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# Climate Change Adaptation Plan





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## A MESSAGE FROM THE MAYOR

I am very pleased to present the District of Saanich's Climate Change Adaptation Plan, the first Plan in the Capital Region that identifies climate change impacts in our community and the actions we can take to be ready for those changes. Advisory committees, employees, and residents have been instrumental in helping to create an innovative and collaborative Plan that will improve the resilience of our community to climate change. This Plan provides the final piece of Saanich's foundation for climate action, which also includes the Climate Action Plan and the Saanich Official Community Plan. By identifying the potential impacts and actions for the community and municipal operations, Saanich residents can be confident that Saanich is prepared to respond to an uncertain future of a changing climate.

A handwritten signature in black ink, reading "Frank Leonard". The signature is fluid and cursive, with the first name "Frank" and last name "Leonard" clearly distinguishable.

Frank Leonard, Mayor

# AN UNCERTAIN FUTURE

There is increasing evidence that human activities are already having a significant impact on the natural and man-made systems of our planet which will have long-lasting effects. Many of the impacts are materializing as climatic changes resulting mainly in increased summer and winter temperatures, increased frequency and intensity of wind and storm events, and sea level rise. Our natural environments and our cities are especially at risk to these changes. The sensitivity of ecosystems to change may mean a dramatic shift to existing habitats and to our natural environments as we know it. For communities, the concentration of people, buildings, infrastructure and transportation systems in a relatively small area, climate related impacts will have an adverse affect on economic, social, and environmental well being. Our future is not what we planned it to be and therefore, we must plan to adapt.

The risk is that the changes are unprecedented and we may not be prepared. If we wait to see what impacts are going to materialize, we risk being unable to effectively respond to manage the consequences that will result. In waiting, we also miss out on the opportunity to reduce the impacts and even capitalize on some of the positive benefits that could arise.



## WHAT CAN WE DO?

The District of Saanich has identified the need to adapt to climate change. From undertaking energy planning in the early 1980's to committing to carbon neutral operations by 2012, Saanich has been a leader in taking action. The purpose of the Climate Change Adaptation Plan is to identify priority adaptation impacts and actions the municipality should focus on in the short and long-term.

To prepare, we must first continue forward with our long-term strategy to reduce greenhouse gases (GHG) by implementing mitigation actions that address the root cause. The Climate Action Plan, approved by Council in April 2010, has set a path for the municipality to make these reductions.

Secondly, we must prepare to adapt to the changes and impacts that are coming or already underway. By preparing to adapt to this uncertain future, we will enhance the resilience of our natural environment and cities, reducing the risk that climate events will impact our community. Adaptation and Mitigation measures will overlap in some areas and these dual benefit actions will be a priority.

**MITIGATION** is action to reduce greenhouse gas (GHG) emissions – primarily carbon dioxide from combustion

**ADAPTATION** is making adjustments and preparing for observed or expected change in climate, in order to moderate harm and to take advantage of new opportunities

## WHAT CLIMATE CHANGES ARE EXPECTED FOR SAANICH?



Climate models predict the characteristics of future climate, which are typically expressed by changes in temperature, precipitation, and other factors.

The key general trends noted are:

- Increasing year round temperatures.
- Increased winter precipitation and decreased summer precipitation. Higher intensity storm events could include higher wind speeds.
- Sea level rise of 0.2 – 1.0m over the next 100 years.

These trends have been identified based on the climate data compiled in Table 1 below along with additional data on agriculture and tree species. Saanich has been fortunate to have a global leader in climate data modeling in our community. The Pacific Climate Impacts Consortium (PCIC), located at the University of Victoria, quantified the impacts of climate change and variability for the municipality.

**Table 1. Projected Saanich Climate Changes**

Category	Variable	Units	Historical Climate	Projected Future Climate Value and (change from historical)		
			(1961-1990)	2020's	2050's	2080's
Temperature	Annual Mean (°C)	(°C)	6.1	7.0(+0.9)	7.8(+1.7)	8.8(+2.7)
	Summer Night-Time Low		8.4	9.3(+0.9)	10.1(+1.7)	11.2(+2.8)
	Summer Day Time High		20.4	21.7(+1.3)	22.7(+2.3)	23.9(+3.5)
	Winter Night-Time Low		-3.4	-2.1(+1.3)	-1.2(+2.2)	-0.2(+3.2)
	Winter Day Time High		1.4	2.3(+0.9)	3.1(+1.7)	4.0(+2.6)
Precipitation	Annual Mean	mm/day	4.0	4.12 (+3 %)	4.2 (+5 %)	4.32 (+8 %)
	Winter Precipitation		6.7	6.9 (+3 %)	7.0 (+5 %)	7.4 (+11 %)
	Summer Precipitation		1.2	1.08 (-10 %)	0.98 (-18 %)	0.89 (-26 %)
Sea Level	Sea Level Rise (by 2100)	m from present	--	--	--	0.17 – 0.94
Agriculture	Frost Free Days	days per year	324	351(+27)	364(+40)	365(+41)
	Growing Degree Days	Deg-days>5°C	2026	2810(+784)	3513 (+1487)	4549 (+2523)
	Summer Heat Moisture Index	--	117.0	133.5	150.6	171.1
Forest species	Douglas Fir Suitability	(% suitability)	80 %	77 %	73 %	70 %
	Spruce Suitability		82 %	81 %	79 %	77 %

**NOTES:**

[1] All values are predicted mean – or average value.



## *Saanich is prepared for and resilient to the impacts of climate change.*

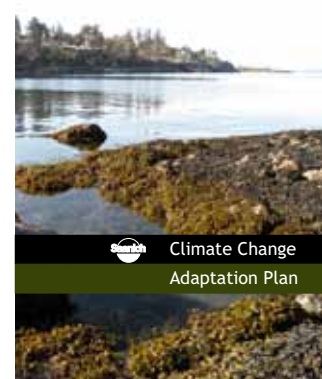
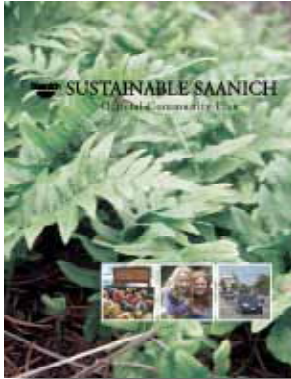
Saanich will become a climate change resilient community by preparing for the coming changes to all aspects of our community and reducing our greenhouse gas emissions.

To achieve this vision, the consideration of climate change impacts will become a regular part of community planning and municipal operations decision making from this point forward. We will do this by assessing risks and implement priority adaptation actions in key climate sensitive sectors.

This Plan is the third of three municipal plans which work together to reduce emissions and adapt to climate change. The first step was the completion of the Official Community Plan in 2008, which committed Saanich to support provincial climate action initiatives, to establish a climate action plan, and established a corporate emissions reduction target of 10% by 2010 from 2004 levels. This target was achieved two years early in 2008.

The second step was the completion of the Climate Action Plan in 2010 which contains strategies focused on the reduction of transportation, building, and waste emissions. The plan lays the foundation for community and municipal climate action to 2020 and beyond. The Climate Action Plan matches the Provincial reduction targets of 33% by 2020 from 2007 levels for community emissions and also commits to a 50% reduction in corporate emissions over the same time period. Working toward the goal of reducing Saanich's carbon footprint lowers emissions to the atmosphere and improves community resilience to climate changes and increasing fossil fuel costs.

