



Disaster-Resistant University Hazard Mitigation Plan
Section 8 Mitigation Strategy

Section 8 Mitigation Strategy

The Interim Final Rule (IFR) published in the February 26, 2002 Federal Register requires mitigation strategies as part of a hazard mitigation plan. This section of the plan addresses that requirement.

Contents of this Section

- 8.1 IFR Requirement for Mitigation Strategy
- 8.2 University of Maryland Mitigation Goals
- 8.3 University of Maryland Mitigation Objectives and Strategies
- 8.4 University of Maryland Mitigation Priorities
- 8.5 University of Maryland Mitigation Actions
- 8.6 Evaluation of Mitigation Actions

8.1 IFR Requirement for Mitigation Strategy

Mitigation Strategy: §201.6(c)(3): The plan shall include a mitigation strategy that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools.

Local Hazard Mitigation Goals (Page 3-30 of the Part 3 Multi-Hazard Mitigation Planning Guidance).
Requirement §201.6(c)(3)(i): [The hazard mitigation strategy shall include a] description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.

Identification and Analysis of Mitigation Actions (Page 3-32 of the Part 3 Multi-Hazard Mitigation Planning Guidance) Requirement §201.6(c)(3)(ii): [The mitigation strategy shall include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.

Implementation of Mitigation Actions (Page 3-36 of the Part 3 Multi-Hazard Mitigation Planning Guidance) Requirement: §201.6(c)(3) (iii): [The mitigation strategy section shall include] an action plan describing how the actions identified in section (c)(3)(ii) will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.



Disaster-Resistant University Hazard Mitigation Plan
Section 8 Mitigation Strategy

8.2 University of Maryland Mitigation Goal

Goals are general descriptions of desired long-term outcomes. State and federal guidance and regulations pertaining to mitigation planning require the development of mitigation goals to reduce or avoid long-term vulnerabilities to identified hazards.

As required by the planning process, the Mitigation Core Team developed a goal statement that expresses the University's desire to minimize its exposure to the effects of natural hazards (risks). To do so, the team reviewed FEMA's national mitigation goals, several examples of goal statements from other states and communities, and the State of Maryland mitigation goals. The committee also considered information about natural hazards that may occur in the area and their potential consequences and losses.

Mitigation Goal

Ensure that the University of Maryland minimizes the impacts of natural hazards on its students, staff and visitors, and on its physical assets and operations.

8.3 University of Maryland Mitigation Objectives and Strategies

Objectives

Objectives are well-defined intermediate points in the process of achieving goals. The University's mitigation planning objectives include:

1. Reduce potential impacts of natural hazards on critical facilities and populations.
2. Maintain full, detailed knowledge of the potential effects of natural hazards on UM.
3. Fund mitigation actions through federal and State grants.
4. Achieve full cross-integration of the mitigation plan with other UM plans and guidance.

Strategies

A strategy is a specific course of action to achieve an objective or objectives. University of Maryland mitigation planning strategies include:

1. Integrate effective mitigation practices and concepts in to other UM plans.
2. Seek grant funding for mitigation actions and projects.
3. Implement cost-effective projects and actions to reduce risk from natural hazards.
4. As appropriate, work with surrounding jurisdictions and the State to ensure that policies and mitigation actions are coordinated effectively.



Disaster-Resistant University Hazard Mitigation Plan
Section 8 Mitigation Strategy

5. Undertake detailed risk studies of UM critical assets to identify vulnerabilities and potential projects to reduce them.
6. Monitor mitigation measures to ensure they are functioning efficiently.
7. Continuously monitor and update this Plan to ensure that it remains current.

8.4 University of Maryland Mitigation Actions

The mitigation committee considered a number of related factors in identifying and prioritizing mitigation actions. High priority was placed on actions that are consistent with current UM policies, those that are technically feasible and have high political and social acceptance, and those that can be achieved using existing authorities, budget levels, and staff.

High Priority Actions

High Priority Action 1

Action: **Retrofit Electrical Feed to Security Operations Center in Pocomoke Building**

This project is to retrofit the electrical feed to the Pocomoke Building, as a mitigation measure to reduce the risk of losing power in a high-wind event. This facility is the coordination center for the University during emergencies, and is considered one of the most critical facilities on the campus.

