



Climate Change Adaptation Plan

Port Elgin, New Brunswick



Prepared by EOS Eco-Energy
Endorsed by Port Elgin Council on
February 8, 2016

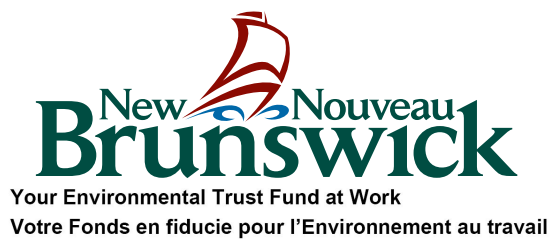
Cover photo credit: Anne Goodwin, Port Elgin

February 2016

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This project was funded by:



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Climate Change Adaptation Committee

| | | |
|---------------|-------------------------|--|
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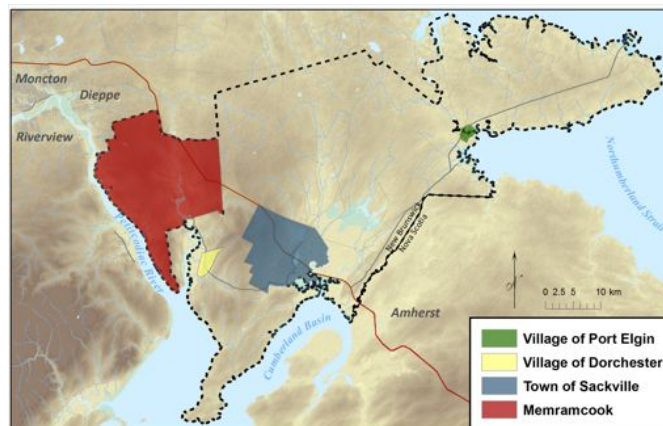
Introduction

Port Elgin, New Brunswick, located on the Northumberland Strait, is one of the most vulnerable regions in the province to climate change impacts, in particular coastal flooding and erosion. A number of intense storms and storm surges have impacted the community in recent years. Most notably, in 2010 one major storm surge hit the Village, causing extensive damage estimated to be about \$700,000. During winter 2015 many houses were without power for an extended time due to a powerful snowstorm.

Due to these well-known vulnerabilities, the Village of Port Elgin has taken a series of actions to adapt to climate-related changes including planting rain gardens in partnership with EOS Eco-Energy, developing an excellent emergency measures plan, and conducting an inventory of homes with wood heat (for use during winter power outages), etc.

Furthermore, the Village of Port Elgin completed its sustainability plan, *Picture Port Elgin* in 2011, and is taking action to mitigate the effects of climate change by being part of the Partners for Climate Protection (PCP) program, which involves a 5-step process to reduce emissions at the local level.

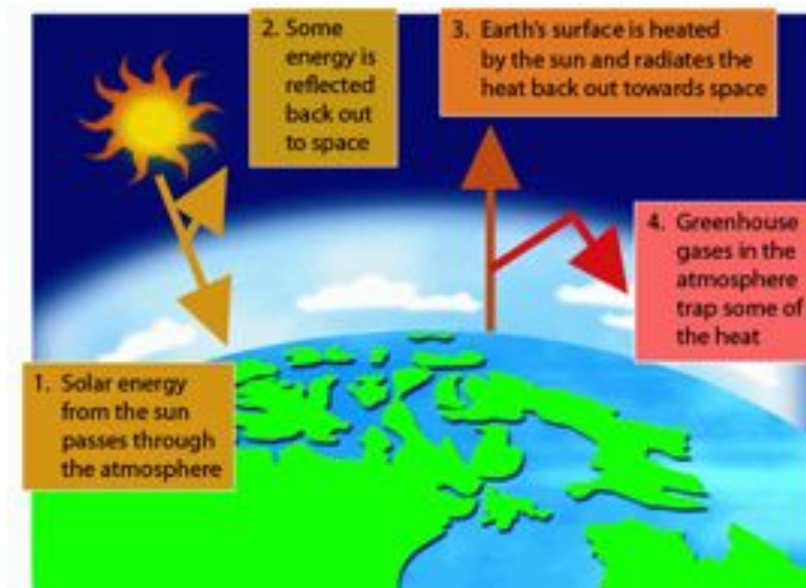
The next step was to formalize the community's various adaptation actions into a community-based climate change adaptation plan. EOS Eco-Energy coordinated the planning process and obtained funding from the New Brunswick Environmental Trust Fund. The following community-based adaptation plan includes information on climate change adaptation, local impacts, flood scenarios, a summary of previous risk and vulnerability assessments, and the adaptation plan organized by priority area.



Map of the Tantramar Region, including Port Elgin, NB. Source: J. Bornemann

What is Climate Change?

Climate is the average weather pattern over many years while weather is short-term. Climate dictates what parts of the planet tend to be warmer, colder, wetter, drier, and how often we see extreme weather events such as hurricanes. Global temperatures are rising which will lead to more severe climate changes in the future.



The greenhouse effect. Source: NB Department of Environment and Local Government

What is Climate Change Adaptation?

Climate change adaptation describes how we adjust to future climate conditions. Adaptation involves making adjustments in our decisions, activities, and thinking, because of projected changes in climate. Making these adjustments will help decrease the negative effects of the changing climate, and allow us to take advantage of any new and favourable opportunities.

Examples of adaptation measures can include:

- Choosing not to build houses in flood plains.
- Having a storm emergency kit and evacuation plan.
- Relocating houses from at-risk areas over time.
- Maintaining natural buffers to floods (wetlands, stream vegetation).
- Adjusting storm water and sewage infrastructure either by moving them, or by increasing their capacity.

- Reducing run-off and the burden on storm water infrastructure by increasing permeable pavements, and increasing tree and vegetation covers.
- Growing new foods better suited to a hotter climate.

In contrast to adaptation there can also be maladaptation. Maladaptation is more harmful than helpful. An example includes sporadic placement of shoreline stabilizers. While these adaptation measures may help protect an individual lot owner, overall maladaptation measures actually increase a community's vulnerability to climate change and often result in increased economic costs.

Our Community

The Village of Port Elgin, New Brunswick is located at the mouth of Gaspereaux River along the Northumberland Strait and is known for its, lumber, manufacturing, and fishing history, rich natural diversity and saltwater marshes. The community lies near the New Brunswick/Nova Scotia border, 70km from the City of Moncton, NB. It has an aging population of 418 spread across roughly 18.55km². This small coastal community has a kindergarten to grade 8 school, health centre, churches, a small wharf, museum, fair grounds, seniors housing complexes, fire station, community parks, and a few small restaurants and storefronts. It is also home to Atlantic Windows, a window manufacturer, and PEDVAC (Port Elgin District Volunteer Action Council).



