



Business Resilience Guide: Reducing Risks and Building on Strengths

Overview

When disaster strikes, even the best run businesses can be impacted. According to the Federal Emergency Management Agency, about 25 percent of businesses do not reopen after disasters. Some businesses can cope with adversity better than others – they are less disrupted by an event, resume operations sooner, recover faster, and adjust for the future based on their experience. These businesses are described as resilient.

For a small business, being resilient involves understanding risks, planning for them, identifying employee needs and responsibilities, and ensuring back-ups and redundancies are in place. This Guide can help small businesses determine how to anticipate the impacts of a disaster on operations so disruptions can be minimized. The disasters you plan for may be an immediate threat, like a hurricane or unseasonably cold weather, or plans may arise out of caution, in anticipation of a pandemic or an earthquake. Thinking about how these risks would disrupt your operations and planning for them will enable you to rebound quicker and avoid a recurrence.

The primary audience for this Guide is the small business owner who may not be familiar with disaster preparedness and mitigation. This Guide breaks down activities to make the process of planning for and recovering from a disaster manageable.

This Guide is organized into six sections:

Section 1: Documenting the current state.

Section 2: Identifying critical relationships.

Section 3: Safeguarding resources.

Section 4: Addressing financial matters.

Section 5: Becoming more resilient with mitigation.

Appendices: Worksheets.



Section 5 includes information on hazard mitigation and provides an overview of the Small Business Administration's (SBA's) post-disaster lending programs that can help you and your business when you are impacted by a disaster. SBA loans can assist with expenses related to the repair or replacement of property and can provide support for essential business operations in the aftermath of a declared disaster. These low-interest subsidized 30-year loans have 0 percent interest for the first year as well as deferred payments for the first year after the loans are disbursed.

SBA also offers a mitigation option as part of the post-disaster loan program that enables a property owner to increase their physical disaster loan by up to 20 percent of the verified loss (or a maximum of \$500,000) to pay for interventions that will make a property more resilient in the future. Mitigation reduces a property's risk of damage from future events so people can return to their home or business more quickly after a disaster. This section also includes multiple examples of hazard mitigation efforts at different price-points.

Additionally, the worksheets provided in the Appendices, when used in conjunction, will provide content to develop a Business Continuity Plan. It is a good idea to keep a hard copy of your plan both at your business and at another location, in case your business is inaccessible or without power after a disaster.

SBA thanks our partners for their support of small business resiliency. The Insurance Institute for Business and Home Safety contributed material as part of their "*Open for Business*" program. The Insurance Information Institute provided information about how small businesses can transfer risk through insurance. And the material prepared with this Guide can contribute to the emergency preparedness checklist that the U.S. Chamber of Commerce Foundation requires from businesses that register with them pre-disaster to meet requirements to qualify for a \$5,000 post-disaster grant.



Section 1: Documenting the Current State

Start your Business Continuity Plan (BCP) by documenting how your business runs during “blue skies” and then identify possible courses of action to take when darker skies roll in. The material developed here will be the basis for your plan.

Inventory and Equipment

Many successful businesses have specialized equipment, supplies or technology that can play a critical part in making their business operations effective. Without those key inputs a business may have to reduce its output of products or services. Identifying critical equipment and inventory that is necessary for your business’ essential functions will enable you to determine the steps that will allow you to reestablish operations quickly should a disaster occur.

In advance of a storm, for example a hurricane, that you anticipate might damage your facility or the materials inside, one option to consider would be moving your equipment to another location. Other hazards, like blizzards, might not impact your building but could knock out the electrical power that you need to operate your equipment. Moving critical materials and equipment to another location in advance of these kinds of hazards would protect them from damage and to ensure you can continue your operations after the event. If flooding is your main concern, you may be able to protect your assets more easily by raising them off the floor. Considering how different hazards could impact your equipment can help you determine how best to protect it.





Because some disasters like tornadoes and earthquakes have little advance notice, it is important to identify critical assets in advance and determine whether they are replaceable. This can also help in conversations with your insurance company. It is a good idea to keep photographs and copies of sales information, product manuals, and warranties with the BCP that you initiate with the form provided in the Appendix A.

