Nashua
NEW HAMPSHIRE'S GATE CITY

NIST
National Institute of Standards and Technology
U.S. Department of Commerce

EPA

FEMA

City of Nashua Resilience Initiative

Kickoff Workshop

Introduction - Nashua’s Resilience Initiative

- Meeting Logistics
- Agenda
- Handouts
- Introductions

Welcome!

What is our group structure?

Engagement for our Resilience Plan:

Steering Committee
Community Stakeholders
Public
Working Groups & Existing Community Groups
One-on-Ones

What we expect of you?

Who else should be involved in the process? (see worksheet)

Documenting follow up questions is key!

What is Resilience?

Urban Resilience:

“...the capacity of individuals, communities, institutions, business, and systems within a city to survive, adapt, and grow no matter what kinds of chronic stresses and acute shocks they experience.”

- [Rockefeller Foundation 100 Resilient Cities Initiative]

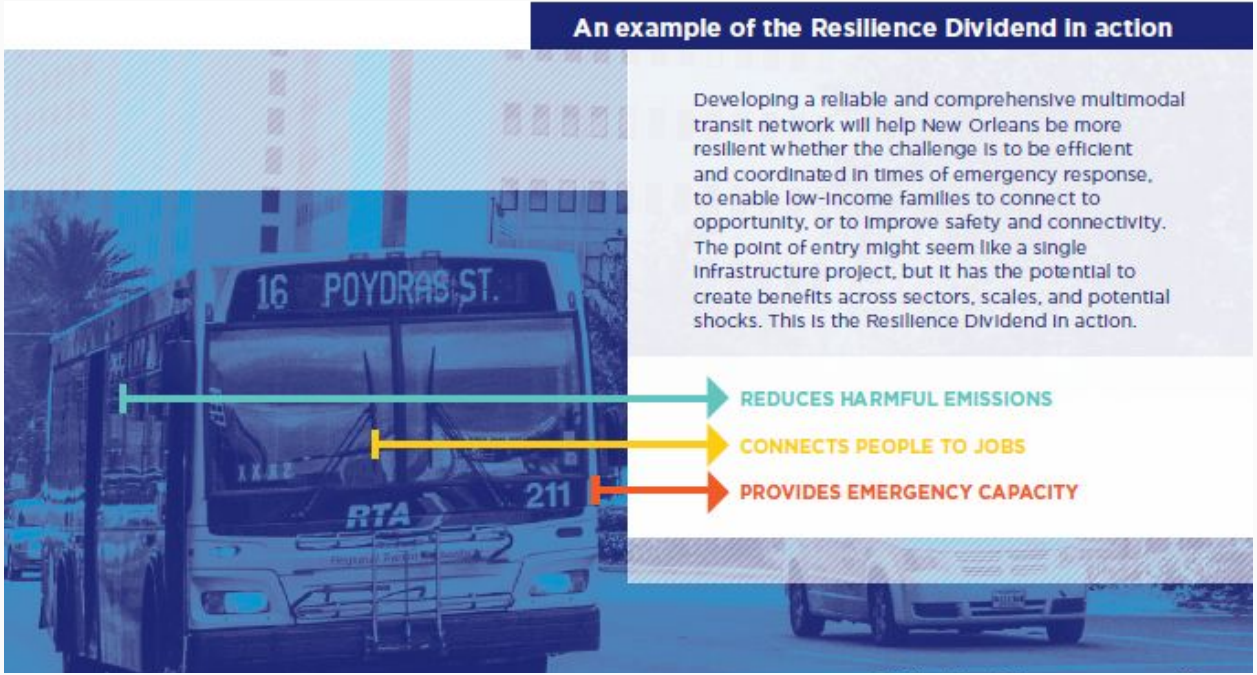
Resilience Dividend

Resilience Dividend:

“net benefits associated with the absorption of shocks and stressors, the recovery path following a shock, and any co-benefits that accrue from a project even in the absence of a shock”

“net positive”

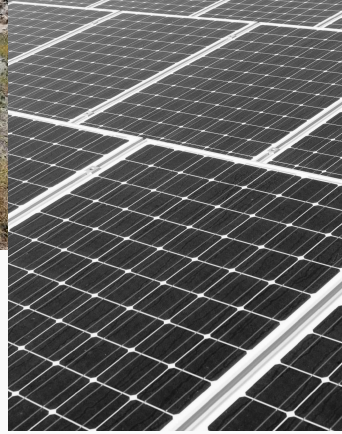
- Bond et al 2017



Atlanta, GA: Develop, integrate, and institutionalize urban agriculture into policies, programs, and projects

Boston, MA: Prioritize equitable education opportunities to close the gap for young people of color.

Boulder County, CO: Create Resilient Design Performance Standard



Pittsburgh, PA: Develop a resilient energy portfolio through diversified sources and local generation

New York, NY: Expand the accessibility of the city's transportation network to seniors and people with disabilities

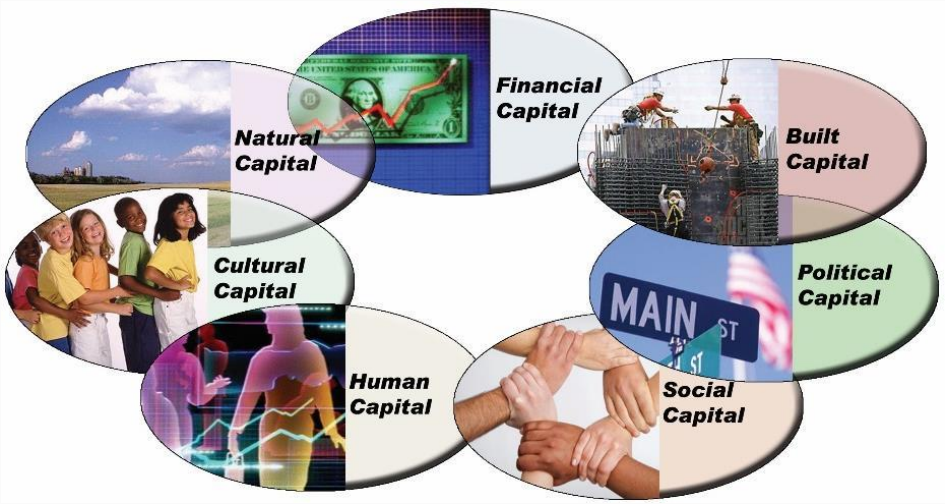
San Francisco, CA: Promote Neighborhood Affordability

State of OR: Service providers for all essential sectors should be encouraged to develop business continuity plans.

New Orleans, LA: Invest in comprehensive and innovative urban water management

Aligning the Resilience Initiative to Nashua's Resources & Assets

- **Social Capital**
- Cultural Capital
- Political Capital
- **Built Capital**
- Natural Capital
- Financial Capital
- Human Capital

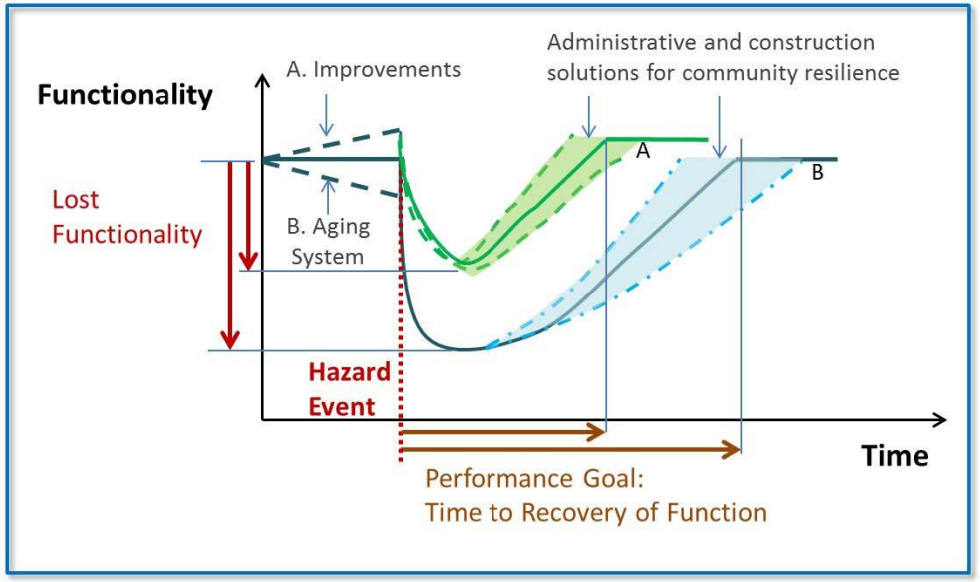


The Community Capitals Framework (Cornelia & Jan Flora et al, 2008)

The social functions and needs of a community should drive the requirements of the built environment for a community to be resilient.

