Hazard Area	% in Hazard Area	$ on Campus	$ in Hazard Area	% in Hazard Area	# on Campus	# in Hazard Area	% in Hazard Area
Residential	2	2	100	$2.5M	$1.6M	65	128	96	75
Classroom Buildings / Auditoriums	4.6*	4.6*	100	$3.8M	$2.5M	65	587	440	75
Administration	2.15*	2.15*	100	$1.08M	$703,497	65	147	96	75
Libraries	.75*	.75*	100	$1.2M	$783,433	65	100	20	20
Dining Facility / Auditorium	.5*	.5*	100	$512,550	$333,157	65	250	100	40

*****Some structures identified on the chart are dual purpose and thus shared.

<u>UNM Taos Branch Campus (Table 46)</u>

Hazards used for analysis include: Thunderstorm to include lightning and hail, high winds, and tornado. In determining this data, many assumptions can be made based on the time of day and season. For example, campus population fluctuates based on class schedules and athletic events do not occur on a daily basis.

Table 46: UNM Taos Branch Campus Hazard Event Vulnerability

Type of Building	Number of Structures			Value of Structures			Number of People		
	# on Campus	# in Hazard Area	% in Hazard Area	$ on Campus	$ in Hazard Area	% in Hazard Area	# on Campus	# in Hazard Area	% in Hazard Area
Classroom Buildings On Campus	2	2	100%	$2.8M	$2.8M	100%	795	520	65%
Classroom Leased Off Campus	7	5	71%	$850,000	$604,000	71%	530	345	65%
Auditorium	1	1	100%	$5.5M	$5.5M	100%	450	158	35%
Administration	2	2	100%	$1.3M	$1.3M	100%	75	56	75%

UNM Valencia Branch Campus (Table 47)

Hazards used for analysis include: Thunderstorm to include lightning and hail, high winds, and WUI fires. In determining this data, many assumptions can be made based on the time of day and season. For example, campus population fluctuates based on class schedules and athletic events do not occur on a daily basis.

Table 47: UNM Valencia Branch Campus Hazard Event Vulnerability

Type of Building	Number of Structures			Value of Structures			Number of People		
	# on Campus	# in Hazard Area	% in Hazard Area	$ on Campus	$ in Hazard Area	% in Hazard Area	# on Campus	# in Hazard Area	% in Hazard Area
Classroom Buildings	5	2	65	$8.6M	$1.3M	65	1,700	1,105	65
Administration	2	1	50	$1.5M	$748,125	50	100	75	75
Recreational	1	1	100	$1.1M	$559,510	50	500	325	65
Libraries	1	1	100	$3M	$1.5M	50	1,000	450	45
Dining Facility / Auditorium	1	1	100	$899,344	$449,672	50	750	336	45

UNM Sevilleta LTER Field Station (Table 48)

Hazards used for analysis include: Thunderstorm to include lightning and hail, high winds, and WUI fires.

Table 48: UNM Sevilleta LTER Field Station Hazard Event Vulnerability

Type of Building	Number of Structures			Value of Structures			Number of People		
	# on Campus	# in Hazard Area	% in Hazard Area	$ on Campus	$ in Hazard Area	% in Hazard Area	# on Campus	# in Hazard Area	% in Hazard Area
Residential	9	9	100%	$959K	$623K	65	75	56	75
Libraries	1	1	100%	$81K	$52,650	65	25	16	65
Research	2	1	50%	$1.5M	$750,000	50	75	45	60
Utilities	1	1	100%	$59K	$38,350	65	25	16	65

Thunderstorms/Hail/Lightning Vulnerability

Thunderstorm is difficult to predict precisely in pattern, frequency, and degree of severity. The impact from severe weather events (thunderstorms to include hail and lightning) has been moderate, with localized flooding occurring from severe thunderstorms and minor damages to specific locations from hail and lightning. All UNM Campuses can be and have been impacted by any one of the thunderstorm events to include hail and lightning. With regards to hail, all UNM campuses can be affected by a hail event up to 2.0 inches in diameter or referring to table 6, anywhere from H0 to H5. UNM Main Campus has maintained a limited list of past occurrences highlighting their vulnerabilities as high in damage from hail and lightning strikes. Data does not exist for the Gallup, Los Alamos, Taos, Valencia Branch Campuses and the

Sevilleta LTER Field Station. Mitigation strategies will be identified to capture future events and enhance the identification of vulnerability at these locations.

Winter Storms Vulnerability

Winter storms occur frequently on an annual basis and impact all UNM Campuses. As with State and County jurisdictions, all UNM campuses can be affected by winter storm events. Referencing Figure 14, the average snowfall UNM campuses could receive range from 1 to 40 inches of snow. UNM Campuses located in higher elevations (Los Alamos and Taos UNM Campuses) could receive up to 60 inches in a given year.

The threat winter storms events pose is primarily to electric utilities when snow and ice-laden branches fall across power lines, breaking them and interrupting service. Additionally, due to the location of our rural Branch Campuses (Gallup, Los Alamos, Taos), access in and out can be limited due to roads becoming risky and or closed. The UNM Main Campus has maintained a limited list of past occurrences highlighting their vulnerabilities in damages caused by winter storms. Discussions with branch administrators identified winter storm issues and costs inquired but data does not exist for the Gallup, Los Alamos, Taos, Valencia Branch Campuses and the Sevilleta LTER Field Station. Data for individual structures was not available for this study, so it was difficult to determine the exact number and types of structures within Bernalillo County that have heightened vulnerability to snow loads.

Recognizing UNM's data deficiency for collecting past natural hazard events, this information reinforces the fact that the probability of a winter storm causing structure damage or risking life safety are considered low. Data deficiencies do exist and in the next 5 years, UNM will gather data to support occurrences and enhanced mitigation strategies and actions. Future updates to the mitigation plan will include a more in-depth review of high wind events at branch campuses based on the mitigation strategies developed.

High Wind Vulnerability

No areas of New Mexico are immune from damaging high winds. High wind is a fact of life for state residents, especially in the spring. Extremely high velocity wind over a prolonged period is rare. Such occurrences can result in downed power lines, roof damage, trees being blown down, and difficulty in controlling high profile vehicles on the highways. Microburst wind damage is more common, since it is often associated with powerful downdrafts originating from thunderstorms. These winds are of relatively short duration. Wind damage for the UNM Main Campus has proven to be very vulnerable in the past.

As with State and County jurisdictions, all UNM campuses can be affected by high wind storm events. Referencing table 9, UNM campuses could experience high wind events between 0 and 63 mph. Table 10 provides an overview of the number of events and costs based on the specific hazard. Recognizing this data deficiency for collecting past high wind events, this information reinforces the fact that UNM Campus' are at risk to a high wind event. UNM main campus identifies high winds as being medium based on past occurrence recorded. UNM Branch Campuses and the Sevilleta LTER identified winds as being a low risk.

Since high wind events may affect All UNM campuses, it is important to identify specific critical facilities and assets that are most vulnerable to the hazard. Evaluation criteria include age of the building (and what building codes may have been in effect at the time of construction), type of construction, and condition of the structure (how well has the structure been maintained). Data for individual structures were not available for this study, so it was difficult to determine the exact number and types of structures at each UNM Campus that have a heightened vulnerability to wind hazards. The UNM Main Campus has maintained a limited list of past occurrences highlighting their vulnerabilities in damages caused by winter storms. Discussions with branch administrators identified high wind issues and costs inquired but data does not exist for the Gallup, Los Alamos, Taos, Valencia Branch Campuses and the Sevilleta LTER Field Station. Data deficiencies do exist and in the next 5 years, UNM will gather data to support occurrences and enhanced mitigation strategies and actions. Future updates to the mitigation plan will include a more in-depth review of high wind events at branch campuses based on the mitigation strategies developed.

Extreme Heat Vulnerability

Extreme Heat can equally affect UNM campuses' roadways, facilities housing high value research and art, and some equipment, but it is generally a health risk, not a structural hazard. In temperatures exceeding 90°F, young children, the elderly, outdoor laborers, and sick people are the most likely to suffer from sunstroke, heat cramps, heat exhaustion, and possibly heatstroke. Extreme heat is a concern for UNM because of the number of facilities which house many different specimens for research. In an extreme heat condition, the loss of air conditioning can cause catastrophic loss to experiments and specimens that requires a controlled environment. These losses of experiments are of such significance they are considered irreplaceable due to the years of research in the process. UNM Main Campus has maintained a limited list of past occurrences which does not identify any extreme heat issues. Vulnerability is viewed as low based on discussions with campus administration. Backup alternatives are in place in the event of the loss of power (generators) but recognize these type alternatives can fail as well. Discussions with branch administrators identified extreme heat as being minor vulnerability. Data is nonexistent for the Gallup, Los Alamos, Taos, Valencia Branch Campuses and the Sevilleta LTER Field Station. Mitigation strategies will be identified to capture future events and enhance the identification of vulnerability at these locations.

Tornado Vulnerability

Tornado activity in the State of New Mexico is generally on the eastern portion of the state. UNM Campuses generally are not vulnerable to tornado activity as they reside on the western edge of the tornado risk zone. Vulnerability of tornado activity is considered low based on discussions and the hazard analysis. Official data is nonexistent for UNM Main Campus, the Gallup, Los Alamos, Taos, Valencia Branch Campuses and the

Sevilleta LTER Field Station. Mitigation strategies will be identified to capture future events and enhance the identification of vulnerability at these locations.

Flood Vulnerability

Virtually every jurisdiction in the state is subject to flooding, given the right conditions. Based on the locations of the UNM Main and Branch Campuses in their jurisdiction, the only campus vulnerable to a flooding event and lies in a flood zone is the Valencia Branch Campus. Flood data collected by the UNM Main Campus was caused by pipes bursting due to age or from freezing due to cold weather events. The Sevilleta LTER Field Station is relatively close to the Rio Grande but is situated west of the river located on much higher terrain. No official data is available for the Sevilleta location. The Gallup, Los Alamos, and Taos Campuses have not maintained a database on past flood events. Discussions with branch campus administrators identified no known flooding issues. Mitigation strategies will be identified to capture future events and enhance the identification of vulnerability at these locations.

Wildfire and Wildland/Urban Interface Fire Vulnerability

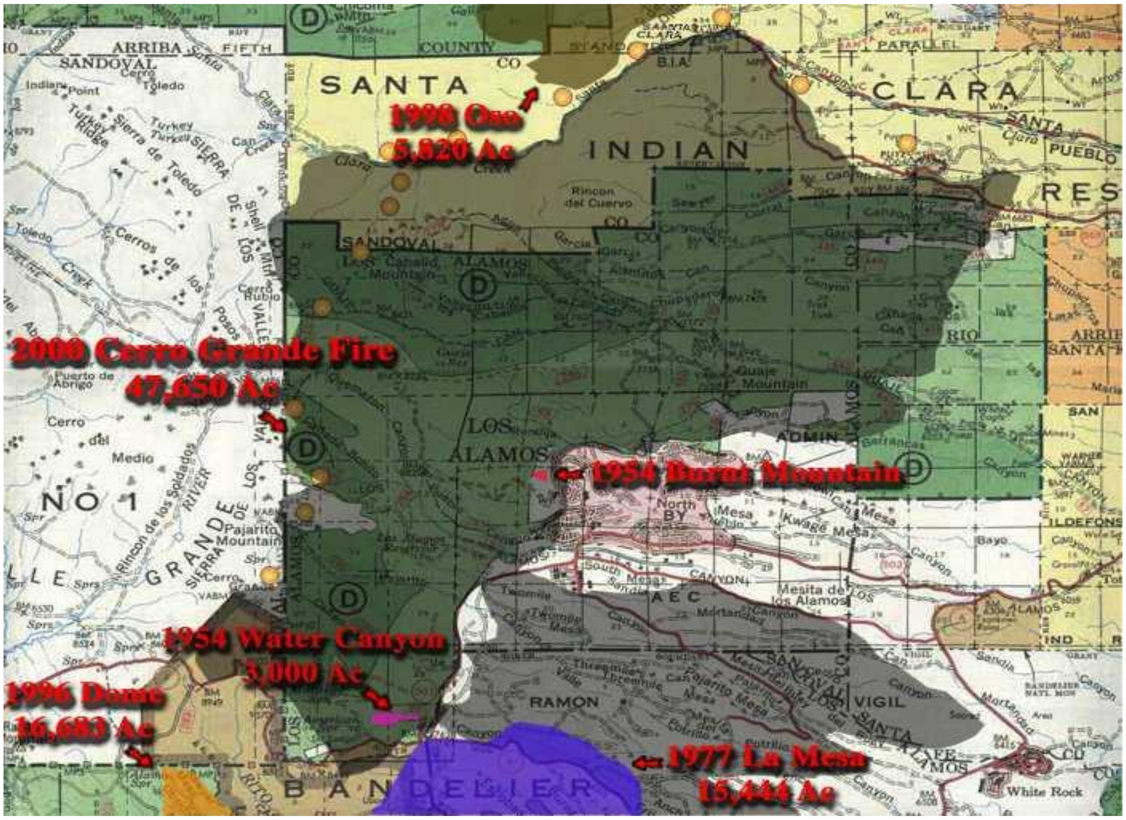
Several areas in the state have been identified by the New Mexico Energy, Minerals, and Natural Resources Department Forestry Division as being highly vulnerable to wildland/urban interface fire. A significant number of people could be impacted by a wildfire, especially populations living or working in close proximity to forested areas, residents with asthma or other respiratory sensitivity, and very young and elderly residents. The vulnerability to wildfire is judged highest in 14 counties: Bernalillo (UNM Main Campus), Catron, Colfax, Grant, Lincoln, Los Alamos (Los Alamos Branch Campus), Mora, Otero, Rio Arriba, San Juan, San Miguel, Sandoval, Santa Fé, and Taos (Taos Branch Campus).

The UNM Gallup Branch Campus, located in McKinley County, vulnerability is due to the two areas of established wildland/urban interface located in the Cibola National Forest to the southeast of Gallup. Additionally, the City of Gallup has a small fuel load at its wildland/urban interface. Though the risk is limited, awareness to the potential hazard is important. The main risk in the event of a wildland/urban fire is the effects of smoke to campus population. Most at risk are those with respiratory problems.

The UNM Los Alamos Branch Campus is located in the Los Alamos County. This area is no stranger to wildfire. It is the most frequent natural hazard facing the community and Branch Campus. Within the past 50 years alone there have been five wildfires within LAC and the immediate vicinity (Figure 59):

- Water Canyon Fire, 1953, 6,000 acres
- La Mesa Fire, 1977, 15,444 acres
- Dome Fire, 1996, 16,683 acres
- Oso Complex Fire, 1998, 5,820 acres
- Cerro Grande Fire, 2000, 47,658 acres

Figure 59: Los Alamos County 50 Year Wildfire Map



Source: Los Alamos County Mitigation Plan, 2001

Based on the number of fires within the last 50 years, the risk of another fire occurring can be viewed as moderate. Though local officials highlight fire safety and awareness through many outlets to the general public, the possibility of a fire starting through natural occurrences (lightning strike) are real. The risks to the Los Alamos Branch Campus include respiratory issues from smoke to a complete campus evacuation to loss of facilities should a fire become uncontrollable.

The Sevilleta LTER Field Station vulnerability to wildfires is considered moderate. This location recently experienced a wildfire that burned over 12,000 acres of the LTER site. The site is a research site and instituting fire wise projects is difficult without disrupting the scientific location. The biggest concern for this site is the ongoing research that is being conducted, some 10 years plus. The loss of this site and the experiments will have a huge impact on studies being conducted that are of irreplaceable value.

Earthquake

Much of the state and local infrastructure, many public buildings, and most private residences and businesses have not been designed with earthquake resistance in mind. An earthquake of even moderate scale in the right place could cause extensive damage. Based on peak acceleration values presented in Appendix G, it is apparent that the region roughly along the Rio Grande from southern Socorro County north into Rio Arriba County is where seismic activity would be expected. UNM Main, Los Alamos

Branch Campus, Taos Branch Campus, Valencia County Branch and Sevilleta LTER Field Station are located within Rio Grande fault line and are vulnerable to earthquake damage. The Gallup Branch Campus data is not available and further studies will be required to determine those vulnerabilities.

FEMA, under a cooperative agreement with the National Institute of Building Sciences (NIBS), has developed a standardized, nationally-applicable natural hazards loss estimation methodology. This methodology is implemented through PC-based geographic information systems (GIS) software called HAZUS-MH assessed by EDAC's GIS Specialist who is a Certified Floodplain Manager. HAZUS-MH applies a multi-hazard methodology, with models for estimating potential losses from earthquake, flood (riverine and coastal), and wind (hurricanes) hazards.

Utilizing HAZUS-MH MR3 (v1.3) September 2007, an assessment was conducted to determine the extent of damage caused by a 5.0 magnitude for UNM Main and Branch Campuses. The following areas were assessed:

- Number of Casualties
- Amount of Debris
- Impact on Utilities
- Impact on Systems
- Impact on Buildings
- Building Stock

In applying the data received, the overall severity was minimal. Though the data is reflective of 2000 Census data, it's not for certain that these numbers completely reflect the overall damage that could occur. As state above, much of the state and local infrastructure, many public buildings, and most private residences and businesses have not been designed with earthquake resistance in mind. An earthquake of even moderate scale in the right place could cause extensive damage. Information related to the HAZUS-MH assessment is located in Appendix G.

These maps were developed from information in HAZUS-MH Level 1. These figures are only indicators for informative purposes and should not be viewed literally for analytical purposes. For analytical purposes, Level 2 data must be used (where specific local information can be keyed in to replace the data in the national database) for greater accuracy. Currently there is no Level 2 HAZUS-MH data for New Mexico. This data limitation is addressed in the Mitigation Strategies.

HAZUS-MH Levels are as follows:

Level 1: National data sets are used for analysis, extrapolated to state-specific data based upon broad modeling assumptions.

Level 2: National data are modified by specific known local data for more site-specific results.

Level 3: Users may supply their own techniques to study special conditions such as dam break and tsunami, although engineering and other expertise is typically needed at this level.

Earthquake Vulnerability Analysis of UNM Campuses' Facilities

There are no credible seismic damage estimates for UNM Main, Gallup, Los Alamos, Taos, Valencia branch campuses and Sevilleta LTER Field Station. The PDMT needs more information on the types of structures —their age, condition, and construction type—in order to rate their relative vulnerability. For example, unreinforced masonry structures built before current building codes are more susceptible to damage than others built to seismic-resistant codes. The PDMT could not generate accurate estimates of the number of vulnerable buildings. UNM Main Campus building age ranges from 1889 to present day. Older buildings within the infrastructure are more susceptible to natural hazards than newer constructed or reconstructed structures and become a challenge when determining the best approach to implement a mitigation strategy. Facilities at the Branch locations are newer in design and have fewer infrastructure concerns, based on past incidents. As buildings are being considered for renovation or new facilities constructed, UNM Planning and Campus Development consider building design based on mandatory construction laws and regulations as well as best practices and lessons learned from past natural hazard events.

Drought

All UNM campuses are equally vulnerable to drought conditions. Drought measurements are not very precise, and often they are directed toward particular segments of the state. For example, there are drought measurements based upon agricultural conditions; there are measurements of stream flow and water storage in reservoirs; there are measurements of groundwater and effects upon drinking water systems; and there are strictly meteorological and climatic measurements. Some drought indicators might point toward an abatement of drought conditions for the agricultural sector, while the drought continues for drinking water in the same area. Overall, however, most indications are that the drought will continue and will probably get worse before it gets better. Because of the state's situation, UNM Main and Branch Campuses vulnerability to drought is determined low.

Land Subsidence

Land subsidence events are not of concern at the UNM Main, Gallup Branch Campus, Los Alamos Branch Campus, Taos Branch Campus, Valencia County Branch and Sevilleta LTER Field Station. No data exists regarding land subsidence events at any of the UNM campus locations. The PDMT needs more information on the types of structures, their age, condition, and construction type, in order to rate their relative vulnerability. For example, un-reinforced masonry structures built before current building codes are more susceptible to damage than others built to seismic-resistant codes. The PDMT could not generate accurate estimates of the number of vulnerable buildings. Any changes to this vulnerability will be updated as plan maintenance to this PDM plan is conducted.

Expansive Soils

Expansive soils events are not of concern at the UNM Main, Gallup Branch Campus, Los Alamos Branch Campus, Taos Branch Campus, Valencia County Branch and Sevilleta LTER Field Station. No data exists regarding Expansive soil events at any of the locations. Any changes to this vulnerability will be updated as plan maintenance to this PDM plan is conducted.

Landslide

Landslide events are not of concern at the UNM Main, Gallup Branch Campus, Los Alamos Branch Campus, Taos Branch Campus, Valencia County Branch and Sevilleta LTER Field Station. No data exists regarding landslide events at any of the locations. The PDMT needs more information on the types of structures, their age, condition, and construction type, in order to rate their relative vulnerability. For example, un-reinforced masonry structures built before current building codes are more susceptible to damage than others built to seismic-resistant codes. The PDMT could not generate accurate estimates of the number of vulnerable buildings. Any changes to this vulnerability will be updated as plan maintenance to this PDM plan is conducted.

Volcanoes

Volcanic events are not of concern at the UNM Main, Gallup Branch Campus, Los Alamos Branch Campus, Taos Branch Campus, Valencia County Branch and Sevilleta LTER Field Station. No data exists regarding volcanic activity at any of the locations. Due to the prolonged inactivity of the known volcanic fields, it is believed that they are not likely to erupt in the foreseeable future. Studies of the fields center more around their formation and past events, rather than focusing on potential future events. In the next update, addressing the direct relation of volcanic activity to seismic activity is a priority. Any changes to this vulnerability will be updated as plan maintenance to this PDM plan is conducted.

Dam Failure

The hydrology of the Rio Grande is greatly influenced by water management facilities and their operations. Water management along the Rio Grande began as early as 1400 A.D. for the purpose of agricultural irrigation. Contemporary water management in the basin evolved over decades, as a result of separate compacts, treaties, and authorizing legislation, plus the combined policies and distinct missions of multiple agencies. The Rio Grande is like a series of dominos. The dams downstream from each other could fail if almost any others above them do. Most vulnerable to a compounding dam failure is the Valencia County Branch Campus that resides in a flood zone. If a dam failure was of catastrophic domino effect, the Sevilleta LTER Field Station could potentially be vulnerable to potential flooding. No data exists at this time to determine the overall vulnerability if the domino effect would occur. The UNM Main and Gallup, Los Alamos, and Taos Branch Campuses vulnerability to a dam failure are considered low due to the location of the dam and campus locations.

CHAPTER 6 – CRITICAL FACILITIES

UNM Main and Branch campus resources include assets such as facilities and infrastructure necessary for the university to conduct operations and provide services. Resources can be housed on campus or in the community. Values include academic, research health science, historical and cultural assets. For the purpose of this document 'critical facilities' means: UNM owned assets which are vital to the health, safety, well-being, history and educational value of university faculty and staff, students and visitors during time of natural disaster. This includes:

1. **Places that house populations of people who are not able to take care of themselves in a life-threatening event (i.e., Hospital, Clinics and Cancer Center):**

2. **Places where public health and safety functions are performed or coordinated (i.e., Emergency Operations Center):**

3. **Places with a research and educational function with high value and high hazard (i.e., Research Facilities, Laboratories, and Museums and Art Collections):**

4. **Places with historical and significance value:**

5. **Other – Provides a service to UNM and surrounding community**

The exclusion of a building from the list does not mean that it houses an unimportant function; it just means that the PDMAC and department representatives determined that the activities and functions carried out at those locations were not vital to the immediate health and safety of the students, faculty or visitors on UNM Campuses or Branches. This list represents the determinations of the PDMAC. Any buildings excluded from this list will be reevaluated during future updates.

Methodology

Each participating department was asked to submit a prioritized list of their UNM owned facilities during the hazard assessment. The PDMAC was also asked to provide input on those critical facilities that may not have been included on department submissions. Additional data was extracted from the Campus Heritage Preservation Survey dated December 2006.

The location of each facility was then compared to known hazard areas (based on the risk assessment section). The potential damages to each location were estimated based on previous occurrence. Finally, Planning and Campus Development (PCD) values were compiled to provide an estimate of the potential losses to those facilities.

[redacted]

Redacted for security purposes

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

4. <u>Places with Historical Value and Significance</u>

A study was accomplished in September 2006 which determined the number of historic buildings on UNM. The university history was divided into three major historical periods:

- The Formative Period (1889 – 1928) – Marked the creation of the University campus on the barren sand hills of Albuquerque's East Mesa
- The Expansion Period (1928 – 1945) – University expansion due to New Deal funds
- The Boom Years (1946 – 1960) – Growth in post-World War II

Though growth didn't stop, it is significant in the identification of historic buildings on the university campus. Table 49 outlines UNM buildings/zones that appear in the UNM Heritage Preservation Plan. For the sake of implementing the Plan, they are listed in the following ranked order:

1 – Highest (historically <u>very important</u> to retain, or already state or federally registered)
2 – Medium (has historic features that can be archived, replicated or recalled) Does not preclude removal if there is a compelling need for use the property on which it sits or the adjacent lands;
3 – Lowest (Marginally historically relevant)

The table outlines those historical properties along with the vulnerabilities and average loss based on the natural hazard. Some historic land marks do not classify as a buildings with contents. Though highlighted as historical, the probability of loss is low and the replacement value is difficult to determine. Because of the importance of these historical locations to the university population was identified as historically very important to retain, they are listed on the table and classified accordingly. By no means does this low rating declassify the importance of these landmarks. Figure 60 provides an overview of the location of each of the historical properties in relation to the campus.

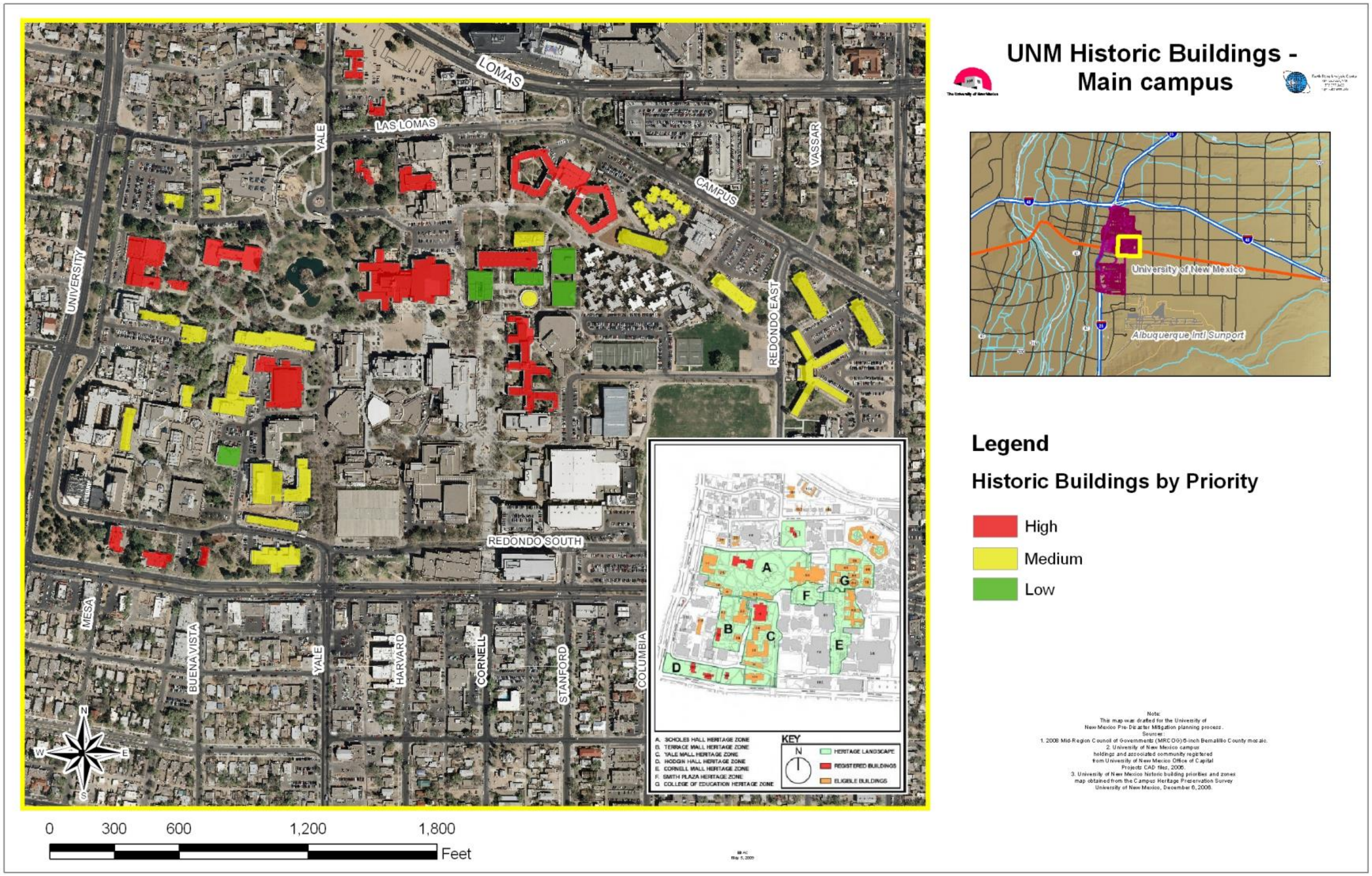
Table 49: UNM Historical Property and Resource Assets

1 – Very Important	Level of Property Vulnerability (H/M/L)	Loss to Structure	Loss to Contents ($)	Loss of Function or Use ($)	Displacement Cost	Total Loss for Hazard Event	Level of Community Value for Ranking Purposes (H/M/L)
Ash Mall	Low	Unknown	Unknown	Unknown	Unknown	Unknown	Low
Duck Pond	Low	Unknown	Unknown	Unknown	Unknown	Unknown	Low
Zimmerman Cactus Garden	Low	Unknown	Unknown	Unknown	Unknown	Unknown	Low
Scholes Hall	Low	$3.8M	$1.5M	$2.2M	$750K	$8.25M	Low
Anthropology Building	Medium	$5.4M	$1.2M	$2.3M	$300K	$9.2M	Medium
Alumni Chapel	Low	$422K	$85K	Unknown	Unknown	$511K	Low
Zimmerman Library	Low	$20.8M	$24.5M	$1.2M	$5.2M	$46.1M	Low
Terrace Mall	Low	Unknown	Unknown	Unknown	Unknown	Unknown	Low
Carlisle Gym	Low	$2.8M	$1.4M	$1.2M	$500K	$16.3M	Low
Northrop Hall (E&PS)	Low	$6.8M	Unknown	Unknown	Unknown	$6.8M	Low
Tight Grove	Low	Unknown	Unknown	Unknown	Unknown	Unknown	Low
Alumni Memorial Courtyard	Low	Unknown	Unknown	Unknown	Unknown	Unknown	Low
Hodgin Hall	Low	$1.5M	Unknown	Unknown	Unknown	$1.5M	Low
Sara Raynolds Hall	Low	$295K	Unknown	Unknown	Unknown	$295K	Low
Art Annex	Medium	$1.5M	Unknown	Unknown	Unknown	$1.5M	Medium
1 – Very Important	Level of Property Vulnerability (H/M/L)	Loss to Structure	Loss to Contents ($)	Loss of Function or Use ($)	Displacement Cost	Total Loss for Hazard Event	Level of Community Value for Ranking Purposes (H/M/L)
Mesa Vista Hall	Low	$8.9M	Unknown	Unknown	Unknown	$8.9M	Low
Travelstead Hall (COE)	Low	$2.6M	Unknown	Unknown	Unknown	$2.6M	Low
University House	Low	$556K	$25K	$15K	$10K	$606K	Low
Economics Building	Low	$1.6M	$75K	$25K	$20K	$1.72M	Low
Hokona Hall	Low	$16M	$1.2M	$2.3M	$1.6M	$23.5M	Low
Naval ROTC	Low	Unknown	Unknown	Unknown	Unknown	Unknown	Low
Johnson	Medium	$31.8M	$12.8M	$3.5M	$2.8M	$50.9M	Medium
Estufa	Low	$53K	Unknown	Unknown	Unknown	$53K	Low
2 - Medium							
Bandelier Hall	Medium	$1.2M	$560K	$350K	$200K	$18.06M	Medium
Mitchell Hall	Medium	$4.0M	Unknown	Unknown	Unknown	$4.0M	Medium
Engineering Annex	Low	$751K	$120K	$110K	$150K	$1.1.2M	Low
Anthropology Annex	Low	$799K	$1.5M	$1.2M	$800K	$4.2M	Low
Clark Hall	Medium	$7.9M	Unknown	Unknown	Unknown	$7.9M	Medium
Yale Mall	Low	Unknown	Unknown	Unknown	Unknown	Unknown	Low
Marron Hall	Low	$2.1M	Unknown	Unknown	Unknown	$2.1M	Low
Castetter Hall	Medium	$14.2M	$5.6M	Unknown	$7.2M	$27M	Medium
Communication & Journalism	Low	$2.8M	$85K	$120K	$58K	$3.09M	Low
Parsons Grove	Low	Unknown	Unknown	Unknown	Unknown	Unknown	Low
Cornell Mall	Low	Unknown	Unknown	Unknown	Unknown	Unknown	Low
Smith Plaza	Low	Unknown	Unknown	Unknown	Unknown	Unknown	Low
COE Courtyard	Low	Unknown	Unknown	Unknown	Unknown	Unknown	Low
COE Tech Center	Low	$3.5M	Unknown	Unknown	Unknown	$3.5M	Low
COE Kiva Lecture Hall	Low	$361K	Unknown	Unknown	Unknown	$361K	Low
1717 Roma (26)	Low	$619K	$25K	0	$100K	$744K	Low
1801 Roma (20)	Low	$301K	Unknown	Unknown	Unknown	$301K	Low

Tapy Hall	Low	Unknown	Unknown	Unknown	Unknown	Unknown	Low
Santa Clara Dormitory (61)	Low	$3.4M	$1.2M	$850K	$1.5M	$6.9M	Low
Coronado Dormitory (155)	Low	$8.7M	Unknown	$1.4M	$1.5M	$11.6M	Low
Santa Ana Dormitory (71)	Low	$4.3M	Unknown	$975K	$1.1M	$6.3M	Low
Laguna DeVargas Dormitory (74, 75)	Low	$7.8M	Unknown	$1.1M	$1.2M	$10.1M	Low
Onate Hall Dormitory (156)	Low	$3.1M	Unknown	$725K	$1.0M	$4.8M	Low
Alvarado Hall Dormitory (157)	Low	$3.5M	Unknown	$875K	$1.6M	$5.9M	Low
3 - Lowest							
Biology Annex	Low	$796K	$165K	$134K	$75K	$1.1M	Low
COE Simpson Hall	Low	$733K	$243K	$56K	$32K	$1.06M	Low
COE Educ Classrooms	Low	$1.9M	$435K	$84K	$13K	$2.4M	Low
COE Masley Hall	Low	$1.5M	$267K	$67K	$12K	$1.5M	Low
COE Manzanita Center	Low	$751K	$134k	$34K	$9K	$928K	Low

Some historic locations identified on this chart have unknown loss of structure, contents function/use and displacement costs at the time of writing this PDM Plan. One action identified for future review is to determine those costs and update the chart in accordance with plan maintenance.

Figure 60: UNM Historic Buildings - Main Campus



[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

Summary of Vulnerability of UNM Facilities
Based on the information presented in this section, UNM-owned or operated buildings, infrastructure and critical facilities were ranked according to their vulnerability from the high-risk hazards. As additional data and mapped locations of UNM-owned or operated buildings, infrastructure, and critical facilities is collected, better details on their vulnerability will be generated and updated in future revisions of this document.

The following are comments on UNM-owned critical facilities with respect to the identified natural hazards:

General

- UNM-owned facilities are no more exposed to natural hazards than are any other facilities
- Newer UNM facilities are built to a more stringent building code than are private residences and businesses

Thunderstorm/Hail/Lightning
UNM owned property is vulnerable to thunderstorm/hail/lightning the same as all other property. Special concerns may arise over critical facilities such as electric transmission lines, and communications towers being affected by hail or lightning. Power failures that occur as a secondary effect of severe weather would affect confined populations, communications systems, and just about every other segment of the population.

Winter Storm
Winter storms can disrupt day to day operations depending on the severity of the storm. All UNM locations (UNM main campus (Albuquerque), the four branch campuses (Gallup, Los Alamos, Taos, and Valencia) and the Sevilleta LTER Field Station located in Socorro, New Mexico) have experienced winter storm events that have caused closure to campuses due to large amounts of accumulation. According to UNM disaster history records, only three events (April 2004, December 2006 and December 2007) were identified but limited data is available discussing the overall significance of these events. Comments collected on hazard analysis surveys identified past occurrences with no significant responses to infrastructure damage. According to UNM PPD, extreme cold temperatures associated with winter storms have in the past caused water

pipes on UNM Main Campus to burst causing internal water damage to some buildings housing student classrooms, research labs and dormitories. This occurred during December 2006 causing $2M in water damage and repairs. Future mitigation strategies have been identified to account for these types of damages to determine trends of natural hazard occurrences.

High Wind

No UNM Campus is immune from damaging high winds. The probability of UNM main campus (Albuquerque), the four branch campuses (Gallup, Los Alamos, Taos, and Valencia) and the Sevilleta LTER Field Station located in Socorro, New Mexico is high, especially in the spring. Extremely high velocity wind over a prolonged period is rare. UNM campuses are vulnerable to downed power lines, roof damage, trees being blown down, and winds blowing debris into windows causing damage. Microburst wind damage is more common, since it is often associated with powerful downdrafts originating from thunderstorms. These winds are of relatively short duration.

Between 1999 and 2009, UNM SRS reported 11 high wind events causing over $242K in property damages, specifically on the main campus in Albuquerque. Though wind is a factor for all UNM campuses, the other 4 branch campuses and Sevilleta have not kept records on high wind damages. Discussions with branch campus officials highlighted the fact they have experienced high wind and some minor damage to facilities. Future updates to the mitigation plan will include a more in-depth review of high wind events at branch campuses based on the mitigation strategies developed.

Extreme Heat

Heat can affect UNM campuses' roadways, facilities housing high value research and art, and some equipment, but it is generally a health risk, not a structural hazard. Extreme heat is a concern for UNM because of the number of facilities which house many different specimens for research. In an extreme heat condition, the loss of air conditioning can cause catastrophic loss to experiments and specimens that requires a controlled environment.

Tornado

New Mexico has three different tornado risk zones. The far Eastern portion of the state along the Texas border is in Zone III where UNM Taos Branch Campus could see wind speeds of 200-250 MPH which corresponds to an EF5. The central portion of the state including, UNM Main Campus, Los Alamos Branch Campus, Taos Branch Campus and Valencia Branch Campus are in Zone II and could experience winds of 160-200 MPH, which corresponds to EF3-4. UNM Gallup Branch Campus is located in Zone I and can experience tornadic winds of up to 120 MPH. Based on Figure 19, UNM Campuses reside in counties that have anywhere from zero to 8 average events average. There is no data of a tornado event recorded on or near UNM Campus. Hazard analysis responses concluded that no events have occurred on or near UNM main or branch campuses. The majority of UNM campuses reside in zones I and II with a tornado impact probability as low. Taos Branch Campus resides in the risk zone III and has impact probably of low to medium. Though no campus has experience a tornado event, the facility damage probability is estimated up to 50% damage. Future updates to the mitigation plan will include a more in-depth review of tornadic events at UNM Main and Branch Campuses based on the mitigation strategies developed.

Flood

UNM owned facilities are not usually located in flood-prone areas, although certain segments of UNM property may be subject to occasional flooding, such as low points on highways. The Sevilleta LTER Field Station facilities are located north of Socorro, NM and west of the Rio Grande elevated on higher terrain. During flood plain research, no current data exists for the Socorro region. Based on the location of field station facilities flooding is not an issue of concern. UNM will work with state and flood management officials in the future to update this area accordingly.

Wildfire and Wildland/Urban Interface Fire

Most UNM owned facilities are not located in areas that are subject to an unusual wildfire hazard. The Sevilleta LTER Field Station is located in a Pinon-Juniper environment. Smoke from wildfires can endanger the health of faculty, students and visitors at the facility and cause evacuations. In 2009, Sevilleta experienced a wildfire that caused extensive damage to nine experiments. In the 2003, the Bosque in Albuquerque caught fire and caused evacuations and serious concerns to the interstate system. In the event the Bosque would catch fire, smoke could become an issue of concern. This can create a hazard to health care facilities and can force evacuation of residents if the smoke becomes extreme. Evacuation of UNM Hospital facilities would pose a serious logistical problem, whether due to direct fire danger or smoke.

Earthquake

The effect of earthquakes on UNM-owned property and critical facilities is largely an unknown due to the fact that there have not been any serious earthquakes in the state in recent time. Nevertheless, the central corridor of the state from Socorro County to Rio Arriba County is a moderate earthquake zone. Recently built facilities are constructed to a relatively high earthquake standards, but there are many older buildings and critical facilities that were not designed with earthquake resistance in mind. It is unknown whether any of these facilities have been or need to be examined for mitigation action. Areas of particular concern are highway bridges and overpasses, railroad facilities, hazardous material locations such as tank farms, and pipelines.

