

# RiskTopics

## Guide to hurricane emergency action plans for construction

### Zurich Resilience Solutions - Risk Engineering

If working in a region prone to hurricanes and tropical storms, have an up-to-date hurricane emergency action plan (HEAP) in place as part of any windstorm mitigation strategies.

#### Introduction

Hurricanes are the most powerful storms on Earth. The term hurricane is used only for the large storms that form over the Atlantic basin, which includes the Atlantic Ocean, Caribbean Sea, Gulf of Mexico and Pacific Ocean in North America. The generic term is tropical cyclone. Other names, depending on where they occur in the world, include typhoons or cyclones. Once a tropical cyclone produces sustained winds speeds of 74 mph or higher, the storm is classified as a hurricane.<sup>1</sup>

Tropical storm seasons occur at different times around the globe. The map below summarizes the typical seasons of the various tropical storm prone regions of the world.

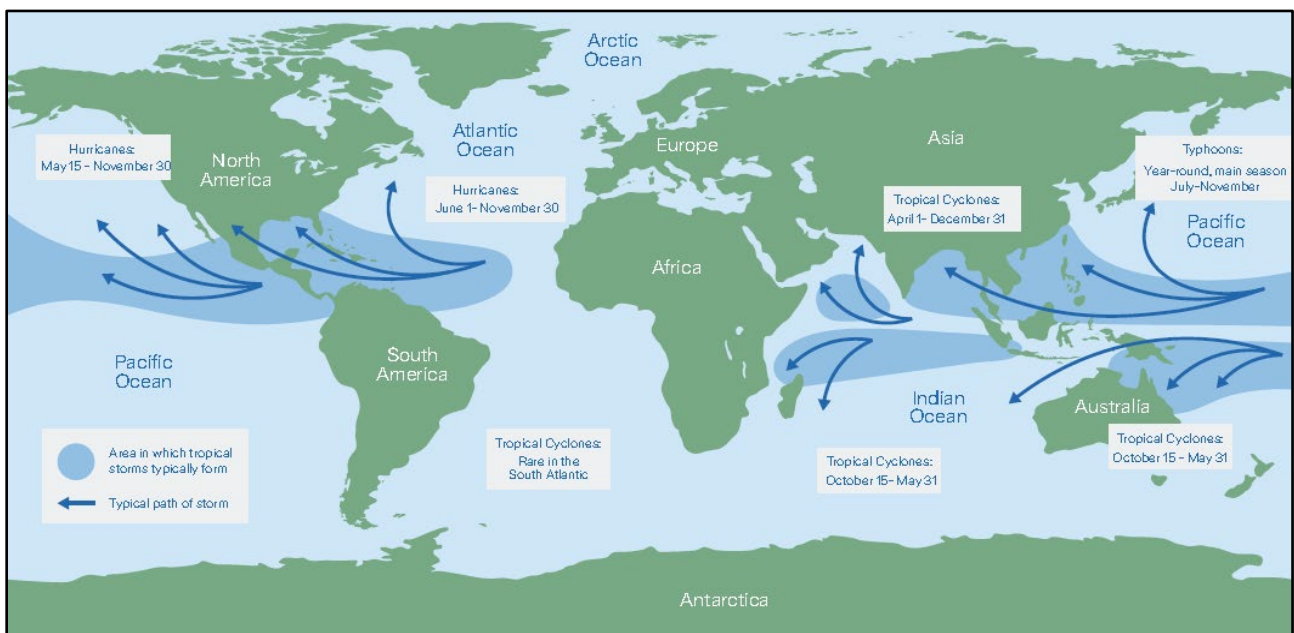


Figure 1 – Areas in which tropical seasons typically form

This Table further demonstrates typical tropical storm seasons by geographic area; however, it is important to recognize these are just historical dates.

Construction projects should be prepared for significant events before or after these storm season windows.

North Atlantic	June 1 to November 30
Northeast Pacific	May 15 to November 30
Northwest Pacific	All year long, with a main season from July to November
North Indian Ocean	April 1 to December 31
Southwest Pacific	October 15 to May 31
Southeast Indian Ocean	October 15 to May 31

Table 1 - Typical tropical cyclone seasons around the world

Hurricanes are classified based on their maximum sustained wind speed using the Saffir-Simpson hurricane wind scale, as shown to the right.