Lead Office: Facilities Management and/or UMPD.
Support: High level of support from multiple sources is likely because of criticality and potential for widespread damages if the function is interrupted.
Status: Pending availability of grant funds or internal funding by UM.
Cost: Pending final engineering report.
Effectiveness: Very effective; eliminates almost all risk related to wind hazard for this element.
Cost Effectiveness: Presumed highly cost-effective because the project effectively eliminates risk to a vulnerable element in a critical facility.
Timing: To be determined based on UM priorities and availability of grant funds.

High Priority Action 2

Action: **Retrofit Windows or Install Shutters for Security Operations Center in Pocomoke Building**

This project is to retrofit exterior windows or install shutters on the Security Operations Center in the Pocomoke Building, in order to mitigate the risk of breakage from overpressure or vacuum, or penetration from flying debris during high wind events. Even relatively simple mitigation measures such as applying film to windows or installing exterior shutters can greatly reduce the potential for damage. Not only does this increase life safety for occupants, but it improves the survivability of the entire facility during high wind events by preventing wind and water from entering the structural envelop of the building.



Disaster-Resistant University Hazard Mitigation Plan
Section 8 Mitigation Strategy

Lead Office: Facilities Management and/or UMDPS (Dept. of Public Safety)
Support: High level of support from multiple sources is likely because of criticality and potential for widespread damages if the function is interrupted.
Status: Pending availability of grant funds or internal funding by UM.
Cost: Pending final engineering report.
Effectiveness: Very effective; eliminates almost all risk related to wind hazard for this element.
Cost Effectiveness: Presumed highly cost-effective because the project effectively eliminates risk to a vulnerable element in a critical facility.
Timing: To be determined based on UM priorities and availability of grant funds.

High Priority Action 3

Action: **North Campus Storm Sewer System Repair/Upgrade (UM Project QC 8766)**

This project is to modify a portion of the existing campus stormwater distribution system. The area to be modified is in the north part of the campus, beneath the road surfaces in Regents and Stadium Drives, near the corner of the Bio-Chemistry building. Because of a long-term increase in impervious surfaces upstream of this area, the volume of water that had previously percolated into the soil or was diverted elsewhere is now directed into the storm system in this area. Based on experience and a recent engineering study of the area, the existing system is clearly under capacity, with the result that several buildings have been repeatedly flooded by overland flows due to surcharge and a lack of drainage capacity. This project would increase the capacity of the underground drainage system and thereby reduce the risk to surrounding buildings. This is particularly important because of the potential for damage to the A.V. Williams building, which has a critical function in campus-wide communications.

Lead Office: Facilities Management.
Support: Strong.
Status: Underway as of Spring 2007.
Cost: Estimated \$1,700,000.
Effectiveness: Very effective for most rainfall/flood events.
Cost Effectiveness: Highly cost-effective because of criticality of functions that may be affected by flooding (primarily A.V. Williams facility).
Timing: To be determined based on UM priorities.

High Priority Action 4

Action: **Small-scale Local Flood Mitigation Projects near South Mall**

This project is to make repairs to existing foundation drains for several buildings along the south side of McKeldin Mall. The purpose of these modifications and repairs is to reduce the effects of repeated flooding that occurs because of excessive runoff and an oversubscribed existing storm water system. The overall project includes excavation and replacement of the existing foundation drain systems for Taliaferro, Woods, Skinner, and Frances Scott Key Halls.



Disaster-Resistant University Hazard Mitigation Plan
Section 8 Mitigation Strategy

Lead Office: Facilities Management.
Support: Strong.
Status: Pending availability of grant funds or internal funding by UM.
Cost: Estimated \$2,400,000, for all projects; individual projects depend on scale.
Effectiveness: Very effective for most rainfall/flood events.
Cost Effectiveness: Highly cost-effective because of high probability of more floods occurring on this site. As described in the risk assessment part of this plan, several buildings on the south side of the Mall flood numerous times per year. Although the floods are typically not causing extreme damages, the University spends probably \$10,000 per year on repairs to each building, including drying or replacing carpet, removing and replacing drywall, and mold mitigation, among other incidental expenses. The use of offices and classrooms is interrupted by these events as well, meaning that additional staff time and logistics support is regularly required in response to the floods. These mitigation measures are relatively inexpensive and simple to implement, and will solve the most recurrent flood problems.
Timing: To be determined based on UM priorities.