Building & Infrastructure Systems Resilience

Condition A	Condition B
• Well maintained • Benefitted from good design and mitigation projects • Improved level of functionality before hazard event • **Modest loss of functionality after the event**	• Degradation of functionality • Deterioration in the physical system • Lack of adequate maintenance

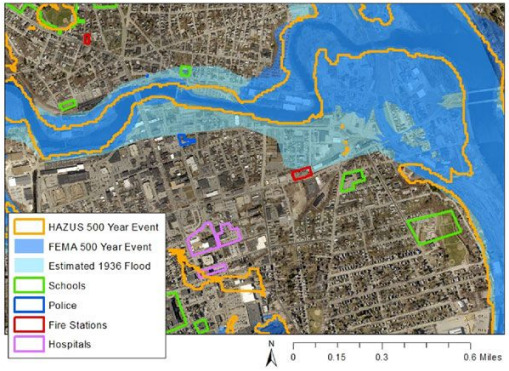


(Therese McAllister 2013)

Greater Nashua's Existing Resilience Efforts

- Mayors National Climate Action Agenda
- NFIP Community Rating System (CRS)
- Livable Nashua Dashboard
- Nashua Downtown Riverfront Development Plan
- Greater Nashua Climate and Health Adaptation Plan
- Nashua Region Water Resiliency Action Plan
- Environment & Energy Committee
- Greater Nashua Voluntary Organizations Active in Disaster (VOAD)
- Northeast States Emergency Consortium (NESEC) Map Your Risk Assessment

Livable Nashua
Our Progress Towards a Thriving, Resilient Future



Integrated Project Components

Resilience Plan & Strategy

- Comprehensive Resilience Strategy
- Recovery Workshop
- Flood Recovery Exercise
- *EPA Healthy Communities Grant*

Hazard Mitigation Plan

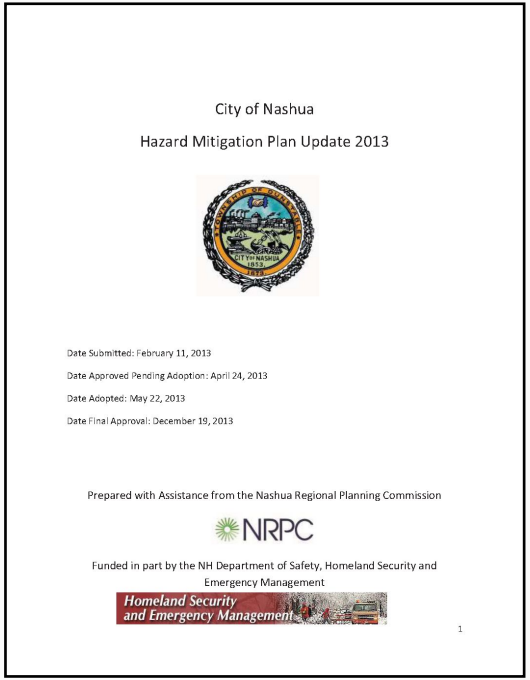
- 5-Year Update to Hazard Mitigation Plan
- Tight integration with NIST Community Resilience Planning Guide process
- *FEMA Pre-Disaster Mitigation Grant*

Resilience Integration Workshop

- DHS Coastal Resilience Center Plan Integration for Resilience Scorecard process
- *National League of Cities Leadership in Community Resilience Program 2018 Cohort*

2013 Hazard Mitigation Plan

- Utilized Local Emergency Planning Committee (LEPC) as planning team
- 13 Mitigation Actions recommended
- Actions are very generic across the entire City
- Numerous opportunities have arisen over the past five years for hazard mitigation projects but were not identified in the 2013 plan
- Much of this is attributed to limited information included from infrastructure/building code officials during process



City of Nashua

Hazard Mitigation Plan Update 2013

Date Submitted: February 11, 2013

Date Approved Pending Adoption: April 24, 2013

Date Adopted: May 22, 2013

Date Final Approval: December 19, 2013

Prepared with Assistance from the Nashua Regional Planning Commission

NRPC

Funded in part by the NH Department of Safety, Homeland Security and Emergency Management

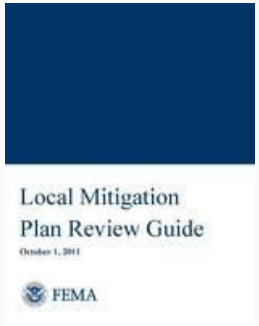
Homeland Security and Emergency Management

1

2018 Hazard Mitigation Plan Process

- Determine the Planning Area and Resources
- Build the Planning Team
- Create an Outreach Strategy
- Review Community Capabilities
- Conduct a Risk Assessment
- Develop a Mitigation Strategy
- Keep the Plan Current
- Review and Adopt the Plan (Q4 2018)
- Create a Safe and Resilient Community

The purpose of this Local Mitigation Plan Review Guide is to help Federal and State officials assess Local Mitigation Plans in a fair and consistent manner, and to ensure approved Local Mitigation Plans meet the requirements of the Stafford Act and Title 44 Code of Federal Regulations (CFR) §201.6.



- Our plan will need to include the requirements within
- Will be submitted to NH HSEM for approval & finally adopted by Mayor and Board of Aldermen

2018 Hazard Mitigation Plan Process

Benefits of integrating with the NIST process:

- Looking beyond natural hazards
- Looking beyond existing hazards and conditions (climate change, aging infrastructure, etc)
- Including adaptation techniques in recommended mitigation actions
- Including Pre-Disaster Recovery Planning

Society saves $6 for every dollar spent through federal grants funded to the private sector for mitigation - National Institute of Building Sciences 2017 Report

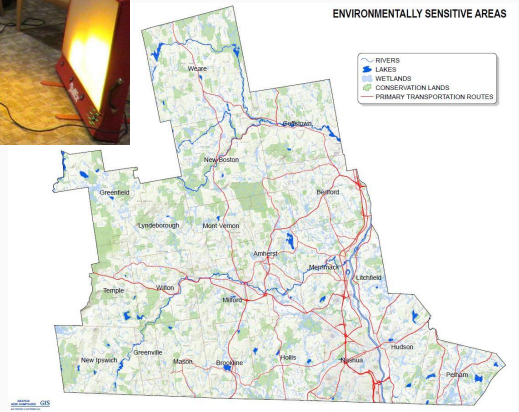
What we've done so far...

- Hired Anna McGinty as the City's Community Resilience Coordinator in January
- Started project scoping meetings with individual City Departments throughout January
- Worked with NIST to format this workshop and overall project timeline
- Currently reaching out to other jurisdictions with community resilience efforts underway

Opportunities to Support Other Efforts

Community Resilience can support other planning efforts:

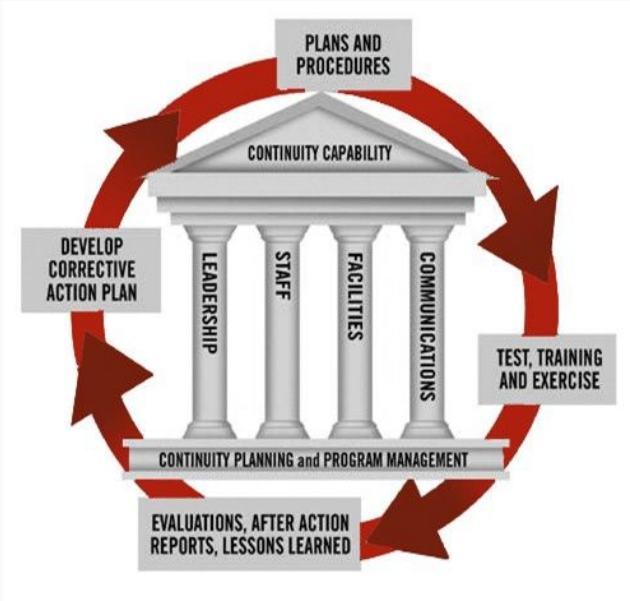
- Eversource Critical Facilities List Annual Update
- GIS Data Facility & Infrastructure Updates
- Community Outreach & Messaging priorities with Greater Nashua Public Health
- Priorities of Energy & Environment Committee
- Future City of Nashua Master Plan



Upcoming Resilience Projects

Projects on the horizon:

- Update of the Resilience Toolkit Website (initial project funded through CDBG) (Q2 2018)
- Climate Adaptation for Hazardous Materials Handling Facilities Workshops (Q2 2018)
- Municipal Continuity of Operations (COOP)/Continuity of Government (COG) Planning (Q3 2018)



National League of Cities Leadership in Community Resilience Program

- Out of 45 applicants, Nashua was one of seven awardees
- Each city will receive a $10,000 grant and at least 12 months of technical assistance, staff support, and professional development opportunities for community leaders.
- Will host a Resilience Integration Workshop to align the multitude of adaptation and planning efforts proposed or underway in the City
- Utilization of **Plan Integration for Resilience Scorecard** by DHS Coastal Resilience Center & Texas A&M University
- Aligns with Steps 2, 3, & 4 of the NIST Community Resilience Planning Guide

NLC NATIONAL LEAGUE OF CITIES

CITIES STRONG TOGETHER

2018 Resilience/Recovery Workshop
2019 Flood Recovery Tabletop Exercise

- Partnership with NH Department of Environmental Services & NH Homeland Security & Emergency Management
- **Workshop:** Educate community officials on resources available & development of Resource Guide
- **Exercise:** Focus on executing plans developed in Nashua to leverage all local, state, and federal resources in a coordinated effort towards recovery after a significant flooding incident
- Opportunity to demonstrate capabilities of NH Silver Jackets

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

SILVER JACKETS MANY AGENCIES ONE SOLUTION Be Risk Aware!

