



# **Climate Change Adaptation Plan**

## **Dorchester, New Brunswick**

Prepared by EOS Eco-Energy Inc.  
Approved by Dorchester Municipal Council on  
March 20, 2017



Cover photo credit: Sara Boyce, Dorchester

March 2017

EOS Eco-Energy

P.O. Box 6001

131D Main Street

Sackville, NB E4L 1G6

[www.eosecoenergy.com](http://www.eosecoenergy.com)



This project was funded by:



## Disclaimer

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## Acknowledgements

EOS Eco-Energy wishes to acknowledge the New Brunswick Environmental Trust Fund, which funded this climate change adaptation plan. We are also grateful for the contributions made by Dr. Paul Arp (wet areas mapping), Dr. David Lieske and Laura Penney (community risk and vulnerability mapping workshop), Fort Folly First Nation (meeting space), as well as those on the Dorchester climate change adaptation committee and members of the public who contributed to the plan.

## Climate Change Adaptation Committee

Sam Malenfant-Edgett	Treasurer	Village of Dorchester
Benjamin Edgett	Councillor	Village of Dorchester
Bob Hickman	Deputy Mayor	Village of Dorchester
Wayne Feindel	Councillor	Village of Dorchester
Greg Partridge	Fire Chief	Dorchester Fire Dept.
Sara Boyce	Fire department volunteer	Dorchester Cape
Tina Milner	Administrator	Fort Folly First Nation
Amanda Marlin	Executive Director	EOS Eco-Energy Inc.
Tracey Wade	Planner	Southeast Regional Service Commission

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## Introduction

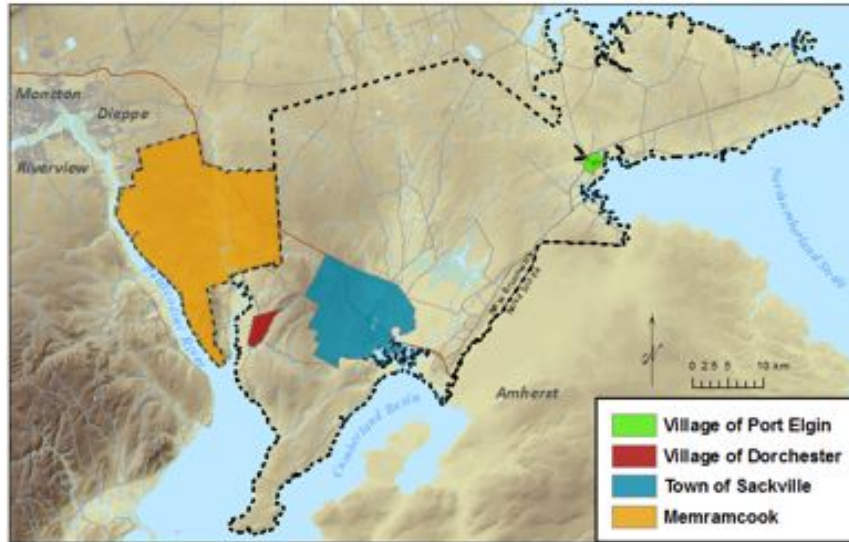
Dorchester, New Brunswick, is located at the head of the Bay of Fundy in southeast New Brunswick. The Dorchester area is one of the most vulnerable regions in the province to climate change impacts. A number of intense storms have impacted the community in recent years, leading to freshwater flooding and multiple routes in and out of the area being cut off. Most notably, there was a flood in spring 2014, which cut off Route 106 between Dorchester and Memramcook for about three months. This caused school students to take a 45 minute bus ride via Memramcook and Sackville in order to get back to the other side of Dorchester (which would normally take 5 minutes). Many residents were cut off from medical care, groceries and other important services. In addition, in January 2017 there was a severe ice storm, which left over 130,000 customers without power across the province, including the Dorchester area. The school was closed for three days and people were left without power for about three days. The sparsely populated area was not a high priority leaving the community to rely on its own self-sufficiency.

Due to these vulnerabilities, the Village of Dorchester has taken a series of actions to adapt to climate-related changes including planting rain gardens in partnership with EOS Eco-Energy, parking a fire truck on the other side of the village in advance of stormy weather and flood risk, and meeting with their local member of the legislative assembly (MLA), especially to deal with the flood concerns in spring 2014. The village is also in the process of creating an emergency measures committee and updating their municipal emergency measures plan.

Furthermore, the Village of Dorchester took part in regional sustainability planning and uses the *Tantramar 2040* plan as its sustainability plan. Dorchester is also 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 and future activities 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

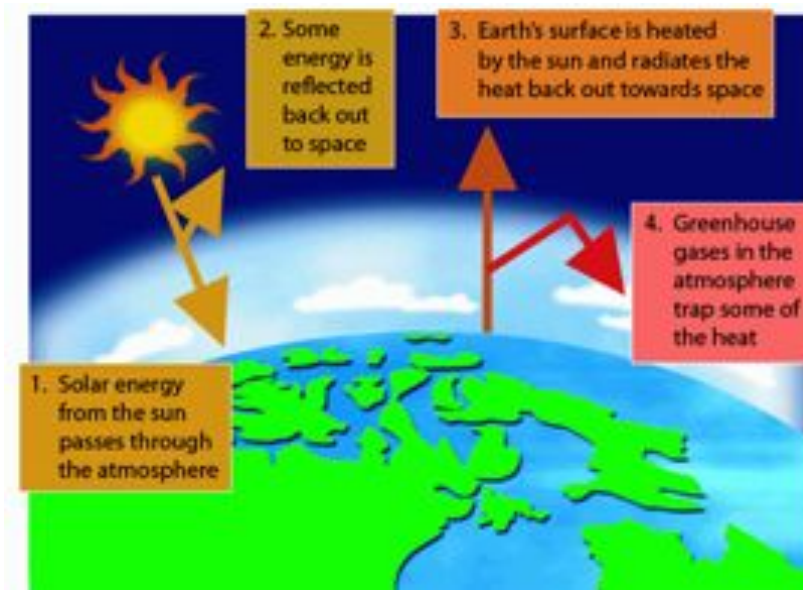
impacts, flood scenarios, a vulnerability assessment, and the adaptation plan organized by priority area.



Map of the Tantramar Region, including Dorchester, 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 prone areas.
- Having a storm emergency kit and evacuation plan.
- Relocating houses from at-risk areas over time.
- Maintaining natural buffers to flooding (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 piecemeal placement of rip rap will erode the surrounding properties that do not have it and actually increase a community's vulnerability to climate change and often result in increased economic costs.

## Our Community

The Village of Dorchester is home to approximately 1000 people but many more live in the unincorporated areas of Upper Dorchester, Dorchester Cape, Johnson's Mills, Middleton, Frosty Hollow and Fort Folly First Nation. The village has a municipal office and fire station, library, convenience store, kindergarten to grade 8 school, churches, two museums, and the Dorchester Penitentiary (a minimum and medium security federal penitentiary). The village does not have a grocery store, hardware store, or any medical facilities but one fire truck does have some medical supplies and equipment. There is a gas station nearby in Fort Folly First Nation, but it is located on a road across a brook which has flooded in the past cutting it off from the village for a time. Fort Folly uses Dorchester's municipal water and sewer system. There are a number of elderly people and people on dialysis in the Dorchester area.