High Priority Action 5

Action: **Detailed Risk, Mitigation Options and Feasibility Study of Security Operations Center in the Pocomoke Building.**

This project is to perform a detailed risk assessment of the Security Operations Center (SOC) in the Pocomoke Building. The purpose of the study is two-fold. First, engineers will perform a detailed assessment of risks to the SOC, based on the potential for various hazards to impact the facility (the expectation is that the study will focus on wind risks, but this will not be known until the work commences). The study will identify vulnerabilities to all building components (including windows, doors, roof, electrical/gas feeds, etc.); quantify the potential for failure of various building components, and estimate the possible physical and operational losses related to those failures. The second part of the study will be to identify mitigation options to reduce or eliminate these risks, and to assess their feasibility and potential cost. This aspect of the study will also determine the appropriate engineering standards for the retrofit.

Lead Office: Facilities Management.
Support: Strong.
Status: Pending availability of grant funds or internal funding by UM.
Cost: Estimated \$25,000.
Effectiveness: Not independently effective as mitigation, but necessary to determine the best course of action to reduce risks.
Cost Effectiveness: Not cost effective as a stand-alone mitigation action, but will lead to effective use of UM and/or grant funds for reducing risks.
Timing: To be determined based on UM priorities.



Disaster-Resistant University Hazard Mitigation Plan
Section 8 Mitigation Strategy

Second Priority Actions

Second Priority Action 1

Action: **Construct and/or Harden Shelter Facilities in High-Occupancy Areas**

This project is to construct or harden hazard shelters in or near high-occupancy areas of the campus. Certain areas of the campus where there are typically high concentrations of students or staff will make good locations for tornado or hurricane shelters. A study of shelter requirements and feasibility should be conducted prior to undertaking any engineering projects, detailed planning, or development of specifications (see Action 2 below).

Lead Office: Facilities Management.
Support: To be determined, but likely to have strong support.
Status: To be determined, may require capital budgeting depending on grant availability.
Effectiveness: Highly effective when coordinated with detection and warning systems.
Cost: To be determined based on engineering study; depends on size of facility.
Cost Effectiveness: Highly cost-effective, depending on occupancy and proximity to populations.
Timing: To be determined, but within five years, after feasibility study.

Second Priority Action 2

Action: **Study Wind Vulnerabilities in High-Occupancy and Critical Facilities;
Identify Appropriate Shelter Areas.**

The scope of the UM Hazard Mitigation Plan did not allow highly detailed wind vulnerability assessments of all campus facilities, but the planning process did identify elements in critical facilities that may have some increased vulnerability to wind hazards. UM will use a similar process to select high-priority facilities for additional study, and will develop recommendations regarding potential retrofits to harden these against potential wind damage.

Lead Office: Facilities Management.
Support: To be determined, but likely to have reasonably strong support.
Status: Pending.
Cost: To be determined, but probably in the \$150,000 range, depending on scope.
Effectiveness: Necessary precursor to retrofits; required for grant applications.
Cost Effectiveness: Not independently cost-effective, but mandatory for development of effective grants and retrofit projects.
Timing: To be determined based on UM priorities.



Disaster-Resistant University Hazard Mitigation Plan
Section 8 Mitigation Strategy

Second Priority Action 3

Action: **Critical Facility Wind Retrofits**

Retrofit critical UM facilities to withstand high winds. A campus-wide wind study would identify vulnerabilities in key assets and operations, and lead to development of appropriate mitigation alternatives. For vulnerable buildings and populations, wind retrofits tend to be very cost-effective because they are often relatively inexpensive to implement. UM has a history of losses from wind effects, and, as described in the risk assessment portion of the plan, some relatively old buildings that may be good candidates for simple retrofits like window film or improving structural connections among building components.

- Lead Office:** Facilities Management.
Support: To be determined, but likely to be widely supported.
Status: Pending.
Cost: Depends on measure. This will be determined based on the vulnerability assessment phase of the overall work.
Effectiveness: Wind retrofit projects tend to be highly effective in reducing potential damage, although it is not possible to indicate this definitively prior to project development.
Cost Effectiveness: Highly cost effective if appropriate projects result from the study; generally speaking wind retrofits are relatively inexpensive, though their effectiveness is often limited to low-probability/high-consequence events. Because of this, any such work will likely focus on highly vulnerable and very valuable facilities.
Timing: To be determined based on UM budgeting priorities and availability of outside funding sources.