The Saffir-Simpson scale is used to estimate potential for property damage; however, it does not take into account other serious hazards associated with tropical storms, such as storm surge or flooding.<sup>1</sup>

Category	Wind Speed (mph)	Damage at Landfall
1	74-95	Minimal
2	96-110	Moderate
3	111-129	Extensive
4	130-156	Extreme
5	157 or higher	Catastrophic

Figure 2 - Saffir-Simpson hurricane wind scale<sup>1</sup>

## Discussion

A hurricane emergency action plan should be a living document. It should be reviewed and updated each year before the season begins and after any major storm. It should address among other things, actions to take:

- Before hurricane season begins
- When hurricane season begins
- 48 hours before hurricane landfall
- 36 hours before hurricane landfall
- During a hurricane
- After a hurricane

### Characteristics of a hurricane action plan

**Quick** – Fits a reasonable time frame starting 48 hours before hurricane landfall

**Simple** – Checklists to guide actions and provide reminders

**Practiced** – Fully tested to verify time, staff and resource needs

A HEAP should be quick, simple, and practiced.

- **Quick** means the plan must fit into a reasonable time frame, typically beginning no more than 48 hours before estimated hurricane landfall and allowing sufficient time to allow for personnel evacuation.
- **Simple** means having a series of checklists to facilitate implementation. The checklists should be backed up with more detailed documentation as needed, but as a hurricane approaches, a simple and easy-to follow list of priorities along with pre-determined roles and responsibilities is essential.
- **Practiced** means you have conducted a full-scale implementation test of your plan. You know how many people are needed, you know what tools and supplies are needed, and you know how long each task will take. In short, you know the plan will work because you have tested it.

## Guidance

### Integrating the hurricane plan

When implementing a hurricane plan, consider other emergency plans, systems or practices that will support surviving and recovering from a storm. For example:

- Emergency power
  - Review emergency power systems. Are they sized and arranged to carry the appropriate loads? In addition to the traditional emergency loads, the system should carry loads needed to maintain any essential functions needed during construction, such as dewatering pumps or critical HVAC systems. The fuel supply for the emergency power system should be sufficient to support the system for the anticipated duration of normal power interruption and the anticipated time frame to resume fuel deliveries.
  - Where possible, locate generators and batteries above expected levels of flooding.
  - Have spare generators located and available in a protected location. Generators may be in great demand after a hurricane. Remember the fuel needed to operate them.
- Business data
  - Verify there is a program in place for the routine backup of critical computer data. The data should be backed up to a location that will not be affected by the hurricane.
  - Identify vital business records (e.g., technical drawings, electronic files, paper files, inspection and testing reports or certificates, welding films). Make plans to protect them or relocate them to a protected location.
- Utilities, natural gas, and process gases
  - Verify the location of utility disconnects and confirm that shutoffs are identified with suitable markings. This includes water, electric and fuel / feed gas utilities.
- Equipment and stock
  - Know the elevations of critical equipment, including rotating equipment (motors) and electrical equipment (transformers and switchgear). This may help you identify equipment that may be exposed to damage due to storm surge or flooding. Relocating this type of equipment before a storm is difficult. Protecting or sparing the equipment may be the only realistic option. Maintain critical equipment spares in a protected location.
  - Verify practices for installing important electronic equipment. This would include equipment such as computers, local area networks and telephone systems. To reduce exposure to water damage, electronic equipment should be located above any anticipated flood elevation, including hurricane storm surge and at least 4 inches above any floor. Prior to an impending storm, cover with plastic to protect against water damage in the event the building windows or roof is breached.
  - Verify stored materials are at least 4 inches above the floor to reduce water damage exposure.
- Coordination
  - When working within an existing facility or on government properties such as military bases, the project owner will also likely have a facility hurricane emergency action plan. Be sure to coordinate plans with the facility or project owner as they may require specific actions and specific timelines to prepare and evacuate the entire facility, sometimes much earlier than 48 hours out from landfall.
- Vendors
  - Develop relationships with equipment suppliers. Arrange in advance to obtain supplies, services or spare equipment quickly. After a storm, there may be a surge in demand for all resources. Established relationships helps improve access to priority service.
- Personnel
  - Verify there is a contact list for all jobsite personnel. This will assist in locating personnel after a storm. Make sure that subcontractors have their own method of tracking and locating personnel.