Drought

While drought does not cause damage to buildings and critical facilities in general, all places where people live and work are subject to drought effects. UNM Main and Branch Campus properties can engage in drought mitigation through water conservation plans, practices, and educational programs. Hospitals and other places with confined populations need to develop contingency plans to address a critical water shortage.

Land Subsidence

Land subsidence is not a problem for UNM Campus in Albuquerque. The Main Campus was constructed on, and excavated into, a land surface that has been stable since at least the least the Late Pleistocene, and possibly the middle Pleistocene. The terrace itself is coarse-grained alluvium dominated by fluvially deposited sand and gravel, and the soil developed on this terrace is an aridisol, marked by clay B horizon resting atop at Km horizon ("caliche," state II-III). The B horizon does not possess a sufficiently high clay percentage to create dramatic shrink-swell properties and therefore has no effect on the main, north and south campus. Additionally, none of the other branch campuses (Gallup, Los Alamos, Taos, and Valencia) have data on issues with land subsidence.

Expansive Soils

Expansive soils are not a problem for UNM Campus in Albuquerque. The Main Campus was constructed on, and excavated into, a land surface that has been stable since at least the least the Late Pleistocene, and possibly the middle Pleistocene. The terrace itself is coarse-grained alluvium dominated by fluvially deposited sand and gravel, and the soil developed on this terrace is an aridisol, marked by clay B horizon resting atop at Km horizon ("caliche," state II-III). The B horizon does not possess a sufficiently high clay percentage to create dramatic shrink-swell properties and therefore has no effect on the main, north and south campus. None of the other branch campuses (Gallup, Los Alamos, Taos, and Valencia) have data on issues with expansive soils.

Landslide

UNM Main Campus is located near the valley-ward margin of an ancient, gently sloping land surface that is of middle-late Pleistocene age. This surface was uniformly graded by the Rio Grande when it was flowing at this elevation, creating a relatively level terrace surface. As a consequence it lacks higher topography that could be a source of sediment and potential energy to generate landslides. Most critical facilities that are susceptible to landslides are in mountainous areas, such as communications towers, and along mountain roads. Some communities have allowed development in these areas, but UNM critical facilities are not located in such areas. Additionally, none of the other branch campuses (Gallup, Los Alamos, Taos, and Valencia) have data on issues with landslides.

Volcanoes

Due to the antiquity of known volcanism and the absence of related historical seismic activity in the State of New Mexico, the PDMAC concludes that the near-term risk of volcanic eruption where UNM main campus (Albuquerque), the four branch campuses (Gallup, Los Alamos, Taos, and Valencia) and the Sevilleta LTER Field Station reside is low.

Dam Failure

Most critical facilities at UNM Campus and Branches are not located in floodways, or in inundation zones. However most inundation zone maps are outdated and may not be accurate. These facilities will be re-evaluated as the maps are updated.

Potential UNM Losses in Local Jurisdictions

The university utilized, when available, those local mitigation plans to help identify potential losses. When data were unavailable or outdated, potential losses have been generalized based on data from FEMA's Hazards US Multi-Hazard (HAZUS-MH) beta version. HAZUS-MH is one of the principal planning tools available to state and local governments. However, with Level 1 data being the only HAZUS-MH data for New Mexico at this time, HAZUS-MH is of little use beyond some very general assumptions. HAZUS-MH Level 1 data does not necessarily present an accurate picture of reality. UNM must input specific data in a wide range of parameters to make Level 1 data more accurate. Appendix G provides an earthquake assessment on UNM Main and Branch Campuses using the HAZUS-MH tool.

Conclusions

This hazard analysis and risk assessment is based on the best and most up to date available data from federal, state and local sources. It presents a reasonable range of hazards that have affected the state in the past. By extrapolation, those same hazards can be expected to affect the state in the future. Nevertheless, there are a number of conclusions that we can make from the hazard analysis and risk assessment:

- UNM-owned and critical facilities are no more exposed to natural hazards than are other structures in the same general vicinity
- Critical facilities deserve additional mitigation attention because of the higher potential life and property loss or environmental harm in the unlikely event that they suffer significant damage
- UNM Main Campus and Branches residing in Bernalillo and McKinley Counties have the highest social vulnerability
- The UNM Main Campus in Bernalillo County has the highest vulnerability in terms of building stock
- The UNM Sevilleta LTER Field Station in Socorro County has the highest vulnerability in terms of transportation infrastructure
- The UNM Gallup Branch Campus in McKinley County has the highest vulnerability in terms of utility infrastructure
- The UNM Valencia Branch Campus in Valencia County has the highest vulnerability in terms of the number of state-owned facilities
- The UNM Campus and Valencia Branch Campus in Bernalillo and Valencia County have the highest vulnerability in terms of the total dollar exposure of state-owned facilities

It is important to note that, although some hazards are classified as low or moderate in probability of occurrence, it does not mean that they cannot affect UNM Campus and Branches in any significant way, only that such an occurrence is relatively less likely. The hazard analysis in this document provides helpful insights for planning purposes and determination of priorities, but it cannot offer guarantees. Table 50 provides an overview of those hazards and the vulnerability that hazard could cause to UNM Campuses.

Table 50: Summary of UNM and Branch Campus Natural Hazard Vulnerability Assessment

Locations	UNM Main		UNM Gallup		UNM Los Alamos		UNM Taos		UNM Valencia		Sevilleta LTER Field Station	
	Risk	Vulnerability	Risk	Vulnerability	Risk	Vulnerability	Risk	Vulnerability	Risk	Vulnerability	Risk	Vulnerability
Thunderstorm Hail Lightning	High	Main campus has 624 structures with an estimated value of over $400M; contents include thousands of art collections, and other research collections that are irreplaceable value, years of medical and technology research with an estimated value of over $189M	High	Gallup branch campus has 4 structures with an estimated value of over $19.7M. No data was provided by the campus on content vulnerability. Mitigation strategy will be developed to capture future updates to account for those contents and their vulnerabilities.	High	Los Alamos branch campus has 11 structures with an estimated value of over $8.6M. No data was provided by the campus on content vulnerability. Mitigation strategy will be developed to capture future updates to account for those contents and their vulnerabilities.	High	Taos branch campus has 5 structures with an estimated value of over $8.5M. No data was provided by the campus on content vulnerability. Mitigation strategy will be developed to capture future updates to account for those contents and their vulnerabilities.	High	Valencia branch campus has 10 structures with an estimated value of over $14.9M. No data was provided by the campus on content vulnerability. Mitigation strategy will be developed to capture future updates to account for those contents and their vulnerabilities.	High	Sevilleta LTER Field Station has 12 structures with an estimated value of over $2.6M. Contents include years of research and educational programs in biology, ecology, geology, and anthropology. No data was provided by the campus on content vulnerability. Mitigation strategy will be developed to capture future updates to account for those contents and their vulnerabilities.
Winter Storm	Low	UNM Main has 624 structures with an estimated value of over $400M; contents include thousands of art collections, and other research collections with irreplaceable value, years of medical and technology research estimated over $189M	Low	Gallup campus has 4 structures with an estimated value of over $19.7M. No data was provided by the campus on content vulnerability. Mitigation strategy will be developed to capture future updates to account for those contents and their vulnerabilities.	Low	Los Alamos has 11 structures with an estimated value of over $8.6M. No data was provided by the campus on content vulnerability. Mitigation strategy will be developed to capture future updates to account for those contents and their vulnerabilities.	Low	Taos campus has 5 structures with an estimated value of over $8.5M. No data was provided by the campus on content vulnerability. Mitigation strategy will be developed to capture future updates to account for those contents and their vulnerabilities.	Low	Valencia branch campus has 10 structures with an estimated value of over $14.9M. No data was provided by the campus on content vulnerability. Mitigation strategy will be developed to capture future updates to account for those contents and their vulnerabilities.	Low	Sevilleta has 12 structures with an estimated value of over $2.6M. Contents include years of research and educational programs in biology, ecology, geology, and anthropology. No data was provided by the campus on content vulnerability. Mitigation strategy will be developed to capture future updates to account for those contents and their vulnerabilities.

Locations	UNM Main		UNM Gallup		UNM Los Alamos		UNM Taos		UNM Valencia		Sevilleta LTER Field Station	
	Risk	Vulnerability	Risk	Vulnerability	Risk	Vulnerability	Risk	Vulnerability	Risk	Vulnerability	Risk	Vulnerability
High Wind	Low	UNM Main has 624 structures with an estimated value of over $400M; contents include thousands of art collections, and other research collections with irreplaceable value, years of medical and technology research estimated over $189M	Low	Gallup has 4 structures with an estimated value of over $19.7M. No data was provided by the campus on content vulnerability. Mitigation strategy will be developed to capture future updates to account for those contents and their vulnerabilities.	Low	Los Alamos has11 structures with an estimated value of over $8.6M. No data was provided by the campus on content vulnerability. Mitigation strategy will be developed to capture future updates to account for those contents and their vulnerabilities.	Low	Taos campus has 5 structures with an estimated value of over $8.5M. No data was provided by the campus on content vulnerability. Mitigation strategy will be developed to capture future updates to account for those contents and their vulnerabilities.	Low	Valencia campus has 10 structures with an estimated value of over $14.9M. No data was provided by the campus on content vulnerability. Mitigation strategy will be developed to capture future updates to account for those contents and their vulnerabilities.	Low	Sevilleta has 12 structures with an estimated value of over $2.6M. Contents include years of research and educational programs in biology, ecology, geology, and anthropology. No data was provided by the campus on content vulnerability. Mitigation strategy will be developed to capture future updates to account for those contents and their vulnerabilities.
Tornado	Low	UNM Facilities, faculty, staff, students and visitors. Critical facilities identified in Chapter 6	Low	Data deficiency; for planning purposes assumptions can be made that UNM facilities, faculty, staff, students and visitors. Critical facilities identified in Chapter 6. Mitigation action will be identified.	Low	Data deficiency; for planning purposes assumptions can be made that UNM facilities, faculty, staff, students and visitors. Critical facilities identified in Chapter 6. Mitigation action will be identified.	Low	Data deficiency; for planning purposes assumptions can be made that UNM facilities, faculty, staff, students and visitors. Critical facilities identified in Chapter 6. Mitigation action will be identified.	Low	Data deficiency; for planning purposes assumptions can be made that UNM facilities, faculty, staff, students and visitors. Critical facilities identified in Chapter 6. Mitigation action will be identified.	Low	Data deficiency; for planning purposes assumptions can be made that UNM facilities, faculty, staff, students and visitors. Critical facilities identified in Chapter 6. Mitigation action will be identified.
Drought	Low	Does not cause damage to buildings and critical facilities; No additional data provided; If future conditions or events warrant, upcoming editions of the plan will further elaborate on this hazard.	Low	Does not cause damage to buildings and critical facilities; No additional data provided; If future conditions or events warrant, upcoming editions of the plan will further elaborate on this hazard.	Low	Does not cause damage to buildings and critical facilities; No additional data provided; If future conditions or events warrant, upcoming editions of the plan will further elaborate on this hazard.	Low	Does not cause damage to buildings and critical facilities; No additional data provided; If future conditions or events warrant, upcoming editions of the plan will further elaborate on this hazard.	Low	Does not cause damage to buildings and critical facilities; No additional data provided; If future conditions or events warrant, upcoming editions of the plan will further elaborate on this hazard.	Low	Does not cause damage to buildings and critical facilities; No additional data provided; If future conditions or events warrant, upcoming editions of the plan will further elaborate on this hazard.

Locations	UNM Main		UNM Gallup		UNM Los Alamos		UNM Taos		UNM Valencia		Sevilleta LTER Field Station	
	Risk	Vulnerability	Risk	Vulnerability	Ris k	Vulnerability	Risk	Vulnerability	Risk	Vulnerability	Risk	Vulnerability
Extreme Heat	Low	Heat can affect UNM campuses' roadways; facilities housing high value art and research and some equipment. In extreme heat condition loss of air conditioning can cause loss of research requiring controlled environment. These potential losses are of such significance they are considered irreplaceable due to the years of research.	Low	Heat can affect campus roadways and some equipment, but it is generally a health risk, not a structural hazard. Periods of extreme heat can also place additional demands upon the electrical grid. Brown outs and black outs could dramatically increase vulnerability, particularly to those facilities associated with the housing and care of vulnerable populations.	Low	Heat can affect campus roadways and some equipment, but it is generally a health risk, not a structural hazard. Periods of extreme heat can also place additional demands upon the electrical grid. Brown outs and black outs could dramatically increase vulnerability, particularly to those facilities associated with the housing and care of vulnerable populations.	Low	Heat can affect campus roadways and some equipment, but it is generally a health risk, not a structural hazard. Periods of extreme heat can also place additional demands upon the electrical grid. Brown outs and black outs could dramatically increase vulnerability, particularly to those facilities associated with the housing and care of vulnerable populations.	Low	Heat can affect campus roadways and some equipment, but it is generally a health risk, not a structural hazard. Periods of extreme heat can also place additional demands upon the electrical grid. Brown outs and black outs could dramatically increase vulnerability, particularly to those facilities associated with the housing and care of vulnerable populations.	Low	Heat can affect campus roadways and some equipment, but it is generally a health risk, not a structural hazard. Periods of extreme heat can also place additional demands upon the electrical grid. Brown outs and black outs could dramatically increase vulnerability, particularly to those facilities associated with the housing and care of vulnerable populations.
Flood	Low	Based on the location, UNM Main is not vulnerable to a dam failure.	Low	Data deficiency; Mitigation action will be identified.	Low	Data deficiency; Mitigation action will be identified.	Low	Data deficiency; Mitigation action will be identified.	Low	Data deficiency; Mitigation action will be identified. The campus is identified in a flood zone in section 4, page 68; figure 26.	Low	Data deficiency; Mitigation action will be identified.
Earthquake	Low	The effect of earthquakes on campus property & critical facilities is an unknown as no serious earth-quakes in the state recently. The central corridor of the state from Socorro to Rio Arriba County is a moderate earth-quake zone. Recently built facilities are constructed to a relatively high earthquake standard, but there	Low	The effect of earthquakes on campus property & critical facilities is largely an unknown because of no serious earthquakes in the state recently. Recently built facilities are constructed to a relatively high earthquake standard. No data currently is available. No additional data provided; If future	Low	The effect of earthquakes on campus property & critical facilities is largely an unknown because of no serious earthquakes in the state recently. Recently built facilities are constructed to a relatively high earthquake standard. No data currently is available. No additional data provided; If future	Low	The effect of earthquakes on campus property & critical facilities is largely an unknown because of no serious earthquakes in the state recently. Recently built facilities are constructed to a relatively high earthquake standard. No data currently is available. No additional data provided; If future conditions or events warrant, upcoming	Low	The effect of earthquakes on campus property & critical facilities is largely an unknown because of no serious earthquakes in the state recently. Recently built facilities are constructed to a relatively high earthquake standard. No data currently is available. No additional data provided; If future conditions or events warrant, upcoming	Med	The effect of earthquakes on Sevilleta LTER Field Station property & critical facilities is largely an unknown because of no serious earthquakes in the state recently. Nevertheless, the central corridor of the state from Socorro to Rio Arriba County is a moderate earth-quake zone. Recently built facilities are constructed to a relatively high earthquake standard,

		are many older buildings and critical facilities that were not designed earth-quake resistance in mind. It is not known whether any of these facilities have been or need to be examined for mitigation action. No additional data provided; If future conditions or events warrant, upcoming editions of the plan will further elaborate on this hazard.		conditions or events warrant, upcoming editions of the plan will further elaborate on this hazard.		conditions or events warrant, upcoming editions of the plan will further elaborate on this hazard.		editions of the plan will further elaborate on this hazard.		editions of the plan will further elaborate on this hazard.		but there are many older buildings and critical facilities that were not designed earth-quake resistance in mind. It is not known whether any of these facilities have been or need to be examined for mitigation action. No additional data provided; If future conditions or events warrant, upcoming editions of the plan will further elaborate on this hazard.
Locations	**UNM Main**		**UNM Gallup**		**UNM Los Alamos**		**UNM Taos**		**UNM Valencia**		**Sevilleta LTER Field Station**	
	Risk	**Vulnerability**	**Risk**	**Vulnerability**	**Risk**	**Vulnerability**	**Risk**	**Vulnerability**	**Risk**	**Vulnerability**	**Risk**	**Vulnerability**
Wildfire	Low	Smoke from wildfires could endanger the health of patients in health care facilities and can force evacuation of campus if the smoke becomes extreme. Impact of fires on electrical transmission lines or substations could impact research facilities	Low	Smoke from wildfires could endanger health of patients in health care facilities and force evacuation of campus if the smoke becomes extreme. Fires impact electrical transmission lines or substations impacting campus operations. No data provided by campus.	Med	Smoke from wildfires could endanger the health of patients in health care facilities and can force evacuation of campus if the smoke becomes extreme. Impact of fires on electrical transmission lines or substations could impact campus operations. No data provided by campus.	Low	Smoke from wildfires could endanger the health of patients in health care facilities and can force evacuation of campus if the smoke becomes extreme. Impact of fires on electrical transmission lines or substations could impact campus operations. No data provided by campus.	Low	Smoke from wildfires could endanger the health of patients in health care facilities and can force evacuation of campus if the smoke becomes extreme. Impact of fires on electrical transmission lines or substations could impact campus operations. No data provided by campus.	Med	Smoke from wildfires could endanger the health of patients in health care facilities and can force evacuation of campus if the smoke becomes extreme. Impact of fires on electrical transmission lines or substations could impact research facilities
Dam Failure	Low	Based on the location, UNM Main is not vulnerable to a dam failure.	Low	Based on the location, Gallup branch campus is not vulnerable to a dam failure.	Low	Based on the location, Los Alamos branch campus is not vulnerable to a dam failure.	Low	Based on the location, Taos branch campus is not vulnerable to a dam failure.	Med	Valencia is located in a flood zone. Section 4, page 114 outlines risk of dam failure; Assumption can be made that resources vulnerable to flooding would include people and campus buildings	Low	Based on the location, Sevilleta is not vulnerable to a dam failure.

Locations	UNM Main		UNM Gallup		UNM Los Alamos		UNM Taos		UNM Valencia		Sevilleta LTER Field Station	
	Risk	Vulnerability	Risk	Vulnerability	Risk	Vulnerability	Risk	Vulnerability	Risk	Vulnerability	Risk	Vulnerability
Volcano	Low	Due to this extremely low probability of occurrence there is a data deficiency. In the next update, addressing the direct relation of volcanic activity to seismic activity is a priority. Due to the prolonged inactivity of the volcanic fields in New Mexico, it is believed that they are not likely to erupt in the foreseeable future. Studies of the fields center more around their formation and past events, rather than focusing on potential future events. If circumstances warrant, future versions of the plan will elaborate.	Low	Due to this extremely low probability of occurrence there is a data deficiency. In the next update, addressing the direct relation of volcanic activity to seismic activity is a priority. Due to the prolonged inactivity of the volcanic fields in New Mexico, it is believed that they are not likely to erupt in the foreseeable future. Studies of the fields center more around their formation and past events, rather than focusing on potential future events. If circumstances warrant, future versions of the plan will elaborate.	Low	Due to this extremely low probability of occurrence there is a data deficiency. In the next update, addressing the direct relation of volcanic activity to seismic activity is a priority. Due to the prolonged inactivity of the volcanic fields in New Mexico, it is believed that they are not likely to erupt in the foreseeable future. Studies of the fields center more around their formation and past events, rather than focusing on potential future events. If circumstances warrant, future versions of the plan will elaborate.	Low	Due to this extremely low probability of occurrence there is a data deficiency. In the next update, addressing the direct relation of volcanic activity to seismic activity is a priority. Due to the prolonged inactivity of the volcanic fields in New Mexico, it is believed that they are not likely to erupt in the foreseeable future. Studies of the fields center more around their formation and past events, rather than focusing on potential future events. If circumstances warrant, future versions of the plan will elaborate..	Low	Due to this extremely low probability of occurrence there is a data deficiency. In the next update, addressing the direct relation of volcanic activity to seismic activity is a priority. Due to the prolonged inactivity of the volcanic fields in New Mexico, it is believed that they are not likely to erupt in the foreseeable future. Studies of the fields center more around their formation and past events, rather than focusing on potential future events. If circumstances warrant, future versions of the plan will elaborate.	Low	Due to this extremely low probability of occurrence there is a data deficiency. In the next update, addressing the direct relation of volcanic activity to seismic activity is a priority. Due to the prolonged inactivity of the volcanic fields in New Mexico, it is believed that they are not likely to erupt in the foreseeable future. Studies of the fields center more around their formation and past events, rather than focusing on potential future events. If circumstances warrant, future versions of the plan will elaborate.
Land Subsidence	Low	Data deficiency; Data does not exist. Upon examination by Subject Matter Experts (SMEs), this section does not require an update unless event or incident warrants further action.	Low	Data deficiency; Data does not exist. Upon examination by Subject Matter Experts (SMEs), this section does not require an update unless event or incident warrants further action.	Low	Data deficiency; Data does not exist. Upon examination by Subject Matter Experts (SMEs), this section does not require an update unless event or incident warrants further action.	Low	Data deficiency; Data does not exist. Upon examination by Subject Matter Experts (SMEs), this section does not require an update unless event or incident warrants further action.	Low	Data deficiency; Data does not exist. Upon examination by Subject Matter Experts (SMEs), this section does not require an update unless event or incident warrants further action.	Low	Data deficiency; Data does not exist. Upon examination by Subject Matter Experts (SMEs), this section does not require an update unless event or incident warrants further action.

Locations	UNM Main		UNM Gallup		UNM Los Alamos		UNM Taos		UNM Valencia		Sevilleta LTER Field Station	
	Risk	**Vulnerability**	**Risk**	**Vulnerability**	**Risk**	**Vulnerability**	**Risk**	**Vulnerability**	**Risk**	**Vulnerability**	**Risk**	**Vulnerability**
Expansive Soil	Low	Data deficiency; Data does not exist. Upon examination by Subject Matter Experts (SMEs), this section does not require an update unless event or incident warrants further action.	Low	Data deficiency; Data does not exist. Upon examination by Subject Matter Experts (SMEs), this section does not require an update unless event or incident warrants further action.	Low	Data deficiency; Data does not exist. Upon examination by Subject Matter Experts (SMEs), this section does not require an update unless event or incident warrants further action.	Low	Data deficiency; Data does not exist. Upon examination by Subject Matter Experts (SMEs), this section does not require an update unless event or incident warrants further action.	Low	Data deficiency; Data does not exist. Upon examination by Subject Matter Experts (SMEs), this section does not require an update unless event or incident warrants further action.	Low	Data deficiency; Data does not exist. Upon examination by Subject Matter Experts (SMEs), this section does not require an update unless event or incident warrants further action.
Landslide	Low	Data deficiency; Data does not exist. Upon examination by Subject Matter Experts (SMEs), this section does not require an update unless event or incident warrants further action.	Low	Data deficiency; Data does not exist. Upon examination by Subject Matter Experts (SMEs), this section does not require an update unless event or incident warrants further action.	Low	Data deficiency; Data does not exist. Upon examination by Subject Matter Experts (SMEs), this section does not require an update unless event or incident warrants further action.	Low	Data deficiency; Data does not exist. Upon examination by Subject Matter Experts (SMEs), this section does not require an update unless event or incident warrants further action.	Low	Data deficiency; Data does not exist. Upon examination by Subject Matter Experts (SMEs), this section does not require an update unless event or incident warrants further action.	Low	Data deficiency; Data does not exist. Upon examination by Subject Matter Experts (SMEs), this section does not require an update unless event or incident warrants further action.

CHAPTER 7 – PRE-DISASTER MITIGATION CAPABILITY

UNM Funded Mitigation Personnel

The PDM program provided funds to The University of New Mexico for hazard mitigation planning prior to a disaster event. Funding this plan reduces overall risks to the university population and structures, while also reducing reliance on funding from actual disaster declarations. The mitigation plan is sponsored by a grant from FEMA of $185,157 from the New Mexico Department of Homeland Security. The University of New Mexico is providing 25% of the funds or $61,719 for a total project of $246,876. The funds covered portions of salaries for the Earth Data Analysis Center's GIS Program Manager, a GIS Technician, consulting and administrative support. When the mitigation plan is complete, the university will then seek out additional funds to implement the plan, seeking "Mitigation Project" funding.

State Policies and Statutes Related to Mitigation Issues

The two cornerstones of Emergency Management legislation in New Mexico are as follows:

12-11-23 to -25, Emergency Powers Code, 2005, as amended: provides state funds to be expended for disaster relief for any disaster declared by the Governor that is beyond local control. Such funds may also be used as a match for federal disaster relief grants; and,

12-10-2 to -5, NMSA 1978 as amended: The State Civil Emergency Preparedness Act. This Act establishes the basic structure of Emergency Management as a state agency and defines the role of local government in emergency preparedness.

Most policies that relate to mitigation are local initiatives and are not mandated by the state. The few state statues that relate to mitigation interests are detailed below.

3-18-6, NMSA 1978 as amended: The state requires communities to designate special flood hazard areas and mudslide hazards: "A county or municipality shall designate flood plain areas having special flood or mudslide hazards in substantial conformity with areas identified as flood- or mudslide-prone by the federal insurance administration pursuant to the national flood insurance program." The NMDHSEM Floodplain Coordinator distributes information about NFIP and general floodplain issues and attempts to recruit non-participating communities into the NFIP program. NFIP communities have ordinances in place to comply with the various NFIP requirements, thus mitigating flood losses.

3-17-7, 4-37-9.1, 72-14-3.2, 6-21-23, and 72-4A-7, NMSA 1978 as amended: All relate to the requirement for applicants for financial assistance from the New Mexico Finance Authority to submit water conservation plans with funding application, effective December 31, 2005. Water conservation plans help to mitigate drought.

74-6-2 and 74-6-4, NMSA 1978 as amended: Allows the use of up to 250 gallons per day of greywater for residential irrigation, subject to certain requirements. This reduces the consumer demand for potable water.

72-4A-2 through 72-4A-7, NMSA 1978 as amended: Allows Water Trust Board funds to be used for water conservation and water re-use activities. This serves to mitigate drought.

72-14-3.1, NMSA 1978 as amended: Directs the Interstate Stream Commission to prepare a comprehensive state water plan. This plan helps mitigate drought.

68-2-34, NMSA 1978 as amended: Creates the Fire Planning Task Force and outlines its duties. This serves to mitigate wildfire, especially in the Wildland/Urban Interface.

In addition, the state subscribes to and enforces the International Building Code (IBC), which requires that certain earthquake and wind-loading standards be met for specified categories of structures. UNM is responsible for monitoring its own development and submits Capital Project requests for new buildings, for new additions to buildings, for fixing life safety issues in buildings, for correcting non-compliant ADA issues in and around buildings as examples. The State permits new construction through the NM Construction Industries Division and all buildings are inspected following the State adopted IBC. UNM is not self regulating, similar to any state-owned, and therefore, is required to follow the Governor's mandate to build all new buildings at a minimum of LEED Silver.

Apart from those policies and statutes shown in Table 51, there are no other policies, laws or programs guiding mitigation in New Mexico. These policies were all in place prior to the 2009 mitigation plan.

Table 51: Policy Evaluation

Evaluation of Policies and Statutes Related to Development

Policy/Statute	Effectiveness	Benefit
3-18-6	This statute is not particularly effective because there is no provision of a penalty for non-compliance.	This statute serves as evidence that the State Legislature believes floodplain regulation to be important; could ease the way into NFIP for communities that are contemplating NFIP.
3-17-7 4-37-9.1 72-14-3.2 6-21-23 72-4A-7	This statute requires a water conservation plan as a co-requisite for receiving state funds from the NM Finance Authority and the water trust board for financial assistance in the construction of any water diversion, storage, conveyance, water treatment or wastewater treatment facility.	Statute serves to protect water users in time of drought and to clarify the need for drought contingency planning. The fact that the finance authority and water trust boards have issued tens of millions of dollars in loans shows that many jurisdictions are creating these plans.
74-6-2 to 74-6-4	The effectiveness of the legislation lies in the construction techniques of builders and the desire of homeowners to make retrofits. The statute does not require the installation of such systems. The fact that homeowners are not required to get state permits for installing such a system makes the process easier.	This statute serves to allow homeowners to use gray water for landscaping and gardening; therefore, it will conserve water through re-use in drought prone areas.
72-4A-2 to 72-4A-7	This statute allows funding to go to water conservation activities. Several projects around the state have been implemented that would not have been implemented had the funds not been available.	Statute serves to allow state funds from the water trust board to be used for water conservation and re-use activities, which had previously been prohibited. It will promote water conservation in drought prone areas.

Policy/Statute	Effectiveness	Benefit
72-14-3.1	This statute is effective in planning for use of the state's limited water resource.	This statute requires a state plan to allocate the state's water resources and plan for future needs. It is beneficial to the entire state, which is facing drought conditions.
68-2-34	This statute is effective in bringing together representatives from a variety of state agencies that have a concern in the wildfire hazard.	This statute is beneficial in that the Fire Planning Task Force must identify areas of unusually high fire hazard and propose mitigation measures.
International Building Code	All new buildings in the state are required to meet or exceed the standards in the International Building Code or the International Residential building code. This code requires a certain level of protection be installed in new buildings, to protect against wind, snow loads, fires, earthquakes and other natural hazards.	This code represents a higher standard than was previously in effect, especially regarding earthquake and wind loading requirements for public buildings.

Mitigation Grant Programs

The state does not have any pre- or post-disaster mitigation grant programs or funding of its own. The state acts as the grantee for federal mitigation grant programs, evaluates and recommends projects to FEMA for funding, and passes federal grant funds through to the sub-grantees. The non-federal share is usually borne by the applicant, although on rare occasions the state may contribute to the non-federal share. Applicants may meet their match by cash, in-kind services, or a combination of the two. Future funding of all federal grants depends upon continued funding by Congress. Apart from meeting the requirements of federal programs and technical assistance, the state and UNM has limited mitigation capability.

The following grant programs are all federal in origin and directly or indirectly relate to mitigation. Some are for specific hazards, while others can be applied to whatever hazard the applicant wants to address.

Hazard Mitigation Grant Program

Section 404 of the Robert T. Stafford Disaster Relief Emergency Assistance Act created the Hazard Mitigation Grant Program (HMGP) in November 1988. The HMGP assists states and local communities in implementing long-term hazard mitigation measures following a major disaster declaration. The grant is a cost-share of 75% federal share and 25% state and/or local share. On October 30th, 2000, the Robert T. Stafford Disaster Relief and Emergency Assistance Act was amended by Public Law 106-390 and is referred to as the DMA 2000. At this time, regulations for implementing this amended Act are being written. For all disasters declared after October 30th, 2000—local mitigation plans must be developed that include:

- Public and private sector involvement in the planning process
- Hazard Identification and Risk Assessment
- A mitigation strategy that identifies mitigation goals, measures and priorities
- A plan maintenance and review process
- Documentation that the governing body of the jurisdiction requesting approval of the plan has formally adopted the plan

The Hazard Mitigation Grant Program objectives are:

- To prevent future losses of lives and property due to disasters
- To implement state or local Hazard Mitigation plans
- To enable mitigation measures to be implemented during immediate recovery from a disaster
- To provide funding for previously identified mitigation measures that benefit the disaster area

How Does The HMGP Differ From Mitigation Funded Under The Public Assistance Program?: Mitigation projects may also be identified and funded through FEMA's Public Assistance Program following a disaster declaration. Public Assistance funds allow an existing damaged facility to incorporate mitigation measures during repairs, if measures are cost-effective or are required by code. The Federal Emergency Management Agency, the state or local applicants can identify potential mitigation measures. Mitigation funded under Public Assistance is only for public facilities damaged by the disaster. The HMGP can fund mitigation measures to protect public or private property, so long as these measures fit within the overall mitigation strategy for the disaster area, and comply with program guidelines. For public property damaged in the disaster, it is more appropriate to fund mitigation measures under Section 406 before applying to the HMGP.

Eligibility: Applicant eligibility is the same for the Hazard Mitigation Grant Program as it is for the Public Assistance Program. Applicants who are eligible for the HMGP are:

- State and local governments
- Certain private non-profit organizations or institutions
- Indian tribes or authorized tribal organizations and Alaska Native villages or organizations

Types of Projects That Can Be Funded: The HMGP can be used to fund projects to protect either public or private property. Examples of projects include:

- Acquisition and relocation of structures from hazard-prone areas
- Retrofitting, such as flood proofing to protect structures from future damage
- Elevation of structures or utilities
- Structural hazard control, such as debris basins, floodwalls, rip rap; or wetland restoration
- Studies to determine if highway structures obstruct flood flows
- Statewide GIS inventory of flood prone structures
- Storm and infrastructure protective measures

In New Mexico, HMGP assists State and local communities in implementing long-term hazard mitigation measures after a major disaster declaration, including flooding. This means that taking action to mitigate the causes of damage immediately after a disaster occurs can significantly reduce future flood damages. HMGP mobilizes financial and technical assistance in the aftermath of disasters – exactly the time when citizens and local elected officials are most receptive to undertaking projects and initiatives that reduce the impacts of future disasters. On the proverbial ‘sunny day’, which is typical for New Mexico, flooding is a low priority for homeowners and business owners, regardless of the mounting evidence that future floods will occur.

Flood Mitigation Assistance

The Flood Mitigation Assistance program (FMA) is made available to the State on an annual basis. The FMA program provides grants to communities for projects that reduce the risk of flood damage to structures that have flood insurance coverage. This funding is available for mitigation planning and implementation of mitigation measures only. The State is the administrator of the FMA program and is responsible for selecting projects for funding from the applications submitted by communities within the State. The State then forwards selected applications to FEMA for an eligibility determination. Although individuals cannot apply directly for FMA funds, their local government may submit an application on their behalf. FMA was created as part of the National Flood Insurance Reform ACT of 1994 (42 U.S.C. 4101) with the goal of reducing or eliminating claims under the NFIP. FMA is a pre-disaster grant program.

Applicant Eligibility: Any State agency, participating NFIP community or qualified local organization is eligible to participate in FMA. Communities that are suspended or on probation from the NFIP, are not eligible. Individuals wishing to participate in FMA should contact their local community officials.

Grant Types: Two types of grants are available under the FMA program: (1) Planning Grants are grants to States and communities to develop or upgrade flood mitigation plans; and (2) Project Grants are grants to States and communities to implement measures to reduce flood losses.

Planning: Planning is the foundation of FMA. FEMA encourages communities to identify ways to reduce their risk of flood damage by preparing Flood Mitigation Plans. Communities that have Flood Mitigation Plans can request approval of their plans from their FMA State Point of Contact (POC) and FEMA. Approved plans make a community eligible to apply for FMA project grants. Plans must assess flood risk and identify actions to reduce that risk.

Project Grant Eligibility Criteria: A project must, at a minimum, be:

- Cost Effective
- Cost beneficial to the National Flood Insurance Fund
- Technically feasible
- Physically located in a participating NFIP community or must reduce future flood damages in a NFIP community

A project must also conform with:

- The minimum standards of the NFIP Floodplain Management Regulations.
- The applicant’s Flood Mitigation Plan
- All applicable laws and regulations, such as Federal and State environmental standards or local building codes

Examples of Eligible Projects: Projects that reduce the risk of flood damage to structures insurable under the NFIP are eligible. Such activities include:

- Elevation of insured structures
- Acquisition of insured structures and real property
- Relocation and demolition of insured structures
- Dry flood proofing of insured non-residential structures
- Minor, localized structural projects that are not fundable by state or other Federal programs

Cost Share and Funding Limits: FEMA may contribute up to 75% of the total eligible costs. At least 25% of the total eligible costs must be provided by a nonfederal source. Of this 25%, no more than half can be provided as in-kind contributions from third parties. There are limits on the frequency of grants and the amount of funding that can be allocated to a State or community in any 5-year period.

How FMA Works: FEMA distributes FMA funds to States, which in turn provide funds to communities. The State serves as the grantee and program administrator for the FMA. The State:

- Sets mitigation priorities
- Provides technical assistance to communities applying for FMA funds
- Evaluates grant applications based on minimum eligibility criteria and State priorities
- Awards planning grants
- Works with FEMA to approve projects and award funds to communities
- Ensures that all community applicants are aware of their grant management responsibilities

In the past, New Mexico, has not taken advantage of this grant program. Additionally only three communities in the state have FMA plans. These grants come under the State Floodplain coordinator. UNM is not a NFIP participating member and is not eligible for the FMA and its benefits.

Pre-Disaster Mitigation Program

The Pre-Disaster Mitigation (PDM) Program was authorized by §203 of the Robert T. Stafford Disaster Assistance and Emergency Relief Act (Stafford Act), 42 USC, as amended by §102 of the Disaster Mitigation Act of 2000. Funding for the program is provided through the National Pre-Disaster Mitigation Fund to assist States and local governments (to include Indian Tribal governments) in implementing cost-effective hazard mitigation activities that complement a comprehensive mitigation program. The program is a nationally competitive funding source, and while each State has a $500,000 set aside, all applications must meet basic criteria, and are subject to technical, cost-benefit and peer evaluations. All applicants must be participating in the NFIP if they have been identified through the NFIP as having a Special Flood Hazard Area (a Flood Hazard Boundary Map (FHBM) or FIRM has been issued). In addition, the community must not be suspended or on probation from the NFIP.

In 44 CFR Part 201, Hazard Mitigation Planning, establishes criteria for State and local hazard mitigation planning authorized by §322 of the Stafford Act, as amended by §104 of the DMA. After November 1st, 2004, local governments and Indian Tribal governments applying for PDM funds through the States will have to have an approved local mitigation plan prior to the approval of local mitigation project grants. States will also be required to have an approved Standard State mitigation plan in order to receive PDM funds for State or local mitigation projects after November 1st, 2004. Therefore, the development of State and local multi-hazard mitigation plans is key to maintaining eligibility for future PDM funding.

UNM relies exclusively upon federal mitigation grant programs available through the NMDHSEM and FEMA to fund mitigation projects. There is currently no university funding sources identified for mitigation projects. UNM may pursue outside funding sources as identified by the State of New Mexico Hazard Mitigation Plan dated 2007 (Table 52).

