

CRITICAL INFRASTRUCTURE STUDY – Criticality of Municipal Infrastructure in Newfoundland and Labrador

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Critical Infrastructure

Why is critical infrastructure important?

In order to minimize the impact on communities and society in the case of severe disturbances affecting municipal infrastructure systems

Systems must be resilient to failures, i.e. that they are able continue operations or quickly recover a stable state after a major mishap



Infrastructure

Municipal infrastructure includes:

buildings,
structures,
facilities,
equipment,
rolling stock,
furnishings, and
development and purchase of land,

As well as the associated items to bring the foregoing into operation,
and major rehabilitation work.

What is Critical Infrastructure?

Critical infrastructure can be defined as:

physical facilities,
supply chains,
information technologies and
communication networks,

which if
destroyed,
degraded or
rendered unavailable for an extended period,

would significantly impact on the social or economic wellbeing of a
municipality and the province.

What is Critical Infrastructure?

Essential services we all rely on in our daily lives, such as:

Power

Water

Health

Communications systems and

Banking

Are all examples of critical infrastructure.

Obviously some are owned/operated by a municipality – some are not.

Purpose of the Study

MNL has partnered with Newfoundland and Labrador Power to develop a better understanding of critical infrastructure that exists within municipalities

The study assesses good practices around the identification, assessment and management of critical infrastructure at a municipal level

Also identifies what critical infrastructure exists within municipalities within the province.



Why is Critical Infrastructure Important?

Most of the critical infrastructure we see in the province of Newfoundland and Labrador is interlinked.

This means that the continuity of supply of critical infrastructure often depends on the availability of other critical infrastructure services.

Some of this infrastructure is owned and operated by municipalities in Newfoundland and Labrador.

Some of it is owned by the province, the federal government and finally the private sector – unclear who owns what and where it is

National Planning around Critical Infrastructure

National planning for critical infrastructure protection is under way.

Some provinces and territories may be using modified definitions of the critical infrastructure sectors, but the concepts are similar.

However, the entire critical infrastructure in the province resides in some municipality.

How this critical infrastructure is identified, managed and assessed, especially that which is the responsibility of the municipality itself, is an important consideration for councillors and for staff.



National Planning around Critical Infrastructure

Critical infrastructure roles and activities should be carried out in a responsible manner at all levels of society in Canada.

Responsibilities for critical infrastructure in Canada are shared by federal, provincial governments, local authorities and critical infrastructure owners and operators – who bear the primary responsibility for protecting their assets and services.

Individuals also have a responsibility to be prepared for a disruption and to ensure that they and their families are ready to cope for at least the first 72 hours of an emergency.

National Planning around Critical Infrastructure

Given that disasters most often occur locally, the first response is almost always by the owners and operators, the municipality or at the provincial/territorial level.

The federal government fulfils national leadership responsibilities relating to emergency management, respecting existing federal, provincial and territorial jurisdiction and legislation.

The federal government is also responsible for providing assistance to provinces/territories if the province/territory has requested the assistance.

Benefits of Understanding and Managing Critical Infrastructure

There are effectively four benefits of engaging in an improved approach to dealing with municipal critical infrastructure:

1. A strong and effective business (i.e. Newfoundland Power) – municipality partnership;
2. Enhanced risk management of the infrastructure operating environment;
3. Effective understanding and management of strategic issues around critical infrastructure; and
4. A mature understanding and application of municipality/ organizational resilience to deal with critical infrastructure.

FINDINGS

Findings from the Study

Differences

There are many definitions of critical infrastructure.

While there are some commonalities, there are differences defined by national and regional boundaries.

The differences in the definition of critical infrastructure are important in understanding their relevance to both municipalities and utilities such as Newfoundland and Labrador.



What is Critical Infrastructure?

In Canada, critical infrastructure refers to processes, systems, facilities, technologies, networks, assets and services essential to the health, safety, security or economic well-being of Canadians and the effective functioning of government.

Critical infrastructure can be stand-alone or interconnected and interdependent within and across provinces, territories and national borders.

Disruptions of critical infrastructure could result in catastrophic loss of life, adverse economic effects and significant harm to public confidence.

So What Is Critical?

The following are the most common classification of critical infrastructure:

1. Energy and utilities (e.g. electrical power, natural gas, oil production and transmission systems)
2. Communications and information technology (e.g. telecommunications, broadcasting systems, software, hardware and networks, including the internet)
3. Finance (e.g. banking, securities and investment)
4. Health care (e.g. hospitals, health care and blood supply facilities, laboratories and pharmaceuticals)

So What Is Critical?

