

2013

Municipal Climate Change Action Plan



Abridged Version
Section I – Climate Change Action Plan

Town of Bridgewater
Nova Scotia



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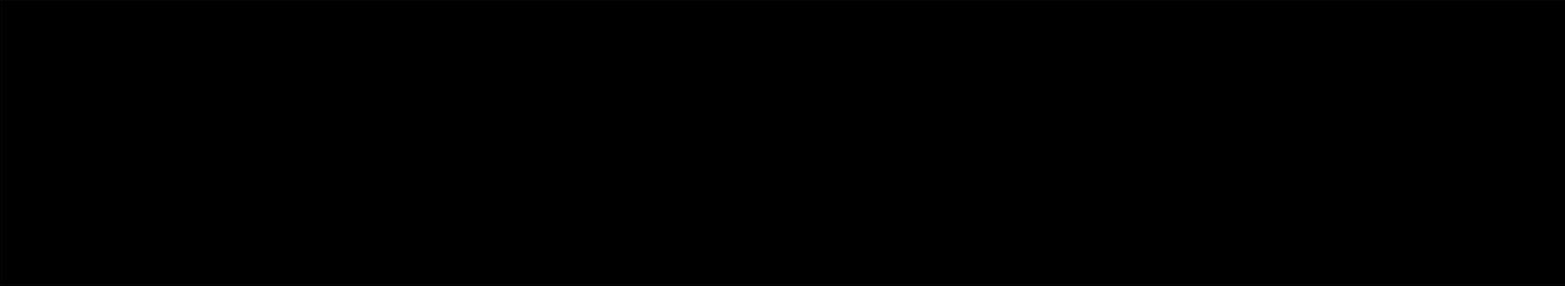
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This document is an abridged version of the MCCAP. Sections II and III are available upon request from the Bridgewater Planning Department by contacting Leon de Vreede, Sustainability Planner, at (902)541-4390 or ldevreede@bridgewater.ca

Council Resolution

This document was adopted by Town Council for the Town of Bridgewater on January 13, 2014, through the following resolution:

“That Town Council for the Town of Bridgewater approve Bridgewater’s Municipal Climate Change Action Plan (MCCAP) as presented in Document 14-001, and authorize the CAO to submit the Plan to the Province of Nova Scotia for final review and approval.”



Section I

Climate Change Action Plan

Background & Climate Science

MCCAP Planning Process

In 2005, the Town of Bridgewater signed the Municipal Funding Agreement on the Transfer of Federal Gas Tax Revenues with the Province of Nova Scotia. This allowed Bridgewater to receive its share of \$145.2 million in federal funding to invest in eligible municipal infrastructure projects from 2005 to 2010.

In March of 2010, Town Council for the Town of Bridgewater approved the Integrated Community Sustainability Plan (ICSP). The ICSP identified Bridgewater's goals for becoming a more sustainable community, and provides ongoing direction for our municipality's spending of our Gas Tax funds. Completing the ICSP allowed the Town to continue to receive Gas Tax funding from 2010 to 2014, the total value of which had risen to \$223 million over 4 years for Canadian municipalities.

As a requirement for their ongoing participation in the Municipal Funding Agreement for 2014 and beyond, all municipalities in Nova Scotia are required to prepare and submit to Service Nova Scotia and Municipal Relations (SNSMR) a Municipal Climate Change Action Plan (MCCAP) by December 31, 2013.

As stipulated in the Municipal Climate Change Action Plan Guidebook (Fisher, 2011), a document published by the Province that lays out mandatory requirements for the MCCAP, the MCCAP focuses on both climate change adaptation and mitigation and describes how municipalities plan to respond to climate change. The mandatory requirements for this planning process are outlined in the following table:

Adaptation	
Step 1	Form an adaptation committee
Step 2	Identify climate change hazards & issues
Step 3	Identify affected locations
Step 4	Identify affected facilities & infrastructure
Step 5a	Identify vulnerable populations
Step 5b	Identify potential economic implications
Step 5c	Identify potential environmental implications
Step 6	Set priorities for adaptation
Mitigation	
	Create a mitigation plan to reduce greenhouse gas emissions

In short, the MCCAP seeks to answer the question: "how may Bridgewater be impacted by a changing climate, and how could our community respond to this?" The mandatory requirements of the MCCAP stipulate that this document is to adopt a risk management approach - in other words, it flags a broad set of possible climate-related issues, rather than attempting to predict the future very specifically. The MCCAP then identifies the issues of greatest concern for the community, and identifies a set of possible

actions the Town can take to help reduce problems in these areas. While the major emphasis of the MCCAP is intended to be on adaptation, it also contains a section on mitigation - in other words, how Bridgewater can reduce its contribution to climate change by minimizing greenhouse gas (GHG) emissions from its municipal facilities and operations.

Completing this planning process has many benefits for Bridgewater. The foremost, is that many impacts and hazards associated with climate change translate into issues that are local in nature, and directly affect our community, our people and our businesses. Climate change adaptation strategies also allow for the protection of municipal investments (such as infrastructure and municipally owned and operated facilities) because climate change can seriously damage expensive infrastructure and affect the delivery of municipal services. Successful adaptation does not mean that negative impacts will not occur, only that they will be less severe than would be experienced had no adaptation occurred. Adaptive strategies are being planned by all municipalities across Nova Scotia and by many municipalities around Canada, demonstrating the value of this work to local and regional governments.

This document is the Town's submission to the Province of Nova Scotia to meet the requirements of the Municipal Funding Agreement. It also represents one of many actions that make up the Town's ongoing commitment to sustainability.

Climate Change Science & Assumptions

Climate change refers to both the warming of the earth's atmosphere and oceans, in addition to an increase in the natural variability of the climate. In Nova Scotia, climate change poses risks to communities. An increase in the frequency of extreme weather events, changes in water availability and quality, sea level rise and changes to the performance of infrastructure systems, are creating a need for municipalities to change the way they manage their capital assets and operations.

Our municipality cannot simply rely on the assumption that the prevailing climate will be more or less the same as it was over the past 50 to 100 years. We can expect to live in a climate with different rainfall patterns, warmer temperatures, more frequent storms, and severe weather events. The most authoritative and respected source of climate science is the United Nations' Intergovernmental Panel on Climate Change (IPCC), which assesses and corroborates the work of thousands of climate scientists worldwide and provides consensus information on the scientific findings. The IPCC document "*Working Group I Contribution to the IPCC Fifth Assessment Report - Climate Change 2013: The Physical Science Basis*" (Stocker, et al., 2013) identifies the following climate science updates:

- *Warming of the climate system is unequivocal, and since the 1950s, many of the observed changes are unprecedented over decades to millennia. The atmosphere and ocean have warmed, the amounts of snow and ice have diminished, sea level has risen, and the concentrations of greenhouse gases have increased.*
- *Each of the last three decades has been successively warmer at the Earth's surface than any preceding decade since 1850. In the Northern Hemisphere, 1983–2012 was likely the warmest 30-year period of the last 1400 years.*
- *The atmospheric concentrations of carbon dioxide (CO₂), methane, and nitrous oxide have increased to levels unprecedented in at least the last 800,000 years. CO₂ concentrations have increased by 40% since*

pre-industrial times, primarily from fossil fuel emissions and secondarily from net land use change emissions.