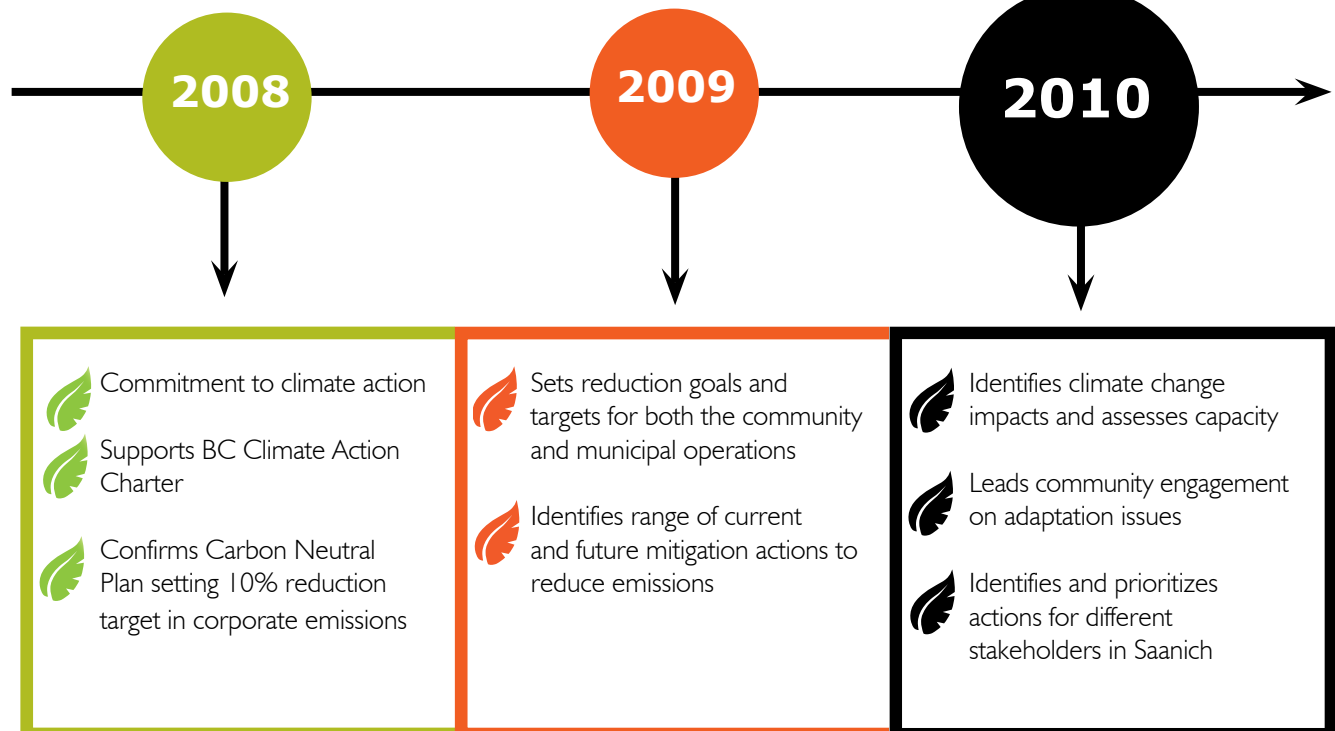
The final step is the development of this Climate Change Adaptation Plan that will prepare the community and our operations for the anticipated climate changes in the district. While the Official Community Plan provides overall guidance for community development, and climate related policies are implemented through the two climate action plans, all three of these plans are needed to properly respond to this challenge and provide a long-lasting foundation for climate change resiliency in the municipality.



## Official Community Plan

## Climate Action Plan

## Climate Change Adaptation Plan



# PROJECT FRAMEWORK

## PROJECT TEAM

This cross-departmental project was led by Stantec Inc., and Saanich's Sustainability Coordinator and supported by the following groups:

### **Saanich Management Group**

- A diverse group of Saanich Directors and Managers to oversee the development of the Plan.

### **Adaptation Specialists**

- Specialists in the field from provincial and regional levels of government to provide perspective to the project.

### **Advisory Committees**

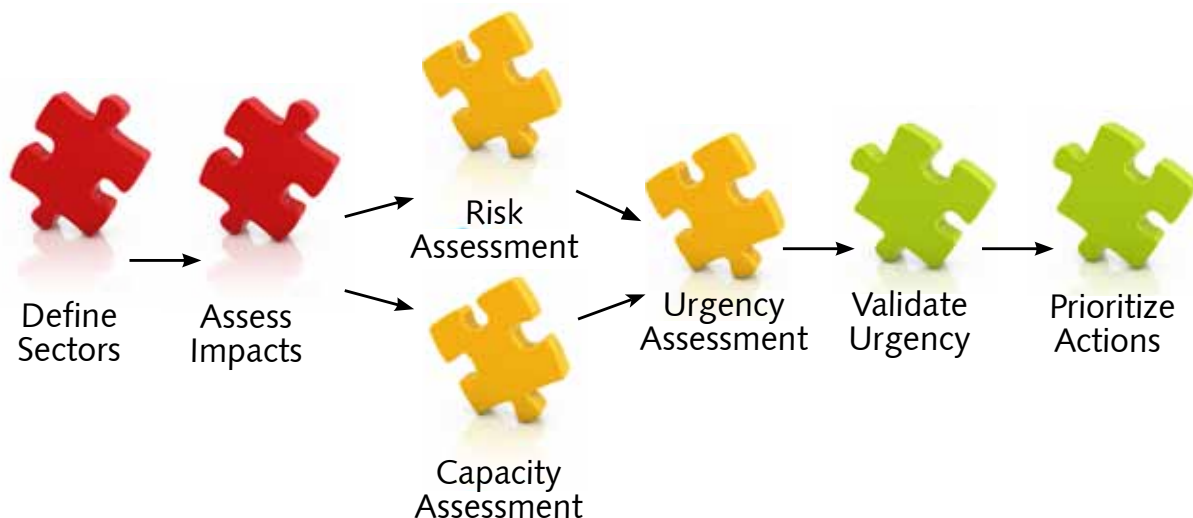
- Seven different committees consisting of residents and Councillors assisted in the validation and prioritization of impacts and actions.

### **The Public and Community Stakeholders**

- Vital to the development of this Plan was the contribution of ideas and concerns through workshops and engagement activities. These included a regional municipal operations workshop, key stakeholders workshop and community engagement through online materials and one-on-one events.

## TECHNICAL FRAMEWORK

To methodically identify and assess impacts for this project, the Stantec project team developed a customized framework based on a process previously used for local government adaptation planning. The framework provides a consistent structure to the plan development process. The extensive analysis used in this process is contained in the Adaptation Discussion Paper, this plan's supporting document which holds the detailed technical review behind the results produced in this Plan. The following graph outlines this process.





## DETERMINING IMPACTS

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Climate change adaptation planning is a highly localized endeavour that takes the findings from global climate models and translates the predicted changes in order to determine what impacts may occur to a local sector, such as transportation, infrastructure, ecosystems, etc. For this project, impacts were identified for each sector through workshops and interviews with key stakeholders and municipal staff from Saanich and around the region, adaptation expert contributions and municipal document reviews.



## ASSESSMENT AND IMPACT URGENCY

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Each identified impact was run through a risk assessment matrix to determine an initial risk rating (See Discussion Paper for detailed analysis). The risk assessment helps determine the severity to which an area is directly or indirectly impacted by climate change and how easily the impacts can be avoided or adapted to.

At the same time, the adaptive capacity of the Municipality to respond to each impact was reviewed. Adaptive capacity is the ability of a system to respond and absorb climatic changes with minimal disruption or cost. Sectors with a high adaptive capacity are better able to adapt to and absorb climate change impacts. For instance, in ecosystems, adaptive capacity often relates to the term “resilience” which is the ability of nature to absorb changes without changes to the overall health of an ecosystem.

Risk and adaptive capacity assessments then help determine the overall urgency of an impact for the community.



## VALIDATE AND PRIORITIZE

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The urgency of impacts was then validated through staff and expert reviews and a review by stakeholders and the community in general.

