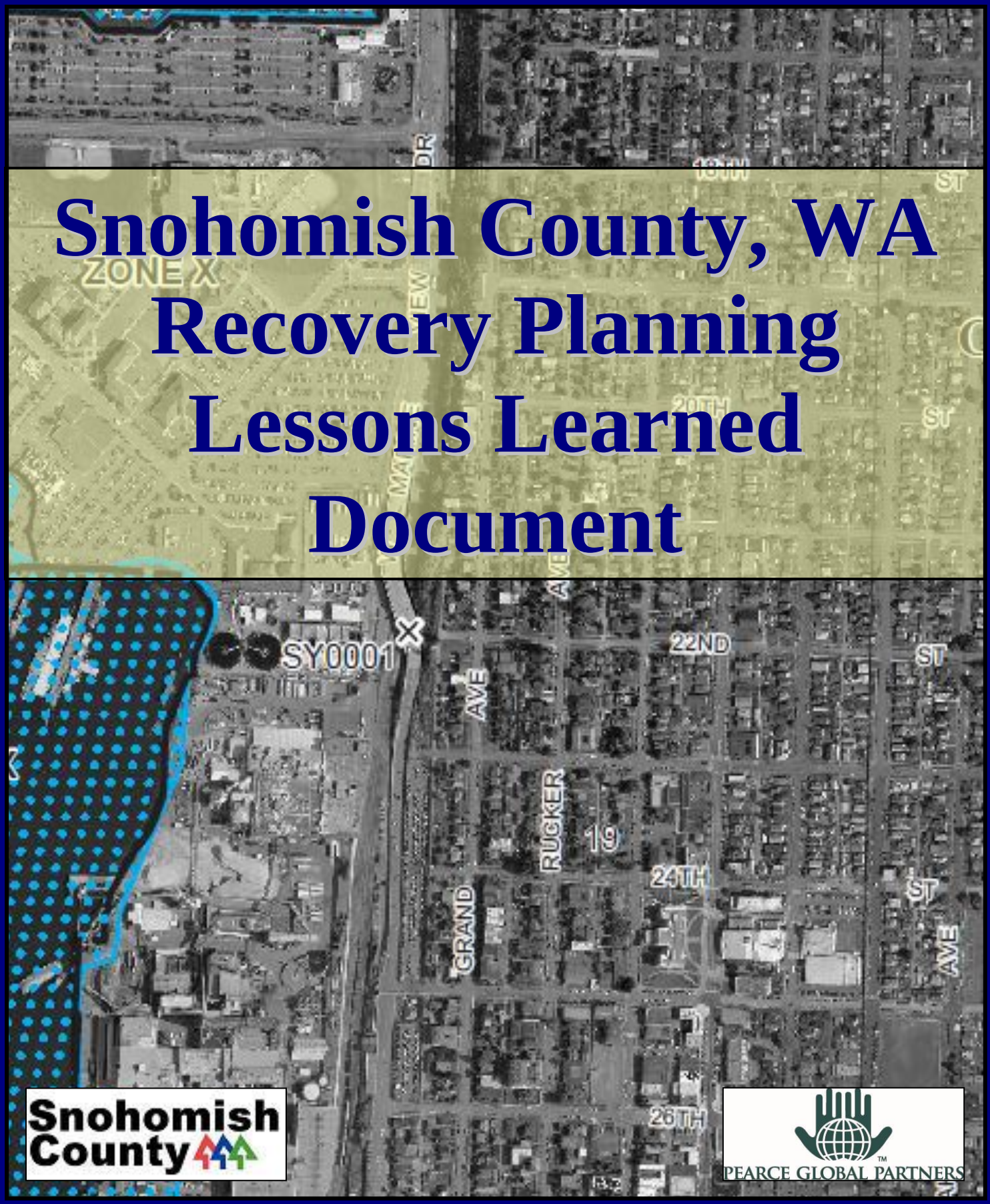
Snohomish County, WA Recovery Planning Lessons Learned Document



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Executive Summary

The ***Snohomish County Recovery Planning Lessons Learned Document*** has been developed to present to recovery planning team members and other relevant stakeholders the findings of a pre-planning Multi-Department Workshop and multiple informational interviews conducted in the lead-up to pre-disaster recovery planning activities. This report also incorporates the findings of a literature review through which the project team analyzed county hazard risk and vulnerability in the recovery context (using existing County documents and records as well as recovery best practices, doctrine, and guidance).

Data and information contained in this report was collected via three separate efforts, including:

1. The Multi-Department Workshop
2. Recovery Stakeholder Interviews
3. Literature Review

Presented in this report are the key lessons and information obtained through the workshop and interviews, organized according to the recovery planning sectors previously identified through literature review (and reported in the *Snohomish County Literature Review Memorandum*). These Recovery sectors, or themes as they are often referred, include:

- The Recovery Operations Base Plan/Framework
- Housing Sector Recovery
- Infrastructure Sector Recovery
- Healthcare Sector and Psychosocial Recovery
- Recovery of Natural and Cultural Resources
- Economic and Business Sector Recovery

Finally, included after the sector-specific lessons and information gained through local consultation is a summary of best-practices gleaned from the external literature review.

The Multi-Department Workshop

The recovery planning project team, in consultation with the Snohomish County Department of Emergency Management, planned and conducted a workshop with key community recovery planning stakeholders focused on the following:

1. Informing them of the launch of recovery planning efforts
2. Explaining the process through which recovery planning will take place
3. Garnering stakeholder buy-in to the recovery planning process
4. Initiating the collection of the vital data and information held by stakeholders
5. Identifying concerns and issues that the attendees have concerning the recovery planning effort

The Multi-Department Workshop was conducted on October 14, 2001 with over 30 County, city, and planning team staff in attendance. Project team members facilitated a short educational

seminar that introduced the recovery planning project to participants, focusing on the identification of key hazard vulnerabilities that exist in the County, the identification of existing recovery plans, and the identification of recovery planning gaps and opportunities that will be addressed through the development of the pre-disaster recovery framework.

Participants in this workshop included:

- Carl E. Baird, Sr. Environmental Specialist, City of Everett Public Works Department
- Jason Biermann, Mitigation & Recovery, Snohomish County Division of Emergency Management
- Peter Camp, Executive Director, Snohomish County Executive Office
- Randy Darst, Director, Environmental Health Department, Snohomish Health District
- Dave Dehaan, Director, Everett Office of Emergency Management
- Gerry Ervine, Land Use Manager, City of Everett Planning and Community Development
- Terry Ferguson, Support Staff Supervisor, Human Services Department
- Debra Fulton, Executive Director, Mukilteo School District Support Services
- Meg Haley, NCARB, Plans Examiner, City of Everett Public Works Department
- Linda M. Hjelle, Snohomish County Chief Deputy Assessor
- Brian Haseleu, Budget and Systems Manager, Snohomish County Finance Department
- Mary King, Aging and Disability Services, Human Services Department
- Michael McCrary, CBO, Snohomish County Fire Marshall
- Tim McDonald, RS, MPH, Director, Communicable Disease Division, Snohomish Health District
- Keith Mitchell, CPCU, County Risk Manager, Snohomish County Finance, Risk Management Division
- John Pennington, Director, Snohomish County Division of Emergency Management
- John Petersen, Assistant Director, City of Everett Planning, Project Development, and Maintenance
- Cindy S. Portmann, Snohomish County Assessor
- Richard T. Robinson, Fire Marshall, City of Everett Fire Department
- Dara Salmon, Emergency Program Manager, Snohomish County DEM
- Steven E. Thomsen, P.E, Public Works Director, Snohomish County
- Clay White, Director, Snohomish County Planning and Development Services

In the course of the workshop presentations and discussions, participants were asked to identify any issues or concerns they had about the recovery planning process. These comments have been incorporated into the *Planning Priorities and Opportunities* section below where the results of the Recovery Stakeholder Interviews also appear.

Recovery Stakeholder Interviews

In addition to conducting the Multi-Department Workshop, project team members conducted a series of one-on-one and group interviews with key County staff. Interviews, which were

conducted in-person and by telephone, focused on capturing the knowledge, experience, observations, and opinions of those officials who are considered to be:

1. Integral to the recovery process
2. In positions directly or indirectly affiliated with disaster recovery (or whose positions would be impacted by a disaster recovery operation)
3. Informed about how the recovery process currently operates
4. In a position to provide insight as to how the recovery process may be improved and/or institutionalized

Recovery planning interviews were guided by four key questions designed to focus the discussion on relevant recovery planning information. These questions included:

1. What role do you see your organization playing in a major disaster recovery effort?
2. [In addition to your own organization], what organizations do you feel need to be included in the planning process?
3. What issues need to be addressed in the recovery planning effort?
4. What are the top priorities for a successful recovery in Snohomish County?

The following individuals participated in this process between the dates of October 13 and November 21, 2011:

- Carl Baird, Senior Environmental Specialist, City of Everett
- Wendy Becker, Snohomish Economic Development
- David Behar, CBCP Senior Manager Security and Emergency Management, Snohomish County Public Utilities District
- Bill Burns, Marketing, Snohomish County Red Cross
- Peter Camp, Executive Director, Snohomish County Executive Office
- Dave Dehaan, Director, Everett Office of Emergency Management
- Randy Faye, Volunteer Coordinator, Snohomish County Division of Emergency Management
- Brad Feilberg, Operation Manager, City of Monroe
- Lynn Gross, ESCA
- Linda Hjelle, Snohomish County Chief Deputy Assessor
- Cheryl Jones, Comptroller, IEMC
- John Kletkotka, Chief of Engineering and Planning, Port of Everett
- Ted Lucas, Purchasing
- Ed Madura, Security Supervisor, Port of Everett
- Mike McCrary, CBO, Snohomish County Fire Marshal
- Lanie McMullen, Director of Economic Development, City of Everett Mayor's Office
- Rick Miller, Chief Operating Officer at Master Builders Association of King/Snohomish Counties
- John Miller, Executive Director, Stillaguamish Tribe
- Keith Mitchell, CPCU, Snohomish County Risk Manager
- Barbara Mock, Planning and Development Services

- Chuck Morrison, Public Affairs, Snohomish County Red Cross
- Roger Neumaier, Snohomish County Finance Director
- Steve Paschal, Emergency Management Officer, Naval Station Everett
- John Pennington, Director, Snohomish County Division of Emergency Management
- Cindy Portman, Snohomish County Assessor
- Mary Robinson, Manager of Operations Continuity, Puget Sound Energy
- Dave Somers, Chair (District 5), Snohomish County Council
- Steven Thomsen, Director, Snohomish County Public Works
- Clay White, Director, Snohomish County Planning and Development Services

Literature Review

The project team worked with Snohomish County officials in the project's initial weeks to identify, obtain, and review a wide range of documents, records, and other pertinent data and information, which included:

- Everett Hazard Identification and Vulnerability Assessment (HIVA)
- Everett Hazard Mitigation Plan (HMP)
- Everett Community Emergency Management Plan (CEMP)
- Snohomish County Community Emergency Response Plan (CEMP)
- Snohomish County Hazard Mitigation Plan (Volumes 1 and 2)
- Snohomish County Map of Park Debris Sites
- Snohomish County Permitting Processes
- Snohomish County DMS Parks and Debris Zones
- Snohomish County Disaster Debris Management Plan
- Snohomish County Digital Flood Insurance Rate Maps
- Snohomish County Department of Emergency Management Strategic Plan 2011-2012
- State of Washington Hazard Mitigation Plan
- FEMA Disaster Declarations
- News media articles detailing past disaster events

This document review allowed the research team to isolate special recovery 'sectors' that address the most salient recovery needs in Snohomish County. Each of these sectors is representative of unique strategies, participants, actions, resources, and other key factors. Additionally, this review allowed the team to accomplish each of the following, as reported in the appendix to this document:

- Identify anticipated sources of catastrophic disaster risk (hazards), including the likelihood and geographic range of each hazard and the nature of and magnitude of consequences likely to occur.
- Identify the basis of physical, social, economic, and environmental vulnerability in the county that serve to increase hazard risk for one or more segments of society.
- Illustrate the geographic range of each hazard in order to identify recovery hotspots.
- Identify specific populations most likely to be impacted by specific hazard impacts.

The research team also analyzed an expansive range of existing recovery guidance, doctrine, case studies, and lessons learned in order to identify those practices that best serve the unique needs of Snohomish County. These documents included:

- American Planning Association: *Policies for Guiding Planning for Post-Disaster Recovery and Reconstruction*
- Association of Bay Area Governments: *Regional Long-Term Disaster Recovery Planning*
- Cedar Falls and Waterloo, Iowa: *Long-Term Community Recovery Strategy*
- Cedar Rapids, Iowa: *Long-Term Community Recovery Report*
- Congressional Research Service: *Federal Disaster Recovery Programs: Brief Summaries*
- Council of State Community Development Agencies: *Checklist for Developing a Pre-Disaster Community Recovery Plan*
- Crawford County, WI: *Long-Term Community Recovery Plan*
- Department of Homeland Security: *National Disaster Recovery Framework*
- Department of Transportation: *Recovering from Disasters: The National Transportation Recovery Strategy*
- Emergency Management Australia: *Municipal Recovery Planning Guide*
- Federal Emergency Management Agency:
    - *Long-Term Community Recovery Planning Process*
    - *IS-814: Long-Term Community Recovery*
    - *NRF ESF#14: Long-Term Community Recovery Annex*
- Florida Department of Community Affairs: *Post-Disaster Redevelopment Planning Tool Box*
- Florida Division of Emergency Management: *Post-Disaster Redevelopment Planning*
- Government Accountability Office: *Experiences from Past Disasters Offer Insights for Effective Collaboration after Catastrophic Events*
- Government Accountability Office: *FEMA's Long-Term Assistance was Helpful to State and Local Governments but Had Some Limitations*
- Greensburg and Kiowa County, KS: *Long- Term Community Recovery Plan*
- Homeland Security Institute: *Financing Recovery from Catastrophic Events*
- International recovery Platform:
    - Environment Sector Recovery
    - Governance Sector Recovery
    - Health Sector Recovery
    - Infrastructure Recovery
    - Livelihoods Recovery
    - Pre-Disaster Recovery Planning
    - Psychosocial Recovery
    - Shelter and Housing Recovery
- National Association of Counties: *Lessons Learned: Everything You'll Want to Know About Recovery*
- National Association of Development Organizations: *Resilient Regions*
- Oakland, CA: *Long-Term Disaster Recovery Plan*
- Polk County, FL: *Post-Disaster Development Plan*

- San Francisco Planning and Urban Research Association: *Ideas and Actions for a Better City*

Audience

This document is intended for those individuals, offices, and entities whose input sets the recovery planning process on the best course forward, inclusive of the following audiences:

- The Long-Term Recovery Contractor Planning Team members
- Snohomish County Department of Emergency Management
- Municipal emergency managers from the jurisdictions located within Snohomish County
- Other relevant recovery planning stakeholders

Summary of Recovery Planning Efforts To-Date

Information reported by interviewees indicate that Snohomish County began to address various recovery planning issues as early as the mid-1990s, though the topic did not receive significant attention until more recently. In such previous instances where recovery topics were addressed, efforts were typically secondary to other ongoing planning issues. For example, an examination of the County permit process was conducted using the AMANDA Database Permit Tracking System, which in turn helped to identify improvements in the way permits are issued (a priority function in the aftermath of major disasters). The use and adoption of the SCOPI mapping tool by insurance industry and titling companies, which helps to streamline the assessment process in the aftermath of a disaster, is another example.

Recovery planning has also occurred as a result of actual disaster experience. The county has been impacted by several major declared disasters in the past decade, several of which required the opening of FEMA and SBA disaster recovery centers (DRCs) within or in close proximity to the County. Examples include (but are not limited to):

- 2001: DRC opened in Everett following the Nisqually Earthquake
- 2003: DRC opened in Everett following a declaration for severe storms and flooding
- 2006: DRC opened in Granite Falls following a declaration for severe storms, flooding, landslides and mudslides
- 2007: DRC opened in Lynnwood following a declaration for severe storms, flooding, landslides and mudslides
- 2009: DRC opened in Stanwood following a declaration for severe winter storms, flooding, landslides, and mudslides

Disaster Recovery Center at the Snohomish County State Fairgrounds, February 2009

Given the nature of hazard risk in the County, there has been significant effort to pre-identify and analyze debris disposal sites, which are key to response but become a major factor in long-term recovery as well.

In 2005, Snohomish County Department of Emergency Management, thru a consultant, organized county representatives of 17 critical infrastructure sectors and 4 critical resources in order to conduct a pair-wise comparison of Critical Infrastructure resource interdependencies. Examination of the influence these infrastructure components and resources would have on disaster recovery in the County was among several reasons this effort was conducted. Participants looked at such topics as the continuity and reconstitution of the County government, recovery of the business sector and economic operations, emergency services, and others.