HSEM NEW HAMPSHIRE DEPARTMENT OF SAFETY

Moving Forward

- Community resilience should be based on long-term community growth and development goals.
- For Nashua, this is an excellent time to start this initiative with significant amount of development and growth taking place

NIST Community Resilience Planning Guide Process

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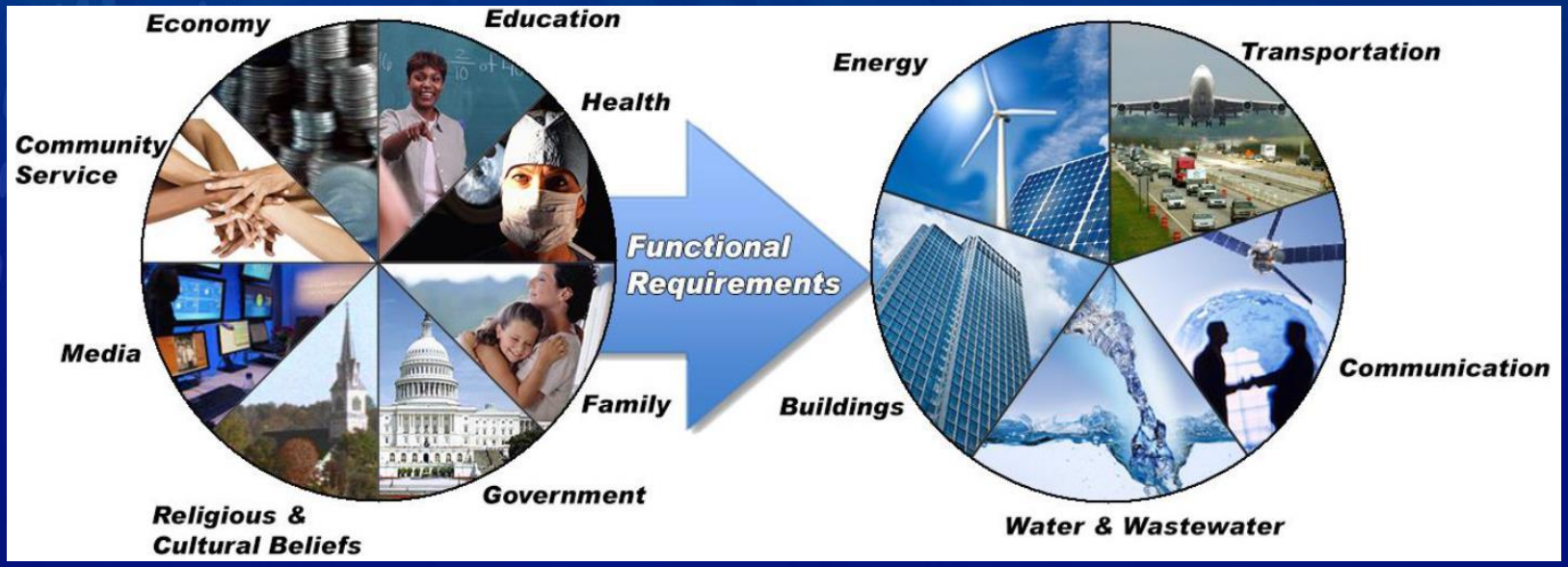
Community Resilience

- Communities are socio-technical systems with various stressors
- Buildings and infrastructure enable social and economic function
- Social and economic needs and functions should inform the goals for performance of buildings and physical infrastructure
- All communities are exposed to hazards that can cause disruption to social and economic activity
- Resilient communities recognize and mitigate the consequences of hazard events on their buildings and physical infrastructure



Challenges

- What hazards should the community be resilient to?
- How to define the interconnected nature of social systems, buildings, and infrastructure?
- How to identify performance gaps (“measure”) resilience?

Hazards
- Natural hazards
- Technological hazards
- Human-caused hazards
- Degradation

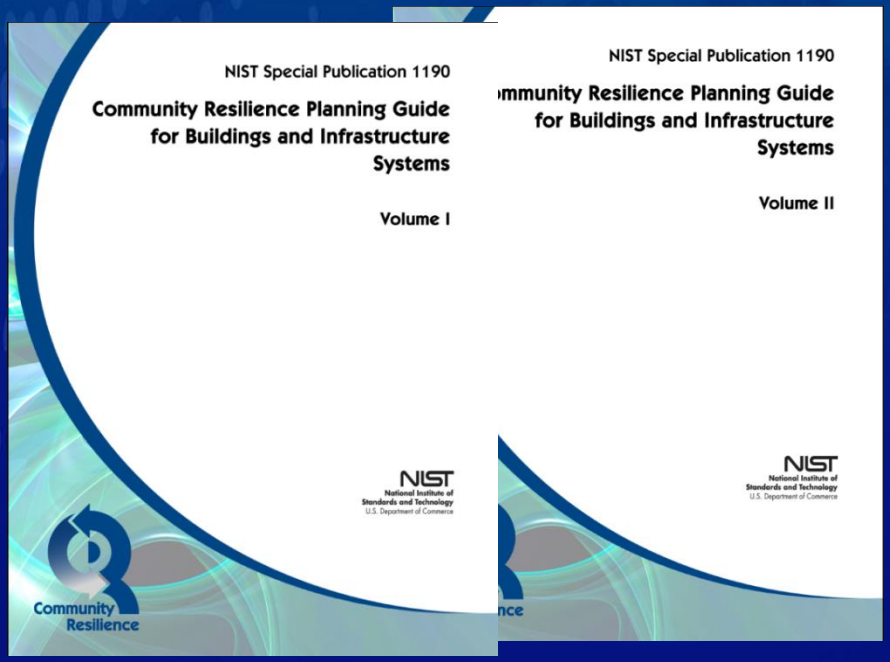
Hazard Level
- Routine
- Expected
- Extreme

Planning Guide Outline

Volume 1 - Methodology

Executive Summary

- Introduction
- 6 Step Methodology
- Planning Example – Riverbend
- Glossary and Acronyms



Volume 2 - Reference

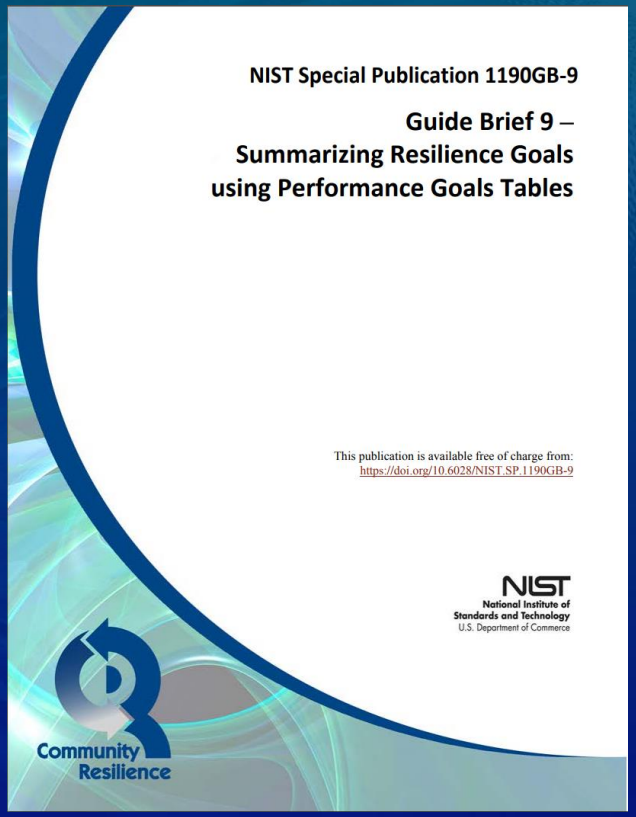
Executive Summary

- Social Community
- Dependencies and Cascading Effects
- Buildings
- Transportation Systems
- Energy Systems
- Communications Systems
- Water & Wastewater Systems
- Community Resilience Metrics

www.NIST.gov/topics/community-resilience

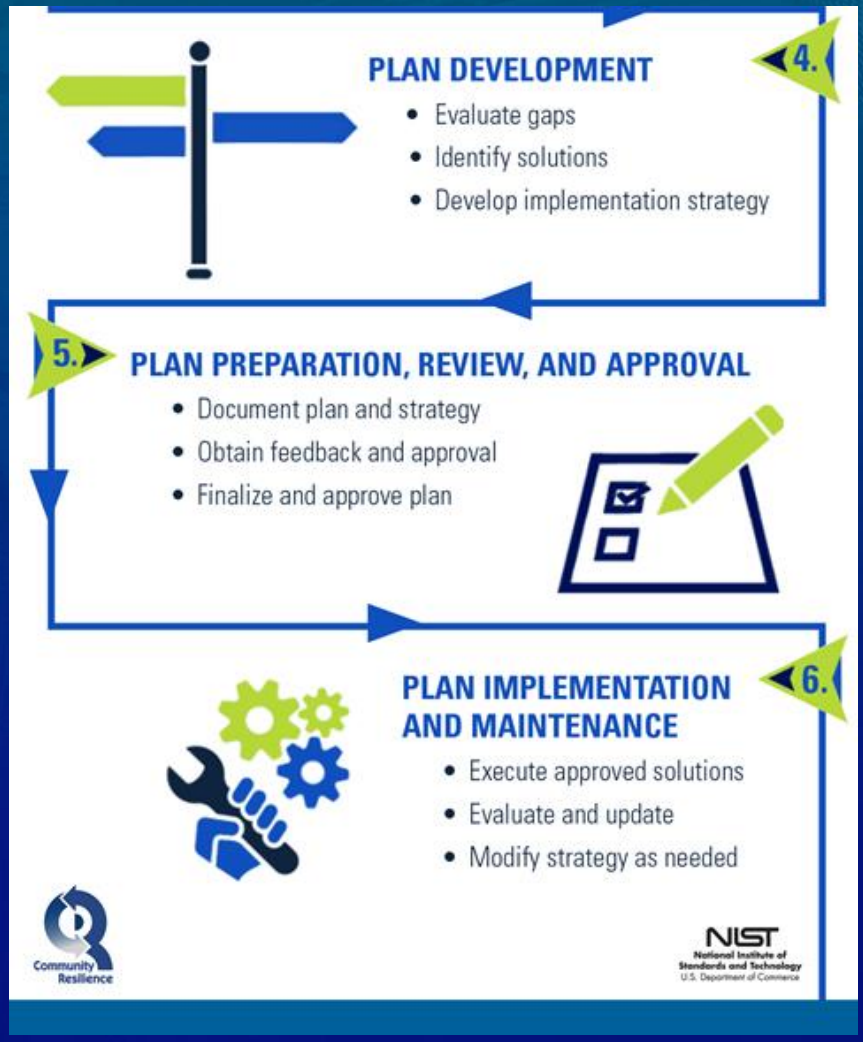
Guide Briefs

- Provide additional guidance for communities to implement the 6-step process in the NIST Guide
  - Currently address specific issues in Steps 2, 3, 4, 6
  - Others being developed
- Serve as a mechanism to provide new guidance/information as identified through:
  - Addition research
  - Lessons learned from implementing Guide in communities