Table 52: Federal Mitigation Programs

Program / Activity	Type of Assistance	Agency & Contact
Basic & Applied Research/Development		
Center for Integration of Natural Disaster Information	Technical Assistance: Develops and evaluates technology for information integration and dissemination	Department of Interior (DOI) –US Geological Survey (USGS) The Center for Integration of Natural Hazards Research: (703) 648-6059
Hazard Reduction Program	Funding for research and related educational activities on hazards.	National Science Foundation (NSF), Directorate for Engineering, Division of Civil and Mechanical Systems, Hazard Reduction Program:
Decision, Risk, and Management Science Program	Funding for research and related educational activities on risk, perception, communication, and management (primarily technological hazards).	NSF – Directorate for Social, Behavioral and Economic Science, Division of Social Behavioral and Economic Research, Decision, Risk, and Management Science Program (DRMS): www.nsf.gov/sbe/drms/start.htm
Societal Dimensions of Engineering, Science, and Technology Program	Funding for research and related educational activities on topics such as ethics, values, and the assessment, communication, management and perception of risk.	NSF – Directorate for Social, Behavioral and Economic Science, Division of Social, Behavioral and Economic Research, Societal Dimensions of Engineering, Science and Technology Program: (703) 306-1743
National Earthquake Hazard Reduction Program (NEHRP) in Earth Sciences	Research into basic and applied earth and building sciences.	NSF – Directorate for Geosciences, Division of Earth Sciences: (703) 306-1550
Technical and Planning Assistance		
Program / Activity	**Type of Assistance**	**Agency & Contact**
Planning Assistance to States	Technical and planning assistance for the preparation of comprehensive plans for the development, utilization, and conservation of water and related land resources.	Department of Defense (DOD) US Army Corps of Engineers (USACE) Contact the Floodplain Management Staff in the Appropriate USACE Regional Office Southwestern: (214-767-2613

Technical and Planning Assistance		
Program / Activity	**Type of Assistance**	**Agency & Contact**
Disaster Mitigation Planning and Technical Assistance	Technical and planning assistance grants for capacity building and mitigation project activities focusing on creating disaster resistant jobs and workplaces.	Department of Commerce (DOC), Economic Development Administration (EDA): (800) 345-1222 EDA's Disaster Recovery Coordinator: (202) 482-6225 www.doc.gov/eda
Watershed Surveys and Planning	Surveys and planning studies for appraising water and related resources, and formulating alternative plans for conservation use and development. Grants and advisory/counseling services to assist w/ planning and implementation improvement.	US Department of Agriculture (USDA) – National Resources Conservation Service (NRCS) Watersheds and Wetlands Division: (202) 720-4527 Deputy Chief for Programs: (202) 690-0848 www.nrcs.usda.gov
National Flood Insurance Program	Formula grants to States to assist communities to comply with NFIP floodplain management requirements (Community Assistance Program).	FEMA
Emergency Management / Mitigation Training	Training in disaster mitigation, preparedness, planning.	FEMA
National Dam Safety Program	Technical assistance, training, and grants to help improve State dam safety programs.	FEMA
National Earthquake Hazards Reduction Program	Training, planning and technical assistance under grants to States or local jurisdictions.	FEMA; DOI-USGS USGS Earthquake Program Coordinator: (703) 648-6785
Floodplain Management Services	Technical and planning assistance at the local, regional, or national level needed to support effective floodplain management.	DOD-USACE Southwestern: (214-767-2613
Watershed Protection and Flood Prevention Program	Technical and financial assistance for installing works of improvement to protect, develop, and utilize land or water resources in small watersheds under 250,000 acres.	USDA-NRCS Director, Watersheds and Wetlands Division: (202) 720-3042 (202) 690-4614 www.nrcs.usda.gov
Environmental Quality Incentives Program (EQIP)	Technical, educational, and limited financial assistance to encourage environmental enhancement.	USDA-NRCS NRCS County Offices Or NRCS EQUIP Program Manager: (202) 720-1834 www.nrcs.usda.gov
National Earthquake Hazard Reduction Program	Technical and planning assistance for activities associated with earthquake hazards mitigation.	FEMA, DOI-USGS Earthquake Program Coordinator: (703) 648-6785
Program / Activity	**Type of Assistance**	**Agency & Contact**
Hazard ID & Mapping		
National Flood Insurance Program: Flood Mapping;	Flood insurance rate maps and flood plain management maps for all NFIP communities;	FEMA
National Flood Insurance Program: Technical Mapping Advisory Council	Technical guidance and advice to coordinate FEMA's map modernization efforts for the National Flood Insurance Program.	DOI-USGS USGS – National Mapping Division: (573) 308-3802
National Digital Orthophoto Program	Develops topographic quadrangles for use in mapping of flood and other hazards.	DOI-USGS USGS – National Mapping Division: (573) 308-3802
Program / Activity	**Type of Assistance**	**Agency & Contact**
Hazard ID & Mapping		
Streamgaging and Flood Monitoring Network	Operation of a network of over 7,000 streamgaging stations that provide data on the flood characteristics of rivers.	DOE-USGS Chief, Office of Surface Water, USGS: (703) 648-5303

Hazard ID & Mapping		
Mapping Standards Support	Expertise in mapping and digital data standards to support the National Flood Insurance Program.	DOI-USGS USGS – National Mapping Division: (573) 308-3802
Soil Survey	Maintains soil surveys of counties or other areas to assist with farming, conservation, mitigation or related purposes.	USDA-NRCS NRCS – Deputy Chief for Soil Science and Resource Assessment: (202) 720-4630
National Earthquake Hazards Reduction Program	Seismic mapping for U.S.	DOI-USGS Earthquake Program Coordinator: (703) 648-6785
Project Support		
Aquatic Ecosystem Restoration	Direct support for carrying out aquatic ecosystem restoration projects that will improve the quality of the environment.	DOD-USACE Chief of Planning @ appropriate USACE Regional Office, Southwestern Division: (214) 767-2314
Beneficial Uses of Dredged Materials	Direct assistance for projects that protect, restore, and create aquatic and ecologically-related habitats, including wetlands, in connection with dredging an authorized Federal navigation project.	DOD-USACE Same as above
Wetlands Protection – Development Grants	Grants to support the development and enhancement of State and tribal wetlands protection programs.	US Environmental Protection Agency (EPA) EPA Wetlands Hotline: (800) 832-7828 Or EPA Headquarters, Office of Water Chief, Wetlands Strategies and State Programs: (202) 260-6045
Clean Water Act Section 319 Grants	Grants to States to implement non-point source programs, including support for non-structural watershed resource restoration activities.	EPA Office of Water, (202) 260-7088, 7100 Chief, Non-Point Source Control Branch:
Community Development Block Grant (CDBG) State Administered Program	Grants to States to develop viable communities (e.g., housing, a suitable living environment, expanded economic opportunities) in non-entitled areas, for low- and moderate-income persons.	US Department of Housing and Urban Development (HUD) State CDBG Program Manager Or State and Small Cities Division, Office of Block Grant Assistance, HUD Headquarters: (202) 708-3587
Community Development Block Grant Entitlement Communities Program	Grants to entitled cities and urban counties to develop viable communities (e.g., decent housing, a suitable living environment, expanded economic opportunities), principally for low- and moderate-income persons.	HUD City and county applicants should call the Community Planning and Development staff of their appropriate HUD field office. As an alternative, they may call the Entitlement Communities Division, Office of Block Grant Assistance, HUD Headquarters: (202) 708-1577, 3587
Emergency Watershed Protection Program	Provides technical and financial assistance for relief from imminent hazards in small watersheds, and to reduce vulnerability of life and property in small watershed areas damaged by severe natural hazard events.	USDA – NRCS National Office – (202) 690-0848 Watersheds and Wetlands Division: (202) 720-3042
Rural Development Assistance -- Utilities	Direct and guaranteed rural economic loans and business enterprise grants to address utility issues and development needs.	USDA-Rural Utilities Service (RUS) Program Support: (202) 720-1382 Northern Regional Division: (202) 720-1402 Electric Staff Division: (202) 720-1900 Power Supply Division: (202) 720-6436
Rural Development Assistance – Housing	Grants, loans, and technical assistance in addressing rehabilitation, health and safety needs in primarily low-income rural areas. Declaration of major disaster necessary.	USDA-Rural Housing Service (RHS) Community Programs: (202) 720-1502 Single Family Housing: (202) 720-3773 Multi Family Housing: (202) 720-5177

Program / Activity	Type of Assistance	Agency & Contact
Project Support		
Project Impact: Building Disaster Resistant Communities	Funding and technical assistance to communities and States to implement a sustained pre-disaster mitigation program.	FEMA
Flood Mitigation Assistance	Grants to States and communities for pre-disaster mitigation to help reduce or eliminate the long-term risk of flood damage to structures insurable under the National Flood Insurance Program.	FEMA
Hazard Mitigation Grant Program	Grants to States and communities for implementing long-term hazard mitigation measures following a major disaster declaration.	FEMA
Public Assistance Program (Infrastructure)	Grants to States and communities to repair damaged infrastructure and public facilities, and help restore government or government-related services. Mitigation funding is available for work related to damaged components of the eligible building or structure.	FEMA
National Flood Insurance Program	Makes available flood insurance to residents of communities that adopt and enforce minimum floodplain management requirements.	FEMA
HOME Investments Partnerships Program	Grants to States, local government and consortia for permanent and transitional housing (including support for property acquisition and rehabilitation) for low-income persons.	HUD; Community Planning and Development, Grant Programs, Office of Affordable Housing, HOME Investment Partnership Programs: (202) 708-2685 (202) 708 0614 extension 4594 1-800-998-9999
Disaster Recovery Initiative	Grants to fund gaps in available recovery assistance after disasters (including mitigation).	HUD; Community Planning and Development Divisions in their respective HUD field offices or HUD Community Planning and Development: (202) 708-2605
Non-Structural Alternatives to Structural Rehabilitation of Damaged Flood Control Works	Direct planning and construction grants for non-structural alternatives to the structural rehabilitation of flood control works damaged in floods or coastal storms. $9 million FY99	DOD-USACE Emergency Management contact in respective USACE field office: Southwestern: (214) 767-2425
Partners for Fish and Wildlife	Financial and technical assistance to private landowners interested in pursuing restoration projects affecting wetlands and riparian habitats.	Department of Interior (DOI) – Fish and Wildlife Service (FWS) National Coordinator, Ecological Services: (703) 358-2201 A list of State and Regional contacts is available from the National Coordinator upon request.
Project Modifications for Improvement of the Environment	Provides for ecosystem restoration by modifying structures and/or operations or water resources projects constructed by the USACE, or restoring areas where a USACE project contributed to the degradation of an area.	DOD-USACE Chief of Planning @ appropriate USACE Regional Office Southwestern Division: (214) 767-2310
Post-Disaster Economic Recovery Grants and Assistance	Grant funding to assist with the long-term economic recovery of communities, industries, and firms adversely impacted by disasters.	Department of Commerce (DOC) – Economic Development Administration (EDA) EDA Headquarters Disaster Recovery Coordinator: (202) 482-6225
Public Housing Modernization Reserve for Disasters and Emergencies	Funding to public housing agencies for modernization needs resulting from natural disasters (including elevation, flood proofing, and retrofit).	HUD Director, Office of Capital Improvements: (202) 708-1640
Indian Housing Assistance (Housing Improvement Program)	Project grants and technical assistance to substantially eliminate sub-standard Indian housing.	Department of Interior (DOI)-Bureau of Indian Affairs (BIA) Division of Housing Assistance, Office of Tribal Services: (202) 208-5427
Land Protection	Technical assistance for run-off retardation and soil erosion prevention to reduce hazards to life and property.	USDA-NRCS Applicants should contact the National NRCS office: (202) 720-4527

Program / Activity	Type of Assistance	Agency & Contact
North American Wetland Conservation Fund	Cost-share grants to stimulate public/private partnerships for the protection, restoration and management of wetland habitats.	DOI-FWS North American Waterfowl and Wetlands Office: (703) 358-1784
Land Acquisition	Acquires or purchases easements on high-quality lands and waters for inclusion into the National Wildlife Refuge System.	DOI-FWS Division of Realty, National Coordinator: (703) 358-1713
Federal Land Transfer / Federal Land to Parks Program	Identifies, assesses, and transfers available Federal real property for acquisition for State and local parks and recreation, such as open space.	DOI-NPS General Services Administration Offices Fort Worth, TX: (817) 334-2331 Boston, MA: (617) 835-5700 Or Federal Lands to Parks Leader NPS National Office: (202) 565-1184
Wetlands Reserve Program	Financial and technical assistance to protect and restore wetlands through easements and restoration agreements.	USDA-NRCS National Policy Coordinator NRCS Watersheds and Wetlands Division: (202) 720-3042
Transfers of Inventory Farm Properties to Federal and State Agencies for Conservation Purposes	Transfers title of certain inventory farm properties owned by FSA to Federal and State agencies for conservation purposes (including the restoration of wetlands and floodplain areas to reduce future flood potential)	US Department of Agriculture (USDA) – Farm Service Agency (FSA) Farm Loan Programs National Office: (202) 720-3467, 1632
Financing and Loan Guarantees		
Physical Disaster Loans and Economic Injury Disaster Loans	Disaster loans to non-farm, private sector owners of disaster damaged property for uninsured losses. Loans can be increased by up to 20 % for mitigation purposes.	Small Business Administration (SBA) National Headquarters Associate Administrator for Disaster Assistance: (202) 205-6734
Conservation Contracts	Debt reduction for delinquent and non-delinquent borrowers in exchange for conservation contracts placed on environmentally sensitive real property that secures FSA loans.	USDA-FSA Farm Loan Programs FSA National Office: (202) 720-3467, 1632 or local FSA office
Clean Water State Revolving Funds	Loans at actual or below-market interest rates to help build, repair, relocate, or replace wastewater treatment plants.	EPA EPA Office of Water State Revolving Fund Branch Branch Chief: (202) 260-7359 A list of Regional Offices available upon request
Section 108 Loan Guarantee Program	Loan guarantees to public entities for community and economic development (including mitigation measures).	HUD Community Planning and Development staff at appropriate HUD field office, or the Section 108 Office in HUD Headquarters: (202) 708-1871
Section 504 Loans for Housing	Repair loans, grants and technical assistance to very low-income senior homeowners living in rural areas to repair their homes and remove health and safety hazards.	US Department of Agriculture (USDA) – Rural Housing Service (RHS) Contact local RHS Field Office, or RHS Headquarters, Director, Single Family Housing Direct Loan Division: (202) 720-1474
Section 502 Loan and Guaranteed Loan Program	Provides loans, loan guarantees, and technical assistance to very low and low-income applicants to purchase, build, or rehabilitate a home in a rural area.	USDA-RHS Contact the Local RHS Field Office, or the Director, Single Family Housing Guaranteed Loan Division, RHS: (202) 720-1452
Rural Development Assistance -- Utilities	Direct and guaranteed rural economic loans and business enterprise grants to address utility issues and development needs.	USDA-Rural Utility Service (RUS) Contact Rural Development Field Offices, or RHS, Deputy Administrator, Community Programs Division: (202) 720-1490
Farm Ownership Loans	Direct loans, guaranteed / insured loans, and technical assistance to farmers so that they may develop, construct, improve, or repair farm homes, farms, and service buildings, and to make other necessary improvements.	USDA-FSA Director, Farm Programs Loan Making Division, FSA: (202) 720-1632

Disaster Resistant Universities (DRU)

The DRU program funds mitigation planning and construction projects on university property. The grant is 75% federal and 25% applicant and is nationally competitive. In 2005, FEMA reserved about $5M of PDM money under a separate grant program only for colleges and universities. Since 2006 and beyond, public universities apply to PDM like any other city or county. DRU is a conceptual term now of a university being resistant to disasters because they control all lands and buildings on campus. It is not a separate grant program and plans for universities must meet same planning criteria as city or county plans, 44 CFR 201.6.

Tornado Shelters Act (TSA)

Recently enacted by Congress, the Tornado Shelters Act enables local governments to utilize Community Development Block Grant (CDBG) funds from HUD to create community tornado shelters, “safe rooms,” in manufactured housing communities.

Post-Disaster Programs

There is essentially no difference between pre-disaster and post-disaster hazard mitigation policies, program, and capabilities.

The designation of programs as either “Pre-Disaster” or “Post-Disaster” only indicates the source of the funding. The HMGP is called a post-disaster program because its funding derives from a declared disaster. HMGP could be considered a pre-disaster mitigation program because eligible HMGP projects seek to mitigate future disasters and do not necessarily relate to the event that produced the funding. HMGP projects may be related to the type of hazard that caused the disaster, but it is not necessary. Applicants for HMGP may be anywhere in the state, not necessarily in the disaster area, and may seek to mitigate any natural hazard. HMGP derives its funding from a percentage of the eligible damages under a Stafford Act Disaster Declaration in which Public Assistance (PA) and/or Individual Assistance (IA) were authorized. The HMGP funding formula is 15% of total disaster grants. The HMGP grant is made to the state, and the state solicits applications for mitigation projects from eligible applicants statewide. Funding is 75% federal, 25% applicant.

406 Mitigation

The only true post-disaster mitigation grant program is the 406 Mitigation program, named for Section 406 of the Stafford Act. 406 Mitigation allows improvements or modifications to eligible PA projects, such as increasing culvert size. These mitigation actions must be cost-effective in reducing future disaster losses without creating a new footprint. Following a declared disaster that affects the University, UNM will work with the NMDHSEM and seek reasonable support if available.

Other Agency Plans and Programs related to the University of New Mexico PDM Plan

The University of New Mexico PDM Plan incorporates by reference the following plans and/or programs developed by other state and federal agencies.

Dam Safety Design and Operation Criteria. NM Office of the State Engineer. 2003. Reference: www.ose.state.nm.us/doing-business/Dam Safety/dam-menu.html

New Mexico Fire Plan. EMNRD Forestry Division, December 2008. Reference: http://www.emnrd.state.nm.us/FD/FireMgt/Fire.htm

New Mexico Forest and Watershed Health Plan. EMNRD Forestry Division. 2004. Reference: http://www.emnrd.state.nm.us/FD/FWHPlan/documents/FWHPLAN033005.pdf

New Mexico 10-Year Comprehensive Strategy Implementation Plan. December 2006. EMNRD Forestry Division. Reference: http://www.forestsandrangelands.gov/plan/documents/10-YearStrategyFinal_Dec2006.pdf

Report on Drought Conditions, New Mexico Drought Monitoring Work Group, Governor's Drought Task Force, January 2007. Reference: http://www.nmdrought.state.nm.us/MonitoringWorkGroup/2007-01-11-dmwg-rpt.pdf

New Mexico Drought Plan, New Mexico Drought Task Force, December 2006. Reference: http://www.nmdrought.state.nm.us/2006-NM-Drought-Plan.pdf

Strategic Plan, Office of the State Engineer and the Interstate Stream Commission, September 2006. Reference: http://www.ose.state.nm.us/PDF/Publications/StrategicPlans/strategic_plan_2006.pdf

New Mexico State Water Plan, Reference: http://www.ose.state.nm.us/water-info/NMWaterPlanning/2003StateWaterPlan.pdf

Progress Report: State of New Mexico Water Plan, Office of the State Engineer and the Interstate Stream Commission, June 2006, Reference: http://www.ose.state.nm.us/PDF/Publications/StateWaterPlans/swp-2006-06-progress-report.pdf

Handbook for New Mexico Floodplain Managers. NM Floodplain Managers Association. Sept. 2003. Reference: www.nmfma.org/handbook.htm

No Adverse Impact: A Toolkit for Common Sense Floodplain Management. Association of State Floodplain Managers. 2003. Reference: http://www.floods.org/NoAdverseImpact/NAI_Toolkit_2003.pdf

New Mexico Communities at Risk Assessment Plan, New Mexico Energy, Minerals and Natural Resources Department, Forestry Division, 2006 Reference: http://www.emnrd.state.nm.us/fd/FireMgt/documents/2006_CAR.pdf

New Mexico Fire Plan, New Mexico Energy, Minerals and Natural Resources Department, Forestry Division, December 2008. Reference: http://www.emnrd.state.nm.us/FD/FireMgt/Fire.htm

Framework for a Comprehensive Statewide Municipal and Industrial Water Conservation Program. Office of the State Engineer. Nov. 2003.
Reference: www.ose.state.nm.us/water-info/conservation

Strategic Plan for the New Mexico Floodplain Managers Association. NM Floodplain Managers Association. April 2003.
Reference: www.nmfma.org

Multi-Hazard Identification and Risk Assessment (MHIRA), Federal Emergency Management Agency, 1997.
Reference: http://www.fema.gov/library/viewRecord.do?id=2214

A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment, 10-Year Strategy Implementation Plan National Fire Plan. USFS December 2006.
Reference: http://www.fireplan.gov/reports/10-YearStrategyFinal_Dec2006.pdf

New Mexico 2000: Census 2000 Profile. US Census Bureau, US Department of Commerce, Economics and Statistics Administration, August 2002.
Reference: http://www.census.gov/prod/2002pubs/c2kprof00-nm.pdf

Project Report, Wind Resource Maps of New Mexico. Prepared for State of New Mexico Energy, Minerals, and Natural Resource Division, Prepared by True Wind Solutions, LLC, May 30th, 2003.

Water Resources of the Middle Rio Grande-San Acacia to Elephant Butte: Decision-Makers Field Guide 2007, Edited by L Greer Price, Peggy S. Johnson, and Douglas Bland, New Mexico Bureau of Geology and Mineral Resources, May 2007

Mining in New Mexico-The Environment, Water, Economics, and Sustainable Development: Decision-Makers Field Guide 2005, Edited by L. Greer Price, Douglas Bland, Virginia T. McLemore, and James M. Barker, New Mexico Bureau of Geology and Mineral Resources, 2009.

Water, Watersheds, and Land Use in New Mexico: Impacts of Population Growth on Natural Resources-Santa Fe Region: Decision-Makers Field Guide 2001, Edited by Peggy S. Johnson, New Mexico Bureau of Geology and Mineral Resources, 2001.

Planning For Extremes; A Report from Soil and Water Conservation Society Workshop, Soil and Water Conservation Society, 2007.
Reference: http://www.swcs.org/documents/Planning_for_Extremes.pdf

Identification of Potential Sources of Private, Local, and State Funding

UNM Mitigation Resources

There are no current non-federal mitigation programs or funds available from the University of New Mexico. It is possible that action by the University could fund the non-federal share for specific mitigation grants and projects, or fund entire projects outright. These initiatives must come from department managers who submit projects and encourage UNM administration to fund mitigation initiatives through the UNM budgeting process.

State Mitigation Resources

There are not currently any non-federal mitigation programs or funds available from the State of New Mexico. It is possible that action by the New Mexico Legislature could fund the non-federal share for specific mitigation grants and projects, or the Legislature could fund entire projects outright. Any such legislative initiative must come from the applicant. Local governments may have the ability to fund mitigation projects through bond issues or cash reserves.

Federal Mitigation Resources

Federal mitigation grant programs are discussed above under “Mitigation Grant Programs.”

Insurance

All UNM property is at risk from natural hazards and responsible for obtaining hazard insurance to the extent they believe it is necessary and affordable. Most hazard insurance mitigates losses, however, not hazards. The development of insurance incentives for doing specific hazard reduction is the responsibility of the insurance industry, not state or local mitigation offices.

The NFIP, administered by FEMA, is the only insurance program that promotes hazard mitigation. NFIP establishes requirements for flood-prone communities and the property owners in those communities. Participating communities must establish by ordinance a set of regulations that limits development in mapped floodplains. NFIP policyholders must meet certain construction and design elements that require new development to be elevated to meet or exceed the base flood elevation. Other flood mitigation efforts may be required as well. Financial institutions may require NFIP compliance before they will lend money for the construction or refinancing of structures in identified flood hazard areas.

(This page intentionally left blank)

CHAPTER 8 – MITIGATION STRATEGY: GOALS, OBJECTIVES, AND ACTION ITEMS

This section presents a series of goals, objectives, and mitigation actions to help guide UNM in addressing hazard vulnerabilities. The identified mitigation actions reflect the vulnerabilities discussed in Chapter 4 by identifying measures that may help the University's Main and Branch Campuses to avoid, prevent, or otherwise reduce damages from natural hazards.

Terminology

Goals are general guidelines that explain what you want to achieve. Goals are usually expressed as broad policy statements representing desired long-term results. In this Plan, the stated goals respond directly to the results of the hazard identification and risk assessment.

Objectives describe strategies or implementation steps to attain the identified goals. Objectives are more specific statements than goals; the described steps are usually measurable and can have a defined completion date.

Actions provide more detailed descriptions of specific work tasks to help a community achieve the goals and objectives. For each objective statement, there are alternatives for mitigation actions that must be evaluated to determine the best choices for each situation.

Mitigation Plans include a listing and description of the preferred mitigation actions and the strategy for implementation, i.e., who is responsible, how they will proceed, and when the action should be initiated and/or completed.

The Mission of Hazard Mitigation

The ultimate mission of all hazard mitigation is the protection and preservation of life and property from the effects of natural hazards. UNM Main and Branch Campuses can make progress toward this goal through an intense and coordinated planning effort and by the use of creative financing to achieve the objectives set forth in this and other plans.

Overview of the Mitigation Strategy Concept

The Hazard Identification and Risk Analysis identify the most likely natural hazards to have severe consequences at the UNM main campus (Albuquerque), the four branch campuses (Gallup, Los Alamos, Taos, and Valencia) and the Sevilleta Long Term Ecological Research (LTER) Facility located in Socorro, New Mexico. These 14 hazards are thunderstorm (to include hail/lightning), winter storms, high wind, extreme heat, tornado, flood, Wildland/Urban Interface Fires, earthquake, drought, land subsidence, expansive soils, landslide, volcanoes and dam failure. The Mitigation Planning Group has developed goals, objectives, and action items to suggest directions and methods for mitigating these hazards. If lesser hazards become significant in the future, annual updates to this plan will develop mitigation strategies to address them.

Mitigation planners must make their mitigation strategies conform to certain basic conditions of reality. There is no point in stating an impossible mitigation goal. For example, a goal such as “The rivers of New Mexico will not flood” is impossible because one cannot control weather events. What one can do is reduce the effects of floods that do occur. A better goal would be “Provide flood control structures in areas where floods have occurred previously.”

In addition, mitigation strategies in the state Hazard Mitigation Plan must address state critical facilities and repetitive loss structures. Situations in which critical facilities are found to lie within high hazard boundaries deserve special attention. Mitigation strategies need to be developed for property that has suffered repetitive loss, regardless of whether or not the loss was during a declared disaster.

Strategies reflect what the government would like to mitigate. For the purposes of this plan, the PDMAC considers the lack of funding not to be a limiting factor in the identification of mitigation strategies. Other factors, such as special considerations due to the National Environmental Policy Act (NEPA) and the National Historic Properties Act (NHPA), impose limitations on the spending of federal funds, making some actions so difficult as to become all but impossible. For planning purposes, the PDMAC has not considered these limitations either. When the time actually comes for deciding to pursue a specific project with federal funding, all of these factors come into play.

NMDHSEM is sometimes able to offer grant applicants technical assistance in planning and executing specific projects. Federal pre-disaster mitigation funding must be authorized annually by Congress. Post-disaster mitigation funding is based on disaster costs arising from a Stafford Act disaster declaration. Considering these limitations, it is impossible to predict the amount of mitigation grant funding that will be available in the future.

Priorities

The PDMAC has prioritized goals, objectives, and actions for the 14 hazard-specific mitigation strategies and one group of miscellaneous strategies. The methodology to determine priorities was based upon a consensus of the PDMAC. Factors considered were cost effectiveness, environmental impact, and technical feasibility.

Nothing in this plan should be construed as an absolute. Local governments need to assess their own vulnerability to the hazards they face and make their own priority determinations. There is far less mitigation funding available than is needed, and there is intense competition for what is available. The priorities identified in this plan are to be viewed as guidelines for local governments, not as requirements. It is not necessary for the first priority to be met before subsequent priorities are addressed. Often grant funding is for specific types of projects, and potential grant recipients must use what is available to them, regardless of priority. FEMA makes grant funding allocations to local governments based upon recommendations from the state. The state prioritizes grant applications based upon the needs of a given applicant in a given situation. State mitigation priorities do not overrule local needs.

Evaluation

In order to evaluate potential actions, the PDMAC used the STAPLE+E criteria, which provides a systematic approach weighing the pros and cons of potential mitigation actions. STAPLE+E stands for Social, Technical, Administrative, Political, Legal, Economic, and Environmental. For each of these characteristics, a series of questions was posed that assisted in evaluating the appropriateness of each potential action to the community, as described below:

Social

The public must support the overall implementation strategy and specific mitigation actions. Therefore, the projects will have to be evaluated in terms of community acceptance by determining:

- Whether the proposed action adversely affect one segment of the population
- Whether the action disrupt established neighborhoods, break up voting districts, or cause the relocation of lower income people
- Whether the action is compatible with present and future community values
- Whether the actions adversely affect cultural values or resources

Technical

Only those actions for which there were reasonable solutions, given the technological requirements of the project, were considered. No assumptions were made that a new technology would be forthcoming to solve impossible problems. Considerations to determine are:

- Whether the action can actually be accomplished (realistic)
- Whether it is a long-term solution
- Whether it reduces or causes secondary impacts

Administrative

Under this part of the evaluation criteria, examine the anticipated staffing, funding, and maintenance requirements for the mitigation action to determine if the jurisdiction has the personnel and administrative capabilities necessary to implement the action or whether outside help will be necessary. Determine whether:

- The jurisdictions have the capability (staff, technical experts, and/or funding) to implement the action, or whether it can be readily obtained
- The community can provide the necessary funding
- The project can be adequately maintained

Political

Understanding how your current community and state political leadership feels about issues related to the environment, economic development, safety, and emergency management will provide valuable insight into the level of political support you will have for mitigation activities and programs. Proposed mitigation objectives sometimes fail because of a lack of political acceptability. This can be avoided by determining:

- Whether there is political support to implement and maintain this action
- Whether there is a department, agency or individual willing to help see the action to completion
- Whether there is enough public support to ensure the success of the action

Legal

Without the appropriate legal authority, the action cannot lawfully be undertaken. When considering this criterion, determine whether your jurisdiction has the legal authority at the state, tribal, or local level to implement the action, or whether the jurisdiction must pass new laws or regulations. Each level of government operates under a specific source of delegated authority. As a rule, most local governments operate under enabling legislation that gives them the power to engage in different activities. Legal authority is likely to have a significant role later in the process when your state, tribe, or community will have to determine how mitigation activities can best be carried out, and to what extent mitigation policies and programs can be enforced. Determine whether:

- The state, tribe, or community have the authority to implement the proposed action
- There are any potential legal consequences (liability)
- The action is likely to be challenged by stakeholders who may be negatively affected

Economic

No benefit/cost analyses (BCA) were run for any proposed actions because to do so would require specific information that would only be available for a specific project. When the time comes for an applicant to submit a grant application, a detailed B/C will be a part of that application. A Cost/Benefit Review (CBR) was conducted that analyzed whether the action is likely to have benefits that are in excess of the cost. The PDMAC only addressed the question as a generality: “Would this action be likely to have benefits that are far in excess of the cost?” In most cases, the answer was obvious. Every local, state, and tribal government experiences budget constraints at one time or another. Cost-effective mitigation actions that can be funded in current or upcoming budget cycles are much more likely to be implemented than mitigation actions requiring general obligation bonds or other instruments that would incur long-term debt to a community. States and local communities with tight budgets or budget shortfalls may be more willing to undertake a mitigation initiative if it can be funded, at least in part, by outside sources. "Big ticket" mitigation actions, such as large-scale acquisition and relocation, are often considered for implementation in a post-disaster scenario when additional federal and state funding for mitigation is available.

Economic considerations must include the present economic base and projected growth and should be based on:

- Whether the costs seem reasonable for the size of the problem and likely benefits
- Whether a financial burden will be placed on the tax base or local economy to implement this action
- Whether the action contributes to other community economic goals, such as capital improvements or economic development
- Whether outside sources of funding are available

Environmental
No proposed action was considered if it was suspected to have a serious negative impact on the environment. Impact on the environment is an important consideration because of public desire for sustainable and environmentally healthy communities and the many statutory considerations, such as the NEPA, to keep in mind when using federal funds. One must evaluate whether, when implementing mitigation actions, there would be negative consequences to environmental assets such as threatened and endangered species, wetlands, and other protected natural resources. Evaluate whether:

- This action will affect the environment (land, water)
- This action will negatively affect any endangered species
- This action complies with local, state, and federal environmental laws or regulations
- Is the action consistent with community environmental goals

Numerous mitigation actions may well have beneficial impacts on the environment. For instance, acquisition and relocation of structures out of the floodplain, sediment and erosion control actions, and stream corridor and wetland restoration projects all help restore the natural function of the floodplain. In addition, vegetation management in areas susceptible to wildfires can greatly reduce the potential for large wildfires that would be damaging to the community and the environment. Such mitigation actions benefit the environment while creating sustainable communities that are more resilient to disasters.

In order to focus on UNM's hazard mitigation priorities and to comply with DMA 2000, the PDMAC identified their top priorities for hazard mitigation for the next five years (after which UNM hazard mitigation plans must be updated). Members of the PDMAC Team applied STAPLE+E characteristics and respective considerations to rank the potential mitigation actions, and applied a review of the probable costs and benefits of the actions.

Table 53: STAPLE+E Elements

Evaluation Category	Consideration
Social Community acceptance: Public must support the overall implementation strategy and specific mitigation actions.	• Affects Segment of Population: Does the action have any affect on the UNM faculty, students, visitors and surrounding community? • Disrupt Communities: • Campus / Branch Values: Is the action compatible with present and future UNM Goals? • Cultural Resources: Will the actions adversely affect cultural values or resources?
Technical Technically feasible, will it help reduce losses in the long term, and has minimal secondary impacts.	• Realistic: How effective is the action in avoiding or reducing future losses? • Long-term Solution: Will it create more problems than it solves? • Secondary Impacts: Does it solve the problem or only a symptom?
Administrative Determine if UNM has the personnel and administrative capabilities necessary to implement the action or whether outside help will be necessary	• Capability (Staffing Levels & Training): Does UNM have the capability to implement the action, or can it be readily obtained? • Funding Allocated: Is funding allocated or identified that will accomplish this action in a timely manner? • Maintenance: Can UNM provide the necessary maintenance?
Political Understand how UNM leadership feels about issues related to environment, economic development, safety, and Emergency Management and the level of support	• UNM Support: Is there support to implement and maintain this action? • UNM Champion or Proponent: Someone willing to help see the action to completion? • Campus / Branch Support: Is there enough support to ensure the success of the action?
Legal Legal authority is likely to have a significant role later to determine how mitigation activities can best be carried out and what extent mitigation policies and programs can be enforced	• Legal Authority: Does UNM have the authority to implement the proposed action? Are there any potential legal consequences? • Liability: Will UNM be liable for the actions or support of actions, or lack of action? • Action Potentially Subject to Legal Challenge: Is the action likely to be challenged by stakeholders who may be negatively affected?
Economic Cost-effective mitigation actions that can be funded in current or upcoming budget cycles.	• Cost of Mitigation Action: Does the cost seem reasonable for the size of the problem and likely benefits? • Burden to Campus / Branch Economy: What burden will be placed on UNM to implement this action? • Contributes to Economic Goals: Does the action contribute to UNM economic goals, such as capital improvements or economic development? • Outside Funding Available: What proposed actions should be considered but "tabled" for implementation until outside sources of funding are available?
Environmental Evaluate whether, when implementing mitigation actions, there would be negative consequences to environmental assets such as threatened and endangered species, wetlands or other protected natural resources	• Affects Land / Water Bodies: How will this action affect the environment? • Affects Endangered Species: How will this action affect endangered species? • Consistent with applicable Environmental Laws: Will the action comply with local, state, and federal environmental laws or regulations? • Consistent w/ UNM Environmental Goals: Is the action consistent with UNM environmental goals?

Each mitigation action was evaluated against the STAPLE +E criterion using the 1 – 3 rating. The rating is defined as follows:

0 = Poor: The mitigation action does not meet basic criteria established under the evaluation category, i.e. action may need to be revised.

1 = Fair (low priority): The mitigation action meets the basic criteria established under the evaluation category.

2 = Good (medium priority): The mitigation action exceeds the basic criteria established under the evaluation category.

3 = Excellent (high priority): The mitigation action exceeds the basic established criteria in an innovative or new way.

The maximum score possible is 72:

- Social = 12
- Technical = 9
- Administrative = 9
- Political = 9
- Legal = 9
- Economic = 12
- Environmental = 12

The scores from the PDMAC were averaged to come up with the score.

Mitigation Goals

The goal of mitigation is to save lives, reduce injuries, property damage and recovery times. Mitigation can reduce the enormous cost of disasters to property owners and all levels of government. In addition, mitigation can protect critical facilities, reduce exposure to liability and minimize community disruption. Preparedness, response, and recovery measures support the concept of mitigation and may directly support identified mitigation actions.

Mitigation Action Items

The process for developing mitigation actions for the UNM PDM consisted of review and evaluation of the hazard assessments provided by each department, face-to-face meetings with department managers, email responses and review of local and state hazard mitigation plans.

These are actions the PDMAC believes will reduce the effect of natural hazards on faculty, staff, students and visitors to the UNM Main and Branch Campuses. They are suggestions. There is no implied or actual commitment to implement these suggested actions.

UNM Identified Mitigation Actions

1. Continue to assess existing UNM structures and infrastructure for maintenance and repair needs but incorporate a system to manage damage by natural hazards

Comments: UNM currently assesses our structures and infrastructure to upgrade and repair facilities. This is step one in facilitating building upgrades that enhance the structural ability to prevent damages during a natural disaster. What is not being monitored is how the number of repairs caused by which natural hazard. This monitoring efforts needs to begin to increase our knowledge of what hazards are causing the most damage.

Hazards - Thunderstorms/hail/lightning, winter storms, high wind, extreme heat, tornado, flood, wildfire, and earthquake

Implementing Office / Department – UNM Physical Plant Department and Multiple departments will have implementation responsibility on UNM Main and Gallup, Los Alamos, Taos, Valencia Branch Campuses and Sevilleta LTER Field Station.

Implementation Time Frame - Evaluation effort to start in the winter (Nov/Dec) of 2010

How Contributes to Strategy: Continuous monitoring of existing structures is critical to the identification and prevention of potential vulnerabilities. The ability to know what maintenance needs are required and what contributed to the repair need (natural hazard or man-made) will aid in identifying trends in repairs based on type of hazard.

Estimated Expenses: $15,000 (.25 FTE)

Funding Sources: Potential funding sources include UNM Operating Budget, UNM Capital Improvement Plan, University bonds, UNM Building Renewal Replacement Funds, State appropriations and State Grants, Legislative Funds, Federal Construction Grants and other Appropriate Federal Grants (i.e., FEMA & Department of Education).

STAPLE+E Score: 36.875

Prioritization: 39

2. Form a committee that addresses UNM Main and Branch campus wide hazards, facilities mitigation needs and prioritizes capital facility needs for submittal to the Capital Planning Committee for inclusion in the UNM Capital Projects Plan.

Comments: Once facilities needs are identified and tracked this new committee which should include representatives from the UNM departments responsible for upgrades, construction and maintenance and hazard mitigation. (Physical Plant Department, IT, Engineering, Office of Capital Projects (OCP), Planning and Campus Development (PCD)) then reviews and prioritizes the needs creating a Capital Projects list for rehabilitation projects. Inclusion on the UNM Capital Projects requests allowing these projects to be considered for funding which would enable the structures to be rehabbed preventing damages from natural hazards.

Hazards - Thunderstorms/hail/lightning, winter storms, high wind, extreme heat, tornado, flood, Wildland/Urban Interface Fires, earthquake, drought, and dam failure

Implementing Office / Department - PPD, IT, OCP, PCD, Engineering, (Finance, Regents are involved in the capital planning process) and Gallup, Los Alamos, Taos, Valencia Branch Campuses and Sevilleta LTER Field Station.

Implementation Time Frame - Evaluation effort to start in the winter (Nov/Dec) of 2010

How Contributes to Strategy: PDMAC spearheads the effort to form a campus-wide committee to address hazards and facilities needs and provide input to the Capital Planning Committee for future enhancements of the UNM infrastructure. Factor other contributing documents to include the UNM Master Plan. Consideration and inclusion of mitigation needs, and the prioritization of those needs, is critical to all capital planning and facility-related decision-making. Inclusion of mitigation needs in the capital planning process is a necessity.

Estimated Expenses: $0

Funding Sources: Potential funding sources include UNM Operating Budget, UNM Capital Improvement Plan, University bonds, UNM Building Renewal Replacement Funds, State appropriations and State Grants, Legislative Funds, Federal Construction Grants and other Appropriate Federal Grants (i.e., FEMA & Department of Education).

STAPLE+E Score: 38.375

Prioritization: 22

3. Continue contractual services for emergency response cleanup and repair including all UNM Main and Branch Campus structures and infrastructure. Update, review, assess adequacy of contractual agreements across UNM departments and fund contractual services to assure inclusion of natural hazard events for all UNM properties.

Comments: UNM has multiple contractual agreements with outside vendors that supply emergency response services from early alert systems should critical infrastructure be in danger to actual repair and cleanup. UNM also carries insurance that protects us from a level of monetary loss should a disaster cause damages. All of these contracts need to be continually reviewed, updated and renewed as a valuable resource for protection from loss due to natural hazards damages.

Hazards - Thunderstorms/hail/lightning, winter storms, high wind, extreme heat, tornado, flood, wildfire, and earthquake

Implementing Office / Department – Office of the Vice President for HSC/UNM Finance and University Controller. (Works with all departments as many departments have these types of protective contracts at varying times due to various projects)

Implementation Time Frame – Ongoing with periodic reviews based on the terms of each contract.

How Contributes to Strategy: An enlightened and prepared work force provides the foundation for preparedness and disaster prevention.

Estimated Expenses: $15,000 (.25 FTE)

Funding Sources: Utilize existing sources such as those funding publications, UNM Operating Budget, UNM Capital Improvement Plan, University bonds, UNM Building Renewal Replacement Funds, State appropriations and State Grants, Legislative Funds, Federal Construction Grants and other Appropriate Federal Grants (i.e., FEMA & Department of Education).

STAPLE+E Score: 37.375

Prioritization: 32

4. Define and identify “critical facilities and infrastructure” based on UNM operational, service delivery and safety needs and prioritize and initiate facilities protection measures.

Comments: UNM facilities house varied services and functions for the University’s students, staff and faculty as well as the public at large. Disruption of these services and structural functionality due to damage caused by natural disaster can threaten the University’s ability to meet educational duties, preserve the integrity of research, and service Health Sciences and UNM Hospital patients. Defining which services and faculties operations are most important to maintain in the event of a disaster assists the University in prioritizing needs and protecting vital infrastructure

Hazards - Thunderstorms/hail/lightning, winter storms, high wind, extreme heat, tornado, flood, Wildland/Urban Interface Fires, earthquake, drought, and dam failure

Implementing Office / Department – UNM Main PPD, Department of Safety and Risk Management and UNM Gallup, Los Alamos, Taos, Valencia Branch Campuses and Sevilleta LTER Field Station.

Implementation Time Frame – Initiate 2011 coordinated data collection. 2012 prioritize and define ‘critical facilities”

How Contributes to Strategy: Prevention

Estimated Expenses: $15,000 (.25 FTE)

Funding Sources: Utilize existing resources to include UNM Operating Budget, UNM Capital Improvement Plan, University bonds, UNM Building Renewal Replacement Funds, State appropriations and State Grants, Legislative Funds, Federal Construction Grants and other Appropriate Federal Grants (i.e., FEMA & Department of Education).

STAPLE+E Score: 36

Prioritization: 43

5. Continue to define, identify and track hazardous materials and their location across UNM Main and Branch Campuses to mitigate potential secondary damages caused by natural hazards.

Comments: The University of New Mexico, like any other large and complex institution, uses a wide variety of hazardous chemicals and radioactive materials that play a critical role in its teaching and research activities. The quantity of these materials on campus has increased significantly with the growth of research and teaching programs at UNM over the past decade. This growth has also increased the complexity of monitoring and disposing of hazardous chemical and radioactive wastes. Furthermore, federal, state and local regulations regarding these materials have also increased significantly. The Department of Safety and Risk Management provides a formal policy regarding the purchase and distribution of hazardous chemicals and radioactive materials on campus. This program contains requirements for practices designed to provide the Department of Safety, Health and Environmental Affairs with important information regarding these materials as they are brought onto University property. The University needs to continue to fund and support these services.

