APPENDICES

Queen's UNIVERSITY

4.0 APPENDICES

Appendix 1: Detailed Case Scores

Category	Sub-Category	Criteria	Maximum Score	Northern Ontario	Conservation Sudbury	North Bay Mattawa Conservation Authority	Lakehead Region Conservation Authority	Mattagami Region Conservation Authority	Sault Ste. Marie Region Conservation Authority	Southern Ontario	Essex Region Conservation Authority	Grand River Conservation Authority	Long Point Region Conservation Authority	Maitland Valley Conservation Authority	Saugeen Valley Conservation Authority	Upper Thames River Conservation Authority	Central Ontario	Kawartha Conservation	Otonabee Region Conservation Authority	Ganarsaska Region Conservation	Nottawasaga Valley Conservation Authority	Lake Simcoe Region Conservation Authority	Eastern Ontario	Rideau Valley Conservation Authority	South Nation Conservation Authority	Mississippi Valley Conservation Authority	Cataraqui Region Conservation Authority	Other Provinces	Prince George, BC	International	Southern Tier Central Region of New York
Climate Change	Recognition	Does the flood risk managment authority recognize climate change is important?	1		1	1	1	0	1		1	1	1	1	1	1		1	1	1	1	1		1	1	1	1		1		1
		(0) No																													
		(1) Yes																													
		Does the flood risk managment authority recognize the need for sustainable practices?	1		0	1	0	0	1		1	1	1	0	1	1		1	1	1	1	1		1	1	1	1		1		0
		(0) No																													
		(1) Yes																													

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Climate Change	Adaptation	Have they restored wetlands? (0) No (4) Yes	4		0	0	0	0	0		4	4	4	4	0	0		4	0	0	0	4		4	4	0	0		4		0
		Do they utilize natural stormwater management practices? (0) No (2) Plan but no action (4) Yes, acted upon	4		4	2	2	2	2		4	4	4	4	0	4		4	4	0	2	4		4	4	4	4		2		0
		Do they have a specific flood response plan (in addition to an emergency response plan)? (0) No (1) Yes	1		0	0	0	1	0		0	0	0	0	1	0		0	0	0	1	0		1	0	0	0		0		0
		Do they have any programs to prepare homeowners for a flood (e.g. how to fill a sandbag, power outage preparation, how to floodproof home etc.)? (0) No (2) Education programs (3) Funding & Education programs	3		2	2	0	2	2		2	2	0	0	0	0		0	2	0	2	0		2	2	0	0		2		2
	Mitigation	Do they have a plan to limit/reduce CO2 emissions? (0) No (2) Yes	2		0	0	0	0	2		2	0	0	2	0	0		2	0	0	2	2		2	0	2	0		2		0
		Does the policy recommend protecting wetlands (all – not just provincially significant)? (0) No (2) Yes	2		2	2	0	2	2		2	2	2	0	2	2		2	2	2	2	2		2	2	2	2		2		2
		Do they have any policies that allow them to take public ownership of lands adjacent to riparian areas? (0) No (1) Yes	1		0	0	1	1	0		1	0	0	0	0	0		0	0	0	1	1		0	0	0	0		0		0
		Do they have any programs in place to re-naturalize areas (e.g. tree planting, native species planting)? (0) No (3) Yes	3		3	3	3	0	3		3	3	3	3	3	3		3	3	3	3	3		3	3	3	3		0		0

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Participation Engagement & Education	Public	Does the policy demonstrate how the public contributed in its creation? (0) No / unknown (2) Yes stated but no documentation provided (3) Yes but documentation provided does not relate to policy (4) Yes, documented well (how they consulted, what the findings were, and how it is connected to policy)	4		0	0	0	0	0		2	3	0	0	0	2		3	0	3	4	2		0	0	0	0		4		0
		Does the flood risk managment authority demonstrate how the public contributes in an ongoing manner? (0) No / unknown (2) Yes stated but no documentation provided (3) Yes but documentation provided does not relate to policy (4) Yes, documented well (how they consulted, what the findings were, and how it is connected to policy)	4		0	2	0	3	0		3	2	2	0	1	2		0	2	0	2	0		1	3	0	0		2		0
		Is there a public facing document that explains the policy in a way that any member of the public could understand? (0) No (2) Yes	2		0	2	2	2	2		0	2	2	2	0	0		2	2	0	2	2		0	2	2	0		0		0
		Do they have a specific flood risk education program for the public? (0) No (3) Yes	3		0	0	0	0	0		0	3	0	0	0	0		0	3	0	0	0		3	0	0	0		0		0
		Does the policy set out transparent evaluation criteria for when a member of the public submits an application? (0) No (2) Yes	2		2	2	0	2	2		0	2	2	0	2	0		2	2	0	2	2		2	0	0	2		0		0

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Participation Engagement & Education	Indigenous Groups	Does the flood risk management authority recognize and include traditional knowledge from Indigenous communities?	3		0	0	0	0	0		0	1	0	0	0	0		0	1	0	0	1		0	1	0	0		0		0
		(0) No																													
		(1) Collected/obtained but not included in policy																													
		(3) Recognized and implemented																													
		Does the flood risk management authority actively seek out and identify Indigenous communities and provide opportunity for involvement?	3		1	1	0	0	0		1	3	0	0	3	0		0	3	0	2	3		1	3	0	0		0		0
		(0) No																													
		(1) Opportunity to comment but not actively sought out																													
		(2) Identifies																													
		(3) Identifies and Consults																													
	Inter-Governmental	Is there a well documented relationship and open communication with other governing bodies sharing the same geographical jurisdiction?	3		3	3	0	3	0		3	3	0	0	3	0		3	3	3	3	0		3	3	3	3		0		0
		(0) No																													
		(3) Yes																													
		Does the flood risk managment authority clearly outline the relationship with other governing bodies?	1		1	1	0	1	1		0	1	1	0	1	1		1	1	1	1	0		1	1	1	0		1		0
		(0) No																													
		(1) Yes																													

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Integrated Flood Risk Management Approaches	Land Use	Is there a consideration for the relationship between land use planning and watershed management in the plan?	**1**		1	1	1	1	0		1	1	1	0	1	1		1	1	1	1	0		1	1	1	1		1		1
		(0) No																													
		(1) Yes																													
		How does the plan/document zone/designate lands for flooding and flood risk management?	**2**		2	2	1	1	2		2	2	2	2	2	2		2	2	1	2	2		1	1	2	1		1		1
		(1) One-Zone concept (Flood zone)																													
		(2) Two-zone concept (Flood-Flood Fringe Zones)																													
		Does the plan consider existing land uses and strategies within the outlined area (I.e. do they look at what is already there and plan with it, not overtop of it)?	**2**		2	1	0	1	1		2	2	2	0	2	2		2	2	1	0	0		2	2	1	1		0		2
		(0) No																													
		(1) Considers Case-by-case																													
		(2) Considers Cumulative impacts																													
		Are there policies in place to recommend suitable development practices in the flood fringe (or areas adjacent to floodplains if is a one zone concept)?	**1**		1	1	0	1	1		0	1	1	0	1	1		1	1	1	0	0		1	1	1	1		0		1
		(0) No																													
		(1) Yes																													
	Scale of Policy	Does the flood risk managment authority have sub-watershed plans?	**2**		1	2	0	1	0		2	2	1	1	1	1		2	1	1	1	0		2	2	1	1		0		0
		(0) Does not follow watershed boundries																													
		(1) Follows watershed boundries but does not look at sub-watersheds																													
		(2) Has sub-watershed plans or equivalent																													
		When making decisions, is the full watershed being considered?	**2**		2	2	0	0	0		2	2	2	0	2	2		2	2	0	0	0		2	2	2	0		2		0
		(0) Planning without consideration for the rest of the watershed																													
		(2) Decision based upon full watershed impacts																													
		Does the policy recognize the whole water cycle by addressing drought management and/or water storage as integrated parts of flood management?	**2**		0	1	1	1	1		2	3	2	0	2	2		2	1	1	1	0		2	2	1	1		1		0
		(0) No																													
		(1) Recognized but no policy																													
		(2) Recognized and enacted in policy																													

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Integrated Flood Risk Management Approaches	Type of Interventions	Is there an evidence-based approach to the policy?	**2**		2	2	0	0	0		2	2	0	0	2	2		2	0	0	2	2		0	0	2	0		0		0
		(0) No																													
		(2) Yes																													
		Does the policy only use structural interventions for protecting existing development?	**1**		1	1	0	1	1		1	0	1	0	0	0		1	1	0	1	1		0	0	1	1		1		0
		(0) New Developments																													
		(1) Only for Existing																													
		Does the policy encourage natural approaches (e.g. riverine naturalization)?	**1**		1	0	1	1	1		1	1	1	0	0	0		1	1	0	1	1		0	1	1	0		0		1
		(0) No																													
		(1) Yes																													
	Flood Line	Is the flood line based on the 100-year flood or is it increasing in response to climate change?	**1**		0	0	0	0	0		0	0	0	0	0	0		0	0	0	0	0		0	0	0	0		0		0
		(0) 100-year flood																													
		(1) Adjusted for Climate Change																													
	Mapping Quality	Is the regulatory map easily accessible?	**2**		1	1	0	0	1		1	2	1	0	2	2		2	1	1	2	2		2	1	2	1		2		2
		(0) No																													
		(1) A guidance map is accessible, but it is not the official regulatory map																													
		(2) Yes																													
		When was the mapping last updated?	**4**		0	0	4	4	0		0	4	0	4	2	4		2	4	4	2	4		4	4	4	4		2		4
		(0) 10 years ago or more																													
		(2) 10-6 years ago																													
		(4) 5 years ago or less																													
		Does mapping appear to cover the full jurisdictional area of the policy?	**1**		0	0	0	0	1		1	1	1	0	1	1		1	1	1	1	1		1	1	1	1		1		1
		(0) No																													
		(1) Yes																													

Category	Sub-Category	Criteria	Maximum Score	Northern Ontario	Conservation Sudbury	North Bay Mattawa Conservation Authority	Lakehead Region Conservation Authority	Mattagami Region Conservation Authority	Sault Ste. Marie Region Conservation Authority	Southern Ontario	Essex Region Conservation Authority	Grand River Conservation Authority	Long Point Region Conservation Authority	Maitland Valley Conservation Authority	Saugeen Valley Conservation Authority	Upper Thames River Conservation Authority	Central Ontario	Kawartha Conservation	Otonabee Region Conservation Authority	Ganarsaska Region Conservation	Nottawasaga Valley Conservation Authority	Lake Simcoe Region Conservation Authority	Eastern Ontario	Rideau Valley Conservation Authority	South Nation Conservation Authority	Mississippi Valley Conservation Authority	Cataraqui Region Conservation Authority	Other Provinces	Prince George, BC	International	Southern Tier Central Region of New York
Policy Delivery & Evaluation	Purpose	Is the role of the governing body (e.g. the CA) clearly stated? (0) No (1) Yes	**1**		1	1	1	1	1		1	1	1	0	1	1		1	1	1	0	1		1	1	1	1		0		1
		Does the flood risk managment authority have a vision statement? (0) No (1) Yes (2) Yes and the vision statement is connected to flood management	**2**		1	1	1	1	1		1	2	1	0	1	1		2	2	1	1	1		1	1	1	1		1		1
	Effectiveness	Does the flood risk management authority have a timeline to evaluate goals? (0) No (2) Yes	**2**		0	2	0	0	2		0	2	0	0	2	2		2	0	0	0	2		0	0	0	0		0		0
		Are there measurable criteria to evaluate the progress on goals? (0) No (1) Yes	**1**		0	1	0	0	1		0	1	0	0	1	1		1	0	0	0	1		0	0	0	0		1		0
		Are all the flood management policies contained within a single document or webpage? (0) No (1) Can all be located on the same webpage (2) All contained within a single document	**2**		2	2	2	2	2		0	1	1	2	2	2		2	2	2	0	2		1	2	2	2		0		2

Appendix 2: Detailed Case Summary Analysis

NORTHERN ONTARIO

Conservation Sudbury

Score Summary

Context Similarity	N/A

Overall Case Score	19.1 / 40
Climate Change Score	5.5 / 10
Participation, Engagement and Education Score	2.8 / 10
Integrated Flood Risk Management Approaches Score	5.8 / 10
Policy Delivery and Evaluation Score	5.0 / 10

Documents Examined

Flood Plain Management Criteria (1990)
Flood Plain Management Policy (1990)
Conservation Sudbury Strategic Plan 2017-2021 (2017)
Conservation Authorities Act Section 28 Hearing Procedures: Nickel District Conservation Authority (2020)
Community Flood Management Plan (City of Greater Sudbury, 2019)
Website Review
News Bulletins

Key Takeaways

- The current low impact development (LID) pilot project is a good foundation for the introduction and enhancement of stormwater management techniques to help reduce flood risk.
- Conservation Sudbury has some good documents pertaining to both Flood Preparedness and Information, as well as Flood Plain Management Policy. However, documents and information are either not available to the public or are difficult to find on their website.
- Transparency and publicly available documents are limiting factors for Conservation Sudbury. If the project team had not been given some of the key documents reviewed such as *Flood Plain Management Criteria* and *Flood Plain Management Policy* Conservation Sudbury would have received a significantly lower score.

Introduction

Conservation Sudbury, formerly known as the Nickel District Conservation Authority, is a large Conservation Authority in Northern Ontario which encompasses the entire City of Greater Sudbury, as well as a substantial area outside of the City boundary. The Conservation Authority has jurisdiction within three watersheds: the Wanapitei River Watershed, the Vermilion River Watershed, and the Whitefish River Watershed. These watersheds encompass a total area of 7576 square kilometres. Conservation Sudbury has outdated flood plain management criteria and policies which they currently use for internal planning and review processes. Through self-reflection and comparison of Conservation Sudbury's policy documents with other Conservation Authorities, Conservation Sudbury hopes to update and enhance existing policy documents in order to better serve its core mandate. Conservation Sudbury has been reviewed in the same manner as the other Conservation Authorities within this report so that it is possible to compare policies, reflect upon areas that can be improved, and acknowledge areas in which Conservation Sudbury is currently succeeding.

Climate Change (5.5/10)

Conservation Sudbury's strategic plan states that:

> *Conservation Sudbury recognizes the social and environmental importance of the effects of climate change. The organization is committed to exploring educational strategies and community engagement processes that promote awareness and action around climate change adaptation and resiliency.*

No wetlands have been restored under their authority; however, they do openly support organizations which have restored wetlands. Within the jurisdiction of Conservation Sudbury, the Friends of Lake Laurentian conservationist group have made it their mission to restore biodiversity within the Lake Laurentian Conservation Area to a level prior to industrialization and have worked with conservation Sudbury in completing these objectives.

In 2019, Conservation Sudbury undertook its first LID pilot project at the Gerry McCrory Countryside Sports Complex on 235 Countryside Drive in Sudbury. The LID project incorporated impervious surfaces, native shrubs, trees, and plant species to decrease the impact of future flooding events. This project is a strong first step in the development of modern stormwater management practices. Additional projects like this should be encouraged and repeated by Conservation Sudbury, and formal policies recommending LID and stormwater management should be adopted.

Conservation Sudbury lacks a Flood Management Plan or equivalent document; however, the City of Greater Sudbury has a *Community Flood Management Plan* which is endorsed by Conservation Sudbury. As well, conservation Sudbury's website gives information pertaining to flood preparedness such as how to fill sandbags, items necessary to prepare for a flood, and information to determine whether you are at risk of flooding.

Conservation Sudbury also has a tree planting program. This program allows landowners to request trees from Conservation Sudbury. This program involves the development of planting plans for residents and the planting of native species to help mitigate flooding, reduce soil erosion, and reduce the effects of storms and climate change. This program could be integrated with the LID program to help mitigate flood risk.

Participation, Engagement and Education (3.3/10)

Conservation Sudbury does not state whether public comments are considered when developing new policies. However, public comments were collected for new projects such as the LID pilot project, and the Conservation Authority recommends throughout its website that members of the public call if they have any questions regarding development proposals or policy inquiries.

Although conservation Sudbury does not have a public facing policy document which could explain the role of the Conservation Authority and some of the policies it uses to regulate development in a floodplain, the Conservation Authority does have steps listed on their website on when to call, who to call, and how to determine if you live within a flood zone. In the case of denial, Conservation Sudbury has a document called *Conservation Authorities Act Section 28 Hearing Procedures* which outlines procedures and what a typical hearing could look like in the event an application is denied by the Conservation Authority and a member of the public wishes to appeal Conservation Sudbury's decision.

Another positive engagement aspect that Conservation Sudbury utilizes is its relationship with the City of Greater Sudbury. Conservation Sudbury promotes several documents from the City of Greater Sudbury such as the Flood Risk Management Plan and the need to contact the City during development processes, indicating a strong working relationship between the Conservation Authority and the City. The City of Greater Sudbury is the only municipality within the jurisdiction of Conservation Sudbury, leading to a unique relationship where the Conservation Authority and the City can come together to make documents and specific plans and policies to directly benefit one another.

When defining Conservation Sudbury's relationship with its membership municipalities, Sudbury states quite clearly that the Conservation Authority is the governing body on and around floodplains, however they leave room for Municipalities to determine how floodplains are represented and planned for. This is evident in the use of one-zone and two-zone concept when planning around floodplains.

Integrated Flood Risk Management Approaches (5.8/10)

Conservation Sudbury outlines the relationship between land use planning and flood management through their *Flood Plain Management Policy* and *Flood Plain Management Criteria* documents. These documents define the types of development recommended on and within flood plains, flood zones, and flood fringe zones, while highlighting developments which should be avoided or simply are not permitted within these areas.

Conservation Sudbury also considers the entire watershed within their jurisdiction when approving and permitting applications, stating directly:

> *Actions taken can impact the health of an entire watershed and therefore development proposals are carefully reviewed*

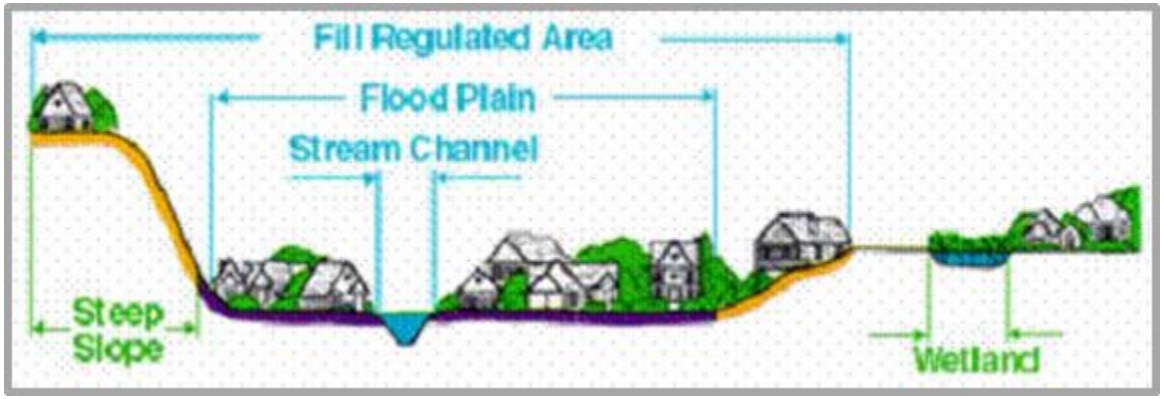


Figure 1: *Conservation Sudbury's diagram of the regulated areas of a Floodplain.*

Conservation Sudbury's internal document "Section 6 - Flood Plain Management Criteria" calls for flood proofing, however, it never explicitly states whether natural approaches are acceptable or preferred. It states that:

> *Flood proofing means a combination of structural changes and/or adjustments incorporated into the basic design and/or construction or alteration of individual buildings, structures, or properties subject to flooding to reduce or eliminate flood damages.*

However, combined with Conservation Sudbury's new LID pilot project the Conservation Authority seems to be heading in a direction which will further encourage natural approaches to flood risk management.

Conservation Sudbury's floodplain mapping needs improvement. The mapping which is available to the public offers little information to the public. The mapping only highlights the floodplain areas, which may not show the full picture of how Conservation Sudbury regulates development within the floodplain, or what regulations apply to a specific piece of land. Conservation Sudbury's mapping is also not complete. Large swaths of land in the rural unincorporated areas north of Sudbury in their jurisdiction have no mapping whatsoever. Finally, there is also no indication of when the mapping was last updated.

Policy Delivery and Evaluation (5.0/10)

Conservation Sudbury states their role and their visions both on their webpages and within some documents such as their Strategic Plan. However, Conservation Sudbury does not state when goals and objectives will be completed. There are also no direct measurable criteria to evaluate their progress or identify shortcomings on reaching some of the objectives stated on the website and within the Strategic Plan. Within Conservation Sudbury's Flood Plain Management Policy document from 1990 all planning and regulation policies pertaining to floodplains is stated. However, this document is not available to the public and was given to the researchers by Conservation Sudbury.

Lakehead Region Conservation Authority

Score Summary

Context Similarity	8.5 / 10

Overall Case Score	12.3 / 40
Climate Change Score	3.2 / 10
Participation, Engagement and Education Score	0.8 / 10
Integrated Flood Risk Management Approaches Score	3.3 / 10
Policy Delivery and Evaluation Score	5.0 / 10

Documents Examined

Ontario Regulation 180/06. Lakehead Region Conservation Authority: Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses (Amended 2013)
Lakehead Region Conservation Authority: Five-Year Strategic Plan 2018-2022 (2018)
Projects Around the Watershed 2000-2009
Website Review

Key Takeaways

- Installing public education boards at conservation areas is a good way to communicate with the public.
- LRCA saves resources on developing low impact development guidelines by providing a link to the Credit Valley Conservation Authority low impact development guidelines and resources page. This allows them to benefit from the work of other conservation authorities.

Introduction

Lakehead Region Conservation Authority (LRCA) is very similar to Conservation Sudbury as both Conservation Authorities are in Northern Ontario, in the same climatic zone, and have a similar population size. Although the region is similar to Conservation Sudbury, it is located on the shore of Lake Superior and as such, it experiences coastal flooding in addition to inland flooding. The jurisdiction area of the LRCA includes: the City of Thunder Bay, the Municipalities of Neebing, Shuniah and Oliver Paipoonge, and the Townships of Conmee, O'Connor, Gillies and Dorion. The total population is about 121,000 and the population density is 44 persons per square kilometre. These factors led to a context similarity score of 8.5/10 for the LRCA. With a similar climatic context, population size, population density and regulatory environment, it is likely that anything LRCA has been able to achieve, Conservation Sudbury should be able to as well.

Climate Change (3.2/10)

Although LRCA recognizes climate change, they have little material addressing it. Their website links to Thunder Bay's *Climate Change Plan* but beyond that, they have not taken any significant actions to address climate change. LRCA encourages natural approaches to stormwater management, however, they have not followed up their plans with specific actions. They recommend using Low Impact Development on their website, and they provide a link to the Credit Valley Conservation Authority Low Impact Development guidelines and resources page.