## Methodology

### Planning Committee

A planning committee was formed which includes representatives from EOS Eco-Energy, the Southeast Regional Service Commission, Village staff and council and the local community, including Fort Folly First Nation. The committee met 5 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 at the Dorchester Lions Club Breakfast and mail out brochures.

### Public Engagement

Public engagement was an important part of the planning process. Information was provided on Facebook, Twitter, local information booths, workshops, brochures, etc. (see Appendix). A pamphlet about climate change impacts and adaptation was developed and mailed to all 425 households in the greater Dorchester area. Copies of the pamphlet were also given out at the public information booths and left at the Post Office. Input and feedback were sought through public workshops. EOS Eco-Energy staff also welcomed comments via Facebook, emails, telephone calls and at information booths, such as during the 2016 Sandpiper Festival and at the Dorchester Lions Club breakfast in November 2016. At this event the public was asked who is vulnerable to



flooding and climate impacts, what is at risk, and how might the community adapt.

Finally the public was invited to participate in a vulnerability mapping exercise at the Fort Folly First Nation band office on November 24, 2016 (see photo below). At this session Dr. David Lieske and GIS student Laura Penney presented an interactive map of the Dorchester area with coastal flood risk scenarios. With different flood levels, participants could see who and what would be impacted. The session looked at coastal flooding, freshwater flood impacts, winter storms, and more.



*Public vulnerability mapping session, November 2016. Photo: Amanda Marlin*

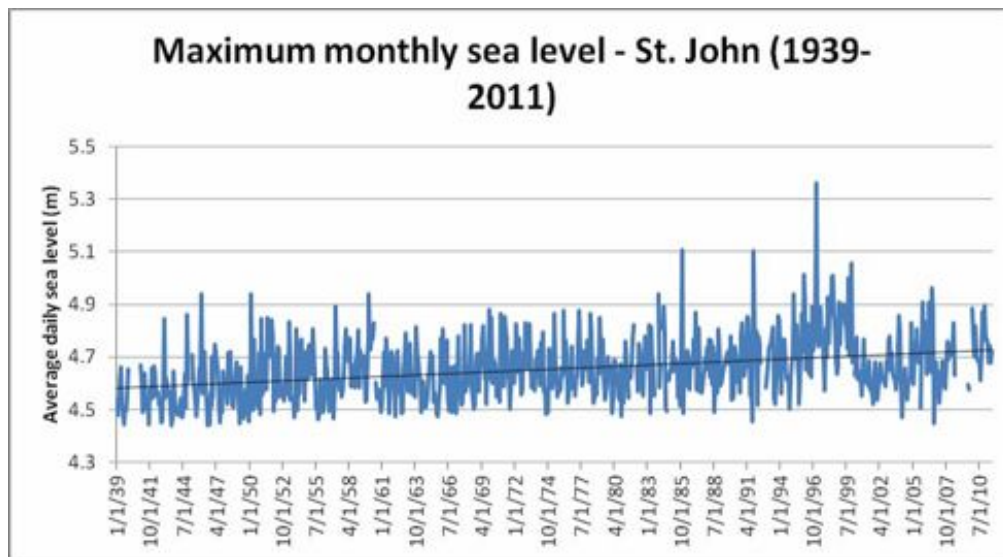
## **Adaptation Vision**

*“Dorchester, New Brunswick is a community resilient to climate impacts.”*

# Climate Change Impacts

## Sea Level Rise

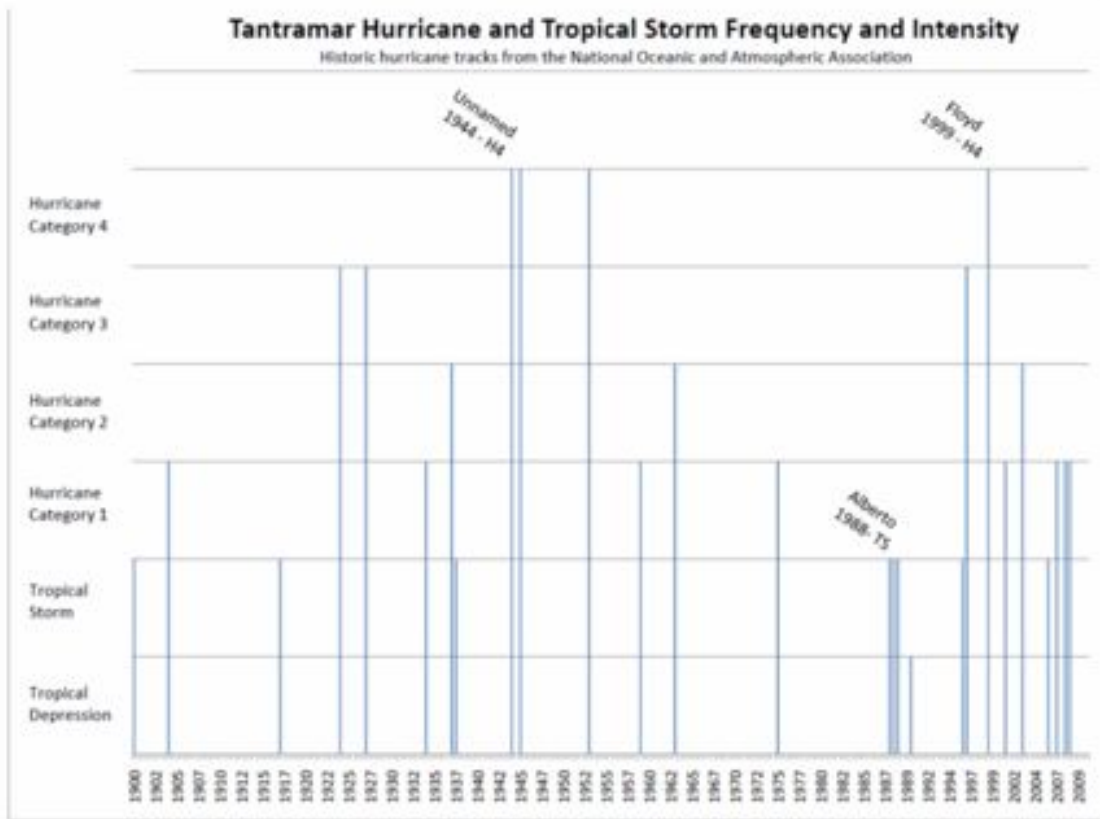
The ocean has been rising over the past 100 years. For example, in Saint John, the sea level has risen by 24 cm since 1920. It is now predicted to rise approximately 1 metre between 2010 and 2100 around New Brunswick. Sea level rise is partly due to natural sinking of the land. Melting of the ice caps 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. Dorchester's sewage lagoon is at risk of being impacted by a storm surge. Luckily the built up area of the Village of Dorchester and many of the houses in the outlying areas are not at risk of coastal flooding – but many roads in and out of the community and surrounding areas could be impacted by coastal flooding.



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

### 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. Routes in Dorchester have been cut off for days and weeks at a time. Roads have been eroded and damaged due to floodwaters. Basements have been flooded. Extreme snowstorms and ice storms have closed major highways and left residents without power for a number of days.