## Before hurricane season begins

- Review the hurricane plan. Make sure it is current. Make sure the plan and training is provided to all new employees and trade contractors as they are onboarded to the project.
- Verify there is always a designated person on site during hurricane season with the authority to implement the hurricane emergency action plan. This includes ordering system shutdowns and jobsite evacuations.
- If responsibilities are assigned to specific individuals or subcontractors, update the assignments if positions or personnel have changed. Designate alternate or backup personnel in the event members of the site preparation or post-event response teams are personally impacted by the storm and are unable to return to site.
- Make sure dedicated hurricane supplies and equipment are on hand. Order replacement materials as needed. See [Appendix A](#) for a sample list of supplies and equipment.
- Conduct annual drills to test all aspects of the hurricane emergency action plan. Verify the plan reflects current conditions at the location. After each drill, request feedback from involved staff and Emergency Response Team members to assess the effectiveness of the plan and identify areas for improvement.
- Schedule an inspection of the building envelope. Have your roofing contractor check the condition of roof coverings and flashing. Verify rooftop equipment is secure and that connections and fasteners holding equipment in place are not corroded. Consider adding strapping or bracing to reinforce rooftop equipment. Verify the condition of all glazing systems and weather seals, and confirm windows and doors are secure and will close tight.
- Consider the need for pre-fabricated protective elements such as window hurricane shutters, skylight covers or plywood panels that can be rapidly deployed in advance of a storm.
- Verify inspection, testing and maintenance of all emergency generators are up to date. Check the entire fuel system, including centralized bulk fuel storage tanks and fuel transfer pumps.
- Inspect and test all dewatering pumps and sump pumps controlling water that could otherwise inundate buildings or deep excavations during a storm. Make sure they are connected to emergency power and operate correctly while on emergency power.
- Establish and maintain emergency contact information and evacuation contact information for all personnel to assist in restoring contact with employees after a hurricane event.
- For marine and near-shore projects, establish safe harbor destinations for vessels, ferries, and barges. Identify alternate locations in each direction from the project.

## When hurricane season begins

During hurricane season, it is important to maintain an awareness of developing and approaching tropical storm and hurricane activity. Websites that provide this information are available for all hurricane-prone regions.

For the continental U.S., Caribbean and Northeast Pacific, awareness of hurricane activity can be maintained through the National Hurricane Center website at <http://www.nhc.noaa.gov/index.shtml>. For these hurricane-prone regions, consider signing up for Email and SMS Weather Alert Services at <http://www.weather.gov/subscribe>, but be aware the email alerts are from non-U.S. government sources.

### National Hurricane Center: hurricane watches, warnings, and forecasts

As a hurricane develops in the North Atlantic and Northwest Pacific, the National Hurricane Center issues a sequence of maps showing tropical storm and hurricane watch areas, hurricane warning areas, the past hurricane track, and the potential hurricane track. The figure below shows an example of such a map.



Figure 3 – Example of National Hurricane Center map displaying watches, warnings and 5-day track forecast (Source: National Oceanic and Atmospheric Administration or NOAA)

The National Hurricane Center uses the terms hurricane watch and hurricane warning. A hurricane watch area may experience hurricane conditions within 48 hours, and a hurricane warning area may experience hurricane conditions within 36 hours.

Following the sequence of hurricane tracking maps allows users to be aware of hurricane progress and the changing likelihood the hurricane may affect their location.

### When and how to react to hurricanes

By maintaining a continuous awareness of hurricane activity, you can develop a sense of when and how to react to an approaching hurricane.

The coastal areas affected by hurricane watches and warnings change constantly as a hurricane moves. The watches and warnings provide an indication of the time available to act. Keep in mind these times are estimates at best, as hurricanes are unpredictable and can arrive early.

Plan to start acting at least 48 hours before the estimated hurricane landfall at your location.

### Easy to tough approach to taking action

At 48 hours before landfall, you may be able to determine if the approaching hurricane is going to affect your location. This is especially true if your jobsite is not located near the centerline of the potential track area. So, plan to start with "easy" actions. Those are actions you will not mind taking even if the hurricane never affects your site. These actions may have to be modified based on your specific situation.