Main Street Port Elgin. Photo: www.villageofportelgin.com

Methodology

Planning Committee

A planning committee was formed which includes representatives from EOS Eco-Energy, the Southeast Regional Service Commission, the Village's Emergency Measures Organization (EMO), a village councillor and the local

community. The committee met six times to discuss local climate change impacts and flood scenarios, to review existing risk and vulnerability assessments, to prioritize vulnerabilities; and develop adaptation options for an action plan. The committee also organized two public engagement sessions and other activities such as an information booth and brochures.

Public Engagement

Public engagement was an important part of the planning process. Information was provided via newspaper articles (see Appendices), Facebook, and workshops. A pamphlet about climate change impacts and adaptation (see Appendices) was also developed and handed out door to door by Port Elgin's EMO coordinator. Copies of the pamphlet were also sent home with students at Port Elgin Regional Elementary School. Input and feedback was sought through workshops over the last few years. EOS Eco-Energy staff also welcomed comments via Facebook, emails, telephone calls and at information booths, such as at the Port Elgin Christmas Craft Fair in November 2015. Finally the public was invited to participate in the vulnerability mapping exercise at Pedvac on November 10, 2015.



Public vulnerability mapping session, November 2015. Photo: Amanda Marlin

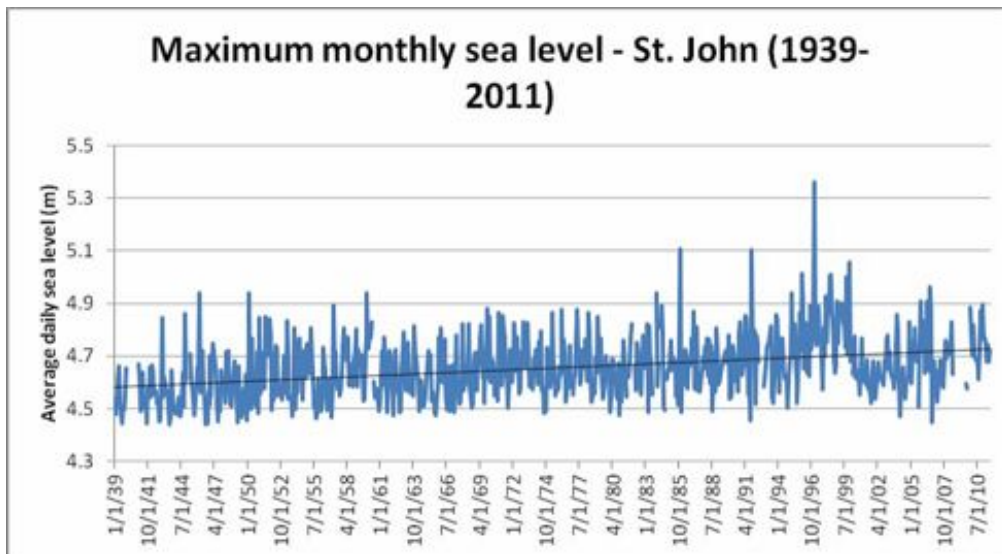
Adaptation Vision

“Port Elgin, New Brunswick is a community resilient to climate impacts.”

Climate Change Impacts

Sea Level Rise

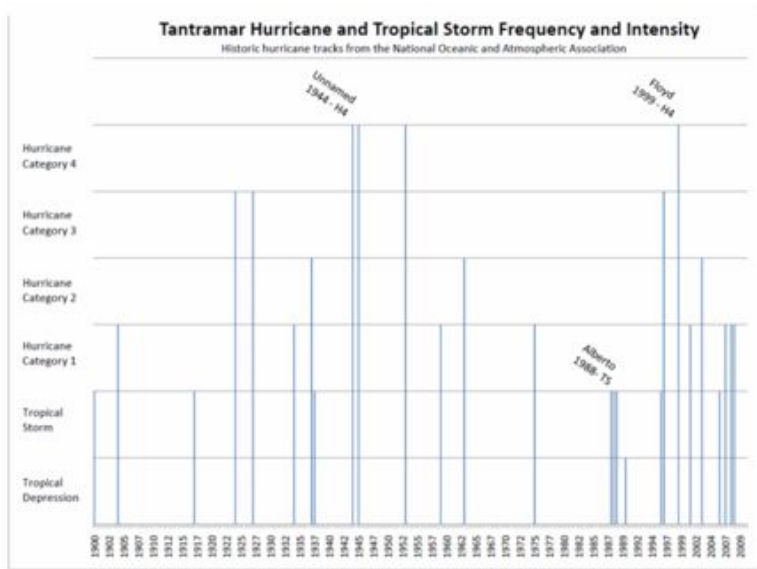
The ocean has been rising over the past 100 years. For example, in Saint John, the sea level has risen by 24 cm since 1920. It is now predicted to rise approximately 1 metre between 2010 and 2100 around New Brunswick. Sea level rise is partly due to natural sinking of the land. Melting of the ice caps and glaciers, as well as the expansion of seawater due to heating, adds to a higher and faster rise in sea levels.



The sea is rising around New Brunswick. Source: Lieske and Bornemann, 2012

Intensifying Storms and Storm Surges

In the last decade there have been several serious storm events in the region. Storm surges often accompany these events and can cause considerable damage. During the past few years, major storm surges have hit many communities in New Brunswick including one that hit Port Elgin in 2010 with extensive damage estimated to be around \$700,000.



Storms are increasing in frequency and intensity. Source: Lieske and Bornemann, 2012.

Erosion

Coastal erosion is increasing in severity around the province. The Northeast region is experiencing the highest erosion rates, followed by the Northumberland Strait, Chaleur Bay, and then the Fundy Coast. Port Elgin and the Northumberland Strait are no exception. Erosion can be mapped through aerial photographs, but sometimes it is also quite apparent to the naked eye in various places around the community, such as by the Main St. lift station in the photo below.



Erosion on the bank of the Gaspereau River below Main St. lift station. Photo: Anne Goodwin.

Changing Precipitation Patterns

More rain and snow are falling, but less often and in more severe events. An extreme rainfall event occurs when 50 mm or more rain falls over a 24-hour period. In recent years, many of these extreme precipitation events have cost millions of dollars in flooding damage to many communities in New Brunswick. Extreme snowstorms have closed major highways and left residents without power for a number of days.

