

2016-2022

MCIP's Role in Mobilizing Municipal Climate Action



MCIP Portfolio Analysis: Summary of Results

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1. Introduction

The Municipalities for Climate Innovation Program (MCIP) is a five-year program (2016-2021) funded by Infrastructure Canada and delivered through the Federation of Canadian Municipalities (FCM). The goal of the program is to help municipalities tackle climate change and its effects by building capacity to better prepare for and adapt to the new realities of climate change, as well as reduce greenhouse gas emissions. MCIP has developed and delivered several diverse programs through which municipalities can access climate action funding, related to both adapting to the projected impacts of climate change (adaptation) and lowering municipal and community emissions (mitigation).

To date, funding has been offered through the following eight programs:

1. Adaptation & Mitigation Planning Grants
2. Climate Adaptation Partnership Grants (CAPG)
3. Climate and Asset Management Network (CAMN)
4. Feasibility Study Grants
5. Operational Study Grants
6. Climate Change Staff Grants
7. Capital Project Grants
8. Transition 2050 (T2050)

From 2020 to 2022, MCIP engaged ACT - the Action on Climate Team (formerly the Adaptation to Climate Change Team) to conduct an analysis of the results – common themes, innovations and outcomes – of the performance of these eight funding programs over the past five years by reviewing both completion reports (self-assessment reporting questionnaires) and the plans, studies, reports and strategies produced by funding recipients.

The goal of this analysis is to explore the overall impact that MCIP programs have had on mobilizing climate action and catalysing climate innovation in Canada at the municipal scale. In addition, we contribute proposed updates to MCIP's Performance Measurement Framework to support future evaluation of program effectiveness, and identify key opportunities and recommendations for future development.

This report presents the findings; in particular, results from seven key areas. The seven key areas guiding the evaluation of successful climate action in the eight MCIP programs are evaluated against ACT's consideration of best practice. These are:

- **Common climate adaptation and mitigation actions being used in municipalities across the country.**
 - ***Identifying actions and indicators showcases intention for or momentum toward implementation.*** Including indicators to measure progress on mitigation actions is considered best practice.

- **Common indicators that are being used to track progress on climate action.**
 - ***Planning for implementation*** includes identifying priority timelines, key roles, budgets and financing. The goal of planning is to move action plans toward implementation. The inclusion of indicators demonstrates opportunities for success and demonstrates a commitment to implementation.
 - Measuring progress on adaptation and mitigation action has never been more important, and the goal of the planning achieved through development of the MCIP action plans is for municipalities to move toward implementation. The inclusion of indicators in municipal plans can be viewed as a proxy for building momentum toward implementation, as the inclusion of indicators promotes thinking about implementation and adaptation goals. Indicators are therefore fundamental to tracking and reporting on effective forms of resilience building. However, planning and implementation have been viewed as two distinct activities. Planning for implementation has not formed part of most climate action plans. The inclusion of indicators shows opportunities for success and demonstrates a commitment to implementation.

- **Strategic co-benefits and alignments between climate action and other community priorities.**
 - ***Identifying the co-benefits of mitigation actions helps to assess actions that multi-task.*** Identifying the additional benefits that come from emissions reductions, such as air quality, walkable communities, clean economy, and biodiversity helps to situate mitigation within broader development goals.
 - ***Identifying the co-benefits of adaptation action helps to assess actions that multi-task.*** Focusing on ways that adaptation actions advance other municipal social, environmental, and economic goals ensures the integration of climate actions across diverse areas of work relating to economy, biodiversity, human well-being, and social equity, for instance.

- **Consideration of equity in actions and process.**
 - ***Equity needs to stand alone as a best practice lens for all climate action planning.*** An equity lens to guide plan and action development ensures that communities that are more vulnerable to the risks of climate change are given the proper consideration.
 - Equity is fundamental for assessing climate risk and effectively developing equitable climate actions. A whole community approach is crucial when assessing the systemic risks of climate change and the climate solutions that advance municipalities toward their resilience and sustainable development goals. Leading municipalities are applying an equity lens to their climate-action planning, assessing disproportionate risks to different segments of the population as a critical priority, mapping vulnerable populations against climate risk data, and are applying equity framing to support the prioritization of actions. Assessing and evaluating who is most vulnerable and exposed to climate risks as well as who benefits from adaptation actions are crucial areas for building equitable and effective climate action.

- **Use of nature-based solutions (NbS).**
 - ***NbS are used to reduce exposure and vulnerability to climate change using low carbon approaches, while meeting other community co-benefits.*** NbS are a key integration strategy that allow municipalities to achieve multiple community goals while reducing costs. Several adaptation plans included NbS actions in their plans to not only reduce the impacts of climate hazards but also reduce emissions through carbon sequestration and improve air quality, etc., showcasing an understanding of the ability of climate action to achieve multiple goals.

- **Other best practices.**
 - ***Linkages with mitigation objectives identify synergies and prevent contradictions.*** Showcasing interdependence between adaptation and mitigation options prevents contradictions and helps to identify both synergies and trade-offs between them. This can be done by assessing adaptation actions for their mitigation or emissions reduction co-benefits; an approach taken in a small number of plans. Or a more comprehensive approach and emerging best practice, referred to as a low carbon resilience (LCR) approach, can be used, in which risk, emissions and co-benefits data are co-evaluated for more systemic and streamlined climate actions.
 - Plans, Studies, and Grants that addressed both adaptation and mitigation were highlighted as best practice. Identifying alignments between adaptation

and mitigation action planning, prevents trade-offs and contradictions, and identifies synergies, optimizing limited municipal resources and capacities. Streamlined and/or integrated climate actions were flagged or highlighted as best practice in this analysis. (For more information on integrated climate action or low carbon resilience, see <https://act-adapt.org/reports/>).

- ***Innovative process design or strategies***, and clear, accurate and streamlined communication of the project goals and actions.
- ***Identification of actions, co-benefits, and indicators leads toward integration and implementation***. Doing so provides a more systemic perspective on the ways that adaptation actions benefit other organization priorities and identifies strategic ways of measuring progress. Including all three is viewed as building the momentum toward implementation.

This report outlines the qualitative approaches and methodologies used to code, query and analyse the MCIP deliverables as well as a framework and methodology for future analysis and evaluation of the remaining deliverables to ensure consistency.

Conclusions provide insights into, and recommendations for, the role that MCIP funding has played in spurring adaptation and mitigation action, and climate innovation and best practice in municipalities across Canada.

Communicating Policy Relevant Results

While the following is a technical report, key policy-relevant results from the analysis have been developed into four briefing notes:

1. Common adaptation and mitigation actions and indicators being used in municipalities across Canada.
2. Municipal climate innovation and best practice in Canada.
3. The co-benefits of climate action in municipalities and cross-cutting opportunities.
4. Key success factors among MCIP's eight program types and recommendations for next steps.

These briefing notes highlight key findings that will be useful to help municipalities as they develop their own climate action opportunities, including common actions, key innovations, and best practices.

2. Methods: Developing the Qualitative Architecture

Due to COVID-19, many MCIP projects and plans were delayed. This analysis is therefore a preliminary snapshot of results from 286 of the 322 municipal plans, studies and reports, or 88% of the deliverables, that MCIP has funded. A total of 300 projects were submitted, but 14 did not include final deliverables that could be coded or analysed. Coding is complete for all files received as of May 13, 2022. Table 1 below provides a summary of the number of deliverables received, coded and analysed for English and French, including completion reports.

Table 1: Summary of Deliverables Received to Date (*E=English, F=French, CR=Completion Report)

MCIP Deliverables	Total expected	No. of Deliverables Submitted	No. of Deliverables Coded & Analysed	No. of CR Submitted	No. of CR Coded & Analysed	Proportion Deliverables Analysed	Proportion CR Analysed
Adaptation Plans	32 E	32	32	30	30	97%	95%
	10 F	10	9	10	8		
Mitigation Plans	32 E	32	32	32	32	93%	93%
	11 F	9	8	9	8		
Feasibility Studies	36 E	36	35	36	36	97%	100%
	25 F	24	24	24	24		
Operational Studies	17 E	17	17	17	17	100%	100%
	1 F	1	1	1	1		
CAPG	12 E	12	12	12	12	100%	100%
	3 F	3	3	3	3		
CAMN	20 E	20	20	26	26	100%	100%
	0 F	0	0	0	0		
Capital Projects	25 E	20	20	20	20	84%	84%
	18 F	18	16	18	16		
Staff Grants	54 E	46	43	46	46	76%	76%
	10 F	7	6	7	7		
T2050	11 E	11	9	11	9	77%	77%
	2 F	2	1	2	1		
TOTAL data points	322	300	286	304	294		
	239 E	226	219	230	227		
	83 F ¹	74	67	74	67		

¹ Three are missing from this count.

The goal of this analysis was to understand common climate actions – both adaptation and mitigation - being used across Canadian municipalities, as well as key co-benefits, indicators, success factors and innovations.

The qualitative analysis of 322 plans, reports, and studies, and their associated completion reports, requires a systematic framework and standardized process. Key aspects of the process developed to code and analyse 286 of submitted projects are outlined below:

- SFU Vault, a secure server, was used to house the plans, reports and studies
- Nvivo qualitative software was used to develop a systematized coding architecture to identify and query relevant features
- Triangulation exercises were used to ensure consistency in coding by our team
- A lexicon of query terms was created for English and French coding (see Appendix 6)
- An Nvivo Guide outlining the coding procedures and providing solutions to common hurdles was developed to ensure standardized and replicable practices (see Appendix 7)

Importantly, it was found early in the coding process that the completion reports, in general, were not an effective tool for understanding the quality and extent of climate action in municipalities. The ACT team pivoted to coding primary data in the plans, which ensured a more robust qualitative analysis of outcomes, results and impacts. A Nvivo Guide and Lexicon of Query Terms were created to ensure that any forthcoming MCIP Plans, Studies, Projects, and Staff Grants can continue to be coded and analysed according to this same architecture.

Developing the qualitative architecture

Below we provide a high-level overview of the coding architecture developed and the key assumptions used. The initial formation of the coding architecture began with establishing how to capture results from the Adaptation Plans. The complex and contextual nature of adaptation planning provided a good starting place to identify key opportunities to develop coding consistency, not only within programs, but across programs. To do this, we identified eight climate hazards being addressed by municipalities across the country. This helped to identify regional variation of climate hazards across the country and common adaptation actions used to address eight hazard types. Based on these hazards we then sub-coded actions in three key risk areas, to ensure a level of detail was captured relating to the types of risks adaptation actions were addressing. We then coded any identified indicators to measure progress. For our purposes here, the identification of indicators was viewed as a proxy for the commitment to implement. The Nvivo coding structure for adaptation is as below:

- Adaptation Plans
 - Eight climate hazards: flooding, extreme weather, extreme temperature, sea level rise, geologic, forest fires, drought, and general climate change impacts (actions which did not specify specific hazards, and are targeted towards general awareness raising, communications, the formation partnerships, steering committees and working groups, etc.).
 - Three risk areas: infrastructure, populations, and eco and agri-systems
 - Indicators

A similar coding structure was applied to Mitigation Plans. Actions to reduce emissions from seven key emissions sectors were identified, as well as actions targeting cultural change towards emissions reducing behaviour and practices, such as climate change awareness building and engagement programs and activities. This helped to identify common mitigation strategies based on sectoral area. We then coded any identified indicators to measure progress. Again, we viewed this as a proxy for a commitment to implement. The coding structure for mitigation is as below:

- Mitigation Plans
 - Seven emissions sectors: buildings, transportation, infrastructure, energy systems, agriculture, cultural change, and waste
 - Indicators

The coding architecture from the Adaptation and Mitigation Plans was used to code adaptation and mitigation actions consistently across all MCIP Programs, including in areas such as asset management, capital projects, and operations. In some cases, both adaptation and mitigation actions were identified in the same plan; these situations were flagged as best practice, as outlined in the introduction above.

The varied deliverables in the Operational Studies, Feasibility Studies and Capital Projects programs could be framed as either adaptation or mitigation but did not necessarily result in actions. As such, consistent coding for adaptation and/or mitigation was applied (as outlined above). However, these deliverables were also sub-coded to help classify them according to five project types. The coding structure is as follows:

- Either adaptation or mitigation focus (or flagged for both)
 - Addressing climate hazards or emissions sector (or both)
 - Five project types: audit program, strategic plan/evaluation, guide/resource, program, or tool.

An additional goal was to capture key success factors, innovations, and best practices for all program types. This was done primarily using the completion reports. Coding answers to

questions such as those from the Plan Completion Reports below helped to identify areas of interest.

- Plans Q23. What were the key factors that allowed for the plan to be developed successfully and why?
- Plans Q25. Aside from the plan itself, did your work result in anything else that could be of use to other municipalities? If so, please briefly describe each item below.
Note: these could include a new policy, operating practice, model by-laws, a public consultation manual, checklists, a measurement tool to assess progress in adapting to the impacts of climate change and/or reducing GHG emissions, etc.

These self-assessment reports were coded based on four key areas relating to key success factors, challenges & barriers, innovations, and use of co-benefits.

More detailed sub-coding helped to drill down into eight key areas and types of innovation.

- Innovation
 - Five general areas: engagement, next steps, outcomes, partnerships, and process,
 - Integrated climate action, where both adaptation and mitigation were addressed as co-benefits, or as an innovative low carbon resilience approach,
 - The cohort experience for CAPG and T2050, and
 - Best practice approaches such as the use of equity and nature-based solutions.

Across all program types, 'flag codes' were used to identify explicit examples of innovative project methodologies or best practices.

Co-benefits were also coded across all programs. The identification and linking of co-benefits of climate actions with other municipal priorities and sustainability goals is, for our purposes here, viewed as a proxy for the commitment to implementation. Similar to using indicators as a proxy to implement (as noted above), connecting the co-benefits of climate actions to ongoing work and mandates promotes movement toward implementation. It was therefore important to develop a sub-coding structure to identify three uses of co-benefits, (e.g. not referenced, referenced or applied), and where identified, and specific co-benefit themes identified (e.g. cost savings, health, biodiversity, etc.) (see Table 2 below).

- Co-benefits
 - Non-existent (no reference to co-benefits),
 - Referenced (the term co-benefit was found, or social, environmental, economic advantages were referenced, but with very little analysis or discussion), and

- Applied (co-benefits were identified throughout the plan/reporting).