Through a combination of workshops and staff feedback, an extensive list of potential actions to address impacts was developed for each sector. Each action has been assigned a priority rating (High, Medium, Low) based on the urgency of the action it addresses or if the action has the potential to address many different impacts.

# SECTOR REVIEW

The following 10 sectors have been identified:

Ecosystems, Urban Forests  
and Parks



Infrastructure



Transportation and Mobility



Buildings



Agriculture



Energy Supply



Economic Development



Health



Land Use



Emergency Response





In the following sections, each sector is provided a review of:

## CURRENT STATUS BY SECTOR

A description of Saanich's current activities in the subject area including a discussion on the current climatic and non-climatic challenges the sector faces. Actions Saanich has already taken on to address some of the challenges are also identified.

## IDENTIFIED IMPACTS

Based on the expected climatic changes, impacts for each sector were identified and a risk rating of high, medium or low was assigned (based on assessing consequence and probability). The assessment rating implies a level of urgency to which that impact should be addressed.

## PRIORITY ACTIONS:

Actions have been prioritized as high, medium or low. A high rating requires the initiation of the action in 1-2 years, a medium rating in 3-5 years, and a low rating requires action within the next 10 years. It is important to note that it is extremely difficult to compare priorities across sectors. Priorities have been set to address the specific impacts identified for each sector.

Please note that some impacts considered to be a positive impact of climate change on a sector have not been included. This is an adaptation plan to increase resilience to climate change and positive opportunities may be summarized at a later date.



## SECTOR REVIEW

### ECOSYSTEMS, URBAN FORESTS AND PARKS



Saanich and its residents are considered to be leaders in the region in preserving and protecting the natural environment. Saanich's natural setting is characterized by Garry Oak ecosystem, marine shoreline, numerous freshwater lakes, streams, and creeks, undulating topography, diverse natural vegetation, and varied wildlife. Much of the Municipality's natural setting is adjacent to or part of built-up areas where natural systems have been altered. Saanich's Environmental Services section in the Planning Department works to conserve, protect and enhance through programs and increase awareness through numerous stewardship initiatives. It also has a significant network of watercourses and floodplains consisting of 14 watersheds and 6 major lakes. These systems provide habitat for fish, wildlife and nesting and migratory birds.

Saanich also has over 160 parks, covering more than 760 hectares, consisting of ocean beaches, creeks, lakes, meadows, forests, playgrounds, multi-use trails and sports fields. The Parks Division of Saanich operations encompasses park planning and design, construction, maintenance, horticulture, natural areas management and urban forestry.

Saanich already experiences impacts from development and has several tools and programs in place to build upon, to help manage impacts including:

- Watercourse, Tree Preservation, Subdivision and Zoning Bylaws.
- OCP Policy.
- Development Permit Areas.
- Natural State and Tree Protection Covenants.
- Parks and Recreation Master Plan (under review).
- Urban Forest Strategy.
- Invasive Species Management Strategy (under review); and
- Mapping of Environmentally Significant Areas and Ecosystems.

Based on the projected changes, increasing temperatures will have an impact on all natural systems, changing the range and tolerance of all species. Storm events will result in increased park damage. Stormwater flows also continue to increase pollution deposition, nutrient overloading, stream bank erosion thereby degrading soil quality, habitat and the ability to support local aquatic species.

Sea-level rise, combined with storm events, will subject areas to flooding. This includes tidal impacts (Gyro Park) and/or water erosion (Mount Douglas Park). Storm events will also increase the amount of damage and disease to urban forest. Many tree stands in Saanich are reaching a mature age as there is suppression of natural fire cycles.

It is important to note that the projected impacts will result in a wide range of changes to our natural systems. To properly assess the enormous effect that ecosystems will encounter, a much more detailed adaptation review will be required. For the purposes of this project, we are looking at impacts from a high level and for actions to broadly address our management of natural areas.



## IDENTIFIED IMPACTS

Impact	Urgency
1. Changes in survivability/suitability range of species (flora and fauna) and ecosystems (e.g., wetlands become more vulnerable to weather changes).	High
2. Loss of ecosystems due to watershed impacts, including watercourse impacts, tree blow downs, heavy snowfall, drier summers and stormwater impacts.	Medium
3. Change in frequency of invasive species and pests.	High
4. Changes in water quality and flow in aquatic ecosystems (ground water re-charge, loss of summer base flows).	High
5. Storm events may cause ecosystem degradation and increased ecosystems maintenance (e.g., due to blow down and stream bank erosion).	Medium
6. Erosion and change in marine shoreline habitat.	High

## PRIORITIZED ACTIONS

Planning	1-1	Conduct a detailed review to identify the many potential impacts from climate change and address adaptation for ecosystems and species.	High
Planning	1-2	Map ecosystems to create a baseline to monitor and plan for change. Create a database of representative sites for hydrology, species composition, etc.	High
All	1-3	Build support for long term restoration and review standards for planting trees, restoring ecosystems and landscaping.	High
Planning	1-4	Encourage residential use of rain barrels, rain gardens, downspout disconnections, bioswales and tree maintenance.	High
Parks	1-5	Ensure there are adequate resources and support for the actions identified in the Urban Forestry Strategy including monitoring of the urban forest canopy over time.	High
Engineering	1-6	Work with private landowners to acquire trail rights-of-way, easements, or other services provided by donation or bequest of privately owned lands or payment for services provided.	High
Parks	1-7	With long term conditions in mind, review standards for planting trees, restoring ecosystems and landscaping.	High
Planning	1-8	Conduct review of DP Guidelines, Environmental Protocols and other municipal development controls for adaptation objectives.	Medium
Parks	1-9	Conduct review of DP Guidelines, Environmental Protocols and other municipal development controls for adaptation objectives.	Medium
Planning	1-10	Build on ecosystem mapping in 1-1 to develop a program to monitor climate related changes to ecosystems over time.	Medium
Planning	1-11	Develop adaptation education programs for schools and community associations.	Medium
Planning	1-12	Monitor surface and groundwater hydrology, to assess impacts on wetland and marine ecosystems and opportunities for restoration.	Medium



## SECTOR REVIEW

### INFRASTRUCTURE

The Saanich Engineering Department which is comprised of three divisions: Engineering Services, Development and Facilities, and Public Works are responsible for roads, the water system, sanitary sewers, storm drains, street and traffic lights and most municipal facilities. The Engineering Services Division is responsible for coordinating the design, rehabilitation, improvement and reconstruction of all municipal infrastructure and facilities. The Public Works Division is responsible for the maintenance and repair of roads, bridges, traffic signals, streetlights, street signs, sidewalks, residential refuse collection, leaf pick up, garden waste drop off and disposal, drainage and sanitary sewer collection system, and the water distribution system.

Water is purchased in bulk from the Capital Regional District (CRD) who also maintains drinking water quality. Saanich owns and maintains the water distribution infrastructure (pipes and pump stations). Other than through water pricing, the municipality has limited capacity to influence demand. Little is known about private water supplies (wells) and the quality of water (typically in rural areas). Many private property water systems were installed decades ago and their condition is largely unknown.

Existing infrastructure has been designed according to established climate normals and design values in building codes and other infrastructure standards. Saanich faces an infrastructure deficit due to ageing infrastructure that is near the end of its useful life, but is already addressing it within their budget planning. This will require ongoing increases to infrastructure spending.



Saanich continues to support the CRD's conservation and demand management initiatives, residential water metering and sprinkling restrictions. Recently the CRD has discontinued rebates for high-efficiency appliances as they are now mandated by the provincial building code. Saanich also meters water consumption and charges customers based on their consumption. As new developments come on line, Saanich is requiring developers to replace aging infrastructure. Furthermore, for the past 4 years, Saanich has been setting aside reserves of funds for infrastructure in current and future year's budgets, has been installing backup generator systems for the municipal hall and for all new and retrofitted sewage pump stations in the case of an electricity failure, and has undertaken a condition assessment of pipes to assess age and type (as part of a replacement strategy). On an informal basis there have been occasions where design has

included additional capacity in infrastructure (e.g. stormwater) to account for possible climate change or other future impacts, though this is a subjective design decision and not based on formalized criteria.