Flood Scenarios

Flood scenarios are based on projected sea levels and storm events that may impact a given area. They are generally outlined in “likelihood” of the event occurring. For example, a 1 in 10 year storm event is likely to happen once every 10 years, or each year there is a 10% chance of it happening. A 1 in 100 (1:100) year storm event is a major event only projected to happen once in a century, or a 1% chance of happening every year. Flood scenarios are developed through scientific analysis by trained climatologists. Sea level flood scenarios we are using for Port Elgin are:

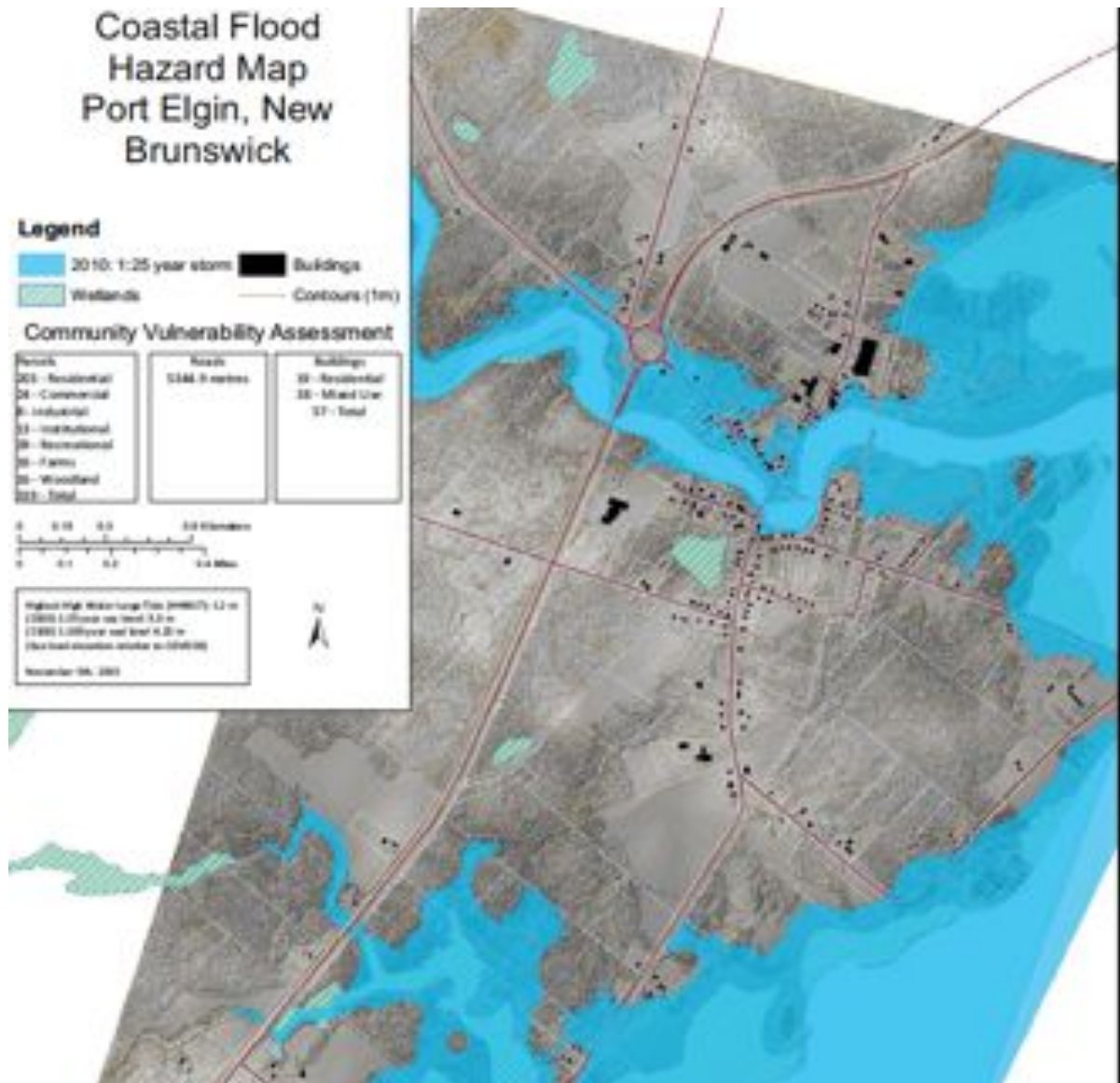
A current 1:25 storm

This storm was experienced by residents in 2010.

A 1:100 storm in the year 2100

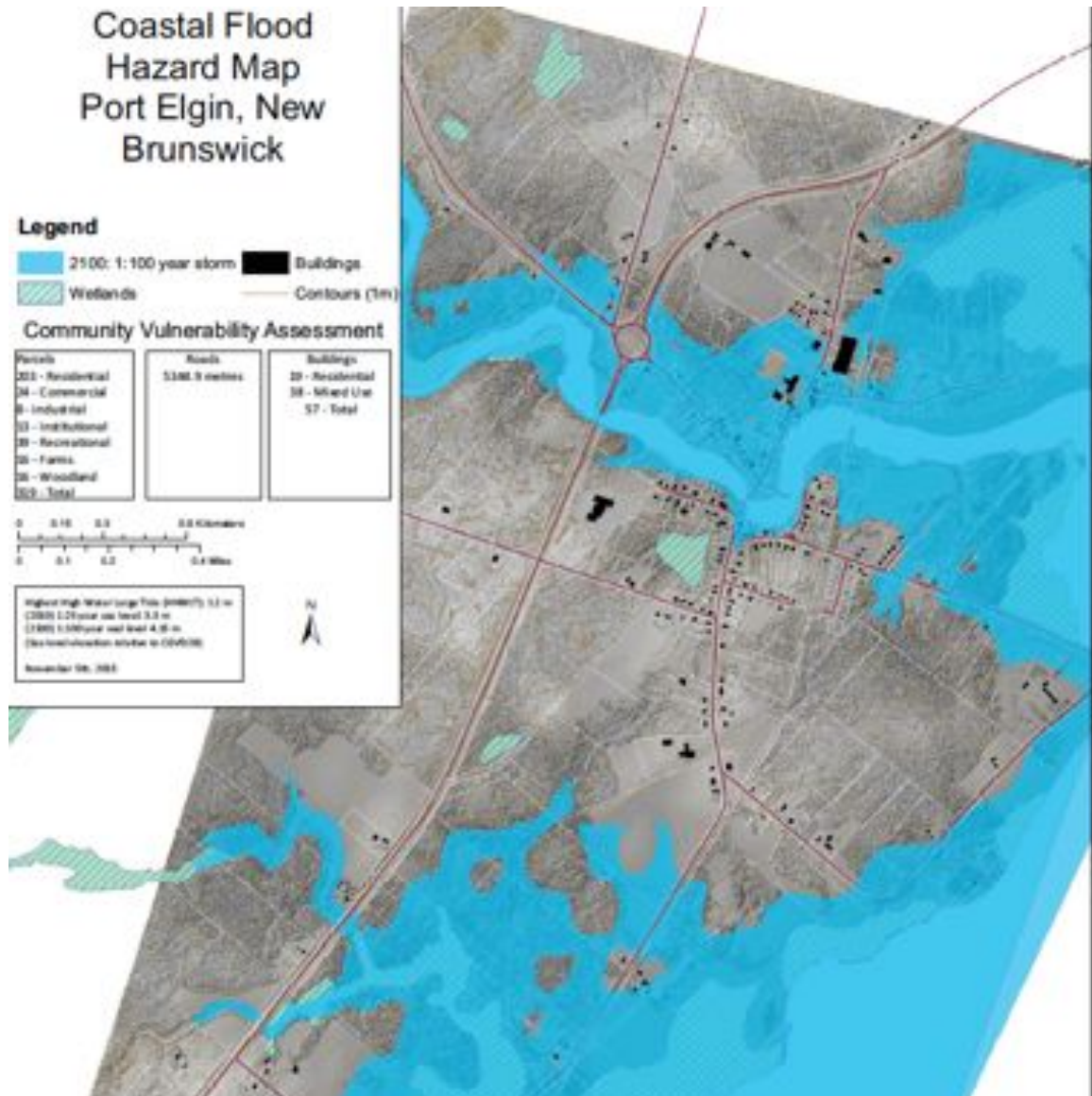
This is the projected “worst-case scenario” storm that could be experienced in that time period, based on scientific projections. The map below shows the possible flood extent (how far the water will reach) during each of these scenarios, and therefore which properties and buildings are most vulnerable to flood damage.