5. Food (e.g. safety, distribution, agriculture and food industry)
6. Water (e.g. drinking water and wastewater management)
7. Transportation (e.g. air, rail, marine, surface)
8. Safety (e.g. chemical, biological, radiological and nuclear safety: hazardous materials; search and rescue; emergency services; and dams)
9. Government (e.g. services, facilities, information networks, assets and key national sites and monuments)
10. Manufacturing (e.g. defence industrial base, chemical industry)

<http://www.publicsafety.gc.ca/cnt/ntnl-scr/crtcl-nfrstrctr/index-eng.aspx>



Managing Critical Infrastructure

To be effective, strategies to address critical infrastructure must be implemented in partnership among all levels of government and critical infrastructure sectors.

Critical infrastructure owners and operators have the expertise and information that governments need to develop comprehensive emergency management plans.

In turn, municipalities must share relevant information in a timely manner, respecting existing federal, provincial and territorial legislation and policies, to help owners and operators assess risk and identify best practices.



How to Manage Critical Infrastructure?

Three key elements to enhance the resiliency of critical infrastructure in municipalities:

Build partnerships;

Implement an all-hazards risk management approach; and

Advance the timely sharing and protection of information among partners.



Partnerships

This partnership approach recognizes that more resilient critical infrastructure helps foster an environment that stimulates economic growth, attracts and retains business, and creates employment opportunities.

Municipalities bring value to the partnership through activities such as:

Information - providing owners and operators with timely, accurate, and useful information on risks and threats;

Engagement - ensuring industry is engaged as early as possible in the development of risk management activities and emergency management plans; and

Working with industry to develop and prioritize key activities for each sector.

Steps to Addressing Critical Infrastructure

1. Identify all parts and connections to the identified critical infrastructure
2. 'Disconnect' unnecessary infrastructure – what's not critical
3. Evaluate and strengthen the resiliency of any remaining infrastructure
4. Removing or disabling unnecessary services
5. Do not rely on proprietary protocols to protect your infrastructure
6. Implement the security/protection features provided by partners

Steps to Addressing Critical Infrastructure

7. Perform audits of critical infrastructure to identify operational/security concerns
8. Conduct physical security surveys and assess all remote sites connected to the critical infrastructure to evaluate their resilience
9. Establish teams within municipalities to identify and evaluate possible attack scenarios
10. Clearly define roles, responsibilities, and authorities for managers, councillors and citizens
11. Document infrastructure and identify systems that serve critical functions or contain sensitive information that require additional levels of protection
12. Establish a rigorous, ongoing risk management process

Steps to Addressing Critical Infrastructure

13. Conduct routine self-assessments
14. Establish system backups and disaster recovery plans.
15. Senior organizational leadership should establish expectations for levels of service and the role of individual municipal employees
16. Establish policies and conduct training

Step 1 - What is Critical?

Many municipalities fail to fully understand the meaning behind the criticality ranking.

Most reliability specialists will tell you that the “critical” assets have the greatest impact on the community, be it service levels or time to deliver a service.

Operating under this mindset, they often overlook the single characteristic that makes each asset “critical” in the first place.

Assessing reliability and resilience will be able to illustrate what enhancements must be made to manage criticality, thus improving their ability to manage assets by criticality.

Has to be done at a federal, provincial and municipality-by-municipality level

Identification Process

Determination of asset types Defines which assets should be evaluated

Consideration in defining assets Describes how and at what level of detail Critical Assets should be defined and special considerations with respect to asset types.

Application of evaluation guidance Defines the evaluation guidance that could be used to determine if an asset is a Critical Asset

Listing essential functions Discusses listing the essential functions of the asset

Documentation of assessment Discusses what should be documented and what forms a basis for determining whether an asset is critical

Source: Identifying Critical Assets (by NERC: North American Electric Reliability Corporation) http://www.nerc.com/fileUploads/File/Standards/Critical_Asset_Identification_2009Nov19.pdf

<http://resources.infosecinstitute.com/scada-security-of-critical-infrastructures/>

