# ELEMENT 3 CHECKLIST

# INFRASTRUCTURE PROTECTION AND RESILIENCE PLANNING

◯ Yes = Action completed ◯ Somewhat = Action in progress or incomplete ◯ No = No action planned or taken ◯ Unknown = Status or action unknown ◯ N/A = Does not apply

| GENERAL | Value | Rank |
|---|---|---|
| *The ability of a health care facility to continue to provide care in a changing climate is in part dependent on the infrastructure and system elements that provide a safe and healthy hospital environment.* | | |
| **3.0.1** Is information about the vulnerability of your facility's infrastructure and systems to current and future climate variability and changing weather patterns continually included in hospital facility risk assessments? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| **3.0.2** Does your health care facility collect best practices and lessons learned regarding infrastructure and related systems resilience from other health care facilities that have experienced extreme weather disasters? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| **3.0.3** Are the individuals responsible for maintenance of your health care facilities, systems and infrastructure adequately trained to manage an extreme weather related emergency or disaster ***(for examples of climate-related hazards, please refer to the hazards listed in Element 1)*** | | |
| • Are front-line workers engaged in the development of plans and responses? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| • Do maintenance procedures of your health care facilities' systems and infrastructure include specifications on how weather may affect the safety and continued functioning of your facility? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| **3.0.4** Does your health care facility invest in infrastructural upgrades or redundancy measures to make your facility more resilient to extreme weather or longer-term gradual impacts from climate change? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| **3.0.5** Develop a checklist for each building system that summarizes major principles that should be considered when developing policies or capital projects. ***Refer to Element 2 Resources and Checklist.*** | | |
| • For Hospitals, have you reviewed FEMA-477 for flood and high wind? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| • For Residential Healthcare Facilities, have you reviewed FEMA-477 and P-361 for Safe Rooms? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| • For ambulatory facilities, have you reviewed FORTIFIED®? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| **3.0.6** Have you completed a time to failure *(96 hour or greater)* assessment of all major building infrastructure systems? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |

| **STEP 1:** Energy and Utility Infrastructure: Power and Thermal Energy | Value | Rank |
|---|---|---|
| *Perform Step 1 for each campus or site* | | |
| **3.1.1** Climate change may result in more power outages in your community, which may result in increased frequency and/or duration of power disruptions at your health care facility. Review energy and utility infrastructure vulnerabilities and parameters of operating without essential utilities *(island operation)* that may be required in extreme weather events | | |
| • What is the current anticipated length of time you can operate without grid power or refueling? *(96 hours is the minimum requirement, but some campuses may have circumstances that require a longer period of time.)* | | ◯ N/A |
| • Is this adequate to meet the projections for extreme weather event durations? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| • Do you produce electricity on-site through CHP or renewable systems? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| • Do you have any other source beyond the municipal grid for normal power provisions? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| • Given the location of the campus and weather risks, is your refueling supply chain resilient to extreme weather disruptions? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| • Are all critical facilities equally equipped to operate without grid power for extended outages? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| • If not, are there plans in place to address identified shortfalls and vulnerabilities? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| **3.1.2** Review locations of energy and utility infrastructure relative to extreme weather hazards. | | |
| • Are all utility connections above 500-year flood elevation? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| • Is the infrastructure located in buildings that can withstand damage from wind or hail? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| • Is all major energy and utility infrastructure located above 500-year flood elevations? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |

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|---|---|---|
| • If not, are major energy and utility infrastructure elements located below flood elevations protected by flood-proof enclosures? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| • Is roof mounted energy and utility infrastructure secured for high wind and protected from impact damage? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| • Are emergency generators located above design flood elevations? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| • Are emergency generators safe from impact damage during high wind events? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| • Based on your answers above, rank the resilience of your energy and utility infrastructure locations | | ◯ 3 *(Exemplary)* ◯ 2 *(Functional)* ◯ 1 *(Marginal)* ◯ *0 (None)* ◯ N/A |
| **3.1.3** In a climate-related emergency involving a power outage at your health care facility, does your facility have back-up power sources available to supply electricity to critical areas? | | |
| • What percentage of your base electrical demand is covered by emergency generators? | | ◯ N/A |
| • Do you have redundancy *(N+1)* for all emergency generators? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| • Does your emergency generator fuel capacity allow for the projected hours of operation indicated in Question 3.1.1? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| • Does the emergency generator have a dedicated fuel source? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| • Do you have external connections for portable emergency generators? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| • Is food refrigeration equipment on emergency power? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| • In a climate related emergency, assess the capability of your back up power sources to continue functioning. | | ◯ 3 *(Exemplary)* ◯ 2 *(Functional)* ◯ 1 *(Marginal)* ◯ *0 (None)* ◯ N/A |
| **3.1.4** In extreme events, thermal *(heating)* energy systems may be taxed. Review the following items related to thermal systems. | | |
| • Have you reviewed the duration of island operation that may be required for the thermal plant in extreme weather events? Enter value here | | ◯ N/A |
| • How many hours of steam production are possible with fuel reserves? | | ◯ N/A |
| • Are your thermal plant fuel source(s) subject to delivery disruptions? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| • Is your heating system electric *(ground source heat pumps or electric baseboard)*? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| • If the answer above is "yes", is it on the emergency power system? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| • Are boilers dual-fueled? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| • Are fuel reserves adequate for the anticipated hours of operation without refueling? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| • Are steam sterilizers fed by oil or natural gas? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| • Are domestic hot water systems electric? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| • If the answer above is "yes", is domestic hot water on the emergency power system? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| • In a climate related emergency, assess the capability of your heating energy system to continue functioning. | | ◯ 3 *(Exemplary)* ◯ 2 *(Functional)* ◯ 1 *(Marginal)* ◯ *0 (None)* ◯ N/A |
| **3.1.5** In extreme events, thermal *(cooling)* energy systems may be taxed. Review the following items related to thermal systems: | | |
| • What is the the duration of "island operation" that may be required for the thermal plant in extreme weather events? | | ◯ N/A |
| • What percentage of the cooling load is on emergency power? | | |
| • Is your cooling plant capable of operating when grid power is lost? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| • Have you reviewed anticipated design temperatures for future plant upgrades? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| **3.1.6** In a climate related emergency, assess the capability of your cooling systems to continue functioning. | | ◯ 3 *(Exemplary)* ◯ 2 *(Functional)* ◯ 1 *(Marginal)* ◯ *0 (None)* ◯ N/A |