As a result of this effort, five critical infrastructure sectors emerged as being critical to recovery, including (in priority order):

1. Energy
2. Dams
3. Water
4. Transportation
5. Emergency Services

Subsequent to this effort was the development (by the electrical, gas, and water utilities) of proposed Critical Infrastructure Measures of Loss Consequences for Snohomish County. These "Measures" provided a common financial threshold (for electrical, water, and gas) for low, medium, and high consequences for loss of services to customers[1].

In 2009, the City of Edmonds released a pre-disaster recovery plan (the City of Edmonds Disaster Recovery Plan). This plan addresses the following recovery topics:

- Recovery and restoration policy
- Pre-disaster mitigation planning
- Transition from response to recovery
- Recovery issues
- Concept of recovery operations
- Responsibilities
- Establishing post-disaster recovery goals
- Recovery task force
- Damage assessment
- Public information and outreach
- Public safety
- Debris management
- Human services
- Public health

[1] High consequence is the threshold at which the electrical, water, or gas utility have exceeded their financial resources and must see outside assistance.

- Communications infrastructure
- Essential service restoration
- Transportation
- Building inspection
- Review of existing plans
- Resource management
- Short-term / long-term housing
- Economic restoration
- Legal
- Financial
- Documents and records
- Staff management

In 2011, the Department of Emergency Management developed the Coordinated Two-Year Strategic Plan that sought to further improve County capacity to respond to major disasters. In this Strategic Plan, recovery has received significant attention given that the County has in recent years experienced and thus recovered from six major (Stafford Act) declarations. As part of this Strategic Plan, the County Department of Emergency Management has asserted their intentions to further address disaster recovery operations by developing and implementing comprehensive recovery strategies for "declared and non-declared incidents." This includes the following strategies:

- Strategy A: Work with county and city partners to develop a damage assessment process that centralizes reporting and is built on existing infrastructure
- Strategy B: Fully define and codify short term/programmatic recovery procedures
- Strategy C: Create a pre-disaster framework to address long-term recovery issues
- Strategy D: Address recovery needs during non-Stafford Act eligible incidents

Planning Priorities and Opportunities

Like emergency and disaster response planning, pre-disaster recovery planning is an ongoing process that accommodates changes in county development and demographics. Pre-disaster recovery planning needs to be tailored to the specific hazards, risks, and vulnerabilities of the community, but it must also be in line with the politics, priorities, and stakeholder dynamics of the community for which it is conducted. It is to address these needs that the workshop and subsequent interviews were conducted. Thus, in recognition of the wide scope of possible recovery topics, the planning team spoke with key staff from throughout the county to identify planning priorities and opportunities. The officials participating in these efforts were drawn from a wide range of backgrounds and experience, and as such a wide spectrum of feedback on priorities was obtained. As anticipated, the overwhelming majority of these stated priorities remain in line with the standard recovery sectors (themes) identified through the literature review process (and reported in the Literature Review Memorandum), and are thus organized in keeping with these sectors in this report. The priorities and opportunities as identified are presented below:

Sector 1: Recovery Operations Base Plan / Framework

The planning process will identify and provide structure for standard actions which are key to the general functioning of a disaster recovery effort. Like the base component of a community Emergency Operations Plan, this base plan or framework will identify actions that must be taken, responsible individuals whose participation is vital to the process, and the source of human, material, and financial resources that must be drawn upon to support recovery projects. This component of the plan is likely to address the following:

- Recovery Activation and Organization
- Management of Recovery (including Decision-making)
- Recovery Needs Assessment
- Post-Disaster Recovery Planning
- Coordination of Recovery Stakeholders and Projects
- Financial Support
- Public Information and Involvement
- Special Recovery Topics (e.g., Post-Disaster Governance (COG), Land Use, Debris Management, Oversight, Permitting and Moratoria, Special Legislation, Special Needs Populations)

Participants provided the following comments, concerns, and observations (organized according to the specific components of the base plan or framework):

Recovery Activation and Organization

- Recovery planning must identify a suitable (safe) location to perform recovery operations and to house recovery staff. It was stated that the County has not put sufficient consideration into the implementation of a COOP / COG (Continuity of Government) plan.
- No reciprocal agreement exists to bring in extra staff to address recovery planning and operations human resource demands.

Management of Recovery (including Decision-making)

- A lack of understanding about who would lead the disaster recovery efforts was an all-around concern of interviewees and workshop participants. It was relayed that Snohomish officials have no idea what their recovery roles would be at this point. Also, there is no agreed-upon place where County staff would congregate in an emergency situation.
- The County Charter gives the Council the authority to declare an emergency to the County Executive, but beyond that it does not specify when the emergency is over and the transition to recovery is made. In past disasters there has been much confusion about the role of the Council members in emergencies. There were no calls for them to participate in the EOC
- The recovery framework must provide clear direction for who (person/organization) in charge of recovery planning and operations. The plan must address the political processes at play within the County, and stipulate the County Executive can do with and

without requiring County Council approval (including any expedited "emergency" processes to implement recovery).
    - There was support for the County-centric DEM structure
    - DEM would be the lead and other County offices would support their needs
    - Confusion exists about what the EOC structure would be regarding recovery, specifically about who will perform which recovery functions, and how this role would be impacted by recovery events requiring several months commitment.
- It was stated that County stakeholders are comfortable with the Department of Emergency Management structure for response, and that the ESF structure and associated coordination has worked well in small disasters. However, one interviewee stated that there may be some confusion of the ESF structure - and how this structure works - by certain recovery participants (in the workshop it was suggested that training or eduction be provided). Another interviewee agreed with the DEM lead but felt that there should be a decentralized structure that allows more flexibility as required in recovery to ensure recovery work gets accomplished. Yet another interviewee felt that they would be very comfortable with the RSF structure, and that it is gaining acceptance.
    - It has been discussed that there be 6 RSFs, but with the "limited time" participants have may make it difficult to develop these in depth. It was felt ahead of time that economic recovery is (or is among) the most important – it was felt that they don't have the tools to assess these issues at present.
    - It was felt that the RSF templates must be flexible to allow people to structure for their own communities – it was envisioned that the City of Everett would take this template "which is county-centric by nature."
- It was stated that meetings were held in the county between the Executive Office and the County Council to work on issues of transition from response to recovery. These issues have yet to be resolved. It was felt that they need to carry through on that to establish agreement on the process such that they "won't end up arguing about it on the middle of either response or recovery." The transition plan, power and authority need to be clarified. At present, it is likely that there is a poor understanding of response and recovery roles among council members and members of the legislative body. Most council members haven't had any form of training.
- Risk management staff described strong integration with recovery planning and operations. County Risk Management would:
    - Provide resources for recovery in DEM
    - Create loss documentation
    - Review insurance policies & protections
    - Develop Mutual Aid Agreements (working with individual departments)
- It was suggested that in times of recovery the Recovery Planning Committee (or other body in charge) work with the County Executive to identify opportunities for granting exceptions to spending caps, with the County Council to address changes to the County budget, and with the Finance Director on any emergency ordinances relative to spending (Finance Director has the ability to tell people that they can spend funds outside of caps in an emergency).
- The recovery framework must provide clear direction on policy issues
- It was stated that while there was wide dispersal of equipment maintenance yards throughout the county (which is good for ensuring redundancy), there is probably not

enough equipment to manage the needs of a major disaster recovery operation. More importantly, at present, there are no official mutual aid agreements, only "gentlemen agreements" that have worked in previous disasters.

- At present there exist competing authorities that have the potential to cause delays and other problems during disaster recovery, such as exists with surface water management and flood districts. The influence of these competing authorities should be addressed in the planning process.
- One interviewee felt that there needs to be a formal ESCA agreement stating Snohomish County is in charge of disaster recovery operations. At present there is only a "gentleman's agreement". At the same time, it was felt that there may be unrealistic perceptions that during times of recovery the County will "come in to save the day." It is presumed this final statement refers to the fact that, while Snohomish County will lead recovery planning and the coordination of resources, any major disaster recovery operation will require the efforts of many different stakeholders within and outside of County and local government.

Recovery Needs Assessment

- The County Assessor will be able to support recovery needs assessment by providing a GIS capability. The Assessor's Office has base maps available for use in recovery that include information on the properties/structures, type of use and value of property and land. These would be an essential tool for damage assessment and to understand the likely / actual severity of disaster events.
- State certification is required for appraisers. The Assessor website that provides GIS capabilities is called SCOPI. While GIS mapping and tracking does work well, map modernization is still needed (and this was identified as an area to be considered for future funding opportunities.)
- The coordination of different County databases (namely AMANDA and SCOPI) may present problems if not addressed prior to actual disaster recovery efforts.
- The County Assessor could provide a staff of 30 to 35 appraisers capable of evaluating properties in the aftermath of a disaster- act as building inspectors to augment Planning and Development Services (PDS) staff.
- PDS is concerned that they have only four inspectors, two engineers, two biologists, and two traffic inspectors. In a major disaster they could not manage the need. It was stated that, "We need to have an entire different concept to handle a major impact disaster- cadre of inspectors that can operate off of laptops in the field that would allow access to data bases."
- Economic Development has lost about 5 staff, making the prospect of dealing with a disaster recovery even more daunting.
- The Red Cross felt that one of the biggest challenges will be getting people who are available to respond because most will be dealing with their own recovery. It was felt that it is very difficult to get volunteers active in Snohomish County and as such they must rely to the same people over and over again. The Red Cross is trying to "get some depth" so that they have greater capacity in a huge disaster.

Post-Disaster Recovery Planning

- Several staff interviewed stated their commitment to including mitigation planning in the post-disaster recovery planning efforts. It was felt that mitigation was key to avoiding a repeat of the issues that led to disaster in the first place. The mitigation plan should be referenced at all junctures during the Recovery Planning effort to ensure that preparations are made to implement specific mitigation projects if and when the opportunity arises.
- Prioritization of recovery resources will be a major issue for the planning team to consider. There will have to be regulations that help to determine which request is met first, and which follow in order. Examples that different interviewees provided include:
    - Which infrastructure components are of greatest importance and therefore receive priority attention as recovery commences (one interviewee stated that water and transportation were of primary and equal importance and that both have to be back up and running as soon as possible after the disaster).
    - The plan must help to define whether commercial versus residential needs take precedence. The same was stated for large versus small cities.

Coordination of Recovery Stakeholders and Projects

- The National Disaster Recovery Framework (NDRF), released just weeks ago, will play heavily into disaster recovery planning. One participant stated that the existence of the NDRF will likely result in a "top-down philosophy" for recovery operations.
- It was felt that the recovery framework must define how the County will work with unincorporated areas and each of the cities to coordinate recovery projects and resources.
- One participant stated that in a major disaster, Federal assets will be located in Snohomish County and as such the County government will provide major support to the rest of region
- The private sector must be engaged in the coordination of recovery resources and projects. The recovery framework must ensure there exists proactive communication between the County and the private sector "in passive events".
- Because recovery thrives in an organized yet decentralized structure, DEM will need to provide significant coordination support for all stakeholders involved.
- Pre-existing contracts will help to ensure that due consideration has gone into the selection of much-needed human and material resources. These contracts will be important for getting the range of services needed for County recovery. The Department of Public Works has had pre-existing contracts in place for 20 years.
- Recovery priorities must be clustered (as is provided in the 'sectors' described herein). This will allow for self-sufficiency within each of the major recovery themes (as opposed to all coordination and direction coming from DEM alone).
- Coordination problems may arise in managing the recovery needs of remote, rural communities in the County.
- Volunteer Management
    - DEM ha recently established a relationship with United Way. They are going to take responsibility for managing and staffing any community points of distribution that are required. There will be Volunteer Registration Centers (VRCs) to vet, register and assign spontaneous volunteers that show up. It is anticipated that in the recovery phase, DEM will be working with a more structured organization, but in early recovery there will be many people showing up who want to help

  - There remains a need for a system to register volunteers as Washington State emergency workers – especially those who come in from out of state. DEM has delegated authority to do temporary registrations on a smaller scale, but the United Way would do this for larger-scale events (with DEM maintaining oversight).
  - DEM priorities for volunteer management in the recovery plan includes providing information to different partner organizations involved in volunteer management
  - Volunteer coordinator would work directly with the recovery task force, sitting in the logistics section. It is assumed that any orders coming out of planning or operations would come down through logistics and they would manage the resourcing of specific requirements.
- At present, 167 organizations are planning to use the fairgrounds in the event of an emergency. This is also a Community Point of Distribution (CPOD) for mass care commodities, so without proper coordination between organizations there could be problems.
- Two sites in the county have been certified or approved for state staging scenarios (Paine Field and Arlington Airport) – this supports the effort that if Seattle had the earthquake, they would act as the supply base in King County.

Finance and Financial Support

- It was stated that DEM will manage disaster funds. However, Finance will handle audit controls (the "Account Code Structure" for emergencies). At present, no department has authorization for managing over $50 million, and it was felt that "Finance will need to become a part of DEM" to manage the recovery funds likely to be generated to address recovery needs.
  - After a disaster, emergency ordinances will be in place and four out of five council votes will be required to address authorizations to manage large recovery projects. Finance can draft a budget ordinance to address short term finances.
  - It was felt that the role of the Finance Department in a major recovery operation must be better defined, including the development of emergency financial procedures that are agreed to by the County Council.
- One participant stated that department directors are trusted leaders and already understand the process of managing grants and tracking worksheets. As such, these individuals would be of great value in managing recovery finance and financial support in a recovery operation.
- Purchasing will require structure and authority, but the plan to do so must be flexible. Given the extraordinary purchasing needs, procedures must be decentralized but centrally-led. To address this, each department will need to train "purchasing agents". There should be a re-write of purchasing authorities in the code to define disaster recover-related procurement authority issues.
- Funding is heavily dependent upon the FEMA bureaucracy, and plans should address the anticipated flow of funding in light of this sourcing.
- The following recovery planning issues were also stated by participants:
  - Loss documentation procedures need to be developed.
  - The Joint State School Levy may be an issue in recovery

  - The Recovery Planning Team should review procedures with the County Insurance carrier as to operations after a major emergency
  - The Recovery Planning Team should develop mutual aid agreements with financial institutions outside the County that could be called on in an emergency
  - ESCA must have a major role in the cost recovery process
  - There should be a reimbursement team in place (FEMA & FHA) (the Public Works Department has worked with FEMA on cost recovery from small events and the process has worked well in the past.)
  - Delegations of authority to allow for emergency purchasing must be established
- The County Charter gives the Executive the authority to mobilize the necessary resources, and the Council has the authority to make decisions to spend money, but there is a lack of clarity on how much and for how long. There also is no clear guidance on consultation with the Council or the role of the Council - although it is clear once the emergency is over and they are in recovery that they go back to their normal contracting procedures. Finally, it is believed that the County Executive has the authority to increase departmental contracting limits up to $50,000, but anything more than that needs Council approval.
- In the workshop, a question was raised identifying the need for better understand of possible funding streams in addressing recovery as well as the determining the role case management can play in facilitating or taking advantage of these opportunities.

Public Information and Involvement

- Public information and involvement did not come up in the interviews. Participants did state the importance of broadening the scope of recovery planning stakeholders. Public involvement per the NDRF is ensured.
- One participant felt that without social equality and some feeling of social rights for all citizens - at least giving them the chance to voice their needs and requirements - there will always be unequal recovery. Trying to find a way to achieve equality should be key to recovery planning efforts.
- Workshop participants voiced the need to reach out to stakeholders and to go beyond the usual groups to include vulnerable populations, animal control, faith based, labor organizations, financial institutions and school systems
- It was stressed by workshop participants that the recovery planning effort should work closely with other County initiatives such as Snohomish County Tomorrow (SCT) and the Puget Sound Regional Council, Chambers of Commerce, and Economic Development organizations, among others.

Special Recovery Topics: Permitting and Moratoria

- The Planning Department manages all permits. Many participants identified permitting as an area that must be addressed in pre-disaster recovery planning. The recovery framework as designed must provide flexibility in order to ensure recovery is able to progress. However, the importance of ensuring proper oversight and expertise in the permitting process (to ensure recovery activities are wise, resilient to future disasters, and in the best interests of the county) was stressed.
- It was suggested that permitting fees be waived in the event that substantial damage has occurred. At present County Council approval is required to suspend any regulatory

issues, and this may take considerable time as the process is currently structured. The Plan should ensure expedited processes are available and within the authority of DEM or a recovery planning committee.