Some actions have been taken to address potential adaptation or mitigation measures in regard to climate change and flood risk. LRCA's tree planting initiative has planted over 135,000 trees through the Private Landholders Tree Seedling Assistance Program. This program provides seedlings to landowners at subsidized prices in order to facilitate more tree plantings. Additionally, they have ownership of 128.4 hectares of land in the floodplain which allows for some mitigation of potential flood risks. These areas are outside of their other conservation areas.

Participation, Engagement and Education (0.8/10)

LRCA performed exceptionally poorly on this evaluation category mostly because they have not made crucial materials available on their website. LRCA has a simplified document that explains its *Strategic Plan* in an easily understandable format. However, they have not made the more detailed document publicly available which vastly undermines the creation of such a document.

No website page or plans at the LRCA document communication with local Indigenous groups. This seems especially odd because this area has a larger Indigenous population as a proportion of the total population than many other areas of Ontario. By examining meeting minutes in the LRCA's online archives, the researchers were able to find some evidence of engagement with local Indigenous groups. It would be helpful for public outreach to document these types of activities on their website.

It does not appear as if LRCA has any flood risk education programs. Although they do have some handouts and FAQ sheets on their website, they are not easily accessible and do a poor job communicating where the floodplain is located, due to a lack of mapping. One way they have been able to communicate with the public is through conservation areas. LRCA has undertaken a number of projects to install public education boards in many of their conservation areas. This could be a good approach for Conservation Sudbury to also take to inform the public about flood risk.

Integrated Flood Risk Management Approaches (3.3/10)

Although LRCA claims to follow watershed boundaries when making plans, this claim is undermined by their region of jurisdiction following strictly municipal boundaries. Only a handful of the watersheds LRCA manages are contained within their area of jurisdiction. With many remaining outside their area of control, this could lead to areas going unmanaged and water resources being harmed. This seems to be a case of the political reality of choosing boundaries, overriding the intention of the *Conservation Authorities Act* to manage flooding on a watershed basis. The image below shows how the jurisdiction of the LRCA does not cover the entire watershed.

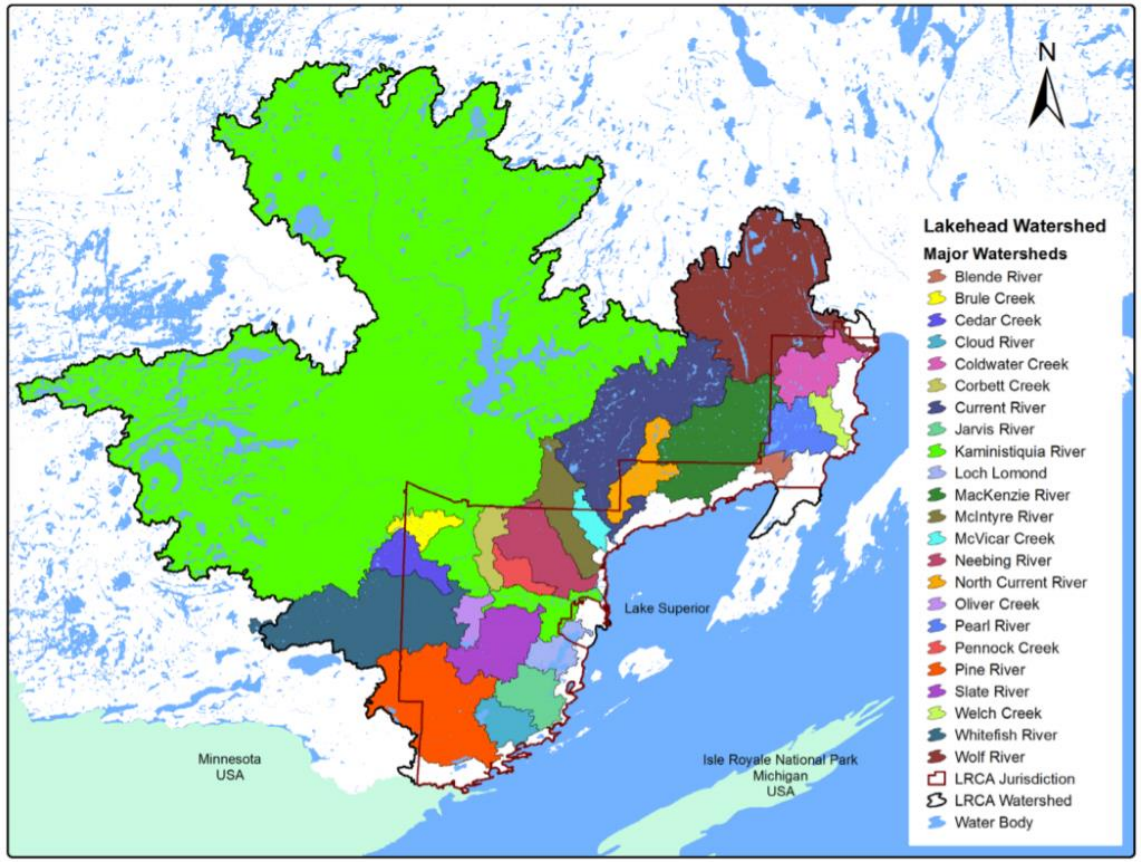


Figure 2: *LRCA watersheds and jurisdiction boundary.*

The LRCA seems to have put a large amount of work into creating watershed reports for all of their sub-watershed. Although this is to be commended, these documents only focus on environmental conditions, and do not address flood risk, nor do they document any useful flood mitigation efforts. The LRCA recognizes the importance of the whole water cycle when addressing flooding, however, policy does not reflect this. Nonetheless, they do have webpages outlining their response to low water events, as well as specific indicators about when those responses will be triggered.

The LRCA uses the regulatory flood line of a 100-year flood, or the 1961 Timmins Flood, whichever is greater. Although this allows for some flexibility it does not respond to a changing climate well. Their mapping leaves much to be desired, mostly due to poor public availability. Their screening maps webpage simply says, “Coming Soon”. Although they are currently working on a mapping initiative, at the moment it is of little use to the public. They have updated mapping in six watersheds since 2015; McIntyre River, Neebing River, McVicar Creek, Pennock Creek, Kaministiquia River, and Mosquito Creek.

Policy Delivery and Evaluation (5.0/10)

LRCA has a vision statement, but it is only concerned with environmental protection as opposed to flood management. Their flood management policies are all contained within a single document, however, that document is just the original Ontario Regulation creating the LRCA. It would be helpful to update and expand on the regulations with a true flood risk management plan. LRCA could improve its policy delivery by setting out flood management goals and periodically monitoring and re-evaluating those goals.

Mattagami Region Conservation Authority

Score Summary

Context Similarity	7.7 / 10

Overall Case Score	18.0 / 40
Climate Change Score	3.6 / 10
Participation Engagement and Education Score	4.4 / 10
Integrated Flood Risk Management Approaches Score	5.0 / 10
Policy Delivery and Evaluation Score	5.0 / 10

Documents Examined

Policies for the Administration of the Development, Interference with Wetlands and Alteration to Shorelines and Watercourses Regulation (2014)
Mattagami Region Conservation Authority: 2017 Year in Review (2018)
Mattagami Region Conservation Authority Flood Contingency Plan (2020)
Shoreline Erosion and Stabilization Guide (2019)
Website Review

Key Takeaways

- Community outreach events such as the yearly "Fun with Water" festival, provide a chance for the MRCA to communicate its purpose to the public and, could be leveraged to communicate flood risks to the community.
- Creating a "call out" of properties most vulnerable to flood risk, and including it in a flood emergency response plan, can help to notify those who need to know first in a flood situation.
- Conditional development zones allow for flexibility in addressing flood risk in previously developed areas.
- MRCA may at its discretion require an agreement on the title of a property when permitting development in flood hazard zones.

Introduction

Mattagami Region Conservation Authority (MRCA) is in Northern Ontario, in the same climatic zone as Conservation Sudbury. The region is very similar to Conservation Sudbury, it is inland and located directly north of Conservation Sudbury's area of jurisdiction. The total population is about 45,000 and the population density is 4 persons/sqkm. These factors all contributed to the MRCA scoring 7.7/10 in the context similarity evaluation.

MRCA consists of the entire Upper Mattagami River watershed and a portion of the Abitibi River watershed, with an area of over 11,000 square kilometres. The major population centre is Timmins, with Gogama and Shining Tree being other significant population centres. Although its population size and density are lower than Conservation Sudbury, MRCA has been able to create a robust document outlining their administration and compliance policies as a Conservation Authority. With a similar climatic context and regulatory environment, it is likely that anything MRCA has been able to achieve, Conservation Sudbury should be able to as well.

Climate Change (3.6/10)

MRCA performed poorly in this category because they have not acknowledged climate change in policy or on their website. Without even a baseline approach to flood risk based on a changing climate many evaluation criteria that addressed mitigation or adaptation were not achieved. They still achieved some points for actions that addressed a changing climate, even if that was not MRCA's focus. They have encouraged natural approaches to stormwater management and shoreline naturalization in their *Shoreline Erosion*

and Stabilization Guide. Where possible they have purchased blocks of flood hazard lands, which will mitigate future flood risk from a changing climate.

They have a specific flood response plan that outlines the roles and responsibilities of the MRCA and other local government agencies. This helps communicate responsibilities before flooding occurs and provides guidance to the public. They have a list of 560 residential and commercial properties that they will call in the case of a flood because they are located within the floodplain.

Although they do not operate any of their own programs to prepare homeowners for a flood, they do provide useful links to the Government of Canada flood preparation resources. This is an easy, low-cost way for a Conservation Authority to provide flood preparation resources to citizens in its jurisdiction.

One of MRCA's strongest policy actions was in the protection of wetlands. The policy recommends protecting all wetlands, not just those deemed provincially significant. Development is generally restricted in the following areas, although permission can be given by the Conservation Authority if conditions are met.

- Provincially significant and non-provincially significant wetlands.
- 120-metre buffer "area of interference" around both provincially significant wetlands and non-provincially significant wetlands larger than 2 hectares.
- 30-metre buffer "area of interference" around non-provincially significant wetlands smaller than 2 hectares.

Participation, Engagement and Education (4.6/10)

No website material or plans at the MRCA document any communication with local Indigenous groups. This seems especially odd because this area has a larger Indigenous population as a proportion of the total population than many other areas of Ontario (Statistics Canada, 2019).

Meeting agendas and minutes are documented on the MRCA website. These materials provide a record of what actions have been taken to identify and consult with civil society stakeholders in an ongoing matter and, provide the public with the opportunity to engage with the Conservation Authority. These meeting minutes also document the strong working relationship between the MRCA and the City of Timmins, flood advisory committee.

MRCA partners with the Timmins Misiway Healthy Kids Community Challenge program to host a "fun with water" event. This event educates youths about the important role of water in our lives. Events such as this provide an opportunity for public outreach, Conservation Sudbury could create such opportunities as well, and use them to communicate flood risks for community members. Additional education programs are operated in partnership with the Yellow Fish Road program from Trout Canada. This group could easily be a partner for Conservation Sudbury as well.

Integrated Flood Risk Management Approaches (5.0/10)

The MRCA uses fairly standard flood risk management practices, such as a one-zone floodway concept, and evaluating applications on a case-by-case basis. However, they also have tried some interesting approaches to manage flood risk over their history. Mountjoy Historical Conservation Area was created in the 1970s after flooding damaged many homes and businesses in the area. Rather than rebuilding the MRCA took possession of the land and demolished the buildings in the floodplain.

Today MRCA still allows for the replacement of residential buildings in floodways that were destroyed by causes other than flooding. Any re-construction is subject to conditions that limit future flood impacts. If a residential structure is destroyed by flooding, any re-construction is subject to the rules of new construction in the floodway, which is generally not allowed. If such a property is allowed the MRCA retains the right at its discretion, to require an agreement on the title of a property. Page 56 of MRCA's policies document specifically mentions using this option if the reconstruction of existing buildings in the floodway occurs.

Additionally, MRCA created two "conditional development zones" where development can happen in the riverine flooding hazard area, provided the proposed development meet certain pre-determined conditions. This allows for their policy to have some flexibility to accommodate areas that were previously developed.

A major mapping initiative was completed in 2019 for the following areas: Mattagami River, Kamiskotia Lake, Town Creek, Porcupine Lake, Frederick House Lake Road, Mountjoy Township, Tisdale Township, and other areas previously mapped. This was the first update of floodplain mapping in over 40 years for the MRCA. Unfortunately, these maps are not yet available to the public, therefore MRCA performed badly in the evaluation of floodplain mapping.

Within the appendix of MRCA's policy document, there are extensive flood proofing guidelines. One best practice in MRCA's document is providing specifications for drainage swales. The following section is from page 51 of their policy document.

B.5 Drainage Swales

Where a lot is being graded to an elevation that exceeds the grade of the adjacent property, the lot grading must not result in additional runoff being directed onto adjacent properties. Grassed drainage swales must be provided between the fill area and the lot line where a natural drainage swale does not already exist. Where drainage swales are required, they should be designed to the following minimum standards:

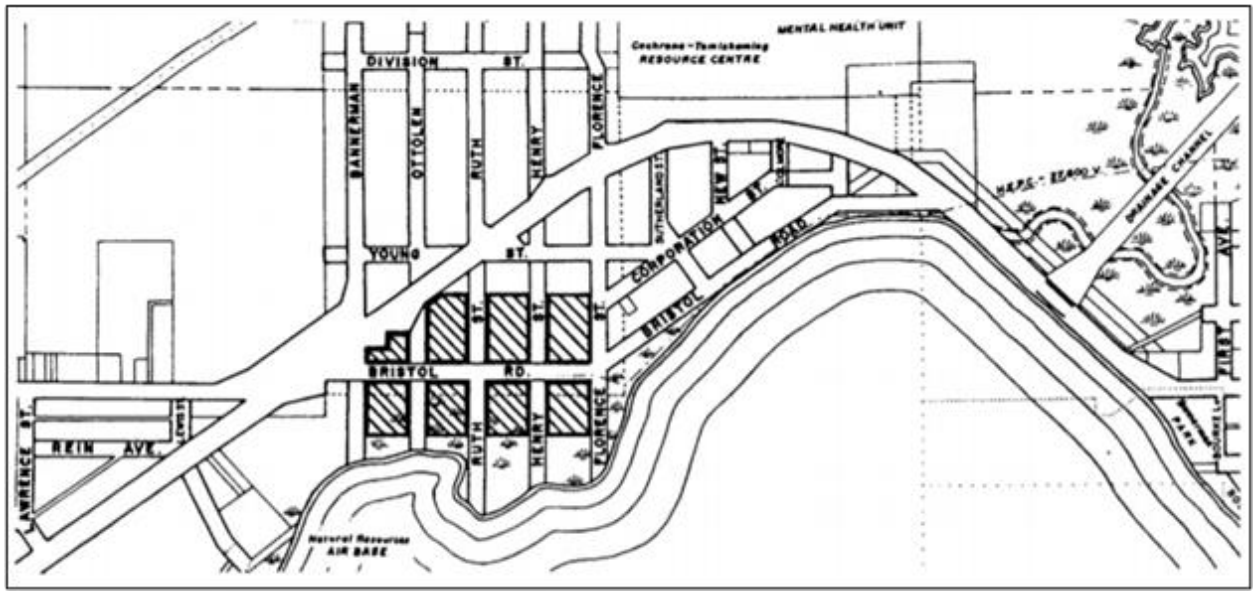


Figure 3: *Bristol Road Conditional Development Zone.*

- *The swale must be located entirely within the limits of the lot and shall not extend beyond the side yard lot lines into neighbouring properties.*
- *The base of the swale should be 0.2 to 0.3 metres in width.*
- *The minimum depth of the swale should be 0.15 metres to a maximum depth of 0.6 metres.*
- *The side slopes of the swale should not exceed a 3 to 1 slope.*
- *A slope of between 2 and 8 per cent is recommended for proper drainage.*
- *The bottom of the swale should be graded smoothly concave.*
- *The inside surface of the swale should be permanently stabilized with grass and mulch and/or other vegetation.*
- *Rock check dams may be required in areas of potentially high flow.*

Policy Delivery and Evaluation (5.0/10)

MRCA has a vision statement but it is not specifically related to flood management. The role of MRCA is clearly stated in the *Policies for the Administration of the Development, Interference with Wetlands and Alteration to Shorelines and Watercourses Regulation.* This document contains all their flood management policies and explains them in a straightforward manner. One issue with the document is that it is extremely difficult to find on their website, being embedded in a hyperlink at the bottom of one page. It would be helpful to have a page devoted to publications, to make this document more easily accessible. The MRCA could have preformed better in this category by having specific flood risk management goals and a plan to monitor them.

North Bay – Mattawa Conservation Authority

Score Summary

Context Similarity	8.5 / 10

Overall Case Score	24.0 / 40
Climate Change Score	5.0 / 10
Participation, Engagement and Education Score	4.4 / 10
Integrated Flood Risk Management Approaches Score	5.8 / 10
Policy Delivery and Evaluation Score	8.8 / 10

Documents Examined

Policies for the Administration of Ontario Regulation 177/06 (2020)
Integrated Watershed Management Strategy (2015)
Wetlands Policy (2013)
Checklist – Applying for Permits Under Ontario Regulation 177/06
Hearings and Procedural Manual (2010)
Website Review

Key Takeaways

- Examining the watersheds on a sub-watershed basis can help to identify local issues that contribute to a better understanding of the entire watershed.
- Creating a checklist of needed application information helps to guide the public towards successful applications.
- Including evidence in policy with a transparent rationale for why that policy exists in the form it does can really improve a policies message when the public is reading it. Including figures helps to communicate the message even more clearly.
- Attention should be used to use clear language when writing policy.

Introduction

North Bay-Mattawa Conservation Authority (NBMCA) is in Northern Ontario, in the same climatic zone as Conservation Sudbury. The region is very similar to Conservation Sudbury and is only located 125 km away. It is inland, with a population of roughly 70,000 and a population density of 13 persons/km^2.These factors contributed to NBMCA scoring an 8.5/10 for its context similarity. Initiatives the NBMCA has been able to complete would likely also work well for Conservation Sudbury.

NBMCA has just released a brand-new policy document, *Policies for the Administration of Ontario Regulation 177/06,* in September of 2020. This comprehensive document is the culmination of many years of work and greatly aids the public in understanding the role and responsibility of the NBMCA. It would be an excellent document to examine when creating future policy plans for Conservation Sudbury.

Climate Change (5.0/10)

NBMCA has done an acceptable job of addressing the issues raised by climate change. Although its *Policies for Administration of Ontario Regulation 177/06* (NBMCA, 2020) do not mention climate change its *Integrated Watershed Management Strategy* (IWMS) (NBMCA, 2015) recognized climate change and affirms the need for sustainable practices. It is assumed this difference is because the NBMCA did not wish to make specific policies in relation to climate change, so that they can have flexibility in their approach to the issue. Section 4.2.1.2 of the IWMS states that the NBMCA affirms it ought to take a leadership role in the region for adapting to the effects of climate change and a participatory role in mitigating further adverse effects due to climate change.

The NMBCA has a policy concerning wetland protection. The *Wetlands Policy* (NBMCA, 2013) recommends protecting as many wetlands as possible not just provincially significant wetlands. The policy acknowledges that there are thousands of wetlands in the NBMCA yet only a few dozen have been evaluated. Although it only specifies guaranteed protection for provincially significant wetlands, it is written in such a way as to provide a significant amount of protection for those not yet evaluated. One significant downside of the *NBMCA Wetlands Policy* is that some sections are difficult to interpret. Section 8 specifies which policies apply in both evaluated and non-evaluated areas. However, when describing where the policy applies in non-regulated areas, the policy uses a list embedded within a double negative, leading to great difficulty in interpreting the policy.

One area in which the NBMCA stood out was with its program aimed at re-naturalizing shorelines. In 2015-2019 the *Restore Your Shore* program helped 147 property owners' plant more than 6.5 km of shorelines and streambanks with 29,000 trees, shrubs, and perennials (NBMCA, 2020). Unfortunately, funding was only provided under a few grants, which ran out in 2020. Currently, the *Restore Your Shore* program is focusing on education and outreach with regards to protecting streambanks, shorelines, and wetlands through planning.

NBMCA could improve their public education programs for adapting to flood risk. At the moment they only have a website that provides information on flood preparedness: how to prepare your property, what to do when a flood is imminent, and what to do after a flood. This site also provides a link to a YouTube video on how to fill a sandbag and points residents towards local suppliers who are selling sandbags if they are needed. Further developing these resources would be beneficial toward preparing the public for a flood. Another action that should be taken is developing a specific flood emergency response plan. Currently, NBMCA relies on flood emergency planning from each of their ten individual municipalities, who have general emergency plans.

Areas that could be improved include plans to limit carbon emissions, restore wetland and introduce natural stormwater management. NBMCA's documents do not mention a plan to limit or reduce emissions. However, it is acknowledged that wetland protection contributes to limiting emissions. Developing a greenhouse gas reduction plan would further affirm their commitment to addressing climate change.

Their IWMS does address the need for natural stormwater management plans. However, it states that this action is usually carried out at the municipal level and the NBMCA just consults on these plans. The document seems to recommend creating "master drainage plans" however it acknowledges that this action has not been undertaken in the NBMCA.

Participation, Engagement and Education (4.4/10)

NBMCA could do more to improve participation, engagement and education. The *Integrated Watershed Management Strategy* is well written for a public-facing document, however other documents such as the *Wetlands Policy* could be improved. Information about public consultation and feedback is not easily accessible on NBMCA's website. It is assumed they have allowed local stakeholders to comment on their policies and plans, however, no documentation providing information pertaining to this process could be found. It also appears that NBMCA has no programs to educate the public on flood risks.

One significant shortcoming of the NBMCA is that it fails to mention any relationship it has with First Nations located near the NBMCA. Although the IWMS acknowledges the fiduciary duty to engage regional First Nation communities, little mention of them is present in the policies and guidance documents from the NBMCA.

NBMCA has an excellent chart in the IWMS which outlines the various public sector partners and their relationships and responsibilities. However, additional clarity could be added to their *Policies for the Administration of Ontario Regulation 177/06.* The chart implies there is an open working relationship between the NBMCA and other governing bodies sharing the same geographic location, but little evidence is given to show these relationships are operating healthily.

One area in which they have done well is in the transparency of the application process. NBMCA has created a client checklist for the public to use prior to submitting an application (NBMCA, n.d). It outlines what data is needed by the Conservation Authority and in what form the data is needed. This provides a transparent process to evaluate evidence and helps the public submit applications that will not be rejected due to incomplete information. If an application is rejected and an applicant wishes to appeal that decision, the NBMCA has a clear and concise document describing how a hearing will be conducted and when the applicant will receive a resolution (NBMCA, 2010).

Integrated Flood Risk Management Approaches (5.8/10)

NBMCA is still using many tools belonging to a reactive hazard-based approach to managing flooding. However, some of their methods are starting to follow a more proactive risk-based approach. The NBMCA uses a two-zone approach to designate lands for flooding and flood risk management. The policy sets out appropriate development uses and guidelines for new and existing development near the floodplain and in the flood erosion hazard zone. Judging by the permit application checklist issued by the NBMCA, it seems that development is assessed on a case-by-case basis instead of considering its cumulative impacts. However, their IWMS has done a good job of identifying specific land uses in each watershed that need to be monitored. This fine-grained approach attempts to catalogue the effects of land use within the overall jurisdiction of the NBMCA.

