

# **RISK ASSESSMENT & MITIGATION PLAN**

## **PURPOSE**

The purpose of this section of the City Disaster Plan is to describe and outline the process of assessing and mitigating our exposure to the effects of a disaster. The process of hazard identification reveals potential hazards and their likelihood of causing an incident (probability). It also predicts the potential effects or consequences of an incident (severity). Risk assessment is the combination of probability and severity. Incidents of either very low probability or very low severity require less time and effort in the planning process than incidents more likely to occur with more severe results. Mitigation is a process of reducing the likelihood of an event when possible and/or taking steps to reduce the impact of the event when it occurs. Mitigation efforts are directed toward those situations which present the greatest risk.

The potential of any particular event occurring may or may not be controllable. As an example, a tornado cannot be predicted nor can it be controlled. The best anyone can hope for is to reduce the impact of a tornado by developing personnel safety programs and making contingency plans for the destruction of property and records. The mitigation process includes general principles which apply to all City departments. In a department where a higher likelihood of occurrence has been identified in the risk assessment process, or where a higher level of impact is anticipated if a problem occurs, additional safeguards or safety programs need to be developed and implemented.

## **GENERAL RESPONSIBILITIES**

We typically think of disaster planning in terms of large scale events. However, the issue of what constitutes a disaster is as it affects each individual. A single injury can constitute a disaster to the person experiencing the pain. In that sense, mitigation begins at the most basic level in each department. Where common sense doesn't prevail, government regulation usually does. Each City-owned facility is subject to local and state codes which dictate how the structures are built and maintained. The codes have evolved, in part, as a result of past problems and tragedies in which lessons were learned about how to make buildings safer for occupants. Each employee is obligated to adhere to the codes and correct violations as they are identified. Past efforts have left most City facilities in pretty good shape, code-wise. However, continued compliance takes some effort on the part of the employees to reduce or eliminate man-made disasters.

As it relates to its employees, the City has an obligation to provide a safe work environment, including the facilities, vehicles, and equipment. That includes adherence to building and fire codes, in addition to other mandatory employee programs, such as the Right-To-Know program. OSHA dictates a number of provisions and programs which help to assure a safe work environment.

Alternately, the employees are obliged to follow all safety rules, identify and report any unsafe conditions, and expend the effort necessary to maintain the work areas in a safe condition. Very simply, creating and maintaining a safe work environment is the responsibility of all City employees.

## PROCEDURES

The risk assessment process was conducted first for City-owned facilities. Disaster planning begins at home. It began with a hazard analysis of city properties where certain disastrous events may occur. The National Fire Protection Association (NFPA) Standard 1600, *Recommended Practice for Disaster Management*, 1995 edition, contains a risk assessment code matrix approach to evaluating risk.

The first step is to assess the worst credible result of a disaster scenario. A severity code is then assigned to the particular event. For planning purposes, seven (7) events were assessed. Those included tornado, lightning, hazardous material incident, fire, power outage, theft, and flooding. The severity categories included, from least to worst result, 'negligible', 'marginal', 'critical', and 'catastrophic'. Each City department was evaluated in this way.

Following the hazard severity assessment, the hazard probability was estimated. Every disaster scenario presents it's own likelihood in each department, and that probability was categorized with one of the designations, 'unlikely', 'possible', 'likely', and 'highly likely'. A hazard probability was associated with each type of disaster scenario for each department facility.

As a result of the severity and probability assessments, a hazard analysis chart was created which summarizes the results of the evaluations. The hazard analysis chart shows the disaster risks in terms of their probability and severity for each listed disaster scenario, in each city department. With that information, a risk assessment code matrix was developed for each department. The matrices display in graphic form the relative risk associated with each disaster scenario. A sample risk assessment code matrix is shown below and shows the relative positions on the matrix ranging from very low hazards to high hazards. Given those relative positions of the hazards on matrix, priority decisions related to the mitigation of the hazards can be made. The risk assessment code matrices for each department are shown on the pages following. The hazard analysis chart is shown at the end of this section.