Second Priority Action 4

Action: **Detailed Assessment of Lightning Vulnerabilities Campus-Wide**

This project is to perform a detailed engineering assessment of lightning vulnerabilities across the campus. There are numerous potential vulnerabilities to lightning on the campus, including antennae and computer and electrical systems that may be exposed to power surges.

- Lead Office:** Facilities Management.
Support: Unknown, but likely to be widely supported.
Status: To be determined, may require capital budgeting depending on grant availability.
Effectiveness: Necessary precursor to retrofits; required for grant applications.
Cost: To be determined, likely in \$200,000 range depending on level of detail and need for design recommendations.
Cost Effectiveness: Not independently cost-effective, but mandatory for development of effective grants and retrofit projects.
Timing: To be determined, but within five years, after feasibility study.



Disaster-Resistant University Hazard Mitigation Plan
Section 8 Mitigation Strategy

Second Priority Action 5

Action: Selective Retrofits/Upgrades to Reduce Lightning Vulnerabilities

Retrofit critical UM facilities to improve resistance to lightning strikes. A campus-wide lightning vulnerability study would identify vulnerabilities in key assets and operations, and lead to development of appropriate mitigation alternatives. For vulnerable buildings and populations, lightning retrofits may be very cost-effective because they are often relatively inexpensive to implement. UM has a history of losses from lightning effects, and, as described in the risk assessment portion of the plan, some critical operations may benefit from even fairly simple retrofits.

Lead Office: Facilities Management.
Support: To be determined, but likely to be widely supported.
Status: Pending.
Cost: Depends on measure. This will be determined based on the vulnerability assessment phase of the overall work.
Effectiveness: Very effective depending on measure selected.
Cost Effectiveness: Cost-effective if appropriate projects result from the study.
Timing: To be determined based on UM budgeting priorities.

Second Priority Action 6

Action: Fully Integrate Hazard Mitigation into the UM Capital Improvement and Master Plans

It will benefit the University at large if the Capital Improvement and Master plans include mitigation components, and if the mitigation plan includes details of the Master Plan and CIP. There presently exists no structure for beginning this process. Completing this task will require development of a working group that is authorized by the University, and a thorough examination of existing plans to determine the best method to integrate them.

Lead Office: Facilities Management, others.
Support: To be determined, but likely to be widely supported.
Status: Pending.
Cost: Minimal if existing UM resources can be employed.
Effectiveness: Difficult to determine exactly, but presumed very effective if the action results in improved hazard mitigation activities.
Cost Effectiveness: Very inexpensive, and presumed cost effective.
Timing: To be determined.



Disaster-Resistant University Hazard Mitigation Plan
Section 8 Mitigation Strategy

Second Priority Action 7

Action: Initiate a Mitigation Outreach/Education Effort on the Campus

UM occasionally promulgates information about hazards, capabilities and response options, but the efforts could be better organized and coordinated to reach the maximum number of students and staff, and those who are at the most risk. This action is to develop and implement an outreach program (and associated materials) that would be used to inform students and staff about known natural hazard risks on the campus, and to make them aware of the appropriate responses under different conditions. This effort would include a combination of written materials, broadcast via the internet, and occasional public relations efforts, such as a presentation at Maryland Day, or giving new students materials during orientation. The effort would include disseminating information about warnings, shelters, and communications, among other subjects.

- Lead Office:** Facilities Management, others.
Support: To be determined, but likely to be widely supported.
Status: Pending.
Cost: Minimal if existing UM resources can be employed.
Effectiveness: Difficult to determine exactly, but presumed very effective if the action results in improved safety for students and staff.
Cost Effectiveness: Very inexpensive, and presumed cost effective.
Timing: To be determined.

8.6 Evaluation of Mitigation Actions

As part of its normal Plan monitoring, maintenance and update processes (described in detail in Section 10), the University of Maryland will review mitigation actions it has taken, to determine their success, and to identify any additional actions that may be indicated or needed. UM will make a particular effort to evaluate actions and projects with respect to their performance during hazard events, to determine their mitigation effectiveness.