The NBMCA's jurisdiction encompasses the entire Mattawa River system but only a portion of the Lake Nipissing basin. Therefore, some management issues that would require a full watershed analysis of the Nipissing Basin would likely not be effective. It should be noted that the Lake Nipissing basin contains most of the NBMCA's significant wetlands.

The IWMS does a particularly excellent job of examining issues of interest to the NBMCA. It breaks down the watershed into various sub-watersheds and provides an environmental, social and economic analysis for each one. This analysis identifies gaps in information, actions that need to be undertaken, and known issues for each sub-watershed. The IWMS also acknowledges drought and water storage as part of whole water cycle management but it does not appear in their policy document.

Their policy does an excellent job of defining where and why areas are regulated. Although the regulatory 100-year flood line is used as a basis, basin characteristics are considered to define where erosion risk is present, and the buffer area is changed in response to those risks. In areas where the slope inclination near to the stream channel is less than 33 1/3 percent, the limit of the regulated area includes two components: the river or stream valley extending to the top of the slope, and an allowance of up to 15 metres from the top of the slope, which includes a 6 metre Erosion Access Allowance.

However, in areas with a slope inclination greater than 33 1/3 percent, the regulation limit consists of two components: the river or stream valley including the predicted long term stable slope projected from the existing stable top of the slope, and an allowance of up to 15 metres from the predicted stable top of slope, which includes a 6 metre Erosion Access Allowance. The graphics included in their regulatory document make this regulation easy to understand and provided an excellent visual aid explaining why the regulation was written in this way.

Figure 4: *NMBCA's regulated erosion hazard area for stable slopes.*

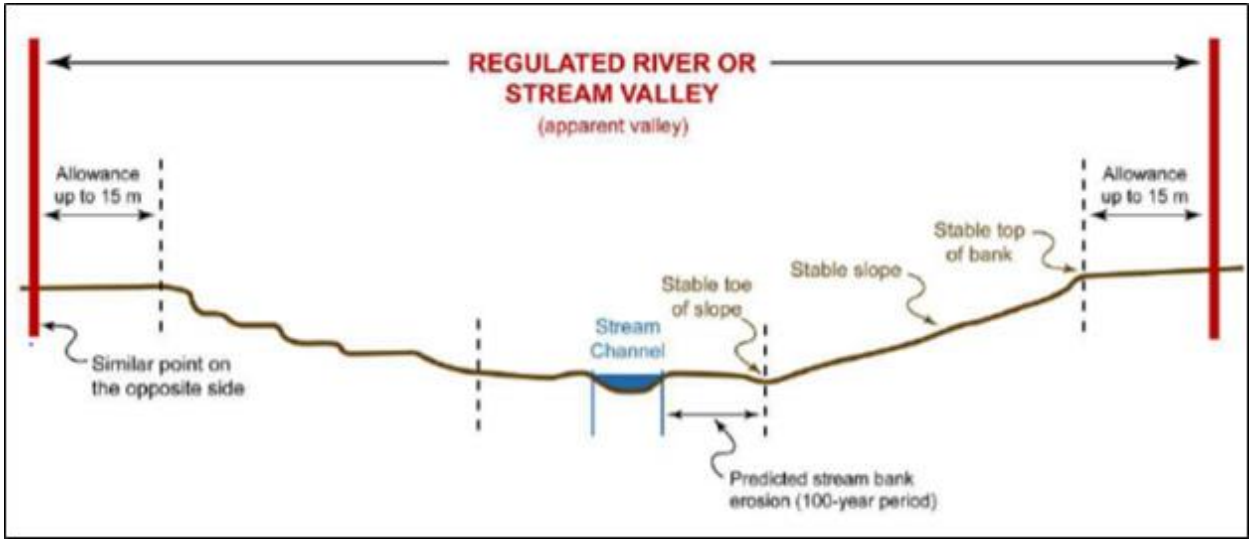
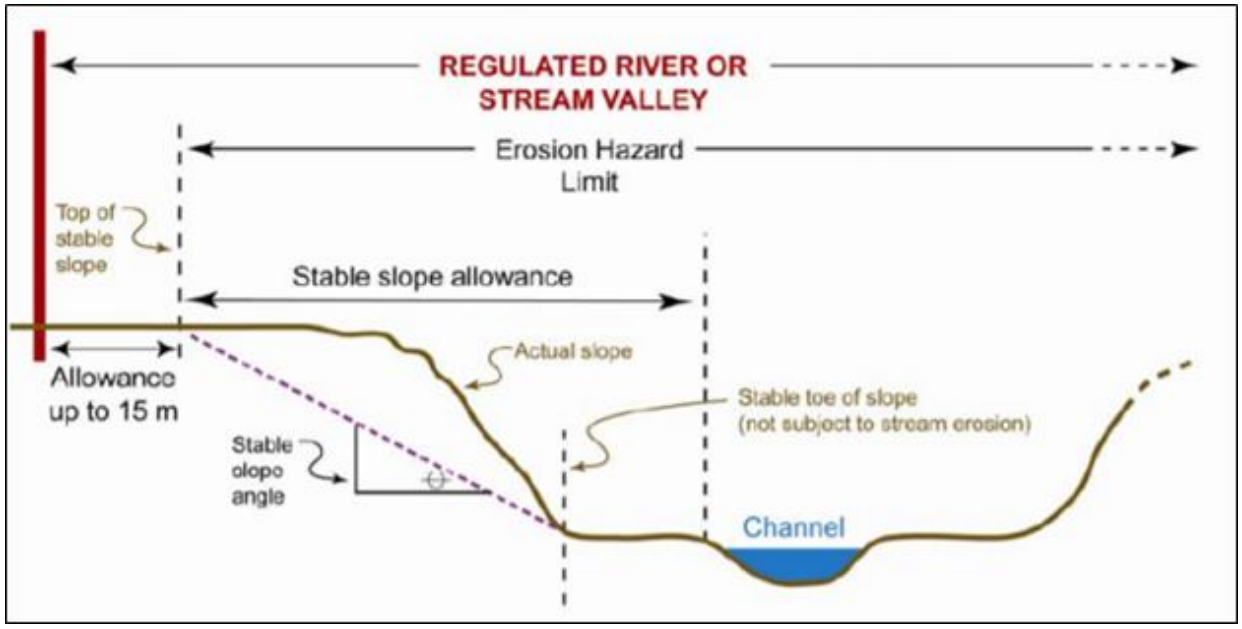


Figure 5: *NMBCA's regulated erosion hazard area for unstable slopes.*



Some areas which could be improved include using natural approaches and mapping. Although the policy does not encourage natural approaches such as riverine naturalization, it also does not encourage engineered approaches such as building concrete drainage ditches. The policy only encourages engineered approaches such as dams or dikes to protect existing development instead of new development.

They have a mapping portal on their website that shows the approximate regulated flood areas. However, there is a disclaimer that this map is not the official map and is meant as guidance only. This disclaimer also states that not all areas are mapped. It could not be determined when the maps were most recently updated, however, because the entire watershed has not been mapped, it is appropriate to assume that some parts were mapped more than 10 years ago.

Policy Delivery and Evaluation (8.8/10)

The policies and plans NMBCA has are current, and up to date with the general policy trends within flood risk management in Ontario. The policy clearly states the role of the Conservation Authority and the tools it has at its disposal. Both the IWMS and the *Policies for the Administration of Ontario Regulation 177/06* have sections to explain this.

The IWMS does an excellent job of highlighting the current priorities of the NBMCA and has a clear plan to evaluate its effectiveness and goals for the next 20 years. Where those goals are met, the next steps are set out for revaluating new goals. This is particularly effective when combined with the sub-watershed approach to identifying risk, opportunities, and gaps in knowledge.

Sault St. Marie Region Conservation Authority

Score Summary

Context Similarity	6.9 / 10

Overall Case Score	20.4 / 40
Climate Change Score	5.9 / 10
Participation Engagement and Education Score	2.0 / 10
Integrated Flood Risk Management Approaches Score	3.8 / 10
Policy Delivery and Evaluation Score	8.8 / 10

Documents Examined

Policies, Procedures and Guidelines for the Administration of Ontario Regulation 176/06 (2017)
SSMRCA Strategic Plan 2017-2021 (2016)
SSMRCA Annual Report (2017)
Marsh Monitoring Program Brochure (2008)
Website Review
News Bulletins

Key Takeaways

- Allowing the construction of low-risk land uses in the flood fringe, such as Geothermal Heating and Cooling systems, allows residents to make the best of flood hazard areas.
- Effective flood hazard mapping can be provided to the public by partnering with local municipalities.
- SSMRCA has a marsh monitoring program for private individuals to volunteer to monitor a marsh. SSMRCA lends out the equipment to do so free of charge. This program supports and encourages a public interest in wetland preservation.
- Has recently signed a memorandum of understanding with Sault College for students to complete projects at SSMRCA's conservation areas as part of their coursework (Sault College, 2019).

Introduction

The Sault Ste. Marie Region Conservation Authority (SSMRCA) was created in 1963. It is the smallest Conservation Authority in Ontario with an area of 552 square kilometres. The jurisdiction of SSMRCA follows the municipal boundaries of the City of Sault Ste. Marie. This area includes the watershed of the St. Marys River, and several smaller watersheds draining into Lake Superior. The area is home to approximately 74,000 people with a population density of 132 persons/sqkm. The SSMRCA is in Northern Ontario and has a similar climatic context to Conservation Sudbury. The only key difference was that SSMRCA may see more coastal flooding effects, because it is located on the shore of Lake Superior. All these factors contributed to SSMRCA scoring a 6.9/10 on the context similarity evaluation.

Climate Change (5.9/10)

SSMRCA acknowledges the challenges climate change presents to our society and emphasizes the need for sustainable practices to respond to a changing climate. SSMRCA highlights its tree planting program as a contributor to mitigating the effects of global warming through carbon sequestration. This program plants over 1000 trees a year at an annual tree planting day festival. By involving the public in a tree planting festival, the SSMRCA can increase public awareness about climate change and garner public support for their programs.

Another significant public-facing initiative they run is the marsh monitoring program. It enables private individuals to volunteer to monitor a marsh. SSMRCA lends out the equipment to do so free of charge. While this program is not specifically aimed at flood risk mitigation, it supports a public interest in wetland preservation.

Although they have not restored any wetlands, their policy protects all wetlands and not just provincially significant ones. However, it is difficult for the casual reader to understand this. Policies regarding wetland protection are scattered across two different chapters of the document. A clear and coherent policy about wetlands would communicate more clearly the good work SSMRCA has done to mitigate flood risk through wetlands protection.

Their stormwater management plan suggests using natural approaches wherever possible and emphasizes only using natural approaches for new developments. The plan gives some examples of best practices that are encouraged for all sites including:

- Grassed swales
- Vegetative buffer strips
- Infiltration pits/trenches/basins
- Sand filters
- Pervious pipe systems

Participation, Engagement and Education (2.0/10)

SSMRCA performed poorly in this category predominantly because they do not adequately document consultation efforts. No public consultation is mentioned in their policy and the website does not document any ongoing consultation with local stakeholders. The SSMRCA acknowledges the importance of an ongoing relationship with local First Nations communities in their strategic plan. However, further information about this relationship is not documented. Increasing their efforts to engage local stakeholders and document the results would greatly aid the SSMRCA. Despite preforming poorly, the SSMRCA did have some strong local collaboration, such as the marsh monitoring program, and a partnership with Sault College. However, these actions did not address flood risk directly.

The *2017 Annual Report* does a good job of explaining the actions and policies of the SSMRCA in a way that the public can understand and support. Their policy document does a good job of outlining their role in relation to other government agencies, however, they do not document a working relationship with other levels of government sharing the same jurisdiction. Finally, their policy document outlines the application process well, explaining what materials are important to include, and how an appeal works.

Integrated Flood Risk Management Approaches (3.8/10)

SSMRCA jurisdictional boundaries do not encompass the entirety of the watershed. Although this is beyond the control of SSMRCA, it does undermine the intention of the *Conservation Authorities Act* to manage flooding on a watershed basis.

SSMRCA uses one-zone, two-zone, and special policy areas to define the flood hazard limit. By using all three tools the SSMRCA maintains flexibility to address flood risk issues, while also minimizing costs as much as possible. SSRCA permits various structures and developments within flood hazard lands, provided proper permitting and applications are submitted. SSRCA has a unique policy regarding geothermal heating and cooling systems, section 5.3.8 of its *Policies, Procedures and Guidelines for the Administration of Ontario Regulation* allow for geothermal heating and cooling systems to be constructed in the flood hazard limit, provided a series of conditions are met. This policy should benefit residents of the SSMRCA by mitigating carbon emissions associated with heating in the future.

SSMRCA's regulatory flood line is based on the 100-year flood line or the 1961 Timmins flood, whichever is greater. Mapping based on this flood line is easily available to the public. Screening maps are included on SSMRCA's website through a program called Soo Maps (hosted by Sault Ste. Marie). This mapping tool is useful for the public to see where the regulated flood areas are located and how they relate to other features in the area. Many other layers can be turned on and off including, roads, land parcels, building footprints, heritage sites, and businesses. Conservation Sudbury may be able to partner with the City of Sudbury on such a mapping initiative to improve their maps. The one major downside to their mapping tool is that it does not show the actual regulatory boundaries, just a rough guideline of where the regulated areas are.

Policy Delivery and Evaluation (8.8/10)

SSMRCA has a vision statement but it does not specifically link to flood risk management. However, the role and responsibilities of the SSMRCA are communicated clearly in their policy. All of their flood risk policies are contained within a single document: *Policies, Procedures and Guidelines for the Administration of Ontario Regulation 176/06*. This document ensures an effective approach to policy by including measurable objectives that can be used to monitor and evaluate progress on policy objectives. Section 3.3 sets out a plan to monitor progress in an ongoing manner and re-evaluate goals every five years. Many guidelines and suggestions for how the public can follow the policies are also included, such as:

- Guidelines for stormwater management
- Guidelines for large scale fill applications
- Guidelines for environmental impact assessment studies
- Guidelines for hydrological studies
- Guidelines for geotechnical studies
- Guidelines for the permit process

SSMRCA links to relevant documents at the bottom of every page on its website. This makes things easy to find for anyone who is looking to get information about flood risk. Conservation Sudbury could adopt this useful practice in order to improve the communication of flood management policies to the public.

CENTRAL ONTARIO

Kawartha Conservation

Score Summary

Context Similarity	9.2 / 10

Overall Case Score	30.9 / 40
Climate Change Score	7.7 / 10
Participation Engagement and Education Score	4.4 / 10
Integrated Flood Risk Management Approaches Score	8.8 / 10
Policy Delivery and Evaluation Score	10 / 10

Documents Examined

Climate Change Strategy (2016)
Kawartha Conservation Strategic Plan 2017-2021 (2016)
Kawartha Conservation Stewardship Strategy 2020-2030 (2020)
Plan Review and Regulation Policies (2013)
BlueScaping Our Neighbourhoods
Website Review
Kawarthas Naturally Connected Website
News Bulletins
Meeting Minutes and Agenda's

Key Takeaways

- A comprehensive climate change strategy document is highly useful in informing and addressing larger global climate change issues facing local Conservation Authorities.
- Utilizing a singular document which outlines ways which property owners can benefit the environment and decrease flood risk makes community involvement in environmental efforts less intimidating and easier to understand for the public.
- Increasing ease of access to mapping is a useful focus for CA's as it improves community interaction with CA websites and resources.
- Setting goals and objectives which are measurable, transparent, and include a timeline for completion provides a straightforward format which can be used to assess and compare success and failure on a regular basis.

Introduction

Kawartha Conservation is a relatively small Conservation Authority with jurisdiction of a singular watershed which is approximately 2,563 square kilometres and includes 6 member municipalities. Altogether the municipalities within Conservation Kawartha's jurisdiction make up a total population of 214,921. However, Clarington which is the largest municipality has only a small portion of its boundaries within the jurisdiction of Kawartha Conservation, making the total population estimate <150,000. The main municipality within Conservation Kawartha is the City of Kawartha Lakes, with a population of 75,000 people. Based on the geographic location, size, and population, Kawartha Conservation scored a 9.2/10 on context similarity in comparison to Sudbury.

Climate Change (7.7/10)

Kawartha Conservation recognizes the importance of climate change and the need for sustainable practices to meet climate change goals and protect the environment. KC has developed a unique *Climate Change Strategy* document in 2016 which outlines the importance of climate change, the CA's role in dealing with climate change, and a checklist to determine reasonable goals for Kawartha Conservation to minimize its climate impacts.

Kawartha Conservation has stated that wetland and natural system restoration is important to the Conservation Authority. This is exemplified in multiple documents including general regulation and policy, the *2017-2021 Strategic Plan,* and the *2020-2030*

Stewardship Strategy. A specific project which addresses wetland and natural restoration is the Lake Scugog Enhancement Project. This was enacted by the Healthy Lakes Scugog Steering Committee which is comprised of members of the public, government officials, and the Conservation Authority. The many groups have come together to directly enhance Lake Scugog by creating a berm for wetlands, repurposing dredged lake bed material to enhance wetlands, and installing oil and grit separators.

Conservation Kawartha utilizes natural stormwater management practices through its Bluescaping Program, which aims to reduce flooding events and hazards by decreasing the speed of surface water runoff and increasing the water absorption and retention of the natural environment. The Bluescaping Programs seeks to reduce flooding hazards and events by encouraging owners to harvest rainwater, build pervious driveways and pavements, create better lawns, naturalize the built environment, and create rain gardens. The Bluescaping program showcases exemplary flood mitigation measures being taken by Conservation Kawartha that would be worthwhile to develop and create within the Conservation Sudbury jurisdiction.

Flood warning and hazard information as well as flood preparation is fully outsourced to member municipalities and it not developed by Kawartha Conservation. Although KC lacks in flood preparation and hazard programs, there are programs and strategies in place for other environmental programs such as tree planting and a strategy to limit CO2 emissions within their jurisdiction as well as their own corporate carbon footprint.

Kawartha Conservation has a wide range of detailed and effective documents regarding climate change and stormwater management practices however, it lacks information on flooding and how to prevent flood risks. Kawartha Conservation does state that proper planning along the watershed will reduce flood risks but does not provide a detailed analysis of this claim which significantly impacted the overall score in this category.

Participation Engagement and Education (4.4/10)

The majority of key documents analyzed in this case study mention that they were created through the consultation of stakeholders, public agencies, and groups such as lake and cottage associations. However, following this reference there is no direct evidence that these groups played a large part in the Conservation Authorities internal document development.

The Kawarthas Naturally Connected project was developed to build a consensus-based natural heritage system through the participation of many key stakeholders within the Kawartha Conservation watershed area. It was developed in conjunction with

members of the public, neighboring Conservation Authorities, and various government and private agencies and companies. Kawartha Conservation's *Climate Change Strategy* document acts as a brief overview of the large policy document and makes the objectives and criteria easier to understand while also relating it to the ongoing and future challenges of climate change. An example of the design process can be seen in the diagram below.

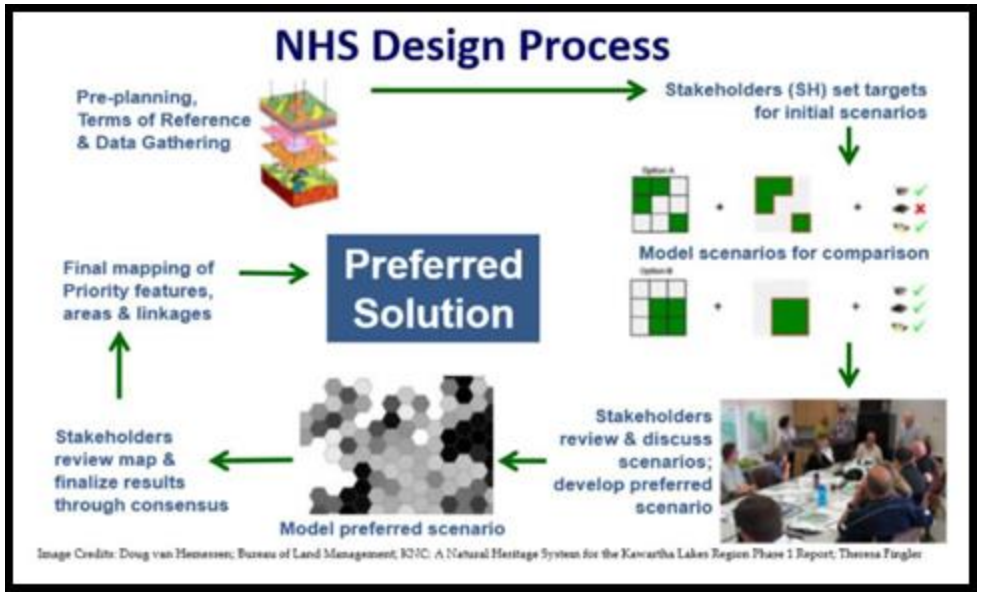


Figure 6: *Natural Heritage System Design process developed by Kawarthas Naturally connected.*

Kawartha Conservation's *Plan Review and Regulation Policies* is a document which outlines the policy and regulations which guide Kawartha Conservation. The document effectively explains the policy in clear and understandable language which meets the criteria within this evaluation. However, the size of the document may be off-putting to some members of the public as it is larger than others which are made available to the public.

Kawartha Conservation does not mention the inclusion of traditional knowledge from Indigenous communities. This lack of Indigenous information is what has caused Kawartha Conservation to have such a low score for the participation and education

category. Although this is not included, the other elements in this category are extremely noteworthy and significant for takeaways and lessons.

Integrated Flood Risk Management Approaches (8.8/10)

The majority of information pertaining to flood risk management is contained within *the Plan Review and Regulation Policies* document produced by Kawartha Conservation. This document contains information on the consideration of land use planning and watershed management including the one-zone and two-zone concepts. Within Kawartha Conservation no areas are designated as two-zone as this would require the completion of multiple watershed-based studies, however the Authority is open to future applications of the two-zone concept.

On Kawartha Conservations website there is information on each of the 27 sub-watersheds within the KC jurisdiction. Kawartha Conservation plans for the whole watershed and takes into account the cumulative effects planning proposals and permits may have on the watershed as a whole.

Section 2.4.1. of the *Plan Review and Regulations Policies* document states the Authority uses a "natural systems approach" which "realizes the important ecological and hydrological linkages that extend beyond property, planning area and political boundaries" (Kawartha Conservation, 2013). This statement and approach combined with the Kawarthas Naturally Connected and Bluescpaing Programs suggests that the Authority is recognizing the entire water cycle, as well as taking an evidence-based approach to their policy.

Kawartha Conservation makes use of natural approaches to flood management through the Bluescaping program as well as their role in the Greenbelt Foundation. This is a foundation designated to the construction and improvement of green infrastructure projects and developments within the Greenbelt. As Kawartha Conservation is within the Greenbelt it has unique access to the Greenbelt Foundation and it is recognized that this is a limitation the Conservation Sudbury does not have access to.

It is unclear of Kawartha Conservation mapping utilizes 100-year flood lines or an extended mapping extent, therefore a 100-year flood line was assumed. The mapping is easily accessible and is one of the few Conservation Authorities which provides mapping that is open to the public on CAMaps. The mapping is also believed to have been updated in 2012 with the Kawarthas Naturally Connected project.