Following are some items to think about while you are preparing your list of critical inventories:

- Consider whether your equipment and materials can be moved within your building or if they would need to be transported to another location to protect them.
- Determine whether the equipment can be easily reordered, and if it was made-to-order, ask the supplier if it would take a substantial amount of time to replace.
- Identify any other equipment you could use without sacrificing your standards, or if there are alternatives you could rent.
- Consider whether any part of your production line could be outsourced if you are not able to replace critical equipment in a timely manner.
- Consider purchasing a storm shelter to store irreplaceable equipment.

See Appendix A for a worksheet to help you document important equipment.

Business Functions

Businesses are well advised to identify their most critical business functions and write them down. The list should be thorough and include all business' operations and processes, regardless of how small or impactful they may be. How often they take place will help determine which operations to prioritize. Start with those most critical to keeping your business running if there is a disruption. For those functions that are less critical, think about how long the business can manage without conducting them.

Appendix B has a worksheet that can be used to document important business functions.

Once the business functions have been documented on the worksheets, think about the impact that would result if that function could not be performed. Some



functions may be able to be bypassed but could still have an impact on businesses processes if they are hampered. This analysis will help you predict the consequences of a disruption to your normal business operations. It can inform potential recovery and resilience strategies that you can use to get your business operating quickly. Impacts to consider include the following:

- Lost sales or delayed income
- Increased expenses due to outsourcing, overtime, express shipping, etc.
- Customer dissatisfaction
- Contractual liabilities

Think about the consequences that would result if a particular business function could not be performed and determine whether there might be work-arounds to minimize disruption. Having redundancies in business functions can help you resume operations faster. For example, there may be a particular employee who is knowledgeable about executing a certain task; a redundancy would be to train another employee to learn the needed skill during periods of reduced activity. A good strategy is to eliminate any single point of failure, like having only one supplier for a critical item. Generating options in advance of a disaster can make the resumption of your business functions easier when something happens.

Vulnerability Assessment

Depending on a range of factors, such as your location or type of business, you might face different kinds of risk. Identifying these risks and prioritizing them can help you prepare effectively and minimize the extent to which you are vulnerable. Think about threats that could impact your ability to do business, and how you might reduce their impact. Having insight into past weather-related events in your area and how local government responded can help inform your determination of potential exposure.

However, it is important to consider how past hazards might operate under future conditions. The frequency and intensity of those hazards that your area experienced in the past may be different in the future. For example, parts of Upstate New York have historically seen around one day per year with temperatures above 90 degrees Fahrenheit. If emissions projections on the high-end are accurate, by the middle of the century that area may have over two weeks



per year with extreme heat. The U.S. had an average of 31 days of extreme heat in 2022.

There are several tools that can help you identify the risks of different natural hazards in your area. Entering your zip code into this National Oceanic and Atmospheric Administration [tool](#)¹ can help you project future climate conditions using mapping data. Aside from natural hazards, risks to consider include security and technology related risks, pandemics, and other types of disruptions.

Armed with historical data and future conditions projections, you can do a simple exercise to determine which threats you should focus on to reduce your vulnerabilities. Using the table below, list the threats that concern you (a few rows are populated with examples, but these may not be the main threats in your area). Then consider the likelihood of that threat happening on a scale of 1 to 5, and how damaging its impacts would be on a scale of 1 to 5. Multiply these two numbers, and the threats that get the highest total should be prioritized for planning purposes.

Example of threat calculation (likelihood X severity determines priority)				
Threat	Likelihood (1-5)	Severity (1-5)	Total	Priority
Pandemic	2	5	10	#3
Flood	4	3	12	#2
Tornado	3	5	15	#1

Recovery Methods

Section 1 of this Resilient Business Guide has included prompts to encourage thinking about identifying risks and how to address them. The worksheet materials in the first two Appendices and your vulnerability assessment table are the foundational elements to develop strategies to recover your business operations after a disaster. Using these materials you can identify where to invest to reduce the likelihood of disruption and build your recovery capabilities.

¹ <https://resilience.climate.gov/pages/learn-more>



For example, if your business is in an area prone to high winds and you rely heavily on electrical power to perform critical business functions, you may want to invest in a backup power source like a generator, or solar panels that are installed to resist strong wind gusts. Identifying this kind of information will help you determine options to minimize the impact of a disaster, ensure that you can meet your obligations, and safeguard your business so it can continue to thrive.

See Appendix C for a worksheet to help determine how to reduce the likelihood of business interruption.

The time needed for each business function to recover will depend on the damage caused by a disaster. Calculating your maximum allowable down time can help you determine recovery methods, like if it is necessary to identify an alternate site for conducting business operations.

