CLIMATE CHANGE STRATEGY

April 16, 2026

Lower Thames Valley Conservation Authority

Revision Status	Revision Date	Approval Authority	Document Title
ALL PRIOR STRATEGIES ARE REPEALED			
New - April 16, 2026	April 2031	LTVCA Board of Directors	LTVCA Climate Change Strategy

Acknowledgements

The Lower Thames Valley Conservation Authority (LTVCA) acknowledges that the watershed is within the traditional territory of Indigenous people who have longstanding relationships to the land, water and region of southwestern Ontario. We also acknowledge the local lower Thames River watershed communities of this area which include Chippewas of the Thames First Nation, Oneida Nation of the Thames, Munsee Delaware Nation, Delaware Nation, Caldwell Nation and Walpole Island First Nation. We acknowledge the Indigenous people within the villages, towns and cities of our communities. We value the significant historical and contemporary contributions of local and regional Indigenous people and all of the Original peoples of Turtle Island (North America). We are thankful for the opportunity to live, learn and share with mutual respect and appreciation.

Thanks

We would like to acknowledge the contributions of all those who participated in the development of the Lower Thames Valley Conservation Authority's Climate Change Strategy.

About this Report

***References*:** Information that helped shape this Strategy were taken from ICLEI's Changing Climate, Changing Communities: Guide and Workbook for Municipal Climate Adaptation; Ganaraska Region Conservation Authority Climate Change Strategy, June 2014; Great Lakes Commission Action Plan for a Resilient Great Lakes Basin; the 2019 Thames River (Deshkan Ziibi) Shared Waters Approach to Water Quality and Quantity; the LTVCA's 2024 Watershed-Based Resource Management Strategy and the 2024 Conservation Lands Strategy.

***Input*:** Input into the Strategy was provided and will continue to be provided by our member municipalities, community and municipal stakeholders, Indigenous watershed communities and LTVCA staff.

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Cover Page Image

Native species of Pale Metanema Moth (Yellow-lined Thorn), Big Bend Conservation Area, May 22, 2025, Valerie Towsley.

Alternative Formats: If you require this document in an alternative format, please contact the LTVCA at 519-354-7310 or admin@ltvca.ca.

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Executive Summary

The LTVCA's Climate Strategy will aid the organization in adapting to the uncertainty of a changing climate with the goal of decreasing our carbon footprint. The LTVCA will take steps to replace and adapt infrastructure to better suit environmental conditions; create adaptation plans to address specific issues throughout the watershed; maintain adaptation goal-oriented programs and services to our member municipalities and the communities we serve; and adapt and change when and where we need to as an environmental oriented organization. The LTVCA will rely on our three main departments to achieve these goals: Watershed and Information Services, Conservation Lands and Services, and Corporate Services, which is a part of and ties everything together.

The LTVCA wants to continue moving forward as a strong resource for the public and member municipalities to rely on, for not only regulatory knowledge about the natural hazards and keeping the public and property safe; but also, as a service provider for re-greening the landscape, whether that's through tree and prairie plantings and wetland habitat projects on private lands, but also within our own conservation areas which will aid with easing impacts of a changing climate. The LTVCA wants to lead by example, moving forward with new technology and innovative planning initiatives for all departments that will allow us to adapt to and mitigate from climate change.

Introduction

Throughout Conservation Authorities (CA) history, CA's have always been a nature-based implementation tool for the public, agencies and member municipalities to utilize. From the beginning, CA's have restored human impacted landscapes back to healthy forested, prairie and wetland ecosystems. CA's are also one of the first and foremost leaders in Ontario preparing landowners and their properties from extreme water and weather-related events that can result in hardships from such hazards as erosion and flooding. The Conservation Authority system is generally considered a good climate change implementation model and plays a crucial role in protecting people and property from natural hazard impacts, which in turn help to mitigate impacts from a changing climate.

Whether the climate will become hotter and dryer, or wetter, or any combination thereof, is still an unknown factor in the equation. What is known, is that we are already experiencing variations in our historical norms for the watershed. There is the potential to experience both a hotter and wetter environment in the same year. Southwestern Ontario is already experiencing more milder winters, wetter springs and hotter, drier summers.

Through climate change processes, there is an increased risk to the quality and quantity of water resources, greater impacts to infrastructure (municipal as well as organizational and private), increased hazards due to changes in Great Lakes processes (lack of ice cover, erosion and flooding) and changes to species composition within the watershed (impacts to existing restoration works), to name a few.

The changes that are currently being experienced are having impacts on our programs and services. As a result, the LTVCA must adapt how we undertake certain programs or services that are provided in order to be able to handle the changes. This adaptation of what we do will help mitigate the impacts that have a ripple effect on staff, our conservation areas, what we provide to the public and our member municipalities through our stewardship programs, the regulatory and natural hazard services that we provide and the overall impact to our budget.

Table of Contents

1. Process as Defined by ICLEI

The Lower Thames Valley Conservation Authority's Climate Change Strategy generally follows the five milestones set out in ICLEI's Changing Climate, Changing Communities: Guide and Workbook for Municipal Climate Adaptation. ICLEI defines climate change as long-term shifts in temperature, precipitation, wind patterns, and other measures of climate that occur over several decades or longer. They emphasize the role of human activities, particularly the emission of greenhouse gases, in driving these changes. ICLEI focuses on how climate change impacts urban areas and works with local governments to develop strategies for mitigation and adaptation.

ICLEI Canada uses the Partners for Climate Protection (PCP) programs five step milestone framework to guide agencies in setting climate action targets and developing climate action plans (see chart below).

2. LTVCA Corporate Structure

The Lower Thames Valley Conservation Authority consists of three department areas, with three corresponding department managers, overseen by the Chief Administration Officer. Corporate Services, Conservation Lands and Services and Watershed and Information Services (refer to chart below).

LTVCA Corporate Structure

Corporate Services	Conservation Lands and Services	Watershed and Information Services	Three Departments Lead by Managers
Finance and Administration Communications and Education	Conservation (Environmental) Services Conservation Lands East Conservation Lands West Phosphorus Reduction - (Project)	Planning and Regulations Technical Services	Programs of Departments Lead by Co-ordinators, and others or directly by Managers

Date of Last Edit: March 2025

3. Draft Vision

"The LTVCA watershed and communities will be resilient and able to adapt to Climate Change"

4. Draft Mission

The mission of the LTVCA Climate Change Strategy is to (Two Parts: Adaptation and Mitigation):

"Create a resilient watershed and communities that will evolve, and adapt, as climate change occurs."

"Work to mitigate Climate Change by modifying business practices and deliverables."

5. LTVCA Goals and Recommendations

Ten goals have been set for the LTVCA's Climate Change Strategy, covering six program areas. Recommendations, either adaptative or mitigative, and any corresponding implementation will aim to achieve the results of fulfilling the mission statements noted above.