Table 2: Seventeen Co-benefit Themes Identified as Advantages of Municipal Climate Action

Air Quality	Human Health
Biodiversity	Job Creation
Carbon Storage	Livability
Clean Energy	Pollutant Capture
Congestion	Property Value
Cost Savings	Reduce Waste
Equity	Water Efficiency
Food Security	Water Quality
Green Spaces	

Adaptation-focused programs were coded first, such as the Climate and Asset Management Network (CAMN) and Climate Adaptation Partner Grants (CAPG). The Studies, Plans and Grants were coded based on their adaptation or mitigation emphasis. Additional codes were created depending on key aspects of each program type (see Lexicon of Query Terms in Appendix 6).

3. Updating the Climate Resilience Reporting Framework

One of the mechanisms used to gauge the impact of MCIP funding is the Performance Measurement Framework (PMF). The PMF was developed to monitor the performance and outcomes of the MCIP program. Based on the outcomes of the analysis to date, the Climate Resilience Reporting Framework (CRRF), comprised of a 3-tiered evaluative framework, has been updated to reflect key outcomes and indicators of success in municipal climate action, municipal process, and innovation, across the eight program types (see Appendix 1). Since it is too early in the climate action planning process to evaluate climate-related results or outcomes, such as reduced risk of flooding (hectares protected) or reductions in transportation emissions (CO₂eq tonnes/year), the indicators come from real and projected common actions (e.g., climate hazards and emissions sectors), changed processes or innovations, and key indicators and co-benefits, which serve to tether climate action to results. These are used as proxies for projected outcomes over time.

This evaluative framework is as follows:

Tier 3: Impacts	Aims to combine the information gathered in Tiers 1&2 to identify the overall impact of MCIP's eight funding programs, including key success factors and challenges for climate action in funded municipalities across Canada.
Tier 2: Results	Identify projected results of Tier 1 actions on policy, planning, business practices and decision processes, including key process innovations or best practices, that suggest movement toward implementation.
Tier 1: Adaptation & Mitigation Actions	Look to understand key climate adaptation and mitigation actions developed by municipalities. The focus is on common climate actions being undertaken in communities, based on hazards for adaptation and sectors for mitigation.

4. Plans

Adaptation Plans

The purpose of this analysis is to provide an understanding of the common types of adaptation planning approaches and key actions being used in municipalities across Canada. Key adaptation actions across eight main climate hazards are examined, as well as the use of co-benefits to tether climate adaptation to broader community goals, and key indicators to measure adaptation success.

Table 3: Adaptation Plans Completed to Date

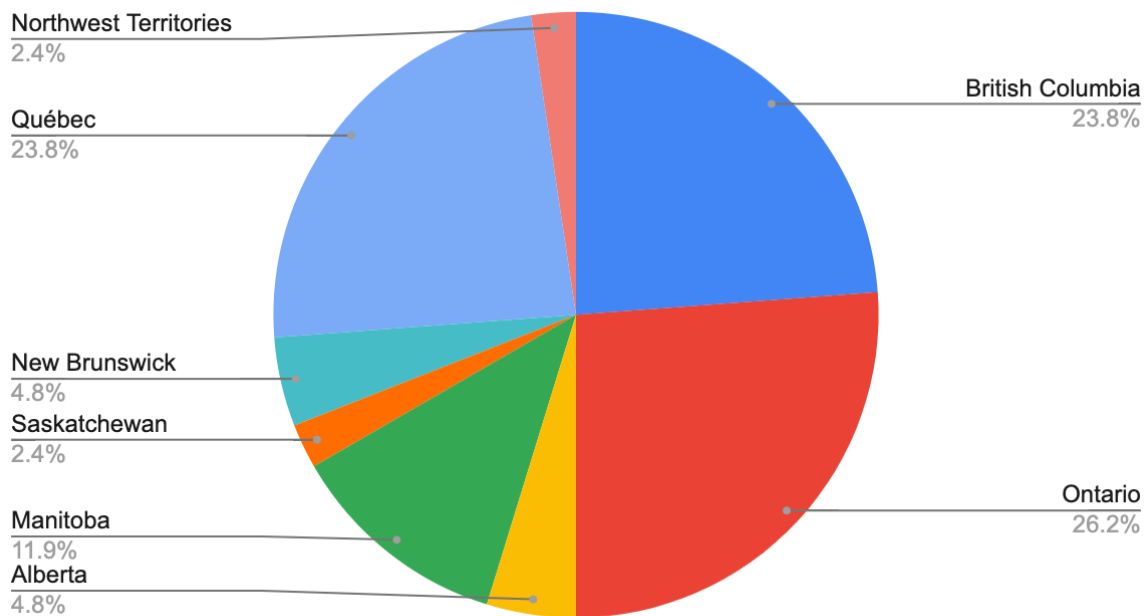
MCIP Deliverables		Total expected	No. Submitted	No. Coded & Analysed	No. of CR Submitted	No. of CR Coded & Analysed	Proportion Deliverables Analysed	Proportion CR Analysed
Adaptation Plans	English	32	32	32	30	30	97%	97%
	French	10	10	9	10	8		
Total		42	42	41	40	38		

To date, 32 English adaptation plans and 30 completion reports, and nine French adaptation plans and completion reports, have been coded and analysed, representing 97% (see Table 3) of the total adaptation plans.² This means that 42 projects have been submitted, and 41 have been coded and analysed.

² Only one plan - from MRC de la Nouvelle-Beauce (QC) - was not included in the submission of the project.

The regional distribution of MCIP-funded adaptation plans ranged from 26% (11) from Ontario, 24% (10) from BC, 24% (10) from Québec, 5% (2) from New Brunswick, 2% (1) from Saskatchewan, and 2% (1) from Northwest Territories (see Figure 1).

Figure 1: Provincial Distribution of Adaptation Plans (English and French)



Four French plans were prepared by the same organisation, Nature-Action Québec, and were landscaping/hardscaping plans geared towards actions that adapt to heavy rain events and the urban heat island effect. These plans were focused on nature-based solutions as a distinct form of adaptation planning.

A total of seven adaptation plans did not include actions. See table 4 below.

Table 4: Adaptation Plans with No Actions

Municipality	Province	Deliverable
District of North Vancouver	BC	Sea Level Rise Assessment & Adaptive Management Strategy with an adaptation measures toolkit
Town of Morris	MB	LiDAR application for Climate Adaptation in the Red River Basin in Manitoba
City of Winnipeg	MB	LiDAR application for Climate Adaptation in the Red River Basin in Manitoba

Rural Municipality of Hanover	MB	LiDAR application for Climate Adaptation in the Red River Basin in Manitoba
City of Saint John	NB	Vulnerability Assessment Methodology
Ville de Victoriaville	QC	Stormwater plan (includes recommendations but no actions)
Régie Intermunicipale du Lac Massawippi	QC	Adaptation plan that focused on three case studies showcasing a normative governance model to adaptation

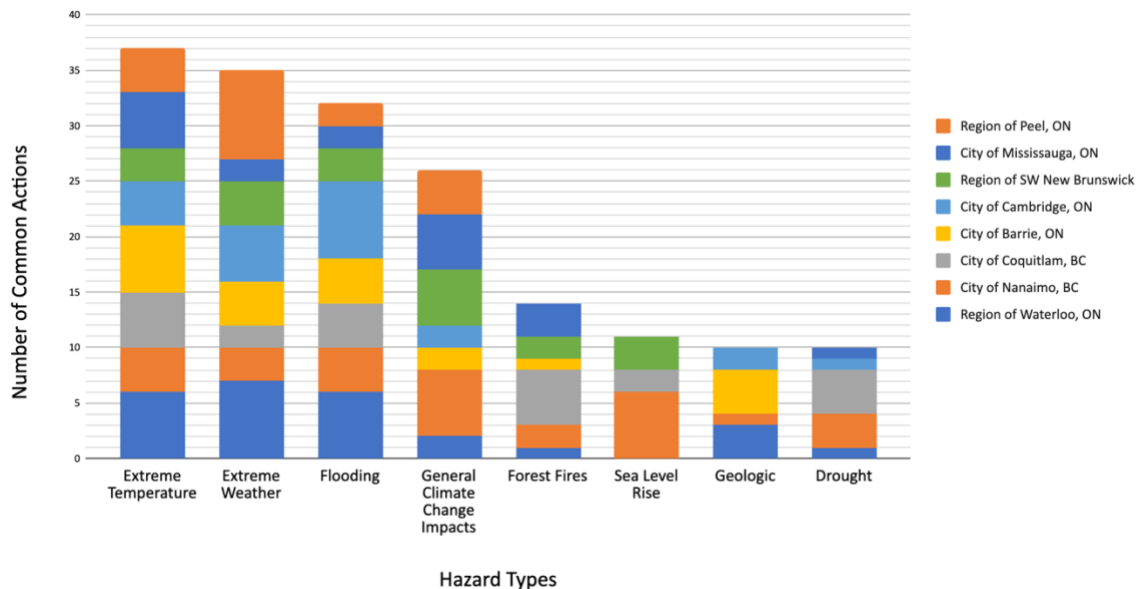
4.1 Common Adaptation Actions Based on Hazard Types

In the 41 adaptation plans that were analysed, a total of 81 key actions were identified across the seven climate hazards and general climate change actions. Actions were considered common if they were identified in three or more municipal plans. Basing the adaptation analysis on the common hazards helps to compare common climate hazards that municipalities are confronting and the adaptation actions that are applied most frequently to address them. It also showcases the regional distribution of hazards, for instance, which are most common to municipalities across Canada. For instance, extreme temperature, flooding, and extreme weather were the three main climate hazards addressed by the majority of MCIP municipalities across all regions; sea level rise was regionally determined among coastal communities.

Seven climate hazards were used to code the adaptation plans: extreme temperature, extreme weather, drought, forest fires, geologic hazards (landslides, erosion, etc.), flooding (inland and coastal), and sea level rise, as well as general climate change actions. Where particular hazards were not being addressed, a code for general actions was used (e.g. awareness-building, engagement, etc.).

Some municipalities addressed specific hazards while others (ten of the 41) performed a more comprehensive climate change vulnerability and risk assessment. Figure 2 below highlights the eight municipalities with the highest number of common adaptation actions across each hazard type; and is indicative of comprehensiveness in planning, including the use of best available climate projections. The City of Waterloo, ON, addressed comprehensive adaptation actions across six of seven hazard types, and had the greatest number of common adaptation actions.

Figure 2: Eight Municipalities with the Most Common Adaptation Actions and Comprehensive Actions across Hazard Types



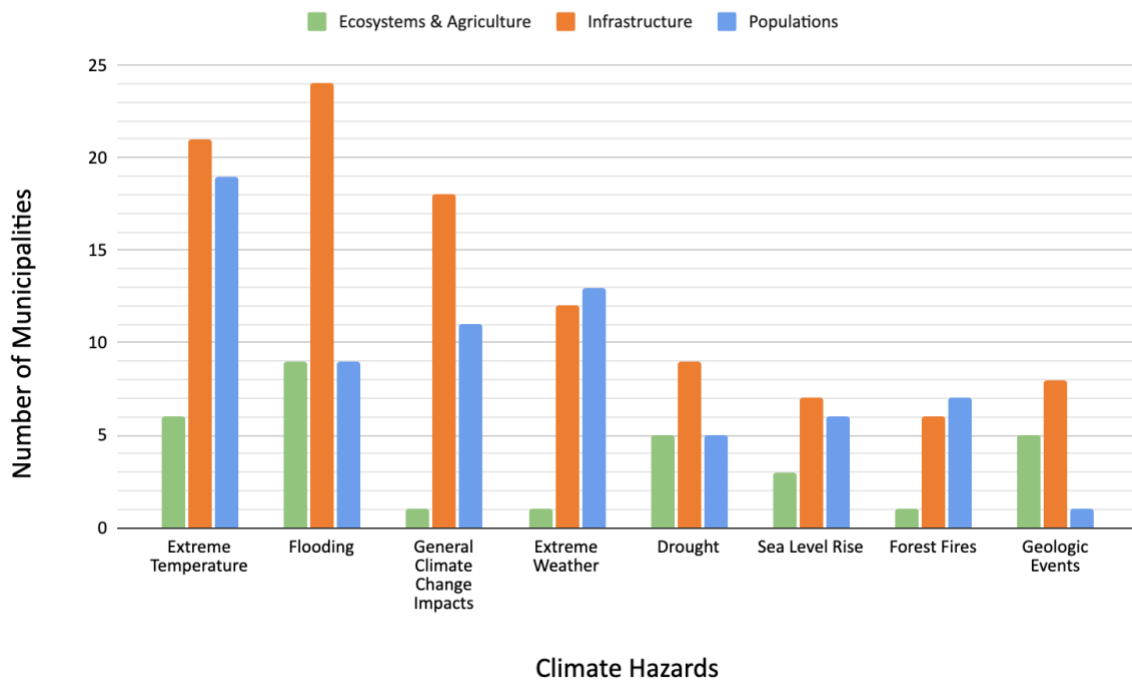
Breaking common adaptation actions down further into three risk areas helps to better understand the priority areas of action in municipalities. Common adaptation actions were broken into three vulnerability and risk sub-codes:

1. **Ecosystems and agricultural actions**, such as protection, restoration, or conservation of natural spaces and/or biodiversity, updates to policies, and/or changing/improving agricultural practices.
2. **Infrastructure and service delivery actions**, such as new and existing building retrofits, updates to public drainage infrastructure and/or policies and standards.
3. **Vulnerable population actions**, such as public engagement, mobility to clean air/cooling facilities, and/or equity actions that build capacity among vulnerable populations.

- Adapting assets to projected flooding and extreme temperature (heat) risks is a priority for preventing disruption to critical services and strengthening asset investments into the future.
- To a lesser degree, vulnerable populations are being addressed on a hazard-by-hazard basis, with the emphasis on flooding and extreme weather.
- Ecosystems and agricultural actions were not as common, given that they were not the focus of MCIP funding programs, and also likely due to governance issues around regional and provincial jurisdictions, respectively.

Figure 3 below shows the distribution of common actions based on risk areas, with infrastructure as the most common area for adaptation action.