- It was recognized that regulatory conflicts will present a challenge to the pace and rhythm of recovery efforts. Regulatory efforts do in fact take precedence over ensuring a rapid recovery, but strict adherence to regulations and disengagement of the regulatory agencies (SWIM provided as an example) are neither required nor helpful. It was felt by some that the Regulatory Agencies do not understand recovery well (an example of Marine & Fisheries was cited.)
- Twenty cities within the County are currently responsible for permitting in their own jurisdictions. A statewide approach is to be implemented on January 1st but communities can opt out of this if they so choose. Recognition of permitting processes within the individual jurisdictions must be accounted for in the recovery framework.
- Certain requirements of the Growth Management Act could impede the recovery effort as could the "Home Rule" authority given to local communities. Recovery planners need to understand how this process will impact long-term recovery. The 2015 revision of the County Comprehensive Plan may be one avenue to add flexibility in recovery operations. The current system does not provide as much flexibility as may be useful during long-term recovery
- Specific regulations that may impact recovery include:
    - The Growth Management Act (GMA), which requires certain processes and policies for any building and development, including during a recovery.
    - Storm Water Management
    - Building Code (currently the 2009 IBC)
- PDS suggested that the planning team look at www.mybuildingpermit.com, which is an alliance of building officials, different permitting agencies, etc. who work together to streamline processes.
- A point was made by a workshop participant that in the building department needs to be linked to the County Health Department for issuing permits

Special Recovery Topics: Post Disaster Governance (COG)

- Several participants felt it was important that the recovery framework ensure there are mechanisms through which the county is able to operate in the recovery period. The new COOP Plan exists to accomplish this, and much time has been spent ensuring it is accurate and effective. Proper integration of this plan into recovery planning efforts could be beneficial.
    - If the COOP plan is effective, the County should have adequate space and access to technology systems in the event of a major disaster, even in long-term recovery efforts.
    - One respondent was concerned that the COOP plan is incomplete.
    - Workshop participants stated that a concerted effort had been placed recently on COOP plan-building but it is unfunded and they wondered how they will address the issue of limited resources.
- Disaster recovery efforts will affect the tax base, and as such concern was raised about how the County will be able to generate revenue when there is no tax base.

Special Recovery Topics: Special Needs Populations

- It is important that the Recovery Planning Process have a grasp of the needs of vulnerable populations living in the County. There was concern that "nobody could provide numbers or locations, or identify the specific special needs."
- Recovery planning will have to be cognizant of different socio-economic populations that are emerging in the County
- There may be significant benefits in this area to be gained through the development of relationships, before the disaster, with the faith base groups that represent the underserved populations.
- DEM concerned with getting accurate and timely information to special needs populations on both the status of the response phase and then recovery (just having translators/assistants in place who can help people if they have to work in recovery centers, filing paperwork, and similar work).
- There is a need for transportation of special needs populations because many people depend on the Paratransit or other community transit resources. SNORAC is a coalition of Paratransit providers in the private sector – DEM is going to coordinate with them to meet the mobility needs of many special needs individuals. The County does, however, have a lack of Paratransit buses. The state mandates that all nursing home facilities and continuing care communities need to have their own plan in place to care for patients in emergencies. Each facility believes they are Paratransit's top priority, but reality does not match these expectations and DEM is trying to educate the providers and dispel misconceptions / wishful thinking.
- Functional Assessment Service Teams (FAST) concept, which started in California, is being used to place volunteers in shelters in order to help the sheltering people work with special needs individuals. They provide assistance and identify new and ongoing needs. There is no group identified as of yet to take this work on, but this is something DEM is going to be working to implement next year (including training). Medical Reserve Corps (MRC) might play a very big part on this though decisions have not been made on that front.
- In past efforts, it has been possible to get volunteers who speak most languages, but sign language has remained a need.

Special Recovery Topics: Debris Management

- Significant work has already been conducted to address debris clearance and disposal.
    - There are typically about 400,000 tons a year shipped by rail to Klickitat County and Roosevelt.
    - The County has only have 7 days of reserve storage if this system breaks down.
    - The County has an Emergency Debris Plan.
    - Coordination with Burlington Northern should be conducted as part of Recovery Planning efforts.
- The Master Builders are aware of a debris-shredding machine that could be used to increase the use of recycled debris in reconstruction efforts.

Infrastructure Sector Recovery

Serves to ensure the rapid restoration of prioritized infrastructure systems and networks, through repair or reconstruction, in such a manner as to incorporate hazard mitigation goals, address long-term community development targets, apply modern technologies and practices, increase sustainable and environmentally-friendly practices, enhance access and reduce costs, and otherwise improve the overall condition of infrastructure within the County. Snohomish County transportation infrastructure is highly susceptible to many hazard forces, and the speed and quality of recovery in all other sectors would be influenced by recovery in the transportation sector as a result. Infrastructure is inclusive of public and private utilities and critical services, as well as County and municipal government facilities and offices and educational facilities.

Participants provided the following comments, concerns, and observations regarding Infrastructure Sector Recovery:

- Infrastructure recovery planning will require significant coordination with private sector utilities, especially with restoration of power
    - There is concern about vulnerability of the electrical system. Public Works does have generators and back-up capacity that could deal with an 8-hour power outage, but refueling generators over a long time has not been addressed in any plans (especially if there is damage to the transportation infrastructure).
    - There is also concern that the vulnerability of water and sewer systems in unknown, and the impacts that would be felt in a major earthquake are likewise unknown.
- The County Public Works Department is particularly concerned about:
    - The County water pipes: there is a single water source for the City of Everett and for 80% of the County
    - The long-haul wastewater system is capturing surface water and contracted waste water – it is considered a 'weak link'.
    - Pavement: the 1,600 miles of street and about 100 bridges.
    - Buildings: many buildings in Everett are aging and un-reinforced.
- There will be special coordination challenges with infrastructure sector recovery. For instance, the road maintenance crews & utilities (PUD) have their own boards. PUD has a chair at the county EOC as part of critical infrastructure (the energy chair).
- The County has not conducted a formal assessment of the current value of public facilities, roadways, bridges, public buildings, and similar facilities that exist in the county as would be required by FEMA for recovery funding. There have been items in the county budget that have provided for upgrading county facilities (mitigation retrofits) that were conducted in the previous ten years, but nothing recently. There are buildings that are known to be vulnerable, and other vulnerabilities that have yet to be addressed.
- PSE provides natural gas to the entire County
    - PSE has thus far planned for their own logistics operations, including staging areas, lodging, food, and general support for staff. For catastrophic events, they will be looking for the same staging areas that the state or counties will be looking at to setup at the same locations, and they would want to coordinate with either the state or the counties to make sure that they have a portion of that staging area for their response and recovery personnel - security for trucks, for fueling, basic needs for their workers, etc. None of this has been pre-coordinated. PSE stated

they would like to be notified as to where the county has designated the staging areas and from there they would decide whether they want to try to ask for permission to stage with them or whether they felt it would be better to find their area to stage their own crews.
    - When PSE brings people in, they have never had to look outside of their own corporate ability to get people. The common experience they have is during winter storms when they bring linemen from other areas (California, Oregon and Montana). Depending on how long they are going to be here, they could either fly crews in, put them in equipment they have in the County (or that their service provider has) or they bring their own equipment. Typically, they need them to bring their own equipment with them. If they ran into problems they would probably go straight to the state for assistance. They serve in 11 different counties, so it's difficult for them to go to each of the counties for any requests
    - PSE has representatives that staff the State EOC in emergencies in ESF 12 (Energy). They have an MOU with the state of Washington to provide an EOC liaison.
    - PSE has an energy system restoration plan, which is public. There is no specific response versus recovery plan. They do have a distinct COOP plan. To deal with costs, the State allows them to recover extraordinary emergency costs through rate hikes.
- PUD provides electricity and water to the County. They tie their electrical infrastructure into Skykomish.
- Relationships between County DEM and the Utilities need to be strengthened/groomed.
- The utilities hosted a meeting that included both gas and electric utilities in the region about 2 months ago. The primary issue was to enable Snohomish PUD to restore electricity (to support critical public services, public life safety, etc.) PSE needs to ensure that the gas system is still safe to the public.
- Snohomish County PUD signed on to the Western Region Mutual Assistance Agreement about a year ago. That is a dual gas utility agreement for all the Western states and there are 32 entities signed on with that. This includes Washington, Oregon, Idaho, Montana, California, Wyoming, Nevada and British Columbia. This agreement does not address recovery, just the sharing of resources.
- There were several transportation-specific comments and observations
    - The plan must ensure that people are able to get where they need to go.
        - 80% of Everett employees commute from the South
    - The County has 1,600 miles of road and 190 bridges (of which 50 are up to standard) (cement) as of the 1980s.
        - Most bridges are rural.
        - There are 15-20 critical bridges that would disrupt County if impacted by a disaster
    - Transportation authority is shared with cities, the County, and Tribes. However, there are County-responsible roads in tribal areas – this seems to work well. There are maintenance agreements and there are reimbursements set up between the County and the Tribes.

- Many critical lifelines are co-located with transportation. For instance, transportation is critical to the daily disposal of County waste materials (the Burlington / Northern loop train).
  - The Utilities mentioned that they would need to have access to their infrastructure to resume services, and this includes authorization to access affected areas.
- In the 2006 winter storm, there was a lot of overgrown vegetation that prevented them from getting to their transmission lines that were damaged in storms. They even had to build roads to access some areas, which caused delays. From the general transportation, all the highways and freeways were blocked with people that were out and about because they didn't have power at home. PSE engaged the state to access the HOV lane, which enabled them legally use them for single occupant response and recovery trucks, and they got that exemption. They sought patrol escorts from the Washington State Patrol to safely remove their crews from the final cleanup. The biggest issue they had was to get to the point of damage. It was a very planned and engineered recovery plan.
- It is key that the port be involved in recovery planning given their role in both response and recovery (and the dependence of the port on the community). Also, if the port is compromised, it will have a significant economic impact on the exporters.
  - If there were a major earthquake or other event that disrupted Seattle or Takoma ports, they may have to shift operations and tracking to Everett (depending on who was impacted).
  - If Mt. Rainer were to erupt there would be a complete change in shipping and tracking of materials coming into Everett would have to be facilitated – it was stated that planners must look to Whidbey Island.
  - The port does not have a huge terminal space and therefore would find it difficult to handle additional shipments (e.g., for response and recovery). They have looked at using the closed Lehigh Cement facility as a backup bulk facility, but there is the question of how easily this facility could be reopened. It could be a significant resource as it has access to truck and rail transportation. The port has received a DHS grant to build 24,000 linear feet of track from the Port as a secondary/duplicate transport means.
  - A primary concern will be getting Boeing up and running, which could involve identifying a backup facility that could handle large cargo (fuselages arriving from Japan). Transportation of this cargo could also become an issue - regional plans call for rerouting I-90 traffic to smaller arteries but it is unknown if these roads could handle large size transportation vehicles, or hazardous material shipments.
  - The port also receives a large volume of hazardous materials from Russia & Canada (primarily mining waste). There is talk of putting these materials on trains and shipping them through Chicago, but it is felt this is not practical.
  - The port would look for help from Seattle, Oakland and Portland, but there are currently no mutual aid agreements.

        - The time of year that the disaster happens will affect the recovery effort – for instance, August is the busiest time. Regardless of the time of year, the there would be a severe economic impact ($1 per day for Boeing alone)
        - Port was interested in help with writing a disaster recovery plan.
    - Planning must consider the scenario where the County is cut off everywhere with the possible exception of highway 2 lane roads. Trying to evacuate people and bring in resources on a single road is going to be a huge management issue, especially if the State and other organizations are trying to bring in supplies. A considered possibility is barging supplies onto a beach - but getting site surveys done in the Port of Everett is going to be huge as it relates to what they are going to work on their recovery tools.
    - Ferries are maintained by the shipyards
    - There is heavy economic reliance on Highway 2, Highway 5, and the rail lines.

Economic and Business Sector Recovery

Serves to ensure that economic and business activities quickly and effectively resume, and that new economic opportunities that result in a sustainable and economically viable community are developed. Seeks to return the community to a self-sufficient state by helping businesses to reopen and/or by establishing new businesses and business opportunities, thereby employing workers, providing for community needs and services, and generating revenue. Addresses the measures required to support residents as they return to their jobs, including the provision of ability of workers to be able to return to work, including the recovery of critical child-care facilities and support networks.

Participants provided the following comments, concerns, and observations regarding Economic and Business Sector Recovery:

- Recovery planning should incorporate an analysis of the anticipated economic effects of a disaster, including potential impacts on the tax base throughout the County, and impacts to the different taxing districts (fire, school, hospital, flood, etc.). Based on the outcome of the analysis, it may be necessary to make recommendations to the State legislature on redistribution of the tax base.
- The post-disaster recovery effort may be a prime opportunity to rebuild the County. Planners must assess what changes would be positive to make in land use, identify opportunities for improving the County economic and business opportunities, and look at County operations and service.
- Businesses must have a business continuity plan so that they can recover quickly from a disaster, as the County economy will depend upon it.
- Banking infrastructure can participate in the recovery planning effort. One area that will be necessary is identifying alternative ways to provide businesses and citizens with access to cash
- Everett has worked with the University of Washington who helped them to incorporate economic issues into the mitigation plan, and an economics graduate student assisted. This was suggested as a possible support tool for recovery in this sector. Everett also

brought in the 20 largest employers in the city, which represented 70% of employment. To do this:

- They extended the invitation to some smaller employers and the Chamber.
- They took that group and split them into 2 - those firms with large employee work forces and those with medium to smaller numbers of employees, and then had open discussion with them about what was most important.
- They presented them with some of the information and discussions led to lessons learned (like where people commute to or from to get to Everett). It was very enlightening to them because the largest percentage of people was determined to be driving from the south, traveling north to the City of Everett. It was quite a bit different to what was presumed. Everett has information to share from this meeting.
- It has been suggested that this group reconvene for recovery planning. However, there is a concern that people be provided with a product in return for their efforts. The Downtown Business Association could be useful in this – or it there could be created a 'disaster council' sub-group of businesses.
- Bigger companies indicated they have spent money on BCP, but not as common with smaller companies that find it more challenging. It was felt that some of the very large companies would share their business resumption plans with them.
- Mutual aid between businesses was not apparent other than with the elder care providers in the county. Years ago, emergency management prompted them to develop robust redundant plans for both shelter in place and evacuation - including how they are going to evacuate and what it's going to take to move their people and where they are going to evacuate to. They did an inventory of their buses and they created some plans - utilizing a lot of the group's buses.

- The economic impact of past disasters have far exceeded the "brick and mortar repair cost" typically reimbursed by FEMA IA/PA, yet the economy does not seem to get sufficient discussion in recovery efforts (past). There is much to do to stimulate economic recovery, and social recovery is a big part of that. "It's a cluster of things, the leadership within the government (direction), the economy, and the social aspect of it. You can't really say what's more important as there are too many interdependencies in the process."
- It was felt by one representative that the impacts of future growth legislation could impede recovery. This individual wondered if there were "elements that could be suspended to speed recovery without doing damage.
- There has not been much thought about how Boeing would operate if workers couldn't come to work because schools were closed or they couldn't get there because of transportation disruption.

Healthcare Sector and Psychosocial Recovery

Serves to restore and improve public health, medical, and psychosocial services and wellbeing for the County population, and to repair, reconstruct, and otherwise improve medical facilities and the healthcare infrastructure that exists throughout the County.

No specific issues were cited by participants other than that the hospitals should be included in the recovery planning process.

Recovery of Natural and Cultural Resources

Serves to protect and otherwise rehabilitate County environmental resources and cultural treasures, both of which play key roles in defining community character. This function includes the repair and restoration of historic properties, landmarks, parks, green spaces, waterways, and other natural features which enhance the aesthetic beauty that characterize the county or which provide some other economic or risk-reduction function.

Participants provided the following comments, concerns, and observations regarding Natural and Cultural Resources Recovery:

- Salmon recovery will take a priority, as this will affect the local economy.

Housing Sector Recovery

Serves to ensure that all disaster affected County residents have access to safe, sustainable, affordable, and disaster resilient long-term housing options, whether through replacement, repair, retrofit, rehabilitation, or relocation. The functional area helps to manage the issues related to siting, design, construction, labor, materials, logistics, inspection, incorporation of mitigation measures, and financing issues, among others.

Participants provided the following comments, concerns, and observations regarding Housing Sector Recovery:

- It was stated that long term housing may present a problem for the county without proper planning.
- Rental opportunities should be scoped.
- The framework should support homeowners who want to remain on-site during recovery.
- The County will have to ensure there is a mechanism to assess destroyed properties for tax purposes.
- The Red Cross, as a regular course of action, works with the community (both city governments and the FDs) to develop sheltering. They have volunteer partners in terms of making sure that they can manage response in a large disaster. In times where they can't get from point A to B, they realized that they should have shelters and sheltering equipment in many communities as they can and also have as many trained volunteers as possible.
- In recent years, the largest sheltering operation has been about 4 shelters with 60-70 people, in response to the big flood in Snohomish. If there is an event requiring far more sheltering they would exceed local capacity pretty quickly because in disasters like that, volunteers tend to take care of their family first. The Red Cross can call upon their members from outside the affected area if need be.
- The Red Cross is training people in the communities to be active shelter volunteers because in Snohomish County, if there is an earthquake (for example), they will be a "city of islands". The Red Cross has approached sheltering such that they can be broken down into 5 island communities within Snohomish Counties. They will not be able to

reach to all those communities. Therefore they need to make sure that the communities themselves are trained to be shelter workers and that the supplies are stationed in those islands so that they can shelter themselves without them traveling from one end of the county to the other.