## IDENTIFIED IMPACTS

Impact	Urgency
1. Water storage capacity may be more stressed from longer drier summers. Further demand management will likely be required to manage growth and climate changes. (e.g., low rainfall in the summer may result in water rationing, failing wells).	High
2. Change in potable water quality. Rain or snow events could result in sediment loads in winter requiring boil water advisory alerts or greater treatment levels. Warmer summer temperatures could increase the likelihood of taste and odour issues in water supplies that could result from anoxia or algae in reservoirs.	High
3. Infrastructure could be overwhelmed and causing damage to residences, buildings, infrastructure and ecosystems (inflow and infiltration increases, storm-sewer overflows, summer heat causing buckling, erosion of bridge culverts and pilings).	Medium
4. Increased frequency and intensity of storm events could result in electrical blackouts interrupting business continuity and cause other damage (e.g., causing the sewage system to backup which may result in fines or damage claims).	Medium

## PRIORITIZED ACTIONS

Engineering	2-1	Review and potentially develop new rainfall design criteria (intensity-duration-frequency or IDF curves) for storm water runoff. Establish criteria for 2050 and 2100 design lives.	High
Engineering	2-2	Develop a detailed inventory of municipal infrastructure and define its operational risks associated with extreme event impacts such as power outages, capacity limitations, health and safety impacts, etc.	High
Planning	2-3	Continue to support aggressive indoor and outdoor water demand management programs.	High
Planning	2-4	Work with the CRD to develop a protocol for emergency water conservation measures.	High
Engineering	2-5	Assess drinking water infrastructure for leaks and other losses.	Medium
All	2-6	Work to improve current BC Health and Building regulations about grey water and treated effluent re-use.	Medium
All	2-7	Require new developments and retrofits to incorporate water conservation measures and sustainable drainage systems.	Medium
Engineering	2-8	Require new roads, or retrofits to be built with Stormwater Management.	Medium
Engineering	2-9	Work with the Ministry of Environment to update Saanich Floodplain Bylaw.	Medium
Planning	2-10	Work with Environment Canada, BC Environment, and the CRD to review the adequacy of precipitation monitoring in Saanich.	Low
Planning	2-11	Identify 'no-development zones' where temporary water storage may be possible during a flood event.	Low

## SECTOR REVIEW

### TRANSPORTATION AND MOBILITY

The transportation network in Saanich is comprised of a provincial highway (Hwy 17), major roads and linkages to an airport and a large ferry terminal. This system is supported by two primary conventional bus trunk routes, cycling routes and pedestrian networks. The two major routes are supplemented by local routes and special transit services such as commuter express trips. The road network in Saanich totals more than 600 kilometers. The Engineering Department is responsible for transportation systems in this Sector and works jointly with the Planning Department to manage future systems and the movement of cyclists, pedestrians and transit users.



Temperature is one of the underlying parameters that affect road design and operation - as a result of the flux in temperatures, overall road maintenance has increased. Furthermore, increased traffic, due to population growth increases road wear and maintenance. Saanich has assessed the condition of existing roads but has a range of other existing challenges including narrow-rights of way, hilly topography and no parking management policies in place. Most major transportation routes within Saanich are not likely to be affected by flooding, due to geography and the continuous upgrades of the infrastructure system.

Past winter storms have resulted in the disruption of transportation systems. After a severe storm event, roads tend to be covered with debris and require cleanup as they are unsafe for drivers and cyclists. In the short-term, Saanich is limited by staff capacity to respond to all area swiftly after a large storm event.

Multi-use trails are also provided for movement of cyclists, pedestrians and many other forms of transport including strollers, scooters, and wheelchairs. The Saanich Trails Master Plan (Centennial Trails 2006 and beyond) project was initiated in 2003 to build upon existing trails and make multi-use trail connections east/west and north/south to all geographic areas of the municipality.



## IDENTIFIED IMPACTS

Impact	Urgency
1. Increased road and trail maintenance as a result of increased summer temperatures and use causing a redirection of fiscal priorities.	Low
2. Transportation systems may be impaired by intense and unforeseen storm events (flooding and snow storms) impacting structures such as bridges and roadside furniture (e.g., signs, streetlights, and variable message signs).	Medium
3. Increased rainfall will decrease mobility options in the fall/winter/spring (limiting active transportation for commuting; and, accessibility for vulnerable populations).	Low
4. Paved areas such as roads and parking lots will have a greater potential for heat island effects.	Low

## PRIORITIZED ACTIONS

Planning	3-1	Develop Saanich Mobility Plan	High
Planning	3-2	Support a shift towards low-carbon transportation and mobility at the Regional level to encourage the use of low-carbon technologies (explore options for LRT, car-sharing, providing amenities for electric bikes and scooters)	High
Engineering	3-3	Incorporate climate change impacts and adaptation measures into engineering departmental plan. Review and update transportation plans on a 5-year basis to reflect current and predicted changes in climate.	Medium
Engineering	3-4	Incorporate adaptation into transportation plans.	Medium
Engineering	3-5	Undertake a transportation infrastructure risk assessment as part of the municipal infrastructure review.	Medium
Engineering	3-6	Adopt best management practices for ground water-recharge and various structures in order to overhaul existing roadway/trail standards to increase ground water recharge (low impact development, gravel etc)	Medium
Engineering	3-7	Develop a detailed inventory of municipal transportation infrastructure and define operational risks from extreme events. (i.e. Road Drainage)	Medium
Planning	3-8	Work with large employers to pilot “telecommute working conditions” for appropriate worksites.	Low
Planning	3-9	Work with BC Transit and the Provincial government to reduce dependence on personal vehicle transportation system via land-use decisions	Low

# SECTOR REVIEW

## BUILDINGS

**Community Buildings:** Saanich has approximately 44,570 private dwellings, over half of which are single detached houses. There are a relatively high proportion of apartments/duplexes though only a small number are five or more stories.

**Municipal Buildings:** Saanich Facility Operations Division (a division of the Engineering Department) is responsible for the safe and efficient operation of all municipal facilities, including the Municipal Hall, Annex, Recreation Centres, Public Safety Buildings and the Public Works Yard.

Municipal buildings are aging and energy inefficient. Other challenges include an infrastructure deficit at recreational centers and physical damage to buildings that has occurred during past storm events.

Saanich is a relatively fully-developed community and thus, there is a considerable stock of residential homes built to historical building code standards. Saanich has identified specific urban centres as locations to concentrate buildings, public transportation hubs and increased density. Saanich currently utilizes Development Permit Area (DPA) Guidelines to guide and regulate growth throughout the municipality.



Specific residential areas are subject to occasional flooding and damage as a result of storm events including areas of Cadboro Bay, Mount Douglas Park and parts of the Gorge waterway. Saanich utilizes a Floodplain Development Permit Area to reduce development in flood-prone areas as well as limit the building of structures below the floodplain elevation. Saanich is replacing infrastructure and building added capacity into design on a case-by-case basis and as a result, Saanich has noted a decline in properties that are subject to flooding.

Saanich has developed an Urban Forestry Strategy which can contribute to reducing the urban island heat effect and summertime energy usage. For all new municipal building retrofits, Saanich is incorporating green standards and is currently developing green development standards.