The time frame for recovery can vary but the main goal is to restore normal operations. You have already considered prioritizing those items that would be most important to getting your business up and running again. Identifying ways to reduce their vulnerabilities and potential workarounds will help you determine possible courses of action.



Section 2: Identifying Critical Relationships

Organizing employees to prepare for potential disasters, and identifying important suppliers and possible alternatives in advance, can save time and stress should an event occur. Establishing and documenting responsibilities will ensure that everyone knows what role they will play.

Essential Contacts

It is vital to have an up-to-date contact list of employees and other relevant individuals such as your insurance agent, accountant, and attorney when a disaster happens. Prompt communications with those who may be impacted is critical to their well-being in a disaster. The more you can reduce uncertainty, the better. Plan to engage others before a disaster hits (if there is advance notice), so that everyone knows what to expect. Your list of essential contacts should be maintained both electronically and in print, in the case of an internet or electrical outage. This list should also include alternate or secondary contacts if a usual point of contact is unavailable.



Appendix D has a worksheet for organizing essential contacts.

Preparing Employees

Employees are one of a business' most critical resources. Ensuring they understand what to do in an emergency is important to both their well-being and the ability of a business to survive disruption. Having a call-down list or a group text to ensure employees are safe when a disaster is expected can help with business continuity. Clarifying everyone's role and training them in the protocols that should be followed before, during and after a disaster, can provide them with the information



they need to react appropriately should your business be impacted. Consider assigning a key person as a back-up to help manage the business if the owner cannot be present after the disaster.

A best practice is to include employees on a disaster planning team to help determine how a business will adjust when a disaster occurs. Depending on the size of your business, employees with specialized work, like information technology support staff, may have awareness of issues that would not otherwise be incorporated in your BCP. Including them in the process of developing the plan also helps foster buy-in if they might be asked to do tasks that are not part of their regular work, or if existing processes will need to be altered to ensure the business can function.

Change can create anxiety for employees, so walking through the plan and practicing its implementation, for example by conducting a fire drill, can alleviate uncertainty. Doing so can reduce discomfort in a real event as everyone would understand what may be asked of them. It is worthwhile to exercise the plan so that everyone understands what their responsibilities will be.

Practicing evacuation plans or call down lists with employees can also help identify shortcomings or additional training or resources you may want to invest in to adequately prepare for a disaster. Carrying out a telework exercise may be a way to determine any additional technological needs that would be necessary to stay in business should another pandemic occur. Make sure employees can stay in touch so you can share important information about the status of operations and when they should return to the workplace.

Supply Chain

Depending on the nature of your business, a disruption in the supply chain might mean an important vendor is unable to provide you with the inputs you require to continue business operations. Assess your supply chain to understand how a disruption will impact your business functions. Identify any alternative business processes or sources of supplies that you might be able to use. Consider a supplier who is in a different geographic area than your vendor, who would not be affected by the same hazard.



Since your ability to resume operations after a disaster may rely on suppliers to provide materials in a timely manner, consider preparing a list of back-up suppliers, potentially in another region. Having an emergency list to turn to, instead of trying to identify alternatives while also dealing with other issues that occur during a disaster, helps minimize the disruption to your operations. Request BCPs from your suppliers to ensure that they themselves are prepared for a disaster.





Section 3: Safeguarding Resources

Two of the most essential assets that most businesses have are their physical facilities and their data. Consider how you would run your business without access to either resource.

Strengthening facilities

Assess the conditions in and around your work areas. This could include familiarizing yourself with the facility's building code. Based on your vulnerability assessment, identify which critical or hazardous items will be vulnerable to damage during emergencies, and take steps to secure them. If possible, gather floor plans indicating the locations of utility connections that may need to be shut off to prevent fire. Consider reinforcing the building using some of the mitigation methods for reducing hazards outlined in Section 5.

If you lease your workspace, decisions about reopening the building after a disaster may be made by the building's owner without your input. It could be beneficial to establish a rapport with the owner to have a say in these decisions. Familiarize yourself with your lease agreement and any provisions concerning post-disaster access to the premises and renovations. When exploring potential rental properties, assess the vulnerabilities of the facility and negotiate terms for repairs in the event of a disaster.

After a disaster, local authorities may restrict access to the affected area. It may be safe to access but law enforcement may be concerned about security. Having on hand a list of employees whom you authorize to enter your facility could expedite your ability to resume business operations.