| **STEP 2: Energy Conservation** | **Value** | **Rank** |
|---|---|---|
| *Perform Step 2 for each campus or site* | | |
| **3.2.1** Energy efficiency initiatives contribute to resiliency by reducing future climate-related health risks *(through greenhouse gas emission reductions)* and reducing reliance on energy on a regular basis *(to be better prepared when power supply is disrupted)*. | | ◯ N/A |
| • Does your health care facility have an energy conservation program? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| • Have you audited and benchmarked energy use in your facility through EnergyStar or equivalent programs? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| • Have you set energy or greenhouse gas reduction targets? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| • Do you monitor or track energy use? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |

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| | • Do you evaluate energy reduction strategies, monitor cost savings, greenhouse gas reductions? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| | • Do you educate staff, patients and visitors about energy reduction strategies *(energy awareness campaigns)*? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| **3.2.2** | Have you engaged in any of the following energy conservation measures? | | |
| | • Central plant or mechanical equipment upgrades? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| | • Low-energy lighting, such as T-5 or LED? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| | • Install lighting control systems to minimize energy consumption? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| | • Install energy efficient equipment? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| **3.2.3** | Has your facility or system investigated the possibility of diversifying energy sources and including renewable energy sources for your buildings or campuses ? | | |
| | • Solar *(photovoltaic or thermal)* | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| | • Wind | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| | • Methane *(from landfill or industrial/agricultural sources)* | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| | • Biomass | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| **3.2.4** | Extreme weather could have cost implications for your health care facility, *(if air conditioning units will need to run at higher intensities and for longer periods of time.)* Do you consider how future climate variability, increasing utility or energy costs could affect costs to run equipment when developing future plans, strategies and programs *(e.g. when investments are made)*? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| **3.2.5** | Based on your responses to Step 2 above, assess your energy conservation program. | | ◯ 3 *(Exemplary)* ◯ 2 *(Functional)* ◯ 1 *(Marginal)* ◯ *0 (None)* ◯ N/A |

| **STEP 3: Water Supply** | | **Value** | **Rank** |
|---|---|---|---|
| | *Perform Step 3 for each campus or site* | | |
| **3.3.1** | Climate change may cause more water restrictions or contamination. Does your health care facility have sufficient plans for water resources in the event of a water related emergency? | | |
| | • Are there two independent water sources to the facility? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| | • Is there a functioning well on your site? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| | • If yes, is it adequate to supply the facility? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| | • Is the water source potable without treatment? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| | • If treatment is required, is there a sufficient supply? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| | • Is there a surface water source; ie, pond, lake, etc that can provide process water needs in an emergency? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| **3.3.2** | Climate change may cause more water restrictions in your community. Does your health care facility have protocols to secure back-up supplies of water in the event of a water related emergency? | | |
| | • How much on-site emergency water storage do you have *(gallons)*? | | ◯ N/A |
| | • What duration of operation can this storage provide *(hours)*? | | ◯ N/A |
| | • Do you rely on bottled drinking water for emergencies? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| | • If so, how much do you store and for what duration? | | ◯ N/A |
| **3.3.3** | Based on your response abovle, rank your overall water supply resilience. | | ◯ 3 *(Exemplary)* ◯ 2 *(Functional)* ◯ 1 *(Marginal)* ◯ *0 (None)* ◯ N/A |

| **STEP 4: Water Usage** | | **Value** | **Rank** |
|---|---|---|---|
| | *Perform Step 4 for each campus or site* | | |
| **3.4.1** | Water distribution systems may be impacted by climate related events. Assess water distibution system vulnerabilities. | | |
| | • Is all utility water piping below frost lines? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| | • Is all internal water piping protected by insulation and routed through heated spaces? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| **3.4.2** | Water usage tracking and benchmarking can help you understand needs and vulnerabilities. Rank your awareness of water usage and cost. | | |
| | • Have you audited and benchmarked your water usage *(gal/day)*? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| | • Do you track or monitor water use for performance measures? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| | • Do you monitor cost savings of water use reduction strategies? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |

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|---|---|---|---|
| | • Do you have a campaign to increase awareness about water conservation/use in the facility among staff, visitors and patients? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| **3.4.3** | A water conservation program could include a variety of initiatives. Has your health care facility adopted any of the following water conservation related strategies? | | |
| | • Low flow showers and faucets? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| | • Low flow toilets? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| | • Water efficient landscaping practices *(drip or no irrigation systems)*? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| | • Water efficient laundry equipment? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| | • Food service equipment? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| | • Sterilization equipment? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| **3.4.4** | Based on your responses above, rank your water usage patterns and opportunities for improvement. | | ◯ 3 *(Exemplary)* ◯ 2 *(Functional)* ◯ 1 *(Marginal)* ◯ *0 (None)* ◯ N/A |

| **STEP 5: Sewage and Wastewater** | | **Value** | **Rank** |
|---|---|---|---|
| *Perform Step 5 for each campus or site* | | | |
| **3.5.1** | Sewage and Wastewater systems may be impacted by climate related events. Inventory backflow prevention systems for all critical buildings or campuses. | | |
| | • Do buildings have check valves or equivalent backflow prevention devices installed on the main sewer discharge line to prevent sewage from flowing back into the building during a major flood event? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| | • Are all floor drains below flood elevation outfitted with drain plugs? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| | • Do you have any provisions for storing sewage in the event municipal systems are disabled or lost? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| **3.5.2** | Based on your responses above, rank your sewage and wastewater infrastructure resilience. | | ◯ 3 *(Exemplary)* ◯ 2 *(Functional)* ◯ 1 *(Marginal)* ◯ *0 (None)* ◯ N/A |

| **STEP 6: Communications Infrastructure** | | **Value** | **Rank** |
|---|---|---|---|
| *Perform Step 6 for each campus or site.* | | | |
| **3.6.1** | Climate related eventes can disrupt power and communicaiton systems. Does your facility or campus have multiple communication systems in the event of extreme weather emergencies? | | |
| | • Landline telephone systems | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| | • Mobile phone systems | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| | • Radio systems | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| | • Other (please specify):_____ | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| **3.6.2** | Is your healthcare facility part of a regional network of healthcare facilities with coordinated communication systems and protocols? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| **3.6.3** | Does your facility or healthcare system have a system to provide "essential personnel" credentials to all required staff during or following extreme weather events, when traffic may be restricted and gasoline rationed? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| **3.6.4** | Rank your communication and information system resilience based on the answers to the questions above. | | ◯ 3 *(Exemplary)* ◯ 2 *(Functional)* ◯ 1 *(Marginal)* ◯ *0 (None)* ◯ N/A |

| **STEP 7: Medical Information Infrastructure** | | **Value** | **Rank** |
|---|---|---|---|
| *Perform Step 7 for the campus or site.* | | | |
| **3.7.1** | Healthcare facilities require Medical Information Systems (MIS) to remain available in order to continue to deliver patient care. Does your facility or system have the following systems in place? | | |
| | • Electronic Medical Records | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| | • Paper record storage in appropriate location *(above flood level or in safe rooms)* | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| | • Off-site data center(s) | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| **3.7.2** | Does your facility or campus have medical information systems that will operate in the event of extreme weather emergencies? | | |
| | • Are Medical Information Systems on emergency power? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| | • Is there an off-site data center or backup to on-site Medical Information Systems? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |

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| | • Is there a backup telecommunications system if the telephone infrastructure fails? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| | • Is there a municipal or regional backup telecommunications system? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| **3.7.3** | Inventory record storage systems and locations and assess their safety. | | |
| | • Are medical records safe from flooding? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| | • Are building infrastructure record documents safe from flooding? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| | • Are all building infrastructure records digitized? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| **3.7.4** | Rank your Medical Information System resilience based on the answers to the questions above. | | ◯ 3 *(Exemplary)* ◯ 2 *(Functional)* ◯ 1 *(Marginal)* ◯ *0 (None)* ◯ N/A |

| **SUMMARY** | | **Value** | **Rank** |
|---|---|---|---|
| *Based on your responses above, develop a list of action items to address Infrastructure Protection and Resilience Planning issues identified.* | | | |
| **3.8.1** | Have you determined key infrastructure resilience improvement strategies for each building and campus from this checklist? | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |
| **3.8.2** | Have you mapped priority strategies for this Element across a timetable for implementation? ***Refer to the Getting Started section of the Climate Resilience Tooklit toolkit.climate.gov.*** | | ◯ Yes ◯ Somewhat ◯ No ◯ Unknown ◯ N/A |