Current 1:25 Storm



Source: Cullen Mulroy, 2015 with Lidar data from 2011

1:100 Storm in 2100



Source: Cullen Mulroy, 2015 with Lidar data from 2011

Risk and Vulnerability Assessments

Climate change is and will continue to impact economic, social and environmental assets in Port Elgin. A number of initiatives, with public input,

have taken place over the last few years to assess local risks and vulnerabilities within municipal boundaries. These are summarized on the next pages.

Port Elgin Coastal Workshops 2010-2011

Three coastal issues workshops were organized in Port Elgin by the Tantrammar Planning District Commission (now the Southeast Regional Service Commission) from April 2010 to February 2011. These workshops took place around three damaging storm surges in the region (in January, October and December 2010). The first workshop involved guest speaker Gary Lines, a senior climatologist with Environment Canada, who spoke to local residents about the latest climate science including predictions for temperature, sea level rise and severe weather events. The second workshop featured Amanda Dean from the Insurance Bureau of Canada and Laurie Colette from the NB Department of Environment who spoke about policies and regulations related to coastline damage.

The third workshop focused on a community vulnerability assessment of Port Elgin to coastal challenges. Participants were asked to identify key coastal issues in Port Elgin and they used maps to identify key locations of impact. In addition, they assessed facilities (lagoon, three lifts stations, nursing home, school, fire department, village office, Main St. business district, wharf, hiking trails and the walking bridge) and the impacts they face from coastal issues as well as if they require repairs or upgrades. Cribwork was also noted to have eroded. A social assessment was also performed. It was concluded that those most affected by coastal issues are people in isolated areas of the town, seasonal cottages along the coast with access roads that are prone to flooding, and several homes in low-lying areas of Port Elgin. The main concerns are being cut off from transportation routes during storms and floods, and being able to receive financial aid for damaged property. In addition, social impacts include impacts to heritage resources such as Fort Gaspereau, human health impacts from a flooded sewage lagoon, as well as general stress and fear. Economic impacts may be felt if local businesses or industries sustain flood damage. The Main St. business district is susceptible to coastal flooding. Finally environmental issues were also discussed and the main issue was damage to the coast line from storm surge events, flooding of the lagoon and boil water orders. Participants felt these would happen more often in the future.

The priorities resulting from these sessions included:

- Storm surges
- Heavy rain

- Location of the lagoon
- Erosion

The adaptation options suggested from these sessions included:

- More government financial assistance
- Rezone and restrict building in certain areas identified as highly vulnerable
- Create regulations around building in sensitive areas
- Good baseline data and better monitoring of tide levels is needed
- Up to date digital elevation models are needed
- Sea level rise scenarios need to be run on digital models
- A radio communication system is needed in the region for EMO
- Expand municipal boundaries
- Address issue of the lagoon and its location on the edge of the river

November 2014 Preparing for Flooding in Tantramar Workshop

A public workshop was organized by EOS Eco-Energy and the Tantramar Climate Change Adaptation Collaborative (the Village of Port Elgin EMO is a member of the Collaborative) in November 2014 at the Marshlands Inn with funding from the New Brunswick Environmental Trust Fund. Eighty people were in attendance.



November 2014 workshop. Photo: Amanda Marlin

The workshop provided the public with information on the current state of the dykes, flood scenarios, and how to prepare for emergencies at home. The session concluded with a tour of the dykes. Some ideas suggested by participants at the session included:

- Have more events like this one and that more of the public need to hear the messages provided.
- Participants wanted to hear more details, more information about how to prepare, more on rescue methods, more on what community EMOs are planning.
- Some participants wanted to see sessions designed specifically for their neighborhoods and streets.
- Others wanted to see more federal government involvement and key decision makers.
- And others wanted to know why construction of new buildings is still allowed in flood plains.
- Have a bulk purchase of sump pumps and backflow valves.
- Weekly preparedness tips in the local paper.

June 2015 ACASA Coastal Adaptation Guidance Workshop

Port Elgin Village councillors, staff, EOS Eco-Energy, Southeast Regional Service Commission, NB Department of Environment and local residents met with researchers from ACASA (Atlantic Canada Adaptation Solutions Association) who were developing an on-line decision tree for small rural coastal communities in Atlantic Canada. The tool is designed to help communities identify different land use and engineering options to address coastal sea level rise and erosion issues. The workshop participants decided to focus on the issue of community-wide flooding and use the decision tool to come up with adaptation options. Participants also noted that there is a somewhat urgent (5-10 year) need for adapting to community-wide flooding. The results of this session included both land use plans and engineering adaptation options (ranked according to appropriateness):

Land Use Planning Adaptation Options (see definitions in Glossary)

1. Emergency preparedness (Port Elgin has an EMO plan)
2. Integrated community sustainability plan (Port Elgin has one already)
3. Green shoreline rating system
4. Management retreat/abandonment

5. Setbacks (included in Port Elgin's zoning by-law, but may need to be increased)
6. Abandonment
7. Land use bylaws or regulations (Port Elgin has a zoning by-law)
8. Development agreements
9. Statutory community plan (Port Elgin has a Municipal Plan)

Engineering Adaptation Options

1. Dyke
2. Living shoreline/wetlands
3. Relocate infrastructure
4. Rain gardens/constructed wetlands
5. Storm water management
6. Raised infrastructure
7. Wet flood proofing buildings
8. Dry flood proofing buildings
9. Drainage ditches