6. Program Areas

1. **Flood Protection:** Work with partners and stakeholders to increase knowledge of how climate change will impact flooding and erosion levels in the Lower Thames watershed communities.
2. **Monitor:** Enhance knowledge of the Lower Thames Watershed's natural environment and its response to a changing climate.
3. **Communicate and Educate:** Facilitate partnerships and connect people to the Lower Thames Watershed in order to build awareness of climate change and capacity to adapt to climate impacts.
4. **Natural heritage:** Improve natural heritage systems in the Lower Thames Watershed to build resilience and assist with adaptation and mitigation.
5. **Stewardship and Land Conservation:** Increase watershed resistance and resilience to climate change through conservation, restoration and improvement of natural systems.
6. **Partnerships:** Be leaders in sustainability making LTVCA the partner of choice for local climate change initiatives.
7. **Corporate Practices:** Build corporate capacity to adapt to future climate projections and reduce LTVCA's corporate carbon footprint by embracing a culture of conservation through using best practices and solutions while measuring progress and effectiveness.

Program Area	Goals
LTVCA General	1, 2 and 3
Natural Heritage	4
Natural Hazards	5, 6 and 7
Monitoring	8
Education and Outreach	9
Land Management	10

LTVCA – General

Goal 1: Provide support to partners and member municipalities as they address climate change adaptation and mitigation.

Goal 2: Evaluate and improve LTVCA business activities to address climate change in a fiscally responsible manner.

Goal 3: Incorporate new science that addresses climate change impacts into all programs offered by the LTVCA.

Natural Heritage

Goal 4: Improve the LTVCA's natural heritage system to build watershed resilience and assist in adaptation to and mitigation of climate change. This includes both aquatic and terrestrial systems.

Natural Hazards

Goal 5: Update the definition of natural hazard areas to address the protection of people and property under climate change conditions.

Goal 6: Improve flood forecasting methods to better warn residents of potential Climate Change flooding and erosion events.

Goal 7: Incorporate new standards and requirements that address climate change into proposed and existing development recommendations.

Monitoring

Goal 8: Develop an LTVCA Integrated Watershed Monitoring program that will provide an understanding of how Climate Change is affecting the LTVCA watershed.

Education and Outreach

Goal 9: Incorporate climate change adaptation and mitigation information into LTVCA education and outreach programs

Land Management

Goal 10: Adapt management and use of LTVCA lands to address Climate Change impacts.

7. Action Plan

LTVCA – General

Goal 1*: Provide support to staff, partners and member municipalities as they address climate change adaptation and mitigation.*

The LTVCA works with our member municipalities and with landowners and other agencies to fulfill similar objectives on the watershed landscape. This could include establishing sound natural hazard guidelines, working to establish natural heritage goals, provide expertise in agricultural and environmental programs and projects.

Adaptation

Transform programs to address partner adaptation.

- Improve flood forecasting and warning programs in anticipation of changing climate conditions.
- Modify policies to ensure planning and regulation services protects LTVCA communities from the impacts of climate change.
- Increase monitoring to provide sound technical information on impacts to the LTVCA watershed.
- Provide broader climate change content to watershed residents and partners through our educational programs to increase residents' awareness of local impacts.
- Refine flood plain and erosion mapping to guide development outside of changing hazards.
- Continue developing a Natural Heritage program to ensure natural areas planning addresses climate change.
- Support municipalities and partners in determining the appropriate native species, methods and future instruction for municipal planting programs, outdoor playgrounds, and public facilities, etc.
- The LTVCA will update the asset management plan taking into account modifications for climate change so that if assets need to be changed, funding can be available.
- Provide training opportunities to LTVCA staff regarding impacts to climate change in their areas of expertise (general awareness).
- Look for Climate friendly future equipment and vehicle purchases as part of the asset management plan.

Mitigation

Transform programs to address partner mitigation.

- Continue to deliver extensive stewardship programs that will support mitigation of greenhouse gas emissions, wetlands for flood mitigation, cover crops for flood and nutrient reduction, etc.
- Provide education programs for landowners and partners to understand actions that can be undertaken to mitigate climate change.
- Evolve agricultural support programs to create a positive mitigation impact.

Current Programs

- Flood forecasting and warning, regulations and planning review services, GIS mapping, stewardship, agricultural programs, monitoring, education, community outreach.

***Goal 2**: Evaluate and improve LTVCA business activities to address climate change in a fiscally responsible manner.*

The LTVCA ensures that any program or initiative is fiscally responsible with measurable benefits to our member municipalities and the ratepayers within the watershed.

Adaptation

The LTVCA will look to adapt administration of services to address climate change with the goal of reducing costs through this work.

- The LTVCA will seek out funding for climate change adaption and mitigation programs and infrastructure.
- The LTVCA will modify our asset management strategies to replace and update assets to support climate change goals.
- The LTVCA will work to retain technical staff with watershed specific knowledge that will support development of strategies to address climate change.

Mitigation

The LTVCA will develop a plan to reduce greenhouse gas emissions.

- Look to install solar panels on remote infrastructure, e.g. public washrooms, for lighting and heating of water (off grid locations) and auto on/off light switches.
- When purchasing vehicles for the fleet, look into hybrid gas/electric models. Costs of installing electric charging stations, and not all work locations will be suitable e.g. vandalism.
- Any future tools and equipment purchased, look into the option of electric version. May not be possible in all situations.
- The LTVCA will utilize technology to reduce travel and use of infrastructure energy e.g. electric vehicles, remote meetings, smart operating systems.
- Reduce and reuse, where possible, and when purchases are required, ensure quality and longevity of products are obtained.
- Ensure assets are cared for to be able to extend the life expectancy of that product.
- Offer and expand recycling at locations where it makes sense.

Current LTVCA Programs

- The LTVCA currently uses Conservation Ontario's, and the Provinces shared purchasing services to reduce costs and emissions.
- Public washrooms in day use areas have automatic on/off light switches.



***Goal 3**: Incorporate new science that addresses climate change impacts into all programs offered by the LTVCA.*

Adaptation

The LTVCA will aim, to the best of our abilities, to incorporate new methods and protocols that improve program delivery and services delivered within the watershed.

- Improve flood forecasting and services with improved models and science.
- Utilize the best scientific knowledge to ensure the appropriate species are planted that will adapt to climate change.
- Review infrastructure to consider needs under future climate conditions, e.g. dam and dykes sufficient to address future flows.
- Utilize science to update assets such as buildings, equipment and vehicles to guarantee optimum use and efficiency to ensure assets can be adapted to ensure delivery.
- Utilize science to ensure recommendations to landowners for conservation practices are relevant in a changing climate, e.g. recommendations to agriculture communities on Phosphorus reduction.
- Continue to use technology to improve and make more efficient monitoring systems needed to understand impacts of climate change.