Policy Delivery and Evaluation (10.0/10)

Kawartha Conservation did exceptionally well in the policy delivery and evaluation section of the review based on the success of the *Climate Change Strategy, Kawartha Conservation Stewardship Strategy 2020-2030, Kawartha Conservation Strategic Plan 2017-2021,* and the *Plan Review and Regulation Policies*. The Kawartha Conservation *Stewardship Strategy 2020-2030* has a strong vision statement and set of goals and criteria which can be used to evaluate if the Authority is completing its main objectives set out for the next 10 years. This specific format of goals and assessment is a tool which is highly recommended to be considered by Conservation Sudbury when writing future policy and flood management related documents.

Otonabee Region Conservation Authority

Score Summary

Context Similarity	9.2 / 10

Overall Case Score	26.7 / 40
Climate Change Score	5.9 / 10
Participation, Engagement and Education Score	7.1 / 10
Integrated Flood Risk Management Approaches Score	7.5 / 10
Policy Delivery and Evaluation Score	6.3 / 10

Documents Examined

2019 Annual Report to the Watershed Community (2019)
Otonabee Conservation Strategic Plan 2017-2020 (2016)
Watershed Planning & Regulations Policy Manual (2012, updated in 2015)
Floodplain Mapping (2019)
Website Review
News Bulletins
Meeting Minutes and Agenda's

Key Takeaways

- Policy and guideline documents which are written in a transparent and easily understandable format for the public are highly valuable tools to provide a deeper understanding of flood management within communities.
- Using LiDAR data is a strategy which can be used to create more accurate flood mapping which may aid in better flood predictions and planning for CA's.
- Partnering with local school boards and municipalities are useful and inexpensive way to implement education and planting programs that aid in naturalization and stormwater retention projects.

Introduction

The Otonabee Conservation Authority is a relatively small Conservation Authority with a jurisdiction area of approximately 1950 square kilometres in size with a total population of 105,000 people. There are 8 municipalities contained within the ORCA jurisdiction. Otonabee Conservation is similar to Conservation Sudbury as both contain one large primary municipality, similar population and density, and are both located inland with contained lakes and rivers. At ORCA the large urban area is the City of Peterborough, which has around 82,000 citizens as per the 2016 Census. Due to these similarities the ORCA has a context similarity score of 9.2/10.

Climate Change (5.0/10)

The Otonabee Region Conservation Authority recognizes the importance of sustainable practices in watershed, floodplain, and forest management. The ORCA has several articles regarding stormwater pond naturalization efforts around the Conservation Authorities jurisdiction. Most naturalized plans are completed through partnerships with municipalities in which the Conservation Authority provides the plants and the City or Municipality is responsible for the ongoing management of the areas in which they are planted.

https://www.otonabeeconservation.com/naturalization-planned-for-towerhill-stormwater-pond/

The ORCA does not have a flood response plan, and limits flood response to emergency services.
However, within the ORCA's *Regulation Policy Manual* is the ORCA's *Floodproofing Guidelines* which contains information on how to reduce the impact of flooding and mitigate risk. Although this is found in the Appendix, it remains a useful aspect and representation of flood mitigation strategies in the area.

Within several documents the Otonabee Region Conservation Authority highlights the importance of wetlands and forest management. With expansive tree planting programs and wetland protection areas, the CA adequately indicates the importance of these natural features. The tree planting program partners with local municipalities as well as schools to help plant native shrubs and trees in various locations across the ORCA's jurisdiction. Their "Newsfeed" is filled with articles regarding plantings within the ORCA's jurisdiction.

Participation Engagement and Education (7.1/10)

The ORCA has several important documents which explain the policy of the Conservation Authority regarding floodplain and watershed management and identify long term goals and public stakeholders. The ORCA's *Watershed Planning & Regulations Policy Manual* is a large document which contains the bulk of the information and planning policy and guidelines needed to explain the role of the Conservation Authority. It also provides information on the ORCA's guidelines and policy requirements for many stakeholders including the general public and developers.

The Otonabee Region Conservation Authority has a flood risk education program called the "Spring Water Awareness" program. This is partnered with Ontario Power Generation to provide in class education and presentations to local schools on the dangers of spring flooding.

Otonabee Conservation does not have direct identification of local indigenous communities within its policy manual or guideline documents. However, within one set of the Conservation Authorities meeting minutes a report titled "Towards an Improved Relationship with Indigenous People" stated that traditional knowledge and help from the Curve Lake First Nation is being used by the CA to improve relations and improve the role of the ORCA. It also states that policy and regulations are in the process of being developed in conjunction with Curve Lake First Nation.

Integrated Flood Risk Management Approaches (7.5/10)

The Otonabee Region Conservation Authority adequately highlights the importance of land use planning and possible impacts that sensitive developments can have on a range of features. This is particularly highlighted in the *Watershed Planning & Regulations Policy Manual.* The ORCA has the ability to use both a one and two zone concept with regards to flood plain planning and management. However, they have reserved the two-zone concept solely for the Township of Asphodel-Norwood.

Applicants who submit development proposals to the ORCA are directly asked to identify that the proposed structures will not adversely impact:

> *River or stream valley; Wetland; Watercourse; Features identified by the Clean Water Act (2006)(i.e, intake protection zones, wellhead protection areas, significant groundwater recharge areas, and highly vulnerable aquifers; High water tables; Other hydrogeologically (i.e., significant discharge areas, springs, seeps, etc.,) and/or other environmentally sensitive features.*

While the ORCA never directly states the hydrological cycle, the items listed above make up all the components of the hydrological cycle and as such, provides a level of protection to environmentally sensitive areas which may not be directly under the control of the ORCA.

The GIS mapping used by the ORCA is currently in the process of being updated and includes the use of new LiDAR imaging to better determine the banks of waterbodies. This will give the Conservation Authority a more accurate detail of flood hazard areas. In its yearly report the ORCA updates on the total kilometres of shoreline which have been newly mapped, showing that this is an ongoing project.

Policy Delivery and Evaluation (6.3/10)

The ORCA provides adequate resources regarding policy delivery and evaluation. The role of the CA, its goals, and vision are clearly stated throughout the list of documents reviewed in this case study. However, the ORCA does not have a timeline for goals or projects and lacks measurable criteria. While there exists a list of items to focus on, there is no direst way to measure these goals outside of the Conservation Authority claiming if they were achieved or not.

The Otonabee Region Conservation Authority has a singular policy and management document which contains most of the information provided in this review. The document is well written with a strong set of goals. It's one drawback is the lack of Indigenous knowledge contained within the document. The *Watershed Planning & Regulations Policy Manual* is a successful example of what a consolidated policy document can look like and what information it provides, all while being easily and readily accessible.

Nottawasaga Valley Conservation Authority

Score Summary

Context Similarity	6.9 / 10

Overall Case Score	20.6 / 40
Climate Change Score	6.8 / 10
Participation Engagement and Education Score	6.7 / 10
Integrated Flood Risk Management Approaches Score	5.8 / 10
Policy Delivery and Evaluation Score	1.3 / 10

Documents Examined

Nottawasaga Valley Conservation Authority 2020 Program Overview
Nottawasaga Valley Integrated Watershed Management Plan 2019
NVCA Climate Change Strategy and Action Plan 2016-2018
Nottawasaga Valley Conservation Authority Flood Contingency Plan 2017
NVCA Natural Hazards Technical Guide 2013
Website Review

Key Takeaways

- Working to implement a *Climate Change Strategy and Action Plan* is one way in which climate change can be incorporated into policy.
- Utilizing an Integrated Watershed Management Approach can incorporate multiple flood risk management strategies to create comprehensive planning practices.
- Engaging and partnering with a variety of sectors in both public and private corporations creates a stronger community of support for flood risk management.

Introduction

The Nottawasaga Valley Conservation Authority (NVCA) is located in central Ontario. It covers approximately 3,700 square kilometres and has jurisdiction in 18 municipalities in the counties of Simcoe, Dufferin, and Grey. The Nottawasaga Valley is the source of watercourses that flow into Georgian Bay at Wasaga Beach, Collingwood, and Severn Sound. The watershed includes 35 kilometres of the Georgian Bay shoreline.

Agriculture (47%) is the dominant land use in the watershed followed by forests (23%), wetlands (12%), and transitional uses (9%). Urban areas compose 4% and roads compose 3%. The remaining 2% consists of golf courses, water, and quarries. The area's economy is dependent on natural capital as there is a strong tourism industry with some of the larger attractions being Wasaga Beach and ski hills and resorts. The area under jurisdiction of the NVCA has a similar population and population density to that of Sudbury giving it an adequate context similarity. However, this is lowered by the significant portion of coastline along the Georgian Bay which decreases focus on inland flooding and increases documentation and focus on coastal flooding practices. Therefore, the context similarity score is 6.9/10.

Climate Change (6.8/10)

The NVCA has several plans and programs that address climate change. The Authority began working on a *Climate Change Strategy and Action Plan* in 2016. The vision includes a sustainable watershed that is resilient to the effects of climate change, urban growth, and other stressors. It aims to provides for safe, healthy and prosperous people and communities with a mission to deliver

innovative integrated watershed management. Under this Plan, the NVCA has a strategy to reduce their corporate carbon footprint by developing a business culture of conservation.

The NVCA also has a land securement strategy for 2020-2030. Since 1960, the CA has successfully secured 23 ecologically significant sites, totalling 5,240 hectares of mostly environmentally sensitive areas within the watershed. The Authority works with private landowners in the internationally significant Minesing Wetlands to secure ecologically significant lands identified as priorities for conservation action. A strategic direction listed in the IWMP is to create man-made wetlands and restore drained wetlands that can store surface runoff and provide flood attenuation in areas with high rates of wetland loss. They also have a number of grants and support services for the conservation, protection, restoration, and creation of wetlands.

In 2019 the NVCA completed over 129 stewardship projects throughout the watershed. They also leveraged funding of approximately $900,000 for projects to restore habitats and improve water quality. The NVCA has a number of partnerships in place to expand forest cover in the watershed. In 2019 the CA planted close to 140,000 trees, and in 2020 they plan to plant another 115,000.

As for flood education and preparation, the NVCA supplies an info sheet on how to fill and lap sandbags for temporary flood protection. The Authority also has a large number of educational programs available including day camps for children, and a "borrow and outdoor educator" program. However, none of these programs appear to focus on flooding and there is no evidence of the Authority having a specific flood response plan. The NVCA does have a *Flood Contingency Plan* which acts as a guide for municipalities, emergency services, and other partners.

Participation, Engagement and Education (6.7/10)

The Authority's *IWMP* demonstrates how stakeholders contributed to its creation. Over 50 stakeholders representing agencies and organizations from sectors including agriculture, development, education, public health, environment and natural heritage, Conservation Authorities, municipal governments, and provincial government ministries participated in engagements held by the CA. The plan also lists approximately 20 stakeholders that were invited to participate, but unable to partake. A number of stakeholders were also invited to participate in a stakeholder advisory group for the NVCA *Climate Change Strategy and Action Plan*. These meeting minutes are available on the NVCA website.

The NVCA website provides surveys for the public to complete if they wish to offer feedback in the areas of accessibility, conservation areas and lands, environmental and outdoor education, the permit application process, special events, stewardship programs, or the general website. There does not appear to be any opportunity for the public to comment on policy. One thing the NVCA does well for the public is outlining the process to apply for a permit on their website.

The NVCA website also lists the municipal members and watershed partners which includes counties, other CAs, government agencies, and conservation partners from a variety of sectors. The NVCA recognizes the importance of working with other governments and understanding each other's mandates, policies, and procedures. They also provide a diagram showing the interactions of agencies involved.

Beyond including a land acknowledgement in some of the documents, the policies do not appear to reflect any incorporation of traditional knowledge from indigenous communities. The Rama First Nations and Saugeen First Nation were invited to participate in engagement sessions for the creation of the IWMP.

Integrated Flood Risk Management Approaches (5.8/10)

In 2019 the NVCA released a new *Integrated Watershed Management Plan (IWMP).* This plan explicitly makes the connection between land use planning and watershed management. This document states that flood hazard mapping is incomplete or outdated for many areas of the Nottawasaga Valley watershed. It lists updating floodplain mapping as a strategic direction and identifies the partners required to collaborate for its execution. According to the 2020 Program Overview, a major focus of the CA for 2020 is to complete flood hazard mapping of the Nottawasaga River for risk assessment. The NVCA *Natural Hazards Technical Guide* mentions that a two-zone policy exists, although the interactive property map only shows the NVCA regulated area and not the floodway-flood fringe boundaries.

The *IWMP* has a strategic goal to establish accurate development limits in relation to flooding, but none of the strategic directions supporting this goal explicitly state this will be part of the implementation. The strategic directions do include the updated floodplain mapping and natural heritage features that provide water quantity control in flood prone catchments. The NVCA completed a watershed-wide health check, which included producing health checks on the Nottawasaga Valley's subwatersheds. They do also plan to develop subwatershed plans.

The *IWMP* recognizes climate change, lack of stormwater management, and increased urbanization as key stressors to flooding in the Nottawasaga Valley Watershed. The strategic directions aim to overcome these stressors through non-traditional flood management approaches including maintaining and enhancing natural features and implementing LID. The *IWMP* sees Low Impact Development (LID) as a tool that can be used to improve source controls and support traditional stormwater management.

Policy Delivery and Evaluation (1.3/10)

While the vision statement, mission statement, and values are connected to flooding, none of them explicitly mention flooding or flood risk management. In terms of effectiveness, the *IWMP* mentions the need for monitoring, reporting, review, and evaluation however, there is no timeline in place to evaluate the goals. The *Climate Change Strategy and Action Plan* has strategies categorized as being short, medium, or long-term, but none of them have specific deadlines to meet. The 2020 program overview and *Climate Change Strategy and Action Plan* have some but not all areas of focus that are measurable. Finally, locating flood management policies is difficult and cannot be found in a single location such as a webpage or document.

Lake Simcoe Region Conservation Authority

Score Summary

Context Similarity	6.2 / 10

Overall Case Score	26.5 / 40
Climate Change Score	8.2 / 10
Participation Engagement and Education Score	4.2 / 10
Integrated Flood Risk Management Approaches Score	5.4 / 10
Policy Delivery and Evaluation Score	8.8 / 10

Documents Examined

Lake Simcoe Region Conservation Authority Watershed Development Guidelines
LSRCA Technical Guidelines for Stormwater Management Submissions
LSRCA 2016-2020 Strategic Plan
Climate Change Mitigation Strategy for the Lake Simcoe Watershed
Website Review

Key Takeaways

- Conducting an inventory of GHG emissions and carbon sequestration in the watershed.
- Partnerships with universities to conduct research provide low cost-effective methods of advancing knowledge and information.
- Updates to regulation mapping on an annual basis provide accurate representation of current conditions.
- The requirement for development to utilize LID as well as demonstration projects effectively communicates the importance of LIDs in flood risk management.

Introduction

The Lake Simcoe Region Conservation Authority (LSRCA) is located in central Ontario. The Lake Simcoe Watershed is 3,400 square kilometres in size, with Lake Simcoe covering 722 square kilometres of this area. Within the watershed there are 18 subwatersheds and major river systems. The LSRCA has jurisdiction in 20 municipalities with over 450,000 residents. It spans from the Oro Moraine in the north to the Oak Ridges Moraine in the south. York and Durham regions, Simcoe County, and the cities of Kawartha Lakes, Barrie and Orillia are also incorporated in the jurisdictional area. This is one of the fastest growing regions in Canada. The local economy has a large tourism and recreation sector, as well as industry and agriculture. Their context similarity score to Conservation Sudbury is 6.2 due to the population and density similarities.

Climate Change (8.2/10)

The LSRCA recognizes the importance of climate change and effectively display this to the public by using local ice cover data for Lake Simcoe, which is a destination for ice fishing in the province. The LSRCA has a Climate Change Mitigation Strategy, Climate Change Adaptation Strategy, and a Carbon Reduction Strategy. Part of the mitigation strategy is to inventory the GHG emissions and carbon sequestration in the watershed. This strategy is the first of its kind to look at climate change at the watershed scale. The Authority conducted this research in partnership with Lakehead University and the University of Toronto. The LSRCA recognizes the need for sustainable practices and has a goal to support municipalities in incorporating carbon sequestration into community design and energy plans.

Another strategy the Authority has is a Natural Heritage System Land Securement Strategy that recognizes the need to protect all wetlands. The Authority has participated in the restoration of wetlands including the 1.06 hectare Rogers Reservoir Wetland located in East Gwillimbury. The LSRCA plans to restore lands they secure while also offering several grants to provide landowners with funding and technical assistance for environmental projects on their land.

Aside from hyperlinks to resources from other organizations and government agencies, a flood response plan could not be located and they do not appear to have any programs to prepare homeowners for flood events.

Participation, Engagement and Education (4.2/10)

The LSRCA undertook a comprehensive public consultation process for the development of the Watershed Development Guidelines. The Authority's partners are listed on their webpage, however there is no detail provided on their working relationship. The LSRCA recognizes the value of Traditional Ecological Knowledge and has made their relationship with the Chippewas of Georgina Island First Nation a priority in their strategic Plan.

The Watershed Development Guidelines document is and easy to understand public facing document, which was updated in June of 2020. All information relevant to flooding appears to be contained within this document, making information easily accessible to the public.

The inclusion of diagrams and photos is beneficial in this document to aid in further understanding for the public. There is no flood risk education program provided by the Authority, however the Watershed Development Guidelines do set out transparent evaluation criteria for application submissions.

Integrated Flood Risk Management Approaches (5.4/10)

The LSRCA jurisdiction covers the entire Lake Simcoe watershed except for the City of Orillia and the Upper Talbot River subwatershed. The LSRCA has an Integrated Watershed Management team. Evidence of an IWMP is presented in other documents, however it is not publicly available online. Since this document could not be located, it is unclear whether the full watershed, cumulative impacts, and drought are considered. This missing information negatively impacted the overall score of the Authority in this evaluation.

The LSRCA has an interactive regulation mapviewer available on their website. The regulation mapping was updated in April of 2019 and according to their website, is updated annually. The LSRCA uses a two zone concept, however it is only applied to selective areas throughout the watershed. The mapping only shows the floodplain and does not differentiate between the floodway and flood fringe zones. It is likely that there are policies that outline suitable development for the flood fringe, however, these could not be located using the LSRCA website. The regulatory flood line is different for specific waterbodies, but none have been adjusted for climate change which negatively impacted the overall score in this category.

The LSRCA encourages natural approaches to stormwater management and flood prevention which includes the use of LID to mimic natural hydrology. The LSRCA also has a Technical Guidelines for Stormwater Management Submissions document which provides information to municipalities, the development community, and their consultants regarding stormwater management and the erosion/sediment control requirements of the LSRCA. One aim of these guidelines is to produce designs that better reflect natural hydrology. This is exemplified in polices such as stormwater management submissions to the LSRCA requiring that every possible effort has been made to follow the LID approach by incorporating lot level and conveyance controls. Forest Glen Road in Newmarket is a demonstration project of LID that the LSRCA implemented with the Town of Newmarket and residents. Additionally, the LSRCA utilized LID at their own head office to demonstrate leadership and their commitment to on-site stormwater management.

The connection between land use planning and flood risk management is never explicitly stated in any of the policies reviewed. Two LSRCA staff members are part of a Natural Resources Canada technical advisory committee which is developing a Federal Land Use Guide for Flood Risk Areas; this implies the LSRCA is well aware of the relationship but needs to make a greater effort to document and communicate it.

Policy Delivery and Evaluation (8.8/10)

The role of the Authority is clearly stated in the Watershed Development Guidelines and the LSRCA website states the Authority protects peoples and property from flooding through regulating land use, understanding and providing advanced notice of flood risk, and protecting floodplains and other hazard lands. The Authority has a vision statement, but it is not directly related to flood management which decreases the overall score. In terms of policy evaluation, each of the priority actions outlined in the *2016-2020 Strategic Plan* have a timeline for completion or a schedule on which the action will be reported on. These priority actions are measurable criteria that support broader goals of the CA and therefore improve the policy delivery and evaluation score overall.

Ganaraska Region Conservation Authority

Score Summary

Context Similarity	6.9 / 10

Overall Case Score	16.0 / 40
Climate Change Score	3.2 / 10
Participation Engagement and Education Score	2.8 / 10
Integrated Flood Risk Management Approaches Score	5.0 / 10
Policy Delivery and Evaluation Score	5.0 / 10

Documents Examined

Policies for the Implementation of Ontario Regulation 168/06
Ganaraska Conservation Strategic Plan 2015-2020
Ganaraska Region Conservation Authority Watershed Report Card 2018
Ganaraska River Watershed Plan (2010)
Website Review

Key Takeaways

- The creation of watershed plans which incorporate scientific research, local knowledge, municipal and agency input, and public consultation allows for focused goals and objectives for policy to conserve the hydrological and ecological integrity of the watershed.
- The creation of a Community Advisory Committee which allows for public input into plans is an effective way to ensure continual and meaningful input of community members and instill a sense of accountability and importance.
- Leveraging relationships with surrounding municipalities and the provincial government to take on planting initiatives allowed the GRCA to create a stronger and more distinguished program that is more well known to the public.

Introduction

The Ganaraska Region Conservation Authority (GRCA) is located in Central Ontario along the shores of Lake Ontario. The region is slightly different than Conservation Sudbury as it is considered a costal location. However, despite being a coastal Conservation Authority, the GRCA has jurisdiction over one river, one inland lake, and multiple creeks inland. The GRCA has jurisdiction over approximately 935 square kilometres with a population density of 25-100 persons per square kilometre. Therefore, despite being located outside of Northern Ontario and being located along a coastline, the GRCA is relatively similar to Conservation Sudbury based on demographic profiles and received a context similarity of 6.9/10.

Climate Change (3.2/10)

The GRCA recognizes the importance of climate change in their *2015-2020 Strategic Plan* stating: "We will build watershed resilience by monitoring environmental change (climate crisis) [and] promoting mitigation and advancing innovative adaptation." (p.12). Although specific policy documents do not mention climate change, the *Strategic Plan 2015-2020* and *Ganaraska River Watershed Plan* both recognize the importance of climate change and the need to for sustainable practices such as the creation of grass swales to aid in stormwater management.

The *2015-2020 Strategic Plan* also addresses the need to develop, implement, and promote a Climate Change Strategy and implement a Terrestrial Natural Heritage Strategy. Section 3.5 of the *Ganaraska River Watershed Plan* states the current effects of climate change on the watershed. It also outlines ways to work in tandem with other governing bodies within the watershed to

mitigate the effects of climate change. Additionally, surface water quantity objective 2.2 of the *Ganaraska River Watershed Plan* recommends the GRCA protect floodplains through land acquisition to mitigate the effects of climate change as floodplains expand.

The GRCA does not acknowledge the restoration of any wetlands in their documents. However, while the GRCA has not restored wetlands yet, objective 4.2 of the *Ganaraska River Watershed Plan* notes that there is a need to protect, restore, and enhance wetlands. Additionally, the *Ganaraska River Watershed Plan* states that wetland restoration should include non-evaluated lands and not be limited to provincially significant wetlands. Furthermore, demonstrating while there are no current policies within the GRCA to protect wetlands, there is documentation recognizing the need of the CA to create such policies.

