



# B-READY for Multi-Family Housing Building Resilience Assessment Tool

October 2017

# Safeguarding Life, Property, and the Environment

Risk Management

Geospatial Hazard  
Mapping

Climate Action  
Planning

Emergency  
Preparedness



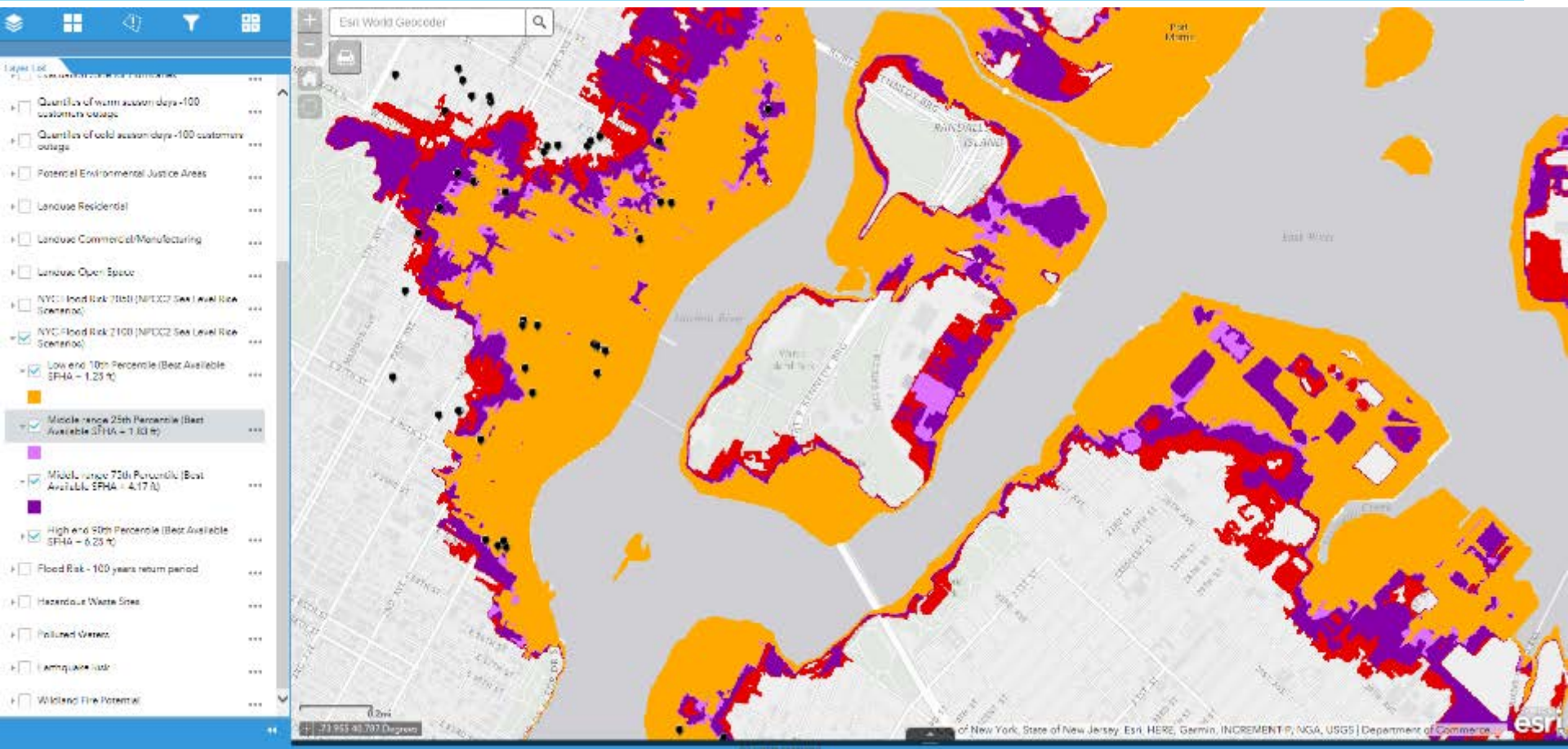
Energy Modelling &  
Commissioning

High Performance  
Buildings

Renewable Energy  
Integration

Policy Development  
and Code Compliance

## Climate-related events lead to site-specific hazards



Knowing **WHERE** you are does not mean you know **WHAT** actions to take.