- Human influence has been detected in warming of the atmosphere and the ocean, in changes in the global water cycle, in reductions in snow and ice, in global mean sea level rise, and in changes in some climate extremes... It is **extremely likely** that human influence has been the dominant cause of the observed warming since the mid-20th century.
- Continued emissions of greenhouse gases will cause further warming and changes in all components of the climate system. Limiting climate change will require substantial and sustained reductions of greenhouse gas emissions.
- Global surface temperature change for the end of the 21st century is likely to exceed 1.5°C relative to 1850 to 1900... Warming will continue beyond 2100... Warming will continue to exhibit interannual-to-decadal variability and will not be regionally uniform.
- Global mean sea level will continue to rise during the 21st century... The rate of sea level rise will very likely exceed that observed during 1971–2010 due to increased ocean warming and increased loss of mass from glaciers and ice sheets.

This evolving consensus on climate science paints the most alarming picture yet of the impending changes to our climate, and the role that human activity has had on it. One other concerning trend is that each IPCC report has painted more extreme impacts than the previous one, and many scientists working on the most cutting edge climate science have demonstrated that even these predictions are being outpaced by actual observed changes in climate.

While these are the global climate science trends, what do they mean for our community? For the Nova Scotia context, the most current scientific source of climate predictions is a report commissioned by the four Atlantic Provinces through the Atlantic Climate Solutions Association (ACASA). The report, “Scenarios and Guidance for Adaptation to Climate Change and Sea-Level Rise – NS and PEI Municipalities” (Richards & Daigle, 2011), published in August 2011, extrapolates global and Canadian climate science down to the level of individual communities across NS and PEI. The report provides the following climate change predictions for the Lunenburg area:

Parameter	2020's	2050's	2080's - 2100's	Implications
Average Temperature - Winter	-2.7C	-1.3C	0.2C	Warmer winters
Average Temperature - Summer	18.7C	19.9C	21.1C	Warmer summers
Annual Precipitation	1564.2mm	1577.2mm	1624.0mm	More precipitation
Hot Days (over 30C)	12.6	21.6	31.4	More heat waves
Water Deficit	35.8mm	44.0	53.1	More droughts
Change in Intensity Short Period Rainfall	5%	9%	16%	More extreme precipitation
Total Sea Level Rise	0.15m ± 0.03	0.43m ± 0.15	1.06m ± 0.48	Sea level will rise by 0.5m to 1.5 m over 90 years

The Province of Nova Scotia has also created a website that describes predicted climate change impacts and possible adaptation strategies, which was used to inform other sections of this report (Nova Scotia Department of the Environment, 2013). The conclusion from these climate studies is that the Town of Bridgewater will generally face more extreme weather events in both summer and winter, and experience the many ramifications of changing climate patterns on the environmental, economic, and social systems on which our community depends.

Using this best available climate science as its foundation, the Town has worked together with a broad group of specialists, including planners, engineers, emergency response specialists, public health professionals, infrastructure managers, as well as other specialists, to help it understand the potential impacts of climate change on our community.

Climate Change Hazards & Impacts

Extreme Weather Hazards

This plan has considered a set of extreme weather hazards to determine climate change risks to the community, and identifies possible adaptive actions. Hazard types are listed and described below, including an overall risk rating arrived at through the extreme weather event risk analysis process.

Hazard Type	Description	Overall Risk Rating
Hurricane	A category 1-5 hurricane that requires an emergency response or significant intervention to maintain Bridgewater's physical, social, and environmental well-being.	110
Extreme Winter Storm	A winter storm event, possibly including heavy snowfall, blizzard conditions, and freezing rain and spray, that requires an emergency response or significant intervention to maintain Bridgewater's physical, social, and environmental well-being.	105
Extreme Rain	A heavy rain event that requires an emergency response or significant intervention to maintain Bridgewater's physical, social, and environmental well-being. May result in estuary or inland flooding, but is not necessarily accompanied by heavy winds.	96
Estuary Flooding	A flood event along the LaHave River that requires an emergency response or significant intervention to maintain Bridgewater's physical, social, and environmental well-being. May be caused by heavy rainfall, sea level rise, storm surge, or a combination of these. Flooding in or around Bridgewater that is not caused by the LaHave River is addressed separately (see "inland flooding").	92
Inland Flooding	A flood event in or near Bridgewater that requires an emergency response or significant intervention to maintain Bridgewater's physical, social, and environmental well-being. Flooding caused by the LaHave River is addressed separately (see "estuary flooding").	89
Extreme Wind	A wind event that requires an emergency response or significant intervention to maintain Bridgewater's physical, social, and environmental well-being. May not necessarily be accompanied by precipitation.	78
Wildfire	An unplanned vegetation fire that requires an emergency response or significant intervention to maintain Bridgewater's physical, social, and environmental well-being.	66
Heat Wave / Hot Days	Three consecutive days in which the temperature reaches 32°C or higher, and that requires an emergency response or significant intervention to maintain Bridgewater's physical, social, and environmental well-being.	45
Drought	A period of abnormally dry weather that requires an emergency response or significant intervention to maintain Bridgewater's physical, social, and environmental well-being.	33
Disease Outbreak	A rapid increase in enteric, food / water-borne, zoonotic or vector-borne (from animals to humans) disease caused by a transmissible infectious agent as a direct result of changing climatic & habitat conditions, and that requires an emergency response or significant intervention to maintain Bridgewater's physical, social, and environmental well-being.	24

Analysis of the risks created by these hazards is described in detail in the “Supporting Documentation” section of this plan, and hazard locations maps may be found in the Section III. Hazards were evaluated by the following parameters:

- Probability of occurrence in the future, based on climate science assumptions
- Type and severity of impact on the community overall
- Social, economic, and environmental risks associated with the hazard

The analysis identifies many complex issues stemming from these extreme weather hazards, with potentially significant consequences for the community. As a result, the analysis of the extreme weather events occupies the largest part of the “Supporting Documentation” section of this plan, and forms the foundation of the majority of adaptation actions.

Gradual Climate Change Hazards

This plan has also considered a set of more gradual climate hazards to determine climate change risks to the community, and identify possible adaptive actions. Hazard types are listed and described below.

Hazard Type	Description	Potential Impacts
Changing precipitation patterns	Increased variability in precipitation patterns during all seasons, with an overall tendency toward greater precipitation.	Environmental, economic, social, and municipal infrastructure
Increasing average temperature	Gradual increases in average temperature for all seasons	Environmental, economic, social, and municipal infrastructure
Increasing UV radiation	Gradual increases in UV radiation at least until the middle of 21 st century.	Social

Analysis of the risks created by these hazards is described in detail in the “Supporting Documentation” section of this plan. The analysis identifies additional complex issues stemming from these gradual climatic changes, which should be of concern for the community. The net effect is that these gradual or “creeping” impacts reduce the community’s local capacity to adapt and respond to future climate hazards. Therefore these gradual impacts should continue to form part of the ongoing discussion on climate change.