## IDENTIFIED IMPACTS

Impact	Urgency
1. Increased costs associated with insurance costs, building energy usage and energy reduction retrofits as well as landscape retrofits.	High
2. Physical damage and deterioration of buildings and structure due to water damage, fires and extreme weather conditions (e.g., wind, snow, heat waves).	Medium
3. Damage to buildings and structures located in coastal areas due to storm-surges and rising sea levels.	Medium

## PRIORITIZED ACTIONS

Planning	4-1	Continue to support community building mitigation actions (Strategy 2) in Climate Action Plan that make all buildings more energy efficient.	High
Engineering	4-2	Identify high priority municipal buildings for structural and energy efficiency upgrades.	High
Planning	4-3	Support energy labeling of residential buildings at point-of-sale.	Medium
Engineering	4-4	Define operational risks of municipal buildings inventory associated with extreme event impacts such as power outages and flooding.	Medium
Planning	4-5	Enhance municipal building policy for civic buildings to achieve higher energy-efficiency standards.	Medium
Planning	4-6	Work with property owners in sea level rise threatened areas to increase resiliency to storm events.	Medium
All	4-7	Support climate change considerations and flexibility into building codes and standards.	Medium
Planning	4-8	Continue to encourage innovative building design including solar orientation, green roofs, light coloured roofing (low albedo) and other green standards.	Low
Planning	4-9	Continue to work with local developers to encourage the development of resilient residential and commercial buildings.	Low

# SECTOR REVIEW

## AGRICULTURE



At present, island food producers provide approximately less than 10% of the food consumed on the island; a significant decrease from 50 years ago when food producers provided 85% of the food for the island. As a result, Saanich is working with the Capital Regional District, the Province, food producers, the Vancouver Island Health Authority, municipalities, and other stakeholders to develop a long-term plan for improving local and regional food security. Agriculture within Saanich falls under the jurisdiction of the Planning Department.

According to NRCAN and the BC Provincial Agricultural Plan, farming operations are subject to many common ailments which are resulting in the declining role that agriculture has in BC's economy. Such climatic and non-climatic ailments include:

- Temporary loss of arable land due to flooding;
- Permanent loss of arable land through increased development and urban sprawl;
- Rising energy prices;
- Competition for potable water use to irrigate lands; and,
- Incidence of heat stress and disease/pest outbreaks.

For agricultural businesses, farmers struggle to earn a living wage off the land and are confronted with many layers of policy governing acceptable practices for farming activities and land-use. There is increased development pressure to convert farmland into urban developments.

To mitigate this pressure, Saanich uses the Urban Containment Boundary to separate urban from rural land uses in order to prevent further suburban sprawl outside the boundary whilst increasing the intensity and concentration of development in appropriate centres. This policy provides added protection of farmlands, environmentally sensitive areas and green space. Saanich can assist with the implementation of various strategies and policies to support local food production, but is limited by funds and resource.



## IDENTIFIED IMPACTS

Impact	Urgency
1. Reduced crop productivity and crop failures due to drier/hotter summers, increased disease/infection of crops and the temporary inundation of land due to flooding.	High
2. Increased water demand and irrigation infrastructure.	High
3. Increased population will result in increased development pressures to convert agricultural land.	Medium
4. Increased conflict between pest-management and integrated pest-management.	Medium
5. Reduced crop productivity and crop failures due to drier/hotter summers, increased disease/infection of crops and the temporary inundation of land due to flooding.	High

## PRIORITIZED ACTIONS

Planning	5-1	Incorporate climate change impacts and adaptation measures into agricultural zone planning.	High
Planning	5-2	Update current land-use policies and zoning to allow for urban agricultural.	High
Planning	5-3	Map out food production opportunities based upon predicted changes in climate.	High
Planning	5-4	Develop an agricultural presence on the Saanich Webpage.	High
Parks	5-5	Implement agro-forestry into municipal parks and boulevards.	Medium
Planning	5-6	Work with the Ministry of Agriculture to provide information on best management farm practices that retain soil moisture.	Medium
Parks	5-7	Conduct review of DP Guidelines, Environmental Protocols and other municipal development controls for adaptation objectives.	Medium
Planning	5-8	Establish an annual “Communities in Harvest” program in the municipality.	Medium
Planning	5-9	Provide educational material on and encourage the use of integrated pest-management.	Medium
Parks	5-10	Promote and support the expansion of community gardens.	Medium

## SECTOR REVIEW

### ENERGY SUPPLY

Both the Saanich community and municipality rely on hydro electricity (61% of total building energy demand), natural gas (23%), heating oil (10%) and propane and gasoline (multiple suppliers) for the purposes of heating/cooling buildings of all types. Saanich relies on the transmission or transport of these energy sources to the island from mainland B.C. When we look at managing our reliance on these energy sources, we must also consider the mitigation opportunities based the emissions from each source.

#### Saanich Building Energy Demand and Emissions

Type	% of Building Energy Demand	% of Total GHG Emissions
Hydro Electricity	61%	15%
Natural Gas	23%	50%
Heating Oil	10%	30%
Propane	6%	5%

Saanich also relies on the delivery of transportation fuels from sources off Vancouver Island. Gasoline accounts for 85% of total fuel consumption while diesel and other fuels account for the other 15%.



Many buildings are heated and cooled using fossil fuels that have been subject to increasing prices as a result of global supply, demand and conflicts. The public and governments are placing pressure on energy users to address climate change and take actions to reduce Greenhouse Gases (GHG's). Past storms and vulnerable energy distribution systems has resulted in blackout periods.

The municipality has a number of green building incentives such as building permit fee rebates, expedited "green" building permits, energy efficiency design assistance and free Energuide assessments. Saanich also promotes the use of solar hot water technologies. With respect to fuel supply management, Saanich participates in the E3 Fleet Management Program, is planning to develop a corporate Transportation Demand Management Program and is using incentives, deploying educational programs, working with BC Transit to increase ridership and is building new trails, sidewalks and bike-lanes to reduce the amount of vehicles on the road as well as fossil fuel dependency.

Transportation systems are subject to price increases and expectations. The resources and technologies available to them limit what the energy and fuel supply management and reduction strategies that Saanich can focus on. Saanich has phased in a fleet of hybrid vehicles and while additional vehicle purchases may be limited by budget challenges the municipality continually upgrades the fuel efficiency of the fleet through each vehicle changeover. Saanich is developing a corporate Transportation Demand Management Program. In the community educational programs and work with BC Transit will help increase ridership along with the building of new trails, sidewalks and bike-lanes to reduce the amount of vehicles on the road.



## IDENTIFIED IMPACTS

Impact	Urgency
1. Interruptions in the energy supply chain as a result of extreme weather related impacts both locally and globally.	High
2. Increase in heating and cooling (for all buildings) demands resulting in increased energy costs for the Saanich municipality and community.	High
3. Increasing operational costs (fuel increases, carbon tax levies) for all organization types in Saanich.	High
4. Increase in fuel/energy demand.	Medium

## PRIORITIZED ACTIONS

Planning	6-1	Work with BC Hydro to reduce peak loads during extreme events (heat waves, winter storms) through educational programs.	High
Planning	6-2	Encourage the use of alternative energy systems (e.g. solar panels, wind energy, and geo-exchange).	High
Planning	6-3	Establish programs for businesses in the community to assist in the reduction of energy consumption.	High
Planning	6-4	Continue to promote the use of trees to shade buildings, green-roofs and high-albedo surfaces to reduce urban heat and energy heating/cooling demands.	High
Planning	6-5	Develop a renewable energy map that identifies possible locations for district energy systems.	Medium
Planning	6-6	Support appropriate densification per the policies of the Official Community Plan, in an effort to create opportunities to develop district energy systems and support alternative transportation.	Medium
Planning	6-7	Create a Development Permit Area(s) for the evaluation and/or incorporation of alternative energy systems in new and retrofit developments.	Medium
Planning	6-8	Work with other Municipalities to coordinate the development of a regional approach to energy demand and supply management.	Medium
Planning	6-9	Undertake thermal imaging to identify urban hotspots for prioritizing cooling programs.	Medium
Engineering	6-10	Invest in alternative fuel-vehicles such as biodiesel, hybrids and electrical vehicles.	Medium
Planning	6-11	Develop and implement Electric Vehicle Strategy	Medium



## SECTOR REVIEW

### ECONOMIC DEVELOPMENT

Within Saanich, the industries with the highest labour force include: public administration, the retail trade sector, education, some tourism, and accommodation and food services. In 2008, the number of business establishments without employees was higher than the number of businesses with employees and thus it can be said that Saanich primarily accommodates small businesses. A large part of Saanich's revenue comes from development via Development Cost Charges (DCC) and land tax revenues. The Finance Department is responsible for the overall management of the financial affairs of the municipality, purchasing, occupational health and safety, information technology and strategic planning.