At 36 hours before landfall, it is time to start the "tough" actions. These are actions you only want to take if there is some certainty your location will be affected by the hurricane. Time to complete these remaining actions will be limited. Make sure remaining site personnel and staffing is adequate to complete remaining critical tasks while allowing time to evacuate all staff that will not remain on site. Constantly monitor announcements and evacuation orders from the local authorities.

Industrial, manufacturing, or chemical projects in the testing and commissioning phases may require several days to safely shutdown or cooldown operational units. The timeline for safe shutdown of such units should be reviewed at first notification that a tropical storm or hurricane is approaching the area so that necessary preparations can be completed ahead of landfall.



## 48 hours before landfall checklist

### General items

- Review the hurricane emergency action plan with all involved personnel.
- Contact suppliers and vendors to advise the site may be shut down. Defer or re-direct deliveries until after it is safe to return to the project site.
- Stock up on essential items needed for post-storm recovery efforts that may be in high demand / short supply as identified in the Hurricane Emergency Action Plan (e.g., water, batteries, first-aid kits, personal protective equipment (PPE), portable generators, sump pumps). Refer to **Appendix A**.
- Check building roofs, including temporary structures for construction activities. Make repairs to coverings and flashing as time allows.
- Remove all loose items from the roof, secure equipment, doors and covers, and remove debris. For roofs still under construction, secure and waterproof leadings edges; remove materials and roofing equipment.
- Verify roof drains are clear of trash and other obstructions.
- Clear and prepare permanent and temporary stormwater drainage inlets, culverts, and ditches for heavy rain. Inspect and repair all Stormwater Pollution Prevention Plan (SWPPP) elements.
- Verify stormwater detention pond and catch basin inlets are clear. Check temporary flood holding reserve or outflow capability.
- Move fuels , oils, lubricants, chemicals and hazardous wastes to high ground above expected storm surge and flood levels or remove items from site if possible.
- Remove or secure all compressed gas cylinders and welding / torch rigs.
- Fill fuel tanks serving emergency generators and other vital equipment services, including company vehicles. Fuel will likely be in high demand after the storm.
- Verify dewatering pumps or sump pumps are in service and working. If dewatering or sump pumps have not been recently operated, test the pumps to ensure they will function properly.
- Remove all outdoor debris that could become windborne “projectiles.”
- Remove loose, outdoor, inactive equipment or retreat it to highest possible elevation. Return specialty equipment that is no longer needed for the project (e.g., scaffolding, formwork).
- Back up computer data to main office.
- Protect or relocate vital business records.
- Allow time for Emergency Response Team members who will remain on site to go home and take care of their personal needs.
- Anchor portable buildings, trailers and storage containers, etc. to the ground.
- Secure equipment and materials in outdoor storage that cannot be moved.
- Install manual protection systems (e.g., shutters, plywood covers and flood gates).
- Cap or cover low lying conduits, pipe spools and valves.
- Raise critical equipment off floors if safe to do so (e.g., all materials, power equipment electric or data equipment). Secure and protect from wind and wind-driven rain.
- Complete all current lifts and postpone any new lifts if there is any chance the lift cannot be completed, and the installation fully secured prior to predicted landfall.

### Partially completed structures

- Securing and preparing temporary and partially completed structures should be under the direct guidance of professional engineers and competent experienced personnel.
- The complete removal of all material and equipment should be considered first.
- When necessary, any remaining materials and equipment should be secured completely using structural based rigging (steel cable and rigging). Ropes and lines are a last resort.

- Remove all fuel, oils, lubricants, and chemicals.
- Remove and or highly secure all staging, scaffolding and access/egress equipment.
- After storm preparations are complete, expedite completion of any work that could minimize the impact of a storm event (structural connections, installing doors, etc.).