Affected Infrastructures & Community Impacts

The extreme weather hazards described above were evaluated for their degree of impact on the following set of municipal and community infrastructures and basic services:

Municipal Infrastructure Categories	
<ul style="list-style-type: none"> ▪ Town Administration & Emergency Response ▪ Water Supply, Treatment & Distribution System ▪ Sanitary Sewer and Waste Water Treatment System 	<ul style="list-style-type: none"> ▪ Storm Sewer System ▪ Roads, Bridges & Transportation Infrastructure ▪ Recreation Assets

Community Infrastructure Categories

- | | |
|---|---|
| <ul style="list-style-type: none"> ▪ Bridgewater Downtown (King & LaHave) ▪ Bridgewater Marina / Port of Bridgewater ▪ Educational Facilities (Schools, NSCC) ▪ Electrical Service (NSP) ▪ Emergency Health Services (EHS) | <ul style="list-style-type: none"> ▪ Government & Community Services ▪ Provincial Park Lands ▪ Recreation Facilities (LCLC, Fieldhouse, Curling Rink etc.) ▪ South Shore Health (including South Shore Regional Hospital) ▪ Telecommunications Systems |
|---|---|

The many significant and complex issues and impacts arising from this analysis are described in the “Supporting Documentation” section. In addition, extreme weather hazards were analysed to determine their impact on the following social, economic and environmental aspects of the community:

Social	Economic	Environmental
<ul style="list-style-type: none"> ▪ Health impacts & social vulnerability 	<ul style="list-style-type: none"> ▪ Economic sector impacts 	<ul style="list-style-type: none"> ▪ Natural environment impacts

Finally, the community’s overall emergency preparedness and ability to respond to climate hazards is discussed under the “Emergency Planning & Response” section. The many significant and complex issues and impacts arising from this analysis are described in the “Supporting Documentation” section.

Climate Change Adaptation Options

Adaptation Concerns & Priorities

After analysis of the climate change hazards faced by the community, as well as consideration of the existing level of preparedness the community has for dealing with these hazards, a summary of adaptation concerns was created. Concerns included in this list meet one or more of the following conditions:

- Significant risk for human health and safety, especially for vulnerable populations
- Significant risk for long-term damage to the community, from an infrastructure, social, economic, or environmental perspective
- Significant risk for overwhelm of services and inability to provide emergency relief or recovery support to individuals or organizations affected

Concerns are ranked in order of priority, with 1 being the highest:

1. Critical infrastructures are vulnerable to increasing damage and disruption by extreme weather impacts.

Critical infrastructures owned or managed by the Town of Bridgewater are necessary for maintaining basic health and safety in the community, and for ensuring the normal functioning of the community and its economy. Multiple infrastructures have been assessed as being at least moderately at risk of significant impact by climate change, and the following have been assessed as being highly at risk: fire protection (hydrants), combined sanitary and storm sewers, sanitary sewer lift stations and pumps, and LaHave River bridges (owned by the Province of Nova Scotia). Compromise or damage of these critical infrastructures would result in significant problems for the community, including considerable health and safety risks, compromised ability to respond to emergencies, and wide-scale economic disruption. Currently few if any adaptation plans exist to mitigate these potential impacts, and in many cases the full extent of the impacts is not properly understood.



2. The community in general, and especially the Downtown, is vulnerable to increasing flood damage, injury, and disruption.

Hurricanes, extreme winter storms, extreme rain, and estuary flooding have been assessed as the top four extreme weather risks for the community of Bridgewater, in large part due to the significant flood risk posed to the lands around the LaHave River. With a high concentration of municipal infrastructure bordering and crossing the river, and the density of buildings owned mostly by the retail and business services sectors along the banks of the river (including the largest vulnerable property, the Bridgewater Mall), flooding risk is a concern that cannot be underestimated. Flooding may result in significant damage to properties and infrastructures, disruption of transportation and services, injury and loss of life, and many challenges associated with clean-up and recovery. Currently few if any adaptation



plans exist to mitigate these potential impacts, and in many cases the full extent of the impacts is not properly understood.

3. There is a lack of local and regional capacity to plan for climate-related emergencies.

Consultations with the Regional Emergency Management Organization, municipal departments, and other government service providers has revealed multiple gaps in the existing emergency plans and planning processes. Most organizations and departments admitted readily that a lack of emergency planning has taken place to date, which is made more concerning by the assumption that future climate change impacts will be more extreme and damaging than past occurrences.



The most commonly stated reason for a lack of planning has been a lack of capacity to undertake the work, with existing staff resources being insufficient to get the necessary work done. Along with a lack of organization planning, emergency measures experts believe that there is a lack of public awareness of the importance of emergency readiness, and not enough residents have taken the highly recommended action of developing 72-hour preparedness plans. A lack of contingency, continuity of operations, climate hazard, and other planning and preparedness compromises the ability of the community to accommodate extreme weather events, protect property and vulnerable populations, and recover from damages and injury.

4. There is a lack of capacity among emergency responders to provide emergency services and relief during climate-related emergencies, especially for vulnerable populations.

Through consultations with emergency response professionals, it has become clear that emergency services (fire, police, EHS, Red Cross, public works, and health care services) will quickly become overwhelmed if a significant extreme weather event were to hit Bridgewater or nearby communities. These resources are often already stretched handling routine emergency situations, and the toll on these services would be extreme if a situation arose where there were multiple deaths, injuries, fires, isolated populations, hazardous material spills, etc., compounded by blocked streets and damaged infrastructure.



While basic emergency response protocols and procedures are in place, sheer overwhelm is a situation that is typically not planned for, and collective response capacity among several compromised services is relatively unknown. A lack of ability to provide functional emergency services during an extreme weather event exposes the community to significant risk of injury and loss of life, as well as property damage and disruption to community functioning. Vulnerable populations would be particularly at risk, as their emergency response and care needs are higher than for other segments of the population.

5. Non-critical municipal infrastructures, assets and services are vulnerable to increasing damage and disruption by climate change in general.

These assets and services constitute important functions of the Town of Bridgewater, and are valued by the community, but do not necessarily provide critical services. They include smaller roads, parks and recreation facilities, and non-critical components of water, waste water, and storm water systems. Multiple infrastructures in these areas have been assessed as being vulnerable to climate change, with vulnerability ranging from low to high. Compromise or damage of these infrastructures or services would result in problems for the Town and the community, including financial loss, increased operational costs, certain health and safety risks, some degree of disruption to the community, and a decline in quality of life for residents. Currently few if any adaptation plans exist to mitigate these potential impacts, and in many cases the full extent of the impacts is not properly understood.



6. The community in general, and especially already vulnerable populations, is vulnerable to increasing regional economic & social problems caused by a changing climate.

Though they are far from being properly understood, the economic and social challenges that will result from the climatic and environmental changes that are being predicted on a gradual scale, will undoubtedly affect the community of Bridgewater. With further declines in fisheries as a result of changing species compositions in the ocean, and troubling impacts predicted for agriculture and forestry in the province (invasive species, pests, plant and animal disease, biodiversity loss, etc.), economic challenges are inevitable. The collapse of the cod and haddock fisheries nearly 2 decades ago, and the more recent collapse of key forest product industries in the local area, though not caused directly by climate change, demonstrated how these economic losses resulted in social impacts, including job losses, increasing costs of basic amenities and products, and social problems such as increased rates of drug and alcohol abuse. The net effect of these impacts is an increase in poverty, an increase in the chronic disease burden, increased outmigration, and a general weakening of community fabric and resiliency, among other problems. Vulnerable populations and those already suffering from health and economic inequities will be worst affected. These social and economic challenges will negatively affect the ability of the community to thrive, and reduce the ability of the community to deal with other climate-related impacts including extreme weather events. Currently few if any adaptation plans exist to mitigate these potential impacts, which themselves are very poorly understood. Initiatives to improve community health, build local sustainability and resilience, strengthen and diversify the local economy, and improve economic and health inequities are all key strategies to addressing these threats.