As noted in the Saanich OCP, there are some barriers to economic development within Saanich. These include the geographic constraints of an island location, limited availability of land for new large scale commercial and industrial development, an aging workforce, shortages of skilled workers in many sectors, significant pockets of unskilled people, a significant number of lower income service sector and tourism jobs, a lack of affordable housing, traffic congestion, and a complex regulatory environment. These issues will be further strained by climate change impacts.



Saanich uses policies and zoning to ensure growth is concentrated in desirable areas and has incentives/ programs in place to support the community. However, significant residential development has occurred along the shoreline and in or near other flood prone areas that could be particularly vulnerable to a changing climate. Municipal departments are challenged with a limited capacity (financial resources and staff), increased community expectations and increased subject matter that continually needs to be reviewed at a high level of rigor.



## IDENTIFIED IMPACTS

Impact	Urgency
1. Increased precipitation and wind events will cause damage to buildings and could increase insurance costs as well as limit developable areas.	High
2. Increased financial demands can be expected from both climate and non-climate related impacts. The impacts reviewed in the other sectors will all have financial implications to municipal finances (greater demand on infrastructure and municipal resources).	High
3. Increase in GHG emissions as a result of increased workforce and business.	Medium

## PRIORITIZED ACTIONS

Finance	7-1	Incorporate adaptation into Saanich financial planning.	High
Engineering	7-2	Develop a system to build reserve funds to retrofit existing or handle damage to infrastructure and buildings in the future (replacement strategy).	High
Engineering	7-3	Prioritize and develop solutions such as retrofit technologies for the most critical building structures and infrastructure types.	High
Planning	7-4	Develop educational/supportive materials for private sector developers on incorporating climate change into planning and development decisions.	High
Planning	7-5	Update development control bylaws to achieve more adaptive developments.	Medium
Planning	7-6	Develop educational material for the general public coastal zones vulnerable to sea-level rise and storm-surges.	Medium



## SECTOR REVIEW

### HEALTH



Saanich provides public services and amenities in the community that are affordable, accessible and inclusive. Saanich has four community recreation centres and a Community Services section that provide accessible, affordable, and inclusive recreation programming, ranging from sports and fitness opportunities to the organization of special events and activities. The health and well-being sector is supported by all of Saanich's departments either directly or indirectly. Community Centres house aquatic facilities, arenas, fitness studios, gymnasiums, youth activity centres, art studios, indoor tennis courts, food services and a variety of multipurpose program space. The Saanich Police department provides works with local partners to ensure the continued safety and security of the community.

Saanich's aging population will become one of the most vulnerable groups in our community in relation to climate change. Such vulnerable populations pose a growing challenge for Saanich as it relates to program development, accessibility and infrastructure in the coming years. The Municipality has limited capacity both in staff and resources to undertake new initiatives.

Overall, Saanich has many programs and services in place to improve the well-being of the community. Saanich is focused on the creation of walkable community-oriented neighbourhoods which increase the local social networks

thereby enhancing some resiliency to climate-related effects. Saanich is also currently implementing adaptable housing requirements to improve the accessibility of residential buildings which will enable citizens to remain at home while they age, experience injury or illness. However, all programs are limited by resources. As the frequency and severity of natural hazards increase, the costs associated with these hazards are likely to increase exponentially. As it relates to early warning detection systems and emergencies, many of the former do not exist and capacity could be limited severely if two or more events occur at the same time.



## IDENTIFIED IMPACTS

Impact	Urgency
1. Increased incidence of insect / water-borne diseases.	Medium
2. Degraded air quality and extreme weather (heat waves) related illnesses, injuries and deaths.	High
3. Increased incidence of flooding and fires.	High
4. Potential increases in electricity / fuel costs and power outages.	High
5. Water shortages and poor water quality.	High
6. Increased precipitation and storm severity could impact transportation and food supply routes.	Medium
7. Increased demands on emergency response system.	High
8. Increased vulnerability of aging, homeless and vulnerable populations (e.g., children, mentally ill, people with existing health problems).	High
9. Increased demand for certain local government services (e.g., recreational centers being used to get out of heat and cold) and degradation of facilities from overuse.	High
10. Increased population migration will place greater pressure on health care system and facilities.	Medium

## PRIORITIZED ACTIONS

Engineering	8-1	Work with the CRD to prepare strategies to prevent and respond to water shortages and/or poor water quality.	High
Planning	8-2	Conduct public education on climate-related health threats (vector borne diseases, heat, air pollution, floods and storms)	High
Planning	8-3	Work with the CRD, Ministry of Health, the Ministry of Environment and other municipalities to prepare strategies to prevent impacts from vector-borne diseases, including: - Early detection and warning systems; - Infestation control; and - Develop backup systems.	High
Fire	8-4	Work with the Ministry of Health, the CRD and member municipalities to prepare strategies to reduce health and security impact from extreme heat weather events, by deploying a health monitoring alert and response systems.	Medium
Engineering	8-5	Work with BC Transit, CRD and the Ministry of Transportation to prepare strategies to reduce the risk of transportation impacts and air pollution impacts.	Medium

## SECTOR REVIEW

### LAND-USE



Saanich is the largest Municipality in the Capital Region with an area of 103.44 km<sup>2</sup> (39.94 sq. miles). It's physical setting comprises 29.61 km (18.39 mi.) of marine shoreline, 3.3 km<sup>2</sup>(1.3 sq. mi.) of freshwater lakes, numerous natural watercourses, a diverse undulating topography with elevations ranging from sea level to 355 m (1164 ft.), and a landscape that includes glacially scoured rock outcroppings, farmland, dense woodlands, and an extensive system of open space and parkland. Approximately half the Municipality is urban and half rural/agricultural. The Planning Department is

comprised of five Divisions: Community Planning, Environmental Services, Subdivision, Special Projects and Inspections/By-law Enforcement. These Divisions manage all activities and applications relating to long range and current planning, subdivision review, building construction, environmental protection, sustainability initiatives and by-law enforcement

Ecosystems are subject to drier conditions, disease and damage due to windstorms, stormwater runoff and increased usage by the population. Tree retention is a contentious issue with the community and developers (trade-offs). Some private homes are subject to flooding, tidal (Gyro), water erosion/bank slumping (Mount Doug) during major storm events. Municipal buildings and infrastructure are aging and are in need of replacement. Physical damage to private buildings and infrastructure has occurred during past storm events. There are current pressures to develop existing green spaces. Municipal department has limited capacity both in staff and resources to undertake new initiatives.

Land-use development in Saanich is guided by the Official Community Plan (OCP) at the municipal level, which in turn must align with the CRD Regional Growth Strategy (RGS). At this time, there is no requirement for communities to investigate or plan for climate change adaptation or risk reduction strategies; however, Saanich's Official Community Plan (2008) does require that Saanich complete a Climate Change Adaptation Plan. Saanich has in place many programs that assist with adaptation efforts such as zoning and subdivision by-laws and Development Permit Agreements (DPA); however, the undertaking of any actions identified will be limited by internal capacity (both resources and funding).