- It was also made clear that the primary responsibility of the Red Cross is response, not recovery, so distinction must be made for how transition will occur to address longer-term housing challenges and who will be responsible for this.

Planning Challenges and Other Observations

In addition to the sector-specific lessons learned and comments listed above, several general recovery planning challenges and observations were cited by participants. These are provided in no particular order:

- Several participants felt that the current political environment was not conducive to cooperative planning efforts. Some felt that John Pennington should be permitted to plan and conduct recovery unimpeded by political forces (but that the Council should be able to make recommendations on this process)
- There are also issues of trust between the private sector and the county that might impede public/private cooperation. There are organizations that are trusted by the private sector, like the Economic Alliance, that could help to build trust into the process.
- One participant stated that, "Recovery will be impacted by the overshadowing of the County by Seattle and Vancouver." Another relayed a similar concern in stating, "Snohomish is a key area between Seattle and Canada - is anyone looking a ripple effects/or border issues?"
- Workshop participants expressed interest in having an information-sharing type of website to keep interested parties aware and updated of the process during this recovery planning effort, and possibly afterwards.
- DEM has limited resources. A County-centric approach will require closer coordination (and the coordination with DEM is working well).
- There is concern about ongoing (and significant) staff reductions. Some departments have seen up to a 50% reduction in staff. How can the county keep up with inspection and permitting requirements after a major disaster with such short staff? There are no MOU's with organizations outside County that could augment staff.
    - For example, the staffing of the Planning and Development Services (PDS) went from 240 employees to 140 employees due to cuts.
- Communication needs to be improved if this level of recovery planning is to take place
- There are growing gang issues. Recovery presents as much of a challenge as it does an opportunity to address such issues.
- Public Works was underfunded in previous flood response efforts.
- At present, the tribes feel they have had no formal role in County recovery planning efforts.
- Snohomish County helped Lewis County during recent flood response and recovery efforts. These relationships can be replicated and formalized.

- County culture regarding disaster recovery planning needs to change. County stakeholders have not fully thought through recovery.
- There are people who keep rebuilding in the floodplain who don't seem to understand why their houses flood again. Part of the challenge is trying to "satisfy the federal side of the house, and trying to resolve that."
- To date the County has had success in getting the messaging out in directing people on the recovery side to know where to go, how to fill out their claims, so on and so forth. It was felt by one interviewee that the County could do better a better job with communications – specifically in making sure that timely information is getting out to people and they are communicating realistic expectations on what can be done and when it will be done. It was also stated that there could be better use made of the 'My State' program.
- Related to infrastructure and that kind of thing, Snohomish County is a pretty well-oiled machine in terms of once recovery starts, there's really good working relationship among water and public works and roads to coordinate their activities to stop landslides, fix roads, inspect bridges, clear debris.
- One participant who had worked with the business community on recovery issues felt that it was very difficult to get from the top employers the contact information for someone the City government could speak to about what help the city could provide in a disaster. It was also felt that employers were not concerned about disasters and were not interested in forging pre-disaster working relationships.
- One participant felt that there "tends to be an I-5 west county urban focus for a lot of folks." Specifically, they have populations up in the rural areas and smaller towns that would be easy to be left out, and it is not certain whether or not they are adequately included in the planning efforts.
- One participant stated that, "We really haven't been tested by a major disaster so we're not sure where or what all of the stresses and weaknesses in the systems that would be priorities for recovery."

Partners in Recovery

Participants were asked to list the community stakeholders they felt would be important in the recovery planning process. Responses include:

- The Federal Government
  - Federal Highway Administration
  - Army Corps of Engineers
  - Federal Emergency Management Agency
  - Navy
  - Medical Reserve Corps
- Washington State Government
  - Washington DOT
  - Washington State Emergency Management Division
- Tribal / County / Local Government
  - Tribal Council / Tribal Government (Talalip Tribe)
  - Permitting agencies

  - Snohomish County Planning and Development Services (PDS)
  - Drainage and Flood Districts
  - Consolidated Dikes Council (CDC)
  - Snohomish County Fire Chiefs Association
  - Snohomish County Sheriff's Association
  - Snohomish County Commissioners Association
  - Snohomish County Committee for Improved Transportation (Reed Shocky)
  - Local Government / Elected Officials
  - Local Tax Districts
  - Water Districts / Flood Districts / Sewer Districts
  - Local Emergency Managers
  - Auditors' Offices
  - Transportation
    - Community Transit
    - Sound Transit
    - Everett Transit
    - Burlington Northern Railroad
  - Public Utility District (PUD) / Puget Sound Energy (PSE)
  - Housing
    - Everett Housing Authority
    - SNOCO Housing
    - Human Services
    - ESCA-H
  - School Districts
- Private Sector
  - Utilities
  - Boeing
  - Kimberly Clark
  - Tulalip Casino
  - Swedish
  - Providence
  - Swedish Edmonds
  - Cascade Valley
  - Scotdal Family
  - Bothell
  - Fluke Corporation
  - Top 10 Employers
  - Building Community
    - Master Builders
    - CAPSTONE
  - New Economic Alliance
  - Chamber of Commerce
  - Banking Industry (Bank of America, Wells Fargo)
  - Pharmaceutical industry
  - Insurance Industry
    - Premera Blue Cross

    - Contractors
    - Labor Unions
    - Small Businesses
    - Hospitals
        - Providence Regional Medical Center
        - Swedish Hospital
- Others
    - Master Builders of King and Snohomish Counties
    - Snohomish County Tomorrow (SCT)
    - Puget Sound Regional Council – critical partner
    - Pacific Northwest Economic Region (PNWR)
    - LEPCs
    - Economic development groups in independent cities (Lynnwood, Edmonds)
    - WASART (animal rescue/shelter)
    - Washington Technology Industry Alliance
    - Northwest Walls and Ceiling Bureau
    - Voluntary Organizations
        - VOAD
        - VOA
        - Red Cross
    - Educational Institutions
        - Western Washington University(WWU)
        - Community colleges
    - Faith-based
        - Interfaith Council
    - Representatives / Organizations serving vulnerable populations
    - Snohomish County Committee for Improved Transportation (SCCIT)
    - Puget Sound Regional Council
    - South County Group - all
    - Regional Coordination
- Citizens

A Department of Public Works representative provided an individualized list of potential public and private sector partners specifically to address Everett Public Works disaster recovery planning. This list follows:

A. PW recovery partners in the public sector:	**Function:**
1. City finance regulations, State financing regulations, FEMA financing regulations, FEMA funding sources	Recovery financing, procurement procedures streamlining
2. Federal, State, and local permitting agencies	Streamlined permitting process for recovery
3. Snohomish Co. & City Councils	Define restoration policy, establish recovery and restoration ordinances.
4. Snohomish County Solid Waste	Debris management, Hazardous waste management

5. County and City Planning Depts.	Define restoration policy, define goals of restoration, include mitigation opportunities in restoration construction
6. Local emergency services	Policy for recovery of public safety emergency routes
7. Public charitable organizations	Management of in-coming donations
8. Volunteers helping in recovery	Management of volunteer services
9. Ethnic representation groups & neighborhood associations	Understand their needs, avenue for being heard, managing expectations, facilitating community cooperation in PW recovery
10. WA Dept. of Health, L&I, Snohomish Health District	Health and safety of recovery workers, volunteers, and general public
11. WA Dept. of Health, Snohomish Health District	Restoration of community sanitation and health standards (clean water, removal of sewage and solid waste)
12. CERT volunteers	Use of volunteers for recovery
13. Community Transit, Everett Transit	Policy for recovery,
14. Mutual Aid Agreements - various	Establish temporary water distribution systems and temporary wastewater collection systems
15. City and County Parks Department	Shelters
16. City and County Animal Control	Community safety
17. US Postal Service	Distributing written materials for community communications

B. PW recovery partners in the private sector:	**Function:**
1. Engineering consultants	Design of utilities and transportation recovery, administration of federal financing of recovery, recovery coordination of multiple consultant/contractor contracts, construction management
2. Local construction companies	Recovery construction
3. News Media, City PIO, County PIO, State PIO	Keeping public informed, managing expectations, facilitating community cooperation in PW recovery activities
4. Downtown business associations	Prioritization of recovery, define restoration policy
5. Rubatino, Waste Management	Debris management
6. Burlington Northern SanteFe Railroad	Transport of solid waste out of the area
7. Lowe's, Home Depot, Wal-Mart, etc.	Local access to materials and tools

	of recovery
8. Verizon, Frontier, Puget Energy, cable co. etc.	Restoration coordination of PW underground utilities with public utilities. Determine coordination policy among public and private underground utilities.
9. Commercial Counseling services	Emotional trauma of PW recovery workers. Emotional trauma of the community being recovered
10. Commercial electronic sign companies	Keep public informed about transportation routes
11. Commercial portable toilet companies	Temporary sewer service
12. Commercial bottled water companies	Temporary water service
13. Commercial fuel suppliers	Temporary energy
14. Commercial trucking companies	Transport solid waste, etc.
15. Commercial generator suppliers	Temporary electrical energy

The US Navy

The Navy is a special planning partner given the interdependencies between the County and the base, and the unique resources the Navy brings to bear as a resident Federal entity. The following comments and observations were drawn from an interview with the base Emergency Manager:

The first priority of the Navy in a disaster is protecting Navy assets and maintaining readiness for national defense. In a catastrophic event, the Navy would be able to provide limited response and recovery assistance to the County (in accordance with DOD guidelines for Military Support for Civil Authority). This would be contingent on the scope of impact on Navy facilities, personnel, support systems, and physical assets.

In the event of a disaster, the Navy will first assess the Naval Station for damages, and consider how long it will take to resume services, the cost of repairs, and to determine how to return people to their jobs. In support of the community, what is likely to be the most useful resource they could provide would be potable water, which they could supply using aircraft carriers (if in port). These are normally at sea for 6 months each year. While a request has never been made, the Navy could also provide the use of the deep-water port and the use of quarters/facilities.

The Naval Station does have distinct vulnerabilities, including their location on soft soils (seismic risk) and their reliance on utilities and transportation networks. The loss of Cable TV and communications/support of Navy families is also a concern. Similar vulnerabilities apply to the Naval Support Facility at Smokey Point - their alternate EOC. Should the Naval Station suffer severe damage the Navy would likely relocate to another facility outside the affected area.

In a major event, the Navy may or may not consider rebuilding which could have a significant impact on the County's economy as there are 5,000 military and 1,500 civilians stationed there (with an additional 14,000 family members residing in the local community).

Naval and County emergency management counterparts do interact – particularly Everett and Snohomish County DEM (and primarily through scheduled networking opportunities). The Navy relies on the various local jurisdictions to help their sailors and dependents develop and maintain community preparedness, and to assist them with federal aid after a Presidentially declared disaster.

Navy communications works in 3 ways:

- Navy-only, chain of command (Facebook & their website)
- PIOs with local media
- Directly with counties, know them all and work with them (Although no formal agreements exist)
- There remains a need to create a liaison between the County and the Navy Captain

The Naval station has no long-term recovery plans, but they have planned for short-term recovery. The Navy also plans to participate in an upcoming Evergreen Quake 2012 exercise and would welcome the County's invitation to be part of the recovery planning effort. From a plans perspective the Navy hasn't so far prepared for anything beyond COOP/business resumption.

The Master Builders Association

The builders may not render first aid or save lives, but they are key responders in that they bring plumbers, electricians and others who can clean up a huge mess. MB participation begins when the emergency is over – they are 'second responders' who facilitate recovery and get people back on their feet by helping them reconstruct.

The MBs in Snohomish are one chapter of 750 nationwide. There are approximately 3000 members. They are a close network that interacts regularly. They do not have a formalized agreement to manage disaster response/recovery issues at the national level but they are interested in getting this started. Their biggest obstacle is a lack of a formal government partner. Locally (in Snohomish County), they are mostly residential contractors. In terms of developing a response partnership, the Associated General Contractors should be invited to participate (they are commercial contractors, who build office buildings and things of that nature). The MBs partner with the Associated General Contractors on multiple projects. It was felt that the sheer volume of debris clean up in big disasters is best handled by the AGC because their members have much more heavy equipment.

The MBs could probably develop a resource to provide the public advice with rebuilding. They could also develop something that helps people to stabilize their situation until a professional is able to come in and repair or rebuild. They have found in other areas that after a disaster there are unscrupulous contractors who take advantage of people and then leave. Stories were relayed about similar things going on in Mississippi and Oklahoma recently. It was felt that managing this issue could be difficult, but that the MBs are a valuable resource because they are trusted and do quality work. Apparently, contractors cannot become members unless they are registered in a Washington city and are bonded by an insurance company – otherwise they must offer a 1-year warranty on their work.

The MBs are very good at navigating the permitting issues. To date there are no formal disaster management / recovery agreements in place between the County and the MBs. The MBs are interested in getting this started. In general, they have a pretty sophisticated operation with a large staff. They can coordinate recovery assistance from their members easily. They can put together an initial team or members of a committee that would serve as directors and have it flowed out from there to the different specialties (plumbers, electricians, etc.) They would develop a plan and work from there. They have a building in Bellevue, but if this building is unavailable they are fully equipped to operate from somewhere else. They can be up and running in 2-3 hours, and are prepared to do this now.

The Snohomish County Red Cross

The Red Cross is a key partner in recovery given the existing relationship with the County and with each of the communities in the County. John Pennington is a member of the Board of Directors; they know each other's staff and work well together (and know each other's capabilities).

The Red Cross is well situated to respond on what they call a Level 3 Disaster - in terms of volunteer assistance. They also work hand in hand with "everybody", including other local Puget Sound Area Red Cross chapters, mainly for the purpose of training their volunteers in disasters (thus creating 'depth' in their volunteer cadre). They have volunteer paths for service from shelter workers, mass care, feeding folks, IT, nurses, or truck drivers. They have to train them all to be ready. Level 3 is kind of like the usual flood in the year, nothing bigger than that. Level 4 or 5 events they will have to go outside the area.

For mass care staff, they draw on their own Red Cross resources. In terms of their capacity, they go within their region, across the state and then beyond the state - in the other states and west as well. They partner with other agencies in Snohomish County and they can call them in when needed. For example, Salvation Army has a kitchen that can feed people, they have an agreement with Food Services America to provide supplies and they have used these people in the past during disasters. They have a number of these contracts & agreements in place with different agencies and companies. Seattle Red Cross also has a mobile feeding unit now that can cook 10,000 meals a day. As for translators, they work in partnership with the Refugee and Immigrant Services Northwest which is located at Everett Community College. Seattle Red Cross also has a language bank. Together these give them access to about 47 different languages.

It is important to note that the Red Cross participates until the transition is made from response to recovery. They have shelters in the county that have been open for a very long time. But in general, their job is sheltering, feeding and helping individuals to develop the wherewithal to ready themselves and their families to be self-sufficient or to look at other resources for their long term recovery – where to go, what to do. They can give them a list of resources to help them get there. But that's not their responsibility and they are careful to draw that line.

They have a fairly strong ability to bring religious communities to the table. There are folks who are trained in disaster spiritual care by Red Cross who are professional grief counselors to begin

with, which does cross the line into recovery. The Red Cross has a good relationship with the Tulalip Tribe. The Red Cross has 457 volunteers registered in Snohomish County

Recovery Planning Approach and Identification of Best Practices

Of all the emergency management functions, recovery draws upon the widest range of knowledge, experience, and professional expertise. Like emergency planning, recovery planning is a problem solving exercise. The recovery planning process challenges recovery planners to first imagine the range of post-disaster recovery needs of the community, and then develop strategies and options for meeting those needs. The luxuries afforded by planning in advance of an actual event are low levels of stress and pressure, and ample time for research, analysis, deliberation, and assessment of the decisions made. There is time to consider the costs and benefits of each decision, including the long-term impacts each decision will have on the nature, character, vitality, and sustainability of each individual municipality and of the County as a whole. In the aftermath of an event, the same cannot be said.