Mitigation

- Utilize the best scientific knowledge to ensure the appropriate species are planted that will provide mitigating impacts.
- Utilize science to update assets such as buildings, equipment and vehicles to ensure optimum use and efficiency thereby mitigating climate change.

Current LTVCA Programs

- Flood forecasting and warning systems are continuously updated with new technology.
- Undertake energy audits of facilities and address suggested recommendations.

Natural Heritage

***Goal 4**: Improve the LTVCA's natural heritage system to build watershed resilience, and assist in adaptation to and mitigation of climate change. This includes both aquatic and terrestrial systems.*

Adaptation

The LTVCA will change how it works to improve the natural heritage system in ways that will consider impacts to that system by a changing climate.

- Utilize the best scientific knowledge to ensure appropriate species are planted that will adapt to climate change.
- Utilize science to ensure recommendations to landowners for conservation practices are relevant in a changing climate, e.g. recommendations to agriculture communities on Phosphorus reduction.
- Adapt programs to address species at risk that may be impacted by climate change.
- Adapt programs to address invasive species, existing and potential threats, that will have an advantage over native species in a changing climate.

Mitigation

The LTVCA will continue to work with our member municipalities, landowners and other agencies to incorporate and recreate natural heritage systems across the watershed in a strategic way that benefits the landscape and aids in abating climate change impacts.

- Continue to improve natural heritage systems through the creation of linkages between natural heritage patches.
- Increase natural areas restoration and planting in a strategic way that will sequester carbon.
- Look to use resources generated from carbon offsetting to finance increased restoration and planting.
- Continue to support the use of BMPs to reduce erosion and nutrient runoff that impact natural heritage systems.
- Seek natural habitat restoration solutions to mitigate flood and erosion risks.
- Develop a way to target and prioritize restoration projects to reconnect and expand existing habitats (e.g. link to Carolinian Canada Big Picture Project).

Current LTVCA Programs

- Plant approximately 50,000 to 100,000 trees per year.
- Plant approximately 150 acres of tallgrass prairie per year.
- Install approximately 10 acres of constructed wetland per year.
- Undertake urban stewardship programs that support adaptation and mitigation of climate change.
- monitors natural heritage systems to understand impacts to those systems from a changing climate.
- constructs habitat structures that increase resilience in the natural heritage system.
- supports construction of best management practices to reduce erosion and nutrient runoff that impact natural heritage systems.

Natural Hazards

***Goal 5**: Update the delineation of natural hazard areas to address the protection of people and property under climate change conditions.*

Adaptation

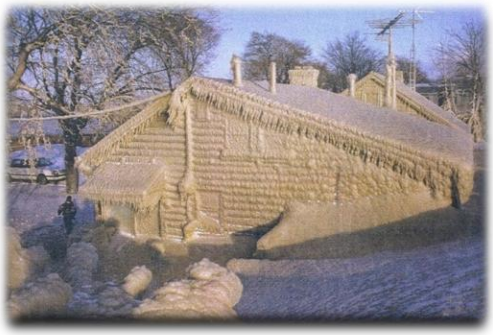
- The LTVCA is updating mapping and inventory of natural hazards (flooding and erosion) and developing predictive models that support adaptation to climate change.
- Continue to partner with municipalities and agencies in understanding and addressing Great Lakes hazards (flooding and erosion).
- Encourage government and municipal (financial) support for managed retreat programs from hazardous areas (e.g. flood prone and bluff areas).
- Turn hazard lands that have been retreated from into public recreation lands (e.g. public trails along the Lake Erie shoreline).

Mitigation

- Restore / plant areas that are retired /retreated from to reduce greenhouse gas emissions and increase CO^2 uptake.
- Restore and/or implement width riparian buffers along drains and watercourses.
- Work with municipal staff around establishing policies to ensure maintenance of the buffer corridors.
- Encourage / incentivise private sector to retreat from high-risk areas (e.g. flood and erosion prone hazardous lands) to mitigate potential Climate Change impacts.

Current LTVCA Programs

- Updating mapping and inventory of natural hazards (flooding and erosion) and developing predictive models that support adaptation to climate change.
- Continue to partner with municipalities and agencies in understanding and addressing Great Lakes hazards (flooding and erosion).



***Goal 6**: Improve flood forecasting and response methods to better warn residents of potential Climate Change flooding and erosion events.*

Adaptation

The LTVCA will:

- improve flood forecasting and warning systems to address climate change.
- adapt operation of flood control structures to address changing conditions.
- strive to use all resources available to provide the most accurate forecasting and modelling that keeps pace with the changing climate.
- support municipal emergency services with tools needed to address changing conditions that will impact response to weather related events.
- The LTVCA will continue to create educational programs to inform watershed residents of the impacts of climate change on natural hazards.

Current LTVCA Programs

- Flood forecasting and warning programs.
- Flood control structure operations when needed.
- Support municipal planning with LTVCA plan review and regulatory services that directs development outside of Hazardous lands that would lead to better planning considerations around Climate Change risk.
- Update the flood control program to address a changing climate.

***Goal 7**: Incorporate new standards and requirements that address climate change into proposed and existing development recommendations.*

Adaptation

- The LTVCA works with our member municipalities, ministries and the province to ensure that the guidance documents and policies that we use to determine safe development are in pace with climate change predictions.
- The LTVCA will support municipalities in the use of tools and guidelines e.g. planning instruments such as official plans and zoning by-laws that will protect residents from natural hazards.
- Will work with Federal and Provincial partners to ensure new policies and standards address local conditions and issues.
- The LTVCA will update tools, standards and design criteria to address climate change.
- The LTVCA will work with municipalities to incorporate new technologies e.g. LID's, that will address some elements of climate change.
  Moved from #5

Mitigation

- The LTVCA will support development proposals that include reduction of greenhouse gas emissions (e.g. geothermal, solar, wind, etc.).
- The LTVCA will support development / municipal driven LID initiatives.

Current LTVCA Programs

- Work that's currently undertaken through the planning and regulation departments (e.g. Lake Erie shoreline setbacks that account for an Average Annual Recession Rate (AARR) plus an additional standard deviation allowance that accounts for Climate Change impacts).