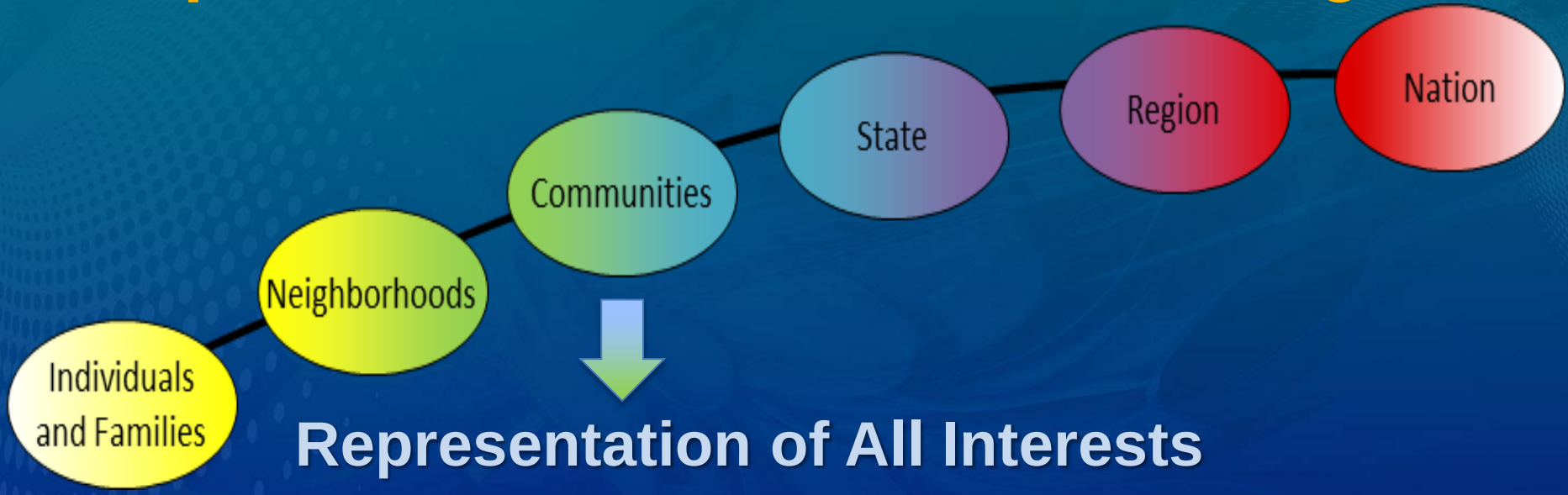


https://www.nist.gov/topics/community-resilience/planning-guide-briefs

Planning Steps for Community Resilience



Step 1. Form a Collaborative Planning Team



Representation of All Interests

Public

- Elected Officials
- Local Government
- Community Members

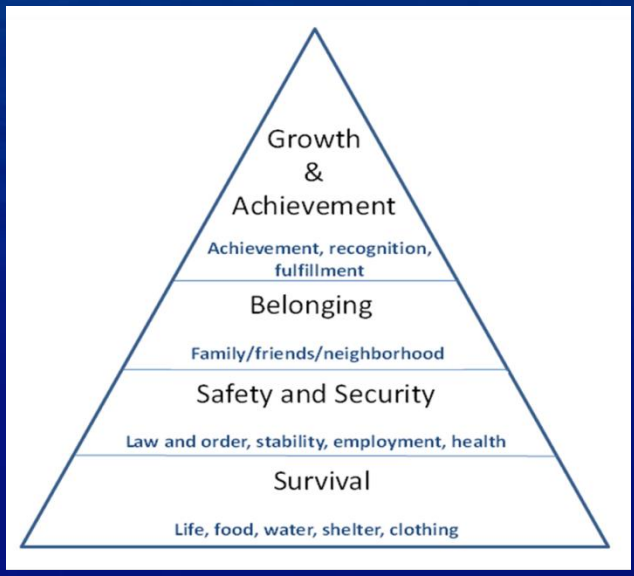
Private

- Business and Services
  - Banking, Health care
  - Utilities
  - Media
- Organizations
  - NGOs (VOAD, Relief)

Step 2. Understand the Situation

Characterize the Social Dimensions

- Community members
  - Present and future needs
  - Demographics and economic indicators
  - Social Capital/Social Vulnerabilities
- Social institutions
  - Social functions
  - Gaps in capacity
  - Dependencies on other institutions
- Community metrics



NIST Guide to understanding Social Dimensions is unique

- *While there are other guides available that address resilience issues, NIST's Planning Guide has three unique aspects:*
  - It recognizes that social needs should play a significant role in settings goals for how our buildings and physical infrastructure systems should perform
  - It acknowledges the unique role of local government as the logical convener for relevant stakeholders needed to develop a comprehensive resilience plan
  - It addresses dependencies among social and physical systems

Characterize the Built Environment

Buildings

Individual structures, including equipment and contents that house people and support social institutions

Building Clusters

A set of buildings that serve a common function such as housing, healthcare, retail, etc.

Infrastructure Systems

Physical networks and structures that support social institutions, including transportation, energy, communications, water and waste water systems.

Dependencies

Internal and External, Time, Space, Source

Characterize

Location, number, construction, demands and use, etc.

Step 3. Determine Goals and Objectives

Established Long Term Community Goals

- Long term goals to improve the community can guide the prioritization and implementation process.
  - Create a desirable place to live by… (Master Plan)
  - Create a region that is more aware and resilient to climate change
  - Encourage the advancement of the City's long-term economic interests
  - Be adequately prepared to deal with all hazards

Establish Desired Performance Goals and Levels for the Built Environment

- Performance goals are independent of hazard events.
  - Community functions are needed during recovery, such as acute health care, 911 call centers, emergency response
  - Consider role of a facility or system that impacts others outside the community.
- Define goals in terms of '*time needed to restore functionality*'.
- Use goals to help prioritize repair and reconstruction efforts.
- Related Performance Levels establish criteria for new construction and retrofit of existing construction.

Performance Levels vs. Performance Goals

Performance Goals

- Indicate time it takes for building clusters to recovery capacity to:
  - Start recovery (30%)
  - Usual operations (60%)
  - Full functionality (90%)

Performance Levels

- Refer to performance of the building which helps achieve recovery time
  - A = Safe and operational
  - B = Safe and usable during repair
  - C = Safe and not usable
  - D = Unsafe – partial of complete collapse

Determine and Characterize Hazards

- Identify prevalent hazards
  - Wind, Tornado, Earthquake, Flood
  - Fire, Snow, Rain, Drought, Extreme Temperature
  - Ground failure, Solar Weather
  - Public Health Incident

- Evaluate hazards for 3 levels
  - Routine — Level expected to occur frequently
    - *Should have minimal disruption*
  - Design — Level used to design buildings
    - *Anchor for community planning*
  - Extreme — Maximum considered possible
    - *Plan for critical services*

Determine Anticipated Performance of Existing Built Environment

- Anticipated performance (restoration of function) during recovery depends
  - Damage level - Condition and capacity of structural and nonstructural systems
  - Recovery time - Materials, equipment, and labor needed for restoration
  - Dependencies on other systems that may be damaged

Hurricane Irene

Hurricane Katrina

Building Performance Goal Tables

Disturbance [1]	
Hazard Type	Earthquake
Hazard Level	Design
Affected Area	Community
Disruption Level	Moderate

Restoration Levels [2,3]	
30%	Function Restored
60%	Function Restored
90%	Function Restored
X	Anticipated Performance

Building Clusters	Support Needed[4]	Design Hazard Performance								
		Phase 1 Short-Term			Phase 2 Intermediate			Phase 3 Long-Term		
		Days			Weeks			Months		
		0	1	1-3	1-4	4-8	8-12	4	4-24	24+
		Building Performance Category								
		A			B			C		D
Critical Facilities										
Emergency Operation Centers	R, S, MS	90%							X	
First Responder Facilities	R, S, MS	90%							X	
Memorial Hospital	R, S, MS	90%							X	
Non-ambulatory Occupants (prisons, nursing homes, etc.)	R, S, MS	90%							X	
National Aircraft Parts Factory (NAP)	R, S, C	90%							X	
Emergency Housing										
Temporary Emergency Shelters	R, S	30%	90%							X
Single and Multi-family Housing (Shelter in place)	R, S	60%			90%					X
Housing/Neighborhood										
Critical Retail	R, S, C		30%	60%	90%					X
Religious and Spiritual Centers	R, S			30%	60%	90%				X
Single and Multi-family Housing (Full Function)	R, S			30%		60%		90%		X
Schools	R, S			30%	60%	90%				X
Hotels & Motels	R, S, C			30%		60%	90%			X
Community Recovery										
Businesses – Manufacturing (except NAP)	R, S, C				30%	60%	90%			X
Businesses - Commodity Services	R, S, C				30%	60%		90%		X
Businesses - Service Professions	R, S, C				30%		60%		90%	X
Conference & Event Venues	R, S, C				30%		60%		90%	X

Footnotes:

1 Specify hazard type being considered
Specify hazard level – Routine, Design, Extreme
Specify the anticipated size of the area affected – Local, Community, Regional
Specify anticipated severity of disruption – Minor, Moderate, Severe

2 30% | 60% | 90% — Desired restoration times for percentage of elements within the cluster

3 X — Anticipated performance for 90% restoration of cluster for existing buildings and infrastructure systems
Cluster recovery times will be shown on the Summary Matrix

4 Indicate levels of support anticipated by plan
R = Regional; S= State; MS=Multi-State; C = Civil (Corporate/Local)

Water Performance Goal Table

Disturbance [1]	
Hazard Type	Earthquake
Hazard Level	Design
Affected Area	Community
Disruption Level	Moderate