In 2019, the GRCA was committed to 39 environmental projects valued at $348,250. These environmental projects planted 38,000 trees in reforestation efforts through the Rural Roads program. Funding was provided through the Durham 5 Million Tree Program and the provincial 50 Million Tree Program. Additionally, the GRCA has forged a new partnership with Northumberland County which will help plant an additional 12,000 trees.

Despite having many good practices concerning climate change, there are areas which significantly impact the overall score of the GRCA in this category. The GRCA does not address the need for the CA to limit its greenhouse gas emissions. The CA also lacks a flood response plan and programs to educate homeowners on how to prepare for a flood. Finally, the GRCA does not have any policies in place allowing them to take public ownership over lands adjacent to riparian areas. These are important aspects which would significantly improve the GRCA's efforts to address climate change.

Participation, Engagement and Education (2.8/10)

The *Ganaraska River Watershed Plan* states that the public was engaged through three open houses during the creation of the plan and list the members of a comm-unity advisory committee. However, the plan does not identify how the public input was implemented into the plan. The GRCA's *Strategic Plan 2015-2020* also identifies the importance of public participation by stating the need to build new partnerships with the public to enhance and conserve the Ganaraska Region Watershed. However, despite having the public contribute to policy, the GRCA lacks a clear criteria checklist for applicants concerning applications which makes public engagement challenging.

The GRCA does well documenting their relationship with other governing bodies sharing the same geographical jurisdiction. The *Ganaraska Region Conservation Authority 2019 Annual Report* notes how the GRCA is in a working relationship with the Municipalities of Clarington and Port Hope to fulfill the Rural Roads program which is aimed at planting trees along rural roads within the Conservation Authority jurisdiction. The GRCA's *Ganaraska River Watershed Plan* notes the relationship of the GRCA with the City of Kawartha Lakes, Municipality of Port Hope, Municipality of Clarington, Northumberland County, Regional Municipality of Durham, Township of Hamilton, in addition to the many other governing bodies as it relates to their consultation in the creation of the plan. Additionally, some of these relationships were outlined in detail within the plan as they related to legislation the plan had to adhere to.

Although successful at interacting with other governing bodies, the GRCA measures up poorly in areas such as providing flood risk education programs for the public and providing public facing documents that explain policy in a more simplistic way. The GRCA also does not recognize Indigenous peoples or communities through consultation or land acknowledgments.

Integrated Flood Risk Management Approaches (5.0/10)

The GRCA has done well mapping its watershed through the creation of a new 'guidance map' which is easily accessibly on their website. While it is not a regulatory map, the map covers the full jurisdiction of the CA while being incredibly up to date, having been made within the last year.

The GRCA notes hazard-based approached which are currently utilized, however is making changes and implementing policy to move towards more risk-based proactive approaches to flood risk management. The GRCA currently uses a one-zone flood risk management approach with a 100-year flood line to designate lands for flooding and risk management. Section 1.5 of the *Policies for Administration of Ontario Regulation 168/06* states that in general development within the floodplain is prohibited while providing suitable development practices 15-30 metres adjacent to the regulatory flood plain.

The GRCA has created five successful watershed plans. Through reviewing these plans, there is a clear recognition of the whole water cycle including drought management and water storage as a part of flood management. However, this acknowledgment has not yielded any policy recommendations within the *Ganaraska River Watershed Plan,* nor does it discuss the impacts to the watershed outside of the CA's jurisdiction. Additionally, the GRCA has done a good job encouraging natural approaches to flood management in objective 2.2 of the *Ganaraska River Watershed Plan* stating that the implementation of

riparian plantings and grass swales can limit hard surfaces in the watershed and control the quantity of stormwater entering the watershed.

The GRCA recognizes relationships between land use and watershed management clearly in objective 2.2 of the *Ganaraska River Watershed Plan,* stating land use changes and their relation to the watershed are considered. Although this relationship has been noted, it has not been acted upon in policy.

The GRCA does have many areas for improving their IFM approaches. The GRCA does not appear to take into consideration the entire watershed, as all their watershed plans do not discuss the effects of policy on the areas of the watershed outside of their jurisdiction. These watershed plans also lack an evidence-based approach to their policies; while the *Ganaraska River Watershed Plan* recognizes that climate change exists, there is no recognition of how climate change, basin characteristics, or socio-economic conditions within the watershed effect the creation of policy. Lastly, the GRCA does not consider the effects of climate change on the regulatory flood line.

Policy Delivery and Evaluation (5.0/10)

The GRCA clearly notes their role in the *Ganaraska River Watershed Plan* stating that the "…role of the Ganaraska Region Conservation Authority is to coordinate the watershed plan process in partnership with the municipalities" (p.5). Additionally, there is a clearly defined role of the GRCA as they relate to each document they create. The GRCA also has a clear vision statement which is noted within their *Strategic Plan 2015-2020*.

The GRCA has placed all flood management policies into the *Policies for Administration of Ontario Regulation 168/06 h*owever, all the watershed plans which have updated information for those looking to develop with the jurisdiction of the GRCA are found elsewhere on the site. The GRCA also rarely provides timelines to evaluate their goals and does not often provide measurable criteria to evaluate the progress of these goals. This creates lack of accountability for implementation and reevaluation of any goals or programs which are discussed.

EASTERN ONTARIO

Rideau Valley Conservation Authority

Scoring Summary

Context Similarity	6.2 / 10

Overall Case Score	25.0 / 40
Climate Change Score	9.1 / 10
Participation Engagement and Education Score	4.6 / 10
Integrated Flood Risk Management Approaches Score	7.5 / 10
Policy Delivery and Evaluation Score	3.8 / 10

Documents Examined

RVCA Strategic Plan 2020
RVCA 2019 Annual Report
Minimum Application Requirements
Guideline for shore works in the Rideau Valley Watershed (2014)
RVCA Wetland policies (2018)
Policies Regarding Development Including the Construction/Reconstruction of Building and Structures, Placing of fill and to Waterways under Section 28 of the Conservation Authorities Act of Ontario (2010, updated in 2018)
Sub-watershed reports

Key Takeaways

- Wetland policies are easy to read and use with plain language and diagrams to explain local flooding issues, causes, and solutions.
- Easily accessible guidelines, checklists, and videos which outline minimum requirements for development applications have been successfully utilized to engage residents in flood risk management practices.
- A collaborative approach is used to engage the community such as partnerships with local school boards to connect with school aged children about the effects of flooding and flood safety.
- The mapping tools provide many layers of easily accessible flood risk and watershed boundary information that is readily available to the public.

Introduction

Rideau Valley Conservation Authority encompasses the nation's capital city of Ottawa and its surrounding municipalities, making it one of the largest CAs in the province. The RVCA's watershed covers approximately 4,234 square kilometres. It is located inland and therefore experiences some similar flooding issues as Sudbury. The area encompasses Ottawa's urban core along with smaller municipalities in the surrounding area. The population density is 335 people per square kilometre and the total population of the area is 934,243. The urban centre of Ottawa helps to explain the much higher population and population density in comparison to Sudbury, but the inland and geographic location make the context similarity a 6.2/10.

Climate Change (9.1/10)

The RVCA website acknowledges the effects of climate change and how it has contributed to the need for some of the projects that have been completed by the Conservation Authority. The need for more sustainable practices to combat severe flooding events is also identified. Although mentioned on the website and in writing, climate change impacts are not explicitly mentioned in official policies.

RVCA has completed multiple wetland restoration projects over the last 5 years. The 2016 Black Rapids Wetland Restoration Project was one of the most celebrated wetland restoration projects in the area. The RVCA collaborated with the National Capital Commission and the Great Lakes Guardian Community Fund to design and expand the wetland in Ottawa's Greenbelt. The project

was completed in 2016 with the size of the wetland more than doubling from 3,444 square metres to 7,000 square metres since then.

Natural stormwater runoff reduction is a priority of the RVCA which is demonstrated through both policy and action. A new rain garden was installed in 2018 at the Baxter Conservation Area, creating a notable example of a natural tool for stormwater management. They also provide a homeowner's guide to stormwater management, providing solutions that homeowners can implement themselves.

Greenhouse gas emissions are reduced through a tree planting program available to residents with an acre or more of suitable land. The RVCA offers landowners tree planting services at a heavily subsidized rate of 15 cents per tree with a 1000 tree minimum. The RVCA website boasts that over 6.6 million trees have been planted since 1983.

Participation, Engagement and Education (4.6/10)

RVCA has a heavily utilized educational program called the Spring Water Awareness Program (SWAP) which provides teachers with activities, games, and safety tips about spring flooding and how to stay safe around thawing water bodies. This is an effective education tool that further involves members of the community of all ages.

In relation to engagement and access for the public, the RVCA provides a clear outline for how residents can file an application for development. The RVCA website provides downloadable pdf forms, a fee schedule, and a checklist for the minimum application requirements. This allows residents to understand the requirements for approvals and makes the process more transparent.

The RVCA also partners with various provincial and municipal governmental bodies to develop flood management policies. A coordinated flood management approach is utilized which includes input from the Mississippi Valley, South Nation, and Rideau Valley Conservation Authorities along with the local municipalities, government agencies, local businesses, and NGOs. In 2019, ongoing fundraising efforts raised $776,599 worth of funding to support grants for tree planting, shoreline naturalization, and clean water projects such as the Ottawa Clean Water Program and the TD Tree Day event.

Although consultation and engagement is evident, it was noted that public participation is limited to only providing opportunities to comment on projects and plans once they are underway and not beforehand. It was also noted that Indigenous communities are not recognized within the RVCA official policy documents and work to include Indigenous knowledge was not available.

Integrated Flood Risk Management Approaches (7.5/10)

The RVCA uses a One-Zone concept which outlines the types of development that are permitted adjacent to the wetland. The current watershed plan considers the cumulative effects of development within the regulated wetland and lands adjacent to it in the development approval process. The limitations in place restrict certain developments within 120 metres of a regulated wetland which controls a fairly large range of land.

The RVCA uses an interactive GIS map to help residents locate personal property and understand the relationship to the flood line. The RVCA reports on 6 sub-watersheds in their jurisdiction, providing a more holistic understanding of the issues and challenges for flooding that can affect the entire watershed. Some water storage measures are mentioned in their policy document; however, drought was not recognized as a part of policy's scope.

The RVCA continues to use traditional flood management interventions to prevent flooding. The policy recommends a variety of structural interventions that can help property owners reduce the risk of flooding if located within the flood fringe. Although there is mention of some natural interventions such as naturalization, priority is placed on structural options for prevention and adaptation, decreasing the overall scoring within the category.

The regulatory mapping tool available on the RVCA website is easy to use and has been updated as part of an ongoing project which started occurred from 2012 to 2019. It covers the entire RVCA jurisdictional area providing a great tool for any property owners, residents, and other stakeholders to use.

Policy Delivery and Evaluation (3.8/10)

The role of the RVCA as a Conservation Authority and the vision of the CA are clearly stated on the website. The vision statement outlines some overall goals for wetland protection and creation, but flooding is not mentioned explicitly as part of their vision.

The flood management wetland policies are located on the same webpage but in separate documents making it difficult to locate and determine current policy delivery progress. A more detailed account of policy goals and specific evaluation criteria to track and measure success of the policy as it is implemented would significantly increase the overall score in this evaluation category.

South Nation Conservation

Score Summary

Context Similarity	6.9 / 10

Overall Case Score	25.6 / 40
Climate Change Score	7.7 / 10
Participation Engagement and Education Score	5.4 / 10
Integrated Flood Risk Management Approaches Score	7.5 / 10
Policy Delivery and Evaluation Score	5.0 / 10

Documents Examined:

Development, Interference & Alteration Regulations
Ontario Regulation 170/06: Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses
Canada's Changing Climate Report (2019)
State of the Nation Report (2014)
Flood Contingency Plan (2020)

Key Takeaways

- Wetland policies are easy to read and use plain language and diagrams to explain local flooding issues, causes, and remedies.
- Opportunities for community members to work in a collaborative setting to address conservation concerns provides meaningful results that create a sense of community involvement.
- Innovative methods for stormwater management present new opportunities to address flooding and watershed issues that may present new opportunity in areas which cannot apply traditional methods.

Introduction

South Nation Conservation (SNC) is located in eastern Ontario and is comprised of 16 membership municipalities. The South Nation Watershed covers approximately 4,441 square kilometres with a population of 21,346 people according to the 2016 Census. The population density of SNC is very similar to Conservation Sudbury with 1,023 people per square kilometre. The proximity to Ottawa's urban centre and significant agricultural land and forests create a population density which is like the Conservation Sudbury jurisdiction and therefore, receives a context similarity of 6.9/10.

Climate Change (7.7/10)

The SNC website acknowledges the effects of climate change and how it justifies projects that have been implemented by the Conservation Authority. Although links to federal climate change documents are provided on the website, SNC does not explicitly mention climate change in official policy which is a significant drawback. A need for more sustainable practices is identified as a way to combat future flooding events, however policy does not reflect this.

SNC has multiple ongoing wetland restoration projects. The 2014 Limoges Floating Wetland Project is an innovative wetland restoration project that has potential to be utilized elsewhere to enhance the water quality improvement features of stormwater treatment ponds. The SNC Floating Wetland Project has shown promising results since its creation by reducing the infestation of algae and accumulation of pollutants in the pond. The project is an innovative approach which presents alternative options to maintaining stormwater management ponds which may them more viable in other areas.

The natural reduction of stormwater runoff is demonstrated by SNC through policy and action. The Stoodley Farm Grass Buffer Project is an example of the collaborative work being done with SNC and private property owners. Stoodley Farm is located along the South Castor Municipal Drain in Vernon, Ontario. Erosion has caused destabilization of the soil along the stream bank. SNC partnered with Ottawa's Rural Clean Water Program and the Stoodley family to fund the planting of various grass species along the drain to help reduce runoff into the drain while preventing erosion. Through this, the farm can also harvest the grass as hay that can be sold as a crop or used to feed their animals. This is a great example of a natural tool for stormwater management that can be implemented at a low cost.

Art for Trees is an art auction and golf tournament that raises funds for tree planting and outdoor educational programs for local youth. Over the last 30 years SNC has planted over 3.4 million trees throughout their watershed jurisdiction with over 140,000 planted in 2020. This event is an effective method to include a broader group of individuals that incorporates the art community to collaborate with SNC and get involved with local conservation efforts.

Participation, Engagement and Education (5.4/10)

The public is not actively involved in SNCs policy development processes, however SNC provides the public with opportunities to contribute in other ways. The Forest Conservation Working Group is a group of Indigenous groups, business owners, municipal representatives, and other stakeholders. The working group creates opportunities for meaningful dialogue between community groups, stakeholders, and SNC. Most public participation directly related to wetland protection is seemingly limited to providing opportunities to comment or ask questions about projects and plans only once they are underway rather than in advance or within the process.

SNC collaborated with the Ontario Ministry of Education and the Ministry of the Environment and Climate Change to host an educational program in 2017 called the St. Lawrence River Student Summit. The summit provided approximately 100 high school students with a 3-day educational experience lead by leaders in the local Indigenous community. The students have an opportunity to learn about managing natural resources, invasive species removal, and water quality testing. On the last day of the program, the students are encouraged to share their perspectives and ideas with a panel of decision-makers. This is a tool which has potential to be applied specifically to flood risk management practices and programs to educate and inform youth. https://www.nation.on.ca/resources/watershed-education/st-lawrence-river-student-summit

South Nation Conservation also makes access to forms to file various applications through their office straightforward and easily accessible to the public. The website provides downloadable pdf forms and fee schedules to make it easier for property owners to submit permit applications.

SNC works with various provincial and municipal government bodies to create flood management policies. A coordinated flood management approach is utilized that includes input from the Mississippi Valley and Rideau Valley Conservation Authorities, along with the local, provincial, and federal government.

Integrated Flood Risk Management Approaches (7.5/10)

SNC uses a one-zone concept which outlines the types of development that are permitted adjacent to wetlands. The current plan considers the cumulative effects of development within regulated wetlands and adjacent land in the development approval process. The Riverine Flooding Hazard places strict limitations on development beyond the regulated floodplain, outlining an additional 15 metre allowance that prevents development beyond the standard regulatory floodplain.

There is a public geoportal available on the SNC website which allows users to browse through SNC regulated areas including river access points and forests. It uses an interactive GIS map to aid residents in locating property and flood lines on properties on interest. SNC reports on 5 sub-watersheds within SNC's jurisdiction, providing a more holistic understanding of the issues and challenges for flooding that can affect the entire watershed. Middle South Nation River, Lower South Nation, Castor River, Bear Brook, and Upper South Nation are the sub-watersheds that are encompassed within the South Nation Conservation's jurisdiction. Some water storage measures are mentioned in policy documents, however drought was not recognized as a part of the policy's scope.

SNC continues to use traditional flood management interventions to prevent flooding. The policies recommend structural floodproofing interventions that can help property owners reduce the risk of flooding if they are located within the flood fringe. Although there is mention of specific natural interventions such as naturalization, the policies primarily focus on structural floodproofing options for prevention and adaptation. This reduces the overall impact and score of SNC for flood risk management development and policy.

The GIS mapping tool available on the SNC website is easy to use and is also provided in a mobile version. It covers the entire jurisdictional area providing a tool for the public to use. A regulatory map is not available to download, but it can be accessed by contacting SNC directly.

Policy Delivery and Evaluation (5.0/10)

SNC states the role of Conservation Authorities in general and the specific vision statement of SNC on the publicly accessible website. The vision statement outlines some overall goals for water quality improvement which identifies water levels as a primary concern for ensuring that the water quality continues to improve. The flood management wetland policy is located on one webpage along with other related documents. However, a more detailed account of policy goals and specific evaluation criteria to track and measure success of the policy as it is implemented would significantly increase the overall score in this evaluation category.

Mississippi Valley Conservation Authority

Score Summary

Context Similarity	9.2 / 10

Overall Case Score	21.6 / 40
Climate Change Score	5.9 / 10
Participation Engagement and Education Score	2.4 / 10
Integrated Flood Risk Management Approaches Score	8.3 / 10
Policy Delivery and Evaluation Score	5.0 / 10

Documents Examined

Development, Interference with Wetlands and Alteration to Shores and Watercourse – Regulation Policies
Mississippi Conservation Authority – 2018 Annual Report
Watershed Management on a Watershed Basis: Implementing an Ecosystem Approach
Interactive Regulatory Map
Shoreline Permit Application Framework
Mississippi Valley Conservation Authority Permit Process for Flood Recovery
Website Review

Key Takeaways

- The use of explicit development regulating policy that are reinforced by further guidelines and design standards are an effective method of policy development and implementation.
- Development policy related specifically to size and type of development in non-provincially significant wetlands is a tool which can be utilized to show emphasis on the importance of all wetlands in a specific jurisdiction.

Introduction

The Mississippi Valley Conservation Authority is located in Eastern Ontario in the Ottawa Valley. It is located inland with four rivers and multiple lakes similar to the system seen in the Conservation Sudbury jurisdiction. The Mississippi Valley Conservation Authority has jurisdiction over approximately 4450 square kilometres with a population density of 25-100 persons per square kilometre. Therefore, despite not being located in Northern Ontario the MVCA still received a context similarity of 9.2/10 due to the similar population and geographic profile.

Climate Change (5.9/10)

The MVCA recognizes the importance of climate change in the Mississippi Valley Conservation Authority – 2018 Annual Report*. This report* states the need to address the impacts of climate change when conducting asset planning concerning natural waterways. In addition to addressing the importance of climate change, the MVCA also addresses the need for sustainable practices in both the 2018 Annual Report and Watershed Management on a Watershed Basis: Implementing an Ecosystem Approach.

The MVCA has also successfully taken on green initiatives such as reducing the CA's greenhouse gas emissions and the planting of trees. The MVCA has reduced their greenhouse gas emissions through the purchase of a Chevrolet Volt which is an eclectic car that reduces emissions by approximately 81%. In addition to reducing their own emissions footprint, the MVCA planted over 121,500 trees in partnership with the Rideau Valley Conversation Authority. The MVCA also distributed over 1,200 trees to 97 shoreline property owners and planted 2,000 stems, trees, and shrubs throughout their jurisdiction within the City of Ottawa.

The MVCA has also done well addressing the utilization of natural stormwater management features in their document Development, Interference with Wetlands and Alteration to Shores and Watercourse – Regulation Policies. This notes the use of grassed drainage swales as a tool for flood protection. Additionally, the MVCA also addresses the need to protect all wetlands,

not just provincially significant wetlands. In section 9.5.1 of their policy document *Development, Interference with Wetlands and Alteration to Shores and Watercourse – Regulation Policies* the MCVA outlines the need to protect wetlands over 0.5 hectares in size that are connected to waterbodies and watercourses. Through setting size and connectivity criteria, the MCVA is able to preserve and regulate non-provincially significant wetlands. The creation of such criteria allows the MCVA's policy to be actionable and therefore extremely useful if these criteria are not met.

Although many successful policies and programs have been implemented and developed, the lack of success in the climate change category is due to multiple factors. Items which are of importance which were not addressed include the need to restore wetlands, a flood response and education plan for the public, and policy to allow the CA to take public ownership over lands adjacent to riparian areas. These are important aspects which would significantly improve the MVCA's attempts to address climate change.

Participation, Engagement and Education (2.4/10)

The MVCA has successfully created a public-facing document which explains the policy and the application process. In section 6.3 of the MVCA's document Development, Interference with Wetlands and Alteration to Shores and Watercourse – Regulation Policies, illustrations clearly define the two-zone concept to the public as seen in the figure on the right. In addition to providing illustrations, the MVCA provides the Shoreline Permit Application Framework and the Mississippi Valley Conservation Authority Permit Process for Flood Recovery. Both of these documents clearly outline the application process for both permit applications and flood recovery. However, despite having three public-facing documents, the MVCA lacks a clear criteria checklist for applicants concerning applications.

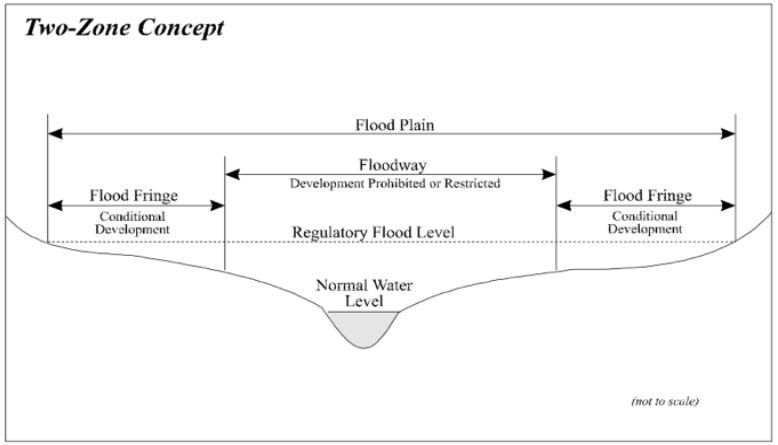


Figure 7: *Two-zone concept diagram.*

The MVCA has also utilized reports to document their relationships with other governing bodies within the same jurisdiction. The Mississippi Valley Conservation Authority – 2018 Annual Report states that their board of directors consists of members from all eleven municipalities the CA works within. In addition to having a board which represents the governing bodies within the

same jurisdiction of the MVCA, the Mississippi Valley Conservation Authority – 2018 Annual Report notes how these relationships with other governing bodies influences the CA through partnered projects within the MVCA.