Monitoring

***Goal 8**: Develop an LTVCA Integrated Watershed Monitoring program that will provide an understanding of how Climate Change is affecting the LTVCA watershed.*

Adaptation

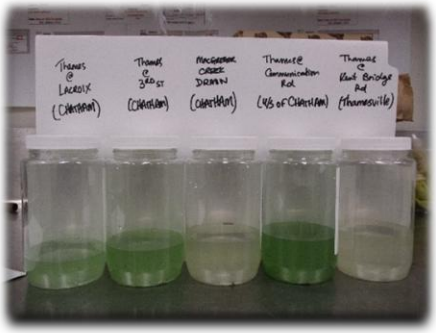
- The LTVCA will develop an Integrated Watershed Monitoring Program that will collect the right data at the right accuracy in the correct locations within the watershed that will allow synthesis of data sets to answer questions around climate change.
- The LTVCA will attempt to determine what trends are taking place in the watershed in natural systems in a changing climate.
- By understanding these trends actions may be taken to ensure resilience of natural and built environments.
- The LTVCA will ensure that the most up to date monitoring, in the right locations, is undertaken to provide accurate results for the implications of a changing climate.

Mitigation

- Identify key parameters.
- Make data available for public use and consumption.
- Use data that has been collected to help direct actions.
- Integrate aquatic and terrestrial observations.
- Adapt new techniques to increase the accuracy of the monitoring program where feasible.

Current LTVCA Programs

- The LTVCA undertakes extensive monitoring programs often to address specific issues and funding.
- Continue maintaining the current program.



Education and Outreach

***Goal 9**: Incorporate climate change adaptation and mitigation information into LTVCA education and outreach programs.*

Adaptation

- The LTVCA will include age-appropriate educational programming into our current programs around climate change that aligns with curriculum, its impacts on the environment around us, and the small changes that people can make that add up.
- The LTVCA will undertake risk assessments regarding climate change impacts in natural areas used for education programming plus adverse weather game plans.
- The LTVCA will utilize traditional and scientific knowledge to support development of educational programs that address climate change and how the LTVCA / community will experience and mitigate / adapt to it.

Mitigation

- The LTVCA will modify education programming to have the ability to do the programs remotely.
- Education and outreach to come up with age appropriate terminology / explanations around Climate Change that are used across all departments to avoid conflicting messaging.

Current LTVCA Programs

- The LTVCA will continue our extensive education programming, around natural heritage and Indigenous traditional knowledge.
- The LTVCA's current BMP / stewardship outreach undertaken help improve environmental resiliency through watershed education (media, webinars, workshops, etc.).
- Climate change and related materials and handouts available at all office locations and taken to public events and workshops.
- Resources available to the public for invasive species reporting and diseases impacting woody and herbaceous species.

Land Management

***Goal 10**: Adapt management and use of LTVCA lands to address Climate Change impacts.*

Adaptation

- Consider what changing vegetation zones mean to types of plantings that currently exist and that will be undertaken in the future.
- The LTVCA will review the 2024 Conservation Lands Strategy to determine what progressive land management, programs and activities that can be applied, and where, to ensure the health and resiliency of LTVCA properties in a changing climate.
- Showcase examples of climate resiliency within our conservation areas that can provide municipalities and watershed landowners examples of similar projects of land management that can be implemented on their properties.
- Understand new risks i.e. risk assessment in our conservation areas and how they can be addressed. This may include maintenance requirements and even what activities can and cannot be supported.
- Budget to create more climate resilience in CA lands.

Mitigation

- Alternative energy sources to service LTVCA infrastructure.
- Expand use of solar panels.
- Consider more efficient HVAC systems when replacement required.
- Acquire hazard land properties, where possible.

Current LTVCA Programs

- Currently showcase BMP's and stewardship services on our CA lands and future lands.
- Installation of interpretive / educational panels highlighting or showcasing BMP and stewardship activities throughout the CA lands where possible.
- Naturalization of LTVCA lands.
- Building upgrades to reduce energy use (ongoing).
- Continue lighting upgrades to reduce energy usage.

8. Next Steps

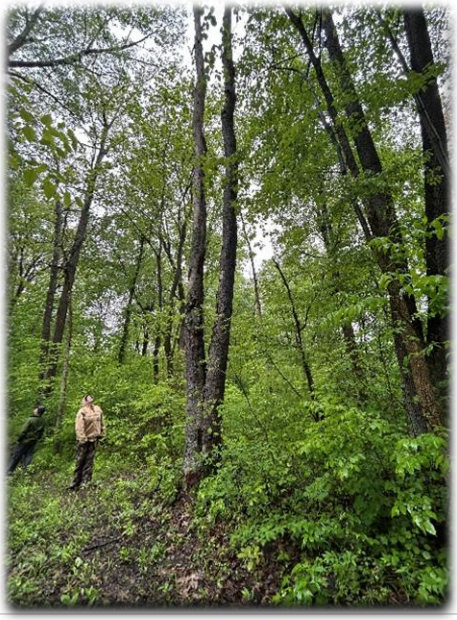
Implementation

The LTVCA Climate Change Strategy has identified numerous adaptation and mitigation strategies throughout this process. These implementation tools will aid staff in moving forward, funding permitting, with changes that will ensure that our lands, programs and services will be more able to deal with potential climate change scenarios.

The strategies outlined in this document should be considered for implementation after a prioritization review is undertaken by the individual departments. This review should be part of an LTVCA strategic planning implementation plan that incorporates recommendations from this report and other strategic planning documents required by the province and completed in December of 2024. A number of different adaptation and mitigation goals may require a risk assessment to be undertaken, which was beyond the scope of this strategic document, to fine tune the recommended actions. Funding considerations and consultation on other goals may be required. However, those goals that are easily implemented with little change to existing programs and services, should move forward as soon as possible.

In order to ensure that the LTVCA's Climate Change Strategy is progressing in keeping with the recommendations outlined in this document, actions undertaken throughout the year will be reviewed during the annual budget deliberations. Any climate change remediations that have taken place in our programs and services should be noted under a specific Climate Change project category to show progression of actions by this organization and its commitment to implementing on the ground local solutions.

Due to the uncertainty of how a changing climate will impact the LTVCA's programs and services, there is a need to keep open dialogue among the watershed residents, our member municipalities, provincial ministries and the federal government, as well as our sister conservation authority agencies. Sharing of best practices among and within these groups can only foster a better outcome of efforts on a boarder scale.