Framework for Critical Infrastructure Analysis



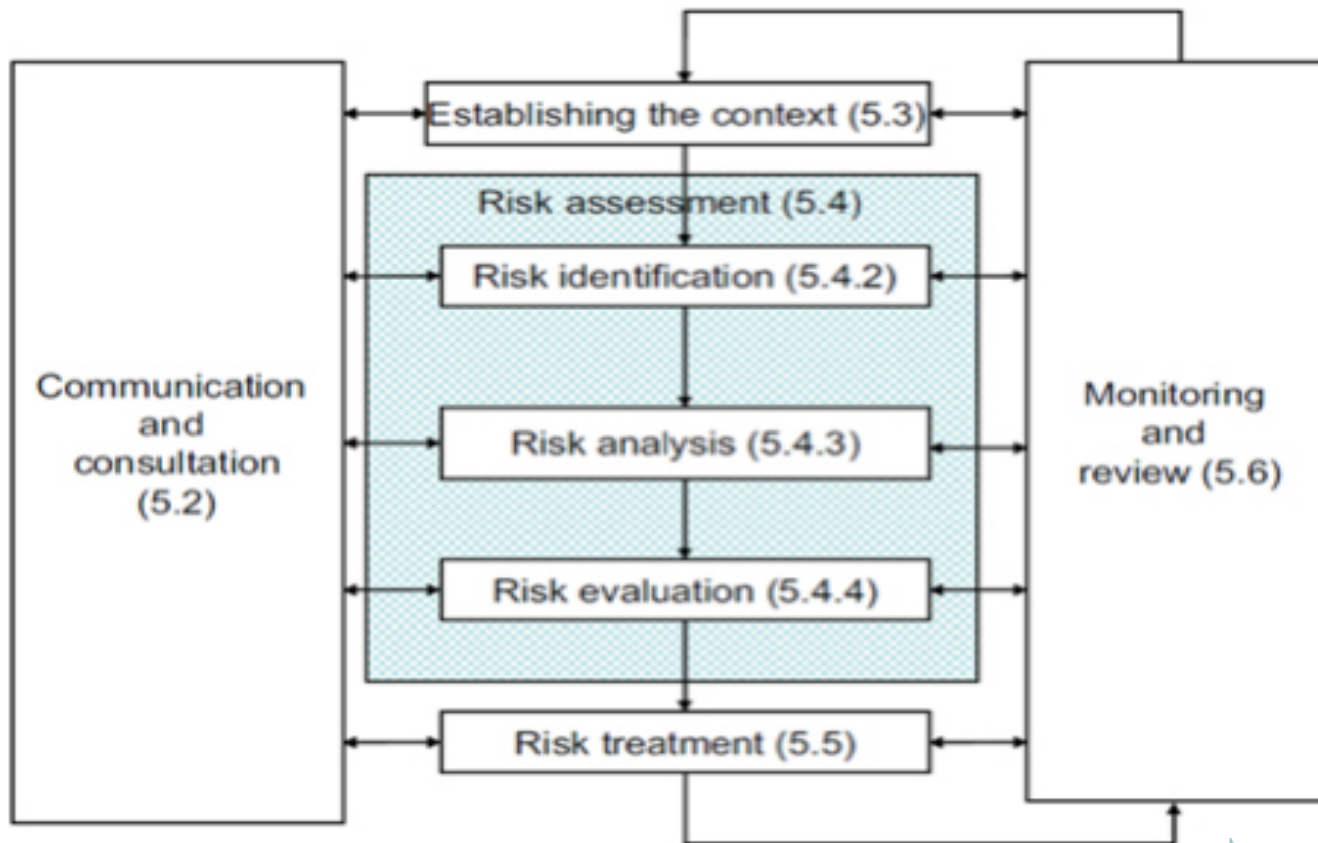
Measures of Critical Infrastructure

Loss Dimension	Description	Unit of Measure
Casualty	Measures the number of people injured or killed	Number of fatality equivalents
Economic	Measures direct economic damage including property loss, repair and cleanup costs, environmental losses as well as the lost to other assets due to the failure	Current year dollars
Mission Disruption	Measures degree of mission disruption for each relevant mission	Percentage reduction in available production capacity
Recuperation Time	Measures the time to reconstitute lost functionality and productive capacity	Time (days or years appropriate)

Considerations and Process – Critical Infrastructure



Risk Based Approach



ISO 31000:2009 Risk Management Process

Conclusions – Evaluating Critical Infrastructure

Mission and community impact

Safety and environmental impact

Ability to isolate single-point-failures

Preventive Maintenance (PM) history

Corrective Maintenance (CM) history

Mean-Time-Between-Failures (MTBF) or “Reliability”

Probability of failure

Spares lead time

Asset replacement value

Planned utilization rate

Conclusions - Managing Critical Infrastructure

Enhancing the resiliency of critical infrastructure can be achieved through the appropriate combination of:

- security measures to address intentional and accidental incidents,
- business continuity practices to deal with disruptions and ensure the continuation of essential services, and
- emergency management planning to ensure adequate response procedures are in place to deal with unforeseen disruptions and natural disasters.

However – you have to know what assets you have – any their degree of criticality

What the Study (Still) Needs from Your Municipality?

Identify person responsible in your municipality

Share any existing policies/plans/maps around critical infrastructure in your municipality

List and (very briefly) describe the critical infrastructure in your municipality. Prioritize if possible.

Share any emergency disaster/continuity plans around critical infrastructure

Be available for a brief follow-up interview if necessary

Thank you for the opportunity to speak....

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