Overall the MVCA does not successfully address public engagement and participation due to multiple factors. The CA does not document how members of the public can engage or contribute to the development of flood related policy, nor do they have flood risk education programs to educate the public. However, within the Board of Directors Meeting minutes on the MVCA, there is mention of the creation of a Strategic Plan for 2021 which would have objectives to target public engagement within the scope of policy creation through public meetings.

The MVCA also does not recognize Indigenous peoples or communities through consultation or land acknowledgements. There is no mention of potential Indigenous measures to aid in flood risk management policy or program development as is seen in Sudbury and many other Conservation Authorities.

Integrated Flood Risk Management Approaches (8.3/10)

The MVCA has integrated floodplain mapping into their scope of work through the creation of an interactive property map. The interactive map notes the policies and regulation all properties are subjected to within the jurisdiction of the CA. In addition to providing an interactive regulatory map, the MVCA has kept the map up to date, with the last update occurring in April 2020. Finally, this map is incredibly accessible being the first link on the home page of the website and accessible through numerous tabs.

The MVCA is using a mixture of a hazard-based approaches and proactive risk-based approaches to managing flooding within their jurisdiction. The MVCA document Development, Interference with Wetlands and Alteration to Shores and Watercourse – Regulation Policies provides regulatory policies for both new buildings and existing development. Section 6 of the Development, Interference with Wetlands and Alteration to Shores and Watercourse – Regulation Policies is exemplary in its approach to regulating flood risk management. In addition to using a mixture of hazard-based and risk-based approaches, the MVCA uses a 100-year flood line as its regulatory flood line. Additionally, the MCVA has created a Floodproofing Guidelines and Design Standards to regulate the type of development in the floodway and flood fringe. The guideline and design standards note general flood proofing principles, safe access/egress, design requirements of residential/habitable buildings and non-residential buildings, fill aprons for floodproofing building, drainage swales, and swimming pools. The creation of this document allows for policy to be easily interpreted and enacted as it sets out the standard for buildings within the floodplain, easily distinguishing between good and bad developments.

The MVCA notes the relationship between land use and watershed management in Appendix G of the *Development, Interference with Wetlands and Alteration to Shores and Watercourse – Regulation Policies 06* document. However, within Appendix G, it is stated that the policies within the outlined area examine land uses and strategies on a case-by-case basis. Additionally, the *Watershed Basis: Implementing an Ecosystem Approach* and *Development, Interference with Wetlands and Alteration to Shores and Watercourse – Regulation Policies* states the MVCA is focused on the cumulative impact of the watershed when making decisions.

The MVCA has outlined the types of interventions they are using within their flood risk management policies and guidelines. Section 3.1 of the MVCA's the Watershed Basis: Implementing an Ecosystem Approach states that the basins of the watershed and sub-watershed will be considered when evaluating land use changes and proposed developments. Also, section 6.3 of the Development, Interference with Wetlands and Alteration to Shores and Watercourse – Regulation Policies states structural interventions for protecting existing and future development may be permitted. Additionally, the MVCA does encourage the utilization of natural approaches in its policy including the creation of grass drainage swales, and the naturalization of riparian zones.

The MVCA has done well in creating watershed plans, having created two watershed plans with one more currently in development. However, these plans currently have broken web links and are unavailable for evaluation. Given that the watershed plans were unavailable to evaluate, this report cannot make any suggestions derived from these documents.

Policy Delivery and Evaluation (5.0/10)

The MVCA clearly notes the role of a CA in associated documents stating the role of the MVCA is "to provide clarification and consistency in the implementation of Ontario Regulation 153/06…" (p.1). Additionally, there is a clearly defined role of the MVCA as they relate to each document they create. The MVCA also has a clearly identified vision statement which is noted within the *Mississippi Valley Conservation Authority – 2018 Annual Report*. Additionally, the MVCA has located all of the flood management policies into the *Development, Interference with Wetlands and Alteration to Shores and Watercourse – Regulation Policies* document, making them easy to locate and use.

Although the policies and document are often useful and exemplary in writing, the MVCA however rarely provides timelines to evaluate their goals and does not often provide measurable criteria to evaluate the progress of their goals. This leads to lack of accountability and action to execute these goals successfully.

SOUTHERN ONTARIO

Essex Region Conservation Authority

Score Summary

Context Similarity	6.2 / 10

Overall Case Score	22.4 / 40
Climate Change Score	9.1 / 10
Participation Engagement and Education Score	3.8 / 10
Integrated Flood Risk Management Approaches Score	7.1 / 10
Policy Delivery and Evaluation Score	2.5 / 10

Documents Examined

A Place for Life: Strategic Plan 2016-2025 (2016)
Windsor/Essex Region Stormwater Management Standards Manual (2018)
Big Creek Watershed Plan (2013)
How to Create a Rain Garden: A Guide for Homeowners! (2018)
Website Review
News Bulletins

Key Takeaways

- Low impact development is a land use planning toolkit that can introduce stormwater management to help reduce flood risk.
- Effective stormwater management can make cities more resilient by creating linkages between flooding, biodiversity conservation and climate change interventions.
- Developing partnerships with stakeholders is essential for Conservation Authorities to implement key policies.
- Providing regulation area mapping in a format that is accessible to the public can help streamline the planning application process.

Introduction

The Essex Region Conservation Authority (ERCA) is the southernmost Conservation Authority in Ontario, with jurisdiction over the watersheds of the City of Windsor, the seven municipalities of the neighbouring County of Essex, as well as the separated Township of Pelee. This area covers the coastal areas of Lake Erie, the Detroit River, and their tributaries. Although Windsor has a higher population and population density than the City of Sudbury, its neighbouring municipalities are predominantly small agricultural settlements. This area has been particularly affected by flood events in recent years as noted in the Province's *2019 Review of Flood Events* (Government of Ontario, 2019). Flooding in this area has been exacerbated by widespread historical biodiversity loss, and relatively impermeable clay soils that prevent water filtration during storm events. Despite these setbacks, ERCA has been able to implement a stormwater management standards manual that will guide all new development in the Windsor-Essex region.

Climate Change (9.1/10)

Essex Region Conservation Authority has done an excellent job of connecting land use planning tools for flood management to climate change adaptation. The top action priority in ERCA's *Strategic Plan 2016-2025* states that:

> *"While efforts to slow climate change must continue, we also need to help our partner communities prepare to adapt to its impacts"* (2016).

Furthermore, this action item states that:

> *"In some cases, municipal infrastructure cannot withstand the pressures of this changing climate. Adaptation will be necessary to build a resilient community and sustainable planning plays a vital role in creating resiliency"* (ERCA, 2016).

The section of the report that addresses this action priority not only connects climate change to flooding, land use planning and conservation, but also identifies the types of actions ERCA can take to address these issues. These actions include connecting people to natural areas, engagement with the community, collaboration with partners and stakeholders, and developing scientific knowledge. ERCA has clearly communicated the role of wetlands in the hydrological cycle and, consequently, in the management of flooding. It also provides grants to conduct renaturalization activities on private property, including restoring and creating wetlands.

Participation Engagement and Education (3.8/10)

ERCA performed quite poorly in this category, but many of its shortcomings can be addressed with simple interventions. The primary shortcoming is that ERCA does not effectively document how public participation contributes to its policies. It simply states that the public was consulted and that the policy measures are a product of this consultation. This is concerning because it is not transparent.

The second simple improvement which would have produced a higher score on this section is including a public-facing document that explains how land use planning connects to flood management. Even including a summary of these activities and their importance in one section of the ERCA website could improve relations with the public by reducing confusion about the role of Conservation Authorities and how the regulations they enforce protect people and property from natural hazards.

Integrated Flood Risk Management Approaches (7.6/10)

ERCA has done a reasonably good job including integrated flood risk management approaches. The biggest contributing factor to this score was its recently completed *Windsor/Essex Region Stormwater Management Standards Manual* (ERCA, 2018). This manual is the key to ERCA's approach of connecting land use planning with flood management and climate change adaptation. It encourages low impact development throughout the region using design principles that are well established in the province of Ontario.

This approach emphasizes the use of green infrastructure wherever possible, to limit the amount of impermeable surface area and

reduce reliance on structural solutions to flood management. In addition to the stormwater management manual, ERCA has educational programs to encourage private landowners to build rain gardens on their own property. The educational material delivered in these programs can be found in *How to Create a Rain Garden: A Guide for Homeowners!* (ERCA, 2018). This is an extremely useful approach because it is a low-cost solution to supplement stormwater management activities on private property.

Policy Delivery and Evaluation (2.5/10)

ERCA performed very poorly on policy delivery and evaluation. As with the public engagement category, many of the shortcomings in their approach can be remedied through documentation. The most important improvement ERCA could make would be to create a single document or webpage containing all of their flood management land use policies. Ideally, such a document would include a clear checklist of criteria by which ERCA evaluates planning applications on regulated property and would connect these criteria to existing documents such as the strategic plan and the stormwater management manual. To improve their score further, ERCA should include a vision statement connected to flood management on this central document. Finally, ERCA should include clear goals for the policies included on this central document, ensure that these goals are measurable, and include a timeline for monitoring and evaluating these policies.

Grand River Conservation Authority

Score Summary

Context Similarity	6.6 / 10

Overall Case Score	34.2 / 40
Climate Change Score	7.7 / 10
Participation Engagement and Education Score	8.3 / 10
Integrated Flood Risk Management Approaches Score	9.4 / 10
Policy Delivery and Evaluation Score	8.8 / 10

Documents Examined

Grand River Water Management Plan 2014
Grand River Water Management Action Plan 2014-2018 Summary of Accomplishments (June 2019)
Grand River Watershed: State of Water Resources (2020)
Policies for the Administration of the Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Regulation
GRCA Website Review
Mapping Resources

Key Takeaways

- Collaborative project teams and working groups can help instill responsibility and accountability in plan development and execution.
- Community responsibility and investment in flood risk management is improved by dividing larger projects into smaller units such as flood maps, flood action plans, and climate change modelling.
- Developing partnerships with local groups and collaborating towards sustainability and flood management practices is an effective way to outline the role of the CA to the public.
- Updating policy to include regulations specific to factors such as the type of development, the location within the watershed and the level of risk provides a more streamlined and clear development process to the public and other development bodies.

Introduction

The Grand River watershed is the oldest Conservation Authority agency in Canada. It is approximately 6,800 square kilometers is size and holds approximately 985,000 residents across 39 municipalities. Most of these residents reside in the larger urban areas of Kitchener, Waterloo, Guelph, Cambridge, and Brantford. Like the area of study in Sudbury there are also two First Nations territories within the watershed. Many of these urban centres such as Guelph and Waterloo have a similar downtown density to downtown Sudbury, giving it a context similarity of 6.6/10 when compared to Conservation Sudbury. Many major rivers within the watershed including the Grand, Conestogo, Nith, Speed, and Eramosa rivers make flooding and flood risk management a major concern for this area. Upstream events and downstream impacts on flooding are significant and strongly related to the land use management in the region.

Climate Change (7.7/10)

Building resiliency to climate change is one of the four major goals for the WMP. This is a Joint Action Plan developed by 16 partnering agencies and endorsed by municipalities, three provincial ministries (MOECC, MNRF, and MAFRA), Environment Canada, and Six Nations of the Grand River. One of the ways in which the GRCA makes climate change a priority is through partnerships with groups such as the MOECC to address climate change targets. The GRCA also adequately outlines the projected impacts a changing climate will have on all areas of the watershed and how global and national climate trends play a role in the local watershed

development considerations in terms of land coverage and urban development. This was achieved using the change field method of climate modelling to evaluate changes in watershed scale hydrological processes and stream flow with the global changing climate projections. These projections provide a local model of flooding and climate change impacts which can be better understood by the community.

The GRCA has successfully implemented multiple programs and land use tools to address the impacts of climate change. Many of these programs include actions and strategies which may be applicable within the Conservation Sudbury jurisdiction.

- Rural Water Quality Program: farmers and rural residents adopt practices of planting cover crops and tree buffers to reduce runoff and prevent overflow into streams and rivers. Grants for these projects range from 50 to 100 percent of total project cost. According to Statistics Canada, Grand River exceeded provincial rates of cover crop planting by farmers and rural residents.
- Local Tree Planting Group Partnerships: The GRCA has partnered with well known local tree planting groups and programs such as Trees for Mapleton, Trees for Guelph, Trees for Woolwich, Wellington Green Legacy, and Brant Tree Coalition to make tree planting more accessible and integrated within community practices (Grand River Conservation Authority, 2020).
- Wetland Restoration and Grant programs: as per the *2020 State of Water Resources* document, the GRCA has successfully implemented projects for the protection and restoration of lost wetlands (Grand River Conservation Authority, 2020). Examples include:
    - The Monticello project at Luther Marsh which created a new 90 hectare wetland
    - Former farmland within the Dunnville Marsh has been converted to wetland habitat
    - Small wetland restoration by private land owners in partnership with the GRCA

Overall, the consideration for climate change impacts and integration within the GRCA plans and policies is evident. Statements of intent and recognition within these documents show the minimum expectations for responding to climate change impacts, and the programs which have been adopted within the member communities shows that these statements are being taken seriously and that action is being taken to mitigate the effects of climate change.

Participation, Engagement and Education (8.3/10)

The GRCA has made engagement and participation of the community, First Nations, non-for-profit groups, and all levels of government a primary concern in all of the flood and land use related planning documents. The *Water Management Plan* provides an integrated action plan which allows all partners to fulfill their roles and responsibilities while planning for the next 30 years. This plan includes the following;

- Steering Committee which provides overall guidance for the new plan development and reports on the progress of partner organizations.
- Project Teams which were developed to oversee and manage each major project or action plan outlined within the *Water Management Plan.*
- Water Manager Working Groups which are groups of senior water management staff from all levels of government (municipal to federal) and including First Nations. They meet quarterly to discuss all levels of watershed issues through information sharing and collaboration. They report on the status of actions from the primary WMP and ensure goals and plans are being achieved. The GRCA supports these working groups to implement the WMP on behalf of the municipalities, creating a strong and fluid working relationship.

The structure of these groups, along with their continuous involvement within watershed planning practices, is a vital part of the success and implementation of a strong WMP.

A method of public engagement used by the GRCA involves breaking down flood risk management into smaller sections relating to urban centres and metropolitan areas within the larger watershed. They have used these smaller regions and developed 35 Flood Emergency Maps which compiled statistics of the infrastructure (roads, structures, and critical infrastructure) located in the floodplain and circulated them to the relevant municipality. These were updated in 2019 to online mapping using LiDAR technology. The maps clearly identify aspects such as regulated watercourses and waterbodies, wetlands, floodplains, special policy area floodplains, and property limits. The maps also have a function where the user can draw or add text to the map and print out or save a copy, making it easily usable for landowners to identify and mark areas of interest.

Integrated Flood Risk Management Approaches (9.4/10)

GRCA policy documents clearly outline the impacts of development and climate change on the watershed, as well as how upstream and downstream land uses impacts affect flooding. This focus on the whole watershed is exemplified in actions with teams such as the Grand River Low Water Response Team. This team was developed by the GRCA on behalf of the MNRF to focus on delivering the *Drought Contingency Pla*n, which aspired to improve the health watershed by treating it holistically.

The GRCA owns and operates dams and reservoirs, which are its primary infrastructure-based flood risk management tools. Although Ontario's approach to flood risk management encourages preventative measures such as land use planning to reduce flood risk, the GRCA continues to operate and maintain these structural flooding prevention measures. Multiple studies and action were performed as part of the WMP to remove unnecessary damns and provide maintenance to those which were a priority. Although infrastructure-based flood risk management is still utilized, land use planning policies and extensive regulatory practices are in place and their effectiveness is continually examined. This is explained in depth in the *Policies for the Administration of the Development, Interference with Wetland and Alterations to Shorelines and Watercourses Regulation* (2015). This outlines details for development policies in flood hazard zones and specific areas within these zones such as residential, commercial, public infrastructure, and wetland developments. Some examples of policies and methods of policy development which may be of interest to Conservation Sudbury include:

- Outlining specific methods which can be used to demonstrate that development on existing uses will not cause a flooding hazard to allow for development (i.e. proof of floodproofing, infeasibility of alternative sites, no risk of structural failure via hydrostatic/dynamic analysis).
- Division of development policy in flood hazard zones based on human habitability. This includes breaking down flooding policy into major zone uses and then further such as residential properties divided into policies for habitable homes versus non-habitable accessory buildings or structures.
- Policy related to specific uses which are common in the area of concern (ie Golf Courses, Stormwater Management Facilities, permanent docks, isolated ponds, etc).

This document was significantly more detailed than the equivalent documents provided by Conservation Sudbury. Including some of these measures when updating Conservation Sudbury's existing policy documents may be beneficial.

One of the noteworthy programs used to control flood management through land use policy is the Cottage Lot Program. The GRCA has purchased lots around critical flood infrastructure such as wetlands and dam reservoirs and allowed them to be leased as 'cottages' by the public. This provides control over the activities which take place and reduces the development which may occur around these environmentally sensitive areas while maintaining a form of public engagement and revenue for the GRCA (Cottage Lot Program, 2020). This strategy makes use of traditional infrastructure-based flood management and associates it with land use and development control to protect and prevent development or urbanization around water sources which may cause increased flooding impacts.

Policy Delivery and Evaluation (8.8/10)

Due to the organized and structured allocation of actions and parts of the WMP within different groups, the delivery and evaluation of the watershed plans have been relatively timely and consistent with initial goals and targets. The yearly updates provided as recently as June 2020 provide in depth review of what goals have been met, which have not and why, and if reallocation of resources or targets is required. The revaluation of initial policy goals and targets on a yearly basis has been possible due to the open communication and consultation between the wide range of project working groups mentioned previously. The GRCA has been able to effectively introduce and expand effective land use and water management practices and evaluate their effectiveness and use through these regular updates and continual communications plans between all those involved.

Long Point Region Conservation Authority

Summary Score

Context Similarity	7.7 / 10

Overall Case Score	19.7 / 40
Climate Change Score	6.8 / 10
Participation Engagement and Education Score	2.9 / 10
Integrated Flood Risk Management Approaches Score	6.3 / 10
Policy Delivery and Evaluation Score	3.8 / 10

Documents Examined

Strategic Plan 2019-2023
Policies for the Administration of the Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Regulation (2017)
LPRCA Low Impact Development Demonstration Project
LPRCA Watershed Report Card (2018)

Key Takeaways

- Updating local regulatory policy for development in the floodplain presents opportunity to include detail for specific land uses such as residential, commercial, public infrastructure, and wetlands.
- Using community members as the face of public programs can aid in community engagement in watershed programs.
- Showcasing LID through CA initiated projects and interactive learning centres on CA lands aids in acceptance and implementation of these programs in communities.

Introduction

The Long Point watershed covers approximately 2,900 square kilometres of both urban and rural land in South-Western Ontario. The total population and density are similar to Conservation Sudbury's jurisdiction, giving it a context score of 7.7/10. The watershed incorporates 6 subwatersheds; Big Otter Creek, South Otter/Clear Creek, Big Creek, Dedrick/Young/Hay Creek, Lynn River/Black Creek and Nanticoke/Sandusk/Stoney Creek. Within these watersheds the major communities include Tillsonburg, Simcoe, Port Dover, Norwich, Port Burwell, and others. Within the watershed there are more than 30 creeks and associated tributaries. This intrinsic network of rivers and streams and the associated impacts from shoreline flooding create significant flood issues for the Long Point Region and associated communities.

Climate Change (6.8/10)

The Long Point Conservation Authority is involved in and implements multiple programs which use sustainable methods to maintain ecological resources that aid in flood prevention. Examples of programs which have been implemented include:

- LPRCA LID Project: in 2010 the LPRCA relocated its head office and used the opportunity to make the well-known site into a LID demonstration project for the community. This project crated long term partnerships with local schools, community groups, businesses, and watershed stewards through engagement and input in the project. The site now provides information for business owners and residents about how they can implement LID practices such as bioswales, tree planting, and de-paving.
- Alternative Land Use Services Program (Long Point Region Conservation Authority, 2020) – run by the community with support and consultation from the LPRCA, farmers receive funding and payments to implement projects such as wetland creation and restoration and establishing riparian buffers. This program has aided in promoting voluntary and responsible development of lands which may impact waterways and flooding. Because the program is run by members of the community and local farmers, it creates a sense of community and is less intimidating than CA or government run projects.

Along with Low Impact Design and implementation of exemplary practices, the LPRCA boasts the Long Point wetland complex which covers 75 square kilometres. This wetland is internationally recognized under the Ramsar Convention and as the Long Point Biosphere Reserve.

Participation, Engagement and Education (2.9/10)

The LPRCA, provides all documents relating to flooding and watershed health for public access on its website. This is useful for access to all publications created by the LPRCA and adequately categorizes these documents by healthy watersheds, watershed report cards, annual reports, and flood forecasting (Long Point Region Conservation Authority, 2020).

On the website, the LPRCA outlines multiple wetland restoration projects, ways in which the community can implement best practices, and more effective tools for watershed and flood management. However, the availability of these documents and the involvement of the public in creating plans relating to flood risk management are not outlined. The LPRCA does not have a comprehensive flood risk management document which includes participation techniques and methods of engagement with the public. The programs utilized for climate change mentioned previously are highly engaging for the public, however, policy documents make little mention of this.

Education programs are similar to those in other regions in terms of conservation site programs for grade school students. Flood education and preparing for floods is directly linked to Provincial resources and webpages for instruction of how to approach flooding events and prepare.

Integrated Flood Risk Management Approaches (6.3/10)

Land use planning and policy is adequately outlined by the LPRCA through documents as recent as the Policies for the Administration of the Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Regulation (2017). This document outlines how the Ontario Regulations for development in hazard zones in being enacted by the LPRCA. The detail and extent of this document when compared to conservation Sudbury has many improved sections and detail elements. Some areas of specific policy regulation which may be applicable or of interest to Conservation Sudbury include the following.

- One zone vs two zone regulation
- Dedicated regulations for specific developments including; existing uses, residential, commercial/industrial, renovations, public infrastructure, recreation, isolated ponds, and agricultural structures.
- Development surrounding inland lakes specifically and relation to flood hazard prevention

- Development policies within Wetlands and Areas of interference – outlines what the area of interference is and development regulations and requirements in relation to development in wetlands, municipal drains, development in areas of interference, and conservation projects in wetlands
- Regulations in relation to water control structures, dams, and restoration projects in rivers, creeks, streams, and watercourses

This document is one of the few directly related to flood management and land use planning in the LPRCA. As a focus in LPRCA flood risk management and planning, this may be of interest for Conservation Sudbury to also consider. Although the LPRCA did not score highly in this section due to lack of advancements in mapping and related documentation to land use planning and flood risk management, this is one takeaway which should be seriously considered.