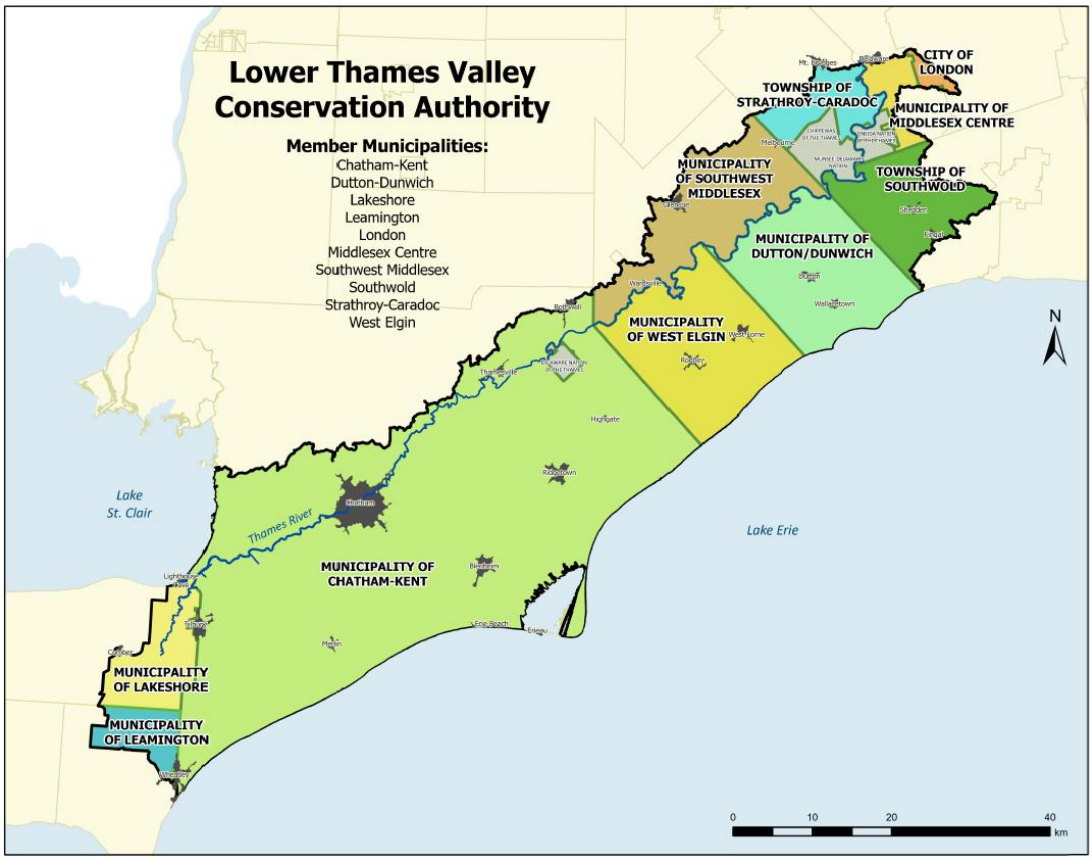


Figure 1: LTVCA Watershed Map with Member Municipalities

Sensitivity, Adaptive Capacity and Vulnerability Assessment

Potential Climate Change Impacts	Program Areas																																		
	Natural Hazards												Natural Heritage						Monitoring			Education and Outreach			LTVCA Lands						LTVCA Business				
	Hazard Definition			Flood Forecasting and Warning			Water Control Structure Operations			Planning And Regulation			Terrestrial			Aquatic						Education Programs			Active Conservation Areas			Passive Conservation Areas								
Assessment Category	S	AC	V	S	AC	V	S	AC	V	S	AC	V	S	AC	V	S	AC	V	S	AC	V	S	AC	V	S	AC	V	S	AC	V	S	AC	V	S	AC	V
Temperature																																			
Increase growing seasons	S1	AC5	V1	S1	AC5	V1	S3	AC4	V2	S2	AC5	V1	S3	AC3	V3	S3	AC3	V3	S3	AC3	V3	S2	AC5	V1	S3	AC4	V2	S1	AC5	V1	S4	AC4	V3
Decrease snow accumulation	S2	AC4	V2	S3	AC3	V3	S3	AC2	V3	S2	AC5	V1	S4	AC3	V4	S4	AC3	V4	S3	AC3	V3	S3	AC4	V2	S4	AC4	V3	S1	AC5	V1	S2	AC3	V2
Change in native plants and animal communities	S1	AC5	V1	S1	AC5	V1	S1	AC5	V1	S2	AC5	V1	S4	AC3	V4	S5	AC3	V4	S3	AC3	V3	S3	AC4	V2	S4	AC3	V4	S4	AC3	V4	S2	AC3	V2
Increase in invasive species presence	S1	AC5	V1	S1	AC5	V1	S1	AC5	V1	S2	AC5	V1	S4	AC2	V4	S5	AC2	V5	S3	AC3	V3	S3	AC3	V3	S4	AC2	V4	S4	AC2	V4	S2	AC3	V2
Increase in forest fire (risk and actual)	S1	AC5	V1	S1	AC5	V1	S1	AC5	V1	S1	AC5	V1	S3	AC4	V2	S1	AC5	V1	S1	AC5	V1	S3	AC3	V3	S2	AC3	V2	S2	AC3	V2	S2	AC4	V2
Increase in insect and disease outbreaks	S1	AC5	V1	S1	AC5	V1	S1	AC5	V1	S1	AC5	V1	S4	AC2	V4	S4	AC3	V4	S3	AC3	V3	S3	AC4	V2	S4	AC3	V4	S4	AC3	V4	S3	AC3	V3
Increase demand for water/drought	S1	AC5	V1	S1	AC5	V1	S3	AC3	V3	S1	AC5	V1	S3	AC3	V3	S4	AC2	V4	S3	AC3	V3	S2	AC4	V2	S2	AC3	V2	S2	AC3	V2	S2	AC4	V2
Increase in stream temperature	S1	AC5	V1	S1	AC5	V1	S1	AC5	V1	S2	AC5	V1	S2	AC4	V2	S4	AC2	V4	S3	AC3	V3	S2	AC4	V2	S3	AC3	V3	S3	AC3	V3	S1	AC5	V1
Increase evapotranspiration	S1	AC5	V1	S1	AC5	V1	S3	AC3	V3	S2	AC5	V1	S3	AC3	V3	S4	AC2	V4	S3	AC3	V3	S1	AC5	V1	S3	AC3	V3	S2	AC3	V2	S1	AC5	V1
Precipitation																																			
Increase in high intensity events	S4	AC2	V4	S5	AC1	V5	S4	AC1	V5	S4	AC2	V4	S1	AC5	V1	S3	AC3	V3	S3	AC3	V3	S4	AC3	V4	S4	AC3	V4	S4	AC3	V4	S4	AC3	V4
Decrease in summer precipitation (not extremes)	S1	AC5	V1	S1	AC5	V1	S3	AC3	V3	S3	AC4	V2	S3	AC3	V3	S4	AC3	V4	S3	AC3	V3	S1	AC5	V1	S3	AC4	V2	S3	AC4	V2	S1	AC5	V1
Increase in fall, winter and spring precipitation	S4	AC2	V4	S4	AC2	V4	S4	AC3	V4	S4	AC2	V4	S3	AC3	V3	S4	AC3	V4	S3	AC3	V3	S3	AC3	V3	S3	AC3	V3	S3	AC3	V3	S2	AC4	V2
Change in lake water levels	S4	AC4	V4	S3	AC3	V3	S1	AC5	V1	S4	AC2	V4	S1	AC5	V1	S3	AC4	V2	S3	AC3	V3	S1	AC5	V1	S1	AC5	V1	S1	AC5	V1	S1	AC5	V1
Decrease summer soil moisture	S4	AC4	V4	S2	AC3	V2	S3	AC2	V3	S2	AC3	V2	S3	AC3	V3	S3	AC3	V3	S3	AC3	V3	S1	AC5	V1	S1	AC5	V1	S1	AC5	V1	S1	AC5	V1
Increase frequency of larger storms (hurricanes)	S4	AC1	V5	S4	AC2	V4	S4	AC3	V4	S4	AC2	V4	S3	AC3	V3	S3	AC3	V3	S3	AC3	V3	S4	AC3	V4	S4	AC3	V4	S4	AC3	V4	S4	AC3	V4
Changes in river ice	S2	AC4	V2	S2	AC4	V2	S1	AC5	V1	S2	AC4	V2	S1	AC5	V1	S1	AC5	V1	S3	AC3	V3	S1	AC5	V1	S1	AC5	V1	S1	AC5	V1	S1	AC5	V1
Increase in lake erosion	S4	AC2	V4	S1	AC5	V1	S1	AC5	V1	S4	AC2	V4	S1	AC5	V1	S3	AC4	V2	S3	AC3	V3	S1	AC5	V1	S3	AC5	V2	S2	AC5	V2	S1	AC5	V1
Increase in riverine erosion	S4	AC2	V4	S1	AC5	V1	S1	AC5	V1	S4	AC2	V4	S1	AC5	V1	S4	AC3	V4	S3	AC3	V3	S1	AC5	V1	S3	AC3	V3	S3	AC3	V3	S1	AC5	V1
Increase frequency of ice storms	S1	AC5	V1	S1	AC5	V1	S1	AC5	V1	S1	AC5	V1	S3	AC4	V2	S2	AC4	V2	S1	AC5	V1	S4	AC3	V4	S4	AC3	V4	S4	AC3	V4	S3	AC3	V3
Change in Lake Ice	S4	AC2	V4	S3	AC3	V3	S1	AC5	V1	S4	AC4	V4	S1	AC5	V1	S2	AC4	V2	S1	AC5	V1	S1	AC5	V1	S2	AC5	V1	S3	AC5	V1	S1	AC5	V1