7. The local economy is vulnerable to increasing disruption and economic loss by climate-related emergencies.

While the local economy will face inevitable longer-term impacts as a result of the gradual changes in climate, it may also be disrupted by sudden extreme weather events, including storms, wildfires, heat waves, drought, and disease outbreak. The scale of these disruptions, and the nature of their impact, will depend entirely on the severity of the extreme weather event, the specific locations affected, and the ability



for emergency responders and relief efforts to mitigate losses. Economic losses will likely be the main impact, as industries and businesses may incur physical damage to products and property through water, fire, ice, wind, and other threats. Interruptions to supply chains would negatively impact manufacturing industries and businesses that are dependent on high product turnover rates, and the inability for employees and customers to travel would also compromise business continuity. Injury to employees is a real threat, especially to businesses located in hazard areas, or where employees are predisposed to greater harm, including construction and other outdoor industries. If impacts are severe enough, entire regional industries, such as tourism or agriculture, may be negatively affected for extended periods of time. The most vulnerable economic sectors in Bridgewater have been assessed as being retail & wholesale, health care and social services, and manufacturing & utilities. Excessive disruption to these and other sectors of the economy could lead to long-term declines in economic productivity of the community, and the many associated social and economic problems that would result. Currently few if any adaptation plans exist to mitigate these potential impacts and in many cases the full extent of the impacts is not properly understood.

8. There is a lack of capacity in the health & social services sector to prevent and accommodate injury and assist with recovery from climate-related emergencies, especially among vulnerable populations.

Through consultations with health care and social service professionals, it has become clear that these public services will quickly become overwhelmed if a significant extreme weather event were to hit Bridgewater or nearby communities. These resources are often already



stretched in providing services on a daily basis, due to the relatively high degree of chronic disease, significant elderly populations, and the relatively high degree of social and economic inequalities in Lunenburg County. In an emergency, the toll on these services would be extreme if a situation arose where there were multiple deaths, injuries, vulnerable populations requiring additional care, and economic losses to those populations who are least able to bear them. Resources available to aid with recovery (e.g. physical rehabilitation, basic services for vulnerable families, provision of shelter and basic necessities, support with repairing homes, or income to offset lost earnings) are slim, and it is unknown if such an emergency would see more resources allocated to these efforts by government agencies, especially if impacts are widespread throughout Nova Scotia. A lack of ability to provide these support services during and after an extreme weather event exposes the community in general, and especially vulnerable populations, to significant challenges including economic losses and social disruption. The net result would likely be further rises in health, social, and economic inequities.

9. Local environments and threatened species are vulnerable to increasing impact by climate change.



While the majority of these concerns have focused on threats to community infrastructure, human health and wellbeing, and economic wellbeing, environmental impacts would also result from both gradual and sudden climate hazards. Local ecosystems, including the LaHave River, forests (both managed urban forests and wild lands), streams and brooks, air quality, and even the Petite Riviere watershed where Bridgewater’s drinking water comes from, are all at some degree of risk from the impacts of climate change. Gradual impacts include plant and animal disease, biodiversity loss due to changing species composition and invasion by non-native species, erosion, loss of threatened species, and a general decline in the environmental health of these ecosystems. Extreme weather impacts include environmental damage from wind, water, fire, and ice, contamination from hazardous materials spills and sewage overflows, and water quality impacts due to erosion and nutrient loading. Currently few if any adaptation plans exist to mitigate these potential impacts and in many cases the full extent of the impacts is not properly understood.

Possible Adaptation Strategies

The following general strategies were identified as being relevant to the community of Bridgewater, with the possibility of being implemented by the Town, local residents and community partners, and/or by regional departments and agencies. Strategies are divided into five overall adaptation approaches – for an explanation of these categories, see the Definitions section under “Supporting Documentation”. Each strategy indicates which of the above concerns it addresses, and what efforts, in general, are already in place on the municipal level to implement that strategy.

General Adaptation Strategy	Existing Municipal Efforts	Concerns Addressed
Overall Adaptation Approach: Preserve		
A Identify and enhance naturalized areas within the community, especially in wetlands and in flood risk areas, to act as natural buffers during flooding events.	Existing town parks and open spaces near streams and ponds	1, 2, 5, 7, 9
Overall Adaptation Approach: Avoid		
B Prevent inappropriate development from encroaching further into hazard risk areas such as flood zones, streams, wetland, and steep slopes prone to erosion	See “Adaptation Through Municipal Planning” below	1, 2, 5, 7, 9
C Prevent inappropriate construction of municipal infrastructure in hazard risk areas	See “Adaptation Through Municipal Planning” below	1, 2, 5, 7, 9
Overall Adaptation Approach: Protect		
D Engineer structures to physically protect vulnerable geographic areas of the community from flooding, erosion, wildfire, and other climate hazards	Some erosion control measures implemented. This is not just a municipal strategy, as private landowners would need to be involved in these solutions.	1, 2, 5, 7

General Adaptation Strategy	Existing Municipal Efforts	Concerns Addressed
Overall Adaptation Approach: Accommodate		
E Improve the self-sufficiency and sustainability of the community in general, through efforts to improve energy, food, transportation, and housing security, and reduce the chronic disease burden and health & economic inequities in the community	Implementation of sustainability efforts (ICSP), in the areas of energy, food, transportation, local economy, education, and municipal infrastructure.	6, 9
F Reduce the impact of extreme weather events through improvements in the ability of municipal infrastructure to withstand or accommodate these events (e.g. storm water system planning and upgrading, or bolstering the ability of existing infrastructure to withstand flooding)	Implementation of some sustainability efforts (ICSP), in the area of municipal infrastructure. Various efforts related to specific infrastructures, though no overall adaptation effort.	1, 2, 5, 7, 9
G Reduce the impact of extreme weather events through improved municipal operational practices (e.g. snow clearing, fire prevention, parks & open space management)	Various efforts related to specific operations, though no overall adaptation effort.	1, 2, 5, 7, 9
H Reduce the impact of extreme weather events through improved planning regulations for new developments (e.g. storm water control, landscaping requirements)	See “Adaptation Through Municipal Planning” below	1, 2, 5, 7, 9
I Reduce the impact of extreme weather events through community education & participation efforts targeting private properties (e.g. rain barrels, fire prevention practices, home flooding prevention measures)	Various efforts related to community safety, though no overall adaptation effort.	1, 2, 5, 7, 9
J Improve local & regional efforts to protect biodiversity, through ecological monitoring, protection of sensitive habitats, reduction of pollution such as agricultural and sewage discharge into water bodies, and improved ecological standards for agriculture, forestry, and fisheries.	LaHave River water quality monitoring support, parks and natural spaces. <i>This strategy needs to be primarily led by a higher level of government in collaboration with local municipalities</i>	6, 9
K Improve emergency preparedness of the community as a whole, through local & regional planning efforts, and community education efforts	Existing contingency plans and procedures, including this plan, and ongoing development of emergency plans. Participation in the REMO group.	1, 2, 3, 4, 5, 6, 7, 8, 9
L Strengthen emergency services and response capacity, especially for vulnerable populations	Ongoing efforts to improve emergency response capacity through fire, police, and public works	1, 2, 3, 4, 5, 6, 7, 8, 9
M Improve social and economic recovery support and capacity, especially for vulnerable populations	<i>N/A – this needs to be led by a higher level of government in collaboration with local municipalities</i>	2, 3, 7, 8
Overall Adaptation Approach: Managed Retreat		
N Decommission buildings and infrastructures from hazard risk areas where appropriate, and rebuild in non-hazard risk areas if necessary. Convert decommissioned areas into uses that are more adaptable to extreme weather events such as naturalized wetlands or open space.	The Bridgewater Downtown & Waterfront Master Plan (2013) identifies some areas in the downtown core that may be appropriate for this strategy.	1, 2, 5, 7, 9