Policy Delivery and Evaluation (3.8/10)

Overall, documentation relating to updates on the watershed and flood management are somewhat limited. Yearly watershed progress reports provide updates to actions which have been implemented in the specific year and how the public can continue to be involved, however the delivery of the actual development and land use policy in terms of how many projects have been proposed to the LPRCA, the effectiveness of the current naturalization projects are not readily available or accessible.

Maitland Valley Conservation Authority

Score Summary

Context Similarity	6.2 / 10

Overall Case Score	12.9 / 40
Climate Change Score	6.4 / 10
Participation Engagement and Education Score	0.8 / 10
Integrated Flood Risk Management Approaches Score	2.9 / 10
Policy Delivery and Evaluation Score	2.5 / 10

Documents Examined

Maitland Valley Conservation Authority: Policies and Procedures for Compliance with the Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Regulation
Carbon Footprint Initiative Framework
Climate Change Background Report

Key Takeaways

- Establishing a not-for-profit carbon/climate change initiative with public and private entities has been key to raising money and garnering public support for rehabilitation, restoration, and natural infrastructure projects.
- The role of the Conservation Authority, as well as their relationship with other governing bodies should be stated clearly, rather than implied, by providing the legislative framework that they work within.

Introduction

The Maitland Valley Conservation Authority (MVCA) is in Southern Ontario, and serves a population of roughly 63,307 residents, with a population density of 18 persons/km^2. The MVCA covers the watersheds of the Maitland, Nine Mile and Eighteen Mile Rivers, as well as smaller watersheds along the Lake Huron Shoreline. The authority is comprised of the Municipalities of Morris-Turnberry, North Perth, Central Huron, Huron East, and West Perth. Unlike Sudbury, the MVCA lands are mostly agricultural, and the conservation area does not include a large urban centre. Further, the MVCA regulates the shoreline of North Huron, which is reflected in its policies and procedures as they include many regulations for coastal hazards. The MVCA scored 6.2 in context similarity to Conservation Sudbury, with their largest similarity being that they share the same Köppen climate category.

Climate Change (6.4/10)

The Maitland Valley Conservation Authority is showing a great effort in addressing climate change. While the *Maitland Valley Conservation Authority: Policies and Procedures for Compliance with the Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Regulation* does not address climate change, the Conservation Authority has established a Carbon Footprint Initiative Leadership Team (CFI). This initiative was started in 2012 when the MVCA invited leaders of four local companies, and one municipality, to meet and form a leadership team. This led to the CFI, which raises money to improve the resiliency of the watershed to deal with the effects of climate change. The CFI has grown into a not-for-profit alliance for public and private entities. The Team takes steps to reduce their carbon footprint and supports the planting of natural vegetation to build watershed resiliency.

There have been many successful community projects supported by the CFI, including rehabilitation and restoration projects. One of these projects, The Middle Maitland Headwaters Restoration Project, restored approximately 300 acres of floodplain and river valley lands, transforming them into a natural buffer for the Middle Maitland River. Wetland restoration projects like this one are said to reduce flooding because of the natural infrastructure upstream of problem areas.

In the CFI's *Climate Change Background Report*, there is a recognition that existing stormwater and drainage systems are not sufficient to meet the intense storms and flooding that are a result of climate change. The CFI has initiated a number of natural infrastructure projects including rural stormwater management systems to control gully erosion, and the use of berms, wetlands, and grassed waterways in stormwater management. The CFI has also planted trees to create natural windbreaks and shelterbelts to decrease damage caused by wind and living snow fences to decrease snow drifting on the road. In addition to the CFI,

the MVCA has a tree planting program, which further aids in natural windbreaking, and stream and shoreline buffering. While the MVCA does not have a specific flood response plan, they do assist municipalities in developing flood plans. Further, they do not have any programs to prepare homeowners for a flood.

Participation, Engagement and Education (0.8/10)

The Maitland Valley Conservation Authority scored low in the participation, engagement and education category. *The Maitland Valley Conservation Policies and Procedures for Compliance with the Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Regulation* is a well written document, and there is a supplementary fact sheet for the public to help understand the policy. However, it is not clear whether the public contributed to the creation of the policy, or if it actively seeks out civil society stakeholders for ongoing involvement. The MVCA does not have a program to educate the public on flood risks.

A shortcoming of the policy is that there is no acknowledgement of Indigenous communities, nor does it recognize or include traditional knowledge from Indigenous communities. Further, it does not outline their relationship with various governing bodies. There is a section about various provincial legislation that it follows, and the MNRF's role in flood management, but the relationships and responsibilities are not clearly outlined. It is stated on the website that the MVCA works with municipalities to review development applications and ensure they meet local and provincial standards, but there is no information available to know the level of this working relationship, or if they are operating healthily.

One area that the MVCA could do better is in its transparency of the application process. The policy does not provide an evaluation criterion for when a member of the public submits an application on its website, instead it is recommended that the resident contact the MVCA via telephone.

Integrated Flood Risk Management Approaches (2.9/10)

In the *MVCA Policies and Procedures* there is no consideration for the relationship between land use planning and watershed management. It is mentioned that natural hazard management requires that natural hazards should be recognized and addressed in a manner that is integrated with land use planning, but this is a direct quote from provincial perspectives on natural hazards, which is not enough. The Conservation Authority should adopt this as a principle of their own, rather than quoting provincial principles.

Further, there is no consideration of existing land uses or the cumulative impacts of development . Instead, throughout the policy, the only considerations are “all new development, including additions to existing structures must not affect flood control, erosion, pollution or conservation of land.” This is a traditional approach to environmental planning that many CA’s still follow, which focuses on protecting individual natural features and areas, rather than the watershed as a whole. It is not surprising then, that the MVCA does not have subwatershed plan, or report cards, as they are planning without consideration of the whole watershed.

The MVCA applies a two-zone approach, with the flood line based on the 100-year flood. The policies regarding development in the flood fringe are very brief, stating “all new development, including additions to existing structures must not affect flood control, erosion, pollution or conservation of land”. While this may allow for a less restrictive approach, it may lead to more inquiries and confusion. Further, because the flood policies are so brief, it is unclear whether structural approaches are used for protecting new development or only existing development.

The MVCA does not have an interactive regulatory map on their website. They have PDF’s of shoreline maps displaying a 100-year erosion potential, as well as proposed gully erosion maps. The only floodplain mapping that is available is for the Wingman area, which is in the Municipality of Morris-Turnberry. This map is in .pdf format. These maps are less than ideal, not only because navigating the .pdf format may be confusing for property owners, but because mapping of the full jurisdictional areas of the MVCA is not accessible to the public.

Policy Delivery and Evaluation (2.5/10)

The policy provides an overview of the *Conservation Authorities Act*, but it does not clearly outline the role of the MVCA. The policy also fails to provide a vision statement, goals, and a timeline and criteria to evaluate goals. The MVCA does include all of the flood management policies within a single document.

Saugeen Valley Conservation Authority

Score Summary

Context Similarity	6.9 / 10

Overall Case Score	22.6 / 40
Climate Change Score	3.6 / 10
Participation Engagement and Education Score	4.0 / 10
Integrated Flood Risk Management Approaches Score	7.5 / 10
Policy Delivery and Evaluation Score	7.5 / 10

Documents Examined

Environmental Planning and Regulations Policies Manual
Forest Management Plan
Strategic Plan

Key Takeaways

- A Natural Heritage Systems Approach to Environmental Planning allows the Conservation Authority to protect the ecological integrity of the watershed as a whole and consider cumulative effects.
- The consolidation of all policies in a new environmental planning and regulations manual has benefits to SVCA staff, municipalities, the development community, community stakeholders, and provincial partners as only one document has to be reviewed when submitting applications.

Introduction

Saugeen Valley Conservation Authority (SVCA) is located in Southern Ontario. It covers approximately 4657 square kilometres with a population of approximately 90,000. The area is comprised of five Counties including Bruce, Grey, Huron, Wellington, and Dufferin. There are three major watersheds that the SVCA has jurisdiction over, and a series of sub-watersheds. Unlike Sudbury, the SVCA lands are mostly agricultural and rural, and the conservation area does not comprise of a large urban centre. Further, the SVCA regulates the shoreline of Lake Huron, which is reflected in its policies and procedures as they include many regulations for coastal hazards. Therefore, the SVCA scored 6.9 in context similarity compared to Conservation Sudbury.

Climate Change (3.6/10)

While the *Environmental Planning and Regulations Policies Manual* mentions climate change and the need for sustainable practices numerous times, it is not demonstrated how the SVCA is taking action towards these goals. For instance, there was no information about wetland restoration projects, or natural stormwater management practices after doing a thorough review of the website and documents. The SVCA does have a flood contingency plan, which outlines the flood forecast system, flood messages and roles of participating organizations. However, the Authority has no programs in places to prepare homeowners for a flood.

The SVCA has a *Forest Management Plan* which allows them to protect more wetlands than just provincially significant. In order for the SVCA to protect other wetlands, the wetlands must be on properties that the SVCA owns. For reference, the SVCA owns 8568 hectares of land. The Authority owned lands with wetlands are managed to provide protection from development. In addition to the protection of wetlands, the SVCA also has programs in place to re-naturalize areas.

Participation, Engagement and Education (4.0/10)

The *Environmental Planning and Regulations Policies Manual* is a well written document that is written and organized in a way to provide guidance for community stakeholders. The policy is very transparent in the CA's planning advisory service role. It has a chapter that provides specific information about the planning advisory services performed by Saugeen CA, and specifically the input and review services that the authority provides. This chapter is detailed and clear about the process, responsibility, and role of the CA when they receive an application. They identify exactly what they look at when carrying out planning related responsibilities. Figure 8 is provided in the policy and provides readers a glance of the SVCA's general approach. In addition, they outline the key principles that are applied when making decisions, and various studies that may be required with an application.

A shortcoming of the policy is lack of supplementary fact sheets to help the public understand the large document. Further, the policy does not demonstrate how the public contributed in its creation. The CA states in their policy that one of their environmental planning areas of interest is stewardship, which recognizes that management of the watershed requires the engagement of landowners, organized partners, and stakeholders. It is stated that they will work with clients and partners to promote "on-the-ground-action" and recognize that management depends on shared ownership and collective action. However, it is not stated who the stakeholders are, or what specific actions will be.

In the policy, it is stated that the SVCA recognizes its First Nations partners and will work to honour this relationship by continuing to engage and consult with them. The SVCA also outlines its relationship to governing bodies, including provincial agencies and member municipalities. The SVCA includes in one of their main principles that they will promote a collaborative and "whole team approach" with their member municipalities. After reviewing the *Strategic Plan*, it is clear that the SVCA makes it a priority to enhance relationships with watershed municipalities. Some of the action items in the Plan involve working with the municipality to receive more funding from capital grant programs, supporting municipal programs and initiatives, and educating municipalities on important conservation issues.

Integrated Flood Risk Management Approaches (7.5/10)

Throughout the *SVCA Environmental Planning and Regulations Policies Manual,* there are many sections that exemplify the relationship between land use and watershed management. This is supported by the guiding principle that states that proper natural hazard management must be recognized and addressed as integrated with land use planning. Another principle of the policy is that a watershed scale perspective must be maintained, which means that any decisions the SVCA makes must consider cumulative impacts on the watershed as a whole. Planning on a watershed scale is supported by A Natural Heritage Systems (NHS) Approach to Environmental Planning which is adopted by the SVCA.

Saugeen Valley Conservation Authority has been using an NHS approach for many years. They move away from traditional conservation approaches that focus on protecting individual natural features. Instead, the SVCA aims to protect the ecological integrity of the watershed as a whole. It is recognized by the SVCA that important ecological linkages extent beyond property, planning areas, and political boundaries. The SVCA uses the *Provincial Policy Statement* as a tool when defending the Natural Heritage Systems Approach as the PPS states that:

> "The diversity and connectivity of natural features in an area, and the long-term ecological function and biodiversity of natural heritage systems, should be maintained, restored or, where possible, improved, recognizing linkages between and among natural heritage features and areas, surface water features and ground water features."

There is an evidence-based approach to the policy as the SVCA states as one of their planning and regulation principles that they "make decisions and take action based on best available science and knowledge and promote the transparent and timely sharing of information" (p.28). Another principle of the policy is that "wherever possible, groundwater recharge functions which support natural features or hydraulic or ecological functions on-site and adjacent to the site will be maintained or enhanced" (p.31). While this proves that the policy recognizes the water cycle by addressing water storage, a recognition of drought as an integrated part of flooding is missing in the policy. The recognition of drought is especially crucial as this Conservation Authority includes mostly agriculture lands in its landscape.

The Saugeen Valley Conservation Authority uses both a one-zone, and two-zone concept when designating lands for flood risk management. This is based on the 100-year flood line. The SVCA provides policies to recommend suitable development practices in the flood fringe, for both new and existing development. However, policies for both the new and existing development include structural and floodproofing approaches. Lastly, mapping is accessible to the public, and was last updated in 2015. It appears to cover the full jurisdiction of the policy and therefore adds to the overall Integrated Flood Management criteria.

Policy Delivery and Evaluation (7.5/10)

The role of the Saugeen Valley Conservation Authority is clearly stated in the *Environmental Planning and Regulations Policies Manual.* The SVCA vision statement, goals, and principles are also included in the policy. While the policy does not have a timeline to evaluate goals, the SVCA has a *Strategic Plan* that compliments this policy. In the *Strategic Plan*, goals related to flood risk management are outlined and timing is laid out, with detailed actions they wish to achieve that act as measurable criteria.

Another strength of the SVCA is that all the policies have been consolidated in a new environmental planning and regulations manual. Before this, they relied on a range of policy sources and regulatory guidelines when reviewing applications submitted to watershed municipalities. This updated manual serves many users including SVCA staff, municipalities, the development community, community stakeholders, and provincial partners.

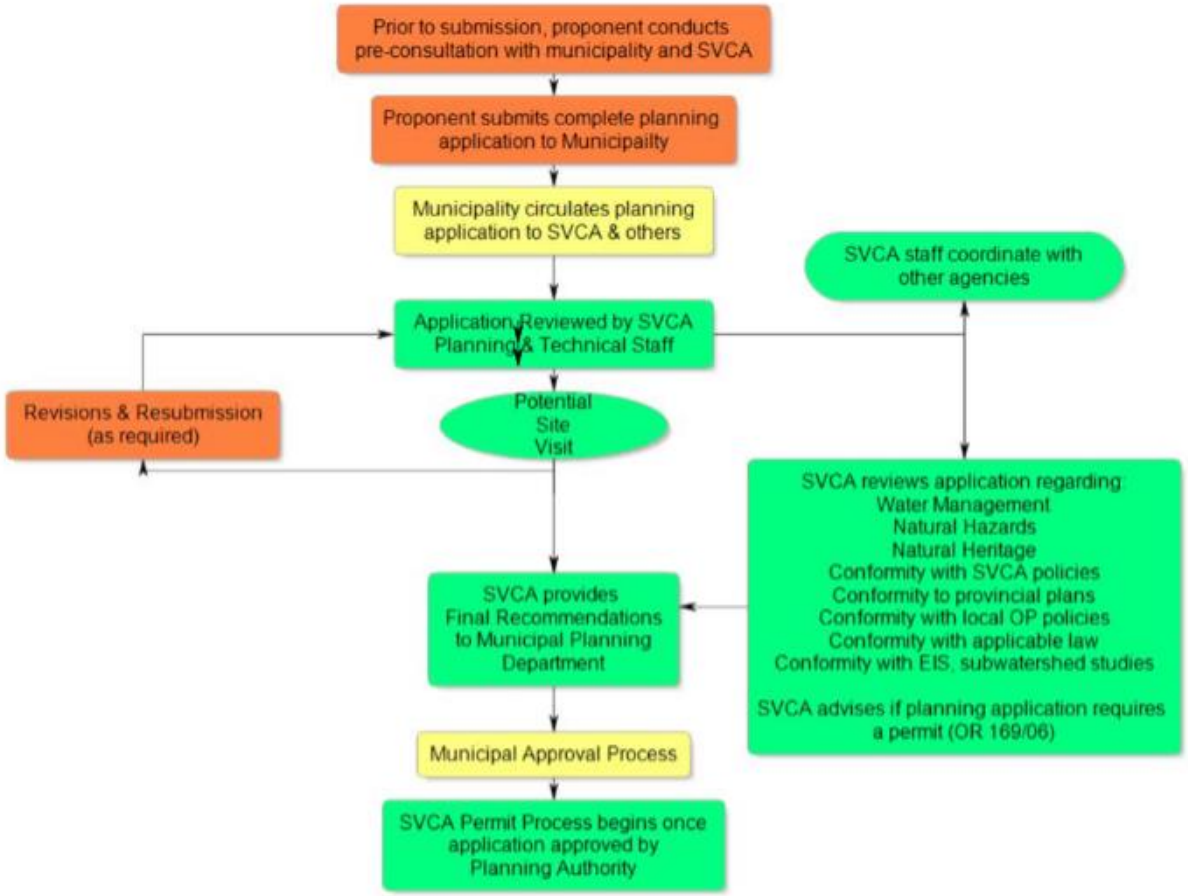


Figure 8: *SVCA's Plan Review Process.*

Upper Thames River Conservation Authority

Score Summary

Context Similarity	6.2 / 10

Overall Case Score	24.1 / 40
Climate Change Score	5.0 / 10
Participation Engagement and Education Score	2.0 / 10
Integrated Flood Risk Management Approaches Score	8.3 / 10
Policy Delivery and Evaluation Score	8.8 / 10

Documents Examined

Environmental Planning Policy Manual for the Upper Thames River Conservation Authority
Strategic Plan June 2016
Stormwater Low Impact Development (LID) webpage

Key Takeaways

- Stormwater Low Impact Development programs to utilize natural stormwater management practices are an effective strategy to educate about and implement LID practices.
- Adopting a Natural Heritage Systems Approach to defend the consideration of cumulative impacts on the watershed when making decisions is an approach encouraged in the PPS and successful in this example.
- Preparing one *Environmental Planning Policy Manual* to facilitate an integrated systems approach for watershed planning creates a more clear and comprehensive planning process.

Introduction

The Upper Thames River Conservation Authority (UTRCA) was formed in 1947 and covers the upper watershed of the Thames River. The watershed covers an area of 3,482 square kilometers with a population of 539,500. The landscape of the watershed is mainly rural, but also comprises the large urban centres of London, Stratford, and Woodstock. The urban land use covers approximately 15% of the watershed, while agriculture covers 73%. Woodlands and wetlands make up the other 12% of land area. The watershed is comprised of 28 subwatersheds. While the UTRCA is in Southern Ontario and serves a higher population than Conservation Sudbury, its watershed is located inland and is in the same Köppen climate category. For this reason, the context similarity score for the Upper Thames River Conservation Authority is 6.2/10.

Climate Change (5.0/10)

The Upper Thames River Conservation Authority scored moderately in the climate change category. While the Authority does not recognize climate change in their policies or website, it is stated in the strategic plan that climate change scenarios will be included in updated flood models and hazard mapping by 2030. This target shows that the UTRCA has consideration for the effects of climate change to their watersheds. Further, the Authority has adopted various programs and policy initiatives that will help mitigate the effects of climate change.

One of the main principles in the *Environmental Planning Manual* states that "natural designs for stormwater management are supported" (p.42). The Authority has done well in bringing this principle into practice by adopting a Stormwater Low Impact Development (LID) Program. UTRCA hosts training opportunities and events related to LID and has been involved in nine LID projects for a variety of property types. To implement LID projects across the watershed, the UTRCA works with developers, municipalities, schools, community organizations, and residents. Methods that have been used in these projects include swale and rain gardens, constructed wetlands, biofilters, and bioswales.

In the *Environmental Planning Manual,* the Authority states "acquisition" as one of their main implementation's strategies. While the UTRCA does not have specific policies that allow them to take public ownership of lands adjacent to riparian areas, the authority does purchase land or easements as a means of obtaining management control. The Authority owns approximately 6500 hectares of land which are managed for various purposes including recreation, protection of wetlands, and protection of the public from flooding processes.

Lastly, the UTRCA includes “all other wetlands” in their wetland policies. These are wetlands in the Regulation Limit that are of local significance whether they have been assessed under the Ontario Wetland Evaluation System or not. In the Upper Thames River watershed, there are 31 provincially significant wetlands and 35 locally significant wetlands. While the locally significant wetlands do not have the same type of protection under the Provincial Planning Policy as provincially significant wetlands, the UTRCA does encourage local governments to protect them. The UTRCA also has a tree planting program and initiates planting projects for windbreaks, highly erodible land retirement, and treed buffer strips along watercourses.

Participation, Engagement and Education (2.0/10)

The UTRCA states that the *Environmental Planning Manual* was developed collaboratively with the community. Further, the various components of their approach (plan, implementation, monitoring and researching, and evaluating and reporting) are undertaken collaboratively with the community which includes municipalities, landowners, professionals, other government agencies, and advocacy groups. However, details are not given for how these groups contribute or the level of participation. The policy does outline UTRCA’s role in planning, and their relationship with other governing bodies.

Overall, the UTRCA scored low in this category because they do not have a public facing document that explains the policy, nor do they have a flood risk education program or evaluation criteria for when a member of the public submits an application. They also do not recognize Indigenous communities or provide opportunity for involvement.

Integrated Flood Risk Management Approaches (8.3/10)

There is a consideration between watershed management and land use planning in the *Environmental Planning Manual*. It is stated in the manual that “the policies are based on the interrelationship between environmental, physical and social factors that impact and use planning and development in the watershed” (p.6). The authority also adopts a Natural Heritage Systems (NHS) approach to planning. As part of this approach, the watershed is used as the scale for planning and it is acknowledged that water does not respect political boundaries, which means that any decision the UTRCA makes must consider the cumulative impacts on the watershed.

The Upper Thames River Conservation Authority encourages its member municipalities to prepare comprehensive studies on natural hazard, natural heritage, and natural resource features when making land use planning decisions. However, the UTRCA recognizes that preparing comprehensive studies may not be economically feasible or practical for every planning

decision. The Authority therefore recommends that studies be conducted in areas where there is more development pressure or where resources are stressed. In every situation, the UTRCA considers the cumulative effects of decisions on the watershed's resources, which may go beyond a single development site.

The UTRCA uses both a one-zone and two-zone concept when designating lands for flood risk management. This is based on the 100-year flood line. The UTRCA provides policies to recommend suitable development practices in the flood fringe. However, policies for both new and existing development include structural and floodproofing approaches. Lastly, detailed floodplain mapping is accessible to the public and was updated in 2018. It appears to cover the full jurisdiction of the policy and therefore significantly benefits the overall Integrated Flood Management category score.

Policy Delivery and Evaluation (8.8/10)

The *Environmental Planning Policy Manual* contains all policies that the UTRCA has that guide development and site alteration. Having one comprehensive manual is beneficial to the UTRCA as it facilitates an integrated systems approach for watershed planning. The Policy Manual focuses on all the UTRCA's regulatory implementation activities. In the Environmental Planning Policy Manual, the role of the UTRCA is clearly stated, and a vision statement is provided.