Sensitivity: How exposed is the program area and environment to the impacts of climate change.

S1: Functionality will stay the same
S2: Functionality will likely stay the same
S3: Functionality is likely to get worse
S4: Functionality will get worse
S5: Functionality will become unmanageable

Adaptive Capacity: Can the program area adjust to the projected impact with minimal cost and disruption. Will the natural system have capacity to adjust?

AC1: No - To costly and adaptation not possible (human and environment)
AC2: No - significant cost and unlikely human and environmental capacity to adapt
AC 3: Maybe - Will require some cost and some ability for human and environmental capacity to adapt
AC4: Yes - Slight cost and ability for human and environmental capacity to adapt, but no certainty.
AC5: Yes - No to little cost and human and environmental adaptive capacity is possible.

S= Sensitivity
AC = Adaptive Capacity
V = Vulnerability

Sensitivity and Adaptive Capacity Matrix

	S1	S2	S3	S4	S5
AC1	V2	V2	V4	V5	V5
AC2	V2	V2	V3	V4	V5
AC3	V2	V2	V3	V4	V4
AC4	V1	V2	V2	V3	V3
AC5	V1	V1	V2	V3	V3

Vulnerability Score
V1: Low Vulnerability
V2: Medium-Low Vulnerability
V3: Medium Vulnerability
V4: Medium-High Vulnerability

ICLEI Canada. 2011. *Changing Climate, Changing Communities: Guide and Workbook for Municipal Climate Adaptation*. ICLEI Canada, Toronto, ON.

Vulnerability Identification

Projected Climate Change Impacts	Program Areas										
	Natural Hazards				Natural Heritage		Monitoring	Education and Outreach	LTVCA Lands		LTVCA Business
	Hazard Definition	Flood Forecasting and Warning	Water Control Structures Operation	Planning and Regulations	Terrestrial	Aquatic		Educat6ion Programs and Centres	Active Conservation Areas	Passive Conservation Areas	
Temperature											
Increase growing seasons	O	O	O	O	X	X	X	O	X	X	X
Decrease snow accumulation	X	X	X	X	X	X	X	X	X	X	X
Change in native plants and animal communities	O	O	O	X	X	X	X	X	X	X	O
Increase in invasive species presence	O	O	O	X	X	X	X	X	X	X	X
Increase in forest fire (risk and actual)	O	O	O	O	X	X	O	X	X	X	X
Increase in insect and disease outbreaks	O	O	O	O	X	X	X	X	X	X	X
Increase demand for water/drought	X	O	X	X	X	X	X	X	X	X	O
Increase in stream temperature	X	O	O	O	X	X	X	O	X	X	O
Increase evapotranspiration	X	X	X	X	X	X	X	O	X	X	O
Precipitation											
Increase in high intensity events	X	X	X	X	X	X	X	X	X	X	X
Decrease in summer precipitation (not extremes)	X	X	X	X	X	X	X	O	X	O	O
Increase in fall, winter and spring precipitation	X	X	X	X	X	X	X	X	X	X	X
Change lake water levels	X	X	O	X	X	X	X	O	O	O	X
Decrease summer soil moisture	X	X	X	X	X	X	X	O	O	X	O
Increase frequency of larger storms (hurricanes)	X	X	X	X	X	X	X	X	X	X	X
Changes in river ice	X	X	X	X	O	O	X	O	O	O	O
Increase in lake erosion	X	O	O	X	X	X	X	O	O	X	O
Increase in riverine erosion	X	O	O	X	X	X	X	O	X	X	O
Increase frequency of ice storms	X	O	O	O	X	X	X	X	X	X	X
Change in Lake Ice	X	O	O	X	O	O	X	X	X	X	O