Hazards - Thunderstorms/hail/lightning, winter storms, high wind, extreme heat, tornado, flood, Wildland/Urban Interface Fires, earthquake, drought, and dam failure

Implementing Office / Department – Department of Safety and Risk Management with coordination with Gallup, Los Alamos, Taos, Valencia Branch Campuses and Sevilleta LTER Field Station.

Implementation Time Frame – Ongoing through an application to purchase materials

How Contributes to Strategy: Prevention, early warning and response strategies supporting hazardous material movement and storage on UNM Main and Branch Campuses.

Estimated Expenses: $15,000 (.25 FTE)

Funding Sources: Utilize existing resources to include UNM Operating Budget, UNM Capital Improvement Plan, University bonds, UNM Building Renewal Replacement Funds, State appropriations and State Grants, Legislative Funds, Federal Construction Grants and other Appropriate Federal Grants (i.e., FEMA & Department of Education).

STAPLE+E Score: 40

Prioritization: 10

6. Evaluate existing structures that house hazardous materials to assure they meet UNM Department of Safety and Risk Management and the Department of Safety and Risk Management and Environmental Affairs standards to prevent additional hazardous materials damages caused by natural disaster.

Comments: 1.4 actions are linked and staged. 1st step is to identify critical facilities and services across all departments and academic disciplines also Identify hazardous materials then develop mitigation and protection measures to assure that natural disasters do not trigger the loss of critical services and additional damages from hazardous materials.

Hazards - Thunderstorms/hail/lightning, winter storms, high wind, extreme heat, tornado, flood, Wildland/Urban Interface Fires, earthquake, drought, and dam failure.

Implementing Office / Department – UNM Main Department of Safety and Risk Management, Physical Plant Department, and Office of Capital Projects and coordination UNM Gallup, Los Alamos, Taos, Valencia Branch Campuses and Sevilleta LTER Field Station.

Implementation Time Frame – Evaluation effort to start in the winter (Nov/Dec) of 2010

How Contributes to Strategy: Obviously, structures that house hazardous materials pose the greatest risk in the event of a natural disaster. As such, continuous evaluation of mitigation practices in the facilities is of extreme importance. Ensures existing UNM structures meet current safety guidelines for storing hazards materials reducing the risk from a natural hazard incident.

Estimated Expenses: $15,000 (.25 FTE)

Funding Sources: Potential funding sources include UNM Operating Budget, UNM Capital Improvement Plan, University bonds, UNM Building Renewal Replacement Funds, State appropriations and State Grants, Legislative Funds, Federal Construction Grants and other Appropriate Federal Grants (i.e., FEMA & Department of Education).

STAPLE+E Score: 39.625

Prioritization: 13

7. Create a public awareness/education program, which identifies educational resources and training opportunities Campus- and Branch-wide.

Comments: There already exists a template baseline orientation for personal safety. This can be included in orientation curricula for parents/students (jointly) and transfer students, for staff and for new faculty. Materials that incorporate the baseline information can be included in the campus planner available to all new students, in the materials available to new staff and in the syllabus developed by faculty for each of their classes.

A Basic Campus Preparedness Course is available online and should be considered as an annual compliance requirement for faculty, staff and student employees. The course can be made available and also tracked through Learning Central. It might be incorporated as an element for performance review.

These courses should be made available in alternate formats for staff without ready access to online resources and for members of the disabled community.

Hazards - Thunderstorms/hail/lightning, winter storms, high wind, extreme heat, tornado, flood, Wildland/Urban Interface Fires, earthquake, drought, and dam failure

Implementing Office / Department - Multiple departments will have implementation responsibility on UNM Main and Gallup, Los Alamos, Taos, Valencia Branch Campuses and Sevilleta LTER Field Station.

Implementation Time Frame – Fall/Winter of 2010 **-** Ongoing.

How Contributes to Strategy: Local media play a familiar role in disseminating information quickly, consistently and with great frequency, especially during or after a natural hazard event.

Estimated Expenses: $15,000 (.25 FTE)

Funding Sources: Utilize existing resources to include UNM Operating Budget, UNM Capital Improvement Plan, University bonds, UNM Building Renewal Replacement Funds, State appropriations and State Grants, Legislative Funds, Federal Construction Grants and other Appropriate Federal Grants (i.e., FEMA & Department of Education).

STAPLE+E Score: 39.25

Prioritization: 18

8. Provide education on recommended responses to identified hazards through multiple and redundant communication and education vehicles (sirens, email, website, text, phones, etc.) including those that can be accessed by the disabled members of the community.

Comments: From sirens to text messages to phone trees, multiple vehicles should be implemented to inform the campus community of an identified hazard. So too should the education on appropriate responses to these hazards be made available in multiple formats to accommodate all members of the UNM community. Messages responding to various crises should be developed in advance of an incident and utilized in the education process.

Hazards - Thunderstorms/hail/lightning, winter storms, high wind, extreme heat, tornado, flood, wildfire, and earthquake

Implementing Office / Department - Multiple departments will have implementation responsibility on UNM Main and Gallup, Los Alamos, Taos, Valencia Branch Campuses and Sevilleta LTER Field Station.

Implementation Time Frame – Fall of 2009 - Ongoing

How Contributes to Strategy: It is vital to educate the broadest spectrum of the University community on the effect of a natural hazard before, during and after an incident.

Estimated Expenses: $15,000 (.25 FTE)

Funding Sources: Potential funding sources include UNM Operating Budget, UNM Capital Improvement Plan, University bonds, UNM Building Renewal Replacement Funds, State appropriations and State Grants, Legislative Funds, Federal Construction Grants and other Appropriate Federal Grants (i.e., FEMA & Department of Education).

STAPLE+E Score: 37

Prioritization: 36

9. Develop a website devoted to campus risk reduction.

Comments: Ultimately, there should be one website that will provide real time information and ongoing education on all emergency matters, including information that can help reduce the campus risk in the face of natural disasters. The page(s) devoted to pre-disaster mitigation can incorporate social media tools that can engage the campus community in ongoing discussions about hazards, exposure and recommended responses. With assistance from the Office of Accessibility Services, information will be developed that will manage the content of all emergency websites, making that content readily adaptable to multiple formats.

Hazards - Thunderstorms/hail/lightning, winter storms, high wind, extreme heat, tornado, flood, wildfire, and earthquake

Implementing Office / Department – University Communication & Marketing in concert with all Branch Campuses.

Implementation Time Frame – Currently in development with completion anticipated by spring 2011. Effort will be ongoing.

How Contributes to Strategy: In the event of a disaster, communication to the numerous campus constituencies that may be affected is of paramount importance. Given the trends of increased electronic communication as a means of information dissemination, a central website is crucial to efficient and effective campus-wide communication. Additionally, a central web-site will provide an opportunity for pre-disaster mitigation and prevention communications. This action enhances mitigation awareness across UNM Main, Branch Campuses and Sevilleta LTER Field Station before, during and after a natural hazard event.

Estimated Expenses: $30,000 (.50 FTE)

Funding Sources: Potential funding sources include UNM Operating Budget, UNM Capital Improvement Plan, University bonds, UNM Building Renewal Replacement Funds, State appropriations and State Grants, Legislative Funds, Federal Construction Grants and other Appropriate Federal Grants (i.e., FEMA & Department of Education).

STAPLE+E Score: 37.375

Prioritization: 33

10. Coordinate with National Weather Service on hazards/risk reduction awareness training for faculty, staff, students and visitors.

Comments: The Emergency Manager has already initiated specialized weather training available for emergency management responders and individuals directly involved with campus emergency operations. The Storm Ready certification process should be expanded to include all interested parties on campus.

Hazards - Thunderstorms/hail/lightning, winter storms, high wind, extreme heat, tornado, flood, wildfire, and earthquake

Implementing Office / Department – UNM Emergency Management and Gallup, Los Alamos, Taos, Valencia Branch Campuses and Sevilleta LTER Field Station.

Implementation Time Frame – Started in 2009 and effort will be ongoing

How Contributes to Strategy: Training and education are critical to effective hazard mitigation. In this light, continuously up to date and relevant training information (such as that provided by the National Weather Service) is critical to our ability to detect, warn, and plan for potential natural disasters. The overall goal of hazard mitigation is to reduce the impact of a natural hazard incident on people and property. With sufficient warning individuals could protect themselves and their possessions from the damaging effects of hazards.

Estimated Expenses: $0

Funding Sources: Potential funding sources include UNM Operating Budget, UNM Capital Improvement Plan, University bonds, UNM Building Renewal Replacement Funds, State appropriations and State Grants, Legislative Funds, Federal Construction Grants and other Appropriate Federal Grants (i.e., FEMA & Department of Education).

STAPLE+E Score: 38.875

Prioritization: 20

11. Coordinate with local media to provide updates and information on natural hazard events that can impact UNM Main and Gallup, Los Alamos, Taos, Valencia Branch Campuses and Sevilleta LTER Field Station.

Comments: As part of FEMA training and (National Incident Management System (NIMS) compliance, public information officers learn the protocols associated with both Incident Commands and Joint Commands and adhere to a unified message that has been vetted through the Emergency Operations Center (EOC) Director and/or Incident commander. The local media play an important role in the dissemination of correct information and are regularly and consistently briefed.

It is recommended that all members of communication teams for Main Campus, HSC and Branch Campuses go through the FEMA and NIMS compliance training in order to have several levels of backup in case of an emergency.

Hazards - Thunderstorms/hail/lightning, winter storms, wind/dust, extreme heat, tornado, flood, wildfire, and earthquake

Implementing Office / Department – University Communication and Marketing

Implementation Time Frame – Fall 2010 **-** Ongoing

How Contributes to Strategy: Effective communication is key to effective disaster management. Given the critical role played by the local media in the dissemination of information regarding disasters, it is critical the university be well-versed and well-trained in their communicating and coordinating efforts with local media. This action provides training consistent with FEMA incident command system and disaster preparedness training requirements. Efforts will ensure consistency across the campuses to ensure compliance with federal guidance and enhance awareness in the event of a natural hazard incident.

Estimated Expenses: $0

Funding Sources: Potential funding sources include UNM Operating Budget, UNM Capital Improvement Plan, University bonds, UNM Building Renewal Replacement

Funds, State appropriations and State Grants, Legislative Funds, Federal Construction Grants and other Appropriate Federal Grants (i.e., FEMA & Department of Education).

STAPLE+E Score: 37.875

Prioritization: 28

12. Provide multi-lingual, multi-cultural and multi-media crisis communication and education designed to reduce hazard risk in formats readily accessible and available to all members of the UNM community.

Comments: Multiple and redundant communication and education formats (cell phone/text, sirens, required course, automated weather alerts, audiotaped messages, multiple language messages, web-based information, phone trees, etc.) should be made available in order to accommodate the needs of all members of the UNM community, including the disabled, ESL and those without ready access to phones of computers. There should also be a communication mechanism developed for use during a major power outage.

Hazards - Thunderstorms/hail/lightning, winter storms, high wind, extreme heat, tornado, flood, Wildland/Urban Interface Fires, earthquake, drought, and dam failure

Implementing Office / Department - Multiple implementation departments and UNM Main and Gallup, Los Alamos, Taos, Valencia Branch Campuses and Sevilleta LTER Field Station with special consultation provided by the Office of Accessibility Services

Implementation Time Frame – Fall 2010

How Contributes to Strategy: Given the many diversities of the UNM community, education and information dissemination must be readily available in multiple languages and formats in order to effectively reach all members of the community. This action increases disaster preparedness targeting all populations attending or visiting the UNM Main and Branch Campuses. Supports disaster awareness and prevention across all populations within UNM.

Estimated Expenses: $50,000 to $75,000

Funding Sources: Potential funding sources include UNM Operating Budget, State appropriations and State Grants, Legislative Funds, and other Appropriate Federal Grants (i.e., FEMA, American with Disabilities Act (ADA) & Department of Education).

STAPLE+E Score: 39.5

Prioritization: 15

13. Keep current the information contained on the various emergency contact databases.

Discussion Comments: Faculty, staff and students each have discreet databases that contain their individual emergency contact information. There should be consistent reminders to keep information current through LoboWeb.

Hazards: Thunderstorms/hail/lightning, winter storms, high wind, extreme heat, tornado, flood, wildfire, and earthquake

Implementing Office/Department: Multiple departments will have implementation responsibility on UNM Main and Gallup, Los Alamos, Taos, Valencia Branch Campuses and Sevilleta LTER Field Station.

Implementation Time Frame: Fall 2010

How Contributes to Strategy: Supports a disaster preparedness and readiness response for all UNM members in the event of a natural disaster.

Estimated Expenses: $20,000 Annually

Funding Sources: UNM Operating Budget, State appropriations and State Grants, Legislative Funds, other Appropriate Federal Grants (i.e., FEMA & Department of Education).

STAPLE+E Score: 35

Prioritization: 46

14. Identify and incorporate hazard emergency response practices based on "lessons learned" from University emergency response and notification drills into UNM Main and Branch Campuses Emergency Plans.

Comments: UNM runs periodic emergency response drills that are both designed to test alert systems and test effectiveness of procedures during a natural disaster. The emergency plan needs to be adjusted to address discovered deficiencies. Other opportunities that enhance disaster preparedness before, during and after a natural hazard event would include attendance at various state hosted workshops, exercise events (drills, tabletop, functional exercise, etc.).

Hazards - Thunderstorms/hail/lightning, winter storms, high wind, extreme heat, tornado, flood, Wildland/Urban Interface Fires, earthquake, drought, and dam failure

Implementing Office / Department – Office of Emergency Management and Gallup, Los Alamos, Taos, Valencia Branch Campuses and Sevilleta LTER Field Station.

Implementation Time Frame – Late fall 2010

How Contributes to Strategy: Lessons learned from “mock-disaster” and training exercises are effective tools to identify strengths and weaknesses in the mitigation plan. Incorporation of these lessons learned into the emergency plan is critical in effective mitigation efforts. This action supports a consistent [natural] disaster preparedness program factoring those lessons learned during exercise and real world incidents that take place on main and branch campuses.

Estimated Expenses: $70,000 to $90,000

Funding Sources: UNM Operating Budget, State appropriations and State Grants, Legislative Funds, and other Appropriate Federal Grants (i.e., FEMA & Department of Education).

STAPLE+E Score: 35.875

Prioritization: 44

15. Develop a building, structure, campus, and university-wide coordinated evacuation plan that specifically address safety from natural hazards.

Comments: UNM has multiple policies and procedures that address evacuation measures. These efforts need to be coordinated to assure the safety off all campus visitors and residents as well as the community surrounding UNM Main and Branch Campuses in the event of a natural hazard occurrence.

Hazards - Thunderstorms/hail/lightning, winter storms, high wind, extreme heat, tornado, flood, wildfire, earthquake and dam failure.

Implementing Office / Department –Multiple departments will have implementation responsibility on UNM Main and Gallup, Los Alamos, Taos, Valencia Branch Campuses and Sevilleta LTER Field Station.

Implementation Time Frame – Initiate coordination 2012

How Contributes to Strategy: Coordination and integration of the many existing segmented evacuation plans, policies, and procedures is necessary to effective disaster management. This action provides guidance for the proper response in the event of a natural hazard incident on the main or branch campuses.

Estimated Expenses: $25,000 (.5 FTE)

Funding Sources: Potential funding sources include UNM Operating Budget, State appropriations and State Grants, Legislative Funds, and other Appropriate Federal Grants (i.e., FEMA & Department of Education).

STAPLE+E Score: 35.625

Prioritization: 45

16. Complete the review of all UNM properties for compliance with ADA access addressing special building and campus evacuation consideration for persons with disabilities during a natural disaster event.

Comments: The UNM ADA Committee has been tasked with reviewing all UNM properties for ADA compliance. This effort receives little or no funding to document, assess and track compliance making the completion of the task difficult.

Hazards - Thunderstorms/hail/lightning, winter storms, high wind, extreme heat, tornado, flood, wildfire, and earthquake.

Implementing Office / Department - UNM ADA Committee and Gallup, Los Alamos, Taos, Valencia Branch Campuses and Sevilleta LTER Field Station.

Implementation Time Frame - initiated, ongoing evaluations with campus wide evaluation completion date dependent.

How Contributes to Strategy: Some of the most vulnerable people on campus are those with disabilities and special needs. Therefore, ADA compliance is of primary concern of effective disaster management. Individuals with special needs safety and security must be considered when developing evacuation or shelter in place plans in the event the university is hit by a natural hazard event.

Estimated Expenses: $10,000 – 35,000 Annually

Funding Sources: Potential funding sources include UNM Operating Budget, UNM Capital Improvement Plan, University bonds, UNM Building Renewal Replacement Funds, State appropriations and State Grants, Legislative Funds, Federal Construction Grants and other Appropriate Federal Grants (i.e., FEMA & Department of Education).

STAPLE+E Score: 37.625

Prioritization: 31

17. List and prioritize UNM properties that need structural mitigation for ADA compliance that can be affected by a natural disaster occurrence.

Comments: The UNM ADA Committee works with PPD and OCP to compile property rehabilitation projects based on ADA compliance issues. A comprehensive list needs to be made and continually reviewed and updated and ensure provisions are made for evacuations during natural disaster occurrences.

Hazards - Thunderstorms/hail/lightning, winter storms, wind/dust, extreme heat, tornado, flood, wildfire, and earthquake

Implementing Office / Department – UNM PPD and Gallup, Los Alamos, Taos, Valencia Branch Campuses and Sevilleta LTER Field Station.

Implementation Time Frame – Late Fall 2010

How Contributes to Strategy: Buildings lacking adequate ADA access should be reviewed and determined what changes or alterations must take place that enhance mobility.

Estimated Expenses: $45,000 - $90,000

Funding Sources: Potential funding sources include UNM Operating Budget, UNM Capital Improvement Plan, University bonds, UNM Building Renewal Replacement Funds, State appropriations and State Grants, Legislative Funds, Federal Construction Grants and other Appropriate Federal Grants (i.e., FEMA & Department of Education).

STAPLE+E Score: 37

Prioritization: 37

18. Fund and rehabilitate buildings to meet evacuation needs and ADA standards.

Comments: Once ADA issues are identified the rehabilitation or remodel projects need to be funded.

Hazards - Thunderstorms/hail/lightning, winter storms, high wind, extreme heat, tornado, flood, wildfire, and earthquake

Implementing Office / Department – UNM Main PCD, OCP, PPD

Implementation Time Frame – Beginning 2012 - Initiative is an ongoing effort

How Contributes to Strategy: Buildings lacking adequate ADA access should be reviewed and determined what changes or alterations must take place that enhance mobility in a natural disaster occurrence.

Estimated Expenses: Costs could be minimal or large depending on the assessment. ($5,000 to possible millions)

Funding Sources: Potential funding sources include UNM Operating Budget, UNM Capital Improvement Plan, University bonds, UNM Building Renewal Replacement Funds, State appropriations and State Grants, Legislative Funds, Federal Construction Grants and other Appropriate Federal Grants (i.e., FEMA & Department of Education).

STAPLE+E Score: 36.625

Prioritization: 40

19. Install a comprehensive communication system with secure access for natural disaster notification.

Comments: UNM runs periodic emergency response drills that are both designed to test alert systems and test effectiveness of procedures. The emergency plan needs to be adjusted to address discovered deficiencies as well as install identified communication mechanisms that enhance notification campus- and branch-wide.

Hazards - Thunderstorms/hail/lightning, winter storms, wind/dust, extreme heat, tornado, flood, Wildland/Urban Interface fires, earthquake and dam failure

Implementing Office / Department – UNM Main ADA Committee, OCP, PPD, PCD Gallup, Los Alamos, Taos, Valencia Branch Campuses and Sevilleta LTER Field Station.

Implementation Time Frame: 2011 **-** Ongoing

How Contributes to Strategy: In the event of a disaster, a reliable and secure communication system to notify affected parties is of paramount importance. The ability for university faculty, staff, students and visitors to receive local hazard warnings will allow them the opportunity to shelter from or avoid hazardous areas and conditions.

Estimated Expenses: $5,000 – $100,000

Funding Sources: Potential funding sources include UNM Operating Budget, UNM Capital Improvement Plan, University bonds, State appropriations and State Grants, Legislative Funds, and other Appropriate Federal Grants (i.e., FEMA & Department of Education).

STAPLE+E Score: 39.375
Prioritization: 17

20. Create University-wide Business Continuity (BC)/Disaster Recovery (DR) plan.

Comments: Some departments and business units have BC/DR plans. When a UNM-wide plan is drafted, these plans should be aligned with the overall UNM BC/DR plan to optimize these efforts given constrained resources. This activity should be the informing document for all other risk mitigation activities, so that the resources we expend in accomplishing the goals of the BC/DR plan are spent most wisely, and may be leveraged by other business, academic, and research areas, regardless of whether they have existing BC/DR plans or not.

Hazards - Thunderstorms/hail/lightning, winter storms, high wind, extreme heat, tornado, flood, wildfire, and earthquake

Implementing Office / Department - OEM and Gallup, Los Alamos, Taos, Valencia Branch Campuses and Sevilleta LTER Field Station.

Implementation Time Frame – Fall of 2010 and ongoing

How Contributes to Strategy: Planning is crucial in order to effectively recover and continue operations after a disaster. Coordination of all BC/DR plans is imperative to the development of a useful, realistic, and effective campus-wide plan, ensuring that inconsistencies and incompatibilities in existing plans are eliminated. Developing a consistent and comprehensive continuity and recovery plan contributes to disaster preparedness and reduces the number of residents at risk to natural hazards.

Estimated Expenses: $65,000 (1.0 FTE)

Funding Sources: Potential funding sources include UNM Operating Budget, State appropriations and State Grants, Legislative Funds, and other Appropriate Federal Grants (i.e., FEMA & Department of Education).

STAPLE+E Score: 37

Prioritization: 38

21. Identify important University information and assets (business and academic records, research, collections, exhibits, etc.).

Comments: Like the BC/DR plan, this is an informing activity for subsequent actions, and should be closely aligned with the BC/DR plan. Limited resources should be expended to protect information that is most valuable, and most at risk, as far as prioritizations go in the event of a natural hazard occurring. For example, if the funds to add a supplementary fire suppression system are greater than the funds to migrate to a digital records management system that fact must be taken into account so that we provide the best value to UNM, especially given the scarcity of such resources.

Hazards - Thunderstorms/hail/lightning, winter storms, high wind, extreme heat, tornado, flood, wildfire, and earthquake

Implementing Office / Department – HR at Main and Gallup, Los Alamos, Taos, Valencia Branch Campuses and Sevilleta LTER Field Station.

Implementation Time Frame – Winter of 2010 continuing 2011

How Contributes to Strategy: Business and Academic records, research data, collections, exhibits, etc. are the most valuable assets at the University, and protection of these assets in the event of a disaster is extremely important. Preservation of these must be a primary focus of disaster mitigation planning. Identification of information and assets and determining the best mitigation action reduces the number of vital records lost and aids in protecting important research and high value collections and exhibits should a natural hazard event occur.

Estimated Expenses: $25,000 (.5 FTE)

Funding Sources: Potential funding sources include UNM Operating Budget, UNM Capital Improvement Plan, University bonds, State appropriations and State Grants, Legislative Funds, and other Appropriate Federal Grants (i.e., FEMA & Department of Education).

STAPLE+E Score: 40.25

Prioritization: 9

22. Classify University information and assets in accordance with their importance and sensitivity, in accordance with the UNM data encryption standard where applicable.
Provide policies, standards, and guidelines, where appropriate to guide University activities as appropriate. Provide routine training for UNM employees and affiliates who have access to sensitive information regarding the appropriate care and stewardship of that information.

Comments: This is another activity that will help inform the expenditure of resources for activities that mitigate natural disaster risks to UNM information assets. Aspects of this activity can take place with current infrastructure and resources (e.g., training materials could be put onto Learning Central or WebCT; some of these can be made mandatory prior to access to particularly sensitive kinds of information, etc.).

Hazards - Thunderstorms/hail/lightning, winter storms, high wind, extreme heat, tornado, flood, wildfire, and earthquake

Implementing Office / Department - HR at Main and Gallup, Los Alamos, Taos, Valencia Branch Campuses and Sevilleta LTER Field Station.

Implementation Time Frame - Winter of 2010 continuing 2012

How Contributes to Strategy: Identification of information and assets and determining the best mitigation action reduces the number of vital records lost and aids in protecting important research and high value collections and exhibits should a natural hazard event occur.

Estimated Expenses: $0

Funding Sources: Potential funding sources include UNM Operating Budget, UNM Capital Improvement Plan, State appropriations and State Grants, Legislative Funds, and other Appropriate Federal Grants (i.e., FEMA & Department of Education).

STAPLE+E Score: 41.5

Prioritization: 2

23. Label sensitive University information per the UNM data encryption standard.

Comments: This activity is covered by the UNM Data Encryption Standard, and is published on the CIO's web site on the standards page.

Hazards - Thunderstorms/hail/lightning, winter storms, high wind, extreme heat, tornado, flood, wildfire, and earthquake

Implementing Office / Department - ITS with support from all Departments and Gallup, Los Alamos, Taos, Valencia Branch Campuses and Sevilleta LTER Field Station.

Implementation Time Frame – Winter of 2010 continuing into 2012.

How Contributes to Strategy: Encryption of sensitive data is extremely important and must be a primary concern during planning. Maintaining continuity with UNM standards and supports mitigation of vital records in the event of a natural disaster.

Estimated Expenses: $0

Funding Sources: Potential funding sources include UNM Operating Budget, UNM Capital Improvement Plan, University bonds, State appropriations and State Grants, Legislative Funds and other Appropriate Federal Grants (i.e., FEMA & Department of Education).

STAPLE+E Score: 37

Prioritization: 38

24. Evaluate current protections of information and assets to determine where to apply protections to the most sensitive and most vulnerable assets should UNM be hit by a natural disaster. For UNM's most sensitive and important systems, particularly those related to the ERP, hot sites, off site back-up locations, and other Business Continuity and Continuity of Operations strategies should be implemented in accordance with the UNM BC/DR plan.

Comments: This is another core activity, yet it depends upon the work accomplished in previous actions of this goal. In general, given the scarcity of resources, they should be expended such that the greatest protections are provided to the most sensitive information. Some of these options are quite costly, yet necessary; they should be directly aligned in support of the UNM BC/DR plan.

Hazards - Thunderstorms/hail/lightning, winter storms, high wind, extreme heat, tornado, flood, wildfire, and earthquake

Implementing Office / Department – ITS/HR/OEM with support from all departments and Gallup, Los Alamos, Taos, Valencia Branch Campuses and Sevilleta LTER Field Station.

Implementation Time Frame - Winter of 2010 continuing into 2012.

How Contributes to Strategy: Recognizing the need to identify those sensitive and vulnerable assets and determine the best methods to protect from loss or damage due to a natural hazard.

Estimated Expenses: $0

Funding Sources: Potential funding sources include UNM Operating Budget, UNM Capital Improvement Plan, University bonds, State appropriations and State Grants, Legislative Funds, and other Appropriate Federal Grants (i.e., FEMA & Department of Education).

STAPLE+E Score: 38.25

Prioritization: 25

25. Migrate to a digital record creation and management system that ensures all important documents are consistently stored and secure in the event of a natural hazard event.

Comments: This activity has been proposed out of HR. UNM owns two electronic document imaging systems, Xtender and Hershey. A decision on what product and / or strategy is best for UNM must take place before this project can be moved forward. Moreover, UNM's Enterprise Resource Planning (ERP) product suite, Banner, must be upgraded to version 8 before this project can be considered as a priority. Migrating will ensure all data is controlled and protected should the university experience a natural hazard event.

Hazards - Thunderstorms/hail/lightning, winter storms, high wind, extreme heat, tornado, flood, wildfire, and earthquake

Implementing Office / Department – ITS / HR and Gallup, Los Alamos, Taos, Valencia Branch Campuses and Sevilleta LTER Field Station.

Implementation Time Frame - Winter of 2010 continuing into 2012

How Contributes to Strategy: In the event of a disaster, electronic document storage is the most reliable means for data storage and recovery. Migration of hard copy records to digital records is an important step to effective disaster mitigation. Recognizing the need to identify those sensitive and vulnerable assets and determine the best methods to protect from loss or damage supports the mitigation of valuable UNM property during a natural hazard event.

Estimated Expenses: $2,500,000 (5.0 FTE for 5 years)

Funding Sources: Potential funding sources include UNM Operating Budget, UNM Capital Improvement Plan, University bonds, State appropriations and State Grants, Legislative Funds, and other Appropriate Federal Grants (i.e., FEMA & Department of Education).

STAPLE+E Score: 36.375

Prioritization: 42

26. Wildfire Mitigation Measures – Automatic Fire Suppression Systems throughout the facilities at the Sevilleta LTER Field Station

Comments: Automatic fire suppression systems will help extinguish fires in their infancy and reduce the likelihood of large fires.

Hazards – Wildfire/Urban Interface Fires

Implementing Office / Department – UNM Main Physical Plant Department, Sevilleta LTER Field Station

Implementation Time Frame – Spring 2011**;** 1- 5 years

How Contributes to Strategy: Reduces property damage, loss of life, injuries, business interruption and loss of valuable equipment used in experiments not to mention the experiments themselves.

Estimated Expenses: $25,000 - $75,000

Funding Sources: Potential funding sources include UNM Operating Budget, UNM Capital Improvement Plan, University bonds, State appropriations and State Grants, Legislative Funds, and other Appropriate Federal Grants (i.e., FEMA & Department of Education).

STAPLE+E Score: 38

Prioritization: 27

27. Adopt a back-up and archive strategy that addresses UNM's need to manage academic, business, research, and collection activities that safeguard vital records should UNM experience a natural hazard event. This strategy must also address regulatory compliance and UNM business issues such as e-Discovery, data retention, and IPRA issues. Provide routine training for UNM employees and affiliates who conduct or oversee such activities with regard to back-up strategies and regulatory requirements for the information and assets entrusted to UNM, and necessary for UNM to continue conducting its business.

Comments: UNM must explore an enterprise wide back-up service for critical data that is not stored in other enterprise systems (digital collections, research data, etc.). UNM owns the IBM Tivoli backup product. It should be determined whether this product would fill the needs of those non-ERP systems mentioned above. This system will enhance UNM's ability to safeguard vital records should a natural hazard occur.

Hazards - Thunderstorms/hail/lightning, winter storms, high wind, extreme heat, tornado, flood, wildfire, and earthquake

Implementing Office / Department – HR/ITS/OEM and support from all Departments and Gallup, Los Alamos, Taos, Valencia Branch Campuses and Sevilleta LTER Field Station.

Implementation Time Frame - Spring of 2011 continuing into 2012

How Contributes to Strategy: Off-site, redundant digital backups of records are essential to effective disaster recovery and business continuity. Recognizing the need to identify those sensitive and vulnerable assets and determine the best methods to protect from loss or damage supports the mitigation of valuable UNM property.

Estimated Expenses: $500,000

Funding Sources: Potential funding sources include UNM Operating Budget, UNM Capital Improvement Plan, University bonds, State appropriations and State Grants, Legislative Funds, and other Appropriate Federal Grants (i.e., FEMA & Department of Education).

STAPLE+E Score: 39.625

Prioritization: 14

28. Hold annual meetings with the Mitigation Planning Committee, OCP, PPD, and PCD to revise and update mitigation standards for new construction as needed.

Comments: UNM adheres to fire codes and building codes and is inspected by the Construction Industries Division. Many of the concerns addressed in the initial draft list of mitigation measures are addressed in Building Code standards that construct to prevent loss due to hazards. However the Mitigation team wanted to address additional UNM specific hazards and this proposed the venue to do so.

Hazards - Thunderstorms/hail/lightning, winter Storms, high wind, extreme heat, tornado, flood, wildfire, and earthquake

Implementing Office / Department - Mitigation Planning Committee

Implementation Time Frame - 2011-2012 with annual updates

How Contributes to Strategy: Dissemination of up to date information is essential. Routine communication of all relevant and responsible parties required to maintain effective disaster mitigation. The Pre-Disaster Mitigation Advisory Committee Mitigation would serve as the lead on mitigation strategy and would make policy recommendations in order to create a safer environment for university staff, faculty, students and visitors.

Estimated Expenses: $75,000 – $150,000

Funding Sources: Potential funding sources include UNM Operating Budget, UNM Capital Improvement Plan, University bonds, State appropriations and State Grants, Legislative Funds, and other Appropriate Federal Grants (i.e., FEMA & Department of Education).

STAPLE+E Score: 37.75

Prioritization: 30

29. Develop a list of UNM assets that are vulnerable to fire hazards including fires caused by damage to natural and propane gas lines and prioritize the list from most vulnerable to fire to minor vulnerability.

Comments: Natural hazards such as seismic events, high winds, winter storms, tornados may damage gas lines causing gas leaks which can then cause secondary damage by fire. UNM has properties all over the state that have not addressed protecting the gas lines from exposure. These need to be identified.

Hazards - Thunderstorms/hail/lightning, winter storms, high wind, extreme heat, tornado, flood, wildfire, and earthquake

Implementing Office / Department – PPD and Gallup, Los Alamos, Taos, Valencia Branch Campuses and Sevilleta LTER Field Station.

Implementation Time Frame - 2011-2012 and ongoing

How Contributes to Strategy: Identification of assets that are vulnerable to specific disasters is necessary to effective pre-disaster mitigation. This action will focus on identifying those assets most vulnerable to fires and retrofitting these facilities will assure their operation during an earthquake event, and will lead to fewer injuries of those critical employees.

Estimated Expenses: $0

Funding Sources: Potential funding sources include UNM Operating Budget, UNM Capital Improvement Plan, University bonds, UNM Building Renewal Replacement Funds, State appropriations and State Grants, Legislative Funds, Federal Construction Grants and other Appropriate Federal Grants (i.e., FEMA & Department of Education).

STAPLE+E Score: 38.5

Prioritization: 21

30. Install seismic gas shut-off valves on University buildings with natural gas and propane connections that are determined “most vulnerable”.

Comments: UNM currently has installed gas shut off valves to protect building from gas leakage in the event that a natural disaster harms the gas lines that would cause fire, explosion, or human exposure. Not all structures are protected with these in particular our rural assets or offsites that are connected to propane.

Hazards - Earth quake, high winds, winter storms, tornados

Implementing Office / Department - PPD and Gallup, Los Alamos, Taos, Valencia Branch Campuses and Sevilleta LTER Field Station.

Implementation Time Frame - initiate 2011 completion 2013

How Contributes to Strategy: Identifying those buildings and installing the appropriate shut-off valves assure their operation during an earthquake event, and will lead to fewer injuries of those critical employees.

Estimated Expenses: $75,000 - $350,000

Funding Sources: Potential funding sources include UNM Operating Budget, UNM Capital Improvement Plan, University bonds, UNM Building Renewal Replacement Funds, State appropriations and State Grants, Legislative Funds, Federal Construction Grants and other Appropriate Federal Grants (i.e., FEMA & Department of Education).
STAPLE+E Score: 38.375

Prioritization: 23

31. Create a database that tracks maintenance and prioritized structural needs for compliance with the State Fire Code.

Comments: The State Fire Marshal works with the University to identify compliance issues. The University needs to track these issues along with the mitigation of issues so we can make timely and appropriate repairs to prevent fire damages.

Hazards - Thunderstorms/hail/lightning, winter Storms, high wind, extreme heat, tornado, flood, wildfire, and earthquake

Implementing Office / Department – PPD and Gallup, Los Alamos, Taos, Valencia Branch Campuses and Sevilleta LTER Field Station.

Implementation Time Frame – Summer 2011

How Contributes to Strategy: Tracking events will identify those buildings that are prone to numerous problems. Trends provide the university with data in which to develop mitigation actions to enhance the structure and will lead to fewer injuries of those critical employees and students.

Estimated Expenses: $0

Funding Sources: Potential funding sources include UNM Operating Budget, UNM Capital Improvement Plan, University bonds, UNM Building Renewal Replacement Funds, State appropriations and State Grants, Legislative Funds, Federal Construction Grants and other Appropriate Federal Grants (i.e., FEMA & Department of Education).

STAPLE+E Score: 37.875

Prioritization: 29

32. Repair, rehabilitate, and or replace campus buildings to meet State fire code requirements based on prioritized maintenance and capital projects needs

Comments: Once compliance issues are identified they can be prioritized based on risk then placed on funding and maintenance schedules for repair and mitigation.

Hazards - earthquake, tornado, high wind, flood, winter storm

Implementing Office / Department – UNM Main PPD, OCP, PDMAC, PCD

Implementation Time Frame: 2011 - Ongoing

How Contributes to Strategy: Enhances the integrity of university buildings and will lead to fewer injuries to faculty, staff, students and visitors.

Estimated Expenses: $50,000 - $300,000

Funding Sources: Potential funding sources include UNM Operating Budget, UNM Capital Improvement Plan, University bonds, UNM Building Renewal Replacement Funds, State appropriations and State Grants, Legislative Funds, Federal Construction Grants and other Appropriate Federal Grants (i.e., FEMA & Department of Education).

STAPLE+E Score: 40.875

Prioritization: 6

33. Develop a mechanism to track natural hazard damage to determine trends and assess enhanced development on future projects

Comments: A database (mechanism) to track all labor and material associated with natural disasters will help identify cost associated due to damage. This effort will be accomplished through The Maintenance Authority (TMA) which is a computerized maintenance management system (CMMS). It is software/database that creates and tracks work orders. This is also the way we track all costs associated with an insurance claim. By setting up each occurrence as a project we will be able easily and accurately report all costs associated with a disaster. There is no implementation cost, just a procedural change.

Hazards – Thunderstorm/hail/lightning, tornado, wind storm, flood, winter storm

Implementing Office / Department – UNM Main PPD and Gallup, Los Alamos, Taos, Valencia Branch Campuses and Sevilleta LTER Field Station.

Implementation Time Frame – Summer 2011

How Contributes to Strategy: The tracking of damage and determination of trends is useful to future disaster mitigation planning. The information obtained after a natural disaster is particularly useful the mitigation of and BC/DR following a disaster. This action enhances the integrity of future university buildings and will lead to fewer injuries to faculty, staff, students and visitors.

Estimated Expenses: $10,000

Funding Sources: Potential funding sources include UNM Operating Budget, UNM Capital Improvement Plan, State appropriations and State Grants, Legislative Funds, and other Appropriate Federal Grants (i.e., FEMA & Department of Education).
STAPLE+E Score: 36.625

Prioritization: 41

34. Reduce fuel loads and create perimeter fire protection around all University facilities that are located in rural areas across New Mexico.

Comments: Recognizing the potential sources that lead to fires and removing will support a fire free campus. Reducing those fuel loads within and around UNM Main and Branch Campuses enhances the safety of students, faculty and visitors plus alleviates the loss of critical and educational facilities.

Hazards – Wildland/Urban Interface Fires, Lightning

Implementation: UNM Gallup, Los Alamos, Taos, Valencia Branch Campuses and Sevilleta LTER Field Station and offsite locations allocated departments and UNM Main PPD.

Time Frame: Ongoing with updates to fire safety and review of campus infrastructure

How Contributes to Strategy: Look into integrating the State's Firewise program into UNM programs. Firewise is a program designed to involve homeowners, local leaders, developers and others in the effort to protect people property and natural resources from wildfires, by building and maintaining communities that are compatible to local environments. Our goal is to increase faculty, staff, students and visitors awareness from potential hazards caused by wildfire and lightning induced natural hazards.

Estimated Expenses: $45,000 – $150,000

Funding Sources: Potential funding sources include UNM Operating Budget, UNM Capital Improvement Plan, University bonds, State appropriations and State Grants, Legislative Funds, and other Appropriate Federal Grants (i.e., FEMA & Department of Education).

STAPLE+E Score: 38.25

Prioritization: 26

35. Provide adequate backup power systems to protect all critical University services and functions including voice, data and electricity.

Comments: Power outages can cause critical operations including patient and student care, research security, evacuation and campus wide security from functioning. Backup systems needs to be evaluated, maintained installed and renewed to assure that UNM maintains critical services in the event of a natural disaster. UNM recognizes that this is a non-fundable action item but is an important mitigation action that must not go unrecognized.

Hazards - Thunderstorms/hail/lightning, winter storms, high wind, extreme heat, tornado, flood, wildfire, and earthquake

Implementing Office / Department – University of New Mexico Hospital (UNMH), HSC, IT, PPD, research facilities and Gallup, Los Alamos, Taos, Valencia Branch Campuses.

Implementation Time Frame - evaluation 2014 with continuing updates and installation

How Contributes to Strategy: In the event of a disaster, backup power is of extreme importance to dealing with the disaster and effective implementation of BC/DR plans. UNM is involved with and conducts thousands of experiments and research initiatives, many aimed at enhancing the quality of life due to illness and disease. Having knowledge that our current backup power systems will continue during a natural hazard event is extremely critical.

Estimated Expenses: $3,000,000 (For ITS Only)

Funding Sources: Potential funding sources include UNM Operating Budget, UNM Capital Improvement Plan, University bonds, UNM Building Renewal Replacement Funds, State appropriations and State Grants, Legislative Funds, Federal Construction Grants and other Appropriate Federal Grants

STAPLE+E Score: 41

Prioritization: 5

36. Reduce Vulnerabilities of Main and Branch Campus Buildings and Utilities from severe weather - Reduce Impacts to Buildings from Trees and Landscaping

Comments: Conduct a landscape inventory for main and branch campuses to evaluate potential vulnerabilities. Develop standards for tree and landscape maintenance.