Restoration Levels [2,3]	
30%	Function Restored
60%	Function Restored
90%	Function Restored
X	Anticipated Performance

Water Infrastructure	Support Needed[4]	Design Hazard Performance								
		Phase 1 Short-Term			Phase 2 Intermediate			Phase 3 Long-Term		
		Days			Weeks			Months		
		0	1	1-3	1-4	4-8	8-12	4	4-24	24 +
Source										
Raw or source water and terminal reservoirs	R, S			90%						
Raw water conveyance (pump stations, piping to WTP)	R, S				90%				X	
Potable water at supply (WTP, wells, impoundment)	R, S	30%		60%	90%			X		
Water for fire suppression at key supply points (to promote redundancy)	R, S	90%			X					
Transmission (including Booster Stations)										
Backbone transmission facilities (pipelines, pump stations, and tanks)	R, S	90%					X			
Control Systems										
SCADA or other control systems	R, S	30%		60%	90%		X			
Distribution										
Critical Facilities										
Wholesale Users (other communities, rural water districts)	R, S		60%	90%			X			
Hospitals, EOC, Police Station, Fire Stations	R, S		60%	90%			X			
Emergency Housing										
Emergency Shelters	R, S		60%	90%			X			
Housing/Neighborhoods										
Drinking water available at community distribution centers	R, S			60%	90%					
Water for fire suppression at fire hydrants	R, S				90%				X	
Community Recovery Infrastructure										
All other clusters	R, S			30%	90%				X	

Footnotes:

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Example Summary Resilience Matrix

Disturbance [1]	
Hazard Type	Earthquake
Hazard Level	Routine
Affected Area	Localized
Disruption Level	Usual

Restoration Levels [2,3]	
30%	Function Restored
60%	Function Restored
90%	Function Restored
X	Anticipated Performance

Summary Resilience Table	Design Hazard Performance								
	Phase 1 Short-Term			Phase 2 Intermediate			Phase 3 Long-Term		
	Days			Weeks			Months		
	0	1	1-3	1-4	4-8	8-12	4	4-24	24+
Critical Facilities									
Buildings	90%	X							
Transportation	90%	X							
Energy	90%	X							
Water	90%		X						
Wastewater		90%	X						
Communication	90%		X						
Emergency Housing									
Buildings	90%		X						
Transportation	90%	X							
Energy	90%	X							
Water	90%		X						
Wastewater		90%	X						
Communication	90%			X					
Housing/Neighborhoods									
Buildings	90%		X						
Transportation		90%	X						
Energy		90%	X						
Water		90%		X					
Wastewater			90%	X					
Communication		90%		X					
Community Recovery									
Buildings		90%	X						
Transportation			90%	X					
Energy		90%	X						
Water			90%	X					
Wastewater			90%	X					
Communication		90%		X					

Footnotes:

1 Specify hazard type being considered
Specify hazard level – Routine, Design, Extreme
Specify the anticipated size of the area affected – Local, Community, Regional
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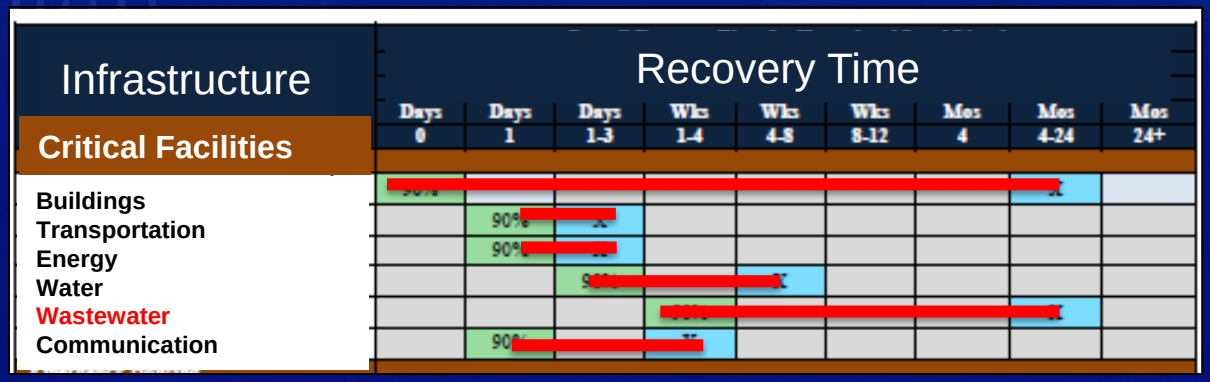
2 | 30% | 60% | 90% | Desired restoration times for percentage of elements within the cluster

3 | X | Anticipated performance for 90% restoration of cluster for existing buildings and infrastructure systems
Cluster recovery times will be shown on the Summary Matrix

Step 4. Plan Development
Evaluate Gaps and Identify Solutions

- Prioritize gaps
  - Long-term community goals
  - Social needs during recovery
- Identify alternative solutions
  - Multiple stages
  - Temporary and permanent
  - Administrative
  - Construction



Prioritize Solutions and Develop Implementation Strategy

- Select solutions for prioritized performance gaps
  - Determine how alternative solutions can be combined to meet community goals.
  - Consider collaborative projects.
- Develop implementation strategies
  - Quantify benefits of impact on public safety and social needs.
  - Evaluate economic impacts on community - costs and savings.
  - Consider short- and long-term benefits versus costs.
- Determine preferred implementation strategy

NAHSUA EXAMPLE #1 – Prioritized and Completed: Pumps and spillways have been installed in several areas that experience local floods, including April Dr. and Thoreau's Landing.

NASHUA EXAMPLE #2 – Lower Priority; not selected: Emergency crossing in Mine Falls Park between Nashua High School North and South to facilitate evacuation in emergency

Step 6. Plan Implementation and Maintenance

Implementation

- Formally adopt community Resilience Plan
- Incorporate results in the City Master Plan and the Hazard Mitigation Plan
- Track and *communicate progress* to stakeholders

Plan Maintenance

- Review strategy and solutions on a regular basis
- Modify or update as needed

Using Performance Goals Tables to Summarize the results

NIST
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U.S. Department of Commerce

Building Performance Goal Tables

Disturbance [1]	
Hazard Type	Earthquake
Hazard Level	Design
Affected Area	Community
Disruption Level	Moderate

6

Restoration Levels [2,3]	
30%	Function Restored
60%	Function Restored
90%	Function Restored
X	Anticipated Performance

Building Clusters	Support Needed[4]	Design Hazard Performance								
		Phase 1 Short-Term			Phase 2 Intermediate			Phase 3 Long-Term		
		Days			Weeks			Months		
		0	1	1-3	1-4	4-8	8-12	4	4-24	24+
5		Building Performance Category								
		A			B			C		D
Critical Facilities										
Emergency Operation Centers	R, S, MS	90%							X	
First Responder Facilities	R, S, MS	90%							X	
Memorial Hospital	R, S, MS	90%							X	
Non-ambulatory Occupants (prisons, nursing homes, etc.)	R, S, MS	90%							X	
National Aircraft Parts Factory (NAP)	R, S, C	90%							X	
Emergency Housing										
Temporary Emergency Shelters	R, S	30%	90%							X
Single and Multi-family Housing (Shelter in place)	R, S	60%			90%					X
Housing/Neighborhood										
Critical Retail	R, S, C		30%	60%	90%					X
Religious and Spiritual Centers	R, S			30%	60%	90%				X
Single and Multi-family Housing (Full Function)	R, S			30%		60%		90%		X
Schools	R, S			30%	60%	90%				X
Hotels & Motels	R, S, C			30%		60%	90%			X
Community Recovery										
Businesses – Manufacturing (except NAP)	R, S, C				30%	60%	90%			X
Businesses - Commodity Services	R, S, C				30%	60%		90%		X
Businesses - Service Professions	R, S, C				30%		60%		90%	X
Conference & Event Venues	R, S, C				30%		60%		90%	X

1

2

3

4

Footnotes:

1 Specify hazard type being considered
Specify hazard level – Routine, Design, Extreme
Specify the anticipated size of the area affected – Local, Community, Regional
Specify anticipated severity of disruption – Minor, Moderate, Severe

2 30% | 60% | 90% — Desired restoration times for percentage of elements within the cluster

3 X — Anticipated performance for 90% restoration of cluster for existing buildings and infrastructure systems
Cluster recovery times will be shown on the Summary Matrix

4 Indicate levels of support anticipated by plan
R = Regional; S= State; MS=Multi-State; C = Civil (Corporate/Local)

First Column - Building Clusters

Building Clusters
Critical Facilities
Emergency Operation Centers
First Responder Facilities
Memorial Hospital
Non-ambulatory Occupants (prisons, nursing homes, etc.)
National Aircraft Parts Factory (NAP)
Emergency Housing
Temporary Emergency Shelters
Single and Multi-family Housing (Shelter in place)
Housing/Neighborhood
Critical Retail
Religious and Spiritual Centers
Single and Multi-family Housing (Full Function)
Schools
Hotels & Motels
Community Recovery
Businesses – Manufacturing (except NAP)
Businesses - Commodity Services
Businesses - Service Professions
Conference & Event Venues

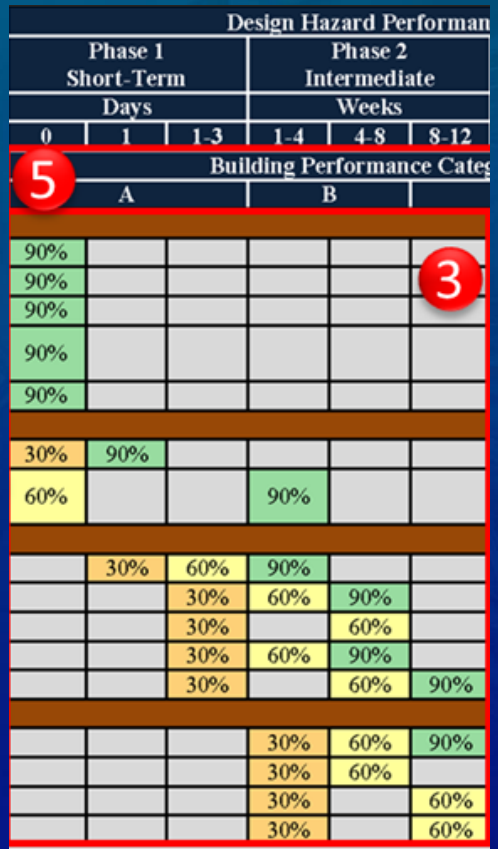
1

1 The selected building clusters are organized and listed in four functional categories in the first column, as shown in Section 3.2 of the Guide.