O = No Perceived Impact
X = Perceived Impact

Appendix B – LTVCA Staff Impact Assessment

LTVCA Climate Change	Corporate Services	Conservation Lands and Services	Watershed and Information Services
Finance and Administration	All projects and programs are budget bound and dependant; look to efficiencies to prevent increased costs such as green technology, solar panel application, etc.	All projects and programs are budget dependant; look to efficiencies to prevent increased costs such as green technology, solar panel application, etc.	All projects and programs are budget dependant
	Save money where we can by undertaking a priority review of projects, infrastructure repairs and services	Save money where we can by undertaking a priority review of projects, infrastructure repairs and services	Save money where we can by undertaking a priority review of projects, infrastructure repairs and services
Communications	New and inexpensive sources for getting messaging out to the public, such as Twitter, Facebook and Tic Tok, etc.; increase our digital footprint	Climate anxiety – relay of information to the public that is clear and concise and what programs that can help offset the impacts e.g. longer degree days of heat – solution: by planting more shade trees throughout the community	Climate change communications to the public need to be geared towards raising awareness of potential impacts e.g. increased erosion / flooding
	Costs for radio spots or producing brochures and pamphlets	Radio spots are still a crucial way to get information out to the public for programs associated with tree planting events and programs as well as special events	Seen as experts of the community for relaying information around natural hazards; More timely information, before a crisis occurs, user friendly outreach promoting what we do and why
	Costs for staff time to produce the required information		Look into increasing communication output that is clear and concise for such things as dam operation, flood hazards, emergency preparedness, etc.
Education	Cost of education programs that need to keep pace with expenses; at what point will the programs become too expensive to run where students can't afford to attend, or bus rental gets too high	What is currently provided through our programs around climate change knowledge and what can be done to offset the potential impacts e.g. tree planting (urban/rural), promote stewardship programs	Are education programs provided around impacts of flooding or erosion, and how climate change will impact them
	Look into sources of funding/donations for getting busing paid for; or look into a more virtual/online presence with adds that offset costs (videos/zoom/media education)		
	Establish education programs around the impacts of CC on our native species, particularly SAR	Do we provide a SAR geared education component on the impacts of climate change and how that may impact SAR either for good or bad (better habitat availability	

		for Carolinian species, or push out species more tolerant of our former cooler climate)	
	Establish new and/or adapt existing education modules and programming around adult education; how/where should they be advertised; active or passive participation; via virtual means; look into getting sponsorship to offset costs	Can include did you know information about our various conservation areas or programs that we offer, special events that we host / participate in, etc.	Look into education programming around flood and erosion hazards that we can provide for adult education via virtual means; look into getting sponsorship to offset costs
	Enhance our First Nation education program; how Indigenous peoples adapted to changes in the climate historically and why a fixed location (property ownership) can cause hardship as nature doesn't care where you live if that's where change is going to occur		
	At what point does weather extremes such as extended periods of high heat, extended rainfall or snowfall events, potential for more tornadic occurrences, flooding of conservation areas result in cancellation of education programs or special events; could result in more in class programming if it can be adapted to that situation; potentially the ability to work from home in these extreme situations (need to assess ability e.g. computer setup/connection to the server, etc.)	Do we provide education around invasive species and how we may see more invasives moving into SW Ontario as a result of the change in weather patterns	
	Expand programs into summer months (day camps?); have hand out programs that the public can do within the conservation area(s) (options for all ages)		
	Weather issues could result in staff being unable to get into work (all sites) to provide education programming		

Conservation (Environment) Services	Potentially increased cost of seedlings and staff time sourcing new nurseries; cost of training community groups/public on species identification and proper collection/storage	Difficulty in obtaining species due to a lack of seed stock; look into undertaking seed collection within our watershed to supply to nurseries (community groups/public assistance); or setting up our own nursery for harder to source native tree species	
	May result in more site visits; wear and tear on the vehicles; potential to look into hybrid / electric vehicles (need secure locations where charging cables can't be stolen)	Increasing movement of diseases and pests; is MNR/CFIA still tracking this, and if so, are we accessing that information;	
	Staff costs for generating information on public guidance documents	Need clarity in messaging around our programs and services as the public looks to us for guidance and projects; more publications or virtual sources of information	
	If weather conditions shrink the time frame available for planting, will need to look into hiring more student/summer staff to complete the work; organizational capacity to undertake this work	More volatile field season may result in planting when it gets too dry/hot; survival rate will potentially decrease as a result	
	If native tree species numbers aren't available, program may need to be cut back accordingly; can this be offset by looking at other CC planting adaptations	Are the correct species being planted that will cope with a changing climate	
	Look into seed collection, tree species movement, CC impact education / training for staff as well as what we can pass on to landowners	Increase native species planting (trees and prairie) and wetland creation; provide education and outreach around the benefits of each	
	Cost of staff time to research / training	Look into seed collection, tree species movement, CC impact education / training for staff as well as what we can pass on to landowners	
	Assess costs	Can't ignore CC issues; need to determine the potential impacts it could have on our services, financial and programming	
	Staff time in education component of program; look into other program options that fit within our programming and mandate	Agricultural community feeling the impacts of CC more than other industries; potential that they might want to undertake more projects or different environmental programs (capacity); might lose out on frost	

		that kills the cover crops planted through our Ag program; increased chemical use might result	
	Potential cost of hiring more staff to implement program	With a need for cooling centres or locations in city centres the urban program might see a higher demand for services; link program to Health Unit services around public health	
	Staff time	Enhanced education of our member municipalities (councils and staff and contractors they use e.g. lawn mowing companies) around what we do and what we can provide to them and why it's important	
	Staff time	Need more connection with our member municipalities and getting them involved in programs and projects within their publicly owned spaces	
	Staff time and education materials	Potentially with a longer growing season (Oct/Nov) farmers might use more chemicals to kill off unwanted vegetation that could result in more erosion and faster runoff after a rain / flood event; how can our programs offset this potential outcome; increased tillage	
Conservation Lands (East and West)	Costs associated with providing updated services; Look at solar / wind power options for offsetting purposes	Campground facilities may require upgrading of electrical services to deal with an increased demand for air conditioner use	
	Cost of maintaining / trimming back trees/tree limbs over campsites to reduce liability risks	Ensuring that new trees are planted within the campgrounds to offset when older trees become too dangerous or reach end of life (successional planting) and need to be removed	
	May require a specialized system be installed to limit services	If demand for electricity becomes too much it could overwhelm the system; potential rolling power outages/reduced capacity/only run when inside of the trailer	
	Loss of revenue if opening season is delayed	If spring weather results in wetter conditions, may need to delay the opening of campgrounds; what preparation work	

		would be needed by staff to get the CA up and running	
	Staffing implications; Rangers kept on longer contracts	Dryer end of year may result in extending the camping season (Oct/Nov)	
	Insurance review of the campground to determine liability risk may result in certain aged trailers needing to be removed from the campground; Staff time to inform trailers not in compliance and enforcing removal	To reduce an energy drain on the system, will certain aged trailers with older air conditioning units that draw more power be prohibited in the campgrounds	
	Costs of undertaking drainage work / potentially providing a naturalized SWM feature within the CAs to deal with excess overland flows	May need to create or deepen drainage features to keep lots free of standing water in spring; where will the water be directed to that won't cause issues elsewhere in the CA	
	Costs associated with trail, infrastructure and structure relocation/removal	Trail / infrastructure relocation for CA's close to water e.g. Warwick, Feasby, McGeachy, Lighthouse Cove, Big Bend, Dutton, Delaware	
	Staff time and manpower needed to undertake maintenance could increase; more staff needing chain saw / safety training	More/stronger wind events will result in increased CA/building/trail safety maintenance work	
	Staff time and training in invasive species identification and for proper and safe removal	Invasive species monitoring in the CA's; need to determine if they pose a danger to users and native species (e.g. poison ivy, dog strangling vine, giant hogweed, Hammerhead worm) or if they are migrating as a result of the changing climate	
	Staff training in proper chainsaw use; more staff may be required; or outsource to local arborists	Potential for the death of species within CA's as the climate changes, especially woody vegetation; results in hazard trees that will be required to be drops for liability reasons	
	Staff time and aggregate resources needed, potentially culvert installations to deal with wet areas on both sides of the roadways, or culvert removal when deemed unnecessary	With changes in rainfall / snow melt events, could cause more washouts of road infrastructure	
Phosphorus Reduction	Staff time and cost of additional instruments	Greater need for more weather stations to be installed throughout the watershed to better monitor events; fill missing gaps in	