Safeguarding data

Small businesses are vulnerable to cyber-attacks because they typically lack the security infrastructure of larger businesses. According to an SBA survey, 88% of small business owners felt their business was vulnerable to a cyber-attack.

However there are some relatively simple strategies that can make your systems more secure. They include training your employees, using antivirus software that updates automatically, securing your network, and backing up important data.

Employees and work-related communications are a leading cause of data breaches for small businesses because they are direct pathways into your systems. Training



employees on basic internet usage best practices can go a long way in preventing cyberattacks. Topics to cover include spotting phishing emails, using good internet browsing practices, avoiding suspicious downloads, using strong passwords, and protecting sensitive vendor and customer information.

Make sure a separate user account is created for each employee. Administrative privileges should only be given to trusted IT staff and key personnel. Conduct access audits on a regular basis to ensure that former employees have been removed from your systems and have returned all company issued devices.

Make sure each of your business's computers is equipped with antivirus software and antispyware. All software vendors regularly provide patches and updates to their products to correct security problems and improve functionality. Configure all software to install updates automatically. Work with your banks or card processors to ensure you are using the most trusted and validated tools and anti-fraud services.

Safeguard your Internet connection by using a firewall and encrypting information. If you have a Wi-Fi network, make sure it is secure and hidden. To hide your Wi-Fi network, set up your wireless access point or router so it does not broadcast the network name, known as the Service Set Identifier (SSID). Password-protect access to the router.



Your data should be backed up regularly and be accessible off-site, making cloud data solutions an ideal option. Unplugging backup drives from the internet is another security strategy. Make sure to understand the data retrieval process and how long it will take, and backup of important records. Back-ups may include USB drives or cloud storage, but it is also wise to have a physical copy if electricity or the internet is not available. Include your BCP with your back-up documents as well as other materials that you may need to enhance your recovery process, like insurance information.



Records Management

Records Management is the process by which your business maintains, secures, identifies, and disposes of required records. Build records management into your business operations plans to ensure you have important documents when you need them. This can include storing data in the cloud and a digital document checklist (#digitalgobag) that lists the whereabouts of each item (such as last year's tax returns, business formation documents, EIN#, insurance policies and more) along with the username and password. Once this digital checklist is complete, send yourself a copy at your personal and professional email addresses. Consider also sending this checklist to your back-up in the event you cannot operate your business after the disaster.

Review with relevant staff which records must be maintained, and for how long, and include this information with your plan. Local, state, and federal laws may provide specific timeframes for keeping certain records, like past tax returns. Ensure that your business has records management redundancies in place so important records can be accessible should your business be impacted by a disaster.



Section 4: Addressing Financial Matters

Reviewing Insurance Plans

Meet with your insurance agent to assess your current plan and discuss topics including property coverage limits, exclusions, deductibles, and co-insurance requirements. Many insurance policies do not cover flooding or earthquakes. Your policy might not cover business interruption or extra expense insurance. Make sure there are no gaps in coverage. Your insurance company may even offer reductions to your premiums if you harden your building with some of the hazard mitigation strategies described in Section 5.

Below are some kinds of commercial insurance to consider.

- Building coverage provides coverage up to the insured value of the building if it is destroyed or damaged by wind or hail, or another covered cause of loss. This policy does not cover damage caused by a flood or storm surge nor does it cover losses due to earth movement, such as a landslide or earthquake, unless added by endorsement.
- Business personal property provides coverage for contents and business inventory damaged or destroyed by wind or hail, or another covered cause of loss.
- Tenants' improvements and betterments provides coverage for fixtures, alterations, installations, or additions made as part of the building that the insured occupies but does not own, which are acquired and made at the insured expense.
- Additional property coverage provides for items such as fences, pools, or awnings at the insured location. Coverage limits vary by type of additional property.
- Business income provides coverage for lost revenue and normal operating expenses if the place of business becomes uninhabitable after a loss during the time repairs are being made.





- Extra expense provides coverage for the extra expenses incurred, such as temporary relocation or leasing of business equipment and payroll to avoid or minimize the suspension of operations during the time that repairs are being completed to the normal place of business.
- Ordinance or law provides coverage to rebuild or repair the building in compliance with the most recent local building codes.

If the disaster has hit other businesses too, expect that insurance agents will be inundated with calls and emails. Try to have all the necessary documentation in front of you when you contact your insurance company following a disaster to expedite the process.