# Regional evaluation can prioritize localized planning

Hazard	Ambient Air Quality	Coastal Surge, Sea Level Rise, & Riverine Flooding	Drought	Extreme Precipitation	Extreme Winter Conditions	Heat Waves	Windstorms
Model							
Threshold	AQI max of 151 to 200: Unhealthy for sensitive groups	Localized 1% Flood measurement	D2: Severe Drought	Heavy rainfall (>0.3 in/hr)	NESIS Cat 3: Major Storm	3+ consecutive days at or above 90 °F	Hazardous winds > 50 mph
Frequency	3-7 occurrences per year	100yr return period 1% Flood	Limited	1-, 2-, and 4 inch 24-hour rainfall events are expected to increase in frequency	21 times in the past 50 years	2 times per year, increasing	27 tornados past 100yrs 1 hurricane per year, increasing

# B-READY Building Assessments: Helping building owners prepare

B-READY helps building owners and managers translate  
**climate-related risks** into  
actionable resilience measures



Simplifies resilience best practices into site-specific recommendations relevant to each building



Resilience index allows for benchmarking over time or across a portfolio of buildings



Incorporates community measures and social equity

# Provide simplified systems approach to building-level resilience

Buildings are made up of systems, requiring a systems process to provide guidance about scale, complexities and uncertainties



# B-READY considers the hazards to the building based on the occurrence of threshold climatic events

## Climatic Event Hazard Matrix

Climatic Event	Hazard Types													
	Air Pollution	Damaging Winds	Extreme Cold	Extreme Heat	Extreme Rainfall	Fire	Flooding	Hail	Lightning	Power Disruption	Snowfall	Water Pollution	Water Supply Disruption	Emergency
Ambient Air Quality	■													■
Coastal Surge, Sea Level Rise, and Riverine Flooding					■		■			■			■	■
Drought				■								■	■	■
Earthquake						■				■				■
Extreme Precipitation					■		■	■	■					■
Extreme Winter Conditions		■	■				■	■			■		■	■
Heat Waves	■			■						■		■	■	■
Wildfires	■					■								■
Windstorms		■							■	■				■
Building-Specific Hazards														■

Resilience measures can be organized by hazard or building system, making it easy to understand system vulnerabilities