Hazards - Thunderstorms/hail/lightning, Winter Storms, high wind, extreme heat, tornado, flood, wildfire, and earthquake

Implementing Office / Department - Physical Plant Department, Risk Management and Facilities Planning and Branch Campuses

Implementation Time Frame - 1- 3 years (Implementation should begin in Spring 2011 and continue as funding allows)

How Contributes to Strategy: Reduces injury and loss associated with window damage and reduces impacts from power outages. Also will server to protect telephone and internet infrastructure on UNM Main and Gallup, Los Alamos, Taos, Valencia Branch Campuses and Sevietta LTER.

Estimated Expenses: $15,000 - $45,000

Funding Sources: Potential funding sources include UNM Operating Budget, UNM Capital Improvement Plan, University bonds, State appropriations and State Grants, Legislative Funds, and other Appropriate Federal Grants.

STAPLE+E Score: 40.75

Prioritization: 7

37. Construct two distinct points of entry for data and voice fiber entering all campus buildings

Comments: Redundant power and fiber and cable feeds to each structure on campus protects each building from outages caused by natural hazards if one line is damaged then the 2nd continues to provide service allowing the buildings to continue to function.
Resiliency: UNM provides critical information technologies services including voice, data and security systems which are in several cases supported by single point of presence or fiber connections to critical building and infrastructure servers. ITS requires redundancy and resiliency to avert interruption of critical services due to natural disaster. UNM recognizes that this is a non-fundable action item but is an important mitigation action that must not go unrecognized.

Hazards - Thunderstorms/hail/lightning, winter storms, high wind, extreme heat, tornado, flood, wildfire, and earthquake

Implementing Office / Department –IT, OCP and PPD and Gallup, Los Alamos, Taos, Valencia Branch Campuses and Sevilleta LTER Field Station.

Implementation Time Frame – Installation commences winter 2010 with initial redevelopment completing in phases trough 2020. New Construction projects budget for ongoing implementation.

How Contributes to Strategy: Maintaining data and voice connectivity in event of a disaster is of paramount importance to effective disaster management. Continuing UNM's education and research initiatives and mitigating the effects from a natural hazard event supports eliminates the potential for catastrophic failure and will preserve life and property.

Estimated Expenses: $60,000,000

Funding Sources: Potential funding sources include UNM Operating Budget, UNM Capital Improvement Plan, University bonds, State appropriations and State Grants, Legislative Funds, and other Appropriate Federal Grants

STAPLE+E Score: 41.25

Prioritization: 3

38. Place all above ground power and IT fiber lines underground.

Comments: UNM Albuquerque campus has a series of utility tunnels that are aging and need repair and up keep. Above ground cable, fiber and power lines are also aging and need repair and or replacement to prevent damages due to natural hazards and subsequent power and data outages effecting critical services. Both above ground and tunnel utilities are vulnerable to natural hazards if the infrastructure that holds them does not properly address and mitigate potential damage. UNM recognizes that this is a non-fundable action item but is an important mitigation action that must not go unrecognized.

Hazards - Thunderstorms/hail/lightning, winter storms, high wind, extreme heat, tornado, flood, wildfire, and earthquake.

Implementing Office / Department – UNM Main IT and PPD

Implementation Time Frame – Fall 2010 - Ongoing

How Contributes to Strategy: Enhances the integrity of power and IT resources by removing them from potential hazardous locations making them less vulnerable to natural hazard events. Underground lines are less susceptible to natural disaster, thus an effective pre-disaster mitigation technique.

Estimated Expenses: $1,300,000

Funding Sources: Potential funding sources include UNM Operating Budget, UNM Capital Improvement Plan, University bonds, State appropriations and State Grants, Legislative Funds, and other Appropriate Federal Grants.

STAPLE+E Score: 39.875

Prioritization: 11

39. Install a University-wide centralized, monitored, and secure alarm and disbursed notification system to protect critical building systems including HVAC, surveillance, and access in all critical health, research, utility and information technologies facilities from natural hazard occurrences.

Comments: Alarm and notification systems; are installed for security, safety and to protect critical infrastructure from damage including natural disasters, flooding, fire, For Example a breach of the roof or building due to storms would cause a notification system to alert key systems operators and maintenance staff to prevent or contain damage to the fiber, computer, electrical, cooling and heating systems that would have adverse effects on operations, research, research animals and people. UNM currently has several different security systems installed in faculties to protect property, research, operating systems (data, voice, water, power chilled water, fire protection, safety etc) these systems while having different functions provide similar early and warning alert notifications. Centralizing the systems will make them both cost efficient and more effective providing wider protection in the event of a natural hazard.

Hazards - Severe weather (thunderstorms/hail/lightning), winter storms, high wind, extreme heat, tornado, flood, wildfire, and earthquake

Implementing Office / Department – UNM Main PPD, IT, Campus police, HSC.

Implementation Time Frame – Initiated planning 2010 completed plan 2011 with installation of systems tentatively scheduled for 2012-2013**.**

How Contributes to Strategy: Implementing a monitoring device will reduce the likelihood of these resources to being destroyed by a natural hazard

Estimated Expenses: $3,000,000

Funding Sources: Potential funding sources include UNM Operating Budget, UNM Capital Improvement Plan, University bonds, State appropriations and State Grants, Legislative Funds, and other Appropriate Federal Grants (i.e., FEMA & Department of Education).

STAPLE+E Score: 44.625

Prioritization: 1

40. Emergency Management Mitigation Measures in response to a natural hazard – Evaluate Evacuation and Shelter-in-Place Planning and Conduct Evacuation Training and Drills

Comments: As with most universities that have student and family housing on campus one of the most difficult issues facing UNM and branch campuses with housing facilities is during an emergency is whether to have residence evacuate or shelter in place. Because most experts believe we may only have a limited warning time in the event of an emergency, we are uncertain that we will have enough time to evacuate residence to a safer location. Methods for doing this could include evacuation modeling from a consultant and/or conducting training and a live exercise to time an evacuation. It is not known whether traffic would become delayed as everyone tried to leave the parking lots at once or whether there would be an orderly exit. Also, due to the short warning time, we would not be able to provide buses to move people from the area in time.

Hazards – Thunderstorms/hail/lightning, winter storms, high wind, extreme heat, tornado, flood, Wildland/Urban Interface Fires, earthquake, drought, and dam failure

Implementing Office / Department – Emergency Manager, Student Services and Multiple Gallup, Los Alamos, Taos, Valencia Branch Campuses and Sevilleta LTER Field Station.

Implementation Time Frame – Fall 2010, on-going

How Contributes to Strategy: Reduces loss of life and injuries

Estimated Expenses: $15,000 – $25,000 for an assessment study

Funding Sources: Potential funding sources include UNM Operating Budget, UNM Capital Improvement Plan, University bonds, UNM Building Renewal Replacement Funds, State appropriations and State Grants, Legislative Funds, Federal Construction Grants and other Appropriate Federal Grants (i.e., FEMA & Department of Education).

STAPLE+E Score: 40.625

Prioritization: 8

41. Construct and provide temporary collocation white floor data space funding for UNM ITS Disaster Recovery and critical research data.

Comments: UNM has a current Disaster Recovery and Consistent Services plan for its critical Information technologies services including voice, data, and security systems to all our campuses, critical research centers, Hospital and Health Sciences clinics. The centralized systems are at risk of failure due to natural disasters because UNM lacks a Disaster Recovery site with appropriate white floor data space that would backup and preserve critical systems.

Hazards - Thunderstorms/hail/lightning, winter storms, high wind, extreme heat, tornado, flood, wildfire, and earthquake

Implementing Office / Department – UNM Main PPD, IT, OCP and Gallup, Los Alamos, Taos, Valencia Branch Campuses and Sevilleta LTER Field Station.

Implementation Time Frame- Seek funding and partnerships 2009-2011

How Contributes to Strategy: Developing a disaster recovery plan campus-wide will support the preservation of life and property. A disaster recovery site for backup systems storing critical assets is a necessity for seamless BC and DR.

Estimated Expenses: Construction $300,000 – $800,000; maintenance $192,000/year for the facility.

Funding Sources: Potential funding sources include UNM Operating Budget, UNM Capital Improvement Plan, University bonds, UNM Building Renewal Replacement

Funds, State appropriations and State Grants, Legislative Funds, Federal Construction Grants and other Appropriate Federal Grants (i.e., FEMA & Department of Education).

STAPLE+E Score: 39.5

Prioritization: 16

42. Identify and Prioritize Potential Stormwater Drainage Projects

Comments: UNM Main and Branch campuses need to be studied to identify and prioritize potential stormwater projects. Often surface runoff is either conveyed along streets or other natural topographic features or intercepted by irrigation ditches. According to facilities management personnel, tunnel systems were frequently flooded. Over the years, minor systems were constructed to alleviate surface flooding, but these systems were constructed on an “as needed basis”, without consideration for future development. As a result, it is difficult to determine what areas of campus have adequate stormwater infrastructure and what areas are deficient. In order to determine the status of the existing stormwater infrastructure, the University’s Main and Branch campuses need to evaluate the stormwater drainage systems to identify deficiencies, develop solutions and prioritize potential projects.

Hazards - Thunderstorms/hail/lightning, winter storms, and flood

Implementing Office / Department - Physical Plant Department, IT, OCP, PCD, Engineering, (Finance, Regents are involved in the capital planning process) and Gallup, Los Alamos, Taos, Valencia Branch Campuses and Sevilleta LTER Field Station.

Implementation Time Frame - 1- 3 years (Implementation should begin in Spring 2011 and continue as funding allows)

How Contributes to Strategy: Reduces property damage, loss of life, injuries, business interruption. It is recommended that the projects identified be implemented in order to reduce flood damage associated with localized stormwater drainage and to improve the capacity and effectiveness of the stormwater drainage system for both existing facilities and for new development on main and branch campuses

Estimated Expenses: $25,000 - $75,000

Funding Sources: Potential funding sources include UNM Operating Budget, UNM Capital Improvement Plan, University bonds, UNM Building Renewal Replacement Funds, State appropriations and State Grants, Legislative Funds, Federal Construction Grants and other Appropriate Federal Grants (i.e., FEMA & Department of Education).UNM, PDM, HMGP, FMA

STAPLE+E Score: 38.375

Prioritization: 24

43. Review current generator campus-wide and determine adequacy of current numbers and determine additional generator requirements based on priority to enhance emergency preparedness for a natural disaster event.

Comments: Emergency generators are used solely for the purpose of meeting our life safety requirements in buildings. Life safety usually only addresses safely evacuating building occupants during an emergency. Typically they only power selected area lighting and exit lights. Stand-by generators are used to provide power to critical pieces of equipment, i.e. telephone switches, IT equipment, freezers, etc. That may also pick-up the life safety load of a building. Over the years UNM has not had a master plan for the installation of generators or a standard of what equipment needs to be powered during an emergency. We also have no records of exactly what each generator provides power to. We do know that we are in compliance with all of the life safety requirements for evacuation of buildings. We either have exit and emergency lights that are backed-up with a generator or have their own integral battery back-up.

UNM's first step should be to complete a thorough survey of what our existing generators are providing power to and what capacity is still available on each generator. The next step should be survey each building to determine if stand-by power is required, where it is required and how much will be required. The consultant should also assist the university in the prioritization of generator installations. Once that information is available cost estimates for new installations and/or expansion of existing emergency power systems can be prepared.

An example of where there may be a need to expand emergency power is Hokona Hall West. The building has a stand-by generator that provides power to critical UNM Police equipment, but does not provide power to the EOC that is located in Hokona Hall. Recommend that the university hires a consultant to perform a thorough evaluation of what we have and what we need. Estimated cost for a consultant to perform a study and report back their findings in the $200,000 range.

Hazards - Thunderstorms/hail/lightning, winter storms, high wind, extreme heat, tornado, flood, wildfire, and earthquake

Implementing Office / Department – PPD and Gallup, Los Alamos, Taos, Valencia Branch Campuses and Sevilleta LTER Field Station.

Implementation Time Frame: Seek funding and conduct study Spring 2011-2012
How Contributes to Strategy: Recognizing that generators are not a PDM funding opportunity, identifying current capabilities, and those facilities that conduct high-value research, enhances the preservation of life and property. Because of the importance, the UNM PDMAC determined it was important to include as a mitigation strategy.

Estimated Expenses: $500,000 - $800,000 (including study and report)

Funding Sources: Potential funding sources include UNM Operating Budget, UNM Capital Improvement Plan, University bonds, State appropriations and State Grants, Legislative Funds, and other Appropriate Federal Grants.

STAPLE+E Score: 41.125

Prioritization: 4

44. Work with City of Albuquerque Public Works and Water Authority to enhance water distribution between the UNM campus and local jurisdiction.

Comments: UNM has its own water wells, reservoirs and distribution system for the main and north campuses. The system is connected to the City of Albuquerque's water system in two different locations. If for any reason the UNM's water system fails during a natural hazard event, the city can provide water to our system through these connections.

Hazards - Thunderstorms/hail/lightning, winter storms, high wind, extreme heat, drought, tornado, flood, wildfire, and earthquake

Implementing Office / Department – UNM Main PPD

Implementation Time Frame – Develop discussions with stakeholders starting in late 2009. Once started, timelines will be updated accordingly.

How Contributes to Strategy: In the event of a disaster, access to water is extremely important. If a disaster renders UNM's water system fails, it is critical that we have alternative methods of providing water to facilities. Working with local jurisdiction to establish and share water resources enhances the preservation of life and property for both UNM and our local partner during natural hazard events

Estimated Expenses: $800,000 – $2,500,000

Funding Sources: Potential funding sources include UNM Operating Budget, UNM Capital Improvement Plan, University bonds, UNM Building Renewal Replacement Funds, State appropriations and State Grants, Legislative Funds, Federal Construction Grants and other Appropriate Federal Grants (i.e., FEMA & Department of Education).

STAPLE+E Score: 39.875

Prioritization: 12

45. Enhance electrical power distribution and prioritize requirements to ensure the integrity and operations of critical facilities.

Comments: The main and north campus receives its electrical power through two UNM owned electrical sub-stations that are connected to Public Service Company of New Mexico's (PNM) grid. UNM can also currently co-generate approximately one third of its power through a natural gas turbine. The utility plant is in the process of purchasing and installing a steam turbine. Once the steam turbine is on line we will be able to generate approximately 40% of our energy needs. UNM has an existing agreement to curtail the use of PNM's power when requested due to PNM's load or equipment failure. During these periods of curtailment UNM would satisfy its electrical power requirements by co-generating power. The current configuration requires manual switching in multiple locations by UNM and PNM. In order to automate the system to assure minimal periods without power and eliminate the possibility of human error UNM would need approximately of $18M.

The first step should be to prioritize what buildings would receive power if PNM's grid was to completely fail. Buildings that have a generator as back up should also be included on this list as a generator can fail. Redundant source of power is essential to continue successful operations.

Hazards - Thunderstorms/hail/lightning, winter storms, high wind, extreme heat, tornado, flood, wildfire, and earthquake

Implementing Office / Department – UNM Main PPD

Implementation Time Frame – Develop discussions with stakeholders starting in late 2009. Once started, timelines will be updated accordingly.

How Contributes to Strategy: This effort is a preventative measure. Ensuring the integrity of electrical power to critical facilities is essential to disaster management and BC/DR. Enhanced distribution and prioritization will enable better BC/DR in the event of a disaster. Working with local jurisdiction to establish and share electrical resources enhances the preservation of life and property for both UNM and our local partner.

Estimated Expenses: $18,000,000

Funding Sources: Potential funding sources include UNM Operating Budget, UNM Capital Improvement Plan, University bonds, State appropriations and State Grants, Legislative Funds, Federal Construction Grants and other Appropriate Federal Grants (i.e., FEMA & Department of Education).

STAPLE+E Score: 39.125

Prioritization: 19

46. Provide assistance to other jurisdictions to support their mitigation efforts in the community in mitigating the effects of natural hazards.

Comments: UNM has the capability to provide support in many areas to include GIS, Emergency Management, Public Safety and long term studies and reports. UNM can assist other jurisdictions and the state in mitigation studies, emergency management planning and initiatives and other needs as required. This effort will strengthen working relationships and enhance mitigation planning on natural disasters state-wide.

Hazards – Earthquake and flooding

Implementing Office / Department – UNM Main OEM, EDAC and Gallup, Los Alamos, Taos, Valencia Branch Campuses and Sevilleta LTER Field Station.

Implementation Time Frame: Spring 2011; ongoing and will be refined over the coming years in many areas.

How Contributes to Strategy: Education and training are essential to complete pre-disaster mitigation. UNM has a responsibility in fulfilling its public service mission to assist local jurisdictions and the state in mitigation studies, emergency management planning, etc. A well-educated and well-trained community surrounding UNM will lead to more effective pre-disaster mitigation. This action is a partnering initiative with other jurisdictions in assisting and participating with planning community mitigation efforts.

Estimated Expenses: $0

Funding Sources: Potential funding sources include UNM Operating Budget, UNM Capital Improvement Plan, University bonds, State appropriations and State Grants, Legislative Funds, and other Appropriate Federal Grants (i.e., FEMA & Department of Education).

STAPLE+E Score: 34.25

Prioritization: 46

47. Provide assistance to NMDHSEM with updating and enhancing the HAZUS-MH database for New Mexico

Comments: FEMA, under a cooperative agreement with the National Institute of Building Sciences (NIBS), has developed a standardized, nationally-applicable natural hazards loss estimation methodology. This methodology is implemented through PC-based geographic information systems (GIS) software called HAZUS-MH. HAZUS-MH applies a multi-hazard methodology, with models for estimating potential losses from earthquake, flood (riverine and coastal), and wind (hurricanes) hazards. The current database is only populated with data from the 2000 Census. That data does not provide adequate information when running studies. The NMDHSEM in their Hazard

Mitigation Plan 2007 identified this as an action to update but to date have not moved on this action. UNM has the opportunity to assist with this project which would enhance data for mitigation studies and provide not only the state and local jurisdictions with better information, but UNM will benefit as well, especially when updating the PDM in the future as required.

Hazards - earthquake, tornado, high wind, earthquake, drought, thunderstorms/lightning, and winter weather

Implementing Office / Department – UNM Main EDAC

Implementation Time Frame: Spring 2011. Time frame will be updated once meetings with NMDHSEM commence.

How Contributes to Strategy: HAZUS-MH is a tool that can forecast potential damages from hazard events. It can help local emergency managers to fully understand the vulnerability within the state, counties and individual jurisdictions. As identified in the New Mexico State Hazard Mitigation Plan, updating HAZUS-MH with the most updated and useful information is critical in mitigating the affects from flood or earthquake natural hazards. Estimates of potential loss are excellent tools to have when preparing pre-disaster mitigation plans and strategies. By assisting the NMDHSEM with updating and enhancing the HAZUS-MH database, UNM is positioning itself for improved pre-disaster mitigation, as well as contributing to the overall quality of the pre-disaster mitigation efforts of the entire state.

Estimated Expenses: $75,000 - $150,000

Funding Sources: FEMA

STAPLE+E Score: 33.5

Prioritization: 47

47. Develop an enforcement plan for implementing mandatory water rationing**.**

Comments: The University currently lacks an enforcement plan and capability should the need arise during drought or extreme heat conditions where mandatory water rationing is necessary to conserve water usage.

Hazards – Extreme Heat and Drought

Implementing Office / Department – UNM President, UNM Emergency Management, PPD, and Gallup, Los Alamos, Taos, Valencia Branch Campuses and Sevilleta LTER Field Station.

Implementation Time Frame: Fall 2011.

How Contributes to Strategy: Establishing requirements for developing a plan to enforce rationing of water during declared drought and extreme heat events will ensure rationing of critical resources.

Estimated Expenses: $10,000 - $15,000

Funding Sources: Potential funding sources include UNM Operating Budget, UNM Capital Improvement Plan, University bonds, State appropriations and State Grants, Legislative Funds, and other Appropriate Federal Grants (i.e., FEMA & Department of Education).

STAPLE+E Score: 33.0

Prioritization: 48

48. Install window film to control the amount of heat that enters the building to enhance indoor comfort during extreme heat declared conditions.

Comments: Controlling interior conditions during an extreme heat declared condition is important to reduce the amount of energy used, protect vital resources to include university experiments and research and enhance the inside environment for faculty, students, staff and visitors to the university and it's branch campuses.

Hazards – Extreme Heat

Implementing Office / Department – UNM President, UNM Emergency Management, PPD, and Gallup, Los Alamos, Taos, Valencia Branch Campuses and Sevilleta LTER Field Station.

Implementation Time Frame: Spring 2012.

How Contributes to Strategy: Installing window film on identified UNM buildings will enhance comfort inside buildings and decrease the amount of energy used during extreme heat conditions.

Estimated Expenses: $45,000 - $105,000

Funding Sources: Potential funding sources include UNM Operating Budget, UNM Capital Improvement Plan, University bonds, State appropriations and State Grants, Legislative Funds, and other Appropriate Federal Grants (i.e., FEMA & Department of Education).

STAPLE+E Score: 32.5

Prioritization: 49

49. Conduct natural hazard studies on each UNM campus to determine the overall risk to each location on landslide, land subsidence, and expansive soils.

Comments: Landslide, land subsidence, and expansive soils were initially identified as a natural hazard to UNM campus' but there is a data deficiency identified during initial mitigation plan development. Each UNM location will conduct a thorough review of their location and determine if these natural occurring hazards are in fact a risk. Locations need to identify risks, past occurrences and identify mitigation actions for implementation to reduce the risks.

Hazards – Landslide, land subsidence, and expansive soils

Implementing Office / Department – UNM President, UNM Emergency Management, PPD, and Gallup, Los Alamos, Taos, Valencia Branch Campuses and Sevilleta LTER Field Station.

Implementation Time Frame: Fall 2012.

How Contributes to Strategy: Conducting a thorough review of campus infrastructure will identify risks to resources, staff, students, faculty and visitors.

Estimated Expenses: $245,000 - $405,000

Funding Sources: Potential funding sources include UNM Operating Budget, UNM Capital Improvement Plan, University bonds, State appropriations and State Grants, Legislative Funds, and other Appropriate Federal Grants (i.e., FEMA & Department of Education).

STAPLE+E Score: 32.0

Prioritization: 50

50. Conduct a floodplain study to determine the extent of flooding and identify the risks associated from a flooding event at UNM Valencia Branch Campus.

Comments: The UNM Valencia Branch Campus is identified as residing in a flood prone area. Data is deficient on the overall risks to the campus infrastructure. Further review is required to identify those vulnerabilities and determine proactive mitigation actions to decrease or eliminate the risks from flooding. Efforts will include working with the local jurisdiction (Valencia County) who are currently going through a floodplain review.

Hazards – Flood

Implementing Office / Department – UNM President, UNM Emergency Management, PPD, Valencia Branch Campus.

Implementation Time Frame: Fall 2012.

How Contributes to Strategy: Conducting a thorough review of campus infrastructure will identify risks to resources, staff, students, faculty and visitors.

Estimated Expenses: $200,000 - $350,000

Funding Sources: Potential funding sources include UNM Operating Budget, UNM Capital Improvement Plan, University bonds, State appropriations and State Grants, Legislative Funds, and other Appropriate Federal Grants (i.e., FEMA & Department of Education).

STAPLE+E Score: 31.5

Prioritization: 51

51. Conduct a Dam Inundation study to determine the extent of flooding and identify the risks associated from a dam failure event at UNM Valencia Branch Campus.

Comments: The UNM Valencia Branch Campus is identified as residing in a flood prone area. North of the campus are three dams that in the event of a failure could cause extensive damage to the campus infrastructure. Data identified in the dam inundation plans are dated and do not describe the potential affects to Valencia County, or the campus. Further review is required to identify those vulnerabilities and determine proactive mitigation actions to decrease or eliminate the risks from flooding due to a dam failure. Efforts will include working with the local jurisdiction (Valencia County) and the Corps of Engineers.

Hazards – Dam Failure

Implementing Office / Department – UNM President, UNM Emergency Management, PPD, Valencia Branch Campus.

Implementation Time Frame: Summer 2012.

How Contributes to Strategy: Conducting a thorough review of campus infrastructure will identify risks to resources, staff, students, faculty and visitors.

Estimated Expenses: $150,000 - $350,000

Funding Sources: Potential funding sources include UNM Operating Budget, UNM Capital Improvement Plan, University bonds, State appropriations and State Grants, Legislative Funds, and other Appropriate Federal Grants (i.e., FEMA & Department of Education).

STAPLE+E Score: 31.0

Prioritization: 52

52. Conduct a volcanic activity to seismic activity to address the risks for updating the mitigation plan in the future

Comments: Due to the prolonged inactivity of the volcanic fields in New Mexico, it is believed that they are not likely to erupt in the foreseeable future. Studies of the fields center more around their formation and past events, rather than focusing on potential future events. Study needs to address the direct relation of volcanic activity to seismic activity is a priority.

Hazards – Volcano

Implementing Office / Department –UNM Emergency Management, EDAC, Los Alamos and Taos Branch Campus and Sevilleta LTER.

Implementation Time Frame: Spring 2012.

How Contributes to Strategy: Determine the risks to UNM campuses and determine strategies that will mitigate the effects in future updates and to implement across each campus.

Estimated Expenses: 40,000 - $90,000

Funding Sources: Potential funding sources include UNM Operating Budget, UNM Capital Improvement Plan, University bonds, State appropriations and State Grants, Legislative Funds, and other Appropriate Federal Grants (i.e., FEMA & Department of Education).

STAPLE+E Score: 30.5

Prioritization: 53

53. Conduct earthquake studies on all UNM campuses to determine past occurrences, risks for each area and determine critical infrastructure requiring enhanced for protection and determine those areas most vulnerable.

Comments: Earthquake data on UNM campuses is deficient. Further research is required to identify Identifying vulnerable populations and infrastructure will enhance each campus' ability to educate and prioritize enhancements that will decrease or eliminate damage and destruction.

Hazards – Earthquake

Implementing Office / Department –UNM Emergency Management, EDAC, and all UNM Branch Campuses Los Alamos and Sevilleta LTER.

Implementation Time Frame: Winter 2012.

How Contributes to Strategy: Determine the risks to UNM campuses and determine strategies that will mitigate the effects in future updates and to implement across each campus. Identifying vulnerable populations and infrastructure will enhance each campus' ability to educate and prioritize enhancements that will decrease or eliminate damage and destruction.

Estimated Expenses: 75,000 - $250,000

Funding Sources: Potential funding sources include UNM Operating Budget, UNM Capital Improvement Plan, University bonds, State appropriations and State Grants, Legislative Funds, and other Appropriate Federal Grants (i.e., FEMA & Department of Education).

STAPLE+E Score: 30.5

Prioritization: 53

(This page intentionally left blank)

CHAPTER 9 – COORDINATION OF UNM MITIGATION PLANNING

UNM Pre-Disaster Mitigation Plan Development

FEMA provides grant funding to the state for mitigation plans under two programs:

- Pre-Disaster Mitigation Grant Program. This funding is dependent upon a yearly appropriation from Congress. Once allocated and obligated, the funding is guaranteed, but future grant funding, while likely to occur, is not guaranteed
- Hazard Mitigation Grant Program. This program provides grants to States and local governments to implement long-term hazard mitigation measures after a major disaster declaration. The amount of funding available for the HMGP under a particular disaster declaration is limited. The program may provide a State with up to 15% of the total disaster grants awarded by FEMA. States that meet higher mitigation planning criteria may qualify for a higher percentage under the DMA 2000. New Mexico meets the standard requirements

In Federal Fiscal Year 07, FEMA, through NMDHSEM, provided $185,157 to UNM to fund the development of a university pre-disaster mitigation. The University of New Mexico is providing 25% of the funds or $61,719 for a total project of $246,876. In March 2007, the Emergency Manager and Co-PI attended a Mitigation Planning Workshop for Local Governments, G-318 conducted by the State Hazard Mitigation Officer, Preparedness Bureau, Department of Homeland Security and Emergency Management.

Technical Assistance

During the initial phases, UNM PDMT sought technical assistance and guidance from NMDHSEM. Assistance received included:

- <u>Training in Hazard Mitigation Plan Writing</u>. Training was presented in March 2007 by NMDHSEM SHMO. UNM attended to take full advantage of all training opportunities offered
- <u>Meeting Support</u>. UNM requested NMDHSEM staff to attend meetings that help support the PDM effort and reinforce the importance of mitigation planning across UNM. Additionally, NMDHSEM and FEMA Region VI representatives conducted a meet and greet to discuss UNM's PDM process and offer insight on project opportunities for consideration in adopting in the PDM draft plan
- <u>Meetings with contractors</u>. NMDHSEM SHMO on several occasions met with the UNM PDMT and the contractor to review various required plan elements. Additionally, the UNM PDMT and contractor conducted numerous technical assistance meetings and met one-on-one with various UNM departments to discuss PDM development

Reviewing and Coordinating UNM Plans with Local and State Plans

DMA 2000 criteria stipulate that local hazard mitigation plans must reflect the mitigation priorities of the State Hazard Mitigation Plan. The SHMO provided a copy to the UNM PDMT to serve as a guide for UNM Mitigation Planners. DMA 2000 requirements suggest the yearly update of local plans, and the mitigation priorities of future local plan editions must agree with those of the new State Hazard Mitigation Plan, although local priorities take precedence. The UNM PDM Plan must consider and evaluate all of the principal hazards identified in the state plan as they apply to UNM Main and Branch Campuses. Hazards not considered a problem at UNM have been acknowledge and justified as required by DMA 2000. As deemed appropriate, additional hazards may be added, as agreed by the PDMAC.

The UNM PDMT reviews the UNM PDM Plan using the Local Plan Crosswalk, dated July 2008, as provided by FEMA. The PDM Plan is reviewed for completeness, and if any deficiencies are noted, the information missing or incomplete is identified for further information. The Crosswalk review is very detailed, and the target for UNM to complete a Crosswalk is 30 days from the date of receipt. The PDMT is responsible for guiding the local plans to a satisfactory review. Ideally, the PDMT should be involved with the UNM plans from their inception. In order to maintain the UNM PDM plan, the PDMT will present any applicable sections from local plans, to the PDMAC, in future meetings.

Linking Local and State Mitigation Plans

During the review and update of the UNM PDM Plan, every effort was made to incorporate information from local mitigation plans where UNM Main and Branch Campuses are located. The PDMT and contractor reviewed each local plan and selected portions of data applicable for incorporation into the UNM plan. In addition, the PDMT will work with the local planners to link their plans to the UNM PDM Plan. It is the goal of UNM and the PDMAC for local planners to use UNM's Plan as a guide when creating their local plans. Every effort has been made to include additional information in the UNM plan for this very purpose.

Linking UNM PDM Plan with other UNM Planning Documents

Upon approval of the UNM PDM Plan, the document will be made available across UNM Main and Branch Campuses for each location to begin enhancing awareness of natural hazards that can affect people and resources. The PDM Plan will be incorporated into the UNM Master Plan, UNM Safety and Risk Services plans and guidance, Office of Emergency Management plans and as part of the UNM Operating Budget process.

Most important, this plan and the strategies outlined in Section 8 of this document will serve as a guide to reduce or eliminate long-term risk to human life and property from natural hazards and strengthen preparedness throughout UNM Campuses. Additionally, incorporating this PDM document within as many UNM planning processes will only increase the value of this plan and provide additional strategies and opportunities for a more disaster resilient university. The UNM PDM plan and strategies will be incorporated into the following processes:

- Incorporate into the Office of Emergency Management to support Emergency Operations Plans, aid in disaster planning and serve as a guide for enhancing awareness on campus and throughout the community where UNM is a partner
- Incorporate into the UNM Master Plan for future year design and development
- Incorporate into RMSS guidance in developing future strategies based on the goals and objectives outlined in the PDM plan
- Incorporate strategies outlined into the UNM Operating Budget reviews and UNM Capital Improvement planning to ensure strategies outlined are reviewed and budgeted for future year development and enhancement
- Incorporate strategies with the UNM Building Renewal Replacement workgroup to ensure future construction of facilities meet if not exceed future development on all campuses
- Incorporate into the Physical Plant Department for deploying strategies on continuous monitoring of existing structures and develop a process for identifying and preventing potential vulnerabilities and develop trends in repairs based on type of hazard

Once the plan is approved the University President will provide formal correspondence to all departments to begin utilizing the mitigation plan in daily, monthly, quarterly and annual meetings and processes. Each department will review the UNM mitigation plan; choose mitigation action(s) to add to their operational plan/budget. Each department will be required to provide annual inputs and participate in updates and reviews as required by the UNM President.

As additional planning opportunities are determined, the PDM Plan will be presented and factored into those processes. The SRS will ensure the PDM Plan is available for those departments where the value of mitigation planning will benefit their goal of resiliency in disaster preparedness.

(This page intentionally left blank)

CHAPTER 10 – PLAN MAINTENANCE

Plan Monitoring

The UNM Safety and Risk Services (SRS) will review and monitor the UNM Pre-Disaster Mitigation Plan at a minimum of every three months to assure that no required actions fall behind schedule. The SRS will stay current with federal and state laws, statutes, and grant programs and will advise UNM of changes that affect them.

The SRS will prepare reports, perform site visits, and maintain files for each mitigation grant received. Files will include records of correspondence, phone calls, financial transactions, meetings, and other pertinent information. The SRS will submit quarterly reports to NMDHSEM personnel in turn will submit quarterly reports to FEMA, as required.

Plan Development and Evaluation

The SRS, working with the PDMAC and various subject matter experts as needed, will evaluate progress toward achieving the goals set for specific hazards. This plan establishes a schedule for plan evaluation and subsequent updating, as follows:

- Approximately three months from the date of the UNM Presidents signature, SRS will convene a meeting of the PDMAC to review the plan. In future years, this will be called the Annual Meeting. At this meeting, the PDMAC will evaluate each mitigation goal and objective with respect to continuing relevance and will consider priorities. The PDMAC may change the wording of goals and objectives, and may write new ones
- The SRS will report to the PDMAC on the progress of all state funded and federally funded mitigation projects and project applications at the state. Every mitigation project should fall under one of the goals identified in this plan. Mitigation projects often take months or years to be approved and obligated due to extensive special considerations that need to be researched, particularly compliance with the NEPA
- The SRS will report on any statutory or regulatory changes from FEMA that have an impact on the plan. These statutory changes, along with project reports and changes to the mitigation strategies will be assembled into a yearly annex and will be sent to all PDMAC members and other designated reviewers for proofreading, editing, and comment
- Following the review period, approximately two months after the first meeting, SRS will once again convene the PDMAC to finalize the yearly annex and send it to all recipients of the plan
- The above process will be repeated as often as necessary to assure that the plan contains the latest information. The meetings of the PDMAC will be conducted yearly, with an annex to the plan produced and distributed. When, in the judgment of SRS and/or the PDMAC, sufficient changes and reports have accumulated, the old plan will be completely rewritten, and yearly annexes will be incorporated into the body of the new plan. As meetings are identified and

conducted the public will be invited to participate to ensure UNM connection to the community. The SRS will ensure public participation by advertising these meetings via website, UNM Lobo, local paper, contact with local neighborhood associations and through the student affairs

- A total re-writing of the plan will occur every five years, if not sooner. Ample time, perhaps 12 months prior to the five-year due date, for NMDHSEM and FEMA review and comment on the re-written plan
- Nothing in this section shall be construed to limit the number of PDMAC meetings per year. SRS will call as many meetings as necessary. The PDMAC members may make any changes to the plan they wish, including this chapter. However, any changes including the yearly annex will have to be approved by the UNM President

Review of Progress on Implementing Mitigation Action Items

At the annual meeting, SRS will report the status of various mitigation projects being funded by the State/FEMA throughout UNM. These reports will include, but are not limited to, the following information:

- Name of FEMA grant program
- Applicant name
- Title of project
- Brief description of project
- Location of project
- Which goal and objective this project works toward
- Amount of funding requested, allocated, and obligated
- Amount of funding paid
- Problems encountered
- Benefits achieved
- Projected completion date

In SRS's report, each on-going project will be linked to one or more of the action items identified in the mitigation strategies. Action items for which there are no projects will also be identified. This process will allow the PDMAC to focus on action items that either might be favored for future funding or be deleted from the list. These reports will be available through the UNM mitigation website for public review and comment.

Monitoring Mitigation Project Closeouts

The SRS will perform interim inspections (if needed) and final inspections of mitigation projects funded by federal grants. This may also occur from the SHMO at anytime. These inspections will include whatever paperwork is required by the granting agency as well as photographs and other documentation from the grant recipient that may be useful in establishing the value and importance of the project. These reports will be incorporated into the annual update.

Mitigation Success and Failure Stories

Occasionally there are examples of mitigation projects that have been successful in protecting whatever they were designed to protect. The SRS will attempt to document these cases whenever there is anything specific to record. However, often when mitigation is successful, often nothing happens, and one must presume that something serious would have happened had not the project been done.

The SRS will also collect and report examples of situations where mitigating actions would probably have prevented significant damage, as well as examples of failed mitigation projects, should any occur.

The SRS will report any mitigation success stories at the annual meeting for inclusion in the yearly annex. Additionally, mitigation success stories will be posted on the UNM mitigation website and included in the UNM Lobo newspaper for the public to review and provide comment as necessary.

The SRS will also submit any mitigation successes of an extraordinary nature to the State and FEMA, for possible inclusion in the "Best Practices Case Studies":

(Source: http://www.fema.gov/plan/prevent/bestpractices/index.shtm#2)

(This page intentionally left blank)

APPENDIX A – AGENDAS, MINUTES AND SIGN-IN SHEETS

August 21st, 2009 Pre-Disaster Mitigation Meet and Greet with FEMA Region VI and New Mexico Department of Homeland Security Emergency Management

THE UNIVERSITY of NEW MEXICO

UNM Pre-Disaster Mitigation Plan

Meeting Agenda

August 21st, 2009
9:00 p.m. – 11:00 p.m.

Location: UNM Earth Data Analysis Center (EDAC) Room 122

Type of Meeting: Meet and Greet with NMDHSEM SHMO, Region VI Mitigation Officer and UNM PDM Plan Development Team

9:00 a.m. – 9:05 a.m.	Brief Introduction (Around the Room)
9:05 a.m. – 9:45 p.m.	Brief Overview of the UNM Plan Development • PDM Process • Mitigation Program Highlights
9:45 a.m. – 10:15 a.m.	Presentation of HAZUS, Flood Plain Data and Other Maps used for developing the PDM Plan • Demonstration on map development
10:15 a.m. – 10:30 p.m.	Questions & Comments
10:30 a.m. –	Campus Tour (Time Permitting)

UNM PDM Plan PI: Debra Kuidis, 505-277-0732, dkuidis@unm.edu

UNM PDM Plan Co-PI: Shirley Baros, 505-277-3622 ext 237 sbaros@edac.unm.edu

UNM PDM Contractor: Brian Fields, 703-863-8857, bfields@bstingventures.com

B-Sting Ventures, LLC

August 10th, 2009 Pre-Disaster Mitigation Advisory Committee Meeting

THE UNIVERSITY of NEW MEXICO

UNM Pre-Disaster Mitigation Plan

Meeting Agenda

August 10th, 2009
1:00 p.m. – 2:00 p.m.

Location: Roberts Room, Scholes Hall

Type of Meeting: PDM Draft Plan Update and Next Steps

Meeting Facilitator: Brian Fields, President & CEO B-Sting Ventures, LLC

1:00 p.m. – 1:05 p.m.	Brief Introduction (Around the Room)
1:05 p.m. – 1:30 p.m.	Update on Draft Plan Submissions
1:30 p.m. – 1:45 p.m.	Next Steps for UNM During State/FEMA Review
1:45 p.m. – 1:55 p.m.	Questions & Comments

Next Meeting

Date and Time Determined Prior to Adjournment.

2:00 p.m.	Adjournment

B-Sting Ventures, LLC

THE UNIVERSITY of NEW MEXICO

B-Sting Ventures, LLC

MEETING SIGN-IN SHEET

Project: Pre-Disaster Mitigation Plan Meeting		**Meeting Date:**	August 10th, 2009 / 1:00pm – 2:00pm
Facilitator: Brian W. Fields (B-Sting Ventures LLC)		**Place/Room:**	Roberts Room, Scholes Hall

Name	Title	Department	Phone	Fax	E-Mail
Brian W. Fields	President & CEO	B-Sting Ventures	703-863-8857	N/A	bfields@bstingventures.com bwfabq@gmail.com
Debbie Kuidis	P.I. Mgr. Ind. Sec.	OVPR	505-277-0732 505-269-27[illegible] (c)		dkuidis@unm.edu
Shirley V. Baros	Co-PI	EDAC, UNM	277-3622 x237	277-3614	sbaros@edac.unm.edu
Wes Stallup	GIS Tech	EDAC, UNM	277-3622 x237		wstallup@edac.unm.edu
Robert Dunnington	SAFETY MGR.	SRS	277-1055	277-9006	rdunning@unm.edu
DONNA HOFF	Program Specialist	PROVOST	277-3036	None	djhoff@unm.edu
Gary Smith	AD-PPD	PPD	7-2413		rgsmith@unm.edu
Susan McKinney	Director UCAM	UCAM	7-1807		mckinney@unm.edu
George Thorning	A.I.	I.T.	277-3037		thorning@unm.edu
Tim Gutierrez	AVP-OSA	OSA	277-0563		tgutierr@unm.edu
DON DUSZYNSKI	SPECIAL ASST.	PRESIDENT'S OFF	277-2704		emeriza@unm.edu
Tandy Miller	Planner	PCD	7-9202		csmiller@unm.edu
THERESA M. ROGERS	ASUNM C.o.S.	ASUNM	702.844.8217		TROGERS1@UNM.EDU

Page 1 of 3

THE UNIVERSITY of NEW MEXICO

FEMA Pre-Disaster Mitigation Plan Advisory Committee
Meeting Minutes

August 10th, 2009

The UNM FEMA Pre-Disaster Mitigation (PDM) Advisory Committee met on August 10th, 2009 at the UNM Roberts Room, Scholes Hall from 1:00 p.m. to 2:00 p.m. The purpose of this meeting was to provide the advisory committee with a brief overview of the responses received from the PDM Draft review and next steps as the contractor and PDM Team finalize the document for submission to NMDHSEM.