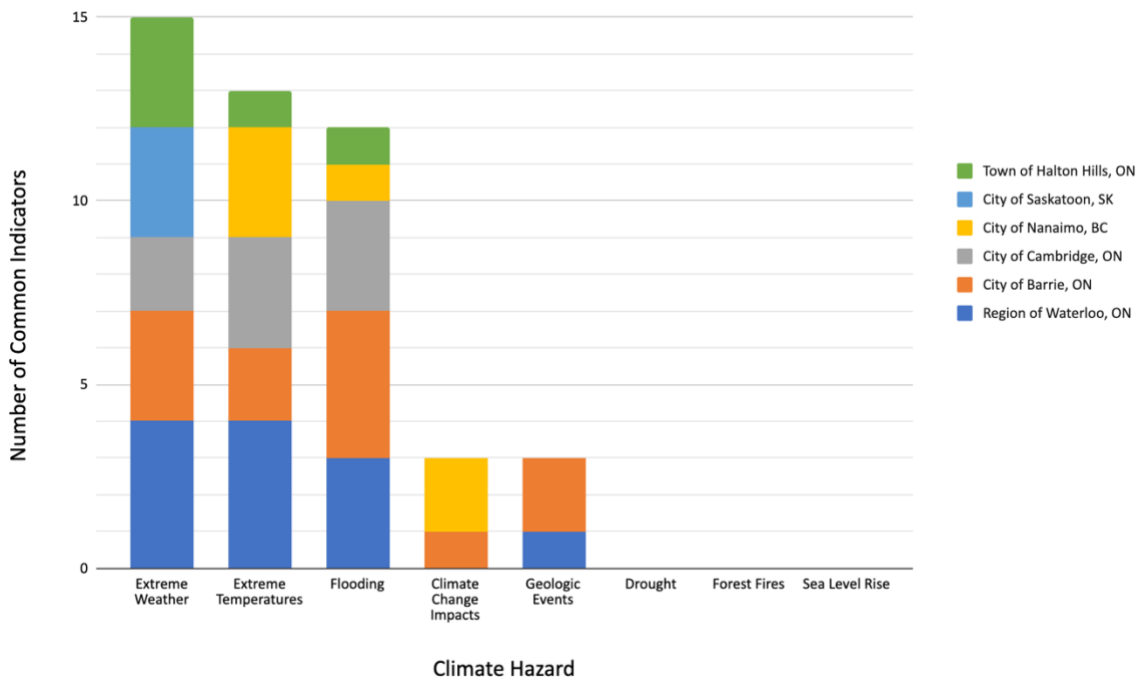
Figure 3: Number of Municipalities Applying Common Adaptation Actions Across Three Key Risk Areas



4.2 Summary of Common Adaptation Indicators

Of the 41 adaptation plans, 36% or 15 included indicators. Nine adaptation plans were identified with common indicators (used by two or more municipalities) across climate hazard types, suggesting some common approaches for measuring adaptation progress. Most common indicators were aimed at measuring progress on minimizing impacts of extreme weather, extreme temperature, and flooding, which are the hazards with the most amount of common actions addressing them. This is consistent with the findings from common adaptation actions. There were no common indicators for sea level rise and forest fires due to the lack of municipalities with indicators measuring progress on or addressing these hazards. Figure 4 highlights the six municipalities with the greatest number of common mitigation indicators across each sector.

Figure 4. Municipalities with the Greatest Number of Common Indicators



Twenty-three common indicators (found in two or more adaptation plans) were identified across each hazard category. For our purposes here, common indicators in Table 5 below are proxies for their municipalities’ adaptation priorities and goals, emphasizing intentions to monitor progress on adaptation once implemented³.

Table 5: Key Indicators Compiled for each Climate Hazard

1. General Climate Change Impact					
1. a) Infrastructure that has been built for resiliency or assessed for climate risk, public and	1. b) Implementation of climate projections/ data in plans, strategies or				

³ The full list of actions and indicators are not seen in the analysis; the intent was to capture the most common actions and indicators across the plans as a means to provide a snapshot of data that is most usable and transferable to municipalities across Canada.

private (% or #)	regulations (% or #)				
2. Drought					
2. a) Water consumption (L)	2. b) Number of pipes with detected/rep aired leaks (#)				
3. Extreme Weather					
3. a) Facilities with back-up power (% or #)	3. b) Communication and engagement with public on weather events and information	3. c) Service Interruptions due to extreme weather events (#)	3. d) Cost of upgrades, repairs, damage to infrastructure (\$)	3. e) Emergency management plans (#)	
4. Flooding					
4. a) Upgrades of existing buildings to accommodate GI/LID or retrofit with new building code standards, public and private (#)	4. b) New buildings that incorporate GI/LID or revised building code standards, public and private (#)	4. c) Projects that have incorporated management of lands and water to address flooding and watershed management (#)	4. d) Emergency management incorporated in business, commercial or municipal buildings (#)	4. e) Green space or tree coverage in community (%)	
5. Geologic Events					

5. a) Existing building retrofitted or upgraded with GI (# or %)	5. b) Sediment control or erosion deficiencies corrected (#)				
6. Extreme Temperatures					
6. a) Use of vegetation in urban areas or new developments (# or %)	6. b) Availability/use of cooling/warming centres (#)	6. c) Air quality index/rating and health reports (#)	6. d) Public engagement in workshops, check ins or communication of information	6. e) Housing that has been rehabilitated or upgraded for extreme climate (#)	6. f) Residential, commercial, institutional, city owned buildings that have implemented green infrastructure (#)
No common indicators were found for sea level rise or forest fire actions.					

The analysis found that 19 of the 81 common actions, or 23%, had associated common indicators (see Appendix 2). How the MCIP-funded adaptation plans move into implementation will be the real test of outcomes and results. It is important to note that municipalities with intention to implement their plans will be looking for funding and budget-sharing opportunities to ensure this next step is taken.

4.3 Identifying the Strategic Use of Co-Benefits

A high-level review was undertaken to determine whether and how co-benefits are used in communicating the broader benefits and advantages of adaptation action. All municipal adaptation plans were coded and analysed for their use of co-benefits and the types of co-benefits being identified. Table 6 below breaks down municipalities' use of co-benefits based on whether they did not use co-benefits; referenced that co-benefits arise from their adaptation plan but did not apply them to actions; or explicitly identified and applied co-benefits in their adaptation plan. Of note, a small number of adaptation plans referred to additional "economic", "environmental", "social", and "community" benefits, rather than

the term co-benefits. This terminology was captured and added to the lexicon of query terms to ensure triple-bottom line advantages were identified.

Twenty-three out of the 41, or 56%, of adaptation plans included co-benefits explicitly or by reference. Of those, 12 referenced the concept of co-benefits in the executive summary or introductory section of the plan but did not go into further detail, while the remaining eleven used specific co-benefits to support their actions. The regional distribution of those that explicitly applied co-benefits included six from Ontario, four from BC, and one from Saskatchewan. Eighteen plans did not have any references to or acknowledgement of co-benefits. Despite accounting for a diverse French language lexicon, references to co-benefits were found in only one of the nine French adaptation plans that were analysed, which developed its plan with a triple bottom line framing.

Table 6: Breakdown of Municipalities that Do Not Use, Only Reference, or Apply Co-Benefits in their Plans

Do Not Use Co-Benefits (18)	Only Reference Co-Benefits (12)	Explicitly Use Co-Benefits (11)
Town of Stony Plain	City of Nanaimo	Region of Waterloo
Municipality of Rhineland	City of Waterloo	City of Cambridge
Region of Southwestern New Brunswick	Town of Virden	City of Campbell River
Town of Golden	Town of Carleton Place	City of Toronto
Rural Municipality of Springfield	City of Edmonton	City of Barrie
City of Coquitlam	City of Vancouver	City of Saskatoon
Northwest Territories Association of Communities	Town of Halton Hills	Region of Peel
Surrey (PIER foreshore report)	Nottawasaga Valley Conservation Authority	City of Surrey (Coastal Flood Adaptation Strategy)
Ville de Beloeil	Ville de Victoriaville	District of North Vancouver
Ville de St. Zotique	Town of Morris	Township of Langley

Ville de Varennes	City of Winnipeg	Rural Municipality of Hanover
Ville de Saint-Jean-sur-Richelieu	Ville de Victoriaville	
Ville de L'Islet		
City of Surrey (Coastal Flood Adaptation Approach report)		
Régie Intermunicipale du Lac Massawippi		
Ville de Plessisville		
Ville de Gatineau		
City of Saint John		

4.4 Equity Considerations in Adaptation Plans

The inclusion of equity considerations in adaptation planning is of critical importance to address existing inequities and the disproportionate impacts of climate change on already vulnerable populations. Best practices for promoting equity in climate assessments include compiling and reporting vulnerability and equity data, nurturing relationships with and including equity-seeking groups in the community to inform action, as well as evaluating program design and outcomes to avoid furthering historic inequities. Vulnerable populations such as elderly, low-income, marginalized, and Indigenous residents, as well as those with limited access to power, already face disproportionate risks under current and projected climate changes. For instance, those without appropriate housing for extreme weather and smoke from wildfires will be severely impacted by climate change compared to those with appropriate housing.

Five adaptation plans stood out for their integration of equity considerations.

- **Supplementing the plan with a community engagement and mapping of vulnerable populations (City of Vancouver, BC).** The City's 2018 Climate Adaptation Strategy Update is supplemented by the Climate Risk – Engaging Vulnerable Populations Project in partnership with Evergreen. The project gathers grassroots input from groups most vulnerable to climate impacts, including seniors and Downtown Eastside residents, to

begin to understand and reduce their vulnerability to climate change impacts related to extreme heat and smoke. The project includes a mapping component of existing low-income neighbourhoods and other vulnerable populations to better anticipate the disproportionate impacts of climate change (such as the urban heat island effect) on already-vulnerable citizens, and is targeting actions and communications accordingly.

- **Using an equity lens tool to identify barriers for vulnerable communities and equity-seeking groups, and incorporate equity considerations into the plan development process (City of Toronto, ON).** The City's Resilience Plan uses an equity lens to help staff identify existing community vulnerabilities and key barriers to adaptive capacity, weaving equity considerations into climate action planning.
- **Specific actions for vulnerable populations in the face of extreme temperature or weather events (Region of Waterloo, ON, City of Waterloo, ON, Southwest New Brunswick, NB, City of Vancouver, BC, City of Coquitlam, BC, City of Mississauga, County of Huron, ON, Town of Halton Hills, ON, City of Toronto, ON, Region of Peel, ON, Ville de Plessisville, QC, and Ville de Beaconsfield, QC).** These 14 municipalities included special consideration of vulnerable populations in the actions of their adaptation plans relating to emergency preparedness against extreme temperature and weather events.
- **Equity is included as a guiding principle and in the pros and cons assessment of different approaches (District of North Vancouver, BC).** The District of North Vancouver's Sea Level Rise Risk Assessment and Adaptive Management Strategy included equity in one of its guiding principles, with an effort to support vulnerable groups. The plan discusses the pros and cons of four high-level approaches to sea level rise (resist, accommodate, avoid or retreat, and advance), and equity concerns surrounding financial constraints feature in the discussion of these approaches.

4.5 Best Practice in Adaptation Planning

It is important to understand how municipalities are addressing projected climate impacts, key vulnerabilities and risks, as well as the common actions noted above. The types of innovative processes, approaches and best practices already being applied help to better understand opportunities for more advanced adaptation planning and outcomes moving forward. To identify adaptation planning best practices, we investigated four key areas, related to: 1) climate projection data use and sources, 2) comprehensiveness of hazard and

risk analysis, common actions, indicators, and co-benefits, 3) integrated mitigation and adaptation planning, and 4) innovative process design or strategies.

In adaptation planning, comprehensive and best available climate data and impact analysis means using scenario analysis and climate modelling to provide the comprehensive data necessary to back cast and prioritize adaptation actions. These comprehensive data and analysis approaches were used by the Town of Halton Hills (ON), City of Coquitlam (BC) and the Region of Waterloo (ON).⁴

Comprehensive assessments of vulnerability and risks include existing vulnerabilities and projected impacts and risks to infrastructure, vulnerable populations and sensitive ecosystems, including agri-systems. A comprehensive evaluation of vulnerabilities and risks was performed by the Region of Waterloo (ON), City of Coquitlam (BC), and Town of Halton Hills (ON), helping them to rank a range of priorities.

Some best practice highlights from the mitigation plans are:

- The Cities of Toronto (ON) and Vancouver (BC), which included an equity lens in their adaptation and resilience planning.
- The Region of Waterloo (ON), City of Barrie (ON), City of Mississauga (ON), and Town of Halton Hills (ON) provided a combination of actions, co-benefits, and indicators within their plans.
- The City of Mississauga (ON), Town of Halton Hills (ON) and Township of Langley (BC) used an integrated and systemic approach to develop their plans, which combined adaptation and mitigation planning.⁵

Seven municipalities were identified as applying best practice approaches in their adaptation plans (see Table 7 below).

Table 7: Best Practices in Adaptation Planning

⁴ Town of Halton Hills (ON): the study, done by a consultant, modelled projections to 2100 using three scenarios. City of Coquitlam (BC): modelled projections for active decrease in emissions and passive scenarios (business-as-usual) to 2050s and 2080s. Region of Waterloo (ON): The Interdisciplinary Centre on Climate Change (IC3) at University of Waterloo put a report together that used the three IPCC RCP scenarios (2.6, 4.5 and 8.5) using 22 climate models plus weather data from the region.

⁵ The City of Mississauga (ON) addressed the need to reduce risk and emissions as part of their plan development. The Town of Halton Hills (ON) explicitly used an LCR approach, connecting risk and emissions reduction strategies with other co-benefit goals.

Municipality	Plan Type	Best Practice Examples
Region of Waterloo (ON)	Municipality Adaptation Plan	<ul style="list-style-type: none"> ● Uses GHG emission projections with multiple scenarios and models (which will affect level of adaptation response) ● Extensively includes climate change impacts on vulnerable populations (Guiding Principle #1 + integration throughout actions) ● Emphasizes long-term sustainability and co-benefits (Guiding Principle #2) ● Provides good layout and detailing of actions (objectives, impact statements, municipality suggestions, current practices, potential partners, next steps, outcomes, and measurements for each action)
City of Barrie (ON)	Climate Change Adaptation Strategy	<ul style="list-style-type: none"> ● Created Action Specific Action Plans (ASAPs), a gold standard among initial plans (outlines objectives, action description, rationale, supporting actions, potential partners/resources, and associated plans and strategies). ● Effectively links actions to existing plans, strategies, and work. ● Provides clear set of indicators at the action level. ● Provides clear level of prioritization and identifies “Quick Wins” to aid in implementation and next steps. ● “People’s Choice” indications help senior leadership understand the level of support needed for each action. ● Cross Cutting Actions section focuses on mainstreaming and integrating the plan into other aspects of the municipality (people, plans, and processes), which makes the plan more relevant and effective. ● Other action theme areas are comprehensive and innovative (local business and tourism and public health).