Water floods road in Dorchester Cape. Photo: Sara Boyce

## Coastal Flood Scenarios

As mentioned earlier, the built up area of the Village of Dorchester and many of the houses in the outlying areas are not at risk of coastal flooding, but many roads in and out of the community and surrounding areas could be impacted by coastal flooding. Coastal 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. Coastal storm surge flood scenarios we used in Dorchester are:

### **A current 1:25 storm**

This storm has a 4% chance of happening every year. It was experienced by residents of Port Elgin, NB in 2010. For Dorchester it represents a 7.9m storm surge.

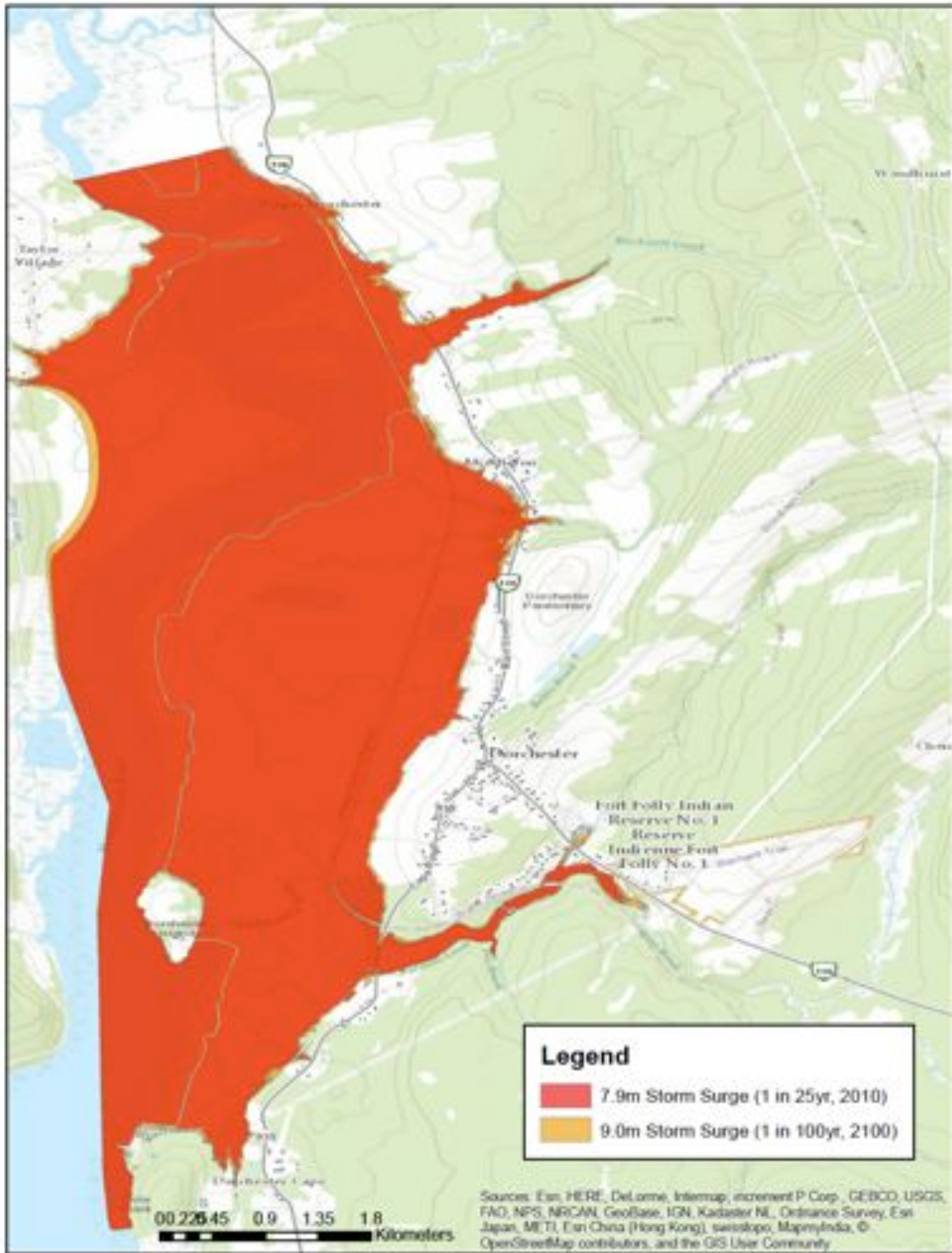
### **A 1:100 storm in the year 2100**

This is the projected “worst-case scenario” storm that could be experienced in that time period, based on scientific projections. It represents a 9.0m storm surge.

The map on the next page shows the possible flood extent (how far the water will reach) during each of these scenarios, and therefore which roads, properties and buildings are most vulnerable to coastal flood damage.

\*\*Note that freshwater flood scenarios are not available at this time.

### Flood Risk Map for Dorchester and Surrounding Area



Source: Dr. David Liekse and Laura Penney, MTA with Lidar data from 2011

## Public Engagement

Climate change is and will continue to impact economic, social and environmental assets in Dorchester. A number of public engagement initiatives have taken place to gain input into adaptation options for Dorchester and to assess local risks and vulnerabilities within its municipal boundaries. These are summarized on the next pages.

### Tantramar 2040

Dorchester uses the regional sustainability plan, *Tantramar 2040*, as its sustainability plan. It was developed in 2011. Elements of *Tantramar 2040* were considered during the development of the community's adaptation plan. Some of the pertinent actions relating to adaptation from the plan include:

- Re-establish a watershed committee to address common concerns of the water resources in Tantramar.
- Bulk purchase rain barrels to encourage water conservation and to help manage storm water.
- In municipal parks, require planting of native grass and flowers (less need to water).
- Implement water metering to encourage water conservation within municipalities.
- Map water quality data; model future potential changes.
- Protect buffer zones / restore water management to natural systems
- Work with economic development groups to promote green communities, low impact developments.
- Strike a regional committee to monitor developments and identify best options for climate adaptation in Tantramar.
- Identify location and size of culverts in communities and in rural areas. Create a map (as per Memramcook project).
- Assess condition of all protective structures (e.g., dykes) and prioritize their importance and assign value to their protection, repair or replacement.
- Assess function of culverts - clear where necessary. Where replacement is necessary, consider climate impacts and increase dimensions of culvert as appropriate.
- Use results of Regional Adaptation Collaborative projects to create local policies for development, storm water management and conservation areas.
- Work with local communities to determine vulnerability of local coastline, using historic information, local knowledge, climate science, and sea level rise projections as appropriate.
- Work with communities to develop an understanding of the need to adapt to changes in our climate. The method of communication will be a key factor in

our ability to work collaboratively as we begin to move forward with adaptation initiatives along the coast.

### **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.

### **November 2016 Dorchester and Area Risk and Vulnerability Workshop**

Taking all of this information into account, a public session to identify community vulnerability was held in November 2016. Organized by the Dorchester adaptation planning committee, the session was facilitated by Mount Allison University student Laura Penney and her supervisor Dr. David Lieske. The workshop took place at the Fort Folly First Nation Band Council Office with 12 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 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 by the planning committee. During the session, areas prone to coastal flooding were pinpointed, including the sewage lagoon, and locations with vulnerable populations (such as the school, prison, Shiretown Manor and people living with dialysis) and were also recorded. The safest (highest) routes out of the area were also identified. Although the map portrayed coastal flooding, participants also identified areas impacted by freshwater flooding because they have lived through this in recent years.