See the Climate Change Action Plan section of this document for a specific list of actions, based on these strategies, that can be undertaken by the Town of Bridgewater to address the community’s climate change adaptation needs. In order to properly evaluate the benefits and costs of these adaptation strategies, more information may be required. In addition, many of these strategies require that higher

levels of government and neighbouring municipalities participate in the implementation of the strategy. These realities are reflected in the Climate Change Action Plan.

Adaptation Through Municipal Planning

As is made clear through the adaptation concerns list, and the suggested adaptation strategies above, one of the main problems with climate change is that parts of the community of Bridgewater, and the assets and infrastructures owned by the Town, are located in areas that are naturally predisposed to environmental hazards. In addition, the nature of urban development is that its built form tends to exacerbate the impact of extreme weather events, for example by reducing natural infiltration and increasing peak flows of storm water, reducing the natural canopy cover that protects low-lying lands from damage by wind, and exposing slopes that may previously have been vegetated and making them prone to erosion and sudden movements of earth.

Besides engineering solutions to all these human-made challenges, which would be cost-prohibitive and not necessarily address all the issues, one of the more valuable tools available to municipalities is the ability to control land-use and institute policies that regulate many aspects of how development and infrastructure interacts with the natural environment. Some of the key adaptation approaches listed above, especially “avoid” and “accommodate”, can be addressed through planning policy and regulation. The Town of Bridgewater is currently undergoing a comprehensive review of its Municipal Planning Strategy, Land Use By-Law, and Subdivision By-Law. Though these documents were still in draft form at the time that this plan was completed, specific adaptation strategies proposed through these planning documents include the following:

- Addition of a new Environmental Constraints Map as a schedule of the Municipal Planning Strategy, which flags slope, erosion, and flood risks and constraints. This map would identify areas where development is either prohibited or permitted only under certain conditions where anticipated environmental impacts are properly mitigated.
- A new policy in the Municipal Planning Strategy requiring developers to mitigate flood risk hazards based on the 2013 study named the *Integrated River and Coastal Hydrodynamic Flood Risk Mapping of the LaHave River Estuary and Town of Bridgewater* (Webster, McGuigan, Collins, & MacDonald, 2013), and to discourage vulnerable land uses or development in said hazard areas (e.g., care facilities, nursing homes, and other uses with prevailing safety considerations).
- A new Conservation Zone in the Land Use By-law to protect ecologically sensitive lands
- A new policy in the Municipal Planning Strategy to maintain or enhance soils and vegetation which serve a healthy riparian function along the LaHave River.
- New landscaping requirements in the Land Use By-law, including those for parking lots to promote natural infiltration and reduce heat island effect.
- A new strategy to reclaim and repurpose land along the LaHave River for public open space purposes, due in large part to vulnerability to climate hazards, as proposed in the *Downtown & Waterfront Master Plan (2013)*.
- A new strategy to undertake comprehensive storm water management planning.

Though these specific policies have not been approved at this time, the Town of Bridgewater is committed to the integration of these types of planning tools into its land use controls and policies as a

key strategy in reducing the impact of climate change on the community. Benefits from such policies will likely take years to bear tangible benefits for the community, as development is typically not a rapid process, but the long-term benefits for the community are expected to be significant. A number of actions flowing from these planning initiatives are to be found in the Climate Change Action Plan.

Climate Change Mitigation Options

Greenhouse Gas Emissions from Municipal Operations

Mitigation means reducing our contribution to climate change by cutting down on greenhouse gas (GHG) emissions, which has been demonstrated to be the main driver of anthropogenic climate change. This plan addresses mitigation primarily as it relates to municipal operations. Further mitigation efforts in the broader community are discussed later on in this section.

In 2008, the Town of Bridgewater launched its first comprehensive energy management initiatives. Early achievements included the implementation of facility-wide energy audits in 2008 and 2009, and a solar thermal energy feasibility study in 2009. Staff began regularly collecting energy data from Town facilities, operational processes, and vehicle fleets. The data was used to develop the Town's Municipal Greenhouse Gas Emissions Inventory Report in 2009, which calculated that the Town's total operations emitted approximately 4,600 tons of GHG emissions annually, with an associated cost of just under \$1,000,000 in fuel and electrical bills. The summary table below shows the GHG emissions from fiscal year 2007-08, which is considered the baseline year compared to which the Town benchmarks its ongoing energy management efforts:

Emission Category	Energy Type	Energy Consumption	Emission Factor (tCO ₂ e/units)	Emissions (CO ₂ e)	Cost (approx.)
Buildings	Electricity	1,467,294 kWh	0.000868	1,274 tons	\$176,400
	Fuel Oil	107,091 L	0.00268	287 tons	\$86,506
Water & Waste Water	Electricity	2,205,601 kWh	0.000868	1914 tons	\$230,477
	Fuel Oil	39,132 L	0.00268	105 tons	\$30,975
	Diesel	38,806 L	0.00263	102 tons	\$33,321
Street Lights	Electricity	772,477 kWh	0.000868	671 tons	\$256,774
Vehicles	Gasoline	100,487 L	0.00234	235 tons	\$89,513
	Diesel	98,497 L	0.00263	259 tons	\$84,058
Solid Waste	n/a	3.8 tonnes	0.5	1.9 tons	n/a
TOTALS	Electricity Fuels Solid Waste	4,445,372 kWh 384,013 L 3.8 tonnes	n/a	4,849 tons	\$988,024

Background calculations used to complete this summary table are available in the UNSM Corporate Energy and Emissions Spreadsheet (2007-2008), which was submitted to the Province of Nova Scotia in 2009, and was a requirement for the submission of this plan.

In 2009 and 2010, staff successfully applied for Federal and Provincial funding to complete a comprehensive set of energy upgrades at Town facilities. Upgrades were implemented from 2010 to 2012, and an energy awareness program was initiated for staff and visitors. In 2010, one of the key recommendations of the Integrated Community Sustainability Plan (ICSP) was that the Town formalize its commitment to energy efficiency and renewable energy in Town operations through the adoption of an Energy Management Plan. The purpose of this Plan was to establish targets for improvements in energy

efficiency and the reduction of greenhouse gas emissions from Town facilities, and to set out a strategy and process for meeting these targets.