Reviewing Finances

Keep your business records updated and think about what steps your business will have to take when it closes temporarily. Preparing your business financially now so it is ready to respond, recover, and continue operating when a business disruption occurs is just as critical as knowing exactly what to do when disaster strikes. Consider recovery costs, temporary accommodations, travel expenses, and other potential needs. It might be a good idea to set aside some emergency cash such as 3-12 months of emergency funds or consider a line of credit.

Some bills and other expenses will still need to be paid on time. Talk with your creditors, suppliers, and landlord about potentially having an extension to pay bills should a disaster occur. Talk with your payroll processor about setting up an automatic payroll system. Make sure your team knows how they'll get paid so they can plan their finances accordingly and support your recovery efforts. Consider adding liability insurance and a section where the insurance provider will carry your payroll for 6-8 weeks post-disaster or up to 90 days if the deductible fits your budget. Determine procedures for tracking expenses if your normal bookkeeping methods are not available (for example, using Google Sheets).



Section 5: Becoming More Resilient

Anticipating Recovery

It is helpful to know that there are programs that can help your business after a disaster. Bookmark [SBA.gov/disaster](https://www.sba.gov/disaster) to learn more about how SBA offers low-interest disaster loans to homeowners, renters, businesses, and most non-profits that have been impacted by declared disasters. Eligible SBA disaster loan borrowers may also receive expanded funding to mitigate their home or business against future disasters. Information on SBA loans is included below. Note that owners of home-based businesses may want to apply for a home loan for real property instead of a business physical disaster loan as the terms may be better.

- Economic Injury Disaster Loans (EIDLs) can help meet financial obligations and operating expenses that could have been met had the disaster not occurred. The loan amount is based on economic injury and financial needs and is not to exceed \$2,000,000.
- Business Physical Disaster Loans are intended to replace damaged business property or restore its pre-disaster condition. Under this loan no upgrades or additions can be included unless required by local building codes, however the mitigation option can be used for resilient upgrades. Funds can cover disaster losses not fully covered by insurance. Up to \$2,000,000 can be borrowed.
- A Home Loan for Real Property is intended to repair or replace the homeowner's primary residence to its pre-disaster condition. As with Business Physical Disaster Loans, the funds can cover losses not covered by insurance. Up to \$500,000 can be borrowed.
- The "Mitigation Option" is an opportunity to increase an SBA post-disaster loan that addresses real property losses by up to 20 percent of the verified physical loss amount to make the property more resilient. These additional funds can be used for upgrades that improve resiliency and exceed local building codes.

SBA has non-disaster loan programs that can also be used to make businesses more resilient. The 504-loan program provides long-term, fixed rate financing for major fixed assets, like equipment or commercial real estate. The 7(a) program can also be used for these purposes, as well as working capital expenses.



Improvements to existing facilities, new buildings, and modernization of utilities or landscaping are also eligible under these loan programs.

Fortifying Buildings with Hazard Mitigation

Mitigation reduces a property's risk from future events and allows business owners and residents to return home more quickly, with less damage, after an event. While



it may involve an initial investment, mitigation pays off in the long run. Estimates indicate that, on average, for every \$1 spent on mitigation, \$6 is saved from future losses.

Mitigation is any activity designed to reduce the loss of life and property by lessening the impact

of disasters. Mitigation can keep natural hazards, like flooding and hurricanes, from having catastrophic impacts. The type of hazard you want to protect your structure from, and the impacts it could have on your business, will influence the kind of mitigation activity you might pursue. For instance, bracing a building will enable it to withstand high winds, while elevating utilities can reduce flood damage.

Mitigation activities often save more than can quantifiably be estimated. Disasters impact ways of life, alter landscapes, and disrupt populations in ways that are difficult to articulate and even harder to assign monetary worth. Mitigation efforts of any kind against future disasters often provide positive benefits over time.

There are a wide range of options for protecting your home or business from disaster events through mitigation. Most of these actions, especially those that affect the structure of your building or its utility systems, should be carried out by qualified technicians or professional contractors licensed to work in your state, county, or city.



Possible Mitigation Activities

MITIGATING HIGH-WIND EVENTS

High-wind events are a broad category of events that may include damage resulting from straight-line winds, severe thunderstorms, hurricanes, or tornados. High wind may occur as part of any of these specific hazards. Winds may vary from high to extreme in the most severe thunderstorm, hurricane, or tornadic events. It is also noted that hail events, which may occur as part of thunderstorms, are covered in this section, as many mitigation interventions that address high wind may lessen the impact of hail.