Second Column – Support Needed

2 The second column of the table indicates levels of support needed by the community for achieving the goal, as discussed in Section 5.2.1 of the Guide.

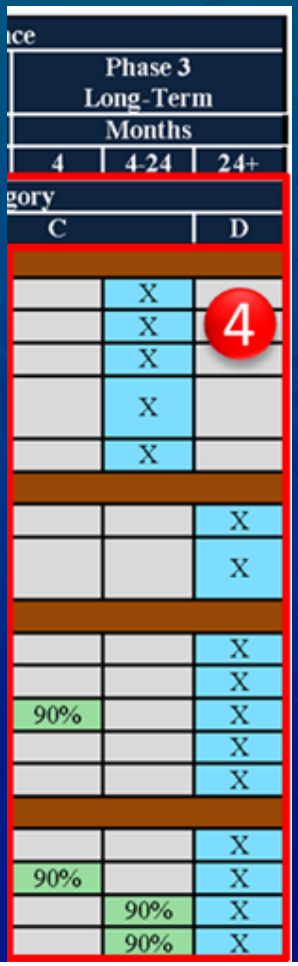
Item 3 – Performance Goals



Design Hazard Performan					
Phase 1 Short-Term			Phase 2 Intermediate		
Days			Weeks		
0	1	1-3	1-4	4-8	8-12
5 Building Performance Categ					
A			B		
90%					3
90%					
90%					
90%					
90%					
30%	90%				
60%			90%		
	30%	60%	90%		
		30%	60%	90%	
		30%		60%	
		30%	60%	90%	
		30%		60%	90%
			30%	60%	90%
			30%	60%	
			30%		60%
			30%		60%

3 The related *design hazard* performance goal for each building cluster, expressed in terms of 30 %, 60 %, and 90 % functionality levels are noted in the appropriate *phases* column, as discussed in Section 4.1.2 of the Guide. 30 % represents the minimum number of buildings in the cluster, or the system capacity in the cluster, that are needed to initiate community recovery. 60 % represents the minimum number needed to resume usual operations in the community. 90 % represents the number needed to achieve normal operating capacity.

Item 4 - Anticipated Performance



4 The anticipated performance of a building cluster in its present condition is indicated by the location of the blue X, as discussed in Section 4.1.4 of the Guide. This information is specific to the hazard event under consideration.

Item 5 – Building Performance Categories

Design Hazard Performance								
Phase 1 Short-Term			Phase 2 Intermediate			Phase 3 Long-Term		
Days			Weeks			Months		
0	1	1-3	1-4	4-8	8-12	4	4-24	24+
Building Performance Category								
A			B		C			D

5 The table includes a *Building Performance Category* (A, B, C, or D as defined in Guide Table 4.1) to ensure compatibility of performance between buildings and infrastructure systems and with codes and standards. The performance levels can also inform the design criteria to be used for new construction, as defined in Table 4-1 of Section 4.1.2.

Item 6 - Disturbance

Disturbance [1]	
Hazard Type	Earthquake
Hazard Level	Design
Affected Area	Community
Disruption Level	Moderate

6

6 The heading table labeled *Disturbance* on the upper left side catalogues the parameters used in determining the anticipated performance of the clusters, and the support needed to achieve that goal, as define in Section 4.1.3. The building clusters, related *performance goals* and building *performance categories* vary for each of the three hazard levels. The anticipated performance may vary for each hazard type.

Water Performance Goals Table

Disturbance [1]	
Hazard Type	Any
Hazard Level	Routine, Design, Extreme
Affected Area	Localized, Community, Regional
Disruption Level	Usual, Moderate, Severe

Restoration Levels [2,3]	
30%	Function Restored
60%	Function Restored
90%	Function Restored
X	Anticipated Performance

Functional Category: Cluster	Support Needed[4]	Overall Recovery Time for Hazard – Routine, Expected or Extreme								
		Phase 1 – Short-Term			Phase 2 – Intermediate			Phase 3 – Long-Term		
		Days			Wks			Mos		
		0	1	1-3	1-4	4-8	8-12	4	4-24	24+
Source										
Raw or source water and terminal reservoirs										
Raw water conveyance (pump stations and piping to WTP)										
Water Production										
Well and/or Treatment operations functional										
Transmission (including Booster Stations)										
Backbone transmission facilities (pipelines, pump stations, and tanks)										
Water for fire suppression at key supply points (to promote redundancy)										
Control Systems										
SCADA or other control systems										
Distribution										
Critical Facilities										
Wholesale Users (other communities, rural water districts)										
Hospitals, EOC, Police Station, Fire Stations										
Emergency Housing										
Emergency Shelters										
Housing/Neighborhoods										
Potable water available at community distribution centers										
Water for fire suppression at fire hydrants										
Community Recovery Infrastructure										
All other clusters										

1

2

Example Summary Resilience Matrix

Disturbance [1]	
Hazard Type	Any
Hazard Level	Routine, Design, Extreme
Affected Area	Localized, Community, Regional
Disruption Level	Usual, Moderate, Severe

Restoration Levels [2,3]	
30%	Function Restored
60%	Function Restored
90%	Function Restored
X	Anticipated Performance

Building Clusters	Design Hazard Performance								
	Phase 1: Short-Term			Phase 2: Intermediate			Phase 3: Long-Term		
	Days			Weeks			Months		
	0	1	1-3	1-4	4-8	8-12	4	4-24	24+
Critical Facilities									
Buildings									
Transportation									
Energy									
Water									
Wastewater									
Communication									
Emergency Housing									
Buildings									
Transportation									
Energy									
Water									
Wastewater									
Communication									
Housing/Neighborhoods/Businesses									
Buildings									
Transportation									
Energy									
Water									
Wastewater									
Communication									
Community Recovery									
Buildings									
Transportation									
Energy									
Water									
Wastewater									
Communication									

Footnotes:

1 Specify hazard type being considered
Specify hazard level – Routine, Design, Extreme
Specify the anticipated size of the area affected – Local, Community, Regional
Specify anticipated severity of disruption – Minor, Moderate, Severe

2 | 30% | 60% | 90% | Desired restoration times for percentage of elements within the cluster

3 | X | Anticipated performance for 90% restoration of cluster for existing buildings and infrastructure systems
Cluster recovery times will be shown on the Summary Matrix

Characterizing Social Dimensions and Related Building Clusters

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SIX-STEP GUIDE TO PLANNING FOR COMMUNITY RESILIENCE

1. FORM A COLLABORATIVE PLANNING TEAM

- Identify leader
- Identify team members
- Identify key stakeholders

2. UNDERSTAND THE SITUATION

Social Dimensions

- Characterize social functions & dependencies
- Identify support by built environment
- Identify key contacts

Built Environment

- Identify and characterize built environment
- Identify key contacts
- Identify existing community plans

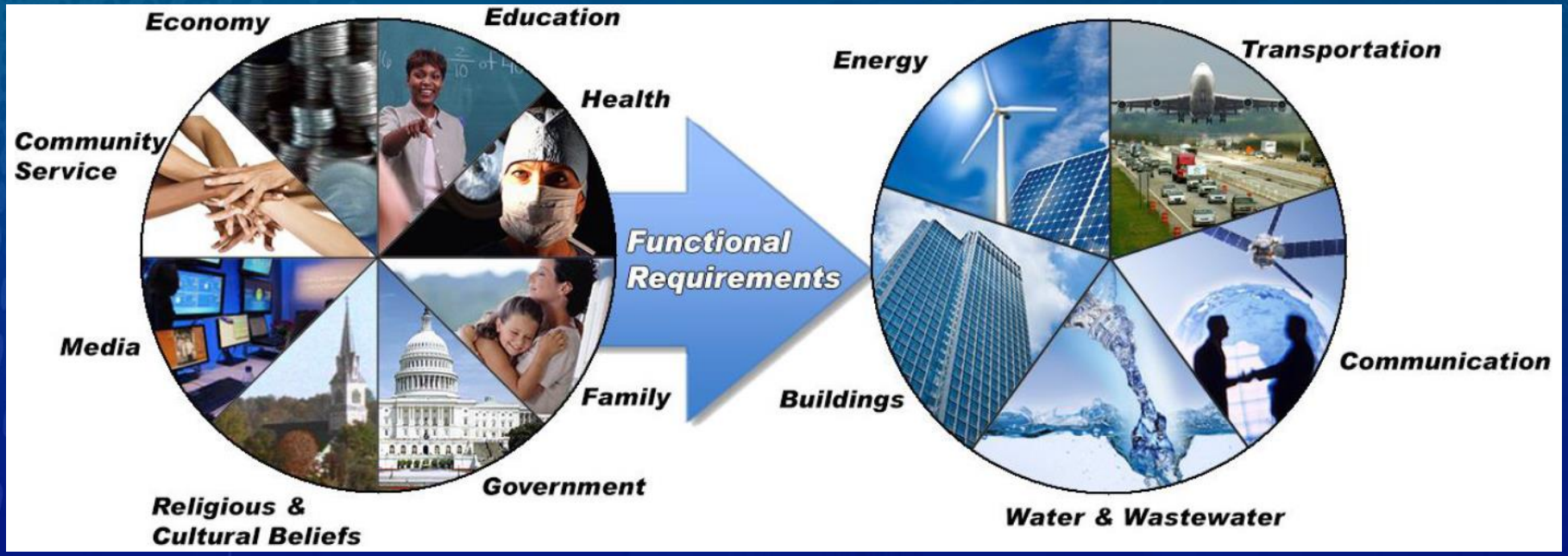
Link Social Functions & Built Environment