Deborah Kuidis opened the meeting at 1:05 p.m. welcoming the committee membership. The meeting was turned over to Brian Fields, President & CEO B-Sting Ventures, LLC who facilitated the afternoon's discussion. Mr. Fields outlined to the membership that of 32 departments, only 11 provided responses including in the PDM plan. Mr. Fields expressed he was currently incorporating these changes and adding additional data into a final draft plan.

Mr. Fields explained to the members that gaps still remain and he was continuing to collect data to meet the FEMA PDM requirements.

Ms. Baros expressed to the membership that once the final draft plan is provided by Mr. Fields (on September 1st), they will do a final review and prepare for submission to the state to begin the finalization process. Ms. Baros also informed the membership that to support this ongoing effort, Mr. Fields has been extended to assist in the approval process.

Mr Fields briefly outlined next steps to the group on the PDM process. This is an ongoing process, even when the PDM Plan is in review at NMDHSEM and FEMA. At the next schedule meeting a more detailed "next step" process will be identified and dates established for future meetings.

The next PDM Advisory Committee:

September 28th, 2009; 1 – 2 p.m. Roberts Room, Scholes Hall

Meeting agendas and working materials will be provided prior to the meeting for preparation purposes.

The PDM Advisory Committee adjourned at: 1:45 p.m.

B-Sting Ventures, LLC

July 20th, 2009 Pre-Disaster Mitigation Advisory Committee Meeting

THE UNIVERSITY of NEW MEXICO

UNM Pre-Disaster Mitigation Plan

Meeting Agenda

July 20th, 2009
1:00 p.m. – 2:00 p.m.

Location: Roberts Room, Scholes Hall

Type of Meeting: PDM Action Item Update and PDM Plan Distribute

Meeting Facilitator: Brian Fields, President & CEO B-Sting Ventures, LLC

1:00 p.m. – 1:05 p.m.	Brief Introduction (Around the Room)
1:05 p.m. – 1:30 p.m.	Discuss STAPLE+E Data
1:30 p.m. – 1:45 p.m.	Distribute PDM Draft Plan and Response Instructions
1:45 p.m. – 1:55 p.m.	Questions & Comments

Next Meeting

August 10, 2009 1pm – 2pm in the Roberts Room, Scholes Hall

2:00 p.m.	Adjournment

B-Sting Ventures, LLC

THE UNIVERSITY of NEW MEXICO

B-Sting Ventures, LLC

MEETING SIGN-IN SHEET

Project: Pre-Disaster Mitigation Plan Meeting		**Meeting Date:**	July 20th, 2009 / 1:00pm – 2:00pm
Facilitator: Brian W. Fields (B-Sting Ventures LLC)		**Place/Room:**	Roberts Room, Scholes Hall

Name	Title	Department	Phone	Fax	E-Mail
Brian W. Fields	President & CEO	B-Sting Ventures	703-863-8857	N/A	bfields@bstingventures.com bwfabq@gmail.com
Robert Dunnington	UNM SAFETY	SRS	277-1055	277-9006	rdunning@unm.edu
Donna Hoff	Prog. Specialist	Provost	277-3036	NA	djhoff@unm.edu
Byron Piatt	Emergency MGR		277-0330	7-2800	bpiatt@salud.unm.edu
Ted Arnett	Emeg MGR	unm H	967-6705		Tarnett@salud.unm.edu
Roger Tanner	BC Emerg Manager	BCDEM	468-1307		rtanner@bernco.gov
Laura Banks	Director	UNM CDM	272-6279	2-6259	LBanks@salud.unm.edu
Susan McKinney	Director	UCAM	7-1807		mckinsey@unm.edu
[illegible]	ASUNM CoS	ASUNM	302.898 8217	—	Trokero1@unm.edu
Ben Vigil	Admin. Assist.	SUB	505277-2331	277-7878	thackes@unm.edu
Martha Bloomenstein for Peter Rieckmann	[illegible] Property	Property	277-2019	7-4003	peter@unm.edu
Karen Wentworth	SR. Univ Comm. Rep	UCAM	277-5627		kwent2@unm.edu
Daniel Weems	Program Specialist	ARC	277-3506	7-3750	weems@unm.edu

Page 1 of 3

THE UNIVERSITY of NEW MEXICO

B-Sting Ventures, LLC

MEETING SIGN-IN SHEET

Project:	Pre-Disaster Mitigation Plan Meeting	**Meeting Date:**	July 20th, 2009 / 1:00pm – 2:00pm
Facilitator:	Brian W. Fields (B-Sting Ventures LLC)	**Place/Room:**	Roberts Room, Scholes Hall

Name	Title	Department	Phone	Fax	E-Mail
D.W. DUSZYNSKI	Consultant - President's Off		277-2704	X	emeriz@unm.edu
Mike Tuttle	Risk Mgr	SRS	7-9791		mtuttle@unm.edu
JOEL STRAQUADINE	FAC. MGR	PPD	76467		JSTRAQUA@UNM.EDU
BOBBI CHILDERS	SR. PUBLIC AFFAIRS	RESIDENCE LIFE + STUDENT HOUSING	78566		childers@UNM.EDU
Deborah Kuidis	Mgr of Industrial Security	OVPRED	7-0732		dkuidis@unm.edu
Judy Pointer	Biosafety	HSC-OR	2-8001		jpointer@salud.unm
Gary Smith	A.D.	PPD	7-2413		rgsmith@unm.edu

Page 2 of 3

THE UNIVERSITY of NEW MEXICO

FEMA Pre-Disaster Mitigation Plan Advisory Committee
Meeting Minutes

July 20th, 2009

The UNM FEMA Pre-Disaster Mitigation (PDM) Advisory Committee met on July 20th, 2009 at the UNM Roberts Room, Scholes Hall from 1:00 p.m. to 2:00 p.m. The purpose of this meeting was to provide the advisory committee with an overview of the STAPLE+E process and results and provide draft copies of the UNM PDM plan for review.

Deborah Kuidis opened the meeting at 1:05 p.m. welcoming the committee membership. The meeting was turned over to Brian Fields, President & CEO B-Sting Ventures, LLC who facilitated the afternoon's discussion. An around the room introduction was initiated followed by a brief overview of the STAPLE+E process. Mr. Fields thanked everyone for their participation stating this is one of the difficult tasks of the mitigation process -- taking the time to work through and prioritize the actions. Mr. Fields also remarked, of the 32 Advisory Committee members, only 8 returned the scoring assessment.

All attendees signed for a CD containing the draft PDM Plan in .PDF and Microsoft Word format. Deborah Kuidis will hand deliver copies to those committee members unable to attend. Shirley Baros will FedEx a copy to the Branch representative in Gallup and Brian Fields will hand deliver a copy to the Albuquerque Emergency Manager.

Mr. Fields explained to the members what to expect on the draft plan. Gaps remain and the membership was asked to provide support in filling those gaps. A handout was provided explaining the process for submitting recommended additions or changes. Mr. Fields explained how to use the PDM change format. Committee member Robert Dunnington asked if the format presented was on the CD. Mr. Fields stated it was not but he would provide the file for everyone to use. Mr. Fields explained how to submit recommended changes and provided examples for reference.

Shirley Baros commented to the members on reviewing the plan, "the plan is large and we invite you to review the entire document, but realize you have many things going on with work. Please at least review the areas that you have a vested interest or expertise. Help us fill the gaps so we send forward a comprehensive and complete plan".

Don Duszynski asked what the process once the draft plan is completed. Mr. Fields explained that he has a required ready date of 1 September to the PI. The PI will submit the final draft PDM Plan to the State of New Mexico Department of Homeland Security and Emergency Management for review. Once the review is complete and approved at the state level, the state will than forward to FEMA Region VI who will conduct a federal review. Once approved, UNM will have roughly 180 days or less to obtain UNM superior review. The other question related to who at UNM will sign and does this plan

B-Sting Ventures, LLC

THE UNIVERSITY of NEW MEXICO

have to be reviewed/approved by the Regents? Deborah Kuidis stated she is working this issue and hopes to have an answer in the next few days.

Deborah Kuidis discussed putting the draft plan on the UNM Mitigation website. The plan will not go on as of yet. We will wait until a final plan is complete and areas that might be of concern for public view will be removed with a comment added to contact the appropriate office to seek review. Mr. Fields stated that agendas and minutes from past meetings can be put on the website. Posting these materials will show the public UNM is serious about mitigation planning.

The next PDM Advisory Committee:

August 10th, 2009; 1 – 2 p.m. Roberts Room, Scholes Hall

Meeting agendas and working materials will be provided prior to the meeting for preparation purposes.

The PDM Advisory Committee adjourned at: 1:45 p.m.

Following the meeting, Mr. Fields emailed the file to Deborah Kuidis who forwarded to Advisory Committee members.

June 15th, 2009 Pre-Disaster Mitigation Advisory Committee Meeting

THE UNIVERSITY of NEW MEXICO

UNM Pre-Disaster Mitigation Plan

Meeting Agenda

June 15th, 2009
1:00 p.m. – 3:00 p.m.

Location: Roberts Room, Scholes Hall

Type of Meeting: PDM Mitigation Action Items

Meeting Facilitator: Brian Fields, President & CEO B-Sting Ventures, LLC

1:00 p.m. – 1:05 p.m. Brief Introduction (Around the Room)

1:05 p.m. – 1:10 p.m. Review of April Meeting Minutes

1:10 p.m. – 2:55 p.m. Review / Prioritize Mitigation Strategies & Actions

Next Meeting

July 20, 2009 1pm – 3pm in the Roberts Room, Scholes Hall

August 10, 2009 1pm – 2pm in the Roberts Room, Scholes Hall

3:00 p.m. Adjournment

B-Sting Ventures, LLC

THE UNIVERSITY of NEW MEXICO

B-Sting Ventures, LLC

MEETING SIGN-IN SHEET

Project:	Pre-Disaster Mitigation Plan Mitigation Action Prioritization	**Meeting Date:**	June 15th, 2009 / 1:00 p.m. – 3:00 p.m.
Facilitator:	Brian W. Fields (B-Sting Ventures LLC)	**Place/Room:**	UNM Roberts Room, Scholes Hall

Name	Title	Department	Phone	Fax	E-Mail
Brian W. Fields	President & CEO	B-Sting Ventures	703-863-8857	N/A	bfields@bstingventures.com bwfabq@gmail.com
Shirley N. Baros	CO-PI GIS Prog Mgr.	EDAC/UNM	7-3622 X237	7-3614	sbaros@edac.unm.edu
W. Stallings	GIS Tech	EDAC/UNM	7-3622 x250	7-3614	wstallings@edac.unm.edu
BYRON PIATT	EMERGENCY MGR	UNM	7-0330	7-2800	bpiatt@salud.unm.edu
MIKE TUTTLE	Risk Mgr	SRS	7-9791	7-9799	mtuttle@unm.edu
DON DUSZYNSKI	Spec. Asst President	Pres/Biol.	7-2704		elmeria@unm.edu
Robert Dunnington	SAFETY	SRS	277-1055	277-9006	rdunning@unm.edu
Joan Green	Director	ARC	277-3506	277-3750	jegreen@unm.edu
Candy Miller	Planner	PCD	7-9202		csmiller@unm.edu
Gary Thorning	AD	ITS	7-3037		thorning@unm.edu
Laura Banks	Director	UNM CDM	2-6279		LBanks@salud.unm.edu
DONNA HOFF	Program Specialist	Provost	7-3036		djhoff@unm.edu
JEFF GASSAWAY	ISO	IA/ITS	7-8146		base@unm.edu

list serve to the create a send email address to entire group

Page 1 of 3

THE UNIVERSITY of NEW MEXICO

B-Sting Ventures, LLC

MEETING SIGN-IN SHEET

Project:	Pre-Disaster Mitigation Plan Mitigation Action Prioritization	**Meeting Date:**	June 15th, 2009 / 1:00 p.m. – 3:00 p.m.
Facilitator:	Brian W. Fields (B-Sting Ventures LLC)	**Place/Room:**	UNM Roberts Room, Scholes Hall

Name	Title	Department	Phone	Fax	E-Mail
ROGER TANNEN	Emergency Manager	Bernalillo County Office of Emerg. Mgt.	468-1307		rtannen@bernco.gov
KAREN WENTWORTH	UNIV. COMM. REP	UCAM	277-5627		Kwent2@unm.edu

Page 2 of 3

May 18th, 2009 Pre-Disaster Mitigation Advisory Committee Meeting

THE UNIVERSITY of NEW MEXICO

UNM Pre-Disaster Mitigation Plan

Meeting Agenda

May 18th, 2009
1:00 p.m. – 3:00 p.m.

Location: Roberts Room, Scholes Hall

Type of Meeting: Begin Development of PDM Mitigation Action Items

Meeting Facilitator: Brian Fields, President & CEO B-Sting Ventures, LLC

I. Brief Introduction

II. Review of April Meeting Minutes

III. Open issues
   a) Present Final Hazards Assessment
   b) Goals and Objectives – Mitigation Action Items

IV. New business
   a) None at this time

V. Next Meeting

June 8, 2009, 1pm – 3pm in the Roberts Room, Scholes Hall

August 10, 2009, 1pm – 2pm in the Roberts Room, Scholes Hall

VI. Adjournment

May 18th, 2009 PDM Advisory Committee Continued

THE UNIVERSITY OF NEW MEXICO
FEMA Pre-Disaster Mitigation & Emergency Management for Higher Education
Advisory Committee Meeting

DATE: Monday, May 18, 2009

LOCATION: Robert's Room, Scholes Hall – University of New Mexico

MEETING: Advisory Committee

Name	Title	Department	Phone	Fax	E-Mail
Kirt Heiser		CAM	7-6329		[illegible]@salud.unm.edu
Ed Padilla	Univ. Libr. Fac. Mgr.	Univ. Libraries	7-0458	7-7196	epadilla@unm.edu
Scott Dotson	Asst. AD [illegible]	Athletics	5-5925	5-5955	ScottD@unm.edu
Robert Dunnington	UNM Safety	SRS	7-1055	7-9006	rdunning@unm.edu
Mary Kenney	University Planning Officer	Planning and Campus Development	7-9300		mkenney@unm.edu
Don Duszynski	Special Asst to the President	Pres. Office	7-2704		eimeria@unm.edu
Mike Tuttle	Mgr. - Ins. & claims	S.R.S.	7-9791	7-9799	Mtuttle@unm.edu
Susan McKinsey	Director	UCAM	7-1807		mckinsey@unm.edu
Tim Backes	Assoc. Direct	SUB	269-2731	7-7878	tbackes@unm.edu
George Thorning	AD	ITS	7-3037		thorning@unm.edu
Candy Miller	PCD	PCD	7-9202		csmiller@unm.edu
Jeff Gassaway	ISO	ITS/IA	7-8148	7-8101	gase@unm.edu

Meeting Start Time:
Meeting End Time:

THE UNIVERSITY OF NEW MEXICO
FEMA Pre-Disaster Mitigation & Emergency Management for Higher Education
Advisory Committee Meeting

DATE: Monday, May 18, 2009

LOCATION: Robert's Room, Scholes Hall – University of New Mexico

MEETING: Advisory Committee

Name	Title	Department	Phone	Fax	E-Mail
Joel Straquadine	Facilities Manager	PPD	7-6467	7-1250	JSTRAQUA@UNM.EDU
Donna Hoff	Program Specialist	Provost	7-3036	None	djhoff@unm.edu
Pete Rleckman	Accountant III	Unrestricted Acctg.	7-2933		PETER@UNM.EDU
Tim Gutierrez	AVP Student Serv.	OSA	70963	7-6099	tgutierr@unm.edu
Roger Tannen	Emergency Manager	Bernalillo County OEM	468-1307		rtannen@bernco.gov
Brian Fields	B-Strong Ventures	Consultant	703-863-8857		bwfaby@gmail.com
Debbie Kuidis	Mgr. Industrial Security	OVPR	7-0732/269-2712	7-5271	dkuidis@comcast.net
Byron Piatt	Emergency Manager	Emergency Management	7-0330	7-2800	bpiatt@salud.unm.edu
Shirley Baros	GIS Prog. Mgr.	EDAC/UNM	7-3622 x237	7-3614	sbaros@edac.unm.edu
Ted Arnett	Emerg. manager	UNM H	467-6705		Tarnett@salud.unm.edu
Mike Richards	Chair Emergency Med	UNM SOM	7-5062		MRICHARDS@SALUD.UNM.EDU
Theresa Rogers	ASUNM, Pres. TBA	ASUNM	322 888 8217	—	TROGERS1@UNM

Meeting Start Time:
Meeting End Time:

May 18th, 2009 PDM Advisory Committee Continued

THE UNIVERSITY OF NEW MEXICO
FEMA Pre-Disaster Mitigation & Emergency Management for Higher Education
Advisory Committee Meeting

DATE: Monday, May 18, 2009

LOCATION: Robert's Room, Scholes Hall – University of New Mexico

MEETING: Advisory Committee

Name	Title	Department	Phone	Fax	E-Mail
Wes Stalleyi	GIS tech	EDAC/UNM	7-3622 x 250	—	wstalleyi@edac.unm.edu
Laura Banks	Director	CDM	7-6279	2-6259	LBanks@salud.unm.edu

May 18th, 2009 PDM Advisory Committee Continued

THE UNIVERSITY of NEW MEXICO

FEMA Pre-Disaster Mitigation Plan Advisory Committee Meeting Minutes

May 18th, 2009

The UNM FEMA Pre-Disaster Mitigation (PDM) Advisory Committee met on May 18th, 2009 at the UNM Roberts Room, Scholes Hall from 1:00 p.m. to 3:00 p.m. The purpose of this meeting was to provide the advisory committee with the updated, ranked natural hazards, as provided by UNM departments, and present the draft mitigation actions for the committee discussion.

Deborah Kuidis opened the meeting at 1:05 p.m. welcoming the committee membership. The meeting was turned over to Brian Fields, President & CEO B-Sting Ventures, LLC who facilitated the afternoon's discussion. Mr. Fields presented the hazard analysis spreadsheet updated since the last advisory committee meeting. A total of 135 departments have responded to date, up from 112 departments. Analysis data added to the spreadsheet had not changed the overall ranking of hazards. Departments highlighted in green indicate those departments who have yet provided a response. There were no comments from the Advisory Committee membership on the current hazard analysis.

Next, Mr. Fields introduced to the committee a list of mitigation actions for their review and discussion. Mr. Fields expressed that some actions were taken from the hazard assessments submitted by departments, some based on discussions with departments and some from past mitigation experience. Mr. Fields outlined the importance of the committee's review and acceptance for insertion into the PDM plan. Discussions began by reviewing each goal, objective and action measure. Much discussion occurred during the review with regards to explaining the best approach for each goal. Who should be the implementing office / department responsible and what hazards would the goal support. During the discussion it was suggested by committee member Susan McKinsey that the advisory committee break out each goal based on subject and assign to subcommittees. Committee members agreed with the suggestion and subcommittees were identified for each goal, with some goals being combined for review by subcommittees. The final subcommittee breakdown is attached to the minutes.

Subcommittees are required to review the assigned goal areas and tasked to complete the following:

- Review each goal and associated objectives/actions and determine if applicable
- Update, enhance, reword accordingly
- Roll up duplications / similar goals, objectives, actions if applicable
- Add additional mitigation actions applicable to that goal

A required format is outlined in the final subcommittee breakdown attached. Subcommittee members are tasked to complete this project and turned in to the Deb Kuidis, PI, no later than June 8th, 2009. Mr. Fields will compile all submissions and

B-Sting Ventures, LLC

May 18th, 2009 PDM Advisory Committee Continued

THE UNIVERSITY of NEW MEXICO

prepare a spreadsheet to be used for prioritizing mitigation actions at the June 15th advisory committee meeting.

During the discussions a few issues were identified to the committee for consideration:

- Mary Kenney commented that the goals didn't seem to be written in a goal format. Additionally Ms. Kenney commented on the lack of metrics for each action. Mr. Fields stated that what is presented to the group is a draft. The committee should review and be part of the process of finalizing mitigation actions. This ensure acceptance by the committee. As for metrics, though not a requirement, if committee members deemed it necessary to add as part of the mitigation actions than each committee will need to determine what the metric is to manage the outcome. If metrics are added, this will need to be added to the plan maintenance section of the PDM plan.

  Prior to adjourning, committee members all agreed that each mitigation action will have a metric assigned.

- During mitigation action discussions, Mr. Fields asked the question about shelters on campus that could be used by students in the event of an extreme natural hazard, i.e., tornado or extreme winds. The advisory committee wasn't sure if or how many shelters currently exist. An issue that can be used as a mitigation action to determine the need and locations. Scott Dotson from Athletics commented to the group on the issue he is faced with at this current time on identifying shelters in the event he had a natural hazard event. This awareness issue was brought about from the recent micro-burst that occurred in Dallas Texas that caused extensive damage to a sport facility. Currently the PIT is going through renovations which take that facility off the shelter list.

- Mary Kenney brought to the group attention the Y2K plan that was developed in preparation for year 2000. She mentioned that there may be some good data to use in our efforts for developing mitigation actions and PDM plan development

- Committee members determined that mitigation goals 4 and 10 were similar and should be combined for the subcommittee to review accordingly.

The next PDM Advisory Committee:

June 15th, 2009; 1 – 3 p.m. Roberts Room, Scholes Hall

August 10th, 2009; 1 – 3 p.m. Roberts Room, Scholes Hall

Meeting agendas and working materials will be provided prior to the meeting for preparation purposes.

The PDM Advisory Committee adjourned at: 2:55 p.m.

April 20th, 2009 Pre-Disaster Mitigation Advisory Committee Meeting

THE UNIVERSITY of NEW MEXICO

UNM Pre-Disaster Mitigation Plan

Meeting Agenda

April 20th, 2009
1:00 p.m. – 3:00 p.m.

Location: Roberts Room, Scholes Hall

Type of Meeting: Discuss UNM PDM Hazard Assessment and Facilities

Meeting Facilitator: Brian Fields, President & CEO B-Sting Ventures, LLC

I. Introduction

II. Review of March Meeting Minutes

III. Open issues
   a) Identify and Profile Hazards – Department Data Received (See Handout)
   b) Identify Critical Facilities
   c) Inventory Assets – Potential Loss from Natural Disasters
   d) Estimate Losses From Natural Disasters
   e) Mitigation Website and Current Advertising

IV. New business
   a) Developing Mission Statement, Goals and Objectives

V. Next Meeting

May Meeting: May 18th, 2009 Roberts Room, Scholes Hall

VI. Adjournment

April 20th, 2009 PDM Advisory Committee Meeting Continued

THE UNIVERSITY of NEW MEXICO

B-Sting Ventures, LLC

MEETING SIGN-IN SHEET

Project:	Pre-Disaster Mitigation Plan Hazard Analysis Review	**Meeting Date:**	20 April, 2009 / 1:00 p.m. – 3:00 p.m.
Facilitator:	Brian W. Fields (B-Sting Ventures LLC)	**Place/Room:**	UNM Roberts Room, Scholes Hall

Name	Title	Department	Phone	Fax	E-Mail
Brian W. Fields	President & CEO	B-Sting Ventures	703-863-8857	N/A	bfields@bstingventures.com bwfabq@gmail.com
JEFF SMITH	MANAGER-SPACE MGMT	PLANNING+CAMPUS DEV.	277-9292		JEFSMITH@UNM.EDU
JOEL STRAQUADINE	FACILITIES MANAGER	PPD	7-6467	7-1250	JSTRAQUA@UNM.EDU
George Anastas	SRS Unit Safety Officer	SRS	7-5488		ganastas@unm.edu
Gary Thorning	AD ITS	ITS	7-3037		thorning@unm.edu
Robert Dunnington	Mgr-Spec Proj	SRS	7-1055		rdunning@unm.edu
Joan Green	Director	ARC	7-3506		jegreen@unm.edu
Tim Backes	ASSOC. Director	SOB	7-2331		tbackes@unm.edu
BOBBY CHILDERS	SR. PUBLIC AFFAIRS REP	STUDENT HOUSING & RESIDENCE LIFE	7-8588		childers@UNM.EDU
Mary Kenney	University Planning Office	PCD	7-9300		mkenney@unm.edu
MIKE BROWN FOR DENISE MONTOYA	SR HR CONS	HR	7-5810		
PETE RIECKMANN	ACCOUNTANT III	UNRESTRICTED ACCG.	7-2933		PETEC@UNM.EDU
ED PADILLA	FAC. MGR.	UNIV. LIBRARIES	7-0458	7-7196	epadilla@unm.edu

Page 1 of 3

THE UNIVERSITY of NEW MEXICO

B-Sting Ventures, LLC

MEETING SIGN-IN SHEET

Project:	Pre-Disaster Mitigation Plan Hazard Analysis Review	**Meeting Date:**	20 April, 2009 / 1:00 p.m. – 3:00 p.m.
Facilitator:	Brian W. Fields (B-Sting Ventures LLC)	**Place/Room:**	UNM Roberts Room, Scholes Hall

Name	Title	Department	Phone	Fax	E-Mail
Bill Cobb		Community Representative	247-8296		silverhillnet@aol.com
Laura Banks	Director	Disaster Med	272-6279		LBanks@salud.unm.edu
Kirk Heider		Disaster Med.	2-6329		kwheider@salud.unm.edu
Tim Gutierrez	AVP	OSA	7-0963		tgutierr@unm.edu
THERESA M. ROGERS	U.GRAD	ASUNM/ATHLETICS	302.898.8217		TROGERS1@UNM.EDU
Mike Tuttle	Risk Mgr	Safety & Risk Svcs	277-9791		mtuttle@unm.edu
ROGER TANNEN	Emergency Manager	Bernalillo County Office of Emerg Mgt	468-1307		rtannen@bernco.gov
BYRON PIATT	EMERGENCY MANAGER	UNIVERSITY OF NEW MEXICO	277-0330		bpiatt@salud.unm.edu
Mike CARR	Director, Info Assurance	ITS	7-1212		mcarr@unm.edu
Scott Dotson	Asso. AD Facilities	ATHLETICS	5-5925		Scottd5@unm.edu
Judy Pointer	University Biosafety Officer	HSC Office of Research	2-8001		jpointer@salud.unm.edu
Susan McKinsey	Director, Comm UCAM	UCAM	7-1807		mckinsey@unm.edu
Debbie Kuidis	Manager of Industrial Security	OVPR	7-0732		dkuidis@unm.edu

Page 2 of 3

THE UNIVERSITY of NEW MEXICO

B-Sting Ventures, LLC

MEETING SIGN-IN SHEET

Project:	Pre-Disaster Mitigation Plan Hazard Analysis Review	**Meeting Date:**	20 April, 2009 / 1:00 p.m. – 3:00 p.m.
Facilitator:	Brian W. Fields (B-Sting Ventures LLC)	**Place/Room:**	UNM Roberts Room, Scholes Hall

Name	Title	Department	Phone	Fax	E-Mail
SHIRLEY BAROS	FEMA CO-PI PDM Grant	EDAC/unm	X237 277-3622	277-3614	sbaros@edac.unm.edu

THE UNIVERSITY of NEW MEXICO

FEMA Pre-Disaster Mitigation Plan Meeting Minutes
April 20, 2009

The UNM FEMA Pre-Disaster Mitigation (PDM) Advisory Committee met on April 20, 2009 at the UNM Roberts Room, Scholes Hall from 1:00 p.m. to 3:00 p.m. The purpose of this meeting was to provide committee with the ranked natural hazards as provided by departments, identify critical facilities, discuss assets and the potential loss from natural disasters and discuss the PDM website and current advertising.

Deborah Kuidis opened the meeting at 1:05 p.m. welcoming the committee membership. The meeting was facilitated by Brian Fields, President & CEO B-Sting Ventures, LLC. Mr. Fields identified the three handouts to the committee: 1) meeting agenda, 2) hazard profile spreadsheet and 3) overview of findings and listing of critical and historical facilities.

Mr. Fields explained the hazard spread sheet. The ranking on the spreadsheet were based on responses from 122 UNM departments. Rankings were based on the following scale:

- High Hazards have an average score over 1.00,
- Medium Hazards are from 0.65-0.99, and
- Low Hazards are up to 0.64.

Departments that did not provide a response were highlighted in green. Committee members were asked to review the list and provide input / feedback. During the discussion committee members identified additional departments that were not on the list. Those departments included the Golf Course, Business Center, Mesa Vista Hall, Cancer Center and Carrie Tingly. At the Advisory Committee's request, Deborah Kuidis collected those departments and their point of contact and will send an email requesting a hazard assessments for the mitigation plan.

Mike Turtle, Risk Manager, will provide additional data and a meeting has been set up for 24 April, 2009 at 8:30 a.m. in Deborah Kuidis' office.

Mary Kenney and Jeff Smith, Planning & Campus Development (PCD), provided input on a study (Historical Society Getty Grant) that was conducted back in 2007. This study and other data elements identified during the meeting will be provided by PCD. Deborah Kuidis and Brian Fields will schedule a meeting to obtain this information.

Judy Pointer asked the committee how can UNM obtain funding from FEMA and what can this funding support? Ms. Pointer expressed that her department experiences many power interruptions and wanted to know if this effort would be a way to fix this problem. Mr. Fields outlined how funding can be obtained. First, the problem has to be contributed by a natural hazard. If damage occurs from a natural hazard, UNM can seek funding to help repair those damages. Second, part of the PDM development is to

B-Sting Ventures, LLC

April 20th, 2009 PDM Advisory Committee Meeting Continued

THE UNIVERSITY of NEW MEXICO

identify mitigation actions. One example of a mitigation action could be a facility that continually floods during heavy rains. That action to fix this might be developing a drainage system around the building to move rain away from the building, thus eliminating the flood. Having identified this as a mitigation action, UNM would be eligible to seek funding. Byron Piatt, UNM Emergency Manager, also stated that having the PDM plan approved by FEMA also opens the doors to other grant opportunities. Without the PDM plan, UNM will not be eligible for other grant opportunities offered by FEMA.

Laura Banks asked the committee if leased buildings are being included in this PDM. Roger Tannen, Bernalillo County Emergency Manager, suggested to the committee that this data be included. Stated that in the event a leased building UNM stands to lose assets, cost of having to relocate, cost of putting classes on hold, as well as the possible human cost.

Mr. Fields discussed the current list of critical and historic buildings and expressed that the list continues to grow. Committee members reviewed and identified additional buildings. PCD will provide additional data on critical and historic buildings.

Bill Cobb, representative from the community, attended and provided valuable feedback to the committee. He stated that networking with neighborhood associations is very important in obtaining the neighborhood perspective. What happens on UNM has an effect on the surrounding community. He asked if the Advisory Committee could provide information on UNM's mitigation effort. Deborah Kuidis offered up the opportunity to come out to the next community meeting to provide an overview of this effort and answer questions.

Shirley Baros provided an update on the UNM mitigation website. Asked the committee for comments and if they have any ideas for content to please provide her with that data. In addition to the website, Ms. Baros shared with the committee that UNM Today published an article on the PDM project.

Before closing the meeting it was agreed by the committee that April 30th would be the drop dead date for hazard assessment. Mr. Fields will finalize the hazards list and provide to Ms. Kuidis. The next step in the process is identifying mitigation actions based on the hazards identified. This will be the focus at the May Advisory Committee meeting. Mr. Fields will put a list together to start the process moving forward.

The next PDM Advisory Committee:

May Meeting: 18 May, 2009, 1 – 3 p.m. Roberts Room, Scholes Hall

Meeting agendas and working materials will be provided prior to the meeting for preparation purposes.

The PDM Advisory Committee adjourned at: 2:45 p.m.

March 26th, 2009 Pre-Disaster Mitigation Advisory Committee Meeting

THE UNIVERSITY of NEW MEXICO

FEMA Pre-Disaster Mitigation Plan

Meeting Agenda

March 26, 2009
9:00 a.m. – 10:00 a.m.

Location: UNM Earth Data Analysis Center Bandelier Hall West / Room 104

Type of Meeting: Discuss FEMA Pre-Disaster Mitigation Plan Milestones to Plan Development

Meeting Facilitator: Brian Fields, President & CEO B-Sting Ventures, LLC

I. Introduction

II. Opening Remarks by EDAC

III. Briefing provided by PDM Facilitator

IV. Open issues
   a) Department Data – Gaps remain in receiving information
   b) Update Maps with Current Data
   c) Update Hazard Statistics
   d) Past Hazards on Campus and Branch Locations

V. New business
   a) Discuss Committee Role in Developing Mission Statement, Goals and Objectives
   b) Discuss Committee Role in Reviewing Department Hazard Submissions
   c) Discuss Committee Role in identifying Mitigation Actions
   d) Discuss Updating Mitigation Website

VI. Next Meeting

April Meeting (Any day between 20 – 25 April)

May Meeting (Any day between 18 – 22 May)

VII. Adjournment

B-Sting Ventures, LLC

THE UNIVERSITY of NEW MEXICO

B-Sting Ventures, LLC

MEETING SIGN-IN SHEET

Project:	Pre-Disaster Mitigation Plan Kickoff Meeting	**Meeting Date:**	26 March 2009 / 9:00AM
Facilitator:	Brian W. Fields (B-Sting Ventures LLC)	**Place/Room:**	UNM EDAC Conference Room / 104

Name	Title	Department	Phone	Fax	E-Mail
Brian W. Fields	President & CEO	B-Sting Ventures	703-863-8857	N/A	bfields@bstingventures.com bwfabq@gmail.com
Ted Arnett	Manager (UNMH) Emerg Prep	Emerg Prep	505-967-6705		Tarnett @ salud.unm.edu
Byron Piatt	UNM Emergency Manager		505 2770330	277 2800	bpiatt@salud.unm.edu
Kirk Heider	[illegible]	COM	505-272-[illegible]		[illegible]@salud.unm.edu
Don Duszynski	Asst to President	Pres. Off	505-277-2704		eimeria@unm.edu
Judy Pointer	Biosafety Officer	HSC ofc. of Research	272-8001		jpointer@salud.unm.edu
Debbie Kuidis	Manager of Industrial Security	Research	277-0732		dkuidis@unm.edu
Karen Wentworth	Communication & Marketing		277-5627		kwent2@unm.edu
Joan Green	Director	ARC	277-3566	277-3750	jegreen@unm.edu
Candy Miller	Planner	PCD	277-9290		csmiller@unm.edu
Jeff Smith	Manager Space Management	PCD	277-9292		JEFSMITH@UNM.EDU
Ed Padilla	Facilities Serv. Mgr.	UNM Libraries	7-0458	7-7196	epadilla@unm.edu
Joel Straquadine	Facilities Manager	PPD	7-6467		JSTRAQUA@UNM.EDU

Page 1 of 3

March 26th, 2009 PDM Advisory Committee Meeting Continued

THE UNIVERSITY of NEW MEXICO

B-Sting Ventures, LLC

MEETING SIGN-IN SHEET

Project:	Pre-Disaster Mitigation Plan Kickoff Meeting	**Meeting Date:**	26 March 2009 / 9:00AM
Facilitator:	Brian W. Fields (B-Sting Ventures LLC)	**Place/Room:**	UNM EDAC Conference Room / 104

Name	Title	Department	Phone	Fax	E-Mail
[illegible] Thorning	AD	ITS / CNS	277-3037	277-6988	thorning thorning@unm.edu
Pete Rieckmann	Accountant III	Unrestricted Acct.	277-2933	277-9286	petec@unm.edu
Denise Montoya	HR Consulting & Staff Employment Director	HR	277-2764	277-0456	montoyad@unm.edu
Robert Dunnington	UNM Safety	Safety & Risk Serv.	277-1055	277-9006	rdunning@unm.edu
Laura Banks	Director	UNM COM	272-6279	272-6259	LBanks@salud.unm.edu
Jeff Gassaway	Info. Security officer	CIO office	277-8148	277-8101	base@unm.edu
Shirley Baros	PDM-Co-PI	EDAC	277-3622x237	277-3614	sbaros@edac.unm.edu
Scott Dorsey	Asso. AD Facility	Athletics	925-5525	925-5755	[illegible]
Sterling Pearson	Commun. Spec.	Safety & Risk Svcs	277-2855	277-9799	spearson@unm.edu
Mike Tuttle	Insur. Mgr	" "	277-9791	277-9799	mtuttle@unm.edu

Page 2 of 3

THE UNIVERSITY of NEW MEXICO

FEMA Pre-Disaster Mitigation Plan Meeting Minutes
26 March, 2009

The UNM FEMA Pre-Disaster Mitigation (PDM) Advisory Committee met on March 26, 2009 at the UNM Earth Data Analysis Center Bandelier Hall West / Room 104 from 9:00 a.m. to 10 a.m. The purpose of this meeting was to introduce the consultant hired to assist in the development of the draft PDM plan and discuss the process, where UNM is, identification of milestones to final draft development and submission to the PDM team leads.

Deborah Kuidis provided the opening remarks at 9:05 a.m. welcoming all those in attendance. Ms. Kuidis provided a brief overview of the consultant hired to help with the drafting of the PDM plan and turned the meeting over to Mr. Fields. The meeting was facilitated by Brian Fields, President & CEO B-Sting Ventures, LLC. Mr. Fields opened the meeting by having all members attending provide a brief introduction.

Following introductions, the facilitator provided a briefing that highlighted the following:

- Why Pre-Disaster Mitigation (PDM) Planning
- Benefits of Mitigation Planning
- UNM PDM Development Phases
- Where UNM is Currently
- Drafting the PDM Process
- PDM Development - Next Steps

During the briefing a few questions were identified by committee members:

Claudia Miller: If we put in the mitigation plan those goals and objectives that require an action (funding mechanism) are we eligible to obtain funds from FEMA to fix identified natural hazard problems.

Brian Fields: Yes, if we have identified in the PDM those actions that are required to fix a potential problem contributed by a natural hazard, UNM would qualify. If not identified and there is a natural hazard that produces problem, UNM would not be eligible to seek funding. As part of the plan maintenance, these types of issues must be accounted for so that as the plan is updated, this information is added for future funding opportunities.

Shirley Baros: The reason UNM is seeking the PDM Plan is that prior to the start of this I submitted a grant request through FEMA. After submission FEMA turned down the request stating that UNM was ineligible to receive funds as we did not have an approved PDM plan.

THE UNIVERSITY of NEW MEXICO

Claudia Miller: As the approval of the PDM plan may take some time going through the State and FEMA approval process, will the consultant remain available to follow this through to ensure the plan is approved at all levels. My concern is with getting the plan adopted by UNM leadership.

Shirley Baros / Deborah Kuidis: Yes, the plan will be followed through until approved.

Brian Fields: One key component of approval is the adoption by UNM leadership. But let me stress that the State and FEMA realizes that this takes time. If the plan is approved at their level, a grace period is provided to UNM to seek adoption, if not already adopted prior to submission.

Peter Rieckmann: For the development of this plan do we want to know all facilities and contents? I can provide facilities, but contents will be the responsibility of those departments that reside in those facilities. Do we come up with exact figures or do we estimate (guesstimate)? And real estate is and acquisition of property changes all the time. How do we account for that?

Brian Fields: Yes, we need to account for all facilities and yes departments must provide some type of estimate (guesstimate) on the value of their assets. We don't have to have exact numbers, unless departments account completely. Estimating is acceptable. The key here is to have identified the value so we can have something when we come to cost base analysis. As for accounting for all property, it is realized that things are changing constantly, I would suggest that a snap shot in time be taken and go from there. Use April 08 as that snap shot and this will be acceptable for PDM plan development

Laura Banks: Issue regarding determining the value of assets, is there some type of formula that has been used by other universities to determine an average cost for analysis purposes for mitigation planning? If not, maybe there is some way to develop or determine a formula for estimating potential losses when assessing risks.

Brian Fields: Unaware of this type of analysis product used or developed by other universities. FEMA does provide worksheets to inventory assets and estimate losses in determining the proportion of buildings, the value of buildings, and the population on campus that are located in hazard areas as a way to estimate losses. Will do some research to see if any universities may have developed a product and advise the committee accordingly.

Following the briefing, the facilitator went through the agenda discussing those open items that require additional attention.

Open issues

a) Department Data – Gaps remain in receiving information

Gaps exist in receiving department data. Deborah Kuidis and Shirley Baros have the list of those departments who have not submitted. Additionally some

THE UNIVERSITY of NEW MEXICO

departments who have provided data have not thoroughly answered all the questions. We have to go back to them one on one and seek additional data for the purpose of PDM Plan development.

Don Duszynski: If we are at only 75% of the responses received, what has been done to try and get those departments to respond and why haven't they responded?

Deborah Kuidis: I have a list of those who have not provided a response. We have sent reminders numerous times for response but have not received anything. As to why they have not responded I cannot answer.