Low-Cost

- **Reinforcing roofs and walls:** Strengthening roofs and walls with hurricane straps, metal connectors, or additional bracing can help prevent structural damage during high winds.
- **Installing hurricane shutters:** Installing hurricane shutters over windows and glass doors can help protect the structure from wind-driven debris.
- **Fortifying garage doors:** Reinforcing garage doors with bracing kits or installing impact-resistant garage doors can protect vehicles and the structure's interior.

Things to Consider

Mitigation Loan Option applicants and recipients might not know that discounts may be available on homeowner/business insurance based on the type of mitigation interventions installed.

Mid-Cost

- **Installing wind-resistant siding:** Using wind-resistant siding materials, such as fiber cement or concrete block, can enhance the structure's ability to withstand hurricane-force winds.
- **Installing impact-resistant windows and doors:** Installing impact-resistant windows and doors, which are designed to withstand high winds and flying debris, provides increased protection for the interior of the structure.



High-Cost

- **Building a safe room or storm shelter:** Constructing a safe room or storm shelter within the structure or in a nearby location provides a secure place for occupants to seek protection during a tornado.
- **Installing a FORTIFIED roof:** These roofs are specifically designed to prevent damage during high winds. FORTIFIED is a program of the Insurance Institute for Business and Home Safety.

MITIGATING FLOODING EVENTS

Flooding events are broadly defined as when water inundates or covers normally dry land. Flooding may include inundation from riverine flooding, coastal flooding, or storm surge. Flooding may result from hurricanes, severe thunderstorms, or be due to snow and ice melt.

Things to Consider

Local floodplain managers may be able to provide useful information about land development that can support the decision-making process when different flood mitigation measures are under consideration.

Low-Cost

- **Elevating utilities and electrical systems:** Raising heating and cooling systems, water heaters, electrical panels, and outlets, as well as other utilities, above flood levels can protect essential systems from flood damage.
- **Installing flood vents:** Installing flood vents in the foundation walls allows floodwaters to flow under the building, reducing the pressure on the walls and minimizing damage.
- **Installing back-flow valves:** Installing back-flow valves can prevent sewage from backing up into the structure during heavy flooding.

Mid-Cost

- **Landscaping modifications:** Ensuring that landscapes are properly graded away from a structure's foundation can help redirect water away from a property during heavy rains and floods.



- **Installing sump pumps:** Installing sump pumps can remove excess water from basements or crawl spaces, reducing the risk of flooding and water damage.

High-Cost

- **Elevating structures:** Elevating structures above flood levels can prevent significant flood damage.
- **Flood gates or doors:** Installing adjustable barriers can divert the flow of water.



MITIGATING WINTER WEATHER EVENTS

Winter weather events are broadly defined as winter storms in which the main form of precipitation is snow, sleet, or freezing rain. Examples may include snowstorms, blizzards, or ice storms. Winter weather events may also include cold waves, which are events where, within 24 hours, there is a rapid fall in temperature that remains at an extreme low level for an extended period.

Low-Cost

- **Insulating attics and walls:** Ensuring adequate insulation in the attic and walls helps retain heat inside the structure, reducing energy consumption and preventing pipes from freezing.
- **Installing roof snow guards:** Installing snow guards or snow retention systems on the roof prevents large snow accumulations from sliding off suddenly and causing damage to people or property below.

Things to Consider

Winter weather brings risks that can be avoided with appropriate preparation. One of the most important risks to mitigate is fire caused by portable heaters; ensure heaters are at the recommended distance from flammable surfaces.



Mid-Cost

- **Incorporating ice dam prevention:** Adding roof heating cables or roof rake systems helps prevent ice dams from forming, reducing the risk of roof leaks.
- **Enhancing the structural integrity of roofs:** Enhancing and strengthening roofs to withstand heavy snow events decreases the chance of collapse or other impacts from heavy snow.

High-Cost

- **Upgrading building materials:** Upgrading materials for shingles, windows, skylights, and siding to help withstand significant impact from ice.

MITIGATING DROUGHTS

Droughts are a deficiency of precipitation over an extended period resulting in water shortages.

Low-Cost

- **Installing drought drought-tolerant landscaping:** Planting drought drought-tolerant landscaping can reduce water use. Rock gardens can be an effective option to reduce irrigation needs.
- **Using permeable driveways and parking surfaces:** Using permeable surfaces for driveways and parking areas can reduce runoff and promote groundwater recharge.
- **Installing rain barrels:** Installing rain barrels can help to store rainwater for future water needs.