Envelope and  
Structure

HVAC and Controls

Electrical and Lighting

Communications and  
Security

Interiors, Equipment  
and Furnishing

Energy Generation

Fire Suppression

Plumbing

Site

Conveying Equipment

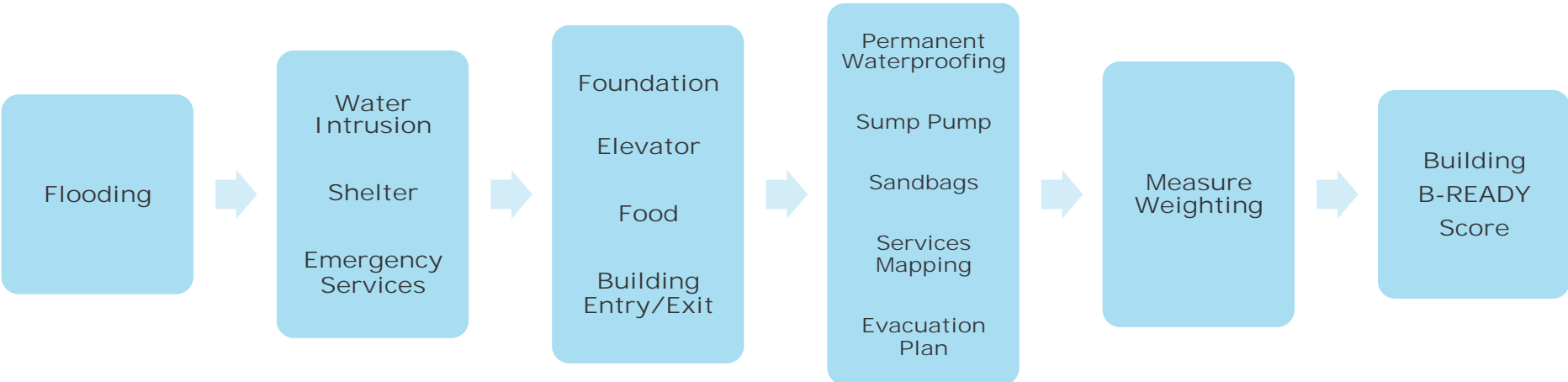
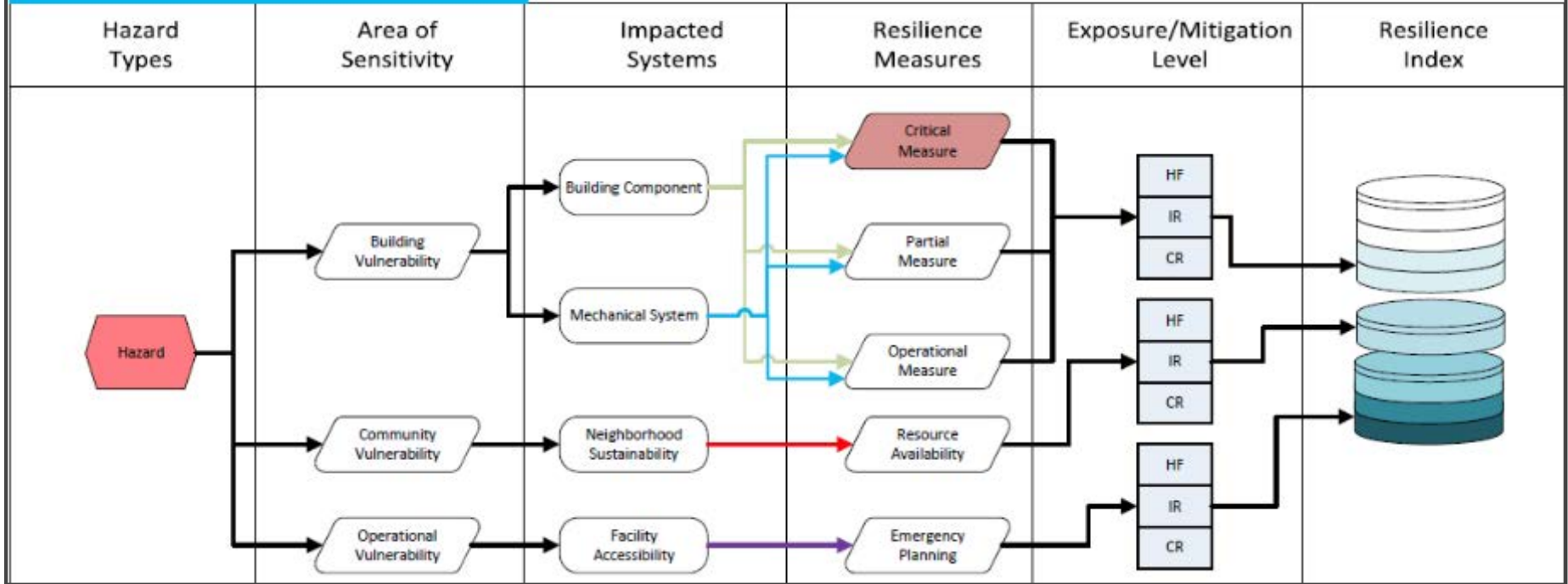
Operations

Community



# HAZARD – VULNERABILITY – RESILIENCE PROCESS MAP

# Tool Process Description



# Resilience analysis and recommendations must be concise, helping owners prioritize

## Analysis:

- 200+ Predefined Measures
- Scenario walkthroughs with building managers
- Measure Ratings factors
  - Hazard frequency: based on frequency and intensity of climatic events
  - Magnitude of impact: the impact that would occur to the building if the measure is not in place
  - Capacity rating: the extent to which the measure has been implemented thereby mitigating the risk

## Recommendations:



### Capital investments

External communication systems, reliable backup power, CO<sub>2</sub> sensors, hazard insurance, water storage, bioswales



### Labor investments

Retro-commissioning, Fire mitigation techniques, safeguard toxic materials, operations and maintenance plans



### Social investments

Emergency plans, first aid, security, areas of refuge, risk awareness education, flexible dress codes and scheduling