ACASA Workshop in Port Elgin, June 2015. Photo: Amanda Marlin

November 2015 Community Adaptation Viewer Workshop

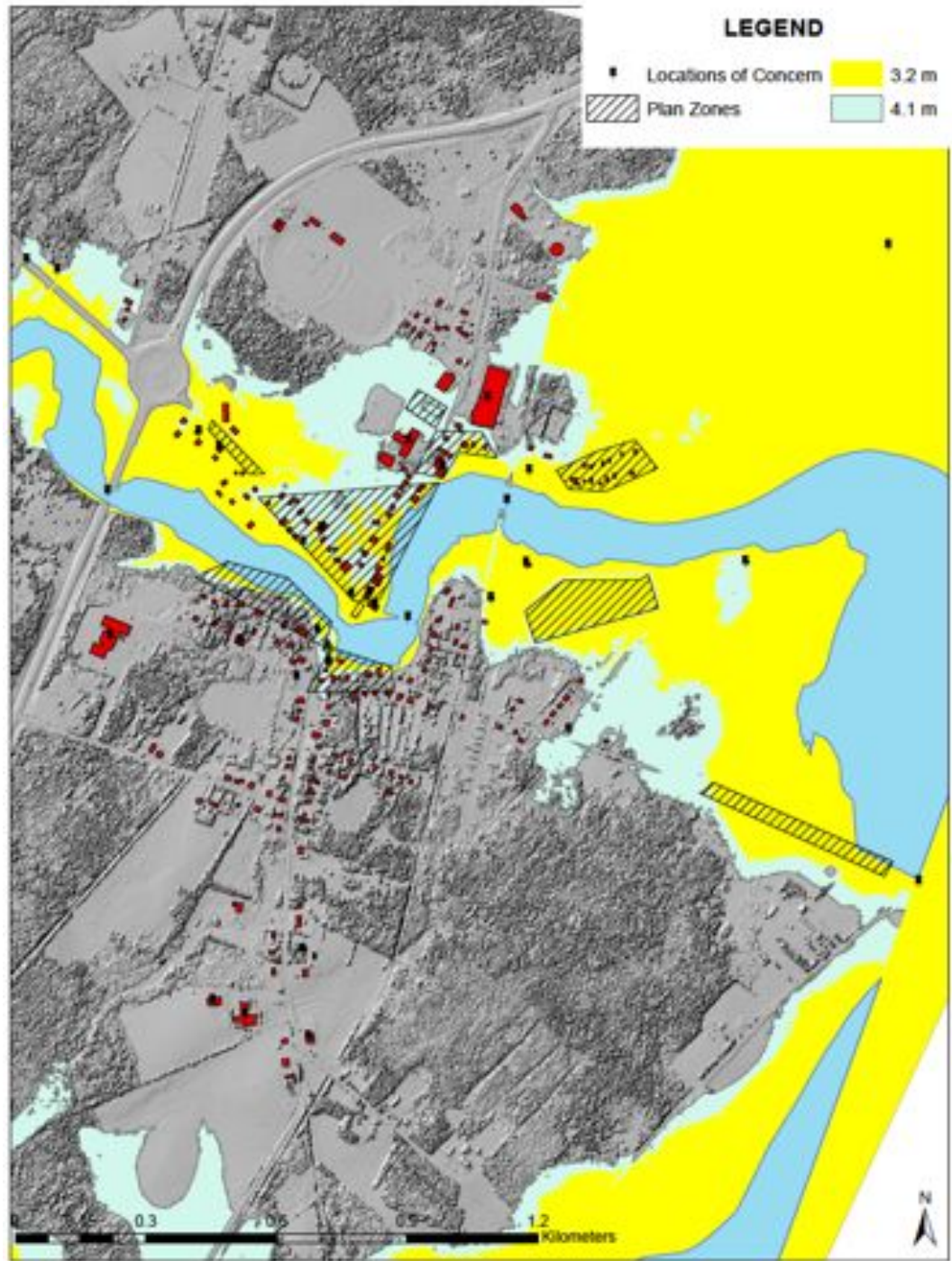
Taking all of this information into account, a public session to identify community vulnerability was held in November 2015. Organized by the Adaptation community, the session was facilitated by Mount Allison University student Cullen Mulroy and his supervisor Dr. David Lieske. The workshop took place at Pedvac with 10 people in attendance. Pizza and refreshments were served and participants began the evening by watching Ian Mauro's video "Climate Change in Atlantic Canada". Participants were then shown two sea level rise flood scenarios – a current 1:25 storm (as was experienced in 2010) and a 1:100 storm in the year 2100. At these flood levels participants could see what community assets would be affected and were asked to locate these on the GIS-based digital map. Information about each point was also entered to create an interactive map for future use. During the session, areas of erosion were identified, areas prone to coastal flooding were pinpointed, the lagoon was mentioned, and locations with vulnerable populations were also recorded.

Finally, results from the 2011 vulnerability assessment by the Tantramar Planning District Commission, as well as entries in the Picture Port Elgin sustainability plan were included in the map for a complete vulnerability assessment of the village. The Picture Port Elgin sustainability plan included related items such as:

- Develop a new hydrographic map and flood plain level
- Conduct a vulnerability assessment of buildings within floodplain
- Develop policies and regulations regarding development within floodplain
- Assess municipal lagoon for stability and adaptation options
- Increase the proportion of porous surfaces
- Encourage low impact developments such as rain gardens
- Assess culverts for capacity and flow
- Encourage landowners to remove cross-connections between storm and sanitary lines, and disconnect sump pumps and foundations drains from sewage systems
- Create new wetlands to accommodate storm water run off
- Begin research on expanding village boundaries to allow for a community retreat from coastal threats

All areas of concern were recorded on the GIS-based digital vulnerability map (see the next page).

Port Elgin Climate Change Vulnerability Map



Priority Areas

Taking into consideration results from the workshops, public input, and the Picture Port Elgin plan, the committee selected the following priority areas for the community-based climate change adaptation plan:

1. Sewage lagoon
2. Flooding of downtown area
3. Fire Station
4. Erosion
5. Magee House
6. Station Street area
7. Winter storms
8. Public education
9. Freshwater and culverts

Each of these priority areas are addressed further below with a series of action plans to address their vulnerabilities and reduce the associated risks.

Community-Based Adaptation Plan

Disclaimer: It is recommended that an engineer review the recommendations presented below to determine if they are feasible and to provide cost estimates.

Sewage Lagoon

Goal: Increased public health and safety, a cleaner river.

Activity: Build up the berm

| | |
|---------------------------|--|
| Description | Increase the height of the berm by 1 meter. Stabilize riverside of the lagoon. |
| Lead and Partners | Village council with NB Department of Environment and Local Government |
| Resources Required | Funding (possibly Provincial/Federal infrastructure) |

| | |
|------------------------------|----------------------------|
| | funding available) |
| Timeline | By 2021 |
| Indicators of Success | No breaches, a clean river |

Activity: Relocate the lagoon

| | |
|------------------------------|--|
| Description | Examine alternate locations for the lagoon at higher elevations. The Village owns land above the lagoon. Perhaps only part of it would need to be moved there. |
| Lead and Partners | Village Council with NB Departments of Environment and Health |
| Resources Required | Funding (perhaps Federal funds available) |
| Timeline | Research completed by 2021, implementation (move) by 2026 |
| Indicators of Success | No breaches, a clean river |

Activity: Green infrastructure to help stabilize ground by sewage lagoon

| | |
|------------------------------|---|
| Description | Plant trees, grasses, etc. by path along riverside of lagoon. |
| Lead and Partners | Village council with Ducks Unlimited and Community Forests International |
| Resources Required | Funding or perhaps in-kind support from DUC and CFI |
| Timeline | By 2021 |
| Indicators of Success | A more stable shoreline (currently trees along the bank are falling into the river) |

Activity: Engineering analysis of lagoon

| | |
|---------------------------|--|
| Description | A professional analysis of the lagoon is recommended to identify further options, solutions and costs. |
| Lead and Partners | Village to seek and hire an engineer |
| Resources Required | Funding |
| Timeline | 2017 |

| | |
|------------------------------|----------------------------------|
| Indicators of Success | A report with monetary estimates |
|------------------------------|----------------------------------|

Downtown Area

Goal: Adapt to flood risk in the downtown business area, reduce risks and potential damage to property.