## 36 hours before landfall

### General items

- Protect or relocate vital business records.
- Remove or secure all loose outdoor storage or equipment.
- Anchor portable buildings, trailers, and storage containers etc. to the ground.
- Install manual protection systems (e.g., shutters, plywood covers and flood gates). Securely cover any open roof penetrations. Inspect and reinforce temporary window or wall coverings.
- Raise critical equipment off floors if it is safe to do so (e.g., all materials, power equipment, computers and electric equipment).
- Move and protect critical equipment from basement and other below-ground areas. Anticipate lower elevation flooding and water accumulation.
- Cover, elevate and secure critical materials and equipment that cannot be moved with waterproof tarpaulins and other preferred methods.
- Initiate an orderly shutdown of any production equipment and systems that rely upon normal power.
- Turn off fuel gas services.
- Turn off non-essential electrical systems.
- Turn off non-essential water services inside structures (except fire suppressions systems).
- Verify all fire protection systems are in service (e.g., water supplies, fire pumps, sprinklers, fire alarms and special extinguishing systems).
- Verify all temporary utilities are secure, turn off and protect temporary site and structure entry points.
- Remove or secure all temporary scaffolding, ladders, stair towers (any temporary access / egress systems).

### Cranes

- Always follow the crane manufacturer's recommendations for securing cranes in high wind and storm conditions.

### Tower cranes

- Hammerhead tower cranes must be left to weathervane.
- Crane's swing radius to be unencumbered, including positioning the jibs at different elevations so the cranes will not strike each other.
- The trolley (hook) should be raised as close to the jib as possible.
- The machine deck should be checked for loose materials. There should be nothing hanging from the crane's hook.
- For luffing jib cranes (using a jib that can be raised and lowered to change the radius), the jib should be lowered as close to the horizontal as possible, hook raised as high as possible, and the crane left to weathervane (verify swing radius is free of obstructions, including the other cranes).
- Remove any banners or signs that were not applied by the manufacturer.

### Mobile cranes (lattice boom crawlers, hydraulic cranes, rough terrain cranes, etc.)

- Cranes and mobile equipment in areas of potential storm surge or flooding should be retreated to highest ground possible.
- Lower booms and jibs to protect from wind and support on cribbing – caution: for long lattice booms, verify that the crane has sufficient capacity before reaching the tipping limit. If supported on cribbing, lashing with synthetic web slings or ropes is recommended – do not strap booms with chains or wire rope.

- Hydraulic booms retracted and lowered, remove any jib extensions and secure.
- Remove ancillary rigging and secure wire ropes, hooks, blocks, etc.
- Clean crane decks of loose material.
- Cover glass and openings where possible.
- Secure all access hatches, covers and panels.
- Lock and secure. Return keys to a central control area (office).

### **Marine and near-shore operations**

- Marine and close-shore equipment: If safe to do so, move vessels and barges to a safe harbor location outside of the projected path of the storm and secure to known anchorages. Always follow the best possible marine operations guidance.

### **Service and material barges / service flexi floats, floating platforms, etc.**

- Barge buoyancy and center of gravity (CoG) must be calculated and considered. Lower ballast to top load weights and CoG should be considered by a competent and experienced professional with marine background.
- Secure barges to breasting lines if in open water, limited to single barge lines per side. Provide sufficient line to accommodate storm surge. Double up all lines. Do not secure barges to other barges in open water, even at breasting lines. If spudded, assure sufficient seating of the spuds, with adequate extension above the deck to accommodate storm surge. Anchorage points in sheltered areas should have barge and vessel mooring considerations to accommodate wind and storm surge. Securement to piles or shore points if possible. Barge to barge securing can be considered only in sheltered waters. Allow sufficient line slack to accommodate storm surge.
- Wind, storm surge, tide and expected surface conditions at time intervals must be considered when selecting the anchorage and securing plan.
- Remove as much material and equipment as possible. Tightly secure all remaining topside equipment.
- Center and spread low on deck all remaining material and equipment as possible. Remember CoG. Secure all with positive strong material with positive strong connections. Rope and knots are a last resort.
- Remove all stored fuels, oils, lubricants and chemicals from barges not required for emergency or recovery efforts. Maintain lowest possible amounts.
- Check and secure bumpers and any exterior accessories such as ladders, etc.

### **Crane barges**

All aspects of mobile crane considerations to include the following. Depending on the location, complexity, and number of crane mounted barges in use, preparation, securement, or retreat may need to start well before 36 hours out from landfall.