The risks and vulnerabilities identified by participants included:

- There is a family that lives on Dorchester Island. It could be an actual island with a storm surge.
- There is chronic freshwater flooding by Daniel's
- Shea's farm also sees annual freshwater flooding
- There are sections in Middleton and Turner's Creek that flood and get cut off in both directions. There are residents with mobility issues in this area.
- The Penitentiary lagoon could flood at with a current 1:25 year storm surge, which would flood nearby residential properties with its sewage.
- Portions of the CN rail could flood with a current 1:25 year storm surge
- Residents who live beyond Palmer's Pond get stuck and cannot get into Sackville.
- Residents in Johnson's Mills and Bucks Flats also cannot go in either direction due to flooded roads (to Dorchester or around to Sackville via



- Wood Point). The steel Bailey Bridge at far end of Johnsons Mills is also at risk.
- The bridge by Palmers Pond on Route 106 between Fort Folly and Dorchester village limits also floods and has been eroded during freshwater flood events. This limits travel to Sackville for those in Dorchester and limits Fort Folly residents from services in Dorchester. Fort Folly Band Office is also currently an emergency operations centre for the area despite potential access issues.
  - Seven or eight years ago there was a culvert washout on Woodlawn Rd and so emergency vehicles had to travel through the Penitentiary property for access.
  - A well house off Woodlawn Rd is a concern because flooding can make access difficult.
  - A priority should be to improve Walker Road to a four-season road. It is a high route directly to the Trans Canada Highway (to Moncton or Sackville). There is portion owned by the Province of New Brunswick (by the power line), which can flood. This portion of the road is also dirt and can be impassable at certain times of the year unless you have a four-wheel drive vehicle.
  - King St (off Woodlawn/Walker Rd heading to Sackville) also floods by where a spring can run over the road.
  - The Cherry Burton Rd from Route 106 to Fairfield (King St) can also flood.
  - Fort Folly could also be stranded. This First Nation has a population of approximately 35 people on-reserve with another 95 off-reserve.
  - All routes out of Dorchester could be flooded by freshwater storm events, stranding many residents in their homes or in Dorchester, which does not have a grocery store, hardware store, medical facility or gas station or other services.
  - The Dorchester Penitentiary has a separate emergency measures plan but the Village of Dorchester does not have access to it for security reasons.
  - The Village's emergency measures plan has not been updated in many years.
  - Power outages are also a concern, especially for people living alone, the elderly and those on dialysis.
  - Muster points should include Dorchester Consolidated School and the Dorchester Veterans Memorial Centre (formerly St. Ed's Hall).
  - A three-day ice storm is also a concern.
  - Due to the area's isolation, people have to be self-sufficient.

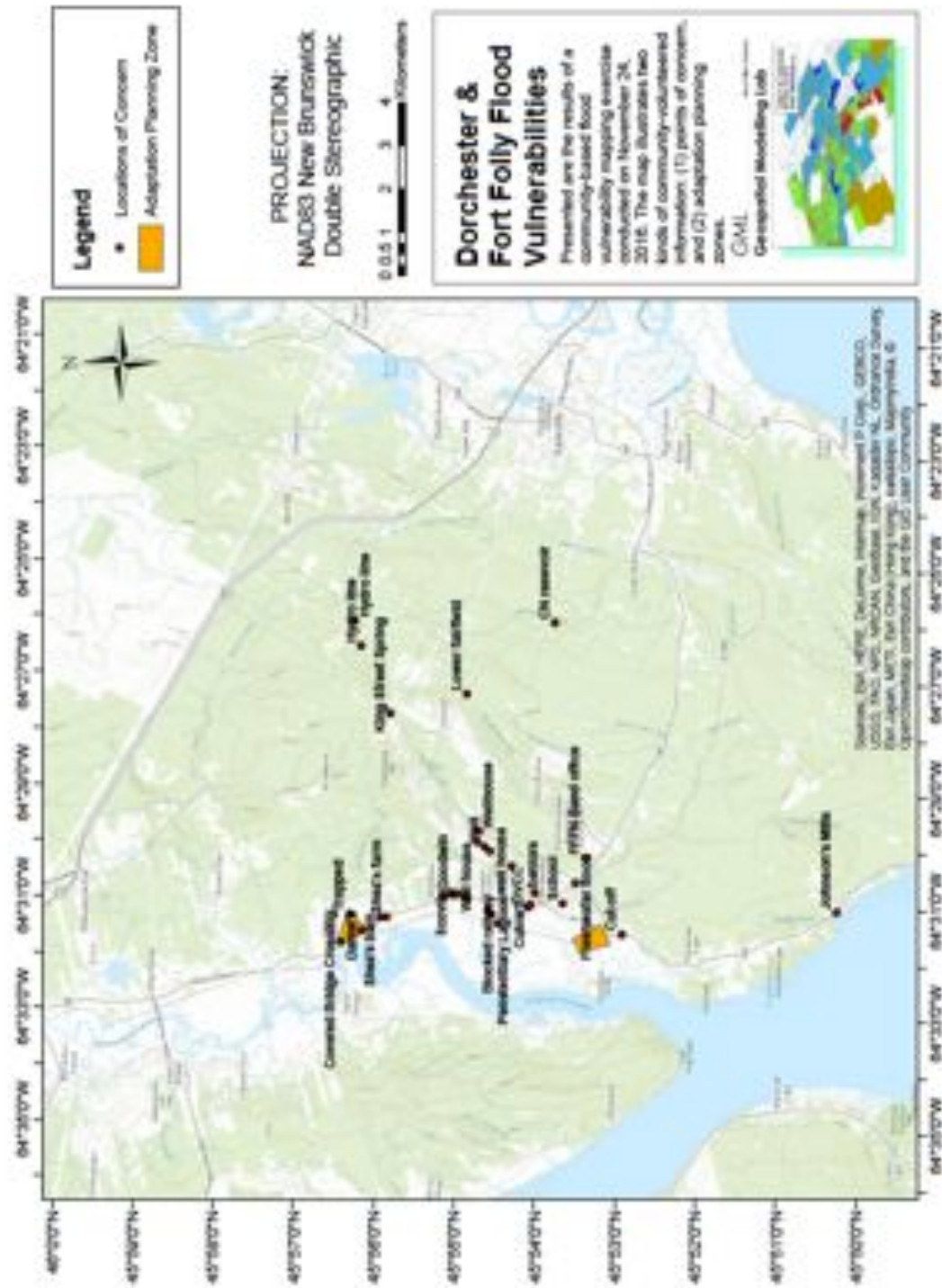
- There is a need for public education including the importance of 72 hour emergency kits and family flood plans.