### **RISK ASSESSMENT CODE MATRIX - Sample**

<b>CATASTROPHIC</b>	Low Hazards			High Hazards
<b>CRITICAL</b>		Medium Hazards	Medium Hazards	
<b>MARGINAL</b>		Medium Hazards	Medium Hazards	
<b>NEGLIGIBLE</b>	Very Low Hazards			Low Hazards
	<b>UNLIKELY</b>	<b>POSSIBLE</b>	<b>LIKELY</b>	<b>HIGHLY LIKELY</b>

### RISK ASSESSMENT CODE MATRIX - City Hall

<b>CATASTROPHIC</b>		Tornado	Fire	
<b>CRITICAL</b>	Flood		Theft	
<b>MARGINAL</b>			Lightning	
<b>NEGLIGIBLE</b>		Haz Mat		Power Outage
	<b>UNLIKELY</b>	<b>POSSIBLE</b>	<b>LIKELY</b>	<b>HIGHLY LIKELY</b>

### RISK ASSESSMENT CODE MATRIX - Public Safety Building

<b>CATASTROPHIC</b>	Flood	Tornado		
<b>CRITICAL</b>			Lightning Fire, Theft	
<b>MARGINAL</b>				
<b>NEGLIGIBLE</b>		Haz Mat		Power Outage
	<b>UNLIKELY</b>	<b>POSSIBLE</b>	<b>LIKELY</b>	<b>HIGHLY LIKELY</b>

### RISK ASSESSMENT CODE MATRIX - Library

<b>CATASTROPHIC</b>	Flood	Tornado	Fire	
<b>CRITICAL</b>			Theft	
<b>MARGINAL</b>				
<b>NEGLIGIBLE</b>		Haz Mat	Lightning	Power Outage
	<b>UNLIKELY</b>	<b>POSSIBLE</b>	<b>LIKELY</b>	<b>HIGHLY LIKELY</b>

**RISK ASSESSMENT CODE MATRIX - Art Center**

<b>CATASTROPHIC</b>	Flood	Tornado	Fire	
<b>CRITICAL</b>			Theft	
<b>MARGINAL</b>				
<b>NEGLIGIBLE</b>		Haz Mat	Lightning	Power Outage
	<b>UNLIKELY</b>	<b>POSSIBLE</b>	<b>LIKELY</b>	<b>HIGHLY LIKELY</b>

**RISK ASSESSMENT CODE MATRIX - Water Pollution Control Plant**

<b>CATASTROPHIC</b>		Tornado Flood		
<b>CRITICAL</b>			Haz Mat Fire	
<b>MARGINAL</b>				
<b>NEGLIGIBLE</b>			Lightning Theft	Power Outage
	<b>UNLIKELY</b>	<b>POSSIBLE</b>	<b>LIKELY</b>	<b>HIGHLY LIKELY</b>

**RISK ASSESSMENT CODE MATRIX - Public Works**

<b>CATASTROPHIC</b>		Tornado	Lightning	
<b>CRITICAL</b>	Flood		Fire	
<b>MARGINAL</b>			Haz Mat	
<b>NEGLIGIBLE</b>			Theft	Power Outage
	<b>UNLIKELY</b>	<b>POSSIBLE</b>	<b>LIKELY</b>	<b>HIGHLY LIKELY</b>

### RISK ASSESSMENT CODE MATRIX - Weed Park

<b>CATASTROPHIC</b>		Tornado	Lightning	
<b>CRITICAL</b>				
<b>MARGINAL</b>				
<b>NEGLIGIBLE</b>	Flood		Haz Mat Fire, Theft	Power Outage
	<b>UNLIKELY</b>	<b>POSSIBLE</b>	<b>LIKELY</b>	<b>HIGHLY LIKELY</b>

### RISK ASSESSMENT CODE MATRIX - Soccer Complex

<b>CATASTROPHIC</b>			Lightning	
<b>CRITICAL</b>				
<b>MARGINAL</b>		Tornado		
<b>NEGLIGIBLE</b>		Fire Flood	Haz Mat Theft	Power Outage
	<b>UNLIKELY</b>	<b>POSSIBLE</b>	<b>LIKELY</b>	<b>HIGHLY LIKELY</b>