City of Waterloo (ON)	Corporate Climate Change Plan	<ul style="list-style-type: none"> ● Creates effective outcomes-oriented Goal Statements, as opposed to using action theme categories. ● Facilitates internal collaboration and provides outcome clarity. ● Assigns responsibilities, roles, supporting documents, current practices, timing, duration, and resources needed.
City of Mississauga (ON)	Climate Change Action Plan	<ul style="list-style-type: none"> ● Specifies mitigation and adaptation goals, which is a low carbon resilience best practice approach. ● Effectively maps the policy ecosystem by specifying the Policy Guidance, Existing Plans, and Future Plans relevant to the plan. ● Uses Action Pathways to categorize actions in an innovative way. ● Makes the linkage between actions and whether they are applicable to adaptation goals, mitigation goals, or both. ● Emphasizes implementation with each supporting action including characterization, cost, timeline, status, and roles/responsibilities.
Town of Halton Hills (ON)	Climate Change Adaptation Plan	<ul style="list-style-type: none"> ● Implements adaptation plans, but includes some actions that address both mitigation and adaptation. ● Accounts for actions and objectives that address vulnerable populations, which are more impacted by climate change related hazards. ● Part of an umbrella framework for low carbon resilience, tying it into the Region’s overarching climate change plans. ● Provides a three-tiered approach to apply the plan, assess, encourage, and regulate. ● Uses three components to help guide the framework and actions, historical climate analysis, projection of climate conditions to 2100 and assessment of historical and future climate ● Identifies cross cutting goals and actions throughout the plan that apply to more than one of the goals and implications beyond the topic area.

		<ul style="list-style-type: none"> ● Provides for identification of potential co-benefits and interconnection between goals for a deeper examination of climate change impacts and actions. ● Scheduled to be updated every five years. ● Contains a comprehensive list of indicators for each goal section of the plan in the Appendix.
City of Coquitlam (BC)	Climate Adaptation Strategic Plan	<ul style="list-style-type: none"> ● Uses active and passive climate scenarios to project future climate and weather events for the city. ● Includes vulnerability rankings for climate impacts on the city, which is used to evaluate severity of the plan's main components, people, economy, and environment. ● Consulted different departments to understand concerns from each to form a gap analysis that informed actions.
City of Toronto (ON)	Toronto Resilience Strategy	<ul style="list-style-type: none"> ● Used a previously developed Equity Lens to guide staff in equity analysis, and the Equity Lens is suggested as a tool to achieve plan goals and actions. ● Incorporates resilience in asset management, including the use of natural assets, and development and land use planning (which can strategically guide future community development with resilience intertwined). ● Emphasizes the inclusion of equity through decision making processes to address vulnerable people/populations. ● Identifies leaders/roles responsible for addressing actions.

Mitigation Plans

To date, 40 out of a total of 43 mitigation plans (or 59 out of 60 total deliverables) and their associated completion reports have been coded and analysed, amounting to 93%. MRC de La Côte-de-Gaspé (QC) was the only municipality which did not submit a mitigation plan, and Ville de Beaconsfield (QC) submitted an adaptation plan along with their mitigation plan. Thirty-three (of 40 total deliverables) were from the English data set, and eight (of 16 total deliverables) from the French data set. The number of deliverables (59) was higher

than the number of projects funded (43) due to three MCIP-funded joint procurement projects that developed multiple municipal plans through one process.

Three contractors delivered cohort-based approaches which included a total of 28 municipalities in Saskatchewan (6), Manitoba (6), New Brunswick (9), and Ontario (7). Each contractor delivered a completion report. The completion reports did not have questions about the cohort experience.

- Eco-West Canada created Climate Change Local Action Plans (CCLAP) for six municipalities in Saskatchewan (English) and six municipalities in Manitoba (French). The plans were structured in the same way, and the actions were very similar, although not identical.
 - The Eco-West completion report had one comment about the cohort model allowing the municipalities to more easily refer to one another when establishing projects and reduction targets.
- The Association Francophone des Municipalités du Nouveau-Brunswick (AFMNB) produced French mitigation plans for nine municipalities across the province.
- The North Simcoe Community Futures Development Corporation led a cohort of seven municipalities through the Sustainability Severn Sound Regional Program in Ontario. This joint process produced a Local Action Plan with a list of 18 recommended actions to be used by all the municipalities in the creation of their own actions. This plan was counted as one, because only one document was produced.
 - The Severn Sound completion report revealed that making use of an existing collaborative built on existing capacity, giving communities the resources to make climate change a priority, and spurring joint action. This cohort process enhanced regional collaboration, resource sharing, and regional innovation potential (e.g., transportation, land-uses, etc.) and was particularly useful to small, resource-strapped rural communities.

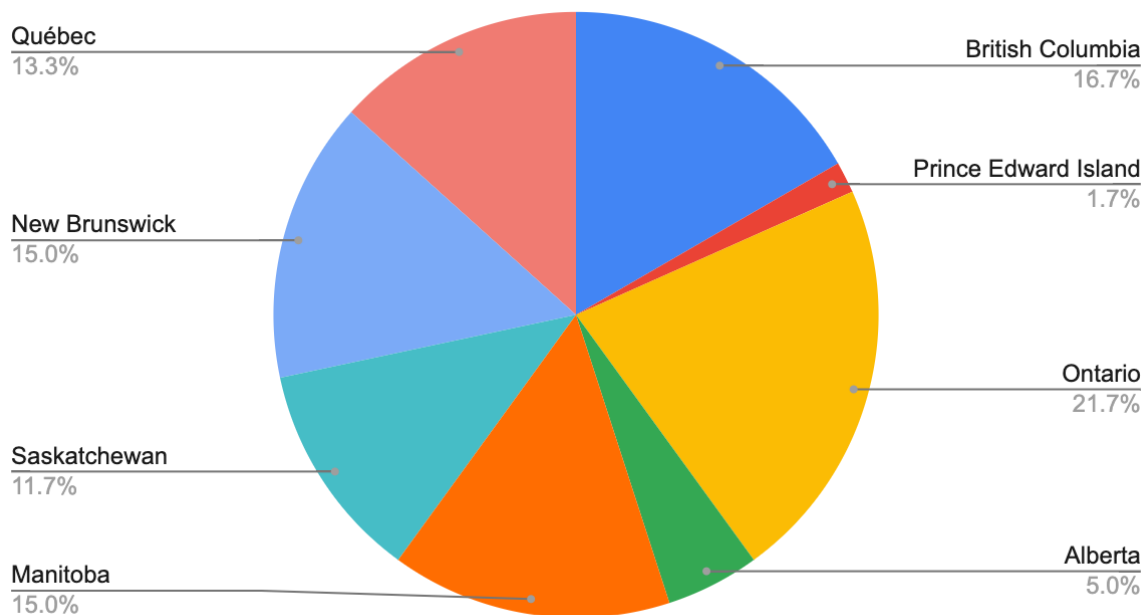
The total number of mitigation plans coded and analysed is 59. For the purposes of the analysis, this number will be used when discussing the results of the analysis, despite the MCIP records showing a total of 40.

Table 8: Mitigation Plans Completed to Date

MCIP Deliverables		Total expected ⁶	No. Submitted ⁷	No. Coded & Analysed	No. of CR Submitted	No. of CR Coded & Analysed	Proportion Deliverables Analysed	Proportion CR Analysed
Mitigation Plans	English	32	32 (43)	32 (43)	32	32	93%	93%
	French	11	9 (16)	8 (16)	9	8		
Total		43	41 (59)	40 (59)	42	41		

The regional distribution of the MCIP-funded mitigation plans to date were primarily from Ontario (13), at 22%, followed by BC (10) at 17%, New Brunswick (9) at 15%, Manitoba (9) at 15%, Québec (8) at 13%, Saskatchewan (7) at 12%, and Alberta (3) at 5%. Figure 5 below shows the regional distribution of the 59 total deliverables. There were no plans funded in the Territories.

Figure 5: Provincial Distribution of Mitigation Plans (English and French)⁸



A total of six mitigation plans did not include actions. See table 9 below.

⁶ MCIP records say 32E and 10F but Eco-West Manitoba (Municipality of Lorne) was noted as French although it was English.

⁷ Distinction between number of projects funded vs number of plans generated through joint procurement.

⁸ The Eco-West plans from Manitoba and Saskatchewan were submitted as a single cohort with six plans each, and the AFMNB plans submitted as a cohort from New Brunswick with nine plans raised the mitigation plan submissions to 59.

Table 9: Mitigation Plans with No Actions

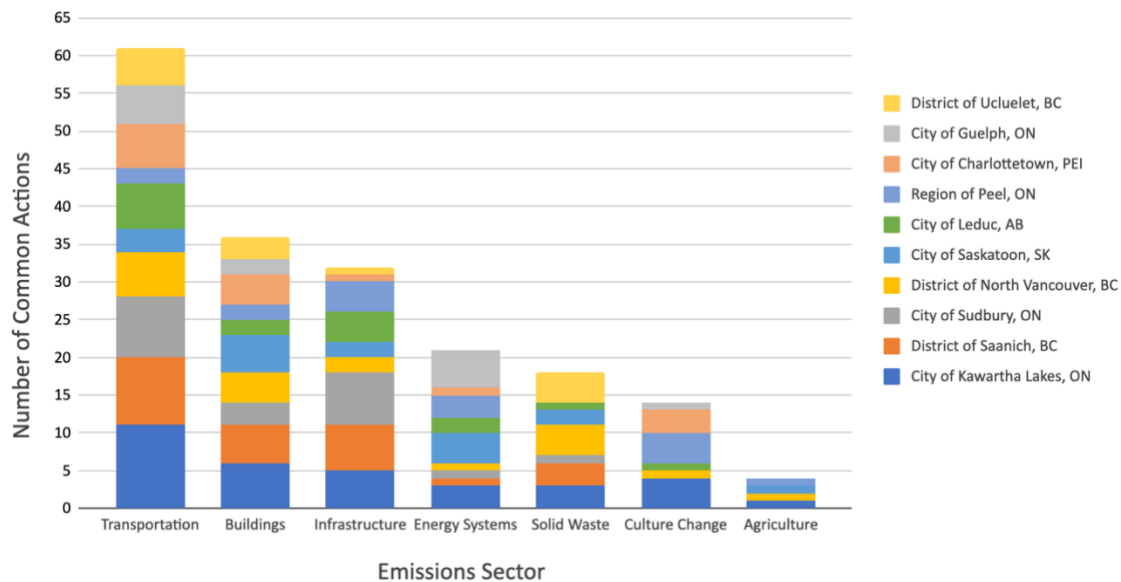
Municipality	Province	Deliverable
Town of Milton	ON	Milton Green Innovation Plan
Township of Mulmur	ON	Community Energy Planning
City of Winnipeg	MB	Westport Regional Transit Service and Hub Feasibility Study and Plan
Ville de Candiac	QC	Plan de transport et d'aménagement urbain (project-specific feasibility study for active transportation or transit)
Conseil régional de l'environnement et du développement durable de l'Outaouais (CREDDO)	QC	Plan stratégique en vue de l'optimisation de l'offre de transport en commun des milieux rural et semi-rural en Outaouais (project-specific feasibility study for active transportation or transit)
ÉcoMalartic	QC	Conception d'un plan de déplacements actifs pour la Ville de Malartic (project-specific feasibility study for active transportation or transit)

4.6 Common Mitigation Actions Based on Sectors

In the 59 mitigation plans analysed, a total of 64 key actions were identified across seven emissions sectors. Actions were considered key if they were found across at least three plans. The sectors are: buildings, transportation, energy systems, infrastructure, agriculture, solid waste, and cultural change. Emphasizing common actions emphasizes feasible and transferable mitigation actions that can be used in other municipalities across Canada (see Appendix 3 for detailed list of actions). It also showcases the primary sectors in which municipalities identify emissions reductions opportunities.

Figure 6 below showcases the top ten municipalities with the greatest number of common mitigation actions and their distribution across each sector. The City of Kawartha Lakes (ON), District of Saanich (BC), and City of Sudbury (ON) are the top three municipalities with the greatest number of key actions across all emissions sector categories. Most mitigation actions across these and other municipalities address the transportation, buildings, and infrastructure sectors.

Figure 6: Ten Municipalities with the Most Common Mitigation Actions and Comprehensive Actions across Emissions Sectors

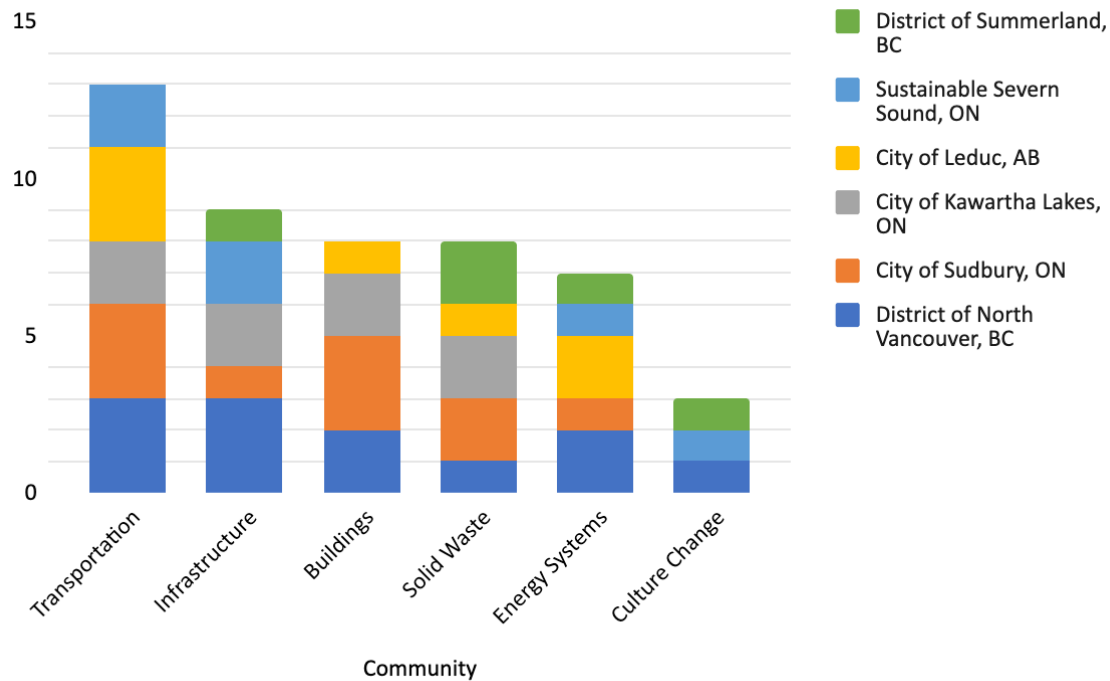


4.7 Summary of Common Mitigation Indicators

Mitigation actions and indicators tend to be quantifiable measures, unlike those related to adaptation. Mitigation actions aim to reduce emissions, and therefore tracking and measuring tonnes of CO₂e reduced per year creates a high level of coherence across actions and sectors. That said, there are a few reasons why common actions may not necessarily link directly to the common indicators in this analysis, ranging from not being common (more than two municipalities) or where indicators are for specialized areas (e.g., active transportation).