- Remove as much fuel from crane as possible, remove any other oils, lubricants and other chemicals from the barge.
- Secure crane to barge with additional structurally rated rigging as necessary to keep crane in center of barge or according to the manufacturer's recommendations and engineer's professional opinion. The crane must not move. Most manufacturers recommend "A" type boom anchoring – requires two lines from the boom tip, one to each barge corner on the same deck end, with boom centered between the tie down points.
- Fully engage house swing / cab locks.
- Lattice booms – Boom down on secured cribbing and secure boom to deck to prevent movement, but do not extend the boom tip beyond the deck edge.
- Hydraulic booms – Booms retracted, and all ancillary equipment should be removed and secured (e.g., jib extensions).
- Remove all rigging and secure all cabling and hooks.

### **Service boats**

- Tugs, push boats and larger powered marine equipment should be moved to a suitable marine port or secure anchorage.
- Tugs, push boats and larger powered marine equipment should follow all coastguard and manufacturer's recommendations for severe storm preparation.



### Smaller watercraft

- Should be removed where possible from water and stored above anticipated high-water levels for event. If brought ashore, the watercraft should be secured to prevent movement from winds.
- Boats secured above forecast high-water levels should have all fuel and interior content removed and be stored upside down or secured covers applied to prevent water inside craft.
- If boats cannot be removed to safe and secure on land storage, they should have low fuel on board for internal tanks. Remove external tanks to safe storage areas.
- If remaining in water, follow all Coastguard, manufacturer's recommendations, and dock facility requirements.
- Watercraft remaining in water should be essentially stripped of removeable / loose contents and covered securely for anticipated heavy rain.

### Falsework, temporary piers and partially completed structures

- Securing and preparing temporary and partially completed construction structures should be under the direct guidance of professional engineers and competent experienced personnel.
- The complete removal of all material and equipment should be considered first.
- When necessary, any remaining materials and equipment should be secured completely using structural based rigging (steel cable and rigging). Ropes and lines are a last resort.
- Remove all unnecessary fuels, oils, lubricants) and chemicals.
- Remove and or highly secure all staging, scaffolding and access/egress equipment.
- Clean and remove all debris from area.

## During a hurricane

If an Emergency Response Team (ERT) is to remain on site during the storm, consider the following:

- The ERT should consist of volunteer members willing to remain on site during the hurricane (if allowed by local authorities).
- Carefully determine whether the location, design and building construction make it a safe place for ERT members to shelter-in-place during the storm.
- ERT members should be trained in all aspects of the emergency action plan and include representatives with decision-making authority as well as knowledge of jobsite operations.
- Security personnel may also be required.
- An ERT supply kit should be prepared that includes items necessary during and immediately after the storm. These include satellite phones, two-way radios, portable AM/FM radios, flashlights, lanterns, plenty of batteries, rubber boots, gloves, blankets or sleeping bags, first-aid kit, spare clothing and an adequate supply of shelf-stable food and water to last at least 72 hours.
- Anticipate loss of electrical power and municipal drinking water for several days following the storm.
- Storm-tracking procedures should be developed. The ERT should include personnel capable of monitoring conditions using various media and equipment (e.g., radio, television, internet, and cellular phone).
- If the project is in an area known to be exposed to a flood or storm surge, specific response procedures should be developed as part of the emergency action plan to manage the water exposures.
- During the height of the storm, the ERT personnel should remain in a location that has been proven secure from wind and flood.