### RISK ASSESSMENT CODE MATRIX - Kent Stein Park

<b>CATASTROPHIC</b>			Lightning	
<b>CRITICAL</b>				
<b>MARGINAL</b>		Tornado		
<b>NEGLIGIBLE</b>		Fire Flood	Haz Mat Theft	Power Outage
	<b>UNLIKELY</b>	<b>POSSIBLE</b>	<b>LIKELY</b>	<b>HIGHLY LIKELY</b>

### RISK ASSESSMENT CODE MATRIX - Transfer Station

<b>CATASTROPHIC</b>		Tornado		
<b>CRITICAL</b>		Flood	Haz Mat	Fire
<b>MARGINAL</b>				
<b>NEGLIGIBLE</b>			Lightning Theft	Power Outage
	<b>UNLIKELY</b>	<b>POSSIBLE</b>	<b>LIKELY</b>	<b>HIGHLY LIKELY</b>

### RISK ASSESSMENT CODE MATRIX - Cemetery

<b>CATASTROPHIC</b>		Tornado	Lightning	
<b>CRITICAL</b>	Flood		Fire	
<b>MARGINAL</b>		Haz Mat		
<b>NEGLIGIBLE</b>			Theft	Power Outage
	<b>UNLIKELY</b>	<b>POSSIBLE</b>	<b>LIKELY</b>	<b>HIGHLY LIKELY</b>

### RISK ASSESSMENT CODE MATRIX - Clark House

<b>CATASTROPHIC</b>		Tornado	Fire	
<b>CRITICAL</b>	Flood			
<b>MARGINAL</b>				
<b>NEGLIGIBLE</b>		Haz Mat	Lightning Theft	Power Outage
	<b>UNLIKELY</b>	<b>POSSIBLE</b>	<b>LIKELY</b>	<b>HIGHLY LIKELY</b>

# CITY OF MUSCATINE HAZARD ANALYSIS CHART

	TORNADO Possible (100 yrs.)	LIGHTNING Likely (10 yrs.)	HAZ MAT	FIRE	POWER OUTAGE Highly Likely	THEFT Likely (10 yrs.)	FLOODING
City Hall	Catastrophic	Marginal	Negligible Possible	Catastrophic Likely	Negligible	Critical (vital records)	Critical Unlikely
Fire Dept.	Catastrophic	Critical (communications)	Negligible Possible	Critical Likely	Negligible	Critical (drugs)	Catastrophic Unlikely
Police Dept.	Catastrophic	Critical (communications)	Negligible Possible	Critical Likely	Negligible	Critical (evidence)	Catastrophic Unlikely
Library	Catastrophic	Negligible	Negligible Possible	Catastrophic Likely	Negligible	Critical (computers)	Catastrophic Unlikely
Art Center	Catastrophic	Negligible	Negligible Possible	Catastrophic Likely	Negligible	Critical	Catastrophic Unlikely
WPCP	Catastrophic	Negligible	Critical Likely	Critical Likely	Negligible	Negligible	Catastrophic Possible
Public Works	Catastrophic	Catastrophic (personnel)	Marginal Likely	Critical Likely	Negligible	Negligible	Critical Unlikely
Weed Park	Catastrophic	Catastrophic (personnel)	Negligible Likely	Negligible Likely	Negligible	Negligible	Negligible Unlikely
Soccer	Marginal	Catastrophic (personnel)	Negligible Likely	Negligible Possible	Negligible	Negligible	Negligible Possible
Kent Stein	Marginal	Catastrophic (personnel)	Negligible Likely	Negligible Possible	Negligible	Negligible	Negligible Possible
Transfer Sta.	Catastrophic	Negligible	Critical Likely	Critical Highly likely	Negligible	Negligible	Critical Possible
Cemetery	Catastrophic	Catastrophic (personnel)	Marginal Possible	Critical Likely	Negligible	Negligible	Critical Unlikely
Clark House	Catastrophic	Negligible	Negligible Possible	Catastrophic Likely	Negligible	Negligible	Critical Unlikely