Brian Fields: I have found that many become complacent in their daily working environment and don't find this as being important. Something I have dealt with in the past.

Don Duszynski: UNM staff members are not complacent, they are just overworked and have many responsibilities with some wearing two and three different hats.

Brian Fields: And yes, some are very busy and wear many hats which they must find time to prioritize and fill out the required information which can be difficult.

Shirley Baros: Departments who are very busy have found the time to provide an answer and submit their hazard questions.

b) Update Maps with Current Data

We'll be using the State plan as a guide but will personalize the plan with UNM data. Our effort will ensure all maps used are up to date and that all hazards listed are current along with the statistics that are required for insertion to the plan.

c) Update Hazard Statistics

As stated in "b" above hazard statistic will be updated to reflect the most current data available.

d) Past Hazards on Campus and Branch Locations

Most important to the PDM plan development are past hazard that have occurred on UNM campus and branches. This data is very important in developing the mitigation goals and objectives and assigning actions that will aid in future FEMA grant funding opportunities.
A committee member asked the question on what type of action would be a funding opportunity?

THE UNIVERSITY of NEW MEXICO

Brian Fields: There could be many opportunities depending on the type hazard and past damaged that has occurred. One example, let's use flooding. If you have a building that every time UNM experiences a severe flood and it receives extensive damage what could help in mitigating this flood from damaging the building? Something to think about is what is in the building? High value items/assets? What would be the cost should it be the museum or a library? By highlighting the past hazard, cost analysis of building and contents, we can develop a mitigation action for the plan. Once approved by all, UNM can then apply for grants to help in fixing the problems and/or apply for disaster recovery funds that will aid in rebuilding or fixing what has been damaged.

The PDM Facilitator briefly discussed new business issues. Those included the following:

a) Discuss Committee Role in Developing Mission Statement, Goals and Objectives
b) Discuss Committee Role in Reviewing Department Hazard Submissions
c) Discuss Committee Role in identifying Mitigation Actions

At the next PDM Advisory Committee, members will begin the process of working "a", "b" and "c" above. The committee will play an active role in prioritizing those hazards identified by the departments and help in identifying goals and objectives and developing mitigation actions.

d) Discuss Updating Mitigation Website

Facilitator briefly discussed the PDM website that will be used as a tool for keeping the public informed on the progress of the PDM committee and development of the plan and host the agendas and minutes for review. Additionally the website will house information related to the PDM provide information as it comes available. Any suggestions for populating the website please provide to Deborah Kuidis or Shirley Baros.

The facilitator identified to the committee the need to assign meeting dates for April and May. This will ensure maximum participation and schedule management. Committee members are encouraged to send someone in their place that can make decisions on their behalf in the event of schedule conflicts. The PDM Advisory Committee committed to the following dates/times:

April Meeting: 20 April, 2009 1 – 3 p.m. Roberts Room, Scholes Hall
May Meeting: 18 May, 2009, 1 – 3 p.m. Roberts Room, Scholes Hall

Meeting agendas and working materials will be provided prior to the meeting for preparation purposes.

The PDM Advisory Committee adjourned at 10:00 a.m.

UNM PDM Presentation at the Branch Campus Luncheon, 3 November 2008

Branch Campus Luncheon Meeting Minutes

November 3, 2008 at UNM SUB, 12:00 to1:15
Sponsored by Eliseo (Cheo) Torres, Student Affairs and
Carmen Brown, Enrollment Management

Attending: See attached list for names and contact information.

TOPIC	DISCUSSION	FOLLOW-UP
Welcome and Introduction	Cheo welcomed everyone to the luncheon and introduced President Schmidly and Provost Suzanne Ortega. Each person introduced themselves and what department they were from. Provost Ortega welcomed the group and will meet those that she does not know yet. President Schmidly talked about his experience working with "branch" campuses and how they were integrated with their main campus. He also mentioned NM state's effort to cut back on their spending to plan for a deficit this year. He wants UNM to "pause" our spending and expenditures and would like for the Branch campuses to contribute toward this effort.	
FEMA Grant	Three UNM staff presented on this: Bryon Piatt, Shirley Baros and Deborah Kuidis. UNM has received two FEMA grants recently. One is for an emergency operations plan to look at vulnerabilities that we need to plan for. This could include natural disasters, such as flooding and fires, but also other areas that could be a concern. This involves a mitigation plan and future planning. The other grant is specific to campus emergencies and violence prevention and planning.	As the planning for these grants move forward, there will be more collaboration on them.
Last Meeting Minutes	The minutes from the last Branch Campus luncheon meeting (October 1, 2007) were distributed. Cheo went through the various initiatives discussed at that meeting.	
Summer Bridge	Cheo would like to have more collaboration on the Summer Bridge programs with main campus and the Branch Campuses. It could be a 2 or 3-week summer course for high school & transfer students. This program can have very positive outcomes for students who are interested in higher education. There is some funding that has been designated for this.	Tim Gutierrez will be working with the Branch Directors on this. In addition work with VP Brown to include her initiatives.
Students not Admitted to UNM	Lists of students who were not admitted to the Branches are now provided to them from main campus Enrollment Management. Carmen Brown is working on a recruitment plan for transfer students and "on the spot" admissions which streamline the admissions process. There has been an Admissions Pathway started with CNM which will be the model used for the Branches. There will be various methods used to contact them, such as emails, letters, visits to UNM. Carmen is creating a letter that will be sent out to them. Carmen is drafting a recruitment plan and she will ask for input and suggestion from the Branches when she is finished with the draft.	Carmen will continue with the plan for follow-up on students not admitted to UNM. Carmen will be asking for input on the recruitment plan draft.
Workforce Investment Act	This is sponsored by the Dept. of Labor for high school students. Pat Boyer has been working on this program to pursue funding for Los Alamos high school students and a UNM Summer Prep Program. AT this time it has been halted by the Northern Workforce Board.	Pat will continue to monitor this program.
Campus Housing	Cedric Page would like to get some funding for renovations on the Los Alamos housing that is needed. The Gallup campus is still interested in building campus residence halls.	We will ask Walt to contact them. (wcmiller@unm.edu)

Branch Campus Sign-up Sheet

Name	Department	Phone No.	Email Address
David Schmidly	UNM President		
Suzanne Ortega	Provost	7-2611	ortegast@unm.edu
Cheo Torres	Student Affairs	7-0952	cheo@unm.edu
Jozi De Leon	Equity & Inclusion	7-1238	jdeleon@unm.edu
Elena Aguirre	Child Care Ctr.	7-3365	leagu@unm.edu
Beth Miller	UNM West	925-8687	schlbeth@unm.edu
Alice Lettney	UNM-Valencia	925-8540	alicel@unm.edu
Vickie Alvarez	UNM-Taos	575-737-4245	valvarez@unm.edu
Patricia Gonzales	UNM-Taos	575-737-6212	patrodr@unm.edu
Paul Kraft	UNM-Gallup	863-7922	pkraft@gallup.unm.edu
Joan Green	ARC	7-3506	gegreen@unm.edu
George Williams	ARC	7-3506	geowillj@unm.edu
Hank Vigil	UNM-Valencia	925-8581	vigilh@unm.edu
Barry Cooney	UNM-Gallup	505-863-7501	bcooney@gallup.unm.edu
Beverly Kloeppel	Student Health	7-1068	bkloeppe@unm.edu
Carmen Brown	Enrollment Mgt.	7-1125	brown@unm.edu
Andrew Gonzalez	CEOP	7-7765	andrewg@unm.edu
Rosa Cervantes	CEOP	7-0562	isela@unm.edu
Tim Gutierrez	Student Affairs	7-0963	tgutierr@unm.edu
Kelly Baatz	Housing	7-9220	Brit1@unm.edu
Pat Boyer	UNM- Los Alamos	505-661-4692	Patboyer@unm.edu
Kate O'Neill	UNM Taos	575-737-6204	koneill@unm.edu
Christy Butler	UNM-Gallup	505-863-7519	cbutler@gallup.unm.edu
Cedric Page	UNM-Los Alamos	505-661-4689	Cpage11@unm.edu
Kim Kloeppel	Student Affairs	7-0957	kimmerly@unm.edu
Jerry Dominguez	Extended Univ.	7-2215	dominguz@unm.edu
Marc Nigliazzo	Rio Rancho Branch	925-8673	Mnigliaz@unm.edu
Jennifer Gomez-Chavez	Title V	7-7763	jengomez@unm.edu
Byron Piatt	Dept of Emer Med – FEMA	2-6103	BPiatt@salud.unm.edu
Shirley Baros	FEMA Grant	7-3622	sbaros@edac.unm.edu
Deborah Kuidis	Mgr. Indust Secur – FEMA Grant	7-0732	akuidis@unm.edu

UNM PDM Presentation to the Dean's Council Meeting

The University of New Mexico
Office of the Provost &
Executive Vice President for Academic Affairs
MSC05 3400
1 University of New Mexico
Albuquerque, NM 87131-0001

MEMORANDUM

DATE: November 4, 2008

TO: Deans

FROM: Suzanne Ortega, Provost & Executive VP for Academic Affairs

RE: Agenda for Deans' Council Meeting – November 6, 2008

The next Deans' Council meeting is scheduled for Thursday, November 6 from 3:30 to 5:00 PM in the Roberts Room of Scholes Hall.

The agenda for this week's meeting is as follows:

1. **Comments/Announcements from the Provost**
   - **Property Accounting**
2. **President Schmidly**
   - **Performance-Based Budgeting**
   - **Master Planning**
   - **Use of Harvesting Funds**
   - **Dean's Role in the Legislative Session**
3. **FEMA Grant Representative- Deb Kuidis**
4. **Diversity Report Card- Jozi De Leon**
5. **Other Business**

Please contact the Provost's Office at 277-2206 if you are unable to attend the meeting or have any questions.

UNM PDM Advisory Committee Meeting 21 October, 2008

The University of New Mexico
FEMA Pre-Disaster Mitigation & Emergency Management for Higher Education
Advisory Committee Meeting

AGENDA
Tuesday, October 21, 2008
Robert's Room, Scholes Hall
Noon to 1:30 p.m.

Meeting purpose:
- To discuss the Hazard Identification and Risk Analysis objectives and process for the **FEMA Pre-Disaster Mitigation (PDM)** and **Emergency Management for Higher Education grants**

AGENDA

1. **Introductions** – Debbie Kuidis, Manager of Industrial Security
   a. PDM Management Team
   b. PDM Advisory Committee Members
2. **FEMA PDM Sub-Grant Award Overview** – Byron Piatt, Interim UNM Emergency Manager
   a. Why is PDM so important to UNM?
   b. What is the role of the PDM Advisory Committee?
3. **Timeline** – Shirley Baros, GISP Program Manager
4. **Plan Review & Assignments** - Byron Piatt, Interim UNM Emergency Manager
   a. Review the Statewide Hazard Mitigation Plan and Crosswalk
   b. Advisory Committee Action Items
      i. Identify Critical Infrastructure
      ii. Identify Vulnerability
      iii. Timeline for Completion – December 22, 2008
      iv. Next Step

5. **Emergency Management for Higher Education Grant,** Dr. Laura Banks, Principal Investigator

5. **Questions?**

6. **Closing Remarks**

THE UNIVERSITY OF NEW MEXICO
FEMA Pre-Disaster Mitigation & Emergency Management for Higher Education
Advisory Committee Meeting

DATE: Tuesday, October 21, 2008

LOCATION: Robert's Room, Scholes Hall – University of New Mexico

MEETING: Advisory Committee

Name	Jurisdiction / Title	Miles Traveled Round Trip to Attend Meeting	Email Address or Phone Number
MICHAEL RICHARDS, MD	CHAIR, EMERGENCY MEDICINE	Ø	MRICHARDS@SALUD.UNM.EDU 505-272-5062
BYRON PIATT	INTERIM EMERGENCY MANAGER	Ø	bpiatt@salud.unm.edu 272-6103 277-0330
Debbie Kuidis	Manager of Industrial Security	Ø	dkuidis@unm.edu 269-2712
Mary Kenney	Planning & Campus Dev.	–	mkenney@unm.edu 7-9300
Paul Kraft	Gallup / Branch Campus	270	pkraft@gallup.unm.edu 863-7522
Yvonne T. Mendoza	UNM-Property Acct.	0	ymendoza@unm.edu 7-8905
Cate Wisdom	ASUNM	0	cwisdom@unm.edu 410-1553
Louis O. Saiz	CNM Risk Mgmt + Safety	/	lsaiz6@cnm.edu
JEFF Gregory for Michael Carr	ITS information Assurance	0	base@unm.edu
Joe Stravquadine	PPD FACILITIES MGR.	Ø	JSTRAVQUA@UNM.EDU 2776467
Robert Dunnington	Safety and Risk Services	Ø	rdunning@unm.edu
Shirley Baros			

THE UNIVERSITY OF NEW MEXICO
FEMA Pre-Disaster Mitigation & Emergency Management for Higher Education
Advisory Committee Meeting

DATE: Tuesday, October 21, 2008

LOCATION: Robert's Room, Scholes Hall – University of New Mexico

MEETING: Advisory Committee

Name	Jurisdiction / Title	Miles Traveled Round Trip to Attend Meeting	Email Address or Phone Number
Bill Cobb	Community/Neighbor'd	.5	Silverhillnet@aol.com
Susan McKinsey	UCAM	0	mckinsey@unm.edu
Tim Gutierrez	OSA	0	tgutierr@unm.edu
Laura Banks	UNM CDM	0	LBanks@salud.unm.edu
Carla Loendorf	UNM ITS	0	loendorf@unm.edu

UNM PDM Advisory Committee Meeting 17 June, 2008

University of New Mexico
FEMA Pre-Disaster Mitigation Advisory Committee

AGENDA
Tuesday, June 17, 2008
Bandelier Hall West Room 104
10:00 to 11:00

Meeting purpose:

- To establish the **FEMA Pre-Disaster Mitigation (PDM) Advisory Committee.**
- The Pre-Disaster Mitigation (PDM) program provides funds to states, territories, Indian tribal governments, communities, and universities for hazard mitigation planning and the implementation of mitigation projects prior to a disaster event.

AGENDA

1. **Introductions** – Dr. Tim Ward, P.E. Professor of Civil Engineering
   a. PDM Management Team
   b. PDM Advisory Committee Members
2. **FEMA PDM Sub-Grant Award Overview** – David L. R. Freeborn, CFM, State Hazard Mitigation Officer, Department of Homeland Security & Emergency Management (DHSEM)
   a. Why is PDM so important to UNM?
   b. What is the role of the PDM Advisory Committee?
3. **Interim UNM Emergency Manager** – Byron Piatt
4. **Closing Remarks**

THE UNIVERSITY OF NEW MEXICO PRE-DISASTER MITIGATION PLAN MEETING

DATE: June 17, 2008

LOCATION: EDAC/UNM Bandelier Hall Rm 104

MEETING: Advisory Committee

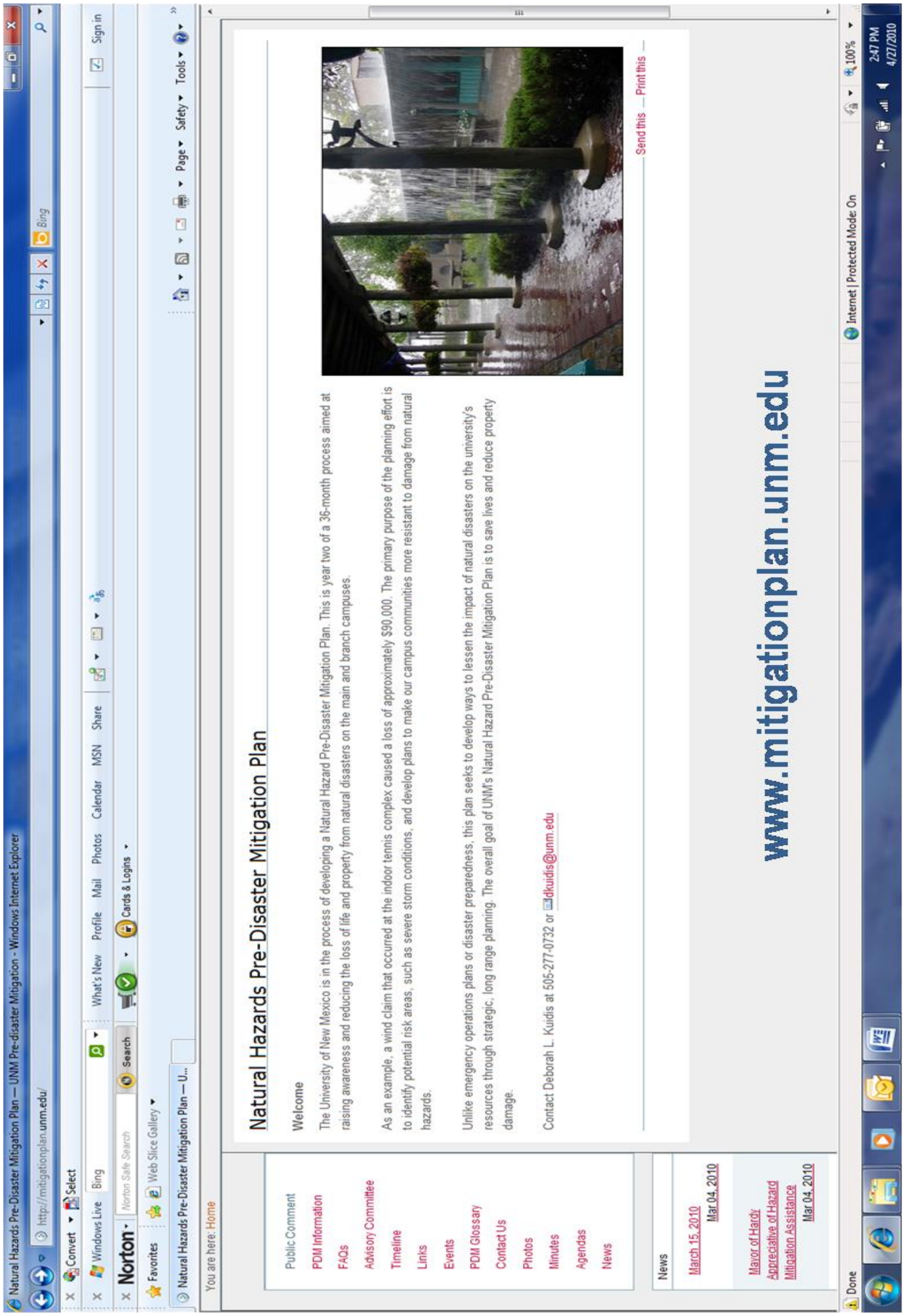
Name	Jurisdiction / Title	Miles Traveled Round Trip to Attend Meeting	Email Address or Phone Number
Robert Dunnington	Safety Manager	2.0	rdunning@unm.edu
Mike Carr	ITS: Director, Info Assurance	–	mcarr@unm.edu
Joel Straquadine	PPD / Facilities Manager	–	jstraqua@unm.edu
Jim De Zetter	SRS - Radiation Safety Mgr	–	jimdz@unm.edu
Tim E. Gutierrez	Student Affairs	–	tgutierr@unm.edu
James S. Mason	NM Dept Homeland Security	50	james.mason@state.nm.us
David Freeborn	NM DHS EM	50	[illegible] @state.nm.us
Don Duszynski	President Schmidly's Office	48	cimeria@unm.edu
Greg Sanchez	City of Alb. OEM	12	gjsanchez@cabq.gov
Pete Rieckmann	Property Accountant III	–	petec@unm.edu
Yvonne T Mendoza	Property Accountant III	–	ymendoza@unm.edu
Denise Montoya	HR Consulting & Staff Employment Director	–	montoyad@unm.edu

Meeting Start Time: 10 AM
Meeting End Time: 10:50 AM

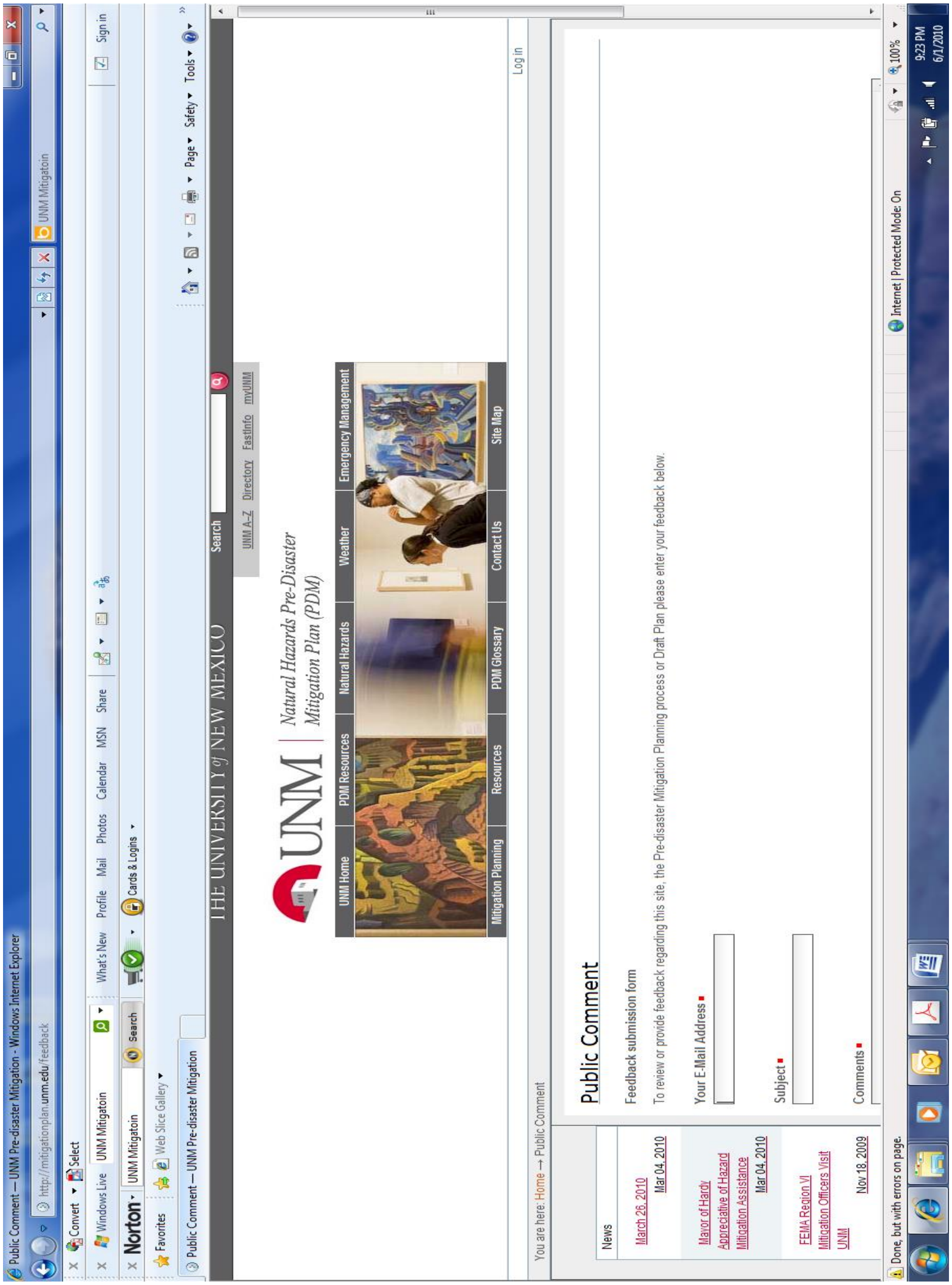
(This page intentionally left blank)

APPENDIX B – UNM MITIGATION PUBLIC AWARENESS

UNM Mitigation Website Main Page



UNM Mitigation Website Public Comment Page



UNM Article on Mitigation Planning

April 20, 2009
Volume 44, Number 9
THE UNIVERSITY *of* NEW MEXICO
UNM Today
For daily news, visit unmtoday.unm.edu

Inside UNM Today

Regents approve tuition increase, salary guidelines

Saying they made the decision reluctantly, UNM regents voted to increase in-state tuition by five percent and out-of-state tuition 10 percent for 2009-10. Student-approved fees will increase approximately $78.

In view of a decrease in state funding coupled with tuition credits of 2.5 percent for resident and eight percent for nonresident students ...

... initiatives aimed at student success as well as recruiting and retaining faculty. It will also cover some fixed costs such as increased utility expenses not already covered by state funding.

President David Schmidly recommended that all discretionary money in this year's budget be focused on the institutional priority areas of ...

The Lobos' Women's National Invitational To... the Santa Ana Star Center. The Lobos lost 78... 11 losses. Amy Beggin and Angela Hartill led
PHOTO BY CAROLYN GONZALES

... said health cost increases are averaging about 10 percent in many parts of the country. ■

Planning for disaster at UNM

BY KAREN WENTWORTH

If a natural disaster damaged or destroyed buildings at UNM today, the university would have to depend on insurance and the state for help, because federal FEMA recovery funding would not be available. That's because UNM has not yet completed the formal planning process needed to be eligible for those funds.

The Pre-mitigation Disaster Planning Advisory Committee is putting together information about buildings and property on UNM's main, south, north and branch campuses and all property owned

Continued on Page 4

THE UNIVERSITY OF NEW MEXICO
UNM TODAY
NON-PROFIT ORGANIZATION
U.S. POSTAGE PAID
ALBUQUERQUE, NM
PERMIT NO. 39

Continued from Page 1

Disaster

by UNM. It's a tremendous job, and they are struggling to get all departments to respond with appropriate information. The initial draft must be complete within the next few days.

"Once the initial plan is complete, individual departments can apply to FEMA for mitigation funding," said Shirley Baros, co-principal investigator for the FEMA planning grant. If a department's computer server is located in the basement and vulnerable to floods, Baros said a FEMA grant might provide funding to move it to a safer spot or enhance the structure.

The Office of Equal Opportunity hopes the plan will be complete soon because they want to apply for money to upgrade the UNM Web site so people with disabilities have access to critical emergency information.

Departments that have not yet furnished information to the advisory committee need to act quickly. Contact Baros at (505) 277-3622 ext. 237 or sbaros@edac.unm.edu or Debbie Kuidis at (505) 277-0732 or dkuidis@unm.edu. ■

(This page intentionally left blank)

APPENDIX C – UNM HAZARD VULNERABILITY ASSESSMENT PARTICIPANTS

This table identifies those UNM Departments, Branch Campuses and entities who participated in completing and returning the Hazard Vulnerability Assessment to the PDMT.

Anderson School of Management	**Engineering, School of:**	**Science and Technology Park**
• Parish Memorial Library	**Academic Departments:**	• Sharp Informatics
Architecture and Planning	• Chemical and Nuclear Engineering	• Technologies Venture Corp.
• Fine Arts and Design Library	• Nuclear Engineering Laboratory	• TruTouch Technologies Inc.
Arts and Sciences, Dept. of	• Civil Engineering	**Law, School of**
Academic Departments:	• Computer Science	• Law Library
• American Studies	• Electrical and Computer Engineering	**UNM Press**
• Anthropology	• Mechanical Engineering	**President, Office of the**
• Biology	**Office of the Dean, School of Engineering**	• Office of the VP of Research and Economic Development
• Chemistry	**Programs:**	• Center on Alcohol & Substance Abuse
• Communication & Journalism	• Center for Biomedical Engineering	• EPSCOR
• Earth & Planetary Sciences	• Center for Emerging Technologies	• Long Wavelength Array
• Economics	• Center for High Technology Materials	• VPR Strategic Projects Office
• English	• Center for Micro-Engineered Materials	• Sevilleta Field Station
• Foreign Language & Literatures	• Center for Nuclear Nonproliferation Science and Technology	**Risk Management Dept.**
• Geography	• Institute for Space & Nuclear Power	• Safety and Risk Services
• History	• Manufacturing Engineering Program & MTTC	**School of Public Administration**
• International Studies Institute	• Mailing Systems	**Student Affairs**
• Linguistics	• Property Accounting	• Accessibility Resource Center
• Math & Statistics	**Fine Arts, College of**	• Children's Campus (Child Care)
• Philosophy	**Academic Departments:**	• College Enrichment & Outreach
• Physics & Astronomy	• Department of Art and Art History	• Mentoring Institute
• Political Science	• Department of Cinematic Arts	• Recreational Services
• Psychology	• Department of Music	• Getaway Adventures
• Sociology	• Department of Theater and Dance	• Johnson Center
• Spanish and Portuguese	**Programs:**	• Open Recreation
• Speech and Hearing Sciences	• Art Museum	**ROTC**
Programs:	• Bunting Visual Resource Library	• Army
• Africana Studies	• Tamarind Institute	• Navy/Naval Science Dept.
• Center for Science, Tech and Policy	**Human Resources Division**	**Student Activities Center**
• Earth Data Analysis Center	**Information Technology Services**	• Student Government (ASUNM)
• Institute for Medieval Studies	**Institute for Applied Research Services**	• Student Health Center
• Maxwell Museum	• Bureau of Business & Economic Research	• Student Housing and Dining
Museum of Southwestern Biology:	• Data Bank	• Student Family Housing (off campus)
• Division of Amphibians & Reptiles	• Division of Government Research	• Student Union Building (SUB)
• Division of Arthropods	**Institutional Support Services**	• Women's Resources Center
• Division of Birds	• Alumni Chapel	**University College**
• Division of Fishes	• ARES Corp.	• The N M Musical Heritage Project
• Division of Genomic Resources	• Bookstore	• Native American Studies program
• Division of Herbarium	• Ensign-Bickford A&D/SCBT Operations	**University Libraries**
• Division of Mammals	• Golf Course	• Centennial Science and Engineering Library
• Long Term Ecological Research Network	• JOA Software and Services LLC	• Zimmerman Library
• Sevilleta LTER (program office)	• KNME-TV	**UNM Communications & Marketing**
Religious Studies	• KUNM-FM Radio	**UNM Police**
Athletics	• Parking and Transportation Services	**UNMH (UNM Hospital)**
Branch Campuses	• PhDx Systems Inc.	• Health Sciences Center BSL3 Labs
• Gallup	• Physical Plant Department	• Animal Research Facilities
• Los Alamos	• Automotive/Fuel	• Health Sciences Library and Informatics Center
• Taos	• Popejoy Hall	**UNM Policy Office**
- Harwood Museum of Art	**Continuing Education**	
• Valencia	**Education, College of**	
• West Side	**Financial Services Dept**	

(This page intentionally left blank)

APPENDIX D – HAZARD ASSESSMENT TOOL

1. Thunderstorms

a. How could this affect my operation?

b. What exactly is vulnerable and why?
   i. Critical Buildings
   ii. Critical Infrastructure
      1. Telephone / Data Lines
      2. Computer Systems
   iii. Vulnerable Populations
      1. Employees
      2. Clientele
      3. Research Subjects
   iv. Work Product
      1. Collections
      2. Archives
      3. Research

c. What could I do to lessen the impact?

d. What is our history with this incident?

2. Tornadoes

a. How could this affect my operation?

b. What exactly is vulnerable and why?
   i. Critical Buildings
   ii. Critical Infrastructure
      1. Telephone / Data Lines
      2. Computer Systems
   iii. Vulnerable Populations
      1. Employees
      2. Clientele
      3. Research Subjects
   iv. Work Product
      1. Collections
      2. Archives
      3. Research

c. What could I do to lessen the impact?

d. What is our history with this incident?

3. High Wind

a. How could this affect my operation?

b. What exactly is vulnerable and why?
   i. Critical Buildings
   ii. Critical Infrastructure
      1. Telephone / Data Lines
      2. Computer Systems
   iii. Vulnerable Populations
      1. Employees
      2. Clientele
      3. Research Subjects
   iv. Work Product
      1. Collections
      2. Archives
      3. Research

c. What could I do to lessen the impact?

d. What is our history with this incident?

4. Winter Storms

a. How could this affect my operation?

b. What exactly is vulnerable and why?
   i. Critical Buildings
   ii. Critical Infrastructure
      1. Telephone / Data Lines
      2. Computer Systems
   iii. Vulnerable Populations
      1. Employees
      2. Clientele
      3. Research Subjects
   iv. Work Product
      1. Collections
      2. Archives
      3. Research

c. What could I do to lessen the impact?

d. What is our history with this incident?

5. **Extreme Heat**
    a. How could this affect my operation?
    b. What exactly is vulnerable and why?
        i. Critical Buildings
        ii. Critical Infrastructure
            1. Telephone / Data Lines
            2. Computer Systems
        iii. Vulnerable Populations
            1. Employees
            2. Clientele
            3. Research Subjects
        iv. Work Product
            1. Collections
            2. Archives
            3. Research
    c. What could I do to lessen the impact?
    d. What is our history with this incident?

6. **Wildland/WUI Fires**
    a. How could this affect my operation?
    b. What exactly is vulnerable and why?
        i. Critical Buildings
        ii. Critical Infrastructure
            1. Telephone / Data Lines
            2. Computer Systems
        iii. Vulnerable Populations
            1. Employees
            2. Clientele
            3. Research Subjects
        iv. Work Product
            1. Collections
            2. Archives
            3. Research
    c. What could I do to lessen the impact?
    d. What is our history with this incident?

7. Earthquakes

a. How could this affect my operation?

b. What exactly is vulnerable and why?
   i. Critical Buildings
   ii. Critical Infrastructure
      1. Telephone / Data Lines
      2. Computer Systems
   iii. Vulnerable Populations
      1. Employees
      2. Clientele
      3. Research Subjects
   iv. Work Product
      1. Collections
      2. Archives
      3. Research

c. What could I do to lessen the impact?

d. What is our history with this incident?

8. Landslides

a. How could this affect my operation?

b. What exactly is vulnerable and why?
   i. Critical Buildings
   ii. Critical Infrastructure
      1. Telephone / Data Lines
      2. Computer Systems
   iii. Vulnerable Populations
      1. Employees
      2. Clientele
      3. Research Subjects
   iv. Work Product
      1. Collections
      2. Archives
      3. Research

c. What could I do to lessen the impact?

d. What is our history with this incident?

9. Land Subsidence

a. How could this affect my operation?

b. What exactly is vulnerable and why?
    i. Critical Buildings
    ii. Critical Infrastructure
        1. Telephone / Data Lines
        2. Computer Systems
    iii. Vulnerable Populations
        1. Employees
        2. Clientele
        3. Research Subjects
    iv. Work Product
        1. Collections
        2. Archives
        3. Research

c. What could I do to lessen the impact?

d. What is our history with this incident?

10. Expansive Soils

a. How could this affect my operation?

b. What exactly is vulnerable and why?
    i. Critical Buildings
    ii. Critical Infrastructure
        1. Telephone / Data Lines
        2. Computer Systems
    iii. Vulnerable Populations
        1. Employees
        2. Clientele
        3. Research Subjects
    iv. Work Product
        1. Collections
        2. Archives
        3. Research

c. What could I do to lessen the impact?

d. What is our history with this incident?

11. Volcanoes

a. How could this affect my operation?

b. What exactly is vulnerable and why?
    i. Critical Buildings
    ii. Critical Infrastructure
        1. Telephone / Data Lines
        2. Computer Systems
    iii. Vulnerable Populations
        1. Employees
        2. Clientele
        3. Research Subjects
    iv. Work Product
        1. Collections
        2. Archives
        3. Research

c. What could I do to lessen the impact?

d. What is our history with this incident?

12. Floods

a. How could this affect my operation?

b. What exactly is vulnerable and why?
    i. Critical Buildings
    ii. Critical Infrastructure
        1. Telephone / Data Lines
        2. Computer Systems
    iii. Vulnerable Populations
        1. Employees
        2. Clientele
        3. Research Subjects
    iv. Work Product
        1. Collections
        2. Archives
        3. Research

c. What could I do to lessen the impact?

d. What is our history with this incident?

13. Dam Failure

a. How could this affect my operation?

b. What exactly is vulnerable and why?
   i. Critical Buildings
   ii. Critical Infrastructure
      1. Telephone / Data Lines
      2. Computer Systems
   iii. Vulnerable Populations
      1. Employees
      2. Clientele
      3. Research Subjects
   iv. Work Product
      1. Collections
      2. Archives
      3. Research

c. What could I do to lessen the impact?

d. What is our history with this incident?

14. Drought

a. How could this affect my operation?

b. What exactly is vulnerable and why?
   i. Critical Buildings
   ii. Critical Infrastructure
      1. Telephone / Data Lines
      2. Computer Systems
   iii. Vulnerable Populations
      1. Employees
      2. Clientele
      3. Research Subjects
   iv. Work Product
      1. Collections
      2. Archives
      3. Research

c. What could I do to lessen the impact?

d. What is our history with this incident?

15. Other

a. How could this affect my operation?

b. What exactly is vulnerable and why?
    i. Critical Buildings
    ii. Critical Infrastructure
        1. Telephone / Data Lines
        2. Computer Systems
    iii. Vulnerable Populations
        1. Employees
        2. Clientele
        3. Research Subjects
    iv. Work Product
        1. Collections
        2. Archives
        3. Research

c. What could I do to lessen the impact?

d. What is our history with this incident?

APPENDIX E – STRUCTURAL AND NON-STRUCTURAL HAZARD MITIGATION CHECKLIST

*The following are **suggested** checklists (list is not all inclusive) of recommended structural and nonstructural mitigation actions:*

Structural Mitigation

Structural mitigation is reinforcing, bracing, anchoring, bolting, strengthening or replacing any portion of the building that may become damaged and cause injury such as:

- exterior walls – (e.g., use a wind resistant design for tornados or windstorms)
- exterior doors – (e.g., non-combustible materials for wildfires or urban fires)
- exterior windows – (e.g., use shutters on windows for tornados or windstorms)
- foundation – (e.g., brace, anchor or bolt the facility for earthquakes)
- exterior columns/pilasters/corbels – (e.g., steel or concrete columns)
- roof – (e.g., use non-combustible materials for wildfires or urban fires)

STRUCTURAL

_______ *Earthquakes* – anchor/brace or bolt the facility to its foundation and reinforce any portion of the exterior of the facility that may cause injury.

_______ *Floods and flashfloods* – elevate and reinforce the facility but ultimately avoid a floodplain location.

_______ *Landslide and mudflow* – build retaining walls on slopes. Build masonry walls to direct the mudflow around the facility. Bolt the foundation and reinforce the walls of the facility.

_______ *Tsunami* – elevate at-risk coastal facilities. Even the strongest building can be damaged by a powerful tsunami.

_______ *Wildfire and urban fire* – use fire resistant materials (e.g., non-combustible roofing material) on the exterior of the facility.

_______ *Tornado* – follow local building codes to use a wind resistant design for your facility.

_______ *Dam failure* – reinforce and flood-proof the facility.

Nonstructural Hazard Mitigation

Nonstructural mitigation reduces the threat to safety posed by the effects of disasters on such nonstructural elements as building contents, internal utility systems, interior glass and decorative architectural walls and ceilings. These actions involve identifying nonstructural fixtures and equipment, which are vulnerable to a disaster and which are either essential to continued operations or a threat to public safety.

Nonstructural mitigation is:

- *Retrofit* – refers to various methods for securing nonstructural items. Retrofitting methods are bracing, securing, tying down (tethers or leashes), bolting and anchoring.
- *Replace* – replacing the item with a new one that is resistant to the hazard.
- *Relocate* – moving items from a hazardous location to a non-hazardous one.
- *Backup Plan* – if there is concern that an essential service will be disrupted, provide for backup service – *it is planning for the consequences of failure*.
- Nonstructural mitigation includes all contents of the structure that do not contribute to its structural integrity such as:
- *Systems and elements* which are essential to the facility operations
- Emergency power generating equipment - plumbing, HVAC
- Fire protection system - fire sprinklers and distribution lines, emergency water tank or reservoir
- Medical equipment - respirators and life support, refrigeration units to store pharmaceuticals.
- Food storage and preparation equipment – keeping food safe to eat (i.e. refrigeration, stoves and ovens)
- Hazardous materials – restrain chemicals on shelves, containers stored on braced storage rack or tall stacks, gas tanks with flexible connections, gas tank legs anchored to a concrete footing or slab.
- *Non-essential elements* whose failure could compromise facility operations, such as:
    - Suspended lights and ceilings
    - Partitions
    - Interior doors
    - Furniture and contents - book shelves, file cabinets, etc.

NONSTRUCTURAL

_______ Brace light fixtures and other items that could fall or shake loose.

_______ Secure top and bottom of compressed gas cylinders with a safety chain.

_______ Store containers of hazardous materials on braced storage rack or tall stacks and restrain the containers with a restraining device such as metal or wire guardrails.

_______ Secure any desktop equipment such as computers, TV monitors, typewriters, printers, etc.

_______ Install shatter resistant protective film or blinds on windows to prevent glass from shattering onto people or install safety glass.

_______ Ensure that any equipment with piping be a flexible connection (e.g., gas pipes, water tanks, sprinkler piping, water heaters)

_______ Anchor any tall, unsecured furniture to the wall and/or to each other.

_______ Ensure that cabinets have positive catching latches.

_______ Secure suspended ceilings with diagonal bracing wires.

_______ Hang heavy objects away from workstations and beds.

_______ Secure any larger equipment such as copiers or heavy machinery to the floor or use tethers and attach to the wall.

_______ Cross brace tall storage racks in both directions or, for racks significantly taller than wide, secure with anchor bolts connected to the concrete slab.

_______ Ensure the main breaker or fuse box and the utility meters are elevated above the anticipated flood level of your facility to prevent damage.