		current station layout; monitor more sensitive areas	
	Accessing of higher resolution data; staff training on use of data/program	More extreme weather events will lead to a need of high-resolution data	
	Staff tenure and knowledge	Need long term observations of at least 25 plus years worth of data	
	Staff time to undertake a review of the watershed for new appropriate locations	Need to examine areas to monitor that aren't primarily phosphorus driven; provides for a range of sites and conditions	
	Cost for staff time and monitoring equipment	Undertake monitoring downstream of adaptation projects to provide feedback on progress/water quality/quantity improvements made (pre and post)	
	Cost for staff time and monitoring equipment	As greenhouse operations increase, is there a need to establish monitoring (pre/post) to determine if and what impacts are being observed	
	Cost for staff time and soil sensors, and purchase of sensors	Start installing soil sensors to our weather stations	
	Cost for staff time to install sensors, and purchase of sensors	extreme weather events, such as high (volume) / extended (time) precipitation events, may affect how soil/water is getting to the streams through changes in infiltration, percolation, etc.; potential to install turbidity sensors to estimate erosion rates (need sites with and without buffers to showcase impacts)	Determine how that can tie in with flood forecasting
	Cost for staff time to install monitors, and purchase of monitoring devices	carbon emission and sequester monitoring to identify areas of concern	

Planning and Regulations and Technical Services	Cost of programming needs is uncertain; potential lack of Provincial funding to cover costs		Uncertainty of how CC will impact our mapping (updated mapping required, increased intervals rather than 5-year gaps), data and regulation application on the landscape
	Cost of sourcing new data		New data sources for determining flood impacts on the Thames, tributaries and the Great Lakes
	Cost for staff to train for CC impacts and going out to our member municipalities (council meetings, staff sessions) to share knowledge where requested		Discussions with our member municipalities around CC and how it will influence the nature of natural hazards / impacts to their communities, infrastructure, day-to-day works, updating of OP's/ZBL's; how our regulatory impacts may extend further than existing mapped features
	Staff training and cost of modelling work		SWM pond design criteria – is it enough to store to the current design criteria, or is more capacity required for quantity control; increased potential for erosion will quality control be enough; link CC with hydrologic modelling, IDF curve tool
	Staff time in discussions with Rotary, costing of materials		LID's – e.g. Rotary's guide to Greening Your Grounds (urban) – make it more accessible to municipalities and landowners (digitize it and have it available on our website – may need to work with Rotary as this generates income for their programs / projects – pay to download?)
	Staff training on LID's, carrying that information forward to municipal councils and staff		try to work with municipalities to incorporate more LID's where site conditions are conducive to the application; are there other methods outside of LID that can be utilized in those cases
	Uncertainty in mapping needs: do we project for both scenarios / cost of doing both		will ice jam related flood prone areas, and associated hazard mapping, shrink if we have less ice and/or weaker ice (decreased length of time river is frozen)

			or will flood prone areas increase in different areas that are currently more prone to nominal overland flooding
	Cost of land purchase (grants/programs/agency funding sources); Establish long term maintenance requirements / are more staff required to undertake the maintenance on these additional lands	Purchase of flood flats along the river and create wetlands/prairie/forested areas, low areas free of obstructions; can create habitat for SAR/ESA and passive trail systems (mow only trail system, rest of area to remain in a natural state; can establish monitoring sites for such things as bats/birds, etc.	Look into creating capacity for flood stage storage on the landscape where possible; natural hazard land acquisition (mandatory services)
	Costs of determining whether current setback rates are accurate through keeping coastal studies up to date with changing CC data		Great Lakes loss of ice cover – how will the dynamics of an increase of active toe erosion (minimal cover over Nov/Dec/Jan/Feb/Mar?) have on the rate of bluff/beach erosion
	Cost of establishing property easements (legal costs); maintaining the easements we presently have that were obtained during the construction of the Diversion Channel (in the past were released as a need for retention not seen at that time)		flood damage easements upstream of Diversion dam (don't currently have any, is this a liability to the CA when we back water up during an event?)
	Staff time to undertake updates and posting		Ongoing updates as improvements and corrections to our mapping layers occur; Ensuring updated mapping is available on our on-line source
	Funding to obtain the ability to provide this feature, training of staff to employ it		Education opportunities around the use of GIS to show impacts from CC related to hazards e.g. increased erosion, extent of flooding; overlay mapping that can be moved from one year to the next showing change

Acronyms used in Appendix B – LTVCA Staff Impact Assessment

CA – Conservation Authority or Conservation Area

CC – Climate Change refers to long-term, significant shifts in global or regional temperature, precipitation, and wind patterns, lasting for decades or longer

CFIA – Canadian Food Inspection Agency is a federal regulatory agency dedicated to safeguarding Canada's food supply, plants, and animals to enhance the health and well-being of Canadians, the environment, and the economy

ESA – Endangered Species Act is a law designed to prevent wildlife species from becoming extinct or lost from the wild, providing for their recovery, and managing species of special concern to prevent them from becoming endangered

GIS – Geographic Information System is a computer framework used to capture, store, analyze, and visualize data mapped to specific geographic locations

LID – Low Impact Development is a sustainable land planning and engineering approach to managing stormwater runoff by mimicking natural hydrology

MNR – Ministry of Natural Resources

OP – Official Plans are an overarching Municipal policy document that guides land use and growth within its jurisdiction

SAR – Species At Risk, now known as the Species Conservation Act, is a Canadian federal law (SC 2002, c. 29) aimed at preventing native wildlife species from becoming extinct or extirpated, facilitating the recovery of endangered or threatened species, and managing special concern species to prevent them from becoming at-risk

SWM – Stormwater Management is the practice of controlling runoff from rain and snowmelt to reduce flooding, prevent erosion, and minimize pollutants entering waterways from impervious / hardened surfaces

ZBL – Zoning By-laws is a Municipal document that regulates land use, specifying what can be built, where it can be located, and how it can be used within designated zones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