Activity: Wet proofing buildings

| | |
|------------------------------|--|
| Description | Wet proof buildings located in the downtown business area within the flood zone by: (1) having a plan to sandbag buildings before storms (including having sandbags stockpiled in the Village), (2) encourage the installation of backflow valves, and (3) sump pumps. |
| Lead and Partners | Port Elgin EMO, EOS Eco-Energy and property owners |
| Resources Required | Funding |
| Timeline | 2016-ongoing |
| Indicators of Success | Number of buildings protected with sump pumps, backflow valves and sandbags |

Activity: Awareness program for downtown business area

| | |
|------------------------------|---|
| Description | Education is needed on how to prevent flood related damages. Information to be shared about the new flood risk maps, benefits of sump pumps and backflow valves, as well as having a 72 Hour emergency kit. |
| Lead and Partners | EOS Eco-Energy and the Village |
| Resources Required | Funding for EOS staff time |
| Timeline | Ongoing |
| Indicators of Success | A more aware business community taking steps to protect their properties |

Fire Station

Goal: A suitable location for the fire department that allows connectivity to the rest of the community and first response during flood events and other emergencies.

Activity: Determine elevation of chosen site for Fire Station

| | |
|------------------------------|---|
| Description | The current potential site for the new fire station is within the flood risk area. The elevation is needed to determine design options. |
| Lead and Partners | Village and Southeast Regional Service Commission |
| Resources Required | Staff time at SERC |
| Timeline | Early 2016 |
| Indicators of Success | Elevation determined |

Activity: If need be, identify alternative locations for the Fire Station

| | |
|------------------------------|--|
| Description | It is crucial that the fire station (as first responders) be situated in a location that allows connectivity to the rest of the community during emergencies, especially floods. Alternative locations need higher elevations. |
| Lead and Partners | Village, Fire Department and Port Elgin EMO |
| Resources Required | Council and staff and volunteer time |
| Timeline | By late 2016 |
| Indicators of Success | A new location for the fire station |

Erosion along Gaspereau River's edge

Goal: Stop erosion along the riverbanks.

Activity: Installation of crib work along Gaspereau River

| | |
|--------------------|--|
| Description | Crib work has eroded in many places along the river's edge and need to be replaced. Riprap and |
|--------------------|--|

| | |
|------------------------------|--|
| | boulder rock are also needed in places to stabilize the river banks. |
| Lead and Partners | Village with Federal/Provincial funding partners and property owners |
| Resources Required | Funding |
| Timeline | 2017 and ongoing |
| Indicators of Success | Stable riverbank |

Activity: Investigate funding sources for erosion work

| | |
|------------------------------|--|
| Description | Funding sources need to be found to support the erosion work including cribwork and engineering analysis, etc. |
| Lead and Partners | Village |
| Resources Required | Funding |
| Timeline | Ongoing |
| Indicators of Success | Amount of financial resources found/secured. |

Activity: Engineering analysis of erosion

| | |
|------------------------------|--|
| Description | A professional analysis of the erosion problem is needed, including rate of erosion and best mitigation options. |
| Lead and Partners | Village to seek and hire an engineer |
| Resources Required | Funding |
| Timeline | 2017 |
| Indicators of Success | A report with monetary estimates |

Activity: Fix erosion by Main St. lift station

| | |
|---------------------------|---|
| Description | This area is a priority for crib work as previous crib work is gone and erosion is further affecting the ground by the lift station. Work will need to be done to cost the crib work and backfill needed. |
| Lead and Partners | Village |
| Resources Required | Funding |

| | |
|------------------------------|--|
| Timeline | By 2019 |
| Indicators of Success | Stabilized land by the lift station, no more erosion |

Activity: Living shorelines

| | |
|------------------------------|--|
| Description | Where there is space, plant natural grasses to prevent erosion and stabilize the riverbanks. |
| Lead and Partners | Village with Community Forests International and Ducks Unlimited Canada |
| Resources Required | Funding |
| Timeline | Ongoing |
| Indicators of Success | Decreased erosion |

Magee House

Goal: Magee House, owned by the NB government, is home to seniors and is located within the flood risk area. The goal is to ensure the safety of the residents, who have mobility challenges.

Activity: Inform New Brunswick Government about climate risks

| | |
|------------------------------|--|
| Description | Awareness is needed about the vulnerable location of Magee House and the risk storm surge impacts |
| Lead and Partners | EOS Eco-Energy in partnership with the Village |
| Resources Required | Meeting time |
| Timeline | 2016 |
| Indicators of Success | The province is aware and has a plan to deal with the flood risk and safety of Magee House residents |

Station Street Area

Goal: Station Street is the most vulnerable street in Port Elgin to impacts of flooding. The goal is to increase public safety and protection of property.

Activity: Zoning regulations for Station Street

| | |
|--------------------|--|
| Description | New zoning regulations need to be implemented that |
|--------------------|--|

| | |
|------------------------------|--|
| | prevent new buildings from being constructed in the Station Street flood risk area without some adaptation considerations. |
| Lead and Partners | Village and Southeast Regional Service Commission (SERSC) |
| Resources Required | Time by Village council and SERSC staff |
| Timeline | 2016-2017 |
| Indicators of Success | New zoning regulations approved/adopted by Village Council |

Activity: Relocation of buildings from Station Street

| | |
|------------------------------|--|
| Description | Over the long-term buildings and homes in this area may need to be relocated to less vulnerable sites. |
| Lead and Partners | Village with Federal and/or Provincial funding partners |
| Resources Required | Funding |
| Timeline | Long-term |
| Indicators of Success | Buildings moved to safer locations. |

Winter Storms

Goal: Storms, including those in the winter, will be increasing in intensity and frequency. The goal is to ensure public safety during winter storms.