Recovery planning in Snohomish County will be a participatory process driven by the planning team but informed primarily by working groups (by local subject matter experts) in each of the key recovery sectors (as described above). The recovery planning process is a systematic one, inclusive of the following general steps and tasks:

1) Understand the hazards, the associated risks, and community vulnerability
2) Identify disaster recovery needs
3) Establish planning mission, goals, and objectives
4) Form the Planning Steering Committee
    a. Identify key participants from:
        i. Relevant government agencies
        ii. The private sector, including privately-owned and/or managed utilities
        iii. Nongovernmental, faith-based, educational, social, media and voluntary organizations
    b. Form special recovery working groups (e.g., Housing, Infrastructure)
5) Develop the Recovery Framework and Annexes
6) Validate the Framework
7) Approve and Implement the Framework
8) Educate and inform the populace of the Framework
9) Form and foster recovery partnerships

For each special recovery sector:

- Identify actions and assign responsibility
- State implementation concepts, principles, and strategies
- Identify resources and/or pre-negotiate contracts for:
    - Labor
    - Equipment
    - Materials / Supplies
    - Services
    - Technical Expertise

    - Facility Use
- Identify and provide strategies or guidelines to ensure that each of the following opportunities is addressed as recovery progresses (as applicable):
    - Hazard Risk Reduction / Mitigation
    - Vulnerability Reduction
    - Modernization
    - Alignment with Long-Term Community Vision/Goals
    - Economic development
    - Recovery incentives
- Identify and capture related recovery laws, ordinances, regulations, authorities, or other related documentation for inclusion in the plan

The conduct of these aforementioned steps must be carried out in a manner that best meets the unique planning conditions and preferences of the planning committee that is assembled. Because the vast majority of communities delay recovery planning efforts until after an actual disaster has occurred, the bulk of guidance that exists refers to post disaster recovery planning. From these documents, however, there is much that can be taken and applied to the pre-disaster planning process, especially in terms of avoiding the very constraints that make post-disaster recovery planning so difficult. Coupled with the growing library of pre-disaster recovery guidance documents and best practices that exists, these post-disaster recovery planning documents provide an abundance of guidance and best practices from which appropriate solutions may be drawn. The following practical planning advice was gleaned from the examination of both pre- and post-disaster guidance and best practices. This information is provided to illustrate different priorities, methods, and mechanisms through and by which pre-disaster recovery planning has been conducted in the past. This information is not meant to be prescriptive, but rather to present to users of this report an established standard from which to initiate actual planning efforts.

In the planning process, disaster managers identify hazards, analyze risk, and determine ways to reduce those risks. In doing so, they gain a much greater understanding about how each of those hazards would affect the community if they were to strike. Though nobody can predict exactly how a disaster will affect a community, many processes are common to all disaster types (such as hurricanes, for example), and they may be identified and studied in advance. Many decisions will have long-term repercussions and, as such, are better made in the relaxed, rational environment that only exists before the disaster occurs. Examples of recovery decisions that are often better made prior to an actual disaster event include:

- The site selection for more resilient, more convenient, or more efficient infrastructure components, facilities, and systems
- The site selection for temporary infrastructure components (including temporary government, school, and hospital facilities, for instance)
- The site selection for the disposal of debris
- The identification of contractors from within and outside the County that could be called upon to assist in repair and reconstruction efforts
- The development of coordination mechanisms, including leadership, membership, and information sharing, for example

- The development of volunteer and donations management mechanisms
- The identification of mitigation measures and other hazard reduction actions that may be too expensive or unfeasible before a disaster, but that may be more opportune if existing structures and facilities were damaged or destroyed.
- The site selection for long-term temporary housing
- The site selection for temporary business activities
- The site selection for the disposal of debris
- The development of coordination mechanisms, including leadership, membership, and information sharing, for example

It has been postulated that disaster recovery based upon pre-disaster planning is much more organized, is more likely to result in community improvement, and is more likely to result in a reduction of future disaster losses. Because nobody knows for sure exactly how and where the disaster consequences will manifest themselves, recovery plans are hypothetical, focusing more on broad goals and ideals than on specific actions and procedures. For instance, they may include "Reduce vulnerability to electrical transmission wires" or "Revise building codes to address new seismicity estimates."

During much of the actual recovery period, many decisions will require split-second action, with little time for analysis. A plan outlining overarching goals and objectives can help guide those decisions. Decisions made without considering these goals can drastically limit opportunities to rebuild the community to be more resilient and disaster resistant. In the post-disaster recovery period, when many decisions are being made about construction and repair of structures, zoning of land, and new development, integration of the Recovery Framework and Mitigation Plan can ensure that proper action is taken to minimize risk. For example, if is determined that a school should be relocated outside the floodplain, voting on approval of funding to accommodate such a large project would be much more likely to pass in light of a recent disaster that directly impacted the school. Planners may find that many of the measures deemed un-fundable or impossible before the disaster are now perfectly acceptable.

Throughout the recovery process, recovery planners must be sure to align any recovery efforts with the community's needs and goals. This also is true for new opportunities. Communities may have already been planning improvements before the disaster occurred, but the disaster presents opportunities to expand those plans. Examples of changes to community long-term planning that can reduce hazard vulnerability and that are appropriate in the recovery period include:

- Redistribution of emergency resources
- Rezoning to account for new hazard information
- Adjusting construction codes and ensure that all repairs and reconstruction are made to code
- Restricting building within zones of greatest risk
- Creation of natural fire breaks
- Design and facilitation of adequate evacuation routes
- Construction of public buildings that can double as shelters
- Reduction in population density
- Widening of primary roads to alleviate pressure

The Council of State Community Development Agencies created a Checklist for Developing a Pre-Disaster Community Recovery Plan that is useful in ensuring that all the necessary steps are considered as recovery planning efforts begin in earnest. These steps as recommended include:

1. **Determine Threats and Vulnerabilities**
    a. Identify most likely community threats
    b. Identify most likely vulnerabilities
2. **Organize Management to Address Identified Threats and Vulnerabilities**
    a. Include community government entities as appropriate
    b. Include community emergency management organization as appropriate
    c. Include community life line utilities and private stake holders as appropriate
    d. Include non-profit organizations and other appropriate groups
3. **Develop a Recovery Plan for Identified Threats and Vulnerabilities to Include, but not Limited to:**
    a. Goals and Objectives to restore the community
    b. Estimated costs and time frames for recovery
    c. Priority strategies for recovery and restoration
    d. Operational concepts for implementation
    e. Identification of available resources for recovery
    f. Identification of mitigation measures to reduce threats
    g. Identification of additional resources needed for recovery
4. **Develop Recovery Plan Annexes to Include, but not Limited to:**
    a. Conduct of damage assessment and documentation
    b. Debris management plan for clearance, storage and removal
    c. Restoration of life lines (utilities)
    d. Operation of unaffected public and private services
    e. Building repair and restoration
    f. Restoration of hospitals and community health institutions
    g. Restoration of public safety facilities
    h. Restoration of public and private communications
    i. Restoration of special needs populations
    j. Restoration of public and private housing and schools
5. **Establish a Recovery Coordination Program for All Key Organizations Which Includes:**
    a. Designated recovery coordinator, including staffing, funding and documentation. The recovery coordinator shall be designated as Applicant Agent for FEMA declared disasters and/or emergencies.
    b. Local community legislation establishing the recovery plan
    c. Local community legislation establishing the Recovery Task Force
    d. Local community legislation to name a recovery coordinator pursuant to FEMA guidelines
    e. Organize the Recovery Task Force to include:
        i. Government agencies and organizations
        ii. Public and private life line utilities
        iii. Private companies, organizations and agencies

iv. Unmet needs volunteers

6. **Develop a Communications Program to Provide Timely Accurate Information to the Public and All Other Participants in the Recovery Effort**
    a. Establish a public information process and staff
    b. Develop recovery program media network
    c. Develop recovery press release and public information needs
7. **Institute a Recovery Resources Program to Secure Necessary Aid for Community Restoration. Outreach May Include:**
    a. Identify available Federal, State or private funds and resources
    b. Establish pre-disaster service contracts with private providers
    c. Establish mutual aid agreements with governments, utilities or private organizations
8. **Develop a Recovery Staffing Program**
    a. Identify trained staff for continuing operations and restoration
    b. Assure all personnel have ample time off the job
    c. Identify staff shortages and develop a strategy to secure additional trained staff
9. **Conduct Annual Recovery Plan Exercises**
    a. Update plans after each exercise
    b. Integrate plan into the community emergency management plan

The National Association of Counties identified 12 items they recommended local governments put in place prior to or in conjunction with the launch of effective community recovery. These include:

- Adoption of a **comprehensive recovery ordinance** that links recovery/resilience efforts in the government, community, lifeline, business/private and non-profit sectors. Establishment of a **recovery council** that is integral to overall plan development to ensure equitable and active participation. This plan should reference the jurisdiction's pre-disaster scenario, peer-reviewed loss estimates, General Plan Safety element and hazard mitigation plans.
- **Post-disaster governance plan**—legislative, executive and administrative contingency framework which includes specified procedures for convening the governing body in alternate circumstances and designated replacement officials to enable COG functions in the on-going recovery period.
- **Decision-making matrix** for governing body that integrates community process and partnership.
- **Lifeline Council** convened beforehand with chief executives of the jurisdiction and utility agencies regularly meeting to develop procedures on decision-making, restoration of service, and use/deployment of contingency systems. **Agreed upon plan to ensure rapid restoration of essential community systems—**power, and sanitary sewer particularly important; clean water system second.
- **Housing strategies**—shelter-in-place, emergency, short-term and interim housing (includes adoption of appropriate ordinances for altered land use, zoning and open space regulations; pre-qualification of installation contractors and sub-contractors.

- **Pre-event MOU established with other government entities** to send in rotating support teams of experienced executive and senior staff from other jurisdictions to "scaffold" existing staff and provide consultative, effective back-up.
- **Development of coherent, unified community information and outreach initiative** that folds in capacity for interactive, culturally competent dialogue with residents, other levels of government.
- **Established relationship with senior state OES and FEMA (regional and HQ) staff** to ensure responsive recovery operations.
- **Fiscal and economic plans in place**—initially for city/local government fiscal continuity—this includes relaxation of bidding requirements as needed for a capped period of time; increased fiscal authority for chief administrative officer for defined period and types of contract authority (capital project, services and supplies and equipment). The local controller develops a post-event strategy to address interim and long-term recovery with financial institutions, rating agencies, and governmental regulators.
- **Adoption of pre-event repair and reconstruction ordinance**; most recent iteration of the IBC with appropriate local amendments that address specific regional hazards, risk conditions. Having these in place gives community best eligibility opportunities for FEMA, state and federal agency assistance.
- **Designate an internal liaison/negotiations team** to directly interact with state OES, FEMA and other federal agency representatives. This group needs **substantive** pre-event training on the state and federal response and recovery regulations as well as **targeted negotiations training**.
- **Immediate establishment of a one-stop recovery shop** that is hub of governmental and non-profit support for the community. The function of this effort evolves over time but is operated to address changing needs, incorporating all community links—311, web access, CERT and NEN support systems.

Recovery Coordination

Coordination during the recovery phase is extremely difficult to achieve, but it is vital to successful accomplishment of its goals and, more important, in achieving reduced risk. Although a majority of the actual recovery actions taken are likely to occur at the local level, managed by local officials, regional or national coordination mechanisms will be required to ensure proper distribution of the many resources, technical assistance, internal and external financial assistance, and other special programs that fuel the process. Recovery of major disasters is a patchwork of local level efforts feeding from and guided by larger, centralized resources.

The success of recovery coordination depends on planners' ability to achieve wide representation within the coordination structure. To address the community's demographic and sociocultural needs and preferences in the recovery plan, it is preferable that representative community groups be involved in the process. There may be considerable interaction between local and regional or national levels throughout the recovery process as well, so inclusion of these outside groups is vital. By involving all of these stakeholders, a highly organized recovery operation is possible that ensures lessons learned, best practices, and efficiency of labor are maximized. In the absence of full coordination and communications, recovery assistance likely will not be able to meet local

needs. If structured correctly, the resulting coordination mechanism will become a central repository of information and assistance for all groups and individuals involved.

A coordinating structure may be formed around an existing community group or government agency, or it may be a new representative committee. The committee may be elected, a public-private partnership, or any other appropriate format for the community or country it is serving. Officials who may be included in the recovery coordination structure include:

- Environmental officers
- Floodplain manager
- Building officials
- Rural and urban planners
- Zoning administrators
- Public works directors — city engineer
- Parks and recreation director
- Storm water manager
- Economic development officer
- Finance officer
- Transportation officer
- Housing department officer
- Regional planning organization or officer
- Local and County emergency management (police, fire, EMS)
- Public information officer
- Chamber of commerce representatives
- Public and private utility representatives
- Neighborhood organizations
- Homeowners associations
- Religious or charitable organizations
- Social services agencies
- Red Cross/other nongovernmental organization (NGO) recovery officials
- Environmental organizations
- Private development and construction agencies

Statutory authority must be granted to this committee to ensure that they have adequate power to enforce their actions and recommendations. This group will perform many of the following functions:

- Collate damage and needs assessment data
- Guide and facilitate the recovery planning process
- Establish recovery and risk-reduction goals
- Centralize information on relief and recovery resources
- Minimize duplication, redundancy, or inefficiencies in services
- Gather and disseminate aid information for victims

Recovery Damage Assessment Capabilities

Access to accurate and timely damage assessment information is key to assigning recovery actions in the aftermath of a disaster. Assessment data helps identify the best strategy for employing available resources and setting action priorities. In the response phase, assessments are conducted to guide the various response activities needed. The information from those assessments is fully transferable for use in the recovery phase, as the information requirements are virtually identical.

Pre-disaster recovery planning must ensure that a damage assessment is possible in the early days of the disaster, and that the information collected is in line with the needs of the recovery framework. Damage assessments can help planners identify the number and types of buildings damaged and destroyed as well as the spatial extent of the hazard consequences (land that was inundated, areas of strong seismic shaking, the location of failed slopes, the number and location of displaced people, and the loss of farmland, among other information dependent upon hazard type and intensity). Further assessment may be necessary for these information needs, and that assessment will need to be performed by various subject experts as defined by the actual recovery needs. For instance, in many cases a more technical inspection of damaged buildings will need to be performed to determine which need to be demolished, which are repairable, and which can be re-occupied immediately. Also, in light of all the new, event-specific hazard and disaster information that will suddenly be available, experts dedicated to specific disaster impacts (such as geologists, meteorologists, or hydrologists) will be needed to create more accurate hazard risk maps. For instance, after an earthquake, new faults may be discovered, and better information about maximum ground-shaking potential for specific geographic regions may have been acquired. Planners can use this information to ensure that any reconstruction or repair fully incorporates those findings.

As is true in the response phase, recovery planners will need to periodically reassess the affected area to determine the pace of recovery. Using these assessments, resources may be reallocated and problems discovered before it is too late to correct them. With a strong coordination mechanism, maximizing the number of organizations participating in the coordination group, assessment will be much easier to conduct. In these cases, establishing a central information repository is desirable for collecting regular progress updates.

Recovery Funding

Without ample funding, repair and reconstruction in the community will stall. Even with local volunteers and abundant donations of equipment and supplies, simply too many resources and services must be purchased. Financial investment in community reconstruction is necessary to complete each recovery goal, whether to repair and rebuild infrastructure, restart the economy, repair and reconstruct housing, or any other activity. Responsibility for reconstruction costs is divided between various sectors of the community. The government is generally responsible for rebuilding public facilities and much of the infrastructure in the public domain. The private sector, including industries, individuals, and families, will lead the rebuilding of houses and businesses, helping to restore overall economic vitality. The public and private sectors will frequently work together and share reconstruction costs.

How quickly the affected area can organize financial and other types of resources will determine how quickly and how effectively that nation recovers from the disaster. The recovery framework should ensure that the processes through which funding is secured are able to be initiated at the earliest juncture. This typically involves detailed data collection and reporting and as such these mechanisms must be established in advance of the disaster. Additionally, alternative funding mechanisms should be explored in the event that State and Federal funding is not available. Insurance is the most obvious of these, but is not always sufficient. Other options include emergency relief funds, donations, loans, catastrophic bonds and weather derivatives, private development funding, incentives, and tax increases.

Local and county governments often offer incentives for private development to speed up the rate at which private relief funding is applied and to attract external funding from outside the affected area. A number of options are open to governments to lure private investment, all of which are based on the fact that demand for real estate will always exist among businesses and homeowners, and the competition between possible locations often boils down to the amenities each offers. By providing incentives such as tax breaks for homeowners, business and employees, tax-exempt bond financing, and other measures, businesses and individuals may be more likely to take a risk and invest in the affected area over other less risky areas with fewer financial incentives.

It is possible to spread the cost of refinancing among the affected population, or across all of those affected or unaffected within the tax base, by increasing tax revenues to cover some of the recovery expenses. Unfortunately, many victims are likely to find themselves without any spare cash, so an increase in taxation is likely to be very unfavorable to them, and therefore, politically unattractive to those who would be responsible for passing the tax increase legislation.

Recovery Personnel

In the recovery period following a disaster, personnel needs for cleanup, repair, and development will be excessive. These range from unskilled or untrained laborers and volunteers to experts in technical fields relating to infrastructure, construction, planning, logistics, and specialized equipment. Without ample personnel, the community may find itself with enough funding and materials to rebuild but without the personnel to support the workload. The most important personnel source is the affected region itself. These individuals, whether personally affected by the disaster or not, have the most vested interest in the outcome of the recovery effort and are most in tune with the community's character. Many are likely to need immediate employment. As recovery efforts often require long-term commitments, locally hired workers are more likely to be able to commit to the full course of the reconstruction effort and are less likely to suffer from recovery and reconstruction "burnout." Using workers from the local economy has the added benefit of ensuring that more recovery funding stays within the community, which in turn helps to spur long-term economic recovery. Wages must be set competitively, but not set at a level so high as to draw workers out of other jobs, destabilizing any remaining balance in the local workforce.