## IDENTIFIED IMPACTS

Impact	Urgency
1. Warmer temperatures and an increasing population will result in increased pressure to develop existing green spaces, preserve ecosystems, and increase agricultural farmland (increased conflict/competition for land use).	Medium
2. Zoning area bylaw impacts. Increased storm events and sea-level rise may result in the impairment of transportation routes, fires, disease outbreaks, droughts, inundation of green spaces and developed areas. These effects may be exacerbated by inter-related climate all of which will likely result in zoning area by-law impacts and changes.	High
3. Expectations of the municipality to mitigate and adapt will increase in the community.	High

## PRIORITIZED ACTIONS

Planning	9-1	Develop educational/supportive materials developers on incorporating climate change into planning and development decisions.	High
Planning	9-2	Use the development review process to consider the use of variances and density bonusing to secure or restore public amenities that could support and buffer climate related impacts (e.g., flooding, heat effect, etc).	High
Planning	9-3	Update the Development Permit sustainability checklist to include adaptation considerations for all land-use proposals.	High
Planning	9-4	Designate coastal hazard zones and establish erosion setback requirements to limit development in high hazard coastal zones.	Medium
Planning	9-5	Implement integrated coastal zone management practices (incorporate the resilience of coastal ecosystems into assessing coast developments or retrofits).	Medium
Engineering	9-6	Re-assess areas with flooding potential and consider raising the requirement for building within the Floodplain Bylaw.	Medium
Planning	9-7	Develop educational tools for the general public on the risks of building or acquiring homes in coastal zones vulnerable to sea-level rise and storm-surges.	Medium



## SECTOR REVIEW

### EMERGENCY RESPONSE

The Public Safety and Emergency Planning Committee assesses and acts on emergency planning issues according to prescribed statutes, bylaws, policies and standards, and develops policies on emergency preparedness, fire and life safety and transportation safety. The Public Safety and Emergency Planning Committee also advances emergency management initiatives in the municipality, and may collaborate with other stakeholders at any time for the informal exchange of ideas. All planning and response initiatives in Saanich utilize the British Columbia Emergency Response Management System (BCERMS) and the Incident Command System (ICS).

The Saanich Fire Department is responsible for providing all proper measures to prevent, control and extinguish fires and provide assistance to medical emergencies, land and marine rescue operations, requests from other fire services, hazardous materials incidents and requests for public service. The Saanich Fire Department is also responsible for the administration of the Saanich Emergency Program, which in turn, is responsible for municipal emergency management activities including department and municipal emergency planning, staff preparedness and training, inter-agency liaison and mitigation activities. There are approximately 120 Municipal Staff who have received training regarding their respective role in Saanich's Emergency Operations Centre. The Emergency Program in Saanich also contains three volunteer response components: Emergency Social Services (ESS), Search and Rescue (SAR) and an Amateur Radio Emergency Communications Team (COMMS). The Saanich Emergency Program collaborates with other local authorities and stakeholders through the Local Government Emergency Program Advisory Commission and the Regional Emergency Coordinators Advisory Commission.

The Saanich Police Department supports the Emergency Program during emergency events. It is therefore important that the department is equipped with suitable response equipment and connected into the Program.

A Hazard, Risk and Vulnerability Analysis (HRVA) has been conducted for Saanich and incorporated into the Emergency Response and Recovery Plan. The risks associated with future climate change will be determined by the interaction of hazards and vulnerability. Current hazards related to adaptation that could affect Saanich include:

- Animal Diseases
- Human Diseases and Pandemics
- Blizzards
- Wind Storms
- Landslides, debris flow
- Snow Storms
- Storm Surges
- Localized Flooding
- Wild land-Urban Interface Fires

Current stressors to the Emergency Response system within Saanich are resource capacity and availability in a time of emergency. On a single event basis, emergency services are quite capable and have the resources to coordinate a response to an emergency. However, capacity could be limited severely during large scale emergencies or when two or more events occur at the same time (e.g., earthquake during a heat wave). The Saanich Emergency program reviews and updates the Emergency Response and Recovery Plan on an annual basis.



## IDENTIFIED IMPACTS

Impact	Urgency
1. Health impacts related to an increased frequency of extreme climate events and climate-related natural disasters (e.g. increase in medical first responder calls during a heat wave).	Medium
2. Increased fire dynamics and fire management in natural areas.	Medium
3. Interconnected climate and non-climatic impacts occurring simultaneously both locally and regionally (e.g. a human - caused fire during a drought).	High
4. Economic costs arising from increased cost of emergency management, preparedness (e.g., resources, training and equipment) and insurance costs.	High
5. Increase in vulnerability of aging population and homelessness.	High

## PRIORITIZED ACTIONS

Fire	10-1	Review hazard specific plans within the Emergency Response and Recovery Plan to reflect and account for risks associated with climate change.	High
Fire/Police	10-2	Partner with other Local Authorities in an effort to ensure provincial funding for emergency management training and response related cost reimbursement is a priority.	High
Fire/Police	10-3	Participate in regional initiatives to develop and implement regional planning that supports emergency services to function together, train for disasters and operate in multiple climate and non-climate related events that occur simultaneously.	High
Fire/Police	10-4	Increase the capacity of municipal departments to cope with extreme weather related events through the development of formalized procedures for departmental operation centers (DOC's).	High
Fire	10-5	Work with the health authority and provincial government to assist at risk populations during extreme weather events.	Medium
Fire	10-6	Work with Parks Department on fuel management best practices in areas deemed of high fire risk.	Medium
Fire	10-7	Review permit requirements and policies for developing in areas identified to be at high fire risk.	Medium



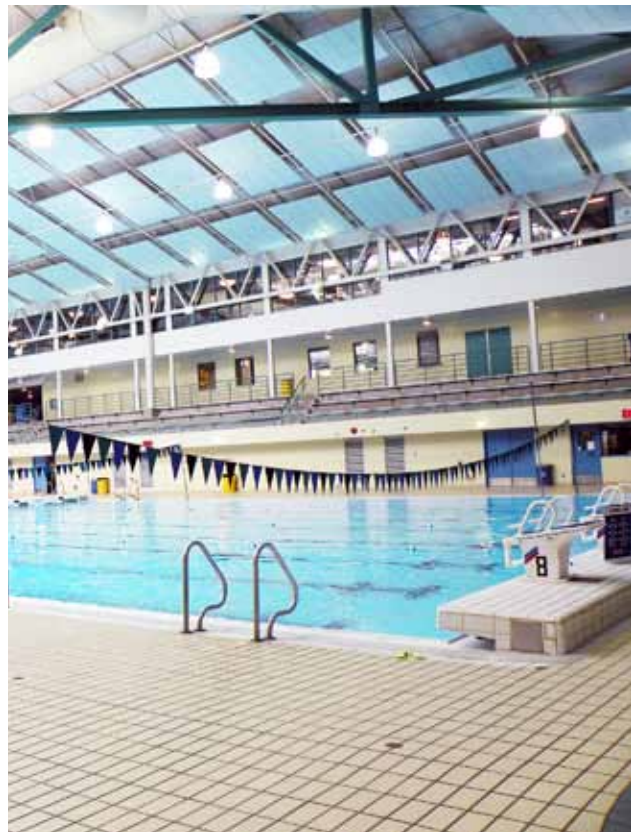
## IMPLEMENTATION

There are some key adaptation challenges that Saanich faces including:

- Climate change adaptation is a new area of activity
- There are many unknowns and we don't really understand what the future will bring.
- Most actions require additional resources.
- The impacts identified extend well beyond the municipality's borders.
- Many of the actions are related to higher levels of government.

In total, 87 actions have been identified. Staff time, resources and management of conflicting demands (e.g., environmental ethic, park-use conflicts) will be required to undertake many of the actions identified within this plan and the challenge for Saanich will be to use available resources most efficiently. The actions identified in this Plan have been prioritized by experts, stakeholders and citizens of Saanich. Each of the actions listed will be integrated into municipal departmental plans where funding commitments are tied into the Saanich budgeting process.