Mid-Cost

- **Incorporating low-flow showerheads and toilets:** Installing low-flow, water-saving showerheads and toilets can reduce water use.

High-Cost

- **Installing graywater systems:** Installing graywater systems can collect water used in bathtubs, showers, bathroom sinks, washing machines, dishwashers, and kitchen sinks for irrigation purposes.



MITIGATING WILDFIRES

A wildfire is an unplanned fire burning in natural or wildland areas such as forests, shrub lands, grasslands, or prairies. Wildfires may—and often do—impact built-up areas in the wildland-urban Interface and pose a major threat to communities.

Things to Consider

The Insurance Institute for Business and Home Safety and the National Association of Insurance Commissioners note that structural modifications can reduce wildfire risk up to 40%, and structural and vegetation modifications combined can reduce wildfire risk up to

Low-Cost

- **Installing roof and eave vents:** Installing spark-resistant roof and eave vents can help prevent embers from entering attics and igniting a structure.
- **Using noncombustible fencing:** Replacing wooden fences and gates with non-combustible material, such as metal, wire, or masonry, can create a fire-resistant perimeter around property.
- **Choosing fire-resistant landscaping:** Choosing fire-resistant plants, creating firebreaks, and spacing vegetation appropriately can minimize fire spread to structures. Rock gardens can also provide an effective barrier to wildfire, slowing the spread of fire across your property.

Mid-Cost

- **Incorporating ember-resistant exterior:** Applying fire-resistant coatings or treatments to the structure's exterior can reduce its susceptibility to ember ignition.
- **Installing dual or multi-pane windows:** Installing dual- or multi-pane tempered glass windows can protect the structure from wildfire damage. The outer pane can serve as a thermal shield.

High-Cost

- **Using fire-resistant roofing materials:** Using Class A fire-resistant roofing materials, such as asphalt shingles, metal roofing, or clay tiles, can reduce the risk of fire damage.



- **Installing exterior sprinkler systems:** Installing exterior sprinkler systems with strategically placed sprinkler heads to wet the home and surrounding area during wildfire events can reduce the potential for fire damage.

MITIGATING EARTHQUAKES

An earthquake is the shaking of the earth's surface by energy waves emitted by slowly moving tectonic plates overcoming friction with one another underneath the earth's surface.

Things to Consider

Check with local building inspectors to ensure compliance with the most up-to-date local codes.

Low-Cost

- **Installing seismic gas shut-off valves:** Installing automatic seismic gas shut-off valves helps prevent gas leaks and potential fire hazards that are caused by gas lines breaking during seismic events.
- **Bracing water heaters:** Installing seismic straps or bracing kits to secure water heaters to walls or floors reduces the risk of water heater ruptures and gas leaks.
- **Strengthening garage doors:** Installing garage door bracing kits or using impact-resistant garage doors can prevent the door from buckling or collapsing during seismic activity.

Mid-Cost

- **Reinforcing foundations:** Strengthening a structure's foundation by adding steel reinforcements or anchor bolts to secure a structure to the foundation can reduce the risk of structural failure during an earthquake.
- **Upgrading cripple walls:** Strengthening cripple walls (short walls between the foundation and the first floor) by adding plywood or structural panels helps prevent them from collapsing during an earthquake.



High-Cost

- **Conducting a seismic retrofit of unreinforced masonry:** Seismic retrofits can add reinforcement elements to improve the strength of walls and provide stability.

MITIGATING EXTREME HEAT

A heat wave is a period of abnormally and uncomfortably hot and unusually humid weather typically lasting two or more days, with temperatures outside the historical averages for a given area.

Low-Cost

- **Incorporating outdoor awnings or louvers:** Installing awnings or louvers on windows, especially those facing south, can reduce the heat that enters a home by up to 80% percent.
- **Choosing appropriate draperies and curtains:** Installing draperies and curtains made of tightly woven, light-colored, opaque fabrics can reflect more of the sun's rays than they let through.
- **Installing window air conditioners:** Installing well-insulated window air conditioners can provide relief from extreme heat.

Mid-Cost

- **Installing attic vents:** Installing attic vents can greatly reduce the amount of accumulated heat in the attic. Properly ventilated attics are approximately 30 degrees Fahrenheit cooler than unventilated attics.