## After a hurricane

- Bring identification, additional supplies, and cameras to document conditions upon returning to the site.
- Communicate with the ERT to determine what supplies are needed.
- Survey the site for hazards:
  - Live electrical wires
  - Broken glass and sharp metal
  - Leaking fuel gases or flammable liquids
  - Damaged building features or contents, including temporary access / egress systems, that could shift or collapse
  - Paved or hardscape areas undermined by wave action and subject to collapse
  - Flammable atmosphere in vapor space of flammable storage tanks
- Reinforce appropriate management loss-prevention programs, including:
  - Controlling the use of smoking materials
  - Using hot work permits to manage all cutting or welding operations
  - Using wet work permits to manage for all wet work-related activity
  - Using all other established work authorization or safe work permits, such as lock out / tag out, confined space, excavation permits, job/task safety analysis forms, crane / lift plans, etc.
- Verify the status of protection systems. Check water supplies, fire pumps, automatic sprinklers, fire alarms and security systems.
- Manage impairment for protection systems:
  - Expedite repairs.
  - Post fire watch in area with impaired fire protection.
  - Post security personnel in areas where building or site access is not suitably controlled.
- Survey the damage and initiate repairs immediately:
  - Engage with the necessary designers, engineers, third-party inspectors, local authorities if needed to determine if it is safe to work in or around any damaged or structurally compromised structures.
  - Promptly notify contractors to avoid waiting in line for service.
  - Establish repair priorities, including the building envelope, utilities and fire protection systems.
  - Barricade, rope-off and restrict access to any areas, buildings or structures that may have been structurally compromised.
- Begin salvage as soon as possible to prevent further damage:
  - Protect the building and contents from further damage.
  - Separate damaged goods.
  - Save all damaged goods.
  - Avoid accumulations of combustible materials inside the building.
  - Avoid storage in areas with impaired fire protection.
- Maintain contact with corporate management and your insurance broker.
- Contact Zurich to report claims and fire protection impairments.  
[Zurich impairment reporting system landing page](#)
- Clear roof drains, balcony drains, and ground-level catch basins and storm drains in preparation for

future rain events.

- Have qualified personnel thoroughly check all utility systems and hazardous processes before returning them to service.
- Restore HVAC system to maintain or restore building interior environment.
- Determine whether adequate raw materials will be available when the jobsite is physically ready to resume work. Remember that local suppliers and distributors may still be down or at reduced levels.
- Provide a means to stay in contact with displaced personnel. Consider a telephone number that delivers a recorded message with daily updates.

## Conclusion

When a project is exposed to hurricanes or tropical storms, establish a hurricane emergency action plan.

The hurricane emergency action plan should be quick, simple, and practiced. Training and drills should be conducted on the jobsite. The plan should be integrated with other emergency action plans and management programs. The plan should consider actions to take before hurricane season, when hurricane watches and warnings are issued, during a hurricane and after a hurricane.

As a hurricane approaches, know the easy actions to take first. Once you are sure a hurricane will affect your project, implement the tough actions. Be sure to identify any tough actions that will require a lot of time. They may need to be started the same time as the easy actions.

Remember, a successful hurricane outcome begins before hurricane season starts.

## References

<sup>1</sup> Saffir-Simpson Hurricane Wind Scale, 2021, [www.nhc.noaa.gov/aboutsshws.php](http://www.nhc.noaa.gov/aboutsshws.php).

## Other resources

[Zurich Hurricane Toolkit](#)

Email and SMS Weather Alert Services. (National Oceanic and Atmospheric Administration – National Weather Service)

[National weather service severe weather alerts](#)

Federal Emergency Management Agency (FEMA)

[FEMA](#)

Hurricane Preparedness. National Oceanic and Atmospheric Administration. (NOAA)

[Hurricane preparedness](#)

NOAA's Atlantic Oceanographic and Meteorological Laboratory. Frequently Asked Questions about Hurricanes

[FAQs - Hurricane season information](#)

## Other related Zurich RiskTopics

- Water infiltration and mold prevention strategies for contractors
- Water damage response plans and response carts
- Water damage response cart sample checklist
- Wet work permit program
- Wet work permit
- Water damage prevention daily jobsite inspection
- Guide to hurricane emergency action plans for construction
- Hurricane emergency action plan (HEAP) checklist for construction
- Flood emergency response plans
- Reducing Infiltration in Modular Construction

## Appendices

### Appendix A – Sample list of hurricane supplies and equipment

- Emergency lighting and portable generators (including an adequate supply of fuel for generators)
- Lumber, plywood and nails/screws
- Tape for windows
- Sandbags
- Roofing cement, sealant and other repair materials
- Tarpaulins
- Caulk
- Duct tape
- Power and manual tools
- Shovels and axes
- Chainsaws and fuel
- Nonperishable food and drinking water
- Cellphone with charged spare batteries
- Satellite phones (as land telephone lines and cellphone service may be interrupted)
- Two-way radios with charged spare batteries
- Flashlights with spare batteries
- Extra / spare PPE (personal protective equipment) and rain gear

March 2023

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