Private contractors from outside the affected area may be lured with disaster recovery work. Local contractors may quickly find themselves overbooked. Technicians with equipment needed

to repair infrastructure components, such as electrical lines, communications systems, or water pipes, may have much more work than they can handle. Therefore, outside assistance may need to be called on to speed up the pace of recovery. Mechanisms to facilitate this should be in place.

Economic Recovery

Disasters place pressure on local economies. Lost resources, lost production, lost jobs, lost business opportunities, and heavy government expenditures all contribute to economic downturns that must be stabilized and then reversed. Individual local economies are sustained by a unique set of drivers, inclusive of tourism, logging and mining, manufacturing, crafts, services, agriculture, and education, among others. Communities grow around and become dependent on the success of these industries, and their citizens acquire skill sets and training tailored to them. Support and service industries, such as transportation, communications, public relations, and shipping, will have developed around these core industries as well. Thus, economic recovery must begin with the recovery of these local economic drivers. Revitalizing the local economy must be a priority for recovery planners. It is vital that local businesses return to full capacity, especially in the immediate recovery period when significant amounts of recovery funding are injected into the affected area. If local businesses are unable to capitalize on that funding, outside contractors are sure to step in and reap the monetary benefits. The ultimate consequence of such an outcome will be that the injected cash is not used to support the local economy.

If large amounts of funding and investment have been collected in the early periods of recovery, it may be possible to revitalize the economy by improving previously existing business infrastructure. Almost all damaged or destroyed infrastructure components, such as communications, facilities, Internet access, and equipment, can and should be rebuilt to the most modern standards, so the overall economic potential is greater than pre-disaster conditions. Pre-existing problems that may have prevented economic expansion, such as a lack of useable industrial or office space or poor transportation options, may be easier to resolve in the post-disaster climate.

Unemployment is a common disaster consequence. Job loss comes as a double blow to victims, who must not only dip into any savings they may have to support their families in the short term but also attempt to recoup their home and property losses. Unemployed victims are more likely to depend on handouts rather than purchase items from the local market, which may further slow the local economy. And without adequate jobs, psychological stresses and depression quickly increase. Fortunately, boosting employment in the affected region can address each of these needs, allowing for victims to regain their sense of independence and pride while injecting much needed money into the damaged local economy. Because most of the initial recovery needs, such as demolition and debris clearance, are labor intensive, this process can begin almost immediately.

The quality of recovery planning and coordination will affect employment in several ways. First, only efficient provision of recovery services, including the distribution of relief (e.g., goods and water) will allow residents time to dedicate to a job. Poor relief distribution that requires

victims to wait in line for hours or travel long distances prevents them from being able to take advantage of job opportunities. Second, victims must be provided with the means to accept jobs that are created, including any needed training, transportation, or application assistance. Employers must consider the extra commitments that victims may have outside of work, such as rebuilding their homes, ensuring their children attend school or have adequate daycare, or attending medical appointments.

Many businesses affected by the disaster will ultimately fail, resulting in a loss of long-term jobs. This is especially true with small businesses. Statistics in the United States have shown that 25% of small businesses forced to close as a result of a disaster never reopen and 40–60% will close permanently within two years of the disaster. Recovery funding can address this problem and, in doing so, retain jobs that would otherwise be lost.

Recovery Strategies for Enhancing Quality of Life

The Natural Hazards Research and Applications Center (NHRAIC) developed a list of *Recovery Strategies for Enhancing the Quality of Life*, which helps to guide recovery planning focused on specific recovery actions that typically arise. A community can start with the situations that exist after a disaster and pick and choose among the options for improving its quality of life and among the implementation tools available to help pursue each of those options to develop strategies that are specially tailored to its own needs. The situations and options listed below are not exhaustive; rather, they are meant to give an idea of the range of possibilities. Likewise, these sample strategies suggest ways in which some options and disaster-induced situations could be combined to help a community improve its quality of life.

- **Situation: Damaged transportation facilities**
- Recovery strategies to enhance quality of life:
    - Rebuild to increase mobility. Circulation patterns should allow efficient and safe movement between home, work, and recreation, as well as effective evacuation. Rebuilding efforts should not threaten neighborhood integrity, historic and cultural resources, or environmental quality.
    - Allow for alternative modes of transit such as walking and cycling. Create connecting paths and greenways for pedestrians and cyclists, with some common nodes for social interaction.
    - Beautify the parking lots of public facilities. Upgrade outdoor parking lot facilities to integrate greening concepts and improve aesthetics. Community residents can be asked to compete in design competitions or tree planting and tree maintenance programs.
    - Rebuild to enhance capacity. Increase the ability to bring people into a business district, and to move goods in and out of a community.
    - Rebuild to improve functionality. Create a different circulation pattern; create and/or expand transit.
    - Undo past mistakes and support redevelopment. Demolish an unneeded overhead freeway to re-establish a stronger urban pattern as a key element of economic revitalization of a district.

  - Rebuild to promote more sustainable transportation systems. Change land use to promote higher density, mixed uses, and/or concentrated development in support of less auto-dependent transportation systems.
  - Ask: Where are roadways and bridges being built? Will moving a road displace a neighborhood?
  - Rebuild to improve resistance to damage. Older transportation facilities can be upgraded to more modern standards that make them more resistant to damage from floods, earthquakes, and other risks.
  - Relocate, where feasible. In some cases, transportation facilities could be relocated or rerouted around hazard-prone areas.
  - Reduce adverse impacts caused by transportation facilities. For example, certain roads and highways can act as dams during periods of flooding, obstructing the flow of runoff or floodwaters.
  - Examine the impact of such facilities on encouraging development in hazard-prone locations. For instance, widening roads may actually stimulate additional development in risky areas.

- **Situation: Damaged public facilities**
- Recovery strategies to enhance quality of life:
  - Make public facilities less vulnerable to future hazards. Move public facilities out of known hazard zones but first study the impact of their new locations on future growth and transportation patterns in the community.
  - Enhance educational opportunities by rebuilding or upgrading schools. Repairs, modernization, and upgrades should focus not only on structural safety but also on energy efficiency.
  - Enhance public facilities and access to them by designing or redesigning schools to be magnets for recreation, sports, and meetings. Ensure that schools have recreational facilities and meeting rooms to host sports tournaments and other activities.
  - Rebuild to transform/expand school facilities in support of economic strategies.
  - Upgrade public spaces to support economic revitalization. Create new sidewalks and street furniture and plant street trees to create a downtown “civic living room” to enhance the pedestrian experience and increase commercial activity.
  - Locate new public uses into a damaged area. Establish a community college branch in a downtown to expand activity and population. Establish a community center for displaced families and others to meet social goals and create higher activity level in support of economic goals.
  - Rebuild key economic facilities to improve economic and environmental functionality.
  - Rebuild a port facility with state-of-the-art characteristics resulting in greater capacity, reduced energy consumption, restoration of environmental features, enhanced pollution controls, and disaster-resilient design.
  - Ask: What are the impacts of redevelopment decisions on vulnerable populations? Does a setback mean the loss of land?

  - Protect against future damage by making such facilities more resistant to damage. For example, elevate buildings above the flood height or build a berm to help keep out floodwaters.
  - Relocate to a less vulnerable area.
  - Avoid building new public facilities in hazard-prone areas.

- **Situation: Damaged utilities**
- Recovery strategies to enhance quality of life:
  - Relocate critical facilities and equipment out of known hazard zones or retrofit the facilities so that hardship and disruption of services is avoided.
  - Create new infrastructure that supports economic growth while incorporating sustainable features. Rebuild a damaged telecommunications system for increased capacity; establish storm water systems where none existed; increase capacities of water, wastewater, or power facilities to meet future economic needs; use disaster-resilient designs.
  - Form partnerships with utility companies to upgrade the system. Add fiber optics or other advanced technologies in infrastructure when it is rebuilt.
  - Safeguard power lines from damage by fallen trees by putting the lines underground.
  - Move water or gas lines out of harm's way. For example, re-route utility lines around earthquake fault zones or floodplains.
  - Protect existing facilities from damage, for example, by constructing berms around sewage treatment facilities located in floodplains.
  - When planning to install new lines, identify the location of hazard-prone areas and try to avoid them.
  - Build redundancy into the system. For example, be able to shift water or wastewater treatment capacity to treatment plants not located in hazard-prone areas.
  - Develop plans to contain and treat spills from existing gas or wastewater treatment lines that may be damaged by natural disasters.

- **Situation: Damaged housing**
- Recovery strategies to enhance quality of life:
  - Create disaster-resilient, affordable housing. Rezone parts of the community for affordable housing.
  - Inventory damaged housing that has a history of abandonment and tax delinquency. Consider buyouts of these properties to eliminate eyesores and to reduce potential negative impacts on property values and potential health threats.
  - Move toward energy-efficient buildings. Provide education forums and advice for home and business owners on techniques and funding sources to replace aging, damaged heating and cooling equipment with the latest techniques and equipment to lower costs.
  - Provide public spaces for social interaction and recreation. Buy out homes in known danger zones and utilize the space as parkland, community gardens, or other public open spaces that will promote social interaction and recreation for all residents.

- Upgrade building codes so that new construction will be done to a higher standard.
- Create new housing opportunities to support area redevelopment. Establish new housing stock in a rebuilding area to support neighborhood-serving businesses.
- Create new housing stock to serve specialized needs in the economy.
- Create housing to attract or retain businesses. Establish housing near job centers and in keeping with the housing needs and preferences of workers.
- Improve neighborhoods to attract or retain businesses. Establish new schools or parks to improve neighborhood vitality. Upgrade housing that was not damaged but could benefit from higher levels of mitigation or quality.
- Relocate housing out of hazard zones. Create new public attractions such as parks and recreation facilities in flood-prone areas to mitigate a hazard and attract people into a business district.
- Ask: Has the community replaced a devastated section of housing (e.g., trailers) with the same, vulnerable housing?
- Ask: Is overcrowding resulting?
- Buy out or relocate damage-prone properties. Acquiring or relocating homes or businesses located in hazard-prone areas, particularly structures that have been damaged repetitively, can help reduce the public costs of disasters, which include emergency services, evacuation, emergency shelters, debris removal, and the loss of tax revenues.
- Acquire vacant, hazard-prone property. Buying vacant property and prohibiting its development permanently reduces the risk of damage to those properties while providing additional open space, wildlife habitat, and recreation areas.
- Rebuild according to modern building codes; upgrade the local code if necessary. Typically, older buildings not built to modern standards are the ones that suffer the most from natural disasters. When rebuilding, make sure that structures comply with modern building codes that specify how to make buildings more resistant to damage from hurricanes, floods, wildfires, wind, or earthquakes. Educate builders about hazard-resistant provisions in the codes.

- **Situation: Damaged commercial/industrial facilities**
- Recovery strategies to enhance quality of life:
  - Maintain employment opportunities and minimize economic disruption.
  - Rebuild commercial buildings with enhanced business-supporting features. Rebuild retail buildings to have increased floor-to-ceiling ratios, window/display area, and better floor layouts.
  - Create interim commercial facilities. Build temporary retail spaces consolidating multiple businesses in shared facilities.
  - Establish and/or improve mitigation features. Rebuild commercial/industrial facilities in flood-prone areas with elevated electrical elements and ability to seal water out in floods.

- **Situation: Environmental damage**
- Recovery strategies to enhance quality of life:
  - Create or enhance natural resources and environmental features.

  - Restore damaged environmental features in ways that support other economic goals. Consider adding improved public pedestrian access along the coastline to encourage tourism while repairing coastal erosion damage.
  - Integrate natural features into business district recovery. Upgrade damaged river levees with improved walkway connections and linkages with a downtown commercial area.
  - Establish new tourism opportunities based on interest in understanding natural systems. For instance, create an "earthquake park" focused around dramatic examples of faulting, liquefaction, or landslides.
  - Establish memorials or tributes. Memorialize people or events in new green areas.
  - Relocate and prohibit land use activities that are not safe for hazard-prone areas, including animal waste lagoons, animal production facilities, septic systems, hazardous waste facilities, junkyards, and sewage treatment plants.
  - Maintain and restore mitigation functions of the natural environment. The natural environment can help mitigate the impacts of natural hazards. For example, wetlands and floodplains slow down and absorb excess water during storms, then slowly release the stored water, thus reducing flooding downstream.
  - Protecting natural areas keeps people and buildings out of the path of natural hazards and maintains the natural capacity of the environment to attenuate disasters. In addition, protecting natural areas serves other purposes, such as preserving open space and wildlife habitat.

- **Situation: Disruption of health and safety**
- Recovery strategies to enhance quality of life:
  - Use the opportunity to identify gaps in family services, social services, and health care facilities and ensure that emergency plans have defined strategies and policies for short- and long-term sheltering for residents with special needs.
  - Create or update the community's inventory of housing locations of most vulnerable populations for evacuation and rescue purposes. Create maps that show locations of different population segments and their potential vulnerability to future hazards.
  - Consider whether the staff in the health and social service sectors is representative of the wider community, especially with regard to spoken languages.
  - Relocate and reuse medical facilities to support economic as well as health objectives. Relocate a damaged hospital while repairing and reusing the previous structure for mixed-use housing, commercial, or office uses.

Pre-Disaster Recovery Planning Issues Specific to the Infrastructure and Housing Sectors

Recovery in the Infrastructure and housing sectors is complex and costly, and will be a primary focus of the recovery committee that addresses the planning and prioritization of recovery projects. The following information is provided to help provide a context for this process.

Infrastructure Recovery

- **Understanding and Addressing Infrastructure Vulnerability**
  Infrastructure components can be characterized into two primary types: object-oriented and network oriented. Object oriented components of infrastructure tend to be individual, even if multiple units of that infrastructure exist throughout the affected area. For example, hospitals are individual 'objects' that together make up the health infrastructure. Network oriented infrastructure systems are more interconnected, and often rely upon lines of transmission that can span the entire County and beyond. Pipelines, communication wires, transmission lines, and roadways, for examples, are each components of network-oriented infrastructure systems. These system characteristics present the greatest influence on infrastructure vulnerability. The following factors are the key sources of vulnerability in the infrastructure sector:

  - **Poor land use planning.** Poor land use planning is the most likely source of vulnerability for infrastructure. Various infrastructure components are placed in high-risk zones - where residential construction has not occurred – for a range of reasons. This is due to both the proximity to resources, because of the availability of a large swath of land, or because of the low cost of the land. In the case of network-oriented infrastructure, it can be difficult to fully avoid high-risk areas given the need to achieve continuous pipelines, roads, or transmission lines, for example. Land-use related vulnerability might also be a matter of infrastructure age. Infrastructure constructed in high-risk areas may have been built decades earlier prior to the identification and mapping of hazard risk.
  - **Poor, weak or inappropriate construction materials**. All infrastructure systems and components rely fully or primarily upon physical structures and components. Network-oriented infrastructure systems that typically include a vast array of built objects, as is true with pipelines and/or transmission lines that span many miles, will crisscross the disaster-affected area. These facilities must be constructed of materials that are able to withstand the forces of anticipated hazards. There are several constraints such as a lack of access to high-quality construction materials (whether as a result of low inventory or high cost) or the unavailability of qualified human resources and/or proper quality control mechanisms, which ultimately result in vulnerability of these systems.
  - **Inappropriate design of buildings and other structures.** Building design can increase resilience or vulnerability according to the hazard to which it is exposed. As such, non-engineered structures present an extreme degree of vulnerability that is often avoided through the use of proper hazard-resistant construction design, principally that which is guided through legal and regulatory mechanisms like building codes and land-use zoning.
  - **Insufficient building codes and Inadequate Code Enforcement.** Building construction codes are based upon known hazard risk, and are typically based upon a minimum standard of safety in recognition of the increased cost of construction with each incremental move towards stringency. Codes that do not appropriately address hazard risk lead to the incorporation of risk into building design. Codes must be regularly updated to match industry innovation, new risk information, and prevailing practice and knowledge of the construction industry. In the absence of adequate enforcement, building codes are of little use. Because of the increased cost of

construction associated with more stringent codes, they are all-too-often neglected both by contractors. Building codes are only effective when there exists a mechanisms to inspect structures as they are built and thereafter, and to impose penalties for those who do not engineer a structure correctly or build it to code.

- **Poor Maintenance.** Maintenance of infrastructure is required to ensure that it is strong enough to withstand external forces, especially the increased forces related to hazard events. However, maintenance is both costly and complicated, and is often neglected as a result. As structures and networks age, materials become weakened, broken, or brittle, and resilience levels fall below what the materials were designed to withstand.
- **Cascading failure.** Infrastructure components are all vulnerable because of the complex dependencies they have upon each other. Cascading failures occur when the loss of one aspect of infrastructure leads to the subsequent loss of others. For instance, the loss of a water treatment plant causes a power generation plant to go offline, which in turn results in a hospital losing power and becoming unable to provide services.