There are vulnerable populations located at:

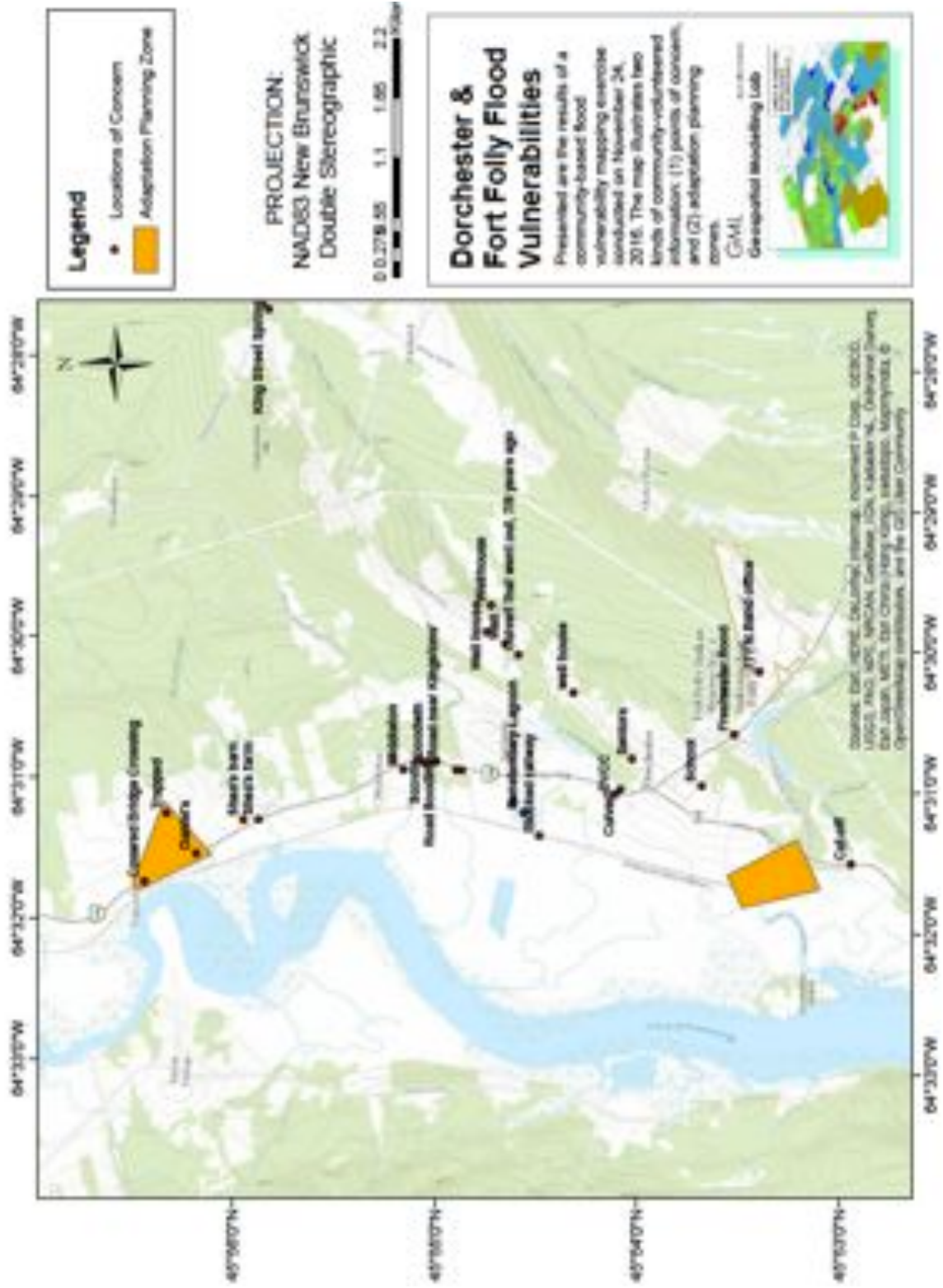
- Dorchester Consolidated School (kindergarten to grade 8 students)
- Shiretown Manor (seniors and other assisted income residents, owned by the Province of New Brunswick)
- Middleton resident(s) with mobility challenges
- Dorchester Cape residents on dialysis

All of these issues were marked on the interactive map to create the community's risk and vulnerability maps (shown on the next pages).

## Dorchester Climate Change Vulnerability Maps



Laura Penney and David Lieske, 2016



Laura Penney and David Lieske, 2016

## **Lions Club Breakfast**

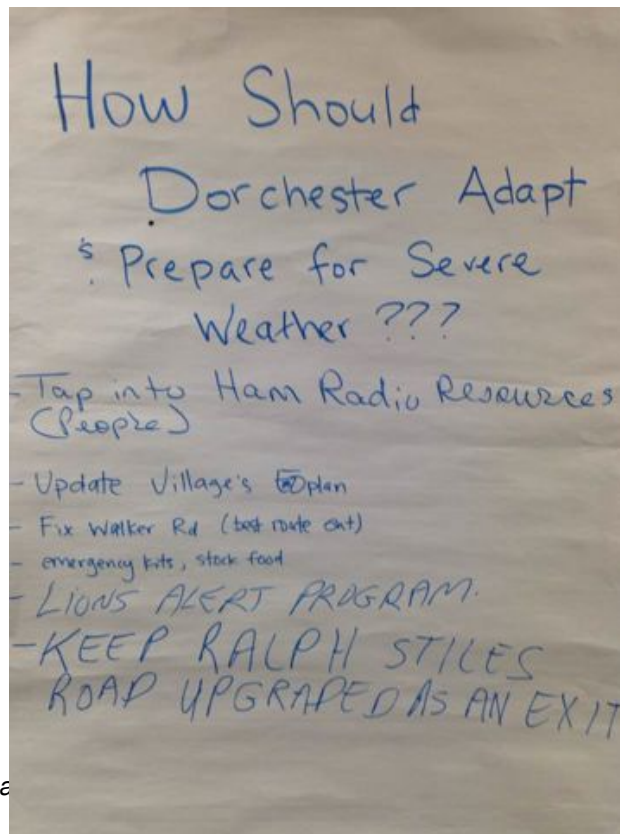
Public input was sought during the November Lions Club Breakfast in Dorchester. Hundreds of residents from the local area attend this popular monthly fundraising breakfast. Participants were shown the flood risk maps and asked: What concerns you about severe weather? And how might the community adapt? Below are the results.

What concerns you about flooding and severe weather?

- Being cut off and stranded
- Economic impacts – ruined farmland due to saltwater intrusion
- People on dialysis
- Having to go around the long way!
- Canadian National Rail
- Rain and run off
- Winter power outages
- Ice storms

How should Dorchester adapt and prepare for severe weather?