Of the 59 mitigation plans queried for this analysis, 23% or 17 included indicators. No French plans included indicators. Thirteen mitigation plans had common indicators (used by two or more municipalities) across emissions sectors, suggesting some common approaches for measuring mitigation progress. Consistent with the previous findings from the mitigation actions, most key indicators relate to transportation, buildings, and infrastructure actions, as well as solid waste. Figure 7 highlights the six municipalities with the greatest number of common mitigation indicators across each sector.

Figure 7: Municipalities with the Greatest Number of Common Indicators



Twenty-six common indicators (in two or more mitigation plans) were found and analyzed across the seven emissions sectors⁹ (see Table 10 below). Broad emissions reduction indicators such as “Total GHG Emissions (tonnes/year)” were seen across almost all sectors, while more granular or sector-specific indicators were more refined to context.

Table 10: Common Indicators Compiled for each Mitigation Sector

1. Agriculture					
1. a) Garden plots built or rented (#)					
2. Buildings					
2. a) Increase in density of	2. b) Reduction in	2. c) Building retrofits to	2. d) Costs saved from	2. e) Energy consumption	

⁹ The full list of actions and indicators are not seen in the analysis; the intent was to capture the most common actions and indicators across the plans as a means to provide a snapshot of data that is most usable and transferable to municipalities across Canada.

buildings (per hectare)	GHG emissions from buildings (tonnes CO2e/year)	improve energy performance (m2)	energy performance (\$)	of municipal buildings (KWh/m3)	
3. Culture Change					
3. a) Awareness / Incentive program participation (#)	3. b) Staff trained in climate change measures (#)				
4. Energy Systems					
4. a) Renewable energy generated / installed / consumed (kWh/year)	4. b) Total GHG emissions (tonnes Co2e/year)	4. c) Total electricity consumption (MWh/year)			
5. Infrastructure					
5. a) Tree canopy coverage (%)	5. b) Trees planted (#)	5. c) Reduction in GHG's (tonnes CO2e/year)	5. d) EV charging stations (#)	5. e) Amount of LID projects in the municipality (#)	
6. Solid Waste					
6. a) Waste diversion rate, residential/municipal (% or	6. b) Total GHG emissions (tonnes	6. c) Amount of waste to landfill (tonnes)	6. d) Organics diverted from landfill (%)		

tonnage/year)	CO2e/year)				
7. Transportation					
7. a) Total GHG emissions from transportation or transit (tonnes CO2e/year)	7. b) Transit ridership (#)	7. c) Commuting mode share (%)	7. e) Proportion of population using public transportation or carpooling (%)	7. f) Hybrid or electric vehicles at the centre of the city (%)	7. g) Proportion of pedestrian and cycle paths that meet safety standards (%)

More detail on which municipalities used which common actions and indicators can be found in Appendix 3.

Our analysis found that 41 of the 64, or 64%, of key mitigation actions had associated indicators (see Appendix 3, 22-24). The fact that the majority of actions have indicators suggests that many mitigation plans and actions have been prepared for implementation, with specific measures of progress. It may therefore be of interest to undertake further work to better understand their use and/or lack thereof in French-speaking provinces.

4.8 Identifying the Strategic Use of Co-Benefits

A high-level review was undertaken to determine whether and how co-benefits are used in communicating the broader benefits and advantages of mitigation action. Table 11 below breaks down municipalities' use of co-benefits based on whether they did not use co-benefits; referenced that co-benefits arise from their mitigation plan but did not apply them to actions; or explicitly identified and applied co-benefits in their mitigation plan. Of note, several plans did not use the term co-benefits, but instead referred to additional "economic", "environmental", "social", and "community" benefits. This terminology has been added to the lexicon of query terms to identify co-benefits. No co-benefits were found for French mitigation plans using our co-benefits query term search.

Thirty-nine out of the 59, or 65% of mitigation plans, including both Eco-West cohorts, mentioned co-benefits explicitly or by reference. Of those, thirteen mentioned co-benefits in the executive summary or introductory section of the plan but did not apply co-benefits to actions later in the plan (see Table 6). Twenty-six plans used co-benefits to build support

for their actions. These were from BC (5), Ontario (6), Saskatchewan (7), Alberta (1), and Manitoba (7).

Table 11: Breakdown of Municipalities that Do Not Use, Only Reference, or Apply Co-Benefits in their Plans

Do Not Use Co-Benefits (16)	Only Reference Co-Benefits (13)	Explicitly Use Co-Benefits (30)
Town of Milton	Town of Banff	District of North Vancouver
Town of Candiac	Township of Mulmur	City of Prince George
City of New Westminster (22 nd Street Plan)	District of Tofino	District of Saanich
Quatsino First Nation	District of Ucluelet	City of Kawartha Lakes
City of Baie-Saint-Paul	City of Charlottetown	Region of Peel
Town of Malartic	City of Guelph	Sustainable Severn Sound
CREDDO (Conseil régional de l'environnement et du développement durable de l'Outaouais)	Town of Oakville	Eco-West Saskatchewan (Village of Zenon Park, Towns of Carrot River, Eston, Gravelbourg, Tisdale and City of Humboldt)
AFMNB (Association francophone des municipalités du Nouveau-Brunswick: Cities of Atholville, Beresford, Caraquet, Grande-Anse, Haut-Madawaska, Maisonnette, Neguac, Rivière Verte, Saint Léonard)	Town of Devon	Eco-West Manitoba (Regional Municipalities of West Interlake, Wallace-Woodworth, Springfield, Norfolk Treherne, Lorne and Cartier)
	City of Sudbury	City of Leduc
	Town of Winnipeg	City of Saskatoon
	Town of Aurora	City of Windsor
	City of Dauphin	City of Thunder Bay

	District of North Cowichan	District of Summerland
		Municipality of Russell-Binscarth
		Corporation of Loyalist Township
		City of Kamloops
		Township of Huron-Kinloss
		Ville de Shawinigan
		Ville de Beaconsfield
		Communauté Maritime des Îles-de-la-Madeleine

4.9 Equity Considerations in Mitigation Plans

Six mitigation plans stood out for their integration of equity considerations.

- **Vulnerable population assessment (District of North Vancouver, BC).** A consultant was hired to perform a population assessment identifying vulnerable people and groups ensuring identified mitigation actions do not disproportionately impact vulnerable populations. For example, the plan highlights how encouraging walkable, mixed-use neighbourhoods with non-market housing results in shorter commutes and greater access to amenities and transit, ensuring that residents of all incomes can benefit from emissions-reductions strategies.
- **Equity in active transportation planning (City of Windsor, ON).** As one of five ‘Quality of Life’ strategies, this plan looked at opportunities to get people out of their vehicles to reduce emissions in a way that was accessible and equitable for all community members, regardless of individual circumstances or geographic location within the city.
- **Advancing integrated climate action and equity (District of Saanich, BC).** Procedural, distributional, structural, and transgenerational equity guided development of the integrated climate action plan, emphasizing resilience strategies for already-vulnerable residents, and strategies to equitably share the benefits of climate actions.

- **Promoting a net-zero transition that increases social equity and supports local economy (City of Thunder Bay, ON).** Actions to support local equity focused on ensuring equitable transportation options and training for a skilled labour force, supporting local colleges and trade organizations, and/or through retraining in smart, green, and resilient design and construction.
- **Equity-centred, inclusive community engagement (Corporation of Loyalist Township, ON).** The plan was developed in collaboration with considered input from residents, local businesses, and municipal staff alike. Community priorities were gathered and goals were generated from resident inputs. One major initiative identified in the plan revolves around reducing home energy usage by developing a home retrofit plan that would focus on community groups experiencing energy poverty. Continued consultation and partnership with community members will be crucial to ensure that the initiatives presented in the plan are implemented to their full potential.
- **Equity as central to adaptation, mitigation, and healthy and resilient communities (City of Kamloops, BC).** This Climate Action Plan streamlined adaptation and mitigation planning into one process, including equity as a central component. The City will link its Social Plan and Housing Affordability Strategy and the Accessibility and Inclusion Plan as guidance on social considerations in the implementation of CCAP actions, ranging from how to make the built environment more accessible, improve accessible transportation options, enhance accessible employment opportunities, and work with community partners to ensure information about climate action and incentive programs is available to people of all ages, abilities, and income levels.

4.10 Best Practice in Mitigation Planning

For mitigation plans, having a strong understanding of both the corporate and community energy and emissions inventories helps to identify key sources of emissions at the local scale. This is important for identifying emissions sources and for forecasting emissions into the future. Identifying common mitigation actions and indicators across sectors, and best practice in mitigation planning helps to understand relevant and practical sectoral mitigation approaches that can be more broadly used in municipalities across Canada. We investigated four key areas related to mitigation planning: 1) inclusion of a comprehensive corporate and/or municipality GHG inventory, 2) identification of common actions, co-

benefits, and indicators, 3) linkages with adaptation, and 4) innovative planning and process design.

In mitigation planning, community and corporate inventories provide a comprehensive assessment of mitigation opportunities. The District of Saanich (BC) performed a community emissions inventory to supplement their corporate planning. The City of Prince George (BC) performed both community and corporate inventories and planning. Typically, mitigation planning has been performed within the bounds of corporate management of facilities, buildings, fleets, and waste. Integrating both corporate and community energy and emissions inventories provides a more comprehensive picture of emissions sources and opportunities for local governments to intervene, either directly (e.g., land-use and transportation planning) or indirectly (e.g., awareness raising and incentives).

Some best practice highlights from the mitigation plans are:

- The District of North Vancouver (BC), Cities of Kawartha Lakes (ON), Windsor (ON), Prince George (BC), and Township of Huron-Kinloss (ON) stood out due to the broader use of actions and indicators.
- The Cities of Windsor (ON) and Prince George (BC), Township of Huron-Kinloss (ON), and District of Summerland (BC) have provided key roles and departments, financing, and timelines, as well as monitoring and evaluation processes within their plans preparing their plans for implementation.
- The Cities of Prince George (BC) and Kawartha Lakes (ON), Region of Peel (ON), Districts of North Vancouver (BC) and Summerland (BC), Corporation of Loyalist Township (ON) use co-benefits to promote farther-reaching emissions reductions in their plans.
- The Districts of North Vancouver (BC), Summerland (BC) and Saanich (BC), Cities of Kawartha Lakes (ON) and Prince George (BC), Township of Huron-Kinloss (ON), Corporation of Loyalist Township (ON) and the Eco-West Manitoba cohort identified adaptation synergies and trade-offs in their mitigation plans.

Nine municipalities were identified as applying best practice approaches in their mitigation plans (see Table 12 below).

Table 12: Best Practices in Mitigation Planning

Municipality	Plan Type	Best Practice Examples
District of North Vancouver (BC)	Community Energy and Emissions Plan	<ul style="list-style-type: none"> • Recognizes adaptation and mitigation approaches as part of cohesive climate change action, where the

		<p>mitigation plan complements the existing adaptation strategy for the city.</p> <ul style="list-style-type: none"> ● Associates well-being co-benefits with actions according to the resilience and other municipality co-benefits of actions. ● Sets a GHG emissions reduction target and identifies how that fits with regional, provincial, and national goals (illustrates transparency and accountability). ● Identifies actions that are outside of the municipality’s jurisdiction but where it still has a supporting role to play. ● Features a strong set of indicators, of which a primary subset is applicable to the plan overall plus a secondary subset applicable sectorally, and which is comprehensive (considers municipal benefits e.g., sense of belonging, mental health, and other physical health effects).
City of Kawartha Lakes (ON)	Healthy Environment Plan	<ul style="list-style-type: none"> ● Includes financing options, lead departments, and anticipated timeframe of action for implementation of each action. ● Includes adaptation and mitigation co-benefits for each action. ● Includes cross-cutting actions and thematic areas to improve plan effectiveness thoughtfully. ● Includes education actions and financing options. ● Associates indicators with each action area. ● Includes an opportunity map to align with internal plans and identify potential partners. ● Intends to update the plan every four years in the year following the last municipal election, helping to remove political pressures that may sideline climate action which has benefits that are more long-term oriented than tends to be attractive during election campaigns.
District of Saanich (BC)	Climate Plan	<ul style="list-style-type: none"> ● Incorporates GHG reduction, climate adaptation, and energy priorities within goals. ● Includes comprehensive climate change overview that makes the linkages between mitigation and adaptation

		<p>work and vice versa (useful communication tool for integrated climate action).</p> <ul style="list-style-type: none"> ● Includes unique guiding principles that provide a helpful lens to the development and interpretation of the plan (e.g., be bold and evidence-based, value nature, consider future generations, reconciliation efforts). ● Introduces ‘climate equity’ components that were considered in the development of the plan: procedural, distributional, and structural/transgenerational. ● Includes associated vision, objectives, GHG inventories, mitigation and adaptation pathway, district role, and partners for each theme. ● Associates mitigation and/or adaptation impacts for each action. ● Includes good prioritization (low, medium, or high).
City of Windsor (ON)	Active Transportation Plan	<ul style="list-style-type: none"> ● Includes strong, outcomes-focused thematic areas for actions, such as connecting communities, places for people, innovation and integration, culture shift and quality of life. ● Includes comprehensive implementation and monitoring section, with roles and timelines, assigned, and cost estimates provided. ● Identifies quick wins for each thematic area. ● Assesses the cost of actions categorized as low, medium, or high priority (best practice for when going to Council to secure funding).
City of Prince George (BC)	Mitigation Plan	<ul style="list-style-type: none"> ● Uses IPCC numbers from 2018 as part of 2020 plan development. ● Implemented previously, the five-step milestone outline developed through PCP (partners for climate protection), achieving the 5th milestone in 2011. ● Looks to update to ensure consistency with current data and changes in the municipality. ● Combines both adaptation and mitigation strategies and goals.