This resulted in the Energy Management Plan for Facilities, which was adopted by Senior Management in 2011. The plan pertains to the Town’s main facilities, though it does not include its process facilities (water & wastewater treatment plants, and related pumping stations). Along with the adoption of an energy mission statement, the plan identified the following 2 goals for Town facilities:

- By 2012-13, reduce annual energy consumption from Town facilities by 15% compared to 2007-08 levels
- By 2012-13, achieve a self-evaluated energy management rating of 50% or better according to the Energy Management Priorities Good Practice Guide

The document also set out an implementation plan for achieving these goals, and allocated staff time and other resources toward them. Since the implementation of the plan, numerous energy improvements have been implemented, resulting in measurable progress toward the achievement of the two goals. A detailed analysis planned for early 2014 will confirm whether these goals have been achieved.

The ICSP also recommended the following actions that relate to reducing GHG emissions from municipal operations, some of which have been initiated, though others have not:

ICSP Category	Action	Status
Energy	▪ Lifecycle Energy Policy: bring an energy perspective to all major Town investments, by considering not only construction and capital costs, but also long-term energy and maintenance costs.	Not yet stated
	▪ New Building Standards: energy principles and targets for new facilities to be commissioned by the Town	Not yet started
	▪ Partners for Climate Protection: register the Town with the national Partners for Climate Protection program, or a similar initiative. This commits the Town publicly to making ongoing reductions in greenhouse gas emissions from corporate as well as community sources	Not yet started
Transportation	▪ Fleet Management Plan: plan and policy to improve fuel efficiency for all Town vehicles	Not yet started
	▪ Policy to Reduce Vehicle Use: policy to reduce the amount of driving by municipal employees	Not yet started
Infrastructure	▪ Water Loss & Leak Detection Technology: improve our ability to detect leaks in the water distribution system through the installation of new monitoring equipment and sensors, and staff training	Partially implemented
	▪ Waste Water Energy Efficiency Upgrades: continue identifying and implementing energy efficiency upgrades in the treatment plan, pumping stations, and other parts of the waste water system	Partially implemented
Implementation	▪ Sustainable Purchasing Policy: include energy principles in the Town’s purchasing policies	Not yet started
	▪ Develop a “Green Team”: examines basic day-to-day operating practices of the municipal organization and develops ways to make them more sustainable	Partially implemented

GHG Reduction Goals

To further its commitments toward mitigation, the Town of Bridgewater has identified the following goals to reduce GHG emissions from its operations:

Emission Category	Goals	Implementation
Buildings	<ul style="list-style-type: none"> By 2012-13, reduce annual GHG emissions from Town facilities by 15% compared to 2007-08 levels By 2017-18, reduce annual GHG emissions from Town facilities by 25% compared to 2007-08 levels 	<ul style="list-style-type: none"> Energy Management Plan for Facilities – past goal Energy Management Plan for Facilities – new goal
Water & Waste Water	<ul style="list-style-type: none"> By 2017-18, reduce annual GHG emissions from Water & Waste Water infrastructure by 5% compared to 2007-08 levels 	<ul style="list-style-type: none"> Energy Management Plan for Facilities – expanded scope
Street Lights	<ul style="list-style-type: none"> By 2017-18, reduce annual GHG emissions from streetlights by 25% compared to 2007-08 levels 	<ul style="list-style-type: none"> LED Street Lighting - new
Vehicles	<ul style="list-style-type: none"> By 2017-18, reduce annual GHG emissions from Town vehicles by 10% compared to 2007-08 levels 	<ul style="list-style-type: none"> Fleet Management Plan - new

Achieving these goals would mean that the Town will have reduced its GHG emissions from municipal operations by a total of 235 tons (5%) by 2012-2013, and a total of 713 tons (15%) by 2017-2018. These goals and actions are in line with the principles of the Memorandum of Understanding on Climate Change, made between the Union of Nova Scotia Municipalities and the Province of Nova Scotia in 2009.

Greenhouse Gas Emissions from the Community

Though they are not the focus of this plan, the ICSP also contains numerous actions, many of which have been initiated or completed, that are designed to reduce GHG emissions from the community at large. Actions include community energy, food, transportation, education, green economy, and a variety of other initiatives. In addition to implementing these actions described in the ICSP, mitigation efforts are being made through land-use controls and policies. Though the revised Municipal Planning Strategy, Land Use By-Law, and Subdivision By-Law were still in draft form at the time that this plan was completed, mitigation strategies proposed through these planning documents include the following:

- New street design standards to support active forms of transportation, including improved sidewalk design and bicycle lanes, and improved street connectivity
- New strategy to promote compact community form by increasing residential density and building height limits and encouraging infill development.
- New minimum bicycle parking requirements for all new developments
- New strategy to promote sustainable design principles and energy efficient technology in projects approved by Development Agreement, including renewable energy, paving / surfacing alternatives, provision of parking for alternative transportation modes, and low impact landscaping

The Town of Bridgewater is committed to continue implementing these types of community solutions to help enhance the sustainability of the town while reducing GHG emissions.

Climate Change Action Plan

Town of Bridgewater Actions

The Town of Bridgewater recognizes that its actions, policies, and regulations have a partial ability to shape how well the community is able to respond to climate change. The following actions have been identified as concrete opportunities for the Town of Bridgewater to take initiative in climate change efforts, based on the adaptation strategies and mitigation goals described above. The general timeframe for these actions is in the 5-7 year range.

KEY	Relative Financial Cost Estimate	Relative Staff Time Estimate		
		••• more (more than \$100,000 / year)	••• more (more than 500 hours / year)	
	•• medium (\$20,000 - \$100,000 / year)	•• medium (150 - 500 hours / year)	• less (less than \$20,000 / year)	• less (less than 150 hours / year)

Action	Description	Adaptation (Strategy)	Mitigation (Goal)	Cost	Staff Time	Responsibility
Emergency Planning						
Increase Capacity for Emergency Planning & REMO Participation	Municipal staff is currently highly limited in its ability to develop contingency plans and take part in regional REMO planning efforts related to extreme weather events, among other disasters. While some progress is being made, efforts in general will remain slow and inconsistent unless more staff time is made available to complete planning work and maintain existing plans. Due to full workloads, this may necessitate changing work responsibilities or taking on additional staff.	✓ (I, K, L)	N/A	••	••	All Departments
Develop & Improve Continuity of Operations Plans	Continuity of Operations Plans are appropriate tools through which the Town can plan for and coordinate municipal response activities under extreme weather scenarios, among other possible disasters. Currently only one or two of these plans exist (e.g. for the Public Service Commission). Developing these plans for other Town infrastructures and services is an essential component in responding to extreme weather events. Existing plans need to be updated on a regular basis to ensure relevance.	✓ (G, K, L)	N/A	•	••	All Departments
Improve Back-Up Power Sources & Emergency Supplies	Staff is aware of a number of specific facilities and operations where back-up power would assist in the provision of essential services or emergency response capacity during extreme weather scenarios. The acquisition of additional generator capacity (both mobile and fixed) is recommended. In addition, stockpiling basic supplies to assist with emergency response during these conditions is recommended. Emergency power needs and supplies are best planned for and coordinated through continuity of operations plans.	✓ (G, K, L)	N/A	••	••	Engineering, Parks Recreation & Culture