# B-READY looks at resilience through various lenses

## Likelihood of Climatic Event at the Site



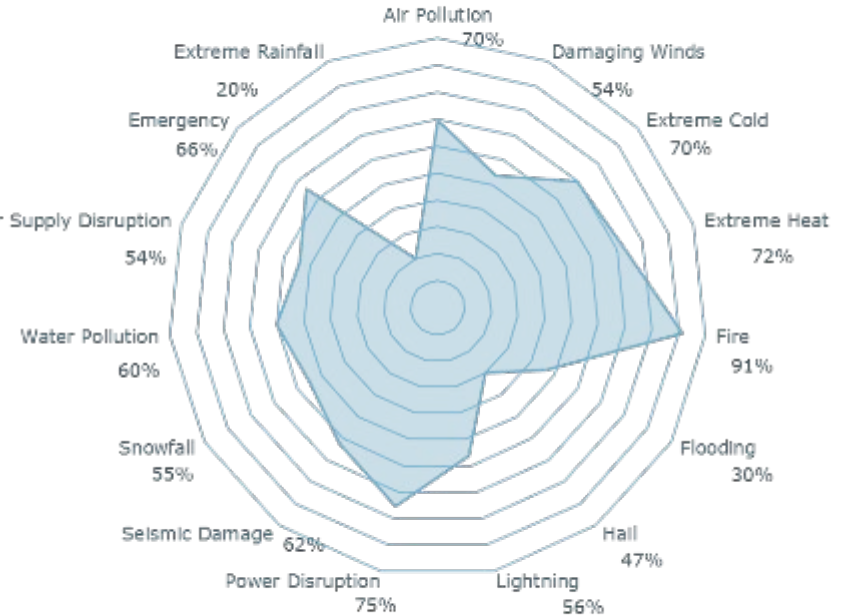
- Ambient Air Quality
- Coastal Surge, Sea Level Rise, and Riverine Flooding
- Drought
- Earthquake
- Extreme Precipitation
- Extreme Winter Conditions
- Heat Waves
- Wildfires
- Windstorms

Climatic events projected to occur most frequently at the building



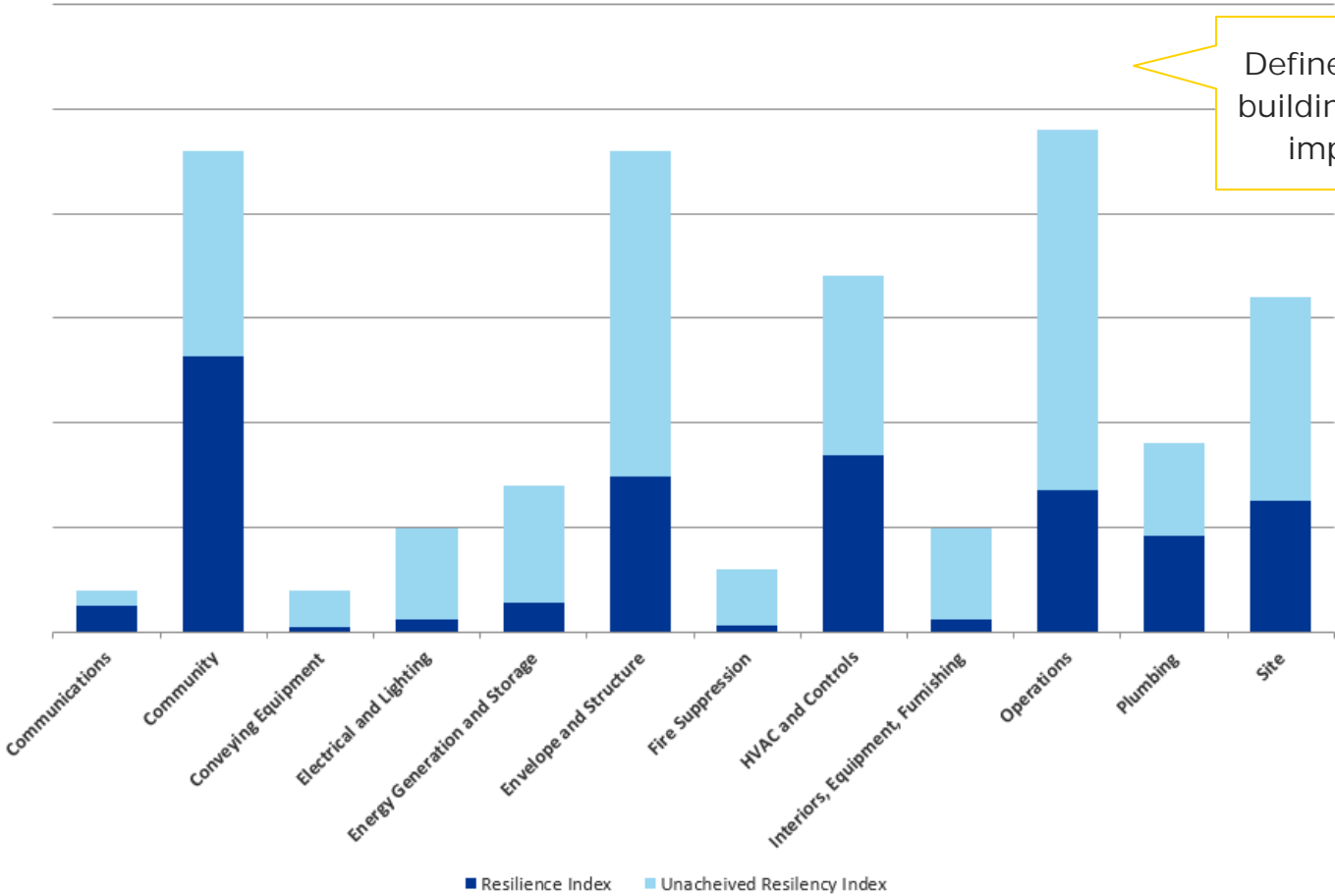
Hazards the building is most and least prepared for