		<ul style="list-style-type: none"> ● Provides a comprehensive emission profile from 2017 data to produce appropriate mitigation strategies into 2050. ● Bases actions around modelling, engagement, and analysis. ● Involves two-tiered engagement through internal and external stakeholder workshops to provide spaces for each group to understand their concerns. ● Provides both corporate and municipality actions based on municipality and stakeholder feedback. ● Categories of actions for the plan align with the City's OCP objectives for inclusion of 'green energy' and the goal to 'reduce carbon emissions.' ● Provides actions, indicators and revised GHG reduction targets in the appendices.
Township of Huron-Kinloss (ON)	Climate Change and Energy Plan	<ul style="list-style-type: none"> ● Brings together mitigation and adaptation to guide the framework of the plan. ● Identifies co-benefits of adaptation and mitigation for financial, social, and environmental sectors. ● Considers the federally recommended reduction of 30% by 2030 to guide their goal/milestone reduction. <ul style="list-style-type: none"> ○ Provides a guiding goal to reduce GHG emissions by 24% by 2036. ● Created a multi-department and stakeholder committee as part of the process to develop the plan, in addition to two other advisory groups, Municipality and Agricultural advisory groups, which provide local knowledge. ● Bases climate data off General Circulation Models (GCMs) and emission scenarios defined by the Intergovernmental Panel on Climate Change (IPCC). ● Provides detailed table of actions, with associated actions, and monitoring metrics/indicators.
District of Summerland (BC)	Community Emissions Plan	<ul style="list-style-type: none"> ● Performs an initial assessment of actions with key adaptation/resilience synergies and includes a forthcoming commitment to look at climate action through an integrated low carbon resilience lens.

		<ul style="list-style-type: none"> ● Includes specific objectives related to GHG emissions reductions in each of the Plans, with 2025 and 2050 targets, as well as an interim 2030 milestone to measure progress. ● Outlines expected economic impacts in each document, with the expectation that saved energy dollars will recirculate in the economy and contribute to local economic development. ● Includes 14 indicators. ● Includes co-benefits in descriptions of actions.
Corporation of Loyalist Township (ON)	Climate Action Plan	<ul style="list-style-type: none"> ● Includes both emissions reducing and resilience building actions that were chosen as a direct result of engagement from residents, stakeholders and municipal staff. ● Includes equity, economic and social considerations into various initiatives related to food security, home energy retrofits focusing on community groups experiencing energy poverty, etc. ● Has line-of-sight connections to many Township documents, such as the Strategic Plan, the Asset Management plan, the Official Plan, and the Infrastructure Master Plan. ● Identifies key limitations within the plan. ● Uses lessons learned from consultation phase to develop a community engagement framework to maintain momentum and public engagement. ● Identifies co-benefits of every goal. ● Integrates adaptation and mitigation planning into one process. ● Includes equity considerations and nature-based solutions.
City of Kamloops (BC)	Community Climate Action Plan	<ul style="list-style-type: none"> ● Includes both emissions reducing and resilience building actions, especially through its use of nature-based solutions. ● Has a thematic area (“Big Move”) called “Healthy Urban Ecosystem” dedicated to preserving ecosystems and using green infrastructure to provide carbon sequestration and climate resilience.

		<ul style="list-style-type: none"> ● Explicitly applies co-benefits to every “Big Move”, including resilience as a co-benefit of mitigation actions. ● Includes economic considerations and trade-offs for each objective, as well as for actions using nature-based solutions. ● Aligns the plan with the Social Plan and Housing Affordability Strategy to address social considerations throughout implementation. ● Will measure progress with an annual report, five-year review and updating implementation timelines. ● Includes a “Big Moves Art Project”, to raise understanding of the plan by Grade 9 students.
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4.11 Nature-based Solutions in Adaptation & Mitigation Plans

Nature-based solutions (NbS) are being applied in municipalities across Canada to adapt to flood and heat risks as well as an opportunity to sequester carbon and ensure low carbon services into the future. Supporting, expanding, and valuing NbS is gaining traction, for instance through inventorying natural assets as well as identifying green infrastructure solutions in areas ranging from green design to street trees to bioswales for stormwater.

NbS actions found in adaptation and mitigation plans were put into the same table because in many cases, mitigation plans were found to include resilience building or risk reducing actions through their incorporation of NbS actions despite otherwise only having mitigation actions, or adaptation plans were found to have actions geared towards carbon sequestering. Table 13 below shows the municipalities which provided NbS in their adaptation and mitigation plans.

Table 13: Key uses of Nature-based Solutions in Adaptation and Mitigation Plans

ACTIONS AND STRATEGIES	MUNICIPALITY
Incorporate natural assets or green infrastructure in stormwater management or development projects to reduce	Adaptation: Nottawasaga Valley Conservation Authority, Cities of Barrie, Nanaimo, Surrey, Edmonton, Vancouver, Mississauga, Toronto, Virden, Waterloo, Cambridge, Coquitlam, Victoriaville, Town of Stony Plain, Regions of Peel and Waterloo

flood risk and/or sequester carbon (23)	Mitigation: Cities of Sudbury, Kawartha Lakes, Dauphin, District of Saanich, Eco-West Manitoba (Rural Municipalities of Norfolk Treherne, Wallace-Woodworth, and West Interlake)
Improve existing green infrastructure/tree canopy to reduce risk of extreme temperature and extreme weather (20)	Adaptation: Cities of Barrie, Cambridge, Coquitlam, Edmonton, Mississauga, Nanaimo, Toronto, Vancouver, Waterloo, Regions of Peel, Southwestern New Brunswick and Waterloo, Town of Halton Hills Mitigation: Cities of Kawartha Lakes and Kamloops, Districts of North Vancouver, Saanich and Summerland, Quatsino First Nation, Township of Huron-Kinloss
Encourage or require integration of LID and green infrastructure in new development projects and/or retrofits (10)	Adaptation: Regions of Peel and Waterloo, Cities of Barrie, Cambridge, Nottawasaga Valley Conservation Authority, Gatineau, Plessisville Mitigation: Township of Huron-Kinloss, Cities of Kawartha Lakes and Sudbury
Expand tree planting (10)	Adaptation: Cities of Nanaimo and Gatineau, Regions of Peel and Waterloo Mitigation: Eco-West Manitoba (Rural Municipality of Cartier), Town of Huron-Kinloss, Cities of Leduc and Thunder Bay, District of Saanich, Loyalist Township
Use and establishment of green infrastructure to reduce risk of drought (7)	Adaptation: Cities of Cambridge, Coquitlam, Nanaimo, Saskatoon, Vancouver Mitigation: City of Kawartha Lakes, Loyalist Township
Use of natural systems and nature-based systems to mitigate geologic hazards and/or coastal flooding (6)	Adaptation: Cities of Barrie, Campbell River, Nottawasaga Valley Conservation Authority, and Region of Waterloo, District of North Vancouver Mitigation: City of Kawartha Lakes
Low-impact development and green infrastructure practices/development (5)	Adaptation: Cities of Barrie, Cambridge, Nottawasaga Valley Conservation Authority, and Region of Waterloo Mitigation: City of Kawartha Lakes
Green or white roofs to reduce need for cooling in buildings (4)	Adaptation: Cities of Beloeil, Saint Zotique, Varennes and Plessisville
Protection or expansion of urban forest (3)	Adaptation: City of Waterloo Mitigation: City of Prince George and District of Saanich
Minimize hazardous land acquisition to prevent flood risk, sea level rise, or erosion (3)	Adaptation: Cities of Campbell River, Nanaimo, and Surrey

Many municipalities are also applying Nature-based Solutions (NbS) in response to both extreme temperatures and flood hazards. NbS are increasingly commonly being used as adaptation actions designed to moderate temperatures and minimize flood damages, while sequestering carbon and avoiding emissions-intensive infrastructure expansion. These solutions come in two forms that either: 1) protect and enhance natural assets, supporting and/or expanding existing ecosystem services provided by wetlands, streams, and forest cover to promote flood and heat protection; for instance, aiming to promote sustainable asset management and services over time; or 2) promote green design and infrastructure (e.g. bioswales, green roofs, etc.). For instance, Nature-Action Québec focused four municipal adaptation plans on the use of NbS to absorb projected excess rainfall and to moderate heat under a changing climate.

Innovative uses of NbS in adaptation plans are outlined below.

Use of LiDAR technology to identify natural asset areas (Rural Municipality of Hanover, MB, the City of Winnipeg, MB, and the Town of Morris, MB).

- **High benefit-cost ratio:** RM of Hanover noted in its completion report that its plan's high benefit-cost ratio was due to integrating natural infrastructure design principles from the outset – specifically the principle of monetizing ecosystem service provided by natural infrastructure.¹⁰ The project has been highlighted as a Natural Infrastructure Case Study in professional development training provided by Engineers and Geoscientists Manitoba through NRCan's BRACE program (Building Regional Adaptation Capacity and Expertise).
- **Field to basin-scale considerations:** The Town of Morris and the City of Winnipeg noted that LiDAR is important because it accelerates the natural infrastructure system design from field to basin-scale, building a culture of water management that includes water harvesting for irrigation and simultaneously addresses flooding, supply water for irrigation, aquifer recharge, nutrient reduction, and wildlife, bird and fish habitat.

In mitigation planning, a stand-out plan was the Community Climate Action Plan by the City of Kamloops (BC), which considered and valued actions under three themes: urban ecosystems, protecting and healing nature, and green infrastructure.

¹⁰ Advocated by the Insurance Bureau of Canada, "Combatting Canada's Rising Flood Costs: Natural infrastructure is an underutilized option" (2018).

4.12 Key Successes and Challenges in Climate Adaptation and Mitigation Planning

The completion reports of the adaptation and mitigation plans were queried together to identify key success factors (KSF), challenges & barriers, and innovations related to the planning process, as well as stated next steps. This analysis highlights what was viewed as important and/or difficult in the development of the Plans program. The total number of completion reports analysed is 79, as the plans that were created in cohorts (Eco-West in Saskatchewan, Eco-West Manitoba and Severn Sound) produced only one completion report each.

4.12.1 Top 7 Key Success Factors

Similar key success factors were found across the other program types, with community, staff and Council engagement, partnerships, expertise from staff and consultants, resourcing and capacity, and following frameworks being cited as critical to the project.

1. Community engagement (34/79).
2. Partnerships with external organizations (33/79), including:
 - a. Cross-sectoral partnerships,
 - b. Other governmental partnerships, and
 - c. Academic partnerships.
3. Hiring quality consultants (31/79).
4. Staff engagement, knowledge, and expertise (30/79).
5. Senior leadership support/buy-in (25/79).
6. Resourcing and capacity (24/79), including strong teams and FCM's financial assistance.
7. Following a framework and methodology (15/79), including a clear plan/process or a key individual to assist with coordination.

4.12.2 Top 5 Key Challenges & Barriers

Key challenges listed in the completion reports centred around lack of data, resource and capacity, difficulties with the methodology, as well as difficulties in maintaining engagement. These were similar challenges and barriers identified across many of the other program types.

1. Resourcing and capacity (26/79), including competing priorities on staff time and resource constraints.
2. Community engagement (19/79), including difficulties coordinating with external partners.
3. A lack of data availability or the questionable quality of data (15/79).

4. Methodological challenges (14/79), including scope creep, short timelines or poor timing, and uncertainty in novel approaches.
5. Staff engagement (14/79), including inconsistent participation.

4.12.3 Identified Next Steps

The main next steps identified were:

1. Secure funding for implementation internally or externally (42/79).
2. Process continuation, mostly through community engagement, government and stakeholder partnerships, and internal committees (36/79).
3. Gain approval from Council (23/79).
4. Monitoring and evaluation (15/79).

5. Feasibility & Operational Studies

77 out of 79, or 97% of the total feasibility and operational studies have been coded, analyzed and included in this report as of May 13, 2022. A set process was documented and followed for the coding of operational and feasibility studies. Where possible, the lexicons that were used for mitigation and adaptation plan coding were also used for the feasibility study coding. Where this was not possible or not ideal, additional query terms were used (see Appendix 6). The City of Charlottetown (PEI) and Ville de Saint-Adèle (QC) did not include final deliverables in their final submissions.

Table 14: Feasibility and Operational Studies Completed to Date

MCIP Deliverables		Total expected	No. Submitted	No. Coded & Analysed	No. of CR Submitted	No. of CR Coded & Analysed	Proportion Deliverables Analysed	Proportion CR Analysed
Feasibility Studies	English	36	36	35	36	36	97%	100%
	French	25	24	24	24	24		
Operational Studies	English	17	17	17	17	17	100%	100%
	French	1	1	1	1	1		
Total		79	78	77	78	78		

5.1 Breakdown by Sector and Study Type

The feasibility and operational study reports spanned five emissions reduction sectors. Of the 77 studies analysed to date, the greatest percentage pertained to infrastructure (36%)

followed by transportation (26%), buildings (21%), energy systems (9%) and solid waste (6%). There were two reports that spanned multiple sectors and were classified as ‘other’ for the purposes of this report (2%). Each of the sectors are broken down into project sub-codes; some deliverables included studies targeting more than one sub-code, which is why the total number of studies addressing sub-sectors is 81.

5.1.1 Infrastructure

Twenty-nine studies were related to infrastructure. There were twice as many reports for grey infrastructure (20) projects than for green infrastructure (9) projects (see Table 15). Of the total infrastructure projects submitted, 12 out of 29, or 41% of studies related to stormwater management.

Table 15: Infrastructure Project Types Breakdown

Infrastructure (29)			
Grey (20)		Green (9)	
Stormwater management	9	Stormwater management	3
Wastewater treatment	3	Natural asset valuation	2
Flood mitigation	3	Stream daylighting	1
Full water system evaluation (water supply, water treatment & rainwater management)	4	Urban forestry management	2
Water conservation	1	Natural asset conservation	1

5.1.2 Transportation

Of the 21 operational and feasibility studies related to the transportation sector, four pertained to EV charging infrastructure; seven of the studies dealt with either fleet electrification or fleet “greening” by other means, such as the adoption of alternative fuel vehicles (e.g. CNG) or route optimization; and four pertained to active transportation infrastructure (see Table 16). There were also three studies related to sharing transportation equipment, including two on car sharing and one on the sharing of micro mobility equipment such as bicycles, e-bikes or e-scooters. The remaining two studies focused on broader transportation infrastructure or roadway planning studies to facilitate active transportation, shorten commuting routes or facilitate shared mobility options.