- Define clusters

3. DETERMINE GOALS & OBJECTIVES

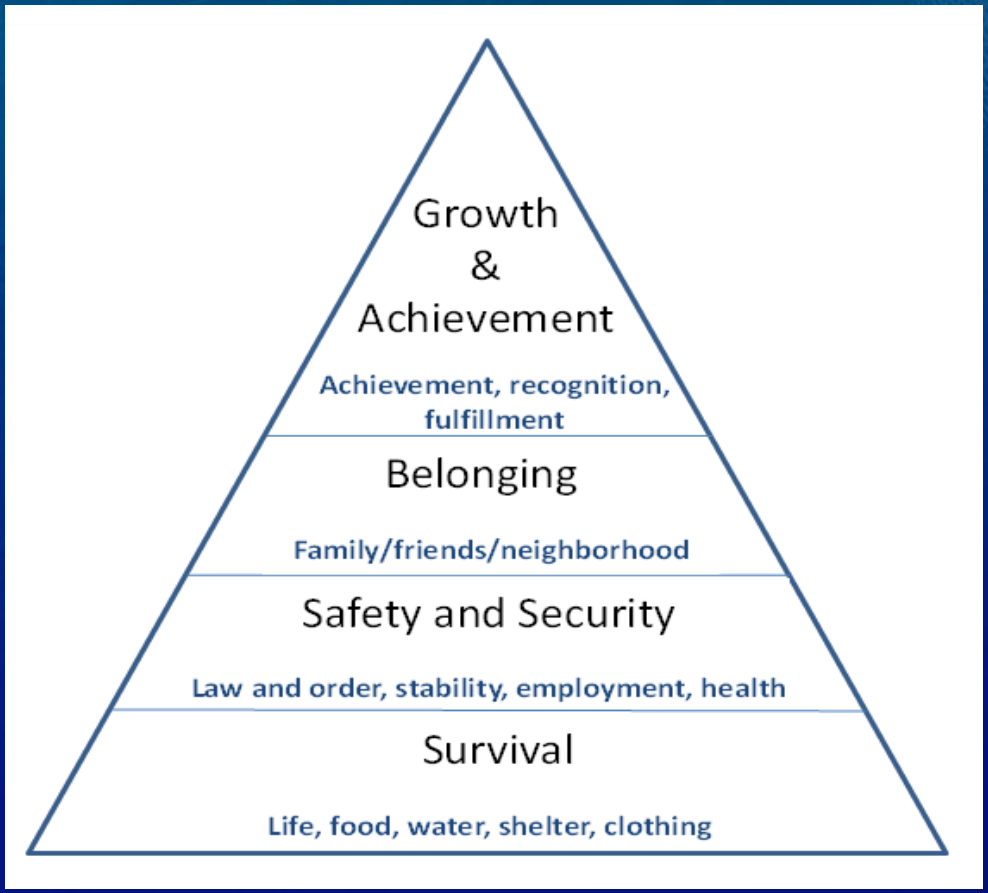
- Establish long-term community goals
- Establish performance goals
- Define community hazards
- Determine anticipated performance
- Summarize results

Relationship Between Social Dimensions of a Community and the Built Environment



A resilient community…

- Meets the needs of all of its members
- All communities are different and meet these needs in different ways through their social institutions



Adapted from Maslow 1943

Identify and Characterize the Social Dimensions

1. Characterize the community's population—community members and their present and future needs
2. Identify social institutions and systems within the community
3. Identify dependencies among and within social institutions
4. Identify key social and economic community metrics associated with resilience

Sub-Step #1

Characterize the community's population—community members and their present and future needs.

- Develop a description of the social dimensions of a community and those who live there
  - Population demographics and location
  - Economic indicators
  - Social vulnerabilities
  - Social capital

- Consider short- and long-term needs, including potential growth

Possible Nashua Demographic Indicators

- Household income
- Households from different state within the last 5 years
- Households receiving Food Stamp/SNAP benefits
- Population (25+) with four year degree or higher
- Unemployment rate
- Population below 18 years of age
- Population 65 years of age or above
- Population with disabilities
- Employed population, uninsured
- Unemployed population, uninsured
- Gender
- English speaking
- Others

Possible Economic Indicators

- Major and minor industries/businesses by type
- Gender income equality
- Ratio of large to small businesses
- Large retail stores per 10,000 persons
- Federal employment
- Occupations and employment by types

Understanding Community Capacity

- Communities have social, cultural, historical, and other characteristics that make them unique
- In characterizing the social environment, it is important that communities identify their strengths and capacities
- Identifying and drawing upon these local capacities as outlined in the Guide are critical to building resilience

Social Vulnerability

- Not all people use community systems and/or have access to community systems in the same way
- Community leaders should identify populations who are most vulnerable
- It is vital to incorporate the perspectives and needs of these populations in the planning process

Potentially Vulnerable Populations

- Older adults
- People living in poverty
- Racial and ethnic minority groups
- People with disabilities
- People suffering from chronic illness
- Homeless people
- People with mobility challenges
- Renters
- Students
- Single-parent families
- Small business owners
- Culturally diverse groups
- Non-English speakers

Social Capital and Community Engagement

- Social capital includes social networks, associations, and trust generated by them among individuals, groups, and communities

- It enhances a community's ability to work toward collective goals—such as planning for resilience

Examples of Social Capital Indicators

- Civic and political organizations
- Non-profit organizations
- Religious organizations
- Arts and cultural centers
- Recreational centers, sports organizations
- Festivals and community gatherings
- Attendance at public meetings
- Voter turnout
- Levels of trust

Sub-Step #1 Considerations…

- Does the planning team have enough data and the right types of information needed to characterize the community?

- Are additional analyses needed to identify community vulnerabilities and capacities that threaten or support resilience?

Sub-Step #1 Considerations…

Keep in mind…

- The necessary data or information may be available, but not in a format that is useful or “user friendly”
- The necessary data may exist, but have not been analyzed in the context of resilience planning and that more analysis may be required
- Additional data collection may be required

Sub-Step #2

Identify social institutions and systems within the community.

- Their functions
- The needs they meet
- Gaps in institutional and organizational capacity that could be improved by changes to the built environment or other approaches

Asking and obtaining answers to the following questions can help to create a basic inventory…

- *What are the key business and financial institutions that serve the community (both within the community and in the broader region)?*
- *What/who are the local government entities, essential personnel, and facilities in the community?*
- *What is the community's capacity with respect to the provision of health-related services?*
- *What/who are the key education entities, personnel, and facilities in the community?*

Asking and obtaining answers to the following questions can help to create a basic inventory…

- *What/who are the key service organizations and personnel (including volunteers) in the community, and what are their capacities?*
- *What/who are the key religious/cultural organizations and personnel (including volunteers) in the community, and what are their capacities?*
- *What are the key media outlets that serve the community (both within the community and in the broader region)?*

Sub-Step #2 Considerations…

- Completion of this inventory should provide the information needed to assess capacities and gaps in service provision

- The inventory should identify dependencies and interdependencies within and among the social institutions and highlight any gaps that might be improved by changes to the built environment or other approaches

Sub-Step #3

Identify dependencies among and within social institutions.

- A disruption on the built environment that affects one social institution may also affect others

- The planning team should identify dependencies among and within social institutions to determine which functions are most critical during recovery

Sub-Step #4

Identify key social and economic community metrics.

- Key social and economic metrics
- Methods to track the processes of community planning
- Methods to track the impact and outcomes of community planning and improvements

Links Between Social Institutions and the Built Environment

Identify links between social institutions and the built environment.

- Social institutions rely on the built environment, and some rely on it more heavily than others
- The Guide provides examples of how the social institutions rely on the built environment
- The tables in Chapter 10 of the Guide offer ways for communities to consider these linkages to support resilience planning

Sample Links Between Social Institutions and Building Clusters

Social Institution	Purpose of Buildings within each Social Institution	How Actualized within Built Environment	Possible Impacts if Buildings are Damaged	
			Direct	Indirect
Family				
Economic	Point of sale Location of employment, gathering points Prepare materials for transport Store materials House equipment and machinery Design and develop aircraft parts	City's downtown: Stores Restaurants Bank Salon and barbershop Internet cafe Houses and apartments National Aircraft Parts plant	Loss of revenue Loss of goods and services for sale Loss of ability to manufacture goods Loss of employment Loss of income Loss of housing Loss of materials Decrease in social capital	Loss of taxes, market share Price increases
Government	Provide work and meeting space for leaders and staff House public safety and emergency response capabilities	Offices Police stations Fire and EMS stations Emergency operations center (EOC) Jail Courthouse Libraries	Diminished emergency response Disruption to government continuity Loss of archived materials	Increased casualties and economic damage
Health Care				
Education				
Community Service				
Religious				
Media				

Defining the Resilience of the Buildings and Physical Infrastructure

Define Building Clusters around need for functionality over time

Source: National Disaster Recovery Framework

Survival
Safety and Security
Belonging
Growth and Achievement

When is each cluster and system needed for recovery?