## Resilience by Hazard Type

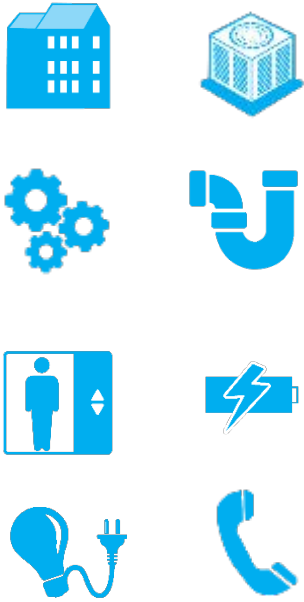


# B-READY shows how resilient each building system to the local hazards

Resiliency Index per System Type



Define the priority areas that the building owner should invest in to improve building resilience.



# Example Recommendations



## Communications

Systems	Measure Description
Intercom	Intercom systems to lobby
Landlines	Available building landline
Occupant Notification	Centralized email, phone, and text notification systems for widespread notifications.  Paper postings at each floor and in main lobby.
Emergency Services	Residents can call the Customer Contact Center to report emergencies or schedule routine apartment/development maintenance repairs.



## Electrical and Lighting

Systems	Measure Description
Lighting	Energy efficient interior and exterior common area lighting for improved energy performance, resident safety, and reduced maintenance burden.
Electrical System	Switchgear and main disconnect are above BFE.
Critical Power Circuit	A circuit designed to be tied to permanent or temporary generation source: <ul style="list-style-type: none"> <li>• District heating system, the water pumps, and elevators.</li> <li>• Emergency outlet in each apartment.</li> </ul>
System Load	Demand reduction initiative. This will reduce the potential for area brownouts and the cost of backup power systems

# Example Recommendations



## Community

Systems	Measure Description
Tenant Association	Active tenant representation is present for interacting with building management
Multilingual Support	Active multilingual community engagement.
Elderly and Disabled Population Support	Ensuring continued contact from and to populations more likely to suffer from hazard events.
Emergency Services	Centralized reporting for emergencies or maintenance scheduling.



## Multifamily Focus

*Assessments integrating community and building-level resilience not only economically prepare us for the effects associated with climate change, it safeguards Life, Property, and the Environment.*

Interested  
in learning  
more?

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SAFER, SMARTER, GREENER