Table 16: Transportation Project Types Breakdown

Transportation (21)			
EV Infrastructure (public and/or fleet)	4	Active transportation infrastructure	4
City fleet vehicle electrification	3	Fleet “greening” strategies	4
Car sharing	2	Roadway planning to include active transport and/or shared mobility	2
Micro mobility	1	Transit hub	1

5.1.3 Buildings

In the building sector, 17 feasibility and operational studies focused on enhancing energy and water efficiency in buildings. Studies mainly related to energy/water efficiency audits in existing buildings (8) and lowering barriers to home energy retrofits (5), either through the provision of a standardized home energy retrofit package (2) or through some form of property assessment-related energy retrofit financing mechanism (2) (see Table 17). Two operational studies produced green development standards for new developments. The remaining three studies related to green roofs, blue roofs, and biomass for heating. The blue roof study was from the Peel Region, Ontario.

Table 17: Building Project Types Breakdown

Buildings (17)			
Energy efficiency or water efficiency audit	8	Standardized Energy Efficiency Retrofit Program	2
Home energy audit and/or retrofit financing program	2	Green roof guide	1
Biomass heating for buildings (via individual boilers or district heating)	1	Blue roof	1
Green development standards	2		

5.1.4 Energy Systems

There were seven studies in total that related to the energy sector. The seven dealt with more than one energy system, but all of them dealt with either biomass or biogas as a feedstock. Six of the seven studies were interested in using biomass or biogas to produce energy for direct use either at the facility producing it (e.g., for heating at a wastewater treatment plant) or for injection into a district energy heating system (see Table 18). Two of

the seven studies looked at refinement of biogas to be injected into the natural gas pipelines. Five of the seven studies related to district heating.

Table 18: Energy System Project Types Breakdown

Energy Systems (7)			
Biogas generation for direct use (thermal fuel or electricity generation)	6	Biogas generation for adding to natural gas lines	2
District heating	5		

5.1.5 Solid Waste

Of the five solid waste studies completed, three pertained to landfill gas GHG reduction, either using flaring which converts methane to CO₂ by burning it, or through the installation of engineered biocover, which converts methane to CO₂ through a biochemical process (see Table 19). The other two solid waste studies looked at how to produce biogas from various types of organic waste.

Table 19: Solid Waste Project Types Breakdown

Solid Waste (5)			
Landfill gas GHG reduction	3	Organic waste to biogas production	2

5.1.6 Other

The other two studies completed could not be classified into one of the economic sectors as they each spanned multiple sectors (see Table 20). The Town of Ajax (ON) Risk and Resiliency study was equivalent to an adaptation plan and the Energize Bridgewater Investment System looked at ways of financing both home energy efficiency measures and municipality energy systems.

Table 20: Other Project Types Breakdown

Other (2)			
Risk and Resiliency Study (Town of Ajax)	1	Energy efficiency and energy generation financing (Town of Bridgewater)	1

6.2 Key Successes and Challenges in Feasibility & Operational Studies

The completion reports were queried to identify key success factors (KSF), challenges & barriers, and innovations related to the process, as well as stated next steps. This analysis highlights what was viewed as important and/or difficult in the development of the studies.

6.2.1 Top 8 Key Success Factors

Similar key success factors were found across the other program types, with community, staff and Council engagement, partnerships, expertise from staff and consultants, resourcing and capacity, and following frameworks being cited as critical to the project.

1. Partnerships with external organizations (31/79), including:
 - a. Cross sectoral partnerships,
 - b. Other governmental partnerships, and
 - c. Academic partnerships.
2. Hiring quality consultants (29/79).
3. Resourcing and capacity (23/79), including FCM's financial assistance.
4. Following a framework and methodology (20/79), including a clear plan/process or a key individual to assist with coordination, as well as having clear, coherent, and timely communication.
5. Senior leadership support/buy-in (16/79).
6. Staff engagement, knowledge and expertise (15/79).
7. Data availability and quality (14/79).
8. Community engagement (11/79).

6.2.2 Top 5 Key Challenges & Barriers

Key challenges listed in the completion reports centred around lack of data, resources and capacity, difficulties with the methodology, and difficulties in maintaining engagement.

Similar challenges and barriers were identified across many of the other program types.

1. A lack of data availability or the questionable quality of data (23/79).
2. Resourcing and capacity (19/79), including competing priorities on staff time and resource constraints.
3. Methodological challenges (18/79), including scope creep, short timelines or poor timing, and uncertainty in novel approaches.
4. Community engagement (8/79), including difficulties coordinating with external partners.
5. Staff engagement (5/79), including inconsistent or reluctant participation.

6.2.3 Identified Next Steps

1. Secure funding for implementation internally or externally (37/79).
2. Perform additional research (29/79).
3. Build awareness with municipal staff and/or Council, and community members (25/79).
4. Complete a pilot project (8/79).

6.3 Identifying the Strategic Use of Co-Benefits

Fifteen of the 77 studies analysed contained references to co-benefits. These were from the Credit Valley Conservation Authority (ON), CREDDO (QC), the Towns of Ajax (ON), Bridgewater (NS), Collingwood (ON), Newmarket (ON) and Placentia (NL), the Region of Peel (ON), the Municipality of Norfolk Treherne, and the Cities of Edmonton (AB), Victoria (BC), Saint John (NB), Windsor (ON), Guelph (ON) and Winnipeg (MB). These studies identified a variety of co-benefits, of which livability, cost savings, air quality, human health and property values were the most frequently cited across communities. Table 21 shows a breakdown of the referenced co-benefits based on the number of studies using them.

Table 21: Co-benefit Breakdown

Identified Co-benefit	Number of municipalities that identified this co-benefit in their study
Livability	7
Cost Savings	6
Air Quality	3
Human Health	3
Property Values	3
Water Efficiency	3
Biodiversity	2
Equity	2
Food Security	2
Green Spaces & Recreation	2
Job Creation	2
Clean Energy	1
Pollutant Capture	1
Water Quality	1

6.4 Equity Considerations in Studies

One feasibility study referenced equity.

- **Understanding climate impacts on water and implications for vulnerable populations (City of Saint John, NB).** “An Urban Blueprint for Water: Securing Our Shared Water Future in Saint John, New Brunswick” seeks to better understand climate impacts on water for the city, identifying existing vulnerabilities and key risks to populations, public health and safety, ecosystems, and infrastructure.

6.5 Nature-based Solutions in Studies

Twelve of the 77 studies analysed identified NbS related to green infrastructure. Most studies using NbS focused on stormwater management, stream daylighting, urban forestry management, and eco-roofs.

Table 22: NbS Strategies Used in Feasibility and Operational Studies

ACTIONS AND STRATEGIES	MUNICIPALITIES
Stormwater management	City of Brandon, City of Montreal (Borough of Ville Marie), Athabaska (Victoriaville and Princeville)
Natural asset capital valuation	Credit Valley Conservation (Region of Peel), City of Saskatoon
Stream daylighting	City of Montreal (CEUM)
Urban forestry management	Conseil Régional de l’Environnement et du Développement Durable de l’Outaouais (CREDDO), Town of Collingwood
Eco roof guide	City of Edmonton
Marsh renewal project	City of Winnipeg
Aquifer recharge	Ville de Lévis
Preservation of wetlands	MRC de La Côte-de-Beaupré

6.6 Best Practice in Studies

6.6.1 Five innovative practices were identified in the analysis of MCIP studies.

- Community engagement via an online public engagement platform and pop-up events that tried to make quiz and survey participation fun for community members (Town of Ajax, ON).

- A unique partnership arrangement that involved multiple municipalities, non-profit organizations, an insurance company, and widespread community consultations to prepare a micro mobility study (City of Montréal, QC).
- The hiring of a dedicated project manager to act as a liaison between the steering committee and various subject matter experts (Town of Shellbrook, SK).
- For green infrastructure, the use of I-Tree software (developed by the US Dept of Agriculture), combined with an urban tree inventory, was showcased as a useful way to value ecosystem services and one that could easily be replicated by other municipalities (City of Saint John, NB).
- Developing comprehensive vulnerable population data for the climate risk and vulnerability assessment: combining census data to better understand vulnerable populations (e.g., low-income neighbourhoods) and performing comparative analysis to city green space helped to identify areas and populations disproportionately vulnerable to extreme temperature and the urban heat island effect (Town of Ajax, ON).

6.6.2 Best Practice: City of Saskatoon’s Natural Asset Assessment

This study undertook a four-step process to value natural assets in the city, including developing a framework, building an inventory, assessing climate vulnerability, and completing a valuation. Three asset classifications were used:

- Natural assets (e.g., wetlands)
- Enhanced natural assets (e.g., parks or bioswales)
- Engineered assets (e.g., green roofs or permeable pavement)

Four classifications of ecosystem services were examined:

- Supporting
- Provisioning
- Regulating
- Cultural

These ecosystem services were linked to “constituents of well-being” for the community. Assets were ranked and prioritized in terms of vulnerability and need for action. Next steps included linking the results of the study to existing city plans to embed natural assets into decision processes.

6.6.2 Best Practice: Town of Ajax Risk and Resilience Study

This study performed a high-level assessment of climate change risk and resilience. Special attention was paid to:

- Emergency preparedness (including climate change hazards arising from extreme temperatures)
- Natural systems (including biodiversity)
- Stormwater flooding and erosion (particularly that arising from climate change-related extreme weather events)

A strategic focus on objectives and implementation strategies ensured that the study centred around achievable and impactful goals with the aim of creating a climate-ready town. Key features included a climate-ready vision for the town, incorporation of adaptation and mitigation considerations into all levels of municipal and community services, inclusion of individual and broader community actions, and a focus on resilience to climate hazards, particularly among already vulnerable populations. Importantly, implementation features such as action leads, costing, timelines, partnerships, and funding were identified to build buy-in and expedite the move to implementation. The study, which was formulated more like a plan, includes key indicators for measuring and monitoring progress as well as requirements for iterative updates every five years.

7. Climate Adaptation Partnership Grants

Climate Adaptation Partner Grants (CAPG) were cohort-oriented grants awarded to service providers to address climate adaptation concerns and considerations across multiple municipalities. Service providers either worked with cohort municipalities within a regional area or used common frameworks in municipalities across different provinces. For instance, ICLEI Canada produced adaptation plans in eight municipalities across three provinces, and the Municipal Natural Assets Initiative (MNAI) and the Smart Prosperity Institute produced Natural Asset Technical Reports for six municipalities across three provinces. All 15 of the CAPGs have been coded and analysed as of May 13, 2022, with the exception of one set of reports missing from the Regional District of East Kootenay (BC) from the Selkirk College cohort, and one project from Ville de Drummondville (QC) from the Nature Québec cohort. Table 23 below shows a summary of all CAPG coding and analysis completed to date.

Table 23: CAPG Projects Completed to Date

MCIP Deliverables		Total expected	No. Submitted	No. Coded & Analysed	No. of CR Submitted	No. of CR Coded & Analysed	Proportion Deliverables Analysed	Proportion CR Analysed
CAPG	English	12	12	12	12	12	100%	100%
	French	3	3	3	3	3		
Total		15	15	15	15	15		

The CAPG program resulted in a variety of adaptation-related reports, programs and tools, including risk and vulnerability assessments, water reports (one targeting watersheds & wastewater and another targeting water security), natural asset technical reports, green infrastructure projects, municipal adaptation plans, a drought plan, greening projects, capacity-building initiatives and a cost-benefit tool (see Table 24). The plans resulting from the CAPG projects were coded based on the adaptation plan framework outlined in section 4.¹¹ Given the range of deliverables, sub-codes were developed for each of the seven project types outlined below (see Lexicon of Query Terms in Appendix 6). In addition, the completion reports were coded and analysed for key strengths and challenges from this program as compared to municipalities producing reports or plans on their own and what was notable about the peer learning/network-building experience.

Table 24: CAPG Project Breakdown

Project type (total # of deliverables)	Cohort / Consultant (# of deliverables)
Adaptation Plans (13)	ICLEI (8)
	Conservation Corps Newfoundland and Labrador (5)
Capacity-building initiatives (12)	Clean Foundation (Adaptation Initiative) (1)
	Selkirk College (7 reports, 3 knowledge briefs, 1 natural asset inventory)
	Nature Québec (greening projects) (4)
Green Infrastructure Visualization, Economic Analysis, and Recommendations (1)	Ontario Parks Association (1)
Natural Asset Technical Reports (6)	Smart Prosperity Institute & MNAI (6)
Risk Assessments (12)	Quest (6)
	Mining Innovation Rehabilitation and Applied Research Corporation (MIRARCO) (5)

¹¹ The adaptation plans from the two CAPG cohorts, however, were not analysed for “common” actions and indicators due to the small number of them and the fact that they were produced by the same cohort.

	Institut National de la Recherche Scientifique (INRS) (1)
Climate Projections for BC Northeast Region + Vulnerability Assessments (5)	Fraser Basin Council (5)
Wastewater and Water Security Reports (8)	Grand River Conservation Authority (Watershed & Wastewater) (7)
	All One Sky (Climate Change & Water Security) (1)
Drought Plan (1)	Quinte Conservation Association (1)
Cost-Benefit Analysis Tool (1)	Ouranos Inc. (1)

7.1 Highlights by CAPG Project Type

Key innovations from the cohort model of the CAPGs included:

- 1) Joint procurement of subject matter experts,
- 2) Working together with and learning from other municipalities to identify best available responses to hazards, and
- 3) Mobilizing adaptation planning in small rural communities with limited resources.

A key finding in this analysis is that the cohort-based model worked well where municipalities were in the same region, facing similar climate impacts and hazards. Highlights from the cohort approach are outlined below.

7.1.1 Adaptation Plans

ICLEI Canada was awarded MCIP funds to initiate and complete a cohort project producing adaptation plans for eight municipalities through the *Adaptation Changemakers project*. Known as a climate action leader in Canada, ICLEI's Building Adaptive and Resilient Communities (BARC) planning tool was applied in eight municipalities across three provinces across Canada: British Columbia (3), Ontario (3), and Newfoundland (2). The municipalities are Town of Caledon (ON), Town of Conception Bay South (NL), City of Peterborough (ON),

Town of Portugal Cove-St. Philips (NL),¹² City of Prince George (BC), Town of Qualicum Beach (BC), District of Ucluelet (BC), and City of Windsor (ON).¹³

Conservation Corps Newfoundland and Labrador were awarded MCIP funds to produce adaptation plans for five municipalities in the province through a program called *Engaging and Supporting Municipalities to Build Capacity to Adapt to the Impacts of Climate Change Initiative*. These were Conne River-Miawpukek First Nation, Town of Grand Falls-Windsor, City of Mount Pearl, Town of Port Blandford, and Town of Portugal Cove-St. Philips.