“Just in Time” Functionality Goals

- **Short-Term**: Secure, Rescue, Stabilize, Clear Routes
  - Category: Critical Facilities and Emergency Housing Related Infrastructure Systems
- **Mid-Term:** Restore Neighborhoods, meet social needs
  - Category: Housing, neighborhoods, main street businesses Related Infrastructure Systems
- **Long-Term**: Community Social and Economic Recovery
  - Category: Commercial Recovery Related Infrastructure Systems

Linking to Services and Function to Building Clusters

Sample linkages from Guide Brief 10 → Edit for Nashua

Functional Category: Critical Facilities		
Recovery Phase: Short-Term		
Critical Facilities are needed during and immediately after the hazard event to stabilize the community and prepare for recovery. These facilities are intended to remain safe and operational during and immediately after a hazard event.		
Building Cluster	**Functions/Services**	
Critical medical	Acute care	Hospice care
Emergency operations center	Emergency operations	
Critical government	Military installations	
Critical city services	Disaster debris and recycling	Police
	Fire and EMS	
Critical commercial	Supply chain distribution	Food distribution

Linking to Services and Function to Building Clusters

Sample linkages from Guide Brief 10 → Edit for Nashua

Functional Category: Emergency Housing		
Recovery Phase: Short-Term		
Emergency Housing includes shelter for displaced residents and emergency responders from outside the area. Emergency housing needs to be available as soon as possible, with most of the centers accepting occupants within 24 hours. Emergency housing may include temporary facilities as well as homes that are safe enough to shelter-in-place. Shelters are intended to remain open until people can return home or transfer to interim housing, within days to weeks after the event.		
Building Cluster	**Functions/Services**	
Skilled nursing facilities	Skilled nursing care and rehabilitation	
Emergency medical	Home/health care	Pharmacies
	Urgent care	
Public information centers	News and broadcast radio	Television, newspapers, magazine publishing
Emergency shelters	Animal shelters	Hotels, motels as shelters
	Assisted living facility	Low cost housing
	Detention centers	Multi-family housing shelter-in-place
	Faith and community based organizations	Single family housing shelter-in-place
	First responder facilities	Transitional housing
Emergency retail	Banking	Gas stations

Linking to Services and Function to Building Clusters

Sample linkages from Guide Brief 10 → Edit for Nashua

Functional Category: Housing/Neighborhoods/Businesses		
Recovery Phase: Intermediate Term		
Housing/Neighborhoods/Businesses include the building clusters necessary to restore a livable environment in which people can return home and to work. This may require interim housing within the community to help residents remain within the community, access their normal social and community networks and services, and return to work. In general, this should be achieved within a few weeks (early in the Intermediate Recovery Phase). Recovery of housing and neighborhoods impacts job and economy restoration, and directly impacts mental health, family well-being, and willingness to contribute to recovery.		
Building Cluster	**Functions/Services**	
Community services	Community centers and libraries	Courts
	Social services	Waste management
Retail	Grocery stores, malls, restaurants, household goods including home repair	Day care centers, fitness centers
Medical	Poison control	Mental health agencies
	Dialysis	Pharmacies
	Medical care	Rehabilitation
Non-governmental organizations	Religious and cultural	Social services
Residential housing	Multi-family	Single family
Schools	K-12	Pre-school

Linking to Services and Function to Building Clusters

Sample linkages from Guide Brief 10 → Edit for Nashua

Functional Category: Community Recovery		
Recovery Phase: Long-Term		
Community Recovery includes all the building clusters needed to restore jobs, commerce, and financial stability to the community. Desirable times to recover community functions range from days to weeks after the event, but may extend for months to years. Business continuity plans for many medium to large businesses may define their pace of recovery. Communities should work with businesses to develop a collaborative approach to community recovery. The largest employers and significant revenue generators in the community are key players in the recovery as communities need resources and tax revenues to operate.		
Building Cluster	**Functions/Services**	
Commercial	Arenas, event centers	Marinas
	Cemeteries	Museums
	Conference centers	Newspaper/magazine publishing
	Hazardous materials facilities	Office park
	Hardware & home improvement centers	Professional services
	Hospitality	Warehousing
	Laboratories	All other retail
Industrial	Agriculture	Mining
	Fishing	Petroleum refineries
	Forestry	
Manufacturing	Construction	Processing facility
	Manufacturing	
Colleges and universities	Colleges and universities	

Nashua's Critical Facilities

Building Cluster	Functions/Services
Critical city services	Police Station
Critical city services	Fire Stations
Critical city services	Fire Alarm
Critical city services	EMS Station
Critical city services	Streets Department Building
Critical city services	Parks & Recreation Department Building
Critical city services	Landfill/Recycling Center
Critical city services	Vehicle Maintenance Facilities
Critical commercial	Supermarket, Grocery Store, Convenience Stores
Critical government	National Guard Armory
Critical medical	Hospitals
Critical Medical	Birthing Centers
Critical medical	Hospice Houses
Emergency operations center	Emergency Operations Center

Nashua's Emergency Housing

Building Cluster	Functions/Services
Emergency medical	Pharmacy
Emergency medical	Non-Emergency Walk-in Care Centers
Emergency medical	Home Health Care Providers
Emergency retail	Fueling Stations
Emergency retail	Banks & ATMs
Emergency shelters	Assisted Living Residences - Residential Care
Emergency shelters	Assisted Living Residences - Supported Residential Health Care
Emergency shelters	Office Buildings
Emergency shelters	Adult Family Care Residences
Emergency shelters	Community Residences at the Residential Care and Supported Residential Care Level
Emergency shelters	Individual Home Care Service Providers
Emergency shelters	Home Care Service Providers
Emergency shelters	Home Hospice Care Providers
Emergency shelters	Acute Psychiatric Residential Treatment Programs
Emergency shelters	Home Care - Durable Medical
Emergency shelters	Emergency Shelters
Emergency shelters	Hotel or Motel
Emergency shelters	Community Organization (Senior Center, Churches, Faith-Based)
Emergency shelters	Single-Family Residences
Emergency shelters	Multi-Family Residences
Emergency shelters	Homeless Shelters/Transitional Housing
Emergency shelters	Animal Care (Includes Grooming and Boarding)
Public information centers	Television Broadcast Station
Public information centers	Radio Broadcast Station
Public information centers	Print Media
Skilled nursing facilities	Nursing Homes
Skilled nursing facilities	Residential Rehabilitation and Treatment Facilities

Nashua's Housing/Neighborhoods/Businesses

Building Cluster	Functions/Services
Community services	Collection Stations
Community services	Adult Day Programs
Community services	Case Management Agencies
Community services	Public Health Building
Community services	Public Works Division Building
Community services	City Hall
Community services	State Offices
Community services	Post Office
Community services	Library
Community services	Court
Medical	End Stage Renal Disease Dialysis Centers
Medical	Ambulatory Surgical Centers
Medical	Educational Health Centers
Medical	Federally Qualified Health Center
Medical	Outpatient Physical Therapy/Speech Pathology
Medical	Health Practitioner Office or Clinic
Retail	Child Care - Center Based
Retail	Child Care - Family Based
Retail	Child Care - Residential Based
Retail	Shopping Center, Mall, or Shopping District
Retail	Small Independent Retail Facility
Retail	Large Chain Retail Facility
Retail	Home Improvement & Hardware Retail
Retail	Full Service Restaurant
Retail	Limited-Service Restaurant
Retail	Sports Recreational Facility
Schools	Pre K - 12 School

Nashua's Community Recovery

Building Cluster	Functions/Services
Colleges and universities	Higher Education
Commercial	Laboratories and Laboratory Services
Commercial	Medical Gases/Prescription Devices
Commercial	Medical Manufacturer, Wholesaler, Distributor or Broker
Commercial	Funeral Home or Crematorium
Commercial	Propane Storage
Commercial	Insurance Company
Commercial	Warehouses/Logistics
Commercial	Commodities Point of Distributions
Commercial	USPS Distribution Facility
Commercial	UPS Distribution Facility
Commercial	Veterinary Service
Commercial	Convention Center
Industrial	Industrial
Manufacturing	Manufacturing
Manufacturing	Construction Providers (Architectural Firms, Engineers, Construction Companies, Supplies and Products Manufacturing)

Determining Building Cluster Performance Goals

Guide Brief 11

NIST
National Institute of Standards and Technology
U.S. Department of Commerce

Expected Process to Complete Performance Goal Tables

- Today
  - Characterize the Social Dimensions and define building Clusters to be used to define the functional categories
  - Set Building cluster performance goals
- Next Steps
  - Define the physical infrastructure as needed for the related performance goal tables
  - Set the physical infrastructure performance goals
  - Complete the summary matrix
- Complete vulnerability assessment for each hazard, record as blue boxes and determine gaps.

Basis of Performance Goals

- Relates to the performance of a complete cluster of buildings, not any one individual building
- Goal is expressed as the time required for the cluster to return to function expressed in terms of days, weeks and months.
- Key goal is to encourage people to stay and assist in the recovery – not relocate to another community
- The goals are independent of hazard, but not hazard level. (Routine, Design, Extreme)
- Suggest setting Design level goals first.

Setting Performance Goals

- Suggested parameters
  - No more than one week to secure the disaster area and complete search and rescue. (Phase 1)
  - Approximately 2 to 4 weeks to restore reasonable living conditions and 8 to 12 weeks to restore normal capacity so the work force can return to work.
  - Business and commerce needs to be able to initiate recovery within 2 to 4 weeks with a focus on recreating jobs. Full recovery may take months to years.
- Interim repairs and temporary solutions should be used to achieve goals as soon as possible. Permanent reconstruction takes years.

Setting Restoration Levels

- The Guide suggest setting return to function goals in terms of three restoration levels – 30%, 60% and 90% of the cluster capacity as defined below
  - 30% = capacity sufficient to start recovery
  - 60% = capacity sufficient to support usual operations
  - 90% = full capacity restored and operating at normal capacity

Restoration Levels [2,3]	
30%	Function Restored
60%	Function Restored
90%	Function Restored

Process for setting goals

- Break into four groups, one for each functional category
- Set performance goals for your assigned category
- As time permits, review other categories of interest
- Reconvene and report out the results and any issues or concerns that were identified by your group.