Action	Description	Adaptation (Strategy)	Mitigation (Goal)	Cost	Staff Time	Responsibility
Assess Need to Upgrade Critical Facilities to Post-Disaster Standards	The Police Station is the only Town facility that is currently built to post-disaster standards. These standards have been established to ensure the structural integrity of buildings for a wide range of disasters, and to ensure that the facility can provide certain relief services during an emergency. Assessing the need to upgrade other Town facilities (e.g. Fire Station, Town Hall, recreation facilities) to these same standards will determine whether such upgrades are necessary to increase the Town's ability to operate safely and provide relief during extreme weather events, among other disasters.	✓ (F, K, L)	N/A	●	●●	Engineering
Infrastructure Management						
Set Up Local Climate Hazard Recording System for Infrastructure	Municipal staff is able to recount a large number of anecdotal incidences of flooding, erosion, and other negative impacts from historical weather events. By setting up a systematic way of recording these impacts, staff can more accurately monitor extreme weather impacts in the community and for municipal infrastructure in particular. This would assist in monitoring whether climate impacts are getting worse, how expensive these impacts are for the municipality, and for evaluating whether interventions may be required.	✓ (F, G, K, N)	N/A	●	●	Engineering
Complete Drainage & Storm Water Master Plan	Many of the extreme weather scenarios described in this plan involve flooding risks. By developing a storm water master plan, the Town can more accurately assess the risks posed by flooding, assess the condition and effectiveness of its storm water system, and strategically improve these infrastructures to minimize flood and erosion damage to the community. As part of the plan, streams, wetlands and other open spaces can be assessed for their suitability to become enhanced as naturalized flood plains.	✓ (A, B, C, D, F, H)	N/A	●●●	●●●	Engineering
Develop Process to Explore Adaptation Options for Future Infrastructure Improvements	The Town lacks the financial resources and staff capacity to fully assess climate change risk to existing municipal infrastructures, and identifying appropriate climate change adaptation measures for these infrastructures is a long-term process. Completing these assessments when infrastructures are due for upgrade, renewal, or decommissioning, or when new infrastructures are planned, is more cost-effective. A process for considering possible adaptation strategies (preserve, avoid, protect, accommodate, and managed retreat) for infrastructure assets under review can be developed in order to bring a climate change lens to infrastructure decisions. This can take the form of climate change consideration within RFP / Tender processes related to infrastructure.	✓ (A, B, C, D, F, H, N)	N/A	●	●	Engineering

Action	Description	Adaptation (Strategy)	Mitigation (Goal)	Cost	Staff Time	Responsibility
Planning Policies & Regulations						
Incorporate Climate Change Policies & Regulations into Planning Documents	The Town can have a significant impact on the community's overall climate change adaptation and mitigation ability by including climate change considerations into the Municipal Planning Strategy, Land Use By-Law, and Subdivision By-Law. These documents are currently under review and draft documents already contain a number of important climate change elements.	✓ (A, B, C, E, F, G, H, J)	✓ (Community)	●	●	Planning
Explore Naturalization Opportunities on LaHave River and Inland Flood Zones	Keeping lands that are prone to flooding (riparian zones, flood plains, wetlands, marshes) as natural as possible not only enhances green space within the community and protects the environment, but also allows these ecosystems to become natural buffers for flood waters, thereby reducing the need for expensive municipal infrastructure to control flooding. A number of such locations exist in the community, and could be explored for their potential to be protected, or if they have already been developed, returned to a naturalized state. This action is best coordinated through the Drainage & Storm Water Master Plan, in combination with the Comprehensive Open Space Master Plan.	✓ (A, B, C, E, F, J, N)	N/A	●	●●	Engineering, Planning, Parks Recreation & Culture
Create Comprehensive Open Space Master Plan	The town's municipally-owned and managed parks, woodlands, and other green spaces have been determined to be vulnerable to some degree to the impacts of climate change. The creation of a comprehensive open space master plan could address many issues and risks faced by these assets, including climate change, and develop comprehensive strategies to maximize their potential and manage them in an ecologically responsible way. Climate change issues such as maintaining biodiversity, enhancing native species, and protecting parks and opens spaces from risks such as flooding, wind, fire, and pest damage should all be addressed through this plan.	✓ (A, B, C, E, F, G, J)	N/A	●●●	●●●	Parks Recreation & Culture, Planning
Operations						
Renew and Expand Energy Management Plan for Facilities	The Energy Management Plan prescribes a continuous effort to reducing energy demand and greenhouse gas emissions from municipal facilities. Currently the plan governs only some municipal buildings, and has no goals beyond 2012-2013. Staff recommends expanding the scope of the plan to include water and waste water facilities and infrastructures, and to set new greenhouse gas emissions targets as described in the "Mitigation" section. This is also an action listed in the ICSP. This action only pertains to rewriting the plan – implementation is a separate action and will require ongoing funding and time.	N/A	✓ (Buildings, Water, Waste Water)	●	●	Planning & Engineering
Implement LED Street Lighting	Retrofit all street lights with LED technology to achieve a significant reduction of electrical consumption and greenhouse gas emissions, as described in the "Mitigation" section. LED street lighting is a mandatory requirement (as of 2011) for all communities in Nova Scotia.	N/A	✓ (Street Lights)	●●●	●●●	Engineering

Action	Description	Adaptation (Strategy)	Mitigation (Goal)	Cost	Staff Time	Responsibility
Develop Fleet Management Plan	Fleet management means taking a systemic approach to purchasing, operating, and maintaining the Town's vehicle fleet. Through this plan, many aspects of vehicle quality and cost can be addressed, including mitigation efforts such as purchasing more fuel efficient vehicles, switching to alternative energy sources such as electric vehicles, and adopting more energy efficient driving techniques and maintenance practices. This is also an action listed in the ICSP.	N/A	✓ (Vehicle Fleet)	●●	●●●	All Departments
Overall Implementation						
Continue Implementation of Integrated Community Sustainability Plan (ICSP)	The ICSP contains actions designed to enhance the sustainability of the community, many of which positively support both adaptation and mitigation strategies described in this plan. ICSP priorities that support this plan include energy, food, transportation, local economy, education for sustainability, and municipal infrastructure. The Town is investing significant resources into the implementation of the ICSP through the use of the Gas Tax fund, and has retained a full-time Sustainability Planner to assist with implementation.	✓ (E, F, G, H, I, J)	✓ (All)	●●●	●●●	Planning
Join Partners for Climate Protection Program	Tracking progress toward meeting climate change mitigation goals is best done through public reporting of greenhouse gas emissions. By registering the Town with the national Partners for Climate Protection program, Council can demonstrate publicly its commitment toward addressing climate change. Through the program, municipalities work to achieve a sequence of "milestones" in reducing greenhouse gas emissions from corporate as well as community sources. This is also an action listed in the ICSP.	N/A	✓ (All)	●	●	Planning
Climate Change Action Plan Review	Conduct a regular review of this plan (approximately every 5 years) to ensure that it remains consistent with changing conditions and climate change science, provincial regulations, and community needs.	✓ (All)	✓ (All)	●	●●●	Planning

Recommendations for Regional Emergency Management Organization

The Town of Bridgewater recognizes that the Lunenburg County Regional Emergency Management Organization (REMO), and the other three municipalities that make up the REMO area (District of Lunenburg, Town of Mahone Bay, District of Chester), are critical partners in improving the community's ability to adapt to climate change, especially with respect to extreme weather events. The following actions have been identified as concrete opportunities for REMO to take initiative in climate change efforts, based on the adaptation strategies described above. The general timeframe for these actions is in the 5-7 year range. The Town of Bridgewater will continue to work with REMO to move forward on these and other adaptation actions.