## **RISK ASSESSMENT CODE MATRIX DEFINITIONS**

*(From NFPA 1600, 1995 Edition)*

**Severity Categories.** Each severity category includes the consequences to personnel, the public investment loss, the environment, compliance, and the mission impact. The hazard is placed in the highest category for which it meets one or more criteria; i.e., a potential death will be “catastrophic” even if all other consequences are negligible.

### **CATASTROPHIC**

Personnel: Death or fatal injury

Public: Death or fatality(ies) due to direct exposure.

Environment: A major hazardous chemical spill that is uncontained. Regional or total species/subspecies loss.

Economic Impact: Total loss of financial base, incapacitating the entity. Funding not available within one week to initiate urgent recovery procedures.

Facilities: Complete shutdown of facilities and critical services for more than a month.

Property: More than 50 percent of the property located in the proximity of the entity is severely damaged.

### **CRITICAL**

Personnel: Permanent disability, severe injury or illness.

Public: Permanent disability, severe injury or illness.

Environment: A minor hazardous chemical spill that is uncontained. Local or species/subspecies damage.

Economic Impact: Partial loss of financial base, temporarily incapacitating the entity. Funding not available within four days to initiate recovery procedures.

Facilities: Complete shutdown of facilities and critical services for more than two weeks.

Property: More than 25 percent of the property located in the proximity of the entity is severely damaged.

### **MARGINAL**

Personnel: Injury or illnesses not resulting in disability, major quality of life loss, or perceived illness.

Public: Injury or illnesses not resulting in disability, major quality of life loss, or perceived illness.

Environment: A major hazardous chemical spill that is contained. Portion of local organisms negatively impacted.

Economic Impact: Minor loss of financial base, temporarily incapacitating the entity. Funding not available within 24 hours to initiate recovery procedures.

Facilities: Complete shutdown of facilities and critical services for more than a week.

Property: More than 10 percent of the property located in the proximity of the entity is severely damaged.

### **NEGLIGIBLE**

Personnel: Treatable first aid injury.

Public: Minor quality of life loss.

Environment: A minor hazardous chemical spill that is contained. No measurable impact to environs.

Economic Impact: Minor loss of financial base, which does not incapacitate the entity. Funding not available within 12 hours to initiate recovery procedures.

Facilities: Complete shutdown of facilities and critical services for more than 24 hours.

Property: No more than 1 percent of the property located in the proximity of the entity is severely damaged.

**Probability Categories.** Occurrence frequency is based upon the likelihood that an identified hazard will result in a mishap based on an assessment of such factors as location, population size, and exposure. Exposure may be assessed in terms of cycles, hours of operation, or years. The risk matrix is based upon the number of expected occurrences in a given number of year.

**HIGHLY LIKELY.** A hazard whose potential impact is very probable within the next year.

**LIKELY.** A hazard whose potential impact is probable (10% - 100%) within the next year, or one whose impact has at least one chance of occurring within the next ten years.

**POSSIBLE.** A hazard whose potential impact is possible (1% - 10%), or has one chance of occurrence in a hundred years.

**UNLIKELY.** A hazard whose potential impact is likely to occur less than once in 100 years (<1%).

## **HAZARD-SPECIFIC MITIGATION PLANNING**

### **TORNADO**

Each facility needs to develop a tornado plan. This plan should contain provisions for early warning of deteriorating weather conditions and provisions for the safety of the occupants. Most City facilities could expect catastrophic damage in the event of a tornado touchdown, including loss of life. Therefore, early warning and safe harboring of the employees is of vital importance in the plan.