- **Infrastructure Impacts and Implications**
  Infrastructure facilities, services, and installations are spread throughout the County, and therefore face a high degree of hazard exposure and subsequent disaster impact when events manifest. Of the many components of county infrastructure, a select few are critical to both disaster response and to the overall safety and security of the affected population. While all infrastructure damaged or destroyed in the disaster will eventually require rebuilding or repair, critical infrastructure problems must be addressed in the short term, while the disaster response operation is ongoing. The repair and reconstruction of critical infrastructure requires not only specialized expertise but also equipment and parts that may not be easily obtained during the emergency period. However, without the benefit of certain infrastructure components, performing other response functions may be impossible. In the longer-term, the implications of infrastructure damage go beyond the short-term matters of loss of or reduction in infrastructure services. Infrastructure damage and destruction is more a matter of the following:
  - Financial implications related to the reconstruction of costly infrastructure components
  - Alterations in infrastructure service patterns, resulting most prominently from population shifts, changes in recognized risk, and recovery planning priorities
  - Modernization and restructuring of infrastructure components to meet modern innovations and more current population needs

- **Infrastructure Recovery Outcomes**
  More than any other sector, recovery of infrastructure represents a window of opportunity to update and improve what existed prior to the event. Infrastructure typically develops over time, in response to changes in settlement and population movements. It is almost impossible outside of a disaster event to fully re-evaluate the placement of infrastructure components and the actual systems and components to meet existing and evolving needs. In the aftermath of a disaster, there is often a great influx of funding to address not only

the replacement of what was damaged or loss, but to address improvements and upgrades. Mitigation options that were before unobtainable may now be possible. Areas that before saw poor (or no) access to infrastructure may now find that there is funding and mandate to provide a positive solution. Inefficient and environmentally-damaging infrastructure can finally be dismantled or upgraded.

Infrastructure recovery planning efforts must be considerate of the wide range of recovery actions required, and as such the recovery of each infrastructure component cannot be addressed in isolation. Infrastructure recovery planning is an outgrowth of urban planning wherein the access, efficiency, and resilience of each and every component of infrastructure is maximized. All decisions should strive to meet or at least approach a core group of target outcomes, which might include any of the following:

- **Accessibility**: Infrastructure components and services supported by the recovery effort should be accessible to all County residents.
- **Hazard Risk Resilience**: Infrastructure solutions must be constructed such that there is a significant if not full reduction in the vulnerability that led to the original damages. While this is likely to increase construction costs, practice shows that every $1 spent on hazard risk reduction ultimately results in a $7 reduction in future reconstruction costs.
- **Sustainability**: Infrastructure solutions must adequately account for the climate, geography, financial and technical capacity, and projected growth of the County.
- **Scalability**: Infrastructure recovery will differ from community to community throughout the County given not only the damage inflicted, but also the geographic size, urbanization, population density, and other social characteristics. Infrastructure recovery planning must be able to address the needs of each and every community irrespective of size if inappropriate solutions are to be avoided.
- **Maintainability**: In addition to the up-front cost of construction, all infrastructure carries associated maintenance costs measured in technical and financial commitment. Communities must be spared the situation where they are equipped with systems and structures for which they have no expertise or economic capacity to maintain them.
- **Community Input and Acceptance:** The wishes of the affected population must be heard, understood, respected, and incorporated, thereby ensuring the most appropriate solutions are delivered.
- **Environmental Soundness**: Infrastructure solutions should have no negative effect on the natural environment, ensuring that any collateral impacts are resolved.
- **Cost Effectiveness**: Reconstruction efforts should not put the County, any local governments, or individual residents in crippling financial circumstances, and must be commiserate with the development goals of the County.
- **Progressiveness**: Ongoing long-term development progress must be maintained, with no sacrifice of long-term goals for short-term individual benefits.

An overarching goal, which is generally the result of these nine ambitious outcomes, is that the infrastructure reconstruction effort provides an overall improvement with regard to reduced vulnerability (over what existed prior to the disaster). Such an ambitious goal hinges upon the ability of planners to incorporate informed urban planning methods and

practices, for which related planning and forecasting has typically been established in the pre-disaster period in line with long-term development goals.

- **Challenges to Infrastructure Recovery**
  Several factors make infrastructure recovery more challenging and these must be addressed in the planning process. By understanding these challenges and having the prescience to recognize them, planners will be better able to reduce their negative impact on future recovery efforts. Overcoming them may be difficult given the pressure placed on political and administrative leadership to quickly resume the provision of infrastructure-related services. However, infrastructure projects represent major national investments and can define the development trajectory of the County for decades to come. Every disaster is unique, so not all may be relevant in each recovery effort. The infrastructure-specific recovery challenges include:

  - **Pressure to Quickly Reinstate Infrastructure Services and Reconstruction Infrastructure Components.** The greatest obstacle faced by those tasked with recovery in any of the infrastructure sectors is the call by the effected population to quickly resume infrastructure services and components (buildings and other structures) such that society can immediately function at levels that existed immediately prior to the onset of the disaster. Most infrastructure services are key to the functioning of society, and some, like potable water and food supply, are vital to the sustaining of life. However, it is widely accepted that simply rebuilding to conditions that existed prior to the event is not only short-sighted, but also irresponsible in that doing such ensures risk is retained. Planners will need to find a balance between the costs of using alternate methods to provide infrastructure services (while planning for repairs, reconstruction, and upgrades are made), and of reconstructing infrastructure components (hospitals, bridges, roads, dams, among many others) and the benefits of long-term development and increased quality of life gained by performing those improvements.
  - **Technical Planning Expertise.** In order to reduce risk to infrastructure systems and improve access and quality of services, there is a significant amount of urban planning required. These ‘big-picture’ efforts require planners to work together with all government sectors to create current and forecast needs assessments, and to plan for the siting and type of infrastructure systems that best meet those needs (within the budget that can realistically be raised to fund the planned projects). Such efforts may involve more technical knowledge than exists in government.
  - **Inequality in Access to Repaired, Reconstructed, or Upgraded Infrastructure.** Different groups enjoy differing levels of access to infrastructure resources as a result of any number of factors, including income, social class, legal status, education, and more. In the aftermath of a disaster these inequalities are greatly exacerbated. While some groups will possess the means and knowledge to be able to drive the reconstruction effort in such a way as to receive a greater benefit simply out of political connectedness or influence, technical knowledge, or financial access, others will have no ability to influence or even contribute to the planning process. Planners must be able to recognize and account for these inequalities or they are likely to perpetuate them in recovery. The following groups tend to be particularly susceptible:

  - Low-income households
  - Single parents
  - Medically dependent (physical and psychological) or disabled
  - Language minority and illiterate
  - The Elderly
  - The homeless
  - The marginally housed
  - New immigrants and Residents without Legal Status
  - Transients and newcomers
  - Isolated households
  - Children

- **The Availability and Cost of Building Materials and Labor.** Infrastructure reconstruction efforts place significant demands on both materials and labor. Local employment and supply markets are based on non-disaster orders, which represent a fraction of what is required post-disaster. Once reconstruction begins these thin resources may be immediately stretched to their limit, causing a recovery bottleneck that can only be relieved through external sources. Additionally, the high demand on such limited labor and materials can cause a shock to local markets, resulting in a spike in construction costs. On the other hand, a market glut caused by excessive outside provision of materials and labor can reduce demand for local products and labor and severely stress local companies and laborers.
- **The Loss of or Reclassification of Land.** Major disasters can drastically alter the landscapes they impact. Rivers can change course, coastlines can change shape, and landslide-induced dams can inundate large swaths of land. These and other processes can claim previously-developed land, destroying property upon which roads, bridges, water treatment plants, refineries, pipelines, water and sewer pipes, power lines, and other infrastructure components previously existed. Sometimes it is just the inherent risk of rebuilding on the land where infrastructure components were located that can result in the loss of that land's use. In any case where land loss occurs, new land must be located for infrastructure reconstruction, and the process by which that is successfully accomplished is a complicated one.
- **Community Dynamics.** Infrastructure exists only because there is a society for it to support. Without people and the economy they feed, there is no need for infrastructure. As societies and communities develop slowly over time, infrastructure development follows slowly behind in response to growing demand and evolving technologies. When a disaster occurs, however, there are two things that happen that drastically change this model. The first is that infrastructure must be developed quickly, oftentimes all at once, to meet an existing population. The second is that there may be uncertainty about where people will live, if they remain in the community at all, and what their post-disaster demands upon those infrastructure components may be. It is contingent upon the recovery planners tasked with infrastructure reconstruction to accurately determine both immediate and long-term community plans such that the infrastructure components that are built are done so in

a way that accurately reflects the changing and growing needs of the community that is served.

During the pre-disaster period, public and private owners and operators of infrastructure may have analyzed the risks and vulnerabilities of these systems and structures, and may have even come up with a broad range of mitigation options to address them. Due to expense or feasibility problems, however, it is likely that in most cases these options were shelved for a later date. After a disaster, most of the conditions that served as obstacles no longer exist or have changed considerably. Budgets may swell with recovery funding. Buildings and equipment that required very expensive retrofitting may have been destroyed, allowing for much cheaper "mitigation through design" to be performed. Systems and facilities placed in high-risk areas where they should never have been built in the first place may have subsequently been destroyed by the disaster. Unknown risks from unmapped or poorly understood hazards will now be easier to incorporate into development plans and thus avoid.

Housing Recovery

- **Housing Sector Vulnerability Factors**
  The following factors are the key source(s) of vulnerability in the shelter sector:

  - **Poor, weak or inappropriate building materials**: Housing structures must be constructed of materials that are able to withstand the forces of anticipated hazards. Old and informal housing may be built with cheap and/or inappropriate materials or not be constructed to prevailing codes.
  - **Inappropriate building design:** Building design can increase resilience or vulnerability according to the hazard to which it is exposed. For instance, in seismic areas, buildings with soft-stories (e.g., 1st floor parking garage), in close proximity, or with an asymmetrical shape are typically more likely to fail in the event of an earthquake. In high wind zones, failure to incorporate reinforcement straps typically leads to roof loss or structural failure. Areas of high snow likelihood must have adequate snow load capacity built into frames and roof structures.
  - **Inadequate Code Enforcement:** In the absence of adequate enforcement, building codes are of little use. Because of the increased cost of construction associated with more stringent codes, they are occasionally neglected both by contractors and by the homeowners themselves. Building codes are only effective when there exists mechanisms to inspect structures as they are built and thereafter, and to impose penalties for those who do not engineer a structure correctly or build it to code. During recovery, demands for inspections will increase many-fold. There have been cases where codes were sufficient, but there was a lack of trained inspectors to handle the case load that existed.
  - **Poor land use planning:** It is often the case that the most desired land is also the most risky. For instance, the slopes of volcanoes and floodplains adjacent to rivers both offer extremely fertile soil. Coastal shores are desired for their aesthetic benefits and their access to fishing. Other times, inappropriate use of land is a matter of ignorance, poverty, or urbanization. Construction near or above seismic faults may

occur for decades or even centuries before the existence of the fault is known. Housing that appears along the urban/wildland interface comes as a factor of urban sprawl and an insufficiency of buildable land.

- **Housing Impacts and Implications**
  Housing represents the largest proportion of building stock in almost every community, far outnumbering all other building types combined, inclusive of commercial, industrial, agricultural, religious, educational, and government facilities. Through their destructive forces, disasters are disruptive to a community's housing stock as a factor of building damage, total loss of the structure, or a loss of inhabitability due to external impacts including contamination. A loss of housing stock is much more than the loss of a building. Each unit of shelter that becomes uninhabitable as a result of a disaster directly translates to an increased burden on the government services that are tasked with providing for the safety of those displaced. Damaged or destroyed housing and the displacement it causes hinders all other aspects of recovery in that displaced residents are typically unable to return to work or otherwise function in their daily lives. Businesses whose employees cannot report to work may fail, markets whose customers are unable to purchase products will suffer, schools and other community facilities that are not able to resume normal function (because of their secondary function of sheltering victims) cannot provide their services, among other impacts. The psychological impacts brought about by housing loss, especially children, are equally disruptive even long after shelter recovery has occurred.

  Housing throughout the affected area will exhibit differing levels of damage and destruction due to its composition, location, elevation, and proximity to the hazard, among other factors. A first priority of government will be to supply housing inspectors able to determine the effect on housing structures according to which recovery planning may be based. In cases where a large number of residential structures lie within the disaster area, there may not exist a sufficient cadre of locally trained and accessible inspectors that can quickly perform this task. Decision makers faced with shelter recovery planning will encounter a wide range of consequences in the assessment phase that affect housing in direct and indirect ways. These include:

  - **Direct Impacts**
    Housing damages will range considerably but are often grouped according to the anticipated level of effort required to return the resident back to their home. These categories typically include:

    - **Affected**: Structure is inhabitable with no additional risk to the resident. Oftentimes following earthquakes, it is common to see residents in the affected area whose structures received no damage whatsoever, but who are otherwise too scared to return because they are unable to assess the safety of their home. Their home may even have suffered some cosmetic damage but is nonetheless safe to inhabit. Typically these structures require nothing more than reassurance from a trained architect or structural engineer who can certify the safety of the home.

- **Minor Damage**: Structure has sustained damage that makes in uninhabitable, but minor temporary repairs can be made to enable the resident to return. For example, houses that may have lost parts of a roof or roof shingles in a cyclone may be able to return home after installing a waterproof tarp. Permanent repairs will be required in the long run, but the habitability of the home reduces the burden on temporary shelter services.
- Major Damage: Structure has sustained damage that will require significant work to repair, and is unsafe to residents in its current state.
- Destroyed: Structure is permanently inhabitable. In these cases, the home cannot be repaired and must be demolished if it is still standing.

- **Indirect Impact**
  There are a number of impacts that may affect housing indirectly that, while they do not affect the physical structure of the building in any way, render a home uninhabitable temporarily or permanently. This is typically a matter of three factors:

  - **Contamination**: A structure or the environment surrounding the structure may become contaminated by a chemical, biological, nuclear, or radiological release that renders it temporarily or permanently uninhabitable. For instance, the Chernobyl accident in the former Soviet Union caused the permanent evacuation of areas in Belarus, Ukraine, and Russia, despite that these homes were structurally sound.
  - **Excessive Risk**: Following disasters, new information is learned about risk. This often leads to the designation of risk zones within which there exist homes that might have survived the disaster only slightly damaged or not damaged at all. However, the potential for future risk far exceeds what is considered acceptable, and people cannot return to these structures. This can happen when new faults are discovered, as floodplains grow and/or change, as hillsides become increasing unstable due to a range of factors, among other examples.
  - **Community Loss or Failure**: In very rare instances, governments may determine that the best course of action to reduce risk to residents is to move an entire neighborhood or community. This can occur even if not every structure within a neighborhood or community faces damage or destruction from the hazard in question. However, because a community is the sum of its parts, the viability of the residents outside of this risk zone that live in otherwise safe homes is threatened in that the community that serves their needs will be gone. In such cases, even these untouched homes are therefore impacted by the event and action must be taken to address the needs of the residents.

  The loss of or damage to housing has far reaching implications to the displaced residents. Secure housing is, coupled with food and water, the greatest concern for most disaster victims. Victims without housing may lose their livelihoods, face exposure to health, safety, and security risk, and suffer from a complete loss of privacy. As such, the reconstruction of housing has the effect of restoring dignity,

safety, security, and economic viability.

- **Recovery Outcomes**
  Achieving successful recovery in the Housing sector has been achievable yet extremely challenging for governments charged with managing the impacts of major disasters. Housing recovery is a highly complex function in large part because of the interactions that exist between the provision and occupancy of repaired and/or reconstructed housing and other recovery sectors. Added to this is the incredible challenge that pre-existing vulnerability factors are addressed such that future risk is minimized. However, the recovery period presents significant opportunity to improve the conditions of those affected in ways that might not otherwise be possible given legal, financial, or technical ramifications – housing is no exception. These improvements extend not only to disaster risk reduction, but also with regards to economic revitalization, urban improvement, rezoning, modernization, among other factors.

  Recovery planning must assume a holistic stance considerate of the wider spectra of recovery functions, rather than considering the construction of each unit or block in isolation. Every decision that guides the housing decision, as addressed in the multitude of issues featured decision carries implications planners must weigh against the possible benefits that might be achieved. All decisions should strive to meet or at least approach a core group of target outcomes, which might include any of the following:

  - **Permanence:** Displaced victims are able to return to or otherwise secure permanent housing
  - **Risk Reduction:** Housing units that are repaired or replaced adequately account for future hazard risk in design, construction, and materials
  - **Viability:** The housing solution is one that ensures access to appropriate wraparound services required by occupants to lead a practical and practicable living (e.g. access to livelihoods; availability of food and water; access to markets, utilities, and transportation; access to religion and religious facilities; existence of a community)
  - **Independence:** Housed victims are able to achieve self-reliance
  - **Cultural Sensitivity:** The culture of the affected population is protected
  - **Community Input and Acceptance:** The wishes of the affected population are heard, understood, respected, and incorporated
  - **Environmental Soundness**: Housing solutions do not have a negative effect on the natural environment, or address any environmental impacts that are caused
  - **Cost Effectiveness**: Housing solutions should not put governments, communities, or individual residents in crippling financial circumstances
  - **Progressive:** Ongoing long-term development progress is maintained, and long-term community goals are not sacrificed for short-term individual benefits

An overarching goal, which is generally the result of these nine ambitious outcomes, is that the housing solutions adopted provide an overall improvement (over what existed prior to the disaster) to the lives of the people who have been affected. Achieving such requires an intimate understanding of the hopes and goals of the victims themselves, and is therefore something that cannot be so easily determined in the absence of such participation. What is most important is that the housing solution is sustainable.