Activity: Wood heat inventory

| | |
|------------------------------|--|
| Description | An inventory of homes heated with wood is being developed so that the EMO knows who has heat in the community during power outages due to winter storms. |
| Lead and Partners | Port Elgin EMO |
| Resources Required | EMO volunteer time |
| Timeline | Ongoing |
| Indicators of Success | A complete inventory that is updated regularly. People opening their homes to others to stay warm. |

Activity: Emergency preparedness for winter storms

| | |
|------------------------------|---|
| Description | Port Elgin’s emergency plans needs to be updated to include specific measures for winter storms, including power outages and stranded residents due to road closures from extreme snowfall. |
| Lead and Partners | Port Elgin EMO |
| Resources Required | EMO Volunteer time |
| Timeline | 2016 |
| Indicators of Success | Complete emergency preparedness plan for winter storms |

Freshwater Flooding

Goal: To limit damage to property and roads from freshwater flooding

Activity: Culvert assessment

| | |
|------------------------------|---|
| Description | A professional engineer is required to assess the size and condition of culverts in Port Elgin for adequate flow. |
| Lead and Partners | Village and engineer |
| Resources Required | Funding |
| Timeline | 2018 |
| Indicators of Success | Report outlining assessment of all culverts within village boundary |

Activity: Build and restore wetlands within village limits

| | |
|---------------------------|---|
| Description | Wetlands can limit freshwater flooding. More wetlands are recommended in Port Elgin to help manage storm water run off. |
| Lead and Partners | Village in partnership with Ducks Unlimited Canada |
| Resources Required | Funding |
| Timeline | 2018-ongoing |

| | |
|------------------------------|--|
| Indicators of Success | Wetlands on the ground working to limit freshwater water flooding. |
|------------------------------|--|

Public Education

Goal: Better prepared community when floods or other emergencies strike. Increased self-reliance during emergencies. Decreased reliance on the Village and its resources during flood and winter storm emergencies. Better protected properties and safer, more resilient community.

Activity: Bulk Purchase of Red Cross 72 Hour Emergency Kits

| | |
|------------------------------|--|
| Description | Conduct a bulk purchase of Red Cross 72 Hour Emergency Kits in order to educate the public about the importance of being prepared and to help reduce the cost of the kits. |
| Lead and Partners | EOS Eco-Energy |
| Resources Required | EOS received funding from the NB Environmental Trust Fund to offer this project. |
| Timeline | The first bulk purchase was completed in September 2015. |
| Indicators of Success | 115 Red Cross 72 Hour Emergency Kits were purchased though EOS's bulk program. |

Activity: Sump Pump and Backflow Valve Bulk Purchases

| | |
|------------------------------|---|
| Description | A bulk purchase and installation of sump pumps and backflow valves would help to educate the public about the importance of these devises for flood protection and to help reduce the cost. |
| Lead and Partners | EOS Eco-Energy |
| Resources Required | EOS has received funding from the NB Environmental Trust Fund to conduct a bulk purchase. |
| Timeline | The bulk purchase of backflow valves will be offered winter 2016. A sump pump bulk purchase will be offered in the future. |
| Indicators of Success | Installation of sump pumps and backflow valves. |

Activity: Continuous Public Education

| | |
|------------------------------|---|
| Description | As a way of mainstreaming adaptation into everyday decision-making ongoing education and awareness-raising on climate change impacts and adaptation is required. Tips in the local paper, information booths, mail-outs, news articles, workshops, etc are all useful to keep climate change top of mind in Port Elgin. |
| Lead and Partners | Village of Port Elgin and EOS Eco-Energy |
| Resources Required | Funding and staff time |
| Timeline | Ongoing |
| Indicators of Success | A more resilient, safe and adaptable community |

Summary of Recommended Actions

| Timeline | Actions |
|-------------------|--|
| Ongoing | <ul style="list-style-type: none"> • Wet proofing in the downtown area (sump pumps, backflow valves, sandbags, etc.) • Awareness and education program on climate change adaptation and emergency preparedness (workshops; bulk purchases of emergency kits, sump pumps; etc.) • Investigate funding sources for erosion work along the Gaspereau River • Where there is space, plant natural grasses to limit erosion along Gaspereau River • Wood heat inventory (for winter storms) |
| Short (2016-2017) | <ul style="list-style-type: none"> • Engineering analysis of lagoon • Determine elevation of selected location for fire station • If need be, determine alternate locations for fire station • Installation of cribwork along Gaspereau River (start in 2017 and continuing) • Engineering analysis of erosion • Inform New Brunswick government about climate related risks for Magee House • Update zoning regulations for Main Street to include adaptation considerations • Update EMO plan to include specific measures for winter storms |

| | |
|--------------------|--|
| Medium (2018-2021) | <ul style="list-style-type: none"> • Build up the berm around the sewage lagoon • Complete research to move the sewage lagoon • Plant trees, grasses, etc. along path by riverside of lagoon • Fix erosion by Main St. lift station • Culvert assessment by professional engineer • Build and restore wetlands within the village (start in 2018 and continuing) |
| Long (beyond 2021) | <ul style="list-style-type: none"> • Sewage lagoon moved to a safer location with higher elevation • Relocation of buildings from Station Street to less vulnerable location |

Implementation and Monitoring

The Village of Port Elgin council and staff will be responsible for implementing the adaptation plan and meeting their goals according to the timelines in the plan. Progress will be monitored regularly and communicated to the public through a variety of means, such as the local paper, community meetings, and social media. Progress will be ensured due to the creation of a climate change adaptation implementation committee. The committee will meet once a year to monitor progress, take steps to ensure implementation of the plan continues, and report to Port Elgin Village Council. Members of the committee will include:

- Village representative
- EMO coordinator
- SERSC representative
- EOS Eco-Energy representative
- Community member

Glossary

Abandonment refers to leaving an area that has become too vulnerable to flood and/or erosion risks.

Adaptation describes how we adjust to future climate conditions. Adaptation involves making adjustments in our decisions, activities, and thinking, because of projected changes in climate. Making these adjustments will help decrease the negative effects of the changing climate, and allow us to take advantage of any new and favourable opportunities.

Climate change adaptation plan is a community plan that examines local climate change impacts, flood risk scenarios, risks and vulnerabilities to climate-related impacts, and outlines an action plan with adaptation options including lead, partners, resources needed, timelines and goals.

Constructed wetlands are manmade wetlands or restored wetlands.

Development agreements are contracts between two parties establishing an agreement concerning development of a parcel of land.

Emergency preparedness is the creation of plans through which communities reduce vulnerability to hazards and cope with disasters.

Dry flood proofing buildings involves making the structure watertight by sealing the walls with waterproof coatings, impermeable membranes, or a supplemental layer of masonry or concrete

Dyke is a long wall or embankment built to prevent flooding from the sea.

Flood scenarios are based on projected sea levels and storm events that may impact a given area. They are generally outlined in “likelihood” of the event occurring. For example, a 1 in 10 year storm event is likely to happen once every 10 years, or each year there is a 10% chance of it happening.

Green/living shorelines use vegetation and natural materials to reduce negative impacts on nearshore habitat for plants, fish, and wildlife while protecting property.

Integrated community sustainability plan is a long-term plan, developed in consultation with community members, to help the community realize sustainability objectives within environmental, cultural, social and economic dimensions.

Land use bylaws regulate and control the use and development of all land and buildings within the municipal boundaries.

Maladaptation is a course of action that is more harmful than helpful as it results in more problems it was intended to prevent.

Managed retreat allows an area that was not previously exposed to flooding by the sea to become flooded by removing coastal protection.

Rain gardens are planted with native plants and grasses and allow runoff to be absorbed into the ground slowly and naturally; they limit flooding and are a natural storm water management option.