- Tap into ham radio operators and resources (there are a number of operators in the region)
- Update the Village's emergency measures plan
- Fix Walker Road (it is the best/highest way out but has a stretch that is dirt and can still be impassable without four wheel drive)
- Stock food and have emergency kits
- Use the Lions Alert Program
- Upgrade the Ralph Stiles Road as a route out of Dorchester Cape and Johnsons Mills area



Ideas from the public at

Photo Amanda Marlin

## Priority Areas

Taking into consideration results from the regional sustainability plan, the flood scenarios and climate impacts, workshops, and public input, the Dorchester adaptation planning committee selected the following eight priority areas for the community-based climate change adaptation plan:

1. Update EMO plan
2. Improve Walker Rd.
3. The region being cut off, and many residents being cut off in different areas
4. Municipal lagoon
5. Risk of flooded rail bed
6. Penitentiary lagoon
7. Lift station at corner of Water St.
8. Localized freshwater flooding and erosion

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

### Priority 1: Update the Dorchester Emergency Measures Plan

**Goal:** Have an emergency measures plan in place for the Village of Dorchester.

**Activity:** Re-establish emergency measures organization (EMO)

<b>Description</b>	There has not been an EMO committee in some time. Gather interested Dorchester residents to create a committee that will develop a new updated EMO plan.
<b>Lead and Partners</b>	EMO Coordinator Ben Edgett in partnership with the Dorchester Lions Club and Dorchester Fire Department
<b>Resources Required</b>	Village Newsletter for communication
<b>Timeline</b>	Spring 2017
<b>Indicators of Success</b>	Committee established

**Activity:** Create EMO plan for Village of Dorchester

<b>Description</b>	The EMO plan is out of date and a new one is required to ensure plans and preparation for a variety of emergency situations.
<b>Lead and Partners</b>	EMO coordinator Ben Edgett and committee
<b>Resources Required</b>	Committee time; Tina to email Ben contacts from Fort Folly First Nation
<b>Timeline</b>	Fall 2017
<b>Indicators of Success</b>	Plan created and approved by Village Council and Mike LeBlanc (NB EMO)

**Activity:** Emergency preparedness for winter storms

<b>Description</b>	Dorchester's emergency plan needs to be updated to include specific measures for winter storms, including power outages and stranded residents due
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	to road closures from extreme snowfall and extended power outages in cold weather.
<b>Lead and Partners</b>	Dorchester
<b>Resources Required</b>	EMO Volunteer time
<b>Timeline</b>	2017
<b>Indicators of Success</b>	Complete emergency preparedness plan for winter storms

**Activity:** Establish Dorchester Consolidated School as a muster point for emergencies

<b>Description</b>	Village council and EMO to discuss with the Anglophone East School District the need to make Dorchester Consolidated a muster point.
<b>Lead and Partners</b>	Dorchester EMO, Village Council, Anglophone East School District, school administration
<b>Resources Required</b>	Time
<b>Timeline</b>	2018
<b>Indicators of Success</b>	Agreement secured

### Priority 2: Improve Walker Rd to Four-Season Road

**Goal:** Fix the road so it is passable (especially a 400 meter stretch of dirt road). To ensure connectivity in and out of Dorchester, especially for access to food, medical appointments, emergencies, etc. during flood events.

**Activity:** Meetings with MLA and MP

<b>Description</b>	Meet with political representatives to explain the importance of Walker Road as the highest and driest way in and out of Dorchester. It is the most direct link to the TransCanada Highway. However a portion of this road, which lies outside of Dorchester’s municipal boundary and owned by the province, remains a dirt road. Because of this, at times in the year, it is still impassable unless residents have four-wheel drive vehicles.
<b>Lead and Partners</b>	Village of Dorchester Council in partnership with Fort Folly and Dorchester Penitentiary
<b>Resources Required</b>	Bring local flood maps, this adaptation plan, photos,



	data, etc. to present. Ask MLA and Member of Parliament (MP) for advice on how to proceed.
<b>Timeline</b>	By spring 2017
<b>Indicators of Success</b>	Meetings held, additional actions identified to move work on Walker Rd ahead.

**Activity:** Contact and obtain letters of support from neighbouring communities and partners

<b>Description</b>	Contact and obtain letters of support regarding the need to address Walker Rd. from Sackville, Fort Folly First Nation, SENB Planning commission, Dorchester Penitentiary/Correctional Services Canada
<b>Lead and Partners</b>	Village of Dorchester Clerk
<b>Resources Required</b>	Staff time
<b>Timeline</b>	By spring 2017
<b>Indicators of Success</b>	Support letters obtained and shared with provincial and federal representatives.

**Activity:** Signage at corner of King St. and Woodlawn Rd.

<b>Description</b>	The corner of King St. and Woodlawn Rd is poorly marked. Coming up King St. from Sackville there is no sign to indicate the need to turn left onto Woodlawn to head to Dorchester. It is especially hard to see during snowstorms and inclement weather. Continuing straight through the intersection and heading down Coppermine Hill can have devastating results. Better signage is needed to ensure public safety. Meet with MLA to explain the issues and request signage.
<b>Lead and Partners</b>	Village of Dorchester Council in partnership with MLA
<b>Resources Required</b>	Collect photos of the intersection to provide to MLA
<b>Timeline</b>	By spring 2017
<b>Indicators of Success</b>	Signage erected.

### Priority 3: Increase Self-Sufficiency due to the Region Being Cut Off

**Goals:** 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 a safer, more resilient community.

**Activity:** Place Engine 3 on other side of tracks stocked with medical supplies

<b>Description</b>	Place Engine 3 on other side of tracks stocked with medical supplies so that people in Dorchester Cape are not stranded without medical supplies.
<b>Lead and Partners</b>	Fire Department in partnership with newly formed EMO committee
<b>Resources Required</b>	Develop a list of materials still needed (by Sara Boyce, Fire Dept), acquire duplicate kits.
<b>Timeline</b>	Ongoing
<b>Indicators of Success</b>	Fully stocked engine 3 and placed across tracks before severe weather.

**Activity:** Create map of alternative routes and share with public

<b>Description</b>	Main routes in and out of Dorchester can be cut off due to floodwaters. Alternative routes may be needed.
<b>Lead and Partners</b>	Village of Dorchester in partnership with Southeast Regional Service Commission and Department of Transportation and Infrastructure
<b>Resources Required</b>	Staff and council time
<b>Timeline</b>	Ongoing
<b>Indicators of Success</b>	Public knowledge of alternative routes

**Activity:** “Adopt a Neighbour” Program

<b>Description</b>	Create a “buddy system” for all vulnerable residents to ensure they are safe during severe weather events. The program would see neighbours checking on neighbours and making sure that everyone is
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	accounted for. Sign up to be a buddy at the Village Office.
<b>Lead and Partners</b>	Village of Dorchester in partnership with local residents
<b>Resources Required</b>	Staff time
<b>Timeline</b>	By fall 2017
<b>Indicators of Success</b>	Established program, improved public safety.

**Activity:** Inform New Brunswick Government about climate risks and its impacts on Shiretown Manor

<b>Description</b>	Awareness is needed about the vulnerable location of the Shiretown Manor and that it could be cut off from health services and food supplies, and experience power outages.
<b>Lead and Partners</b>	Village of Dorchester
<b>Resources Required</b>	Meeting time
<b>Timeline</b>	2017
<b>Indicators of Success</b>	The province is aware and has a plan to deal with the safety of Shiretown Manor residents.