In addition to their *Environmental Planning Policy Manual*, the UTRCA has an *Environmental Targets: Strategic Plan* that was created in June 2016. The plan includes targets to improve subwatershed health, restore natural vegetation cover, reduce flood and erosion, and support green infrastructure. There are measurable criteria to evaluate their progress on goals, and a timeline to evaluate those goals. They also include potential partners for each target, resulting in a high overall score for Policy Delivery and Evaluation.

NATIONAL

City of Prince George, Prince George BC

Score Summary

Context Similarity	6.9 / 10

Overall Case Score	16.2 / 40
Climate Change Score	6.4 / 10
Participation Engagement and Education Score	2.8 / 10
Integrated Flood Risk Management Approaches Score	4.6 / 10
Policy Delivery and Evaluation Score	2.5 / 10

Documents Examined

City of Prince George Bylaw NO. 8285 A bylaw of the City of Prince George to designate land as flood plain and regulate the development of land that is subject to flooding (2011)
Prince George Official Community Plan (2012)
Flood Risk Evaluation and Flood Control Solutions Phase 2 Final Report (2009)
2020 Climate Change Mitigation Strategy (2020)
The Hudson's Bay Wetland Project (2020)
Mapping Resource – PGMAP (2020)
Website Review

Key Takeaways

- Wetland restoration and improvement can be completed for a minimal cost if a willing community partner can be found to undertake the work.
- Having a robust and transparent public consultation process can assist in improving public support for flood control actions.
- Creating a single flood risk management document is a significant tool which can aid in guiding flood risk management in the future.

Introduction

Prince George is a community in northern British Columbia. British Columbia predominantly relies on municipalities to create policies and regulations to manage flood risk and do not have Conservation Authorities like Ontario. The province assists municipalities by creating flood risk maps and guidance on best practices and policies. The provincial government also creates flood risk and preparedness resources available to the public. While this partnership seems to work well, it does have the drawback of not following watershed boundaries. This may leave some municipalities with little control over flood risks that occur due to upstream actions.

The City is located at the junction of the Fraser and Nechako Rivers, and is therefore very susceptible to flooding. The Fraser river tends to flood in the spring as snowmelt and rain cause increased water levels, while the Nechako River is more prone to ice-jam floods. Significant flooding occurred in 2007-2008 including an ice-jam flood on the Nechako River that rose floodwaters above the 200-year flood line. In response to this event, the City initiated a two-phase flood risk management study and have been acting on the recommendations of that report since 2010.

Prince George has a population of approximately 74,000 people. The municipality jurisdiction covers an area of 318 square kilometres with an average population density of 233 people per square kilometre. It is in the same general climatic zone as Conservation Sudbury and is inland. These factors contributed to Prince George scoring context similarity score of 6.9/10, indicating that some of the strategies they use may also be useful for Conservation Sudbury.

Climate Change (6.4/10)

The City of Prince George recognizes the need to address climate change and has a specific strategy for how to do so. The *2020 Climate Change Mitigation Strategy* sets out specific targets for greenhouse gas (GHG) emissions for both the corporate actions of the City of Prince George and the wider community. Unfortunately, the city has not been on the right track with meeting these goals. Instead of reducing GHG emissions by 2% below 2002 levels by 2012, the city increased emissions by 0.8%. By 2017 community GHG emissions were 3.9% higher than 2002 levels. Despite this setback, Prince George is still well-positioned to respond to a changing climate.

Prince George has an ongoing wetland restoration project in partnership with a local community group. *The Hudson's Bay Wetland Project* restores and manages a large wetland area within the city's boundaries. This area acts as vital water storage when flooding occurs. Additionally, all wetland areas within the city limits are protected from development. The *Official Community Plan* policy 6.2.24 states,

> *"The City recognizes the importance of wetlands and the need for their protection and/or rehabilitation in land use planning and should work to identify and develop recommendations to protect wetlands."*

There are specific areas in which Prince George could improve in relation to climate change. The *Official Community Plan* encourages natural stormwater management practices but acknowledges that more work is needed to update the stormwater management bylaw to an integrated stormwater management framework. Some flood preparation materials are provided for residents on the website such as how to flood proof your home; however, it could be improved. Additionally, the City of Prince George does not have a specific emergency flood response plan.

Participation, Engagement and Education (2.8/10)

Public participation and consultation were documented effectively in the *Flood Risk Evaluation and Flood Control Solutions Phase 2 Final Report.* Meetings were held over a two-day conference where any member of the public could contribute. The public was given information collected in the first phase of the flood risk study. The first phase report identified areas with significant flood hazards, the primary causes of flooding, and methods to address flood risk. The advantages and disadvantages of several methods were discussed, and the public participants were given the opportunity to ask questions and voice their concerns. Flood control solutions discussed include the following:

- Re-establishing Natural Back Channels
- Land Use Change
- Building Dikes
- Raising Roads
- Flood-proofing Individual Buildings
- The Cost of Doing Nothing

Unfortunately, besides the record of participation in the *Flood Risk Evaluation and Flood Control Solutions Phase 2 Final Report,* little public information about flooding is available. It would be advantageous to have a public-facing document that simplified the results of this report and explained what actions the City of Prince George chose to take. The report recommends creating a public education program; however, it there is lack of evidence whether or not the City of Prince George acted upon the recommendation.

Another shortcoming of Prince George in the evaluation category was the lack of engagement with local Indigenous groups in terms of managing flood risk. However, Indigenous history and the need to protect Indigenous cultural heritage recognized in Prince George's *Official Community Plan.* It seems likely that the lack of consultation on flood risk is due to this not being the City's primary concern, as opposed to a deliberate or accidental oversight.

Integrated Flood Risk Management Approaches (4.6/10)

The *Flood Risk Evaluation and Flood Control Solutions Phase 2 Final Report* makes recommendations about the best ways to protect the community from flooding. Most of the recommendations are to build engineered solutions such as dikes. However, the recommendations push for land use change by purchasing properties from homeowners wherever possible. No new development will be allowed in the floodplain, and no engineered solutions will be employed to allow new development in the floodplain.

Prince George states in their *Official Community Plan* that they are considering the effects of the entire watershed when making policy. However, due to constructions of the jurisdiction to city boundaries this may be a challenge. The Official Community Plan also recognizes droughts and water storage as integrated parts of watershed management however it does not link these activities to flood risk management.

Flood plain mapping is available through the Prince George Mapping Portal (PGMAP). This open mapping portal is openly available to the public and has multiple layers that can be turned on and off to see how flooding overlaps with activities such as transport, land parcels, and parks. Floodplain mapping was last updated in 2010 and is based on British Columbia's regulatory 200-year flood line. Although the 200-year regulatory flood line of BC is more robust than Ontario's 100-year regulatory flood line, there still is no mechanism built into the regulation to address a changing climate.

Project Delivery and Evaluation (2.5/10)

Prince George performed poorly in this category likely due to the fact that a municipality has different goals and objectives than a flood risk management authority. Their *Official Community Plan* does not outline the responsibilities of the City in terms of flooding, nor does it set out a timeline to revaluate goals. However, based on other standard community plans it is assumed that goals will be revaluated when the community plan is renewed every 5-10 years. Prince George has a vision statement for how their community will look in 2040, however it does not explicitly relate to flooding. This is likely due to flood management not being a core mandate like it is in an Ontario Conservation Authority.

One action that would improve this category would be the creation of a flood management policy specifically. The city has a bylaw designating certain areas as flood plains and it gives some guidance about development that may be allowed in those areas. However, the bylaw has a limited scope and does not address any measures to mitigate or adapt to existing flood risk.

INTERNATIONAL

New York State Southern Tier Central Region, New York, USA

Score Summary

Context Similarity	7.7 / 10

Overall Case Score	12.7 / 40
Climate Change Score	2.3 / 10
Participation Engagement and Education Score	0 / 10
Integrated Flood Risk Management Approaches Score	5.4 / 10
Policy Delivery and Evaluation Score	5.0 / 10

Documents Examined

Municipal Land Use Strategies for Improving Flood Resilience (2017)
Protecting Your Home and Property from Flood Damage Mitigation Ideas for Reducing Flood Loss (2010)

Key Takeaways

- Encouraging the use of natural stormwater management approaches such as bioswales, rain gardens, and green roofs are effective and simple tools for flood risk management.
- Federal guiding documents can be successfully integrated and used within local flood risk management practices such as mapping and land use development.
- The use of a hierarchical flood lines based on type of facilities is a useful way to create more stringent uses in high risk areas (ie a 500-year flood line for critical facilities such as jails, hospitals, schools, daycare facilities, public and private utilities, fire stations, emergency operation centers, police facilities, etc.).

Introduction

The Southern Tier Central Region Development Board is a land development board located in South Central New York and is in the same climatic zone as Conservation Sudbury. It is comprised of Chemung, Schuyler, and Steuben Counties. The STCR is similar to Conservation Sudbury being located inland and therefore not handling coastal flooding. However, being an example from the United States, the development board operates under different rules and regulations than Conservation Sudbury which is acknowledged throughout this analysis. The STCR is covers approximately 5,585 square kilometres with a population of 197,747 residents. Based on these factors it received a context similarity score of 7.7/10.

Climate Change (2.3/10)

The STCR recognizes the importance of climate change in the *Municipal Land Use Strategies for Improving Flood Resilience* document. This states the need to improve forests to help mitigate flood effects. In addition to addressing the importance of climate change, the STCR also addresses the utilization of natural stormwater management practices in section 13 of the *Municipal Land Use Strategies for Improving Flood Resilience* document, which encourages bioswales, rain gardens, and green roofs. Finally, section 12 of this document recognizes the need to regulate development around wetlands to ensure they are protected.

Participation, Engagement and Education (0.0/10)

The STCR has many areas of improvement having scored zero in this category, however, they do provide one document that is of interest. The *Protecting Your Home And Property From Flood Damage Mitigation Ideas For Reducing Flood Loss* document linked on the STCR website is a document created by the Federal Emergency Management Agency (FEMA) explaining ways to mitigate the effects of flooding on your house. While not created by the STCR, providing documents from a national agency is a key takeaway as it does not cost the local agency any money, yet provided some level of education to the public.

Integrated Flood Risk Management Approaches (8.3/10)

The mapping provided by FEMA linked on the STCR website maps the whole watershed and is interactive with GIS technology. The interactive property map is regulatory and overlays a floodplain layer for the entire region in relation to properties. In addition to providing the FEMA maps, it should be noted that the maps are kept up to date by FEMA, with the most recent update coming in

2020. The STCR also provides a document titles *Protecting Your Home and Property from Flood Damage Mitigation: Ideas for Reducing Flood Loss.* This is a federally procured document that serves as a valuable tool for the flood authority as it provides design guidelines at no cost to the STCR.

The STCR utilizes a combination of reactive hazard-based approaches and proactive risk-based approaches to managing flooding within their jurisdiction. The STCR document *Municipal Land Use Strategies for Improving Flood Resilience* provides regulatory policies for both new buildings and existing development which demonstrates a hazard-based and a risk-based approach. Section 8 of the *Municipal Land Use Strategies for Improving Flood Resilience* uses a 500-year flood line as its regulatory flood line for critical development. A 500-year flood is a flood that has a 0.2% probability compared to a 100-year flood which has a 1% probability. The STCR also utilizes a one-zone approach to regulating the flood plain, stating that development should be avoided in the floodway. However, the only prohibited development in the floodway is plants for facilities in which hazardous material are manufactured.

The STCR's *Municipal Land Use Strategies for Improving Flood Resilience* is a document which is targeted towards the relationship between land use and flood risk management. The STCR notes that all land use activities occurring in the watershed should utilize good stormwater management practices as to not cause runoff to overwhelm the system in a storm event. Additionally, the STCR provided land use tools to protect natural features and reduce flood risks. However, the *Municipal Land Use Strategies for Improving Flood Resilience* does not provide zoning recommendations, rather provides tools for land uses such as comprehensive planning (a practice not commonplace in New York) and site plan review.

The STCR has also effectively utilized different types of interventions within the flood risk management policies and guidelines. Section 3 of the STCR's *Municipal Land Use Strategies for Improving Flood Resilience* states that the only use of structural interventions to mitigate flooding is through structural retrofits. Therefore, it can be assumed that structural interventions are only to occur on pre-existing developments and not new developments. Additionally, the STCR does encourage the utilization of natural approaches in its policy including the creation of bioswales, rain gardens, and green roofs within section 13 of their *Municipal Land Use Strategies for Improving Flood Resilience*.

Appendix 3: Designated Hazard Lands and Policies Within the City of Greater Sudbury

The Communities of Sudbury	Alexander Street	- Replacement, expansion, or alteration of existing buildings and infilling existing vacant lots may be permitted - No new lots allowed
	Notre Dame Avenue	- Replacement, expansion, or alteration of existing buildings and infilling existing lots may be permitted - New development allowed up to 95 metres east of Notre Dame Avenue provided it does not occur closer than 25 metres from Junction Creek
	Flour Mill	- Replacement, expansion, or alteration of existing residential buildings and infilling of existing vacant lots may be permitted - No new residential lots permitted - Infilling or replacing non-residential uses may be permitted if it does not occur within 25 metres of Junction Creek
	Long Lake Road Bypass	- Land lying northeast of the Bypass and designated as Living Area and low-density residential development may be permitted provided drainage improvements are installed to mitigate flood hazards
	Ponderosa Area	- If it can be demonstrated to the satisfaction of Conservation Sudbury, that some or all land can be removed from the Flood Plain as a result of flood management improvements development may be permitted (subject to Official Plan amendment) - At rezoning and subdivision stages, adequate provisions are required in the proposal for Flood Plain management and the proposed development and related flood management improvement must justify having no unacceptable adverse impacts on the stability of adjacent existing structures and buildings - No urban or residential development shall occur within 25 metres from the centre line of Junction Creek

The Community of Dowling	Flood Fringe	- Extensions or additions to existing buildings and reconstruction of dwelling units destroyed by natural causes may be permitted if the following is met:
		  o All openings 0.3 metres above flood line
		  o No habitable rooms below the design flood level
		  o All CMHC, Ontario Building Code, and Conservation Sudbury requirements regarding floodproofing structures in the Flood Plain shall apply
		- Single dwelling units from a plan of subdivision existing April 19, 1982 may be constructed if:
		  o The area is a sufficient distance from the flood fringe as determined by regulatory authorities, including Conservation Sudbury
		  o Entry and exit of any proposed development in the flood fringe should contain floodproofing to ensure escape routes are passable during flooding events to the satisfaction of Conservation Sudbury

The Community of Azilda	Floodway	- Floodway is defined as the land below the level of the 100-year Flood in Azilda - All lands within the Floodway except for existing building and structures will be zoned hazard zone. If the Floodway has been altered and approved by Conservation Sudbury, Flood Fringe policies will apply to lands removed from Floodway

	Flood Fringe	- Defined as lands between the 100-year Flood line and the Regulatory Flood Line
		- Development permitted subject to the provision of adequate floodproofing
		- Expansion/alteration of existing buildings and the erection of new structures may be permitted in accordance with the land use designation, subject to the approval of Conservation Sudbury and in compliance with the following:
		  o All openings 0.3 metres above the Regulatory Flood Line
		  o No habitable rooms below the design flood level
		- Reconstruction of dwelling units destroyed by natural causes other than flood may be reconstructed in accordance with floodproofing requirements above

The Community of Chelmsford	Floodway	- Floodway policies from the Community of Azilda (above) apply - Areas between Errington Street and Municipal Road 15, in the Regulatory Flood limits, may be developed in accordance with the Flood Fringe provisions of Azilda

Appendix 4: Public Engagement

Importance of Public Engagement

The area of land under the jurisdiction of Conservation Sudbury is situated on the traditional territory of the Atikameksheng Anishnawbek, the Wahnapitae First Nation and the Whitefish River First Nation (Wiigwaaskinaga) including the traditional lands of the Robinson-Huron Treaty (Manitowabi, 2018). Unfortunately, many of the public engagement initiatives in Sudbury do not actively collaborate with Indigenous communities, which often results in the exclusion of Indigenous voices or concerns in the policy making process.

Governments and industries around the world are recognising the value of community and stakeholder engagement as an integral part of project planning and decision-making. According to (Creighton, 2005), engagement activities add value to communities by providing opportunities to:

- Meet and discuss issues with local government
- Share their experiences and cultural knowledge
- Develop innovative resolutions
- Create awareness and local understanding of issues linked to the watershed
- Build empathy between competing stakeholders

Community engagement also helps to facilitate outcomes that benefit the communities involved as well as the government. It allows all the participating parties to identify concerns, risks, opportunities, options, and potential solutions for the issue at hand. This can assist in leading to more informed decision-making and mutual benefits. In relation to planning, land use and development (Creighton, 2005) outlines some benefits of community engagement that can lead to better policy decisions when developing local planning instruments.

- Improved relationships and communication between the community and local government
- Potential for greater community support for policy implementation
- Community awareness and understanding about the impacts of population growth, natural hazards and climate change, and the need to protect important resources such as open space, areas of environmental significance, and agricultural land
- Community buy-in and higher levels of community ownership of planning instruments

- Effective mechanisms for feedback and evaluation of planning decisions
- Opportunity for individual and community capacity building and shared understanding of potential planning approaches/potential solutions
- Opportunities for consensus building as community groups and stakeholders express their viewpoints
- Sharing new ideas and specific expertise resulting in mutual learning
- Legitimisation of decisions regarding controversial issues

Accessibility, timing, and transparency are all important elements in achieving effective community engagement (Creighton, 2005). Undertaking community engagement efforts earlier in the development of a policy or project can have a range of benefits and also aid in making community groups feel heard. Early engagement gives the community opportunities to learn about the proposed changes and how they may affect the groups involved. It also allows for a diverse range of community views to be considered in the development of options or solutions.

Along with accessibility, timing, and transparency, there are other major elements which are vital in achieving successful community engagement. Below are 5 elements of effective community engagement.

1. Focus is on the best interests of the community and their right to be involved in decision making that will affect them – Consultations are done with the best interests of the entire community in mind, including decision makers
2. Engagement is honest and meaningful – Genuine opportunities to contribute to the plan developments process, and keeping the stakeholders informed of any proposed changes and their potential impact/implications
3. Approaches to engagement are inclusive, appropriate for the needs of the community, seek diverse voices, and seek to address potential barriers to participation.
4. Information is relevant and timely – Enough time provided for community consideration and feedback
5. Information is accessible and easy to understand – The community can easily access the information, it is tailored to the community where necessary (ie: language), and in a format that is appealing to the intended audience

These elements can be used within all types of communities to effectively communicate and engage with the public and effected communities during development. Along with the elements of communication and engagement, the next sections will outline specific communities and groups which are vital to consider in engagement and within Sudbury.

Defining Communities

To understand the communities being impacted by development and those that require public engagement, it is important to understand what groups and communities exist in the study area. The following outlines definitions of different communities as well as examples of communities to consider for policy development within the study area in Sudbury:

> **Communities of place** are defined as areas in which people identify with a specific geographical area (e.g. a neighbourhood, town, or housing development). Examples of this within the area under jurisdiction of Conservation Sudbury are Capreol and Flour Mill (Queensland Government, 2017).
>
> **Communities of interest** are defined as areas in which people share a particular experience, concern, or trait such as religious groups, cultural groups, and Indigenous groups (Queensland Government, 2017). Some examples in the local context include the Atikameksheng Anishnawbek, the Wahnapitae First Nation and the Wiigwaaskinaga (Whitefish River First Nation).

As mentioned above, the area covered by Conservation Sudbury jurisdiction is situated on the traditional territory of the Atikameksheng Anishnawbek, Wahnapitae First Nation and the Whitefish River First Nation (Wiigwaaskinaga), which are the traditional lands of the Robinson-Huron Treaty (Manitowabi, 2018). The Atikameksheng Anishnawbek have a Comprehensive Community Plan that can be utilized as a tool to help build connections between the local Indigenous community and decision makers in the City of Greater Sudbury and associated areas under the jurisdiction of Conservation Sudbury. Some of the objectives in the Atikameksheng Anishnawbek Comprehensive Community Plan as they relate to land use and environmental stewardship are:

- To work with the provincial government and other regulatory bodies to ensure that their policies fully support Indigenous land rights and adopt environmental stewardship practices that align with Indigenous knowledge and values (Community members of Atikameksheng Anishnawbek, Atikameksheng Chief and Council, and Atikameksheng Anishnawbek Staff, 2020).
- To create mechanisms to ensure that the Atikameksheng benefit equitably from all forestry, mining, and other land use activities being carried out on its traditional territory (Community members of Atikameksheng Anishnawbek et al., 2020).
- To create a land and environment related communication strategy (Community members of Atikameksheng Anishnawbek et al., 2020).

Some notable examples of committees enacting effective community engagement within the areas under the jurisdiction of Conservation Sudbury area include Junction Creek Stewardship committee, Rainbow Routes Sudbury, Greater Sudbury Watershed Alliance, Long Lake Stewardship, and Vermilion River Stewardship. Vermillion River Stewardship is a notable organization recognized on the City of Greater Sudbury's website that directly acknowledged the impacts that development and watershed issues have on the local Indigenous communities. Issues such as the hydroelectric damming projects that would have had a significant effect on the flow of the Wabagishik rapids were acknowledged and addressed through community supports and collaboration efforts with the Vermilion River Stewardship and the local Indigenous groups (Vermilion River Stewardship, 2019).

Reconciliation Methods

There are multiple ways that local governments can create a collaborative atmosphere like these mentioned above, which allow for greater community input and dialog around watershed concerns and remedies. The acceptance of Indigenous knowledge, cultural awareness, and relationship building can help to foster new and adopted approaches to flood risk management. This can contribute to more holistic remedies to local flood management in the Conservation Sudbury jurisdictional areas. The Georgian Bay Biosphere Reserve (GBBR) has done exemplary reconciliation work with the Anishnawbek community in the Georgian Bay area. Some of the most significant take-aways from their engagement efforts are discussed below.

Training

Organizing and sharing cultural-awareness training for staff and boards, as well as inviting groups to co-learn (high school teachers, national and provincial park staff, etc.) helps to build rapport and empathy between communities (Judge & Mason, 2019). Organizing staff meetings intermittently with Chief and Council to share what the Conservation Authority is doing and what can be done to support affected Indigenous communities.

Advisory groups

The formation of cultural advisory groups. An advisory group was formed through networking with a group of Indigenous women in GBBR and it inspired informal meetings over tea. These meetings were centered on partnership-building between GBBR and area First Nations and Indigenous youth (Judge & Mason, 2019). These conversations led to expanded, more formal meetings that resulted in advice and program ideas. This example could be used to model future interactions between the Atikameksheng Anishnawbek, Wahnapitae First Nation and the Wiigwaaskinaga and local decision makers.

Showing up

Being present and supportive, attending pow-wows, community events, as well as meeting with community members regarding relevant planning issues (Judge & Mason, 2019) (Manitowabi, 2018).

Respect

Learning how to connect with First Nations' governance structures (Chief and Council, band, and program staff) - this is a process that is individual to each First Nation/Indigenous community (Judge & Mason, 2019).

Community engagement work is multifaceted and complex. Working with various community groups and stakeholders that have competing needs can create tension during engagement activities, but tackling the tension is a necessary undertaking for effective decision making and policy development.