Action	Description	Adaptation (Strategy)	Responsible Group / Agency
Emergency Planning			
Continue & Improve Regional Emergency Planning Efforts	REMO must continue its efforts to help Bridgewater and neighbouring communities prepare for the extreme weather events that are anticipated in this plan. Identifying threats, pooling resources, and increasing response effectiveness are some of the important actions REMO is already undertaking and needs to continue. Regional planning efforts need to be carefully integrated with municipal plans and resources, and support their development. REMO can also be instrumental in improving mutual aid agreements and communications between municipalities.	✓ (I, K, L, M)	REMO / Town
Improve Collaboration With Local Community Resources & Government Service Providers	Community resources and organizations are not sufficiently integrated into emergency response plans. Community aid organizations such as churches and food banks, as well as private businesses with essential skills and equipment have knowledge, resources, and labour to contribute to response efforts. REMO should work more closely with these other partners in planning and response coordination. In addition, essential government service providers, such as Community Services, especially those that serve vulnerable populations, should be collaborated with closely to ensure that negative impacts on the community are minimized during emergency events.	✓ (I, K, L, M)	REMO / Other Partners
Increase Community Education Efforts for Emergency Preparedness	Personal preparedness needs to remain a key strategy in regional and local emergency planning efforts. REMO and the Provincial EMO office must continue coordinating public awareness campaigns so that a greater percentage of residents will be prepared to face adverse conditions for up to 72 hours.	✓ (I, K, L)	REMO / Province
Assess Regional Fire Department Response Capacity	Fire Departments offer critical services during many types of emergencies, but face ongoing equipment and human resource challenges. Assessing regional fire department capacity is a critical and ongoing need to ensure that sufficient resources and manpower are available to deal with increasingly severe extreme weather events. This should be led by municipalities, in collaboration with the Province and REMO.	✓ (K, L)	Fire Services Coordinators / Province / REMO

Recommendations for Provincial Government

The Town of Bridgewater believes firmly that climate change adaptation is first and foremost a Provincial responsibility, and that leadership on this topic needs to start on the Provincial level. Climate change issues and potential solutions are mostly regional in nature, and beyond the ability for any one municipality to effectively tackle in isolation, given the limited resources and jurisdictional powers of Nova Scotia municipalities. The Province must act to create cohesive regional adaptation approaches and policy frameworks that genuinely work to protect all Nova Scotia communities including Bridgewater. The following have been identified as Provincial actions, without which local adaptation efforts will be compromised or even rendered ineffective. Actions are based on the adaptation strategies described above. The Town of Bridgewater will continue to advocate for the Province to move forward on these and other adaptation actions, and is willing to take part in consultations by the Province to see them achieved. Provincial actions on climate change mitigation are not listed in this section as they have already been addressed in the ICSP.

Action	Description	Adaptation (Strategy)	Responsible Group / Agency
Regional Climate Change Policies & Regulations			
Develop Regional Climate Change Strategies & Programs	There is currently no comprehensive strategy for addressing climate change adaptation on the Provincial level. Different departments work on these issues, but lack overall cohesiveness and uniformity. Significant differences and gaps in how departments regulate climate issues create confusion on the local level. For example, there is no comprehensive approach to coastal lands development and protection, which should be a key part of a regional adaptation strategy. Municipal efforts will remain fragmented without a strong, unified Provincial policy framework to work within.	✓ (All)	Province
Improve Regional Climate Impact Monitoring	The Province has undertaken or funded a number of initiatives that gather data on climate change impacts. However, these efforts are not cohesive, and monitoring is not comprehensive or continuous. Local adaptation efforts would be supported greatly by having more climate impact information available. Useful data includes biomonitoring / habitat change, flooding events, damage from storms, costs of infrastructure damage, etc.	✓ (All)	Province
Emergency Planning			
Improve Extreme Weather Event Forecasting & Messaging	Forecasting weather hazards is a provincial responsibility, as this cannot be done effectively at the local level. Without more effective communications methods, such as displaying emergency information on television channels, communication of critical emergency information to local residents is extremely limited, compromising the effectiveness of local emergency response efforts.	✓ (K, L)	Province / REMO
Assess Regional Fire Department Response Capacity	Fire Departments offer critical services during many types of emergencies, but face ongoing equipment and human resource challenges. Assessing regional fire department capacity is a critical and ongoing need to ensure that sufficient resources and manpower are available to deal with increasingly severe extreme weather events. This should be led by municipalities, in collaboration with the Province and REMO.	✓ (K, L)	Fire Services Coordinators / Province / REMO

Action	Description	Adaptation (Strategy)	Responsible Group / Agency
Strengthen Essential Government Service Provision	The Province provides many essential services in the community, especially for vulnerable populations including those with low income, disabilities, seniors, etc. Many services are already operating at their limits, and stress from extreme weather events will result in service overwhelm. This exposes families to significant health and safety risks if they are already only marginally able to meet their basic needs. Strengthening essential services and improving their resiliency should be a priority for the Province. Improved contingency planning should make up part of this strategy.	✓ (K, L, M)	Province
Create Check-Up Procedure for Vulnerable Populations	Responding to the needs of the sick, elderly, chronically ill, and people with mental disabilities, among others, is a Provincial responsibility. With these vulnerable populations facing the greatest risk from extreme weather events, the Province must ensure safety and the ability to meet basic needs during emergencies. By instituting regular check-up procedures and contacting these populations during emergencies, the risk of injury is reduced, requiring fewer limited emergency response resources to be diverted to them. This type of initiative should be instituted in collaboration with REMO.	✓ (K, L, M)	Department of Health and Wellness / REMO
Infrastructure Management			
Assess LaHave River Bridges for Climate Vulnerability	The bridges crossing the LaHave River have been identified as critically vulnerable infrastructures in Bridgewater. The Town is unable to independently assess them for their structural vulnerability, or make improvements to them, as bridges are a Provincial responsibility. The Province must comprehensively assess these infrastructures for their vulnerability, taking increased climate risks into consideration. Without this, the Town lacks confidence that these infrastructures are suitably designed and maintained.	✓ (F, K)	Department of Transportation & Infrastructure Renewal
Improve Electrical Service Contingency Planning	Vulnerability of electrical service during extreme weather events is a major threat to the community. Industry and government players involved in regulating and supplying electricity must improve contingency planning efforts to ensure that the power grid is resilient to extreme events.	✓ (K, L)	Department of Energy / Nova Scotia Power
Community Health & Wellbeing			
Reduce Social Inequities	Social & economic inequities are the reason for the climate vulnerability of many people in the community. These aspects of social wellbeing are the jurisdiction of higher levels of government. Ongoing initiative must be taken to reduce these inequities in the population through efforts in, for example, public transportation, affordable housing, energy & food security, as well as overall poverty reduction.	✓ (E)	Province / Federal Government
Improve Health of People Living with Chronic Diseases	Health and social services are barely able to keep up with increasing demands of the chronic disease burden. This forms a major threat to the ability of communities to cope with the additional health impacts brought on by climate change. The Province must make improving the long-term health of communities a key strategy within its climate change adaptation efforts. Changing social policy environments to promote health, and improved health promotion and public health investment is key.	✓ (E)	Province