**Activity:** Bulk Purchase of Red Cross 72 Hour Emergency Kits

<b>Description</b>	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. Model the bulk purchase after a successful one by EOS Eco-Energy in 2015. Use it as a fundraiser for the Fire Department
<b>Lead and Partners</b>	Sara Boyce, Dorchester Fire Department.
<b>Resources Required</b>	Contact: Rob Fraser Hawktree Solutions 57 Auriga Drive, Suite 200 Ottawa, Ontario. K2E 8B2 T: (613) 692-2517

	C: (613) 851-6625 F: (613) 692-9001 RFraser@hawktreesolutions.com
<b>Timeline</b>	By fall 2017
<b>Indicators of Success</b>	At least 100 kits are needed to obtain free shipping and a savings of approximately \$20/kit

**Activity:** Sump Pump and Backflow Valve Bulk Purchases

<b>Description</b>	A bulk purchase and installation of sump pumps and backflow valves would help to educate the public about the importance of these devices for flood protection and to help reduce the cost.
<b>Lead and Partners</b>	EOS Eco-Energy
<b>Resources Required</b>	Funding for EOS to coordinate bulk purchase programs
<b>Timeline</b>	The bulk purchase of backflow valves was offered in winter 2016 and will be offered again. A sump pump bulk purchase will be offered in the future.
<b>Indicators of Success</b>	Installation of sump pumps and backflow valves.

**Activity:** Continuous Public Education on 72 Hour Preparedness

<b>Description</b>	Education on how to prepare and stay safe during emergencies (sump pumps, 72 hour emergency kits, family flood plans, etc.) Tips in the local community newsletter, information booths, mail-outs, news articles, workshops, etc are all useful to keep climate change and emergency preparedness top of mind in the Dorchester area.
<b>Lead and Partners</b>	EMO committee in partnership with Dorchester Village council, Fire Department, and EOS Eco-Energy
<b>Resources Required</b>	Funding and staff time
<b>Timeline</b>	Ongoing
<b>Indicators of Success</b>	A more resilient, safe and adaptable community

**Activity:** Emergency operation centre

<b>Description</b>	Fort Folly Band Office is currently an emergency operation centre but there is a need to have the Dorchester Veterans Memorial Centre (formerly St. Ed's Hall) as a second centre. To be an appropriate emergency centre it requires a proper kitchen with certification and a generator.
<b>Lead and Partners</b>	Village of Dorchester
<b>Resources Required</b>	\$30,000 for generator, food handling course
<b>Timeline</b>	2020
<b>Indicators of Success</b>	Generator purchased, Veterans Memorial Centre fully equipped to as emergency centre.

**Activity:** Public education regarding limited fuel and food supply in the Village

<b>Description</b>	Dorchester does not have a grocery store and the nearest gas station is in Fort Folly First Nation, across the brook leading to Palmer's Pond which has flooded in the past. Flooded routes can limit the ability of residents to access both food and fuel. They need to be aware of the importance of preparation before storms and stocking up on supplies.
<b>Lead and Partners</b>	Village of Dorchester
<b>Resources Required</b>	Use Village newsletter for reminders.
<b>Timeline</b>	Ongoing
<b>Indicators of Success</b>	A better educated community. Residents taking steps to prepare and adapt to severe weather events.

**Priority 4: Municipal Lagoon**

**Goal:** Increased public health and safety.

**Activity:** Due to its low-lying location, the municipal sewage lagoon could flood into neighbouring marshlands and impact crops and livestock (no homes are currently at risk). A contingency plan for the municipal lagoon is needed in order to know how to restore the lagoon after a flood event.

<b>Description</b>	Develop a contingency plan for if/when the lagoon floods so that the Municipality knows how to get it set up again and what to do while it is not functioning properly (eg. restore bacteria levels to the lagoon, etc.). Look into applying to the NB Environmental Trust Fund for funding for the plan. Eventually possibly explore building up sewage lagoon walls or relocate it (in the long-term).
<b>Lead and Partners</b>	Village of Dorchester Council, Staff, Fort Folly First Nation
<b>Resources Required</b>	Use the list serve, staff time to research and development the contingency plan, ETF funding
<b>Timeline</b>	Contingency plan started by 2018
<b>Indicators of Success</b>	A plan as been created and approved by Council

### Priority 5: Flooded Rail Bed

**Goal:** To prevent flooding of the rail bed and sections of Route 106 between Dochester and Memramcook.

**Activity:** Begin discussions with the Province and CN Rail about at risk areas of the rail bed.

<b>Description</b>	Village councillors to meet with CN contact person.
<b>Lead and Partners</b>	Village councillors
<b>Resources Required</b>	Dorchester climate adaptation plan
<b>Timeline</b>	Beginning in 2018
<b>Indicators of Success</b>	Information shared and eventually rail bed is above flood risk levels.

### Priority 6: Dorchester Penitentiary Lagoon

**Goal:** Public safety

**Activity:** Begin discussions with Federal Government about state of the lagoon and possible safety issues arising from an overflow due to flooding.

<b>Description</b>	During a quarterly meeting between Village councillors and the Penitentiary discuss this climate adaptation plan and the risks associated with flooding and the lagoon.
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<b>Lead and Partners</b>	Village councillors
<b>Resources Required</b>	Dorchester climate adaptation plan
<b>Timeline</b>	Begin summer 2017
<b>Indicators of Success</b>	Information shared and eventually lagoon made safer.

**Priority 7: Lift Station at Corner of Water St.**

**Goal:** To prevent flooding of lift station and sewer back up in Fort Folly First Nation. To ensure public safety during flood events.

**Activity:** Creating a looped system is the first choice.

<b>Description</b>	Looping the sewer line might eliminate the need for the lift station. Discussion is in progress with engineer.
<b>Lead and Partners</b>	Village of Dorchester, Fort Folly First Nation, engineer
<b>Resources Required</b>	Cost of looping the system is estimated at \$1million
<b>Timeline</b>	2022
<b>Indicators of Success</b>	A looped system that is no longer at risk from flooding.

**Priority 8: Localized Freshwater Flooding and Erosion**

**Goal:** To reduce flooding and erosion from freshwater

**Activity:** Install additional rain gardens and rain barrels

<b>Description</b>	Rain gardens are natural storm water management systems planted with native grasses and plants. They help direct rain water and allow it to absorb naturally into the ground. Rain gardens can reduce stormwater runoff, which leads to erosion. EOS Eco-Energy and local volunteers planted rain gardens in Dorchester in summer 2014. Additional rain gardens should be planted around the village. They are easy for homeowners to plant too. Additional education and awareness about rain gardens will take place. In addition, rain barrels help to collect rain water and
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	conserve tap water for watering gardens, washing cars, etc.
<b>Lead and Partners</b>	Village, EOS Eco-Energy, Eco Container Co.
<b>Resources Required</b>	Staff time, plants and gardening materials, barrels
<b>Timeline</b>	Ongoing
<b>Indicators of Success</b>	Rain gardens and rain barrels are common place at many properties and homes in Dorchester.