Things to Consider

Extreme heat is responsible for the highest number of annual deaths among all weather-related hazards. Planning for extreme weather events is critical.

- **Planting trees and vegetation:** Planting trees and other plants can help cool the environment. Trees and vegetation can lower surface and air temperatures by providing shade and cooling through evaporation and transpiration. When the plants directly shade buildings, there is a decreased demand for air conditioning.



High-Cost

- **Incorporating cool roofs:** Installing a cool roof—one made of materials or coatings that significantly reflect sunlight and heat away from a building—reduces roof temperatures, increases the comfort of occupants, and lowers energy demand.
- **Growing green roofs:** Growing a vegetative layer (plants, shrubs, grasses, and/or trees) on a rooftop reduces temperatures of the roof surface and the surrounding air. Also called “rooftop gardens” or “eco-roofs,” green roofs achieve these benefits by providing shade and removing heat from the air through evapotranspiration.





Appendix A: Inventory and Equipment

Use this form to document key equipment, machinery, supplies, and other items you will need to fulfill your critical business functions. Attach photos as appropriate.

Item: _____

Related business function: _____

Brief description of item: _____

Location within the facility: _____

Manufacturer: _____

Model number: _____

Serial number: _____

Asset tag number: _____

Quantity: _____ Purchase/lease date: _____ Acquired new or used:

Price paid: _____

Warranty or service contract information: _____

If the equipment is replaceable, indicate how long it would take to replace: _____

Is vendor installation required? _____

If the equipment can be fixed, indicate how long it would take to become functional? _____

Are spare parts available? _____

Are spare parts on hand in your facility? _____

Primary supplier: _____

Alternate supplier: _____

If the equipment cannot be easily replaced, indicate potential workarounds: _____

Notes: _____



Appendix B: Business Functions

This form can be used to help you determine how to ensure that critical business functions are able to operate through a disruption. Use one form for each function.

Business Function: _____

Priority: High _____ Medium _____ Low _____ Optional _____

Timeframe for when this function begins to impact operations: _____

Potential loss associated with absence of this function: _____

Identify any legal, ethical, regulatory, contractual, or financial obligation associated with this business function: _____

Briefly describe how to perform this function: _____

Document any alternative processes that can be used to temporarily execute this function: _____

Indicate who is critical to performing this function.

Employees: _____

Suppliers: _____

Logistics: _____

Other: _____

Document the inventory required to perform this function.

Equipment: _____

Supplies: _____

Dependencies: _____

Other: _____

Identify those who benefit from this function.

Employees: _____

Vendors: _____

Key contacts: _____

Other: _____



Appendix C: Courses of Action

Reflecting on the questions below can help you anticipate issues that may arise because of a disaster (some questions may not apply to your business). The answers you provide will help you determine what courses of action you may need to take to minimize disruption to your operations.

- Are there features of your business processes or building that would make it difficult to relocate temporarily to another location?
 - Can business operations be moved to another facility used by the business?
 - Is there a similar facility operated by another entity with which your business could establish a mutual aid agreement?
 - Can any work be temporarily outsourced?
 - Can production lines be adjusted or duplicated?
- If business functions are interdependent, what is the weakest link? How can that function be reinforced to reduce the likelihood of failure?
- Approximately how much raw material and finished product does your business have on hand, and can it be increased?
 - Would additional storage capacity be needed? Could it be sited in a different location to reduce the likelihood of both facilities being impacted by a disaster?
 - What elements (specific materials, equipment, etc.) would influence your ability to continue production, and can redundancies be introduced?
 - If the business has perishable stock, is back-up power available, or can perishable items be moved to another storage location?
 - Would it be possible to install a generator at your facility?



- Are shut down and startup plans for equipment, computer systems, or utility systems documented and clearly labeled?
 - Can equipment be repaired by employees?
 - Are there service or maintenance plans to use if equipment goes offline?
 - Can shutdown procedures be practiced as part of a drill or exercise?
- Does the business have a security system in case the facility is inaccessible after a disaster?



Appendix D: Contact Tree

If electrical power is down or the internet is inaccessible, a contact tree can facilitate critical communication among employees and key partners. Each person has a role in calling the individual who is listed after them to relay the critical information. If that person is not available within 15 minutes, the next person should be called and asked to pass on the names of those who could not be initially reached, along with the initial message. The example below shows the last people in the chain calling the Office Manager to relay the results of the call-down.