The extensive and wide range of actions have not been flagged with completion dates, benefit/cost-estimates, and funding allocation, because the scope of many actions cannot not yet be determined. The actions listed in this plan will instead function as a "priority-list" which staff and the community can use to identify and prioritize initiatives to build adaptive capacity in the Saanich community as and when opportunities arise. To ensure accountability, every 3 years this plan will be updated to review the status of impacts and actions.





## PARTNERSHIPS

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There are several groups that the municipality has connected with to develop this Plan. A Natural Resources Canada initiative, the Regional Adaptation Collaborative (RAC) has provided partial funding and development support to this project. Saanich is a member of the British Columbia RAC, contributing to a knowledge base developing across Canada. Following the endorsement of this Plan, the municipality will continue to engage with the RAC membership, seeking opportunities to learn from the experience of others.

In the province, some BC communities have undergone adaptation assessments including Kimberly, Elkford, Prince George, Richmond and Metro Vancouver. Recognizing the importance of adaptation to climate change the Government of British Columbia has released a high-level Adaptation Strategy that includes development of adaptation tools and transfer of adaptation knowledge.

In the Capital Regional District, the CRD's Climate Action Program contributed to this project and will be assisting all municipalities in managing adaptation issues in the future. Saanich has also included other municipalities in our workshop engagement for the purpose of sharing our results, understanding that we must work together to achieve our goals.

## ACKNOWLEDGEMENTS

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**Natural Resources Canada and The Fraser Basin Council**

**Stantec Consulting**

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**British Columbia Ministry of Environment, Climate Action Secretariat** - Jenny Fraser, Climate Change Adaptation Specialist

**British Columbia Ministry of Rural and Community Development** - Cathy Leblanc, Senior Planner

**Capital Regional District** - Sarah Webb, Climate Action Coordinator

**Michelle Laurie** - Climate Change Adaptation Advisor to Stantec

Valuable contributions were also made by a large group of key stakeholders and experts in the region and from management within other Capital Regional District municipalities. A list of these participants is provided in detail in the supporting Discussion Paper.

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Natural Resources Canada's Regional Adaptation Collaborative Program**



Natural Resources  
Canada

Ressources naturelles  
Canada

**Canada**



## GLOSSARY

### **Adaptation**

Adjustment in natural or human systems in response to actual or expected climatic changes.

### **Adaptive Capacity**

The collective of capabilities, resources and institutions of a country, region, community or group to implement effective adaptation measures.

### **Climate Change**

Any long-term change in the “average weather” that a given region experiences. Average weather may include average temperature, precipitation and wind patterns. It involves changes in the variability or average state of the atmosphere over durations ranging from decades to millions of years. These changes can be caused by dynamic processes on Earth (ocean processes, volcanoes), external forces including variations in sunlight intensity, and more recently by human activities.

### **Capital Regional District**

The provincially established federation of local governments and administrative districts providing services to the capital region.

### **District Energy**

District Energy is the distribution of thermal energy using a pipeline distribution system. The central thermal plants may use various types of fuel including natural gas, oil or renewable energy sources. Heat may be generated from either purchased fuel or waste heat.

### **E3 Fleet Program**

E3 is a Canadian, independent, non-profit managed system for “greening” fleets. E3 stands for Energy, Environment, and Excellence – the core focus of the system. <http://www.e3fleet.com/>.

### **ecoEnergy**

The ecoENERGY initiative is a Federal Government program that aims to provide Canadians with clean energy through energy efficiency, renewable sources of energy and greater investment in new energy technologies.



## **Extreme Weather Event**

An extreme weather event refers to meteorological conditions that are rare for a particular place and/or time, such as an intense storm or heat wave. An extreme climate event is an unusual average over time of a number of weather events, for example heavy rainfall over a season resulting in floods.

## **Greenhouse Gas (GHG)**

Gases present in the atmosphere which reduce the Earth's loss of heat into space and therefore contribute to increases in global temperatures through the 'greenhouse effect'. Greenhouse gases are essential in maintaining the temperature of the Earth, however, an excess of greenhouse gases can raise the temperature of the planet. Based on ice-core samples and records, current levels of CO<sub>2</sub> are approximately 100 ppmv higher than during pre-industrial times when direct human influence was negligible. Greenhouse gases include carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), sulphur hexafluoride (SF<sub>6</sub>), perfluorocarbons (PCF's) and hydrofluorocarbons (HFC's).

## **ICLEI**

The International Council for Local Environmental Initiatives (ICLEI) is an international organization that brings together local governments with national and regional government organizations which have made a commitment to sustainable development. ICLEI provides technical consulting, training, and information services to build capacity, share knowledge and support local governments in the implementation of sustainable development and climate change adaptation measures at the local level.

## **Mitigation**

Measures taken during the planning, design, construction and operation of work and development to alleviate potential adverse effects of climate change; these include strategies taken to reduce GHG sources and emissions and enhance GHG sinks.

## **Official Community Plan**

The principal legislative tool for guiding the future growth and change in Saanich. The Official community Plan (OCP) is an expression of the fundamental values and goals of the community. It establishes directions for achieving a collective vision of what Saanich should be.

### **Risk**

A combination of the likelihood and the expected consequence of an adverse event such as a climate related hazard.

### **Sea-level rise**

An increase in the mean level of the ocean. Sea levels can rise at a global level through an increase in the volume of the world's oceans or at a local level due to ocean rise or land level subsidence.

### **Sensitivity**

Sensitivity is the degree to which a system is affected, either adversely or beneficially, by climate variability or change. The affect may be direct, such as a change in the mean, range or variability in precipitation or indirect, such as damages caused by rising sea-levels.

### **Stakeholder**

A person or an organization that has a legitimate interest in a project or entity, or would be affected by a particular action or policy.

### **Sustainability or Sustainable Development**

The concept of meeting the needs of the present without compromising the ability of future generations to meet their needs. Sustainability is based on the efficient and environmentally responsible use of natural, human, and economic resources, the creation of efficient infrastructures, and the enhancement of residents' quality of life.

### **Uncertainty**

An expression of the degree to which the future state of the climate system is unknown. Uncertainty can result from lack of information or from disagreement about what is known or knowable.

### **Urban Forest**

Saanich's urban forest is the sum of all trees and their associated growing environments within the municipality. It is the entire collection of trees growing on parks and private lands, on commercial and institutional lands, along highways, roads, trails and paths, as well as throughout open spaces in the community.



## **Urban Forest Strategy**

The Urban Forest Strategy has created a long-term plan for achieving a sustainable urban forest in Saanich. The Saanich Urban Forest Vision is “The urban forest in Saanich is a highly valued asset comprised of a rich and diverse forest that is widely recognized and appreciated for the contribution that it makes to our community and to our sustainable environment.

## **Vulnerability**

Vulnerability is the degree to which a system is susceptible to, and unable to cope with, adverse effects of climate change. It is a function of the character, magnitude, and rate of climate change and variation to which a system is exposed, its sensitivity, and its adaptive capacity.

## **Weather**

The state of the atmosphere at a given time and place with regard to temperature, air pressure, humidity, wind, cloudiness, and precipitation. The term weather is used mostly for conditions over short periods of time.



### Eco-audit

A limited number of printed copies of this report are being produced. We encourage readers to view the document online whenever possible at [www.climateaction.saanich.ca](http://www.climateaction.saanich.ca) and to only print pages as needed.

Printed versions of this report will be prepared on paper created in a socially responsible manner. The paper used for this report is manufactured from 100% post-consumer fibre; no new trees were used to manufacture this paper. The use of 100% post-consumer fibre paper will help save trees and reduce energy consumption, air pollution, water pollution and solid waste.

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