*NEED TO DO: TORNADO SAFETY PLANS FOR EACH FACILITY*

### **LIGHTNING**

As with a tornado, there is not much to be done to prevent this occurrence. Where it has its greatest potential impact is in the interruption of radio communications and damage to telephone systems and electronic equipment. Mitigation for this occurrence will focus mostly upon protection of these systems through various electrical and technological devices. As it relates to personnel safety, the greatest risk is to employees who typically work outside or are caught outside as a storm quickly develops. Early storm warning systems and City policies related to working in inclement weather will reduce the risk to the employees who are the most vulnerable. That also applies to citizens who find themselves faced with an approaching storm at City facilities such as the soccer facility and Kent-Stein park.

*NEED TO DO: LIGHTNING STORM DETECTION/ NOTIFICATION/ SAFETY PLAN*

### **HAZARDOUS MATERIAL EMERGENCIES**

Every department has the potential for some degree of hazardous material emergency occurring, through the risk presented by simple cleaning materials. The risk may increase where a department has some unique chemicals which are used in proprietary functions. It is the responsibility of the employer to identify those chemicals, make the risks clear to the employees through the Right-to-Know program, and to provide any necessary personal protective equipment necessary to reduce or eliminate the risk. Further, each department needs to consider alternatives to chemicals which present higher risks to the employees than necessary.

Each employee has the responsibility to adhere to safety rules, educate themselves of the hazards of each chemical before its use, and use the proper personal protective equipment.

*NEED TO DO: REVIEW RTK PROGRAM IN EACH DEPT.; REVITALIZE WHERE NECESSARY; ASSURE THAT ALL EMPLOYEES ARE TRAINED AND ALL SAFETY EQUIPMENT IS IN PLACE AND IN USE*

## **FIRE**

Devastating fires do not need to be initiated by catastrophic events. The smallest fire will rapidly grow to a major event if undetected or uncontrolled. Most fires should be considered preventable, either by adherence to applicable codes or use of common sense related to the use of flammable materials, electrical devices, and smoking materials, to name a few. Because of the potential, a fire is a threat in all City facilities. Mitigation involves code compliance for all facilities, fire safety and fire extinguisher classes for employees, and fire detection/suppression systems appropriate for the risks in the particular facilities.

*NEED TO DO: FIRE EXTINGUISHER CLASSES; FIRE SAFETY CLASSES (EMPHASIS ON CODE COMPLIANCE; FIRE EMERGENCY EVACUATION PLANS // EVALUATE DETECTION/ALARM/ SPRINKLER SYSTEM ADEQUACY/ NEED*

## **POWER OUTAGE**

Storm-related power outages are typically of a short duration, and should not significantly affect most operations. Where a power outage of a longer duration is less likely, its affect varies from department to department. The Public Safety Building has an emergency generator which will keep the basic emergency services up and running. Other buildings need to be evaluated on a needs basis to determine the feasibility of providing emergency electrical power, either through a back-up generator or a portable generator setup.

*NEED TO DO: EVALUATION OF CITY BUILDINGS re: ELECTRICAL NEEDS , INCLUDING PORTABLE GENERATOR OPTION*

## **THEFT**

The impact of theft varies with the items stolen. All departments are hampered to some degree by theft, but there are some situations where the impact can be significant. Those may include the theft of vital records, computer systems, evidence, drugs, and other irreplaceable items. Mitigation involves appropriate measures to assure the security of those items whose loss would have the most negative impact.

*NEED TO DO: EVALUATE SECURITY MEASURES, RELATIVE TO THE RISK AND VALUE OF THE PROPERTY*

## **PERSONAL INJURIES**

The scope of services that the City provides includes the possibility of injuries ranging in severity from minor to critical or fatal. The injury risks vary from department to department, but there are some types of incidents that may affect any of us. The first step is prevention. This involves the identification, reduction, and elimination of the risks wherever possible. Following that, provision of good medical care as soon as possible following the event can have a significant impact on the outcome.

*NEED TO DO: assure that safety programs are in place which identify and deal with safety issues related to each department. programs must include details regarding prevention, reporting, and response. Response includes the response of city employees who have been trained in first aid and cpr. THIS may include creation of departmental safety teams.*