**Activity:** Assess suitability for naturalized stormwater retention ponds and potential wetland restoration sites

<b>Description</b>	Wetlands have a natural ability to absorb water and act as buffers for floodwaters. Retention ponds retain storm water and limit flooding. Assess areas for each in Dorchester.
<b>Lead and Partners</b>	The Village, Ducks Unlimited Canada, MTA biology department, Correctional Services Canada
<b>Resources Required</b>	Funding for retention pond and wetland restoration, or done in partnership with Ducks Unlimited Canada
<b>Timeline</b>	Long-term
<b>Indicators of Success</b>	Assessment completed, retention pond(s) built and wetlands restored

**Activity:** Strengthen bridges to address erosion

<b>Description</b>	Bridges have eroded due to run off during extreme storm events. There is a need to strengthen bridges or look at different engineering designs that will withstand the added pressure from floods and run off. Many of the bridges are located outside village limited but are within the Dorchester Fire Department's protection area thus impacting the Department's ability to provide safety services. Safe and functional bridges are also critical for access in and out of the area including for the Penitentiary. The need for action for will be brought to local MLA.
<b>Lead and Partners</b>	Village councillors, Correctional Services Canada and MLA
<b>Resources Required</b>	Meeting time



<b>Timeline</b>	2018
<b>Indicators of Success</b>	Meetings have taken place and bridges are eventually replaced with stronger designs.

**Activity:** Develop a storm water management plan

<b>Description</b>	A comprehensive storm water management plan addresses how stormwater and runoff are managed both naturally with retention ponds, etc. and with engineering such as culverts.
<b>Lead and Partners</b>	Village and consultants/engineers
<b>Resources Required</b>	Funding, possibly from NB Environmental Trust Fund
<b>Timeline</b>	Long-term
<b>Indicators of Success</b>	Storm water management plan approved by council and implemented

**Activity:** Incorporate freshwater flood maps and scenarios when they become available

<b>Description</b>	Freshwater flood scenarios and mapping are not available yet but when they are, it will be important to incorporate the data and maps into future climate adaptation planning. Local residents have experienced numerous freshwater flood events from intense rainstorms and snowmelt. Freshwater flood maps will help to portray the impacts. Scenarios will help with future planning.
<b>Lead and Partners</b>	Village, Southeast Regional Service Commission
<b>Resources Required</b>	LiDAR data
<b>Timeline</b>	2020
<b>Indicators of Success</b>	Freshwater maps and scenarios incorporated in adaptation planning

**Activity:** Culvert and engineering assessment

<b>Description</b>	Assess hydrology, condition, function, size, location, etc. of culverts to manage storm water flow. Also assess suitability and function of the Palmers Pond Dam.
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<b>Lead and Partners</b>	Village and engineer/consultant
<b>Resources Required</b>	Funding for culvert assessment, possibly from NB Environmental Trust Fund
<b>Timeline</b>	Long-term
<b>Indicators of Success</b>	Culvert assessment complete

## Summary of Recommended Actions

<b>Timeline</b>	<b>Actions</b>
Ongoing	<ul style="list-style-type: none"> <li>• Public education regarding limited fuel and food supply in the Village and the region being cut off due to flooding</li> <li>• Continuous Public Education on 72 Hour Preparedness</li> <li>• Create map of alternative routes and share with public</li> <li>• Place Engine 3 on other side of tracks stocked with medical supplies</li> <li>• Install additional rain gardens and rain barrels</li> </ul>
Short (2017-2018)	<ul style="list-style-type: none"> <li>• Bulk Purchase of Red Cross 72 Hour Emergency Kits</li> <li>• Inform New Brunswick Government about climate risks and its impacts on Shiretown Manor</li> <li>• “Adopt a Neighbour” Program</li> <li>• Signage at corner of King St. and Woodlawn Rd.</li> <li>• Contact and obtain letters of support from neighbouring communities and partners regarding the need to improve Walker Rd.</li> <li>• Meetings with MLA and Dominic LeBlanc MP regarding Walker Rd.</li> <li>• Re-establish EMO committee</li> <li>• Create and emergency measures plan for Dorchester, including emergency preparedness for winter storms</li> <li>• Establish Dorchester Consolidated School as a muster point for emergencies</li> <li>• Begin discussions with the Province and CN Rail about at risk areas of the rail bed</li> <li>• Begin discussions with Correctional Services Canada about state of the Penitentiary lagoon and possible safety issues arising from an overflow due to flooding</li> <li>• Begin discussion with MLA regarding the need to strengthen bridges to address runoff and erosion</li> </ul>
Medium (2019-	<ul style="list-style-type: none"> <li>• Emergency operation centre at Dorchester veterans Memorial Centre to have generator</li> </ul>

2021)	<ul style="list-style-type: none"> <li>• Bulk purchase of sump pumps</li> <li>• Contingency plan for the municipal lagoon</li> <li>• Incorporate freshwater flood maps and scenarios</li> </ul>
Long (2022 and beyond)	<ul style="list-style-type: none"> <li>• Create a looped waste water system for Fort Folly to address flood risk of Water St. lift station</li> <li>• Assess suitability for naturalized storm water retention ponds and potential wetland restoration sites</li> <li>• Develop a storm water management plan</li> <li>• Culvert assessment</li> </ul>

## Implementation and Monitoring

The Village of Dorchester 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 village newsletter, community meetings, and social media. Progress will be ensured due to the creation of a climate change adaptation implementation committee. The committee will meet biannually to monitor progress, take steps to ensure implementation of the plan continues, and report to Dorchester Village Council. Members of the committee will include:

- Village clerk and council representative(s)
- EMO coordinator
- Fire Department representative
- 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, mapping flood zones, etc.)

## How can you adapt to climate change?

- Have a 72 hr emergency kit including medication and food, and a 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 the Dorchester area adapting to climate change?

The Village of Dorchester, working with EOS Eco-Energy, Fort Folly First Nation and local residents, 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. EOS received NB Environmental Trust Fund funding for this project.



## For more information on climate change adaptation:

EOS Eco-Energy  
 131D Main St., PO Box 6001  
 Sackville, NB E4L 1G6  
[info@eosenergy.com](mailto:info@eosenergy.com) 506.536.4487  
[eosenergy.com](http://eosenergy.com)

## Climate Change in the Dorchester Area

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 the Dorchester area?

### Rising Sea Levels and Storm Surges

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. Storm surges during storm events can increase sea levels even more and cause considerable damage. Major storm surges have hit many communities in New Brunswick. Dorchester's low lying sewage lagoon could be impacted by a storm surge.



### More Severe Winter Storms

In the last decade there have been several serious storm events in the region, including severe winter storms and blizzards. Winter storms are especially dangerous when they result in power outages and road closures.



### 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 rainfall can also lead to flooded roads around Dorchester stranding residents and making access to food, health care and gas stations challenging.

# Mapping Dorchester and Area's Risks from Severe Weather



Thursday, November 24th, 2016  
6pm-8pm  
Fort Folly First Nation Band Office  
38 Bernard Trail, Fort Folly  
**A light supper provided**  
**Free! Everyone welcome!**

Learn more about weather and climate change in the Dorchester area. Share stories, bring photos, learn about adaptation.

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





**Tuesday, February 21<sup>st</sup>, 2017**  
(Storm date: Thursday, February 23<sup>rd</sup>)  
7pm-9pm  
Veteran's Memorial Community Centre  
4955 Main St., Dorchester, NB  
Special Guests: Mike Johnson, Cumberland  
EMO and Mike Leblanc, SENB EMO



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

EOS to present the Village's draft adaptation plan for public review and input.

**Refreshments! Free! Everyone welcome!**

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