_______ Secure one-of-a-kind equipment of high value from overturning or sliding.

APPENDIX F – HAZUS-MH EARTHQUAKE ASSESSMENT

Figure 61: HAZUS-MH Earthquake Results for all Six UNM Locations

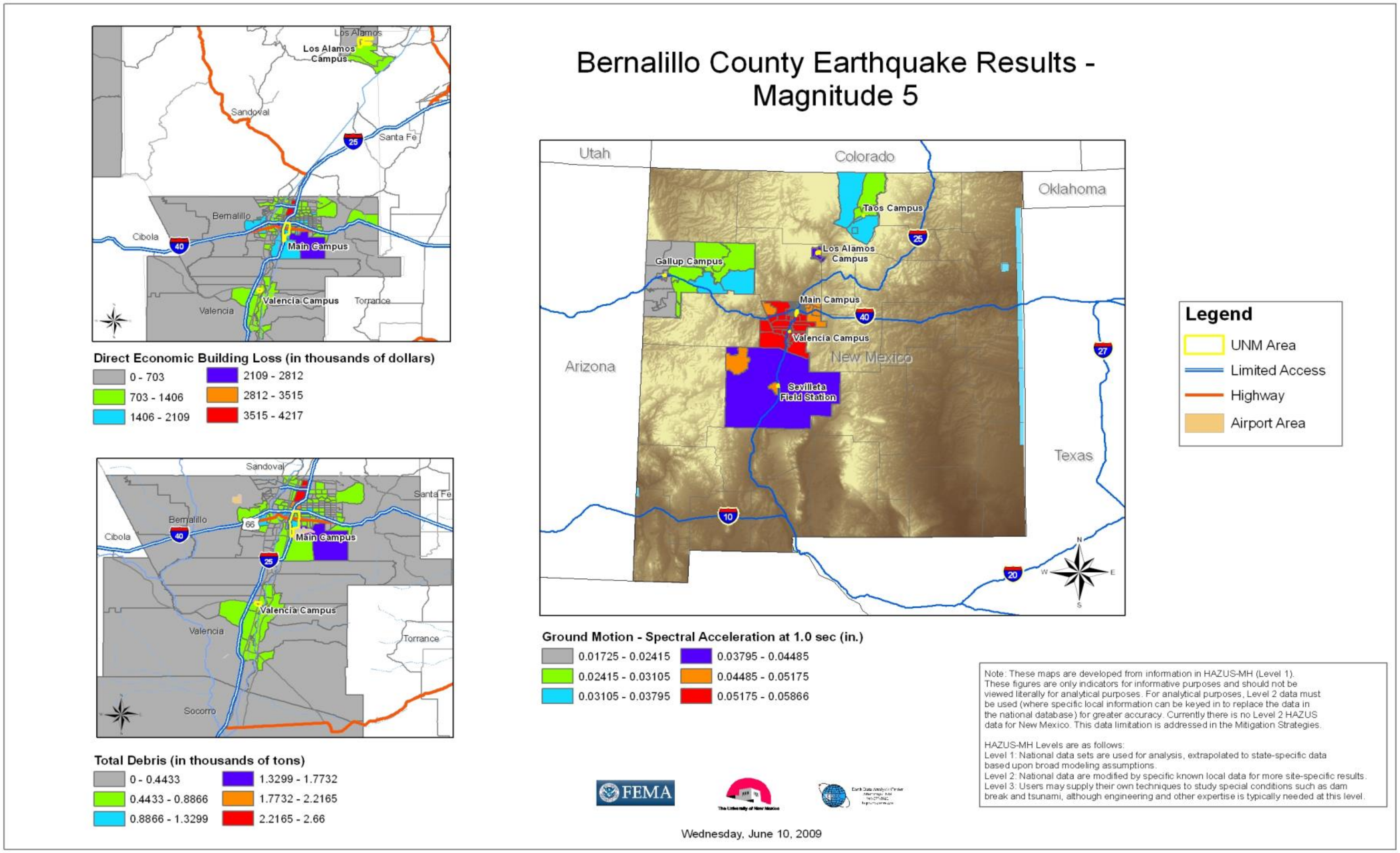


Table 54: Debris Summary Report - HAZUS-MH Earthquake Results for all Six UNM Locations

Debris Summary Report

June 23, 2009

All values are in thousands of tons.

	Brick, Wood & Others	Concrete & Steel	Total
New Mexico			
Bernalillo	31	34	65
Los Alamos	1	1	1
McKinley	0	0	1
Socorro	1	1	1
Taos	1	1	1
Valencia	4	4	8
Total	**38**	**40**	**77**
Region Total	**38**	**40**	**77**

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/states were selected at the time of study region creation.

Study Region : unm2_eq5

Scenario : mag5 quake

Page : 1 of 1

Earthquake Hazard Report

Table 55: HAZUS-MH Impact on Utilities for all Six UNM Locations

Direct Economic Loss For Utilities

June 23, 2009 *All values are in thousands of dollars*

	Potable Water	Waste Water	Oil Systems	Natural Gas	Electric Power	Communication	Total
New Mexico							
Bernalillo							
Facilities	221	269	0	0	346	13	849
Pipelines	111	88	0	94			292
Total	332	357	0	94	346	13	1,141
Los Alamos							
Facilities	0	0	0	0	0	0	0
Pipelines	5	4	0	4			12
Total	5	4	0	4	0	0	12
McKinley							
Facilities	0	17	0	1	84	0	103
Pipelines	62	49	0	52			163
Total	62	66	0	53	84	0	266
Socorro							
Facilities	0	205	0	0	0	0	206
Pipelines	131	104	0	111			346
Total	131	309	0	111	0	0	552
Taos							
Facilities	0	78	0	0	0	0	78

Study Region :unm2_eq5
Scenario : mag5 quake

Page : 1 of 2

Earthquake Hazard Report

Table 42 Continued.

	Potable Water	Waste Water	Oil Systems	Natural Gas	Electric Power	Communication	Total
Pipelines	35	28	0	30			93
Total	35	105	0	30	0	0	170
Valencia							
Facilities	0	715	0	9	0	2	726
Pipelines	77	61	0	65			204
Total	77	776	0	75	0	2	931
Total	**642**	**1,617**	**0**	**366**	**430**	**16**	**3,072**
Region Total	**642**	**1,617**	**0**	**366**	**430**	**16**	**3,072**

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/states were selected at the time of study region creation.

Study Region :unm2_eq5

Scenario : mag5 quake

Page : 2 of 2

Earthquake Hazard Report

Table 56: HAZUS –MH Utility System Dollar Exposure – All Six UNM Locations

Utility System Dollar Exposure

June 23, 2009 *All values are in thousands of dollars*

	Potable Water	Waste Water	Oil Systems	Natural Gas	Electric Power	Communication	Total
New Mexico							
Bernalillo							
Facilities	63,936	63,936	96	0	105,600	4,032	237,600
Pipelines	128,443	77,066	0	51,377			256,886
Total	**192,379**	**141,002**	**96**	**51,377**	**105,600**	**4,032**	**494,486**
Los Alamos							
Facilities	0	0	0	0	0	192	192
Pipelines	9,373	5,624	0	3,749			18,746
Total	**9,373**	**5,624**	**0**	**3,749**	**0**	**192**	**18,938**
McKinley							
Facilities	0	191,808	192	5,232	211,200	1,152	409,584
Pipelines	349,245	209,547	0	139,698			698,491
Total	**349,245**	**401,355**	**192**	**144,930**	**211,200**	**1,152**	**1,108,075**
Socorro							
Facilities	0	63,936	0	0	0	192	64,128
Pipelines	232,452	139,471	0	92,981			464,903
Total	**232,452**	**203,407**	**0**	**92,981**	**0**	**192**	**529,031**
Taos							

Study Region : unm2_eq5
Scenario : mag5 quake

Page : 1 of 2

Earthquake Hazard Report

Table 43 Continued.

	Potable Water	Waste Water	Oil Systems	Natural Gas	Electric Power	Communication	Total
New Mexico							
Facilities	0	191,808	0	0	0	192	192,000
Pipelines	128,159	76,896	0	51,264			256,318
Total	**128,159**	**268,704**	**0**	**51,264**	**0**	**192**	**448,318**
Valencia							
Facilities	0	127,872	0	2,093	0	384	130,349
Pipelines	74,562	44,737	0	29,825			149,125
Total	**74,562**	**172,609**	**0**	**31,918**	**0**	**384**	**279,473**
Total	**986,170**	**1,192,701**	**288**	**376,219**	**316,800**	**6,144**	**2,878,322**
Region Total	**986,170**	**1,192,701**	**288**	**376,219**	**316,800**	**6,144**	**2,878,322**

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/states were selected at the time of study region creation.

Study Region : unm2_eq5
Scenario : mag5 quake

Page : 2 of 2

Earthquake Hazard Report

Table 57: HAZUS-MH Building Stock Exposure All 6 UNM Locations

Building Stock Exposure By General Occupancy

June 23, 2009 *All values are in thousands of dollars*

	Residential	Commercial	Industrial	Agriculture	Religion	Government	Education	Total
New Mexico								
Bernalillo	33,260,084	6,661,110	1,178,982	64,453	526,098	230,433	420,845	42,342,005
Los Alamos	1,662,067	169,923	28,797	1,157	40,290	8,545	8,003	1,918,782
McKinley	2,412,496	357,609	36,352	1,915	51,778	39,404	77,991	2,977,545
Socorro	690,764	99,756	17,002	5,571	9,223	10,887	25,953	859,156
Taos	1,783,512	277,235	48,180	6,213	35,343	18,791	30,040	2,199,314
Valencia	2,499,754	298,520	71,624	9,850	41,364	18,373	48,185	2,987,670
Total	**42,308,677**	**7,864,153**	**1,380,937**	**89,159**	**704,096**	**326,433**	**611,017**	**53,284,472**
Region Total	**42,308,677**	**7,864,153**	**1,380,937**	**89,159**	**704,096**	**326,433**	**611,017**	**53,284,472**

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/states were selected at the time of study region creation.

Study Region : unm2_eq5

Scenario : mag5 quake

Page : 1 of 1

Earthquake Hazard Report

Table 58: HAZUS-MH Direct Economic Losses for Buildings for all Six UNM Locations

Direct Economic Losses For Buildings

June 23, 2009

All values are in thousands of dollars

	Capital Stock Losses					Income Losses				
	Cost Structural Damage	Cost Non-struct. Damage	Cost Contents Damage	Inventory Loss	Loss Ratio %	Relocation Loss	Capital Related Loss	Wages Losses	Rental Income Loss	Total Loss
New Mexico										
Taos	369	667	115	2	0.05	296	103	123	137	1,812
Valencia	2,523	5,951	1,573	31	0.28	2,048	350	426	606	13,510
McKinley	251	395	49	1	0.02	208	38	57	74	1,073
Bernalillo	22,471	56,428	16,135	313	0.19	16,107	5,291	6,214	7,865	130,824
Socorro	411	864	205	3	0.15	359	87	107	127	2,164
Los Alamos	517	1,152	255	2	0.09	314	85	104	138	2,567
Total	**26,543**	**65,457**	**18,333**	**352**	**0.13**	**19,332**	**5,954**	**7,032**	**8,947**	**151,949**
Region Total	**26,543**	**65,457**	**18,333**	**352**	**0.13**	**19,332**	**5,954**	**7,032**	**8,947**	**151,949**

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/states were selected at the time of study region creation.

Study Region : unm2_eq5
Scenario : mag5 quake

Page : 1 of 1

Earthquake Hazard Report

Table 59: HAZUS-MH Casualty Summary Report for all Six UNM Locations

Casualties Summary Report At 2 PM

June 23, 2009

	Population	Severity 1 #	Severity 2 #	Severity 3 #	Severity 4 #	Total #
New Mexico						
Bernalillo						
Commuting		0	0	0	0	0
Commercial		23	3	0	0	26
Educational		5	1	0	0	5
Hotels		0	0	0	0	0
Industrial		3	0	0	0	3
Other-Residential		2	0	0	0	2
Single Family		4	0	0	0	4
Total Bernalillo	556,678	**36**	**4**	**0**	**0**	**41**
Los Alamos						
Commuting		0	0	0	0	0
Commercial		0	0	0	0	0
Educational		0	0	0	0	0
Hotels		0	0	0	0	0
Industrial		0	0	0	0	0
Other-Residential		0	0	0	0	0
Single Family		0	0	0	0	0
Total Los Alamos	18,343	**1**	**0**	**0**	**0**	**1**
McKinley						
Commuting		0	0	0	0	0
Commercial		0	0	0	0	0
Educational		0	0	0	0	0

Study Region : unm2_eq5
Scenario : mag5 quake

Page : 1 of 3

Earthquake Hazard Report

Table 46 Continued.

	Population	Severity 1 #	Severity 2 #	Severity 3 #	Severity 4 #	Total #
Hotels		0	0	0	0	0
Industrial		0	0	0	0	0
Other-Residential		0	0	0	0	0
Single Family		0	0	0	0	0
Total McKinley	74,798	1	0	0	0	1
Socorro						
Commuting		0	0	0	0	0
Commercial		0	0	0	0	0
Educational		0	0	0	0	0
Hotels		0	0	0	0	0
Industrial		0	0	0	0	0
Other-Residential		0	0	0	0	0
Single Family		0	0	0	0	0
Total Socorro	18,078	1	0	0	0	1
Taos						
Commuting		0	0	0	0	0
Commercial		0	0	0	0	0
Educational		0	0	0	0	0
Hotels		0	0	0	0	0
Industrial		0	0	0	0	0
Other-Residential		0	0	0	0	0
Single Family		0	0	0	0	0
Total Taos	29,979	1	0	0	0	1
Valencia						
Commuting		0	0	0	0	0
Commercial		1	0	0	0	1
Educational		1	0	0	0	1
Hotels		0	0	0	0	0

Study Region : unm2_eq5
Scenario : mag5 quake

Page : 2 of 3

Earthquake Hazard Report

Table 46 Continued.

	Population	Severity 1 #	Severity 2 #	Severity 3 #	Severity 4 #	Total #
Industrial		0	0	0	0	0
Other-Residential		1	0	0	0	1
Single Family		1	0	0	0	1
Total Valencia	66,152	4	0	0	0	4
Total New Mexico		42	5	0	0	47
Region Total		42	5	0	0	47

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/states were selected at the time of study region creation.

Study Region : unm2_eq5
Scenario : mag5 quake

Page : 3 of 3

Earthquake Hazard Report

APPENDIX G – DEFINITIONS AND TERMS

Asset: Any manmade or natural feature that has value, including people; buildings; infrastructure such as bridges, roads, and sewer and water systems; lifelines such as electricity and communication resources; and environmental, cultural, or recreational features such as parks, dunes, wetlands, and landmarks.

Building: A structure that is walled, roofed, principally above ground, and permanently affixed to a site. The term also applies to a manufactured home on a permanent foundation on which the wheels and axles carry no weight.

Capability Assessment: An assessment that provides an inventory and analysis of a community or state's current capacity to address the threats associated with hazards. The capability assessment attempts to identify and evaluate existing policies, regulations, programs, and practices that positively or negatively affect the community or state's vulnerability to hazards or specific threats.

Comprehensive Plan: A document, also known as a "general plan," which covers the entire geographic area of a community and expressing community goals and objectives. The plan lays out the vision, policies, and strategies for the future of the community, including all of the physical elements that will determine the community's future development. This plan can discuss the community's desired physical development, desired rate and quantity of growth, community character, transportation services, location of growth, and siting of public facilities and transportation. In most states, the comprehensive plan has no authority in and of itself, but serves as a guide for community decision-making. Not all governmental jurisdictions maintain a plan of this type.

Comprehensive Range of Mitigation Actions: As required by the mitigation strategy, at least 2 distinct mitigation actions per hazard that are inclusive in nature and which relate to accomplishing the goals and objectives of the plan.

Cost-Benefit Review: An evaluation of the favorable returns that result vs. the monetary expenditures required to complete proposed mitigation actions. When prioritizing actions in a mitigation strategy, a special emphasis shall be made on this economic evaluation. *Note: The Cost-Benefit Review should not be confused with FEMA's Benefit-Cost Analysis software. Though this software can provide you with a method for this evaluation, it is not a required step for completing this prioritization.*

Critical facility: Facilities vital to the health, safety, and welfare of the population and that are especially important following hazard events. Critical facilities include, but are not limited to, shelters, police and fire stations, and hospitals.

Disaster Mitigation Act of 2000 (DMA 2000): DMA 2000 (PL 106-390) is legislation designed to improve the planning process signed into law on October 30, 2000 to amend the Stafford Act. This legislation reinforces the importance of mitigation planning and emphasizes planning for disasters before they occur.

Duration: How long a hazard event lasts.

Essential Facility: Elements that are important to ensure a full recovery of a community or state following a hazard event. These would include: government functions, major employers, banks, schools, and certain commercial establishments, such as grocery stores, hardware stores, and gas stations.

Extent of a Hazard: The magnitude or severity of a hazard. Not to be confused with the location or site of a hazard. The extent and damage predicted by a hazard can be established by comparing previous or predicted hazard events to established technical measures, such as the Fujita Scale for tornados. For example, a community might predict that the typical tornado that would affect them is an F2 storm, with speeds of 150 mph. The Fujita Scale predicts impacts that include “considerable damage, roofs torn off houses, mobile homes demolished, boxcars pushed over” etc. This demonstrates the extent, which is the typical magnitude and impact expected on the community.

Frequency: A measure of how often events of a particular magnitude are expected to occur. Frequency describes how often a hazard of a specific magnitude, duration, or extent typically occurs. Statistically, a hazard with a 100-year recurrence interval is expected to occur once every 100 years on average and has a 1% chance (its probability) of happening in any given year. The reliability of frequency information varies depending on the kind of hazard being considered.

Goals: General guidelines that explain what you want to achieve. They are usually broad policy-type statements, long term in nature, and represent global visions.

Governing Body: The governing body of a Tribe, County, Parish or City having legislative and administrative powers, such as passing ordinances and appropriating funds, e.g. city council, county commissioners, quorum court, policy jury, tribal council, etc.

Hazard: A source of potential danger or adverse conditions. A natural event is a hazard when it has the potential to harm people or property. Per the Section 322 of the Disaster Mitigation Act of 2000, only natural hazards are required to be assessed for mitigation planning.

Hazard Event: A specific occurrence of a particular type of hazard.

Hazard Identification: The process of identifying all the types of hazards that threaten or affect a specific planning area.

Hazard Mitigation: Sustained actions taken to reduce or eliminate long-term risk from hazards and their effects.

Hazard Mitigation Grant Program (HMGP): Authorized under Section 404 of the Stafford Act, HMGP is administered by FEMA and provides grants to states, tribes, and local governments to implement hazard mitigation actions after a major disaster declaration. The purpose of the program is to reduce the loss of life and property due to disasters and to enable mitigation activities to be implemented as a community recovers from a disaster.

Hazard Profile: It is a description of the physical characteristics of each hazard identified and a presentation of its various descriptors, including location, extent (magnitude), previous occurrences, and the probability of future events. In most cases, a community can most easily use these descriptors when they are displayed on maps.

Impact: The damage that is expected or predicted by a hazard occurring is a specific area.

Infrastructure: Public services of a community that have a direct impact on the quality of life. Infrastructure includes communication technologies (e.g., telephone lines and Internet access); vital services (e.g., public water supplies and sewer treatment facilities); transportation system components (e.g., airways, airports, and heliports); highways, (e.g., bridges, tunnels, roadbeds, overpasses, railways, rail yards, and depots); and waterways (e.g., canals, locks, seaports, ferries, harbors, dry-docks, piers, and regional dams).

Intensity: A measure of the effects of a hazard event at a particular place.

Interim Final Rule on Local Mitigation Planning (IFR): The governing regulations found in 44 CFR 201.6 which provide the criteria for completing a local hazard mitigation plan. Originally published in the Federal Register on February 26, 2002.

Inventory: The assets identified in a study region, which include buildings and infrastructure.

Location of a Hazard: The area affected by a hazard or hazard event. Some hazards are general to the whole of a planning area (thunderstorms, earthquakes) while others are very specific to known areas (flooding, landslides).

Loss Estimation: Estimation of potential losses by assigning hazard-related costs and losses to inventory data such as data for populations, building stocks, transportation and utility lines, regulated facilities, and more). Loss estimation is essential to decision-making at all levels of government and provides a basis for developing mitigation plans and policies. Loss estimation also supports planning for emergency preparedness, response, and recovery.

Magnitude: A measure of the strength of a hazard event. The magnitude (also referred to as severity) of a given hazard event is usually determined using technical measures to be specific to the hazard.

Mitigate: To cause something to become less harsh or hostile, to make less severe or painful.

Mitigation Actions: Activities or projects that help achieve the goals and objectives of a mitigation plan.

Mitigation Plan: Authorized by Section 322 of the Stafford Act, it is a document that presents a systematic evaluation of the nature and extent of an area's vulnerability to the effects of natural hazards and a description of actions to minimize future vulnerability to hazards. Note: Local Hazard Mitigation Plans must be written to meet 44 CFR Part 201.6 (Interim Final Rule on Local Mitigation Planning) and approved by FEMA for continued eligibility for FEMA mitigation grant programs.

Multi-jurisdictional Mitigation Plan: A mitigation plan that represents the participation of more than one governmental entity in its risk assessment, mitigation strategy, plan maintenance, and adoption. This is opposed to a single-jurisdictional mitigation plan which represents only one governmental entity.

Objectives: Measurable strategies or implementation steps to attain a goal. They are shorter in range and more specific than goals.

Ordinance: A term for a law or regulation adopted by a local government.

Plan Maintenance: An on-going planning function designed to maintain the reliability and accuracy of an approved mitigation plan. This process will include a method and schedule for monitoring, evaluating and updating of the plan following its approval.

Planning: The act or process of making or carrying out plans; the establishment of goals, policies and procedures for a social or economic unit.

Planning Team: A group composed of government, private sector, and individuals with a variety of skills and areas of expertise, usually appointed by a city or town manager, or chief elected official. The group finds solutions to community mitigation needs and seeks community acceptance of those solutions.

Pre-Disaster Mitigation (PDM) grant program: Authorized under Section 203 of the Stafford Act, the PDM program is administered by FEMA and provides funds to states, territories, Indian tribal governments, communities, and universities for hazard mitigation planning and the implementation of mitigation projects prior to a disaster event. Funding these plans and projects reduces overall risks to the population and structures, while also reducing reliance on funding from actual disaster declarations. PDM grants are to be awarded on a competitive basis under an annual allocation from Congress.

Preparedness: Actions that strengthen the capability of government, citizens, and communities to respond to disasters.

Probability: The numeric or statistical likelihood that a hazard event will occur. Theoretically, the probability of the occurrence of an event is between 0% (indicating that the event will never occurs) and 100% (indicating that the event always occurs).

Public Education and Outreach: Any campaign to make the public more aware of hazard mitigation and mitigation programs, including hazard information centers, mailings, public meetings, etc.

Recovery: The actions taken by an individual or community after a catastrophic event to restore order and lifelines in a community.

Reoccurrence Interval: The time between hazard events of similar size in a given location. It is based on the probability that the given event will be equaled or exceeded in any given year.

Resolutions: Expressions of a governing body's opinion, will, or intention that can be executive or administrative in nature. Most planning documents must undergo a council resolution, which must be supported in an official vote by a majority of representatives to be adopted.

Response: The actions taken during and immediately after an event to address immediate life and safety needs and to minimize further damage to properties.

Risk: The estimated impact that a hazard event would have on people, services, facilities, and structures in a community, or the likelihood of a hazard event resulting in an adverse condition that causes injury or damage. Risk is often expressed in relative terms such as a high, moderate, or low likelihood of damage being sustained above a particular threshold as a result of a specific type of hazard event. Risk also can be expressed in terms of potential monetary losses associated with the intensity of the hazard event. In mathematical terms, Risk=Hazard x Vulnerability.

Risk Assessment: A methodology used to assess potential exposures and estimated losses associated with likely hazard events. A risk assessment process includes four steps: identifying hazards, profiling hazard events, inventorying assets, and estimating losses.

Severity: See magnitude

Stafford Act: The Robert T. Stafford Disaster Relief and Emergency Assistance Act (PL100-107) was signed into law November 23, 1988 and amended the Disaster Relief Act of 1974 (PL 93-288). The Stafford Act is the statutory authority for most federal disaster response activities, especially as they pertain to FEMA and its programs. It was most recently amended with the enactment of the Disaster Mitigation Act of 2000 (PL 106-390).

STAPLEE: A systematic evaluation and prioritization method used to assess whether existing and potential alternative mitigation actions fulfill the plan's objectives and if they are appropriate for the planning area. The method evaluates the **S**ocial, **T**echnical, **A**dministrative, **P**olitical, **L**egal, **E**conomic, and **E**nvironmental (STAPLEE) opportunities and constraints of implementing a particular mitigation action within the jurisdiction.

State Hazard Mitigation Officer (SHMO): The state government representative who is the primary point of contact with FEMA, other state and federal agencies, and local units of government in the planning and implementation of pre- and post-disaster mitigation activities. This position usually resides in the State Emergency Management Agency.

Strategy: A collection of actions developed to achieve the goals and objectives. In a mitigation plan, the actions are aimed at reducing or eliminating the risk that a hazard presents to a community.

Vulnerability: How exposed or susceptible to damage an asset is. Vulnerability depends on an asset's construction, its contents, and the economic value of its functions. Vulnerability of an asset may differ from one hazard to another. As well, indirect effects can often be much more widespread and damaging than direct effects of a hazard.

Vulnerability Assessment: An assessment of the extent of injury and damage that may result from a hazard event of a given intensity in a given area. The vulnerability assessment should address the impacts of hazard events on both existing and future conditions.

(This page intentionally left blank)

APPENDIX H – ACRONYMS USED IN THIS PDM PLAN

Acronym	Term
BCA	Benefit/Cost Analysis
BD/DR	Business Continuity/Disaster Recovery
BFE	Base Floodplain Elevation
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
BNSF	Burlington Northern Santa Fe (Railroad)
BSV	B-Sting Ventures, LLC
BWS	Beaufort Wind Scale
CBR	Cost/Benefit Review
CDBG	Community Development Block Grant
CFM	Certified Floodplain Manager
CFOI	Census of Fatal Occupational Injuries
CG	Cloud-to-Ground (lightning)
CMMS	Computerized Maintenance Management System
COE	College of Economics
CRS	Community Rating System (for NFIP)
DFIRM	Digital Flood Insurance Rate Map
DMA 2000	Disaster Mitigation Act of 2000
DOC	Department of Commerce
DOD	Department of Defense
DOI	Department of the Interior
DRMS	NSF Directorate for Social, Behavioral and Economic Science, Division of Social Behavioral and Economic Research, Decision, Risk, and Management Science Program
DRU	Disaster Resistant University
EAP	Emergency Action Plan
EDA	Economic Development Administration

EDAC	Earth Data Analysis Center
EF	Enhanced Fujita Scale
EM	Emergency Management
EOC	Emergency Operations Center
EOP	Emergency Operations Plan
EPA	Environmental Protection Agency
EQIP	Environmental Quality Incentives Program
ERC	Energy Release Component
ERP	Enterprise Resource Planning
FEMA	Federal Emergency Management Agency
FHBM	Flood Hazard Boundary Map
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Studies
FMA	Flood Mitigation Assistance
FTE	Full Time Employee
FWS	Fish and Wildlife Service
FY	Fiscal Year
GAR	Governor’s Authorized Representative
GIS	Geographic Information System
GOES	Geostationary Operational Environmental Satellite
GPS	Global Positioning System
GSD	General Services Department
HAZUS-MH	Hazards U.S. Multi-Hazard
HIRA	Hazard Identification and Risk Assessment
HMGP	Hazard Mitigation Grant Program
HMO	Hazard Mitigation Officer
HUD	Housing and Urban Development
IA	Individual Assistance

IBC	International Building Code
IFR	Interim Final Rule
KBDI	Keetch-Byram Drought Index
LAL	Lightning Activity Level
LANL	Los Alamos National Laboratory
LOMR	Letters of Map Revision
LTER	Long Term Ecological Research
MHIRAM	Multi-Hazard Identification and Risk Assessment
MMI	Modified Mercalli Intensity
MPG	Mitigation Planning Group
MPH	Miles Per Hour
MRCOG	Mid-Region Council of Governments
MSA	Metropolitan Statistical Area
NCDC	National Climatic Data Center
NCHS	National Centers for Health Statistics
NEHRP	National Earthquake Hazard Reduction Program
NEPA	National Environmental Policy Act
NFHL	National Flood Hazard Layer
NFIP	National Flood Insurance Program
NHPA	National Historic Properties Act
NIBS	National Institute of Building Sciences
NIMS	National Incident Management System
NMDHSEM	New Mexico Department of Homeland Security and Emergency Management
NMDOT	New Mexico Department of Transportation
NNMCC	Northern New Mexico Community College
NPS	National Park Service
NRCS	National Resources Conservation Service
NSF	National Science Foundation

NWR	National Wildlife Refuge
NWS	National Weather Service
OCP	Office of Capital Projects
OVPR	Office of Vice President Research
PA	Public Assistance
PCD	Planning and Campus Development
PDA	Preliminary Damage Assessment
PDM	Pre-Disaster Mitigation
PDMT	Pre-Disaster Mitigation Planning Team
PDMAC	Pre-Disaster Mitigation Advisory Committee
PDSI	Palmer Drought Severity Index
PGA	Peak Ground Acceleration
PI	Principle Investigator
PNM	Public Utility Company of New Mexico
POC	Point of Contact
PPD	Physical Plant Department
RAOB	Radiosonde Observation
RGIS	Resource Geographic Information System
RH	Relative Humidity
RHS	Rural Housing Service
ROTC	Reserve Officers Training Corp
RUS	Rural Utilities Service
SBA	Small Business Administration
SC	Spread Component
SFHA	Special Flood Hazard Area
SHMO	State Hazard Mitigation Officer
SRS	Safety and Risk Services
SSA	Socorro Seismic Anomaly

STAPLEE Criteria	Social, Technical, Administrative, Political, Legal, Economic, and Environmental
TMA	The Maintenance Authority
TSA	Transportation Security Administration
UNM	University of New Mexico
UNM-LA	University of New Mexico - Los Alamos
USACE	US Army Corp of Engineers
USDA	US Department of Agriculture
USGS	United States Geological Survey
VEI	Volcanic Explosivity Index
WIPP	Waste Isolation Pilot Plant
WUI	Wildland-Urban Interface

(This page intentionally left blank)

APPENDIX I – REFERENCES

Disaster Mitigation Act of 2000 (PL 106-390)

Multi-Hazard Mitigation Planning Guidance Under the DMA 2000

Planning for a Sustainable Future: The Link between Hazard Mitigation and Livability (FEMA 364)

Rebuilding for a More Sustainable Future: An Operational Framework (FEMA 365)

FEMA Mitigation Planning “How-to” Guides (FEMA 386 series 1 - 8)

Getting Started: Building Support for Mitigation Planning (386-1)

Understanding Your Risks: Identifying Hazards and Estimating Losses (386-2)

Developing the Mitigation Plan: Identifying Mitigation Actions and Implementation Strategies (386-3)

Bringing the Plan To Life: Implementing the Hazard Mitigation Plan (386-4)

Integrating Historic Property and Cultural Resource Considerations into Hazard Mitigation Planning (386-6)

Integrating Manmade Hazards into Mitigation Planning (386-7)

Multi-Jurisdictional Mitigation Planning (386-8)

Using HAZUS-MH for Risk Assessments (FEMA 433)

Report on Drought Conditions, New Mexico Drought Monitoring Work Group, Governor’s Drought Task Force, January 2007.
Reference: http://www.nmdrought.state.nm.us/MonitoringWorkGroup/2007-01-11-dmwg-rpt.pdf

New Mexico Drought Plan, New Mexico Drought Task Force, December 2006. Reference: http://www.nmdrought.state.nm.us/2006-NM-Drought-Plan.pdf

Strategic Plan, Office of the State Engineer and the Interstate Stream Commission, September 2006. Reference:
http://www.ose.state.nm.us/PDF/Publications/StrategicPlans/strategic_plan_2006.pdf

New Mexico State Water Plan, Office of the State Engineer and the Interstate Stream Commission, December 2003,
Reference: http://www.ose.state.nm.us/water-info/NMWaterPlanning/2003StateWaterPlan.pdf

Progress Report: State of New Mexico Water Plan, Office of the State Engineer and the Interstate Stream Commission, June 2006,
Reference: http://www.ose.state.nm.us/PDF/Publications/StateWaterPlans/swp-2006-06-progress-report.pdf

No Adverse Impact: A Toolkit for Common Sense Floodplain Management. Association of State Floodplain Managers. 2003.
Reference: http://www.floods.org/NoAdverseImpact/NAI_Toolkit_2003.pdf

New Mexico Communities at Risk Assessment Plan, New Mexico Energy, Minerals and Natural Resources Department, Forestry Division, 2006,
Reference: http://www.emnrd.state.nm.us/fd/FireMgt/documents/2006_CAR.pdf

New Mexico Fire Plan, New Mexico Energy, Minerals and Natural Resources Department, Forestry Division, December 2008.
Reference: http://www.emnrd.state.nm.us/FD/FireMgt/documents/2008CARPlan_000.pdf

Framework for a Comprehensive Statewide Municipal and Industrial Water Conservation Program. Office of the State Engineer. Nov. 2003.
Reference: www.ose.state.nm.us/water-info/conservation

Strategic Plan for the New Mexico Floodplain Managers Association. NM Floodplain Managers Association. April 2003. Reference: www.nmfma.org

Multi-Hazard Identification and Risk Assessment (MHIRA), Federal Emergency Management Agency, 1997.
Reference: www.fema.gov/library/file?type=publishedFile&file=mhira_in.pdf&fileid=09d3f850-97ab-11db-b057-000bdba87d5b

A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment, 10-Year Strategy Implementation Plan National Fire Plan. USFS December 2006.
Reference:http://www.fireplan.gov/reports/10-YearStrategyFinal_Dec2006.pdf

New Mexico 2000: Census 2000 Profile. US Census Bureau, US Department of Commerce, Economics and Statistics Administration, August 2002.
Reference: http://www.census.gov/prod/2002pubs/c2kprof00-nm.pdf

Project Report, Wind Resource Maps of New Mexico. Prepared for State of New Mexico Energy, Minerals, and Natural Resource Division, Prepared by True Wind Solutions, LLC, May 30, 2003.

Water Resources of the Middle Rio Grande-San Acacia to Elephant Butte: Decision-Makers Field Guide 2009, Edited by L Greer Price, Peggy S. Johnson, and Douglas Bland, New Mexico Bureau of Geology and Mineral Resources, 2009

Balch, R.S., H.E. Hartse, A.R. Sanford, and K.W. Lin. A new map of the geographic extent of the Socorro midcrustal magma body, Bull. Seism. Soc. Am., 87, 174-182, 1997.

Fialko, Y., and M. Simons, Evidence for on-going inflation of the Socorro magma body, New Mexico, from interferometric synthetic aperture radar imaging Geop. Res. Lett., 28, 3549-3552, 2001.

Frankel, A.D., M.D. Petersen, C.S. Mueller, K.M. Haller, R.L. Wheeler, E.V. Leyendecker, R.L. Wesson, S.C. Harmsen, C.H. Cramer, D.M. Perkins, and K.S. Rukstales, Documentation for the 2002 update of the national seismic hazard maps, USGS Open-File Report 02-420, 2002.

s, G.E., 1986, Ground-water levels and direction of ground-water flow in the central part of Bernalillo County, New Mexico, summer 1983: U.S. Geological Survey Water-Resources Investigation Reports 85-4325, 24 p.

Reid, H.G., Remarkable earthquakes in central New Mexico in 1906 and 1907, Bull. Seism. Soc. Am., 1, 10-16, 1911.

Sanford, A.R., R.S. Balch, and K.W. Lin, A seismic anomaly in the Rio Grande rift near Socorro, New Mexico, New Mexico Institute of Mining and Technology Geophysics Open-File Report 78, Socorro, New Mexico, 17 pp., 1995.

Sanford, A.R., K. Lin, I. Tsai, and L.H. Jaksha, Earthquake catalogs for New Mexico and bordering areas: 1869-1998, New Mexico Bureau of Geology and Mineral Resources Circular 210, 2002.

Sanford, A., T. Mayeau, J. Schlue, R. Aster, and L. Jaksha, Earthquake catalogs for New Mexico and bordering areas II: 1999-2004, New Mexico Geology, 28 (4), 99-109, 2006.

Wilson, D., Aster, R., West, M., Ni, J., Grand, S., Gao, W., Baldridge, W.S., Semken, S., Lithospheric Structure of the Rio Grande Rift, Nature, 433, doi: 10.1038/nature03297, 2005.

Dam Safety Design and Operation Criteria. NM Office of the State Engineer. 2003.
Reference: www.ose.state.nm.us/doing-business/Dam Safaty/dam-menu.html

New Mexico Fire Plan. EMNRD Forestry Division, December 2008.
Reference: http://www.emnrd.state.nm.us/FD/FireMgt/Fire.htm

New Mexico Forest and Watershed Health Plan. EMNRD Forestry Division. 2004.
Reference: http://www.emnrd.state.nm.us/FD/FWHPlan/documents/FWHPLAN033005.pdf

New Mexico 10-Year Comprehensive Strategy Implementation Plan. December 2006. EMNRD Forestry Division.
Reference:
http://www.forestsandrangelands.gov/plan/documents/10YearStrategyFinal_Dec2006.pdf

Report on Drought Conditions, New Mexico Drought Monitoring Work Group, Governor's Drought Task Force, January 2007.
Reference: http://www.nmdrought.state.nm.us/MonitoringWorkGroup/2007-01-11-dmwg-rpt.pdf

New Mexico Drought Plan, New Mexico Drought Task Force, December 2006. Reference: http://www.nmdrought.state.nm.us/2006-NM-Drought-Plan.pdf

Strategic Plan, Office of the State Engineer and the Interstate Stream Commission, September 2006.
Reference:
http://www.ose.state.nm.us/PDF/Publications/StrategicPlans/strategic_plan_2006.pdf

New Mexico State Water Plan,
Reference: http://www.ose.state.nm.us/water-info/NMWaterPlanning/2003StateWaterPlan.pdf

Progress Report: State of New Mexico Water Plan, Office of the State Engineer and the Interstate Stream Commission, June 2006,
Reference: http://www.ose.state.nm.us/PDF/Publications/StateWaterPlans/swp-2006-06-progress-report.pdf

Handbook for New Mexico Floodplain Managers. NM Floodplain Managers Association. Sept. 2003.
Reference: www.nmfma.org/handbook.htm

No Adverse Impact: A Toolkit for Common Sense Floodplain Management. Association of State Floodplain Managers. 2003.
Reference: http://www.floods.org/NoAdverseImpact/NAI_Toolkit_2003.pdf

New Mexico Communities at Risk Assessment Plan, New Mexico Energy, Minerals and Natural Resources Department, Forestry Division, 2006
Reference: http://www.emnrd.state.nm.us/fd/FireMgt/documents/2006_CAR.pdf

New Mexico Fire Plan, New Mexico Energy, Minerals and Natural Resources Department, Forestry Division, December 2008.
Reference: http://www.emnrd.state.nm.us/FD/FireMgt/Fire.htm

Framework for a Comprehensive Statewide Municipal and Industrial Water Conservation Program. Office of the State Engineer. Nov. 2003.
Reference: www.ose.state.nm.us/water-info/conservation

Strategic Plan for the New Mexico Floodplain Managers Association. NM Floodplain Managers Association. April 2003. Reference: www.nmfma.org

Multi-Hazard Identification and Risk Assessment (MHIRA), Federal Emergency Management Agency, 1997.
Reference: http://www.fema.gov/library/viewRecord.do?id=2214

A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment, 10-Year Strategy Implementation Plan National Fire Plan. USFS December 2006.
Reference: http://www.fireplan.gov/reports/10-YearStrategyFinal_Dec2006.pdf

New Mexico 2000: Census 2000 Profile. US Census Bureau, US Department of Commerce, Economics and Statistics Administration, August 2002.
Reference: http://www.census.gov/prod/2002pubs/c2kprof00-nm.pdf

Project Report, Wind Resource Maps of New Mexico. Prepared for State of New Mexico Energy, Minerals, and Natural Resource Division, Prepared by True Wind Solutions, LLC, May 30, 2003.

Water Resources of the Middle Rio Grande-San Acacia to Elephant Butte: Decision-Makers Field Guide 2007, Edited by L Greer Price, Peggy S. Johnson, and Douglas Bland, New Mexico Bureau of Geology and Mineral Resources, May 2007

Mining in New Mexico-The Environment, Water, Economics, and Sustainable Development: Decision-Makers Field Guide 2005, Edited by L. Greer Price, Douglas Bland, Virginia T. McLemore, and James M. Barker, New Mexico Bureau of Geology and Mineral Resources, 2009.

Water, Watersheds, and Land Use in New Mexico: Impacts of Population Growth on Natural Resources-Santa Fe Region: Decision-Makers Field Guide 2001, Edited by Peggy S. Johnson, New Mexico Bureau of Geology and Mineral Resources, 2001.

Planning For Extremes; A Report from Soil and Water Conservation Society Workshop, Soil and Water Conservation Society, 2007.
Resource: http://www.swcs.org/documents/Planning_for_Extremes.pdf