- **Obstacles to Shelter Recovery**
  There are several factors that make recovery more challenging. By understanding these obstacles and having the prescience to recognize them, planners are better able to reduce their negative impact on housing repair and reconstruction efforts. These obstacles may be pervasive or individual to families, communities, or other groupings, and may affect some of the factors addressed in the planning effort while having no effect on others. Every disaster, and every effected population, is unique, and as such these are provided merely to provide planners with a general sense of awareness. The shelter-specific recovery obstacles include:

  - **Pressure to Quickly Rebuild or Replace Housing**
    The greatest obstacle faced by those tasked with shelter recovery is the urge of displaced residents, and the community at large, to rebuild and return to a pre-disaster status (often referred to by victims as "normal.") While there is some understanding of delays in the immediate aftermath of the disaster when victims are accommodated in temporary, often congregate shelter locations, it is in the longer-term recovery phase when victims grow impatient with their state of reduced quality of life. As such, many victims will try to address their housing problems as quickly as and by any means possible simply to put an end to the inconveniences they are experiencing. These sentiments can create tremendous pressure for planners, especially if the public outcry is echoed or even amplified by the news media. The immediacy of victim needs can essentially "force" community leaders and other stakeholders to make difficult recovery decisions that might have benefited greatly from a more thorough assessment or study, including decisions related to disaster mitigation such as buying out or relocating structures in the floodplain, for example. Conversely, the delays in the establishment or update to land use regulations, environmental and historic preservation laws, building codes, and permitting processes, as well as decisions on where, how, and whether homes can be rebuilt, can become an obstacle of their own when each or any of these processes is inefficiently carried out.
  - **Denial of Future Risk to Similar Housing Units**
    Many people victimized by disasters feel that the answer to the recovery problem is simple—replace what was destroyed. A "lightning never strikes twice" mentality may tell them that they no longer need to worry, since the disaster already occurred. This sentiment may make it difficult to convince people, especially those taking reconstruction matters into their own hands, to

incorporate risk reduction options that typically raise both the cost and the technical difficulty of the structure.

- **Poverty**
  It is common knowledge that the poor typically bear a greater brunt of the disaster consequences and face much greater difficulty recovering than the wealthy. The leading causes of this include a lower likelihood that pre-disaster mitigation was employed, less access to the resources necessary to bring about recovery, lower use of insurance mechanisms, higher likelihood of living in neighborhoods of high hazard risk, fewer political or social connections to bring about recovery, and less access to the educational background or information that informs the recovery process and drives disaster-resistant reconstruction. Oftentimes, recovery decisions boil down to cost, and faced with alternatives the poor will often take the least costly option even if done so with an assumption of augmented risk. The actual cost of housing repair and reconstruction ultimately most typically rests with or transfers to the homeowners. Many victims will lack the financial resources to rebuild, and will therefore need to turn to outside assistance.
- **Inequality in Housing Reconstruction**
  Different groups have different access to recovery resources and technical assistance. In almost all instances, some groups will possess the means and know-how to receive their share of what is available, while others will lack these qualities thereby preventing them from accessing an equal share of assistance benefits. Examples of situations where inequity in recovery can occur include:

  - Although the rich may be able to afford to rebuild according to new standards and regulations, the poor may not be able to afford the higher construction costs
  - The poor may not have the time to wait in line for goods and services or have access to information about available goods and services
  - Poverty, language, legal status, or other social discriminations may prevent groups from access to goods and services
  - As was true with infrastructure recovery described above, certain groups - such as single women, the elderly, or the disabled - may be subject to cultural norms that prevent them from being able to access goods and services

- **The Availability and Cost of Building Materials and Labor**
  Housing reconstruction efforts place significant demands on both materials and labor. Local employment and supply markets are based on non-disaster orders, which represent a fraction of what is required post-disaster. Once reconstruction begins these thin resources may be immediately stretched to their limit, causing a recovery bottleneck that can only be relieved through external sources. Additionally, the high demand on such limited labor and materials can cause a shock to local markets, resulting in a spike in construction costs. On the other hand, a market glut caused by excessive

donation of materials and labor can eliminate all demand for local products and labor and put local companies and laborers out of work.

- **A Lack of Community Consensus**
  Recovery, and the planning process that accompanies it, affects whole communities. On the individual level, victims need to determine what is best for them. But on a community level, each of these personal decisions has a wider impact. The decision of several neighbors to abandon their homes, or the refusal of the same to accept a buyout of their home contingent upon relocation, are just two examples of situations that can derail a comprehensive recovery effort. Planners will face the challenge of finding solutions that are palatable to the greater community, and that are able to accommodate even those who are not in agreement with the plans ultimately enacted.
- **Dependence on Infrastructure and Wraparound Services (That May No Longer Exist)**
  Recovery of housing involves more than simply rebuilding damaged and destroyed structures. A wide range of opportunities, services, and amenities are what make a group of houses a community. Residents cannot live in a house unless they can earn an income, feed their family, travel freely, communicate with each other, among many other factors described throughout this report. Many, if not most of these factors are addressed in the greater recovery effort – however, coordination between these efforts can be challenging given that the agencies and organizations may have little crossover with each other. Government may prioritize one sector of another, and the pace of recovery between these sectors may vary greatly. For housing recovery to be successful, life must be immediately sustainable in the houses and communities provided.

Appendix: Hazard Risk and Vulnerability Data

Community Hazard Risk Summary

The Community Hazard Risk Summary provides for recovery planning stakeholders a concise contextual depiction of the likely causes of disasters and other disruptive events for which recovery planning becomes necessary. This section, in effect, tells the user what could happen, what impacts might result, and where those impacts would most likely be felt.

Those hazards threatening the community for which major recovery action is likely required include:

1. Earthquake
2. Severe Weather
3. Pandemic
4. Fire
5. Flood
6. Landslide
7. Tsunami
8. Volcanic Eruption
9. Terrorist Attack

Historic County Experience With High-Consequence Hazards

Earthquake activity in Snohomish County exceeds both State and National averages. The Puget Sound region faces an estimated 2 percent probability of ground shaking to exceed 70 percent of the force of gravity within a 50-year timeframe. The Cascadia Subduction Zone faces a 10 to 15 percent probability of occurrence in 50 years. A crustal zone earthquake has a recurrence interval of about 500 to 600 years. South Whidbey Island Fault and Seattle Fault earthquakes have a 2 percent probability of occurrence in 50 years. A quake in the Benioff Zone has an 85 percent probability of occurrence in 50 years.

Several significant earthquake events have occurred in the County, including:

1) 1872: A shallow 7.4 magnitude earthquake struck 75 miles NE of Everett. No fatalities are known to have occurred in Snohomish County.
2) 1949: A 7.1 magnitude earthquake struck the Nisqually Delta Area north of Olympia. Snohomish County experienced intense effects along the South Stillaguamish River valley from Arlington to Granite Falls, and along the Skykomish and Snohomish River valleys. Impacts included fallen chimneys; cracked plaster; broken gas and water mains; damaged docks, bridges, and water storage tanks; cracked pavement and ground; and landslides, debris slides and mudflows.
3) 1996: Magnitude 5.6 event near Duvall caused merchandise to fall off shelves and damaged one chimney. 16,000 residents lost power for several hours. No report of physical damage to electrical power facilities was made.

4) 2001: A 6.8 magnitude event struck the Nisqually Delta Area north of Olympia. County damage was approximately $2-3 million, with the greatest impacts felt along the Snohomish, Monroe, Darrington, and Sultan River valleys. Some unreinforced masonry structures were heavily damaged but no buildings collapsed. Thirteen people were slightly injured.

A **Severe Weather** disaster in Snohomish County has a 29% likelihood of occurrence in any given year, with high wind events occurring annually. These events typically result in downed power lines, fallen trees, interruption of transportation lifelines, and damaged public buildings and homes. Deaths related to severe weather are infrequent but have occurred in the County. The most frequent issues associated with severe weather are loss of utilities and immobility. Roads often become impassible due to snow, ice, or landslide. Electrical lines may be downed and other services, such as phone or water, may be inoperable without electricity. Fast melting snow and/or heavy rain can lead to secondary hazards when they overwhelm natural and man-made drainage systems causing seasonal and flash flooding.

Significant Severe Weather events that have occurred in Snohomish County include:

1) 1993: The Inauguration Day Wind Storm, which resulted in a Presidentially-declared disaster, caused 5 deaths, destroyed 52 homes, damaged 249 homes and 580 businesses, destroyed the Interstate 90 floating bridge, and caused over 870,000 businesses and homes to lose power. Over $130 million in damages were estimated.
2) 1996/1997: The Holiday Blast Storm, which resulted in a Presidentially-declared disaster, caused flooding and landslides that killed 24 people. Over 250,000 people lost power, and damages were estimated at $140 million.
3) 2008/2009: A severe winter storm and record snowfall resulted in a Presidentially-declared disaster. The event damaged roads and bridges, water control facilities, buildings, equipment, utilities, and recreational parks.

Pandemic can and has impacted Snohomish County. In 2009, during the H1N1 outbreak, Snohomish County issued a State of Emergency to battle the virus. While the outbreak was contained and the effects were not as severe as feared, a future event could result in high fatality rates and subsequent losses of services, employment base, and other related impacts.

Wildland fires occur almost every year, with over 850 events having been recovered since 1970. However, all of these events have been contained to sizes smaller than 1,500 acres. Wildland fire losses in Snohomish County include fatalities, injuries, and the destruction of housing, businesses, government facilities, infrastructure, natural resources, and other community resources. Wildland fires can precipitate erosion, flooding and landslides.

Floods are generated via four principal sources, including the Lake Washington Basin, the Snohomish River Basin, the Skagit River Basin, and the Stillaguamish River Basin. Significant flooding events in Snohomish County include:

1) 1975: The Snohomish River Basin Flood caused an estimated $42.4 million in damages. The flood inundated most of the valley from Marshland and the French Slough through Ebey Island upstream. The pumping plant in French Slough collapsed into the river. Around 300 homes were damaged and 3,500 livestock died. Dike failures closed Highway 2.
2) 1997: The Stillaguamish River Basin Flood, caused by excessive snowfall and subsequent melting, damaged and destroyed both homes and farms in the Stillaguamish River valley on account of broken dikes.
3) 2003: The Stillaguamish River Basin Flood caused approximately $10 million in damages. The event caused the destruction or damage of several houses.

Landslides regularly occur in Snohomish County after severe storms. While these events rarely result in fatalities, they have destroyed infrastructure and private property, most significantly roads. Recent instances of landslides in Snohomish County occurred in 1996, 1997, 2003, 2006, 2007 and 2009. The 1997 event, which occurred in Woodway north of the Richmond Beach neighborhood, cut a 50-foot wide swath which destroyed railroad tracks and moved a freight train into Puget Sound.

Historical records and research show that Puget Sound is susceptible to and has been impacted by large-scale Tsunamis, most significantly as a result of a large shallow earthquake on the Seattle Fault approximately 1100 years ago. More recent historical accounts describe large waves causing damages and fatalities in the early 19th century. Tsunami risk is well-known and documented due to advances in tsunami risk assessment. Significant swaths of oceanfront property and land face exposure to this hazard. Today, large tsunamis could be generated by a number of seismic forces, including thrust, strike-slip (oblique), and subduction zone earthquakes, though it is unlikely any such event would to significantly impact Snohomish County.

Three significant Cascade **volcanoes** are relatively close to Snohomish County: Mount Baker is 35 miles to the north; Mount Rainier is 60 miles to the south and Mount St. Helens is 110 miles to the south. Eruptions in the Cascades occur at a rate of one to two eruptions per century, and do so with catastrophic results. Eruptions would impact Snohomish County primarily through ashfall, which causes structural failure due to the weight of accumulated ash, equipment and mechanical failure, and health impacts. Ashfall can also contaminate exposed potable water sources, such as reservoirs

While Snohomish County has no previous occurrences of catastrophic **terrorist attacks**, it must be recognized that the long-term physical and psychological effects of such an event would certainly have long-lasting impacts on the community. Any attack involving a weapon of mass destruction, most notably using biological agents or radiological materials, would permanently affect the habitability of the affected area and possibly the surrounding area as well. Cleanup from WMD events can require significant financial outlay and can take years to complete - during which time the affected area must remain uninhabitable. A terrorist attack of any form, regardless of the weapon used, can have very negative impacts on the perception of safety and security in the community, which ultimately impacts economic stability and long-term development goals.

Hazard Vulnerability Factors

There are a number of key vulnerability factors that make recovery actions in Snohomish County likely. Knowledge of these factors both allows planners to understand why recovery might be needed in the future, and allows them to prescribe targeted recovery actions that address these vulnerabilities directly through the recovery plan itself (thereby ensuring such vulnerabilities are reduced or eliminated over time). Vulnerabilities may be specific to one or more hazards, and are categorized according to their source (namely Physical, Social, Economic, and Environmental).

Physical Vulnerability Factors

- Aging housing stock, with as many as 10,000 households at risk of damage or destruction in a major seismic event (amounting to $4.4 billion in losses). Additionally, there are 1,119 identified critical facilities exposed to seismic hazards, including 466 bridges, 243 schools, 36 water supply facilities, 46 wastewater facilities, 67 HAZMAT facilities, among others.
- Development in the floodplain, given that there are 6,707 structures within the 500-year floodplain and 6,144 structures within the 100-year floodplain. Of these, 38% are commercial, industrial or agricultural and the rest are residential. Approximately $3.05 billion in buildings and contents are at risk from a 500-year flood and $2.06 billion are exposure to 100-year flood risk. A 100-year event would displace about 48,000 people, while a 500-year event would displace as many as 90,000. Many of these individuals are low-income (4.9%), elderly (4.7%), or are children (12.6%).
- Development on soft soils or steep slopes, with approximately 4,700 structures constructed on steep slopes, valued at over $2 billion. Of these structures, 95% are residential. Thirty-six critical facilities and extensive amounts of infrastructure are at risk from landslides, including railroads, roads, bridges, and power transmission lines.
- Coastal development, with approximately 1,500 structures, primarily residential, facing tsunami risk. These structures have a combined value of $1.5 billion. A major tsunami would cause approximately $500 million in damages. Damage or destruction of critical infrastructure, including major roadways and up to 38 bridges, could likewise occur. It is expected a tsunami would displace as many as 21,000 people.
- Residential structures failing to meet construction codes for wind resistance or snow roof loading (up to 20% of homes)
- Structures built in close proximity to large trees, or along the urban-wildland interface, amounting to $4.5 billion in property value. Approximately 36,000 people live along the urban-wildland interface
- Exposed and at-risk critical infrastructure, namely power transmission and communications lines, water and natural gas transmission pipelines, sewerage, and roadways, each of which faces damage due to ice buildup, felled trees, floodwaters, landslides, and wind. At present, over 160 bridges cross the floodplain. Roads have been damaged or blocked in multiple past events.
- At risk siting of hazardous materials production, storage, transport, and usage facilities.
- The location of structures and infrastructure within volcanic ashfall zones (railroad tracks and roadways would be especially hard hit in such an event, though long-term recovery

impacts would more likely be the result of lahars (mudflows) which threaten several schools, fire stations, other critical facilities, and numerous infrastructure components.

Social Vulnerability Factors

- Individuals and families failing to plan for extended shortages of power, food, and water
- Poor or non-existent social networks among individuals
- Approximately 6% of people face linguistic isolation and are thus unable to access emergency management information and resources (including recovery assistance)
- Approximately 9% of people in areas of high seismicity live in below the poverty line
- Approximately 19% of people living in areas of high seismic risk are either above 65 years old, or children

Economic Vulnerability Factors

- Businesses failing to prepare for interruptions, employee shortages, power outages, or damage/loss of facilities, equipment, and/or inventory
- Undercoverage of business and homeowners/renters insurance is prevalent in Snohomish County (it is estimated that only 33% of insurable buildings in the County are currently covered, which is far lower than the national average of 49%)
- Livelihood / job reliance on industries that could be heavily impacted by a major disaster (e.g., high-profile industrial and service operations)
- Negative external investment ramifications related perceptions of high risk
- Hazardous materials incidents can result in the loss of fisheries and the inability of commercial ventures to utilize impacted land

Environmental Vulnerability Factors

- Rerouting of streams could change the nature of the floodplain
- Hazardous materials spills could result in a change in land use or habitability
- Major hazards, especially tsunamis, can significantly impact the aesthetic value of land, can alter the ability of the land to protect from other hazards (such as how a wildland fire negatively impacts slope stability), or can result in contamination of the land or water, thereby damaging wildlife habitats