Raised infrastructure refers to increasing the height the buildings and other infrastructure to decrease impacts from flooding.

Setbacks are rules to ensure buildings are set back from roads, rivers, wetlands, coastal areas, etc. for safety and environmental reasons.

Statutory community plan in New Brunswick is a Municipal or Rural Plan developed under the Community Planning Act.

Storm water management involves techniques used to reduce pollutants from, detain, retain, or provide a discharge point for storm water to best preserve or mimic the natural hydrologic cycle, to accomplish goals of reducing combined sewer overflows or basement sewer backups, or to fit within the capacity of existing infrastructure.

Wet flood proofing buildings involves making a series of modifications to a structure to allow an enclosed area to flood. Allowing the building to flood reduces the risk of damage to the structure. It can also involve placing electrical utilities above the flood level as well as appliances, important documents, etc. so that what remains can withstand a flood.

Appendix – Public Engagement Materials

How can municipalities adapt to climate change?

- Infrastructure upgrades and storm water management, reduce hard surfaces, plant vegetation
- Relocate buildings and community assets to higher ground, out of flood zones, away from the coast
- Land use planning and policies (set backs, update building codes, re-zoning flood zones, etc.)

How can you adapt to climate change?

- Have a 72 hr emergency kit and family flood plan
- Use natural approaches to address erosion such as Living Shorelines
- Reduce hard surfaces, plant vegetation
- Install backwater valves to reduce the risk of sewer backup in your home
- Install a sump pump with battery backup
- Move important items, electrical appliances and hazardous materials to higher ground and out of the basement
- Use a rain barrel
- Plant a rain garden (to help absorb storm water naturally with native plants)
- Fix cracks in foundations.

How is Port Elgin adapting to climate change?

The Village of Port Elgin, working with EOS Eco-Energy, is developing a climate change adaptation plan. Public engagement sessions are planned to gather important community input. If you have any questions or would like to contribute to the plan, please contact EOS or visit the Picture Port Elgin Facebook Page. EOS received NB Environmental Trust Fund funding for this project.



For more information on climate change adaptation:

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Sackville, NB E4L 1G6
eos@nb.eos.com 506.536.4487
eoscoenergy.com

Climate Change & Port Elgin

What is the impact?

How can we adapt?



What is climate change?

Climate is the average weather pattern over many years while weather is short-term. Climate dictates what parts of the planet tend to be warmer, colder, wetter, drier, and how often we see extreme weather events such as hurricanes. Global temperatures are rising which will lead to more severe climate changes in the future.



What is climate change adaptation?

Climate change adaptation describes how we adjust to future climate conditions. Adaptation involves making adjustments in our decisions, activities, and thinking, because of changes in climate.

How is climate change affecting Port Elgin?

Rising Sea Levels

The ocean has been rising over the past 100 years. In Saint John sea level has risen by 24cm since 1920. It is now predicted to rise about 1m by 2100 around New Brunswick. Sea level rise is partly due to natural sinking of the land. Melting of the ice caps and glaciers, as well as the expansion of seawater due to heating, adds to a higher and faster rise in sea levels.



More Severe Storm Surges More Often

In the last decade several serious storm events occurred in the region. Storm surges often accompany these events and can cause considerable damage. In 2010 two major storm surges hit Port Elgin with extensive damage estimated to be around \$900,000.

Changing Coastal Erosion Rates

Coastal erosion is increasing in severity around the province. The Northeast region is experiencing the highest erosion rates, followed by the Northumberland Strait, Chaleur Bay, and then the Fundy Coast.



Changing Precipitation Patterns

More rain and snow are falling, but less often and in more severe events. An extreme rainfall event occurs when 50 mm or more rain falls over a 24-hour period. In recent years, many of these extreme precipitation events have cost millions of dollars in flooding damage to many communities in New Brunswick. Extreme snow storms have closed major highways and left residents without power for a number of days.

Mapping Port Elgin's Climate Change Risks

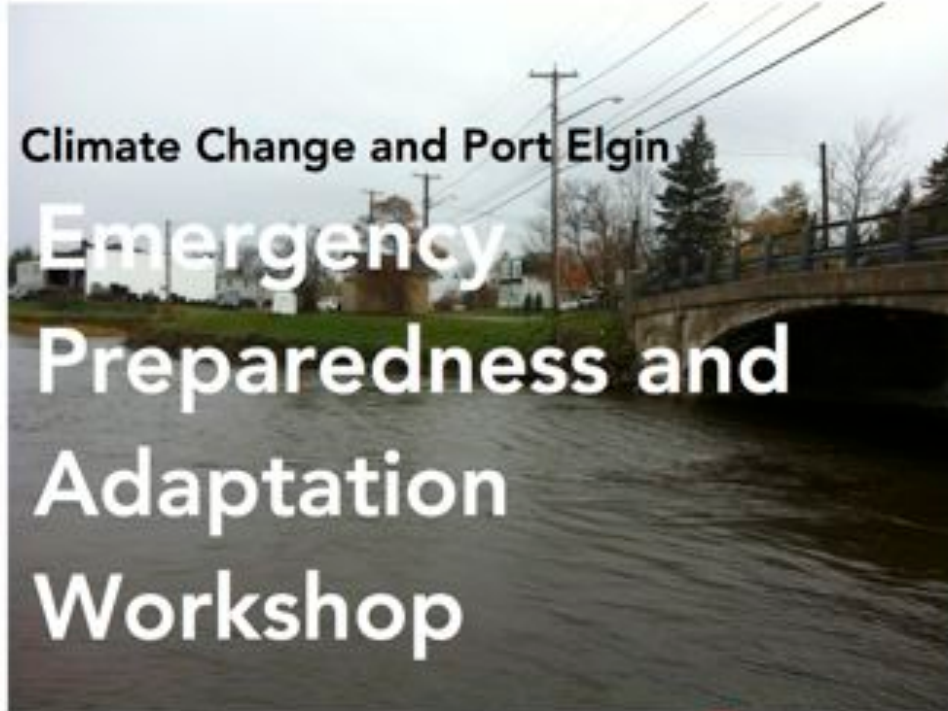


NEW DATE Wed., Nov. 18, 2015
7-9pm
Pedvac, 12 Church St.
Free refreshments!
Everyone welcome!

Learn more about climate change in Port Elgin. Share stories, bring photos, learn about adaptation.

For info: EOS Eco-Energy
536-4487 – eos@nb.aibn.com





Monday, February 1st, 2016

(Storm date: Friday, February 5th, 2016)

6:30pm-8:30pm

PEDVAC, 12 Church St. Port Elgin

Special Guest: Mike Johnson, Cumberland
Emergency Measures Organization



Win a **FREE Red Cross 72
hr Emergency Kit!!**

Learn how to prepare for emergencies.

Contribute to Port Elgin's climate change adaptation plan.

Pizza and refreshments! Free! Everyone welcome!

For info contact: EOS Eco-Energy at 536-4487 or eos@nb.aibn.com