7.1.2 Capacity-building Initiatives

Administered by the Clean Foundation, the Adaptation Initiative was a capacity building and action-planning initiative for seven communities in Nova Scotia (Annapolis County, Cumberland County, Digby County, Kings County, Halifax County, Town of Lockeport, and Yarmouth County). The initiative was generated as a response to several Nova Scotia municipalities expressing concern regarding their vulnerability to climate change impacts, hazards, and risks. One report was produced for all seven communities. The deliverable summarized each stage of the initiative, which included a series of capacity-building and engagement workshops covering risk identification, barrier identification, and action planning for projected climate risks. The workshops developed shared climate literacy, helping staff develop concrete strategies, overcome barriers, and distil municipal action plans with clear timelines.

The Rural Climate Adaptation Capacity Building Project led by the Columbia Basin Rural Development Institute, at Selkirk College produced deliverables for seven municipalities in the Kootenays region of British Columbia, including State of Climate Adaptation reports,¹⁴ three knowledge briefs, and a Community-based Social Marketing Pilot (City of Cranbrook, Village of Silverton, City of Rossland, Regional District of East Kootenay, City of Nelson, Town of Golden, and Regional District of Central Kootenay).

- The aim was to advance climate adaptation literacy and regional-scale action and collaborative learning in the Columbia Basin-Boundary region. This is viewed as best practice, as climate adaptation has regional impacts, and working collaboratively at

¹² The Adaptation Changemakers project is one of two adaptation projects that the Town of Portugal Cove-St. Philips (NL) committed to. The Town partnered with Conservation Corps Newfoundland and Labrador for additional FCM funding for a program to support municipalities in reducing their vulnerability to the impacts of climate change. The two projects supported and enhanced each other.

¹³ Eight Ontario municipalities from the Plans program explicitly referenced the use of the BARC planning tool in their adaptation plans as well. These are: Town of Halton Hills, Region of Waterloo, City of Nanaimo, City of Barrie, City of Cambridge, City of Waterloo, Township of Huron-Kinloss, and City of Kawartha Lakes.

¹⁴ The Regional District of East Kootenay (BC) was the only municipality in the cohort which did not submit one of these reports.

this scale prevents governments from collecting data and building plans in isolation; encouraging collaboration and systemic thinking across jurisdictional boundaries.

- The State of Climate Adaptation reports for each municipality highlight trends and impacts related to the local climate and surrounding environment to inform local planning and decision-making. The reports identify each community's vulnerability to projected climate changes and include areas for further consideration, but no actual actions.
- The knowledge briefs summarised the key themes addressed in cohort activities and training from project. The topics covered ranged from natural asset management, neighbourhood emergency preparedness, low carbon resilience, and asset management. The cohort also produced a report titled "Toward Natural Asset Management in Kootenays: Summary of Inventory Results and Recommendations."

Administered by Nature Québec, the Milieux de vie en santé (MVS) program provided support for five municipalities in Québec emphasizing green infrastructure and nature-based solutions projects aimed at reducing the urban heat island effect and atmospheric pollution (Villes de Lévis, Québec, Victoriaville, Sherbrooke and Drummondville)¹⁵. Three axes of intervention were used to document a range of municipal activities around vulnerability assessment and scenario development: understanding the landscape, mobilization and capacity building, and action support. Nature Québec's guiding principles of the project centre around increasing urban greening, urban canopies, urban biodiversity and reflective surfaces, encouraging active transportation, sustainably managing stormwater, and creating convivial environments.

7.1.3 Natural Asset Technical Reports

The Municipal Natural Assets Initiative (MNAI), working with the Smart Prosperity Institute, created a pan-Canadian cohort to develop Natural Asset Technical Reports for six municipalities spanning British Columbia (City of Courtenay and District of Sparwood), New Brunswick (Town of Florenceville-Bristol, Village of Riverside-Albert, Town of Riverview) and Ontario (City of Oshawa). A natural asset planning framework was applied across all six municipalities, focusing on the risks of increased precipitation and the opportunities to use existing and enhanced ecosystem services to decrease the burden on existing infrastructure and as an adaptation to expanded stormwater/drainage needs. Each of the six municipalities focused on a particular natural asset either related to adapting to

¹⁵ Villes de Drummondville (QC) and Sherbrooke (QC) did not submit a project, and Drummondville did not submit a completion report. Only Ville de Lévis (QC) sent a report outlining the services offered by Nature Québec.

flood risk, enhancing stormwater management, managing erosion, and/or promoting water quality.

Each municipal plan assessed the value of a specific natural asset, ranging in scale from stormwater ponds and riparian areas to floodplains and watersheds, and used the MNAI framework to evaluate the ecosystem services they provide (see Table 25). For instance, the goal of the City of Riverview (NB) was to identify key natural areas within the Mill Creek watershed that could be retained to minimize the need for engineered stormwater management infrastructure and the associated ‘replacement costs’ with expanded drainage and/or new development. Included in this inventory were land cover, forest soils, wetlands, and forest loss. The City of Courtenay (BC) included natural assets as part of a phased flood management strategy that aims to apply a comprehensive and complementary suite of engineered and natural assets to minimize projected flood risks. The Town of Riverview (NB) and District of Sparwood (BC) investigated the value of their nearby watersheds.

Table 25: Breakdown of Service Provided and Scale of Natural Assets in Each Municipality’s Plan

Municipality	Province	Service Evaluated	Scale
City of Courtenay	BC	Reduction in flood risk	Courtenay River floodplain area that transects the City of Courtenay
Town of Florenceville-Bristol	NB	Reduction in soil erosion	Two catchment areas below the St. John River
City of Oshawa	ON	Erosion control from more frequent storm events	Riparian area and stream banks along a 7 km segment of Oshawa Creek
Village of Riverside-Albert	NB	Increased water storage capacity	Two interconnected watersheds (the Arabian Vault)
Town of Riverview	NB	Stormwater management	Mill Creek watershed
District of Sparwood	BC	Erosion and sediment discharge control	Elk River watershed

All reports referenced or explicitly listed the related co-benefits of natural assets, such as reduced infrastructure costs, human physical and social well-being, environmental and biodiversity protection, recreation, and aesthetics, in addition to providing climate-resilient infrastructure that protects from erosion, flooding, extreme weather and heat, and that sequesters carbon over time. The Natural Asset Technical Reports also included recommended next steps: three out of the six plans (Town of Florenceville-Bristol, NB, City of Oshawa, ON, and District of Sparwood, BC) recommended developing a natural asset policy to take steps towards natural asset accounting and management in the municipal context. Integrating and valuing natural assets in municipal accounting and reporting is considered a critical best practice when it comes to the use of NbS for climate planning.

7.1.4 Risk Assessments

Three consultancies - Mining Innovation Rehabilitation and Applied Research Corporation (MIRARCO), Quest, and Institut National de la Recherche Scientifique (INRS) - used cohort-oriented approaches to develop risk assessments.

1. MIRARCO produced five risk assessments in Ontario (Greater Sudbury, City of Thunder Bay, City of Timmins, City of North Bay and City of Sault St. Marie); however, only North Bay and Sault St. Marie had submitted final reports as of May 13, 2021. In this approach, two capacity building workshops were delivered to outline Canadian, regional, and local climate projections and identify priority risks for each municipality assessed in four main categories: people, economy, environment, and city departments. Greater Sudbury, the City of Thunder Bay and City of Timmins produced high-level climate projections data for their communities but had not completed the risk prioritization workshop as of this report's publication.

2. Quest produced six risk assessments across Alberta (City of Cochrane, Town of Devon, Town of Okotoks) and New Brunswick (City of Saint John, Town of Tracadie, and City of Campbellton). Each municipality received an assessment and a set of recommendations for improving community resilience and adapting to climate change, tailored to the local context. Each assessment was structured in the same way, and best available climate projections were used to identify climate hazards for each region. The most common hazards identified were extreme weather, extreme heat, flooding, forest fires, and hazardous materials contamination. Vulnerabilities and risks across ecosystems, infrastructure, and populations were identified. The analysis identified each municipality's strengths, gaps, and opportunities to improve resilience, and the results were used to generate tailored recommendations for each municipality.

3. INRS produced six risk assessments in Québec (Municipalités de Duhamel, Lac-Simon, Papineauville, Plaisance, Ripon, and Saint-André-Avellin). The project proposes ways to better understand and respond to the issue of flooding in the watershed of the Petite-Nation River in the Outaouais region. It includes the implementation of a flood risk management tool and a warning system, an analysis of the impact of climate change on stormwater and flooding, and development of sustainable stormwater management plans. It is being conducted by INRS in partnership with the Petite Nation, Rouge and Saumon river basin organization (OBV RPNS), with the participation of the six municipalities.

7.1.5 Vulnerability Assessments

The Fraser Basin Council produced a Northeast BC Regional Climate Projections Report Vulnerability Assessments for six municipalities within the Peace River region of northeastern BC, as well as Community Scoping Reports¹⁶ (District of Chetwynd, City of Dawson Creek, City of Fort St John, Northern Rockies Rural Municipality, District of Tumbler Ridge, and Village of Pouce Coupe¹⁷). The Climate Projections for BC Northeast Region report was used to assess vulnerability and risk for each municipality. In addition, this report acknowledges the importance of integrated planning in addressing regional impacts. Referring to mitigation as a “key adaptation strategy,” it highlights the importance of viewing risk and emissions reduction as critical parts of integrated planning.

Providing regional climate data and hazard identification to multiple municipalities saved time and resources, generated shared learning about risk and vulnerabilities, and key actions. It also enabled peer exchange in understanding key vulnerabilities and risks in a comprehensive manner (e.g., infrastructure, populations and ecosystems). An initial emphasis on action planning set the municipalities up to build practical adaptation strategies, supporting future opportunities for regional adaptation approaches.

7.1.6 Water Reports

Two Water Reports were created by two different service providers, All One Sky and the Grand River Conservation Authority: one relates to the influence of climate change on water security in a metropolitan area, and the other aims to understand regional climate risks for wastewater treatment plants in five municipalities. Both reports applied climate projections to better understand the influence of climate change impacts on water dynamics,

¹⁶ The Scoping Reports were incomplete and therefore not included as part of this analysis.

¹⁷ Village of Pouce Coupe (BC) did not submit any deliverables.

wastewater and/or drinking water supply, and evaluated the risk of climate change hazards on wastewater and water security.

1. The All One Sky report - “The impact of climate change on water security in the Edmonton Metropolitan Region: A meta-analysis of existing knowledge and information” - presents climate projections in relation to water security in the region, aiming to enhance resilience decision-making among eight partner municipalities in the Edmonton Metropolitan Region (EMR) of Alberta (City of St. Albert, City of Edmonton, Strathcona County, City of Spruce Grove, Town of Stony Plain, Town of Devon, City of Leduc, and the City of Wetaskiwin). The report identifies key hazards related to increased precipitation and higher intensity events, more variable flows, droughts, forest fires, and warmer water temperatures. Risks were identified in terms of their impact on water quality. The report highlights knowledge gaps and uncertainties and provides key messages and recommendations regarding use of the findings and further data collection and research.

2. The Grand River Conservation Authority produced reports for seven wastewater treatment plants - Elora, Elmira, Hagersville, Paris, St. George, Caledonia and Brantford - in five municipalities in Ontario: the Region of Waterloo, City of Brantford, County of Brant, County of Haldimand and the Township of Centre Wellington. The reports summarise climate impacts on inflow and infiltration (I/I) with a view to improving wastewater management facilities and identifying resilience strategies related to flooding, drought, and extreme heat. The next phase of the program will develop strategies to address I/I impacts

7.1.7 Green Infrastructure Visualization, Economic Analysis, and Recommendations

The Green Infrastructure Visualization, Economic Analysis, and Recommendations produced by the Ontario Parks Association built capacity among six municipalities in Ontario (City of Barrie, City of Brampton, City of Guelph, City of London, City of Toronto, and the City of Waterloo) to incorporate green infrastructure into their adaptation strategies. The program consisted of two training courses, a tailored charrette/workshop, aggregated cost-benefit analyses, and the final summary report. Green infrastructure best practices and co-benefits were explained, but were primarily referred to as an adaptation strategy with little to no reference to mitigation potential.

Based on the developed capacity, several next steps were identified for participating stakeholders, including:

- Incorporating green infrastructure costs and benefits into more detailed analyses,
- Identifying strategies to increase benefits from green infrastructure in housing and other developments,

- Encouraging long-term thinking when making decisions,
- Capturing other important benefits into the corporate cost-benefit analysis, and
- Identifying one or more design strategies and elements from the conceptual plans for additional study and implementation.

7.1.8 Drought Plan

Quinte Conservation Association produced one drought plan for the Quinte Region in partnership with nine municipalities in Ontario (City of Quinte West, City of Belleville, Town of Deseronto, Hastings County, Loyalist Township, Marmora and Lake, Town of Greater Napanee, Township of North Frontenac, and Corporation of the Township of Stirling-Rawdon). The plan includes a drought warning plan, four levels of drought action plans for different stakeholders (First Nations, municipalities, the consulting partner/conservation group, and provincial agencies) and different water sources (private wells, central water facilities, water user groups) based on different water levels, as well as post-drought actions. It also includes the role of agencies, actions for drought warning plans, actions for before, during and after a drought, and actions for water use conflicts. Actions mostly related to populations and infrastructure vulnerabilities.

7.1.9 Cost-Benefit Analysis Tool

Ouranos produced a cost-benefit analysis tool for land use planning professionals, called PANACÉES - Plateforme pour l'ANalyse Avantages-Coûts en Érosion et Submersion (Cost-Benefit Analysis Platform in Erosion and Submersion), to reduce the vulnerability of communities to the risk of erosion impacts and geologic events under projected climate change in Québec. PANACÉES is based on a co-construction approach with municipal inputs in support of scientific advances, co-creating relevant user information to support better decision-making in the choice of coastal interventions. Ecosystem services are included as well as the cost of adaptation measures and projected social and economic impacts. This decision support tool provided relevant and consistent data in the development of MRC de La Mitis (QC) and MRC de Rivière-du-Loup (QC) climate action plans.

7.2 Identifying the Strategic Use of Co-Benefits

A high-level review showed that co-benefits were mentioned in 11 of the 15 submitted cohort projects. Four cohorts simply referenced co-benefits while seven explicitly applied them in their projects. The cohorts that explicitly applied co-benefits did so mostly in their adaptation plans, natural asset technical reports, and green infrastructure recommendations, which directly linked co-benefits to their actions or projects. For

instance, projects related to green infrastructure and natural assets explicitly refer to benefits to human health and biodiversity in addition to climate-readiness.

Co-benefits were not used in the same way across cohorts (MIRARCO, ICLEI, Fraser Basin Council, and Conservation Corps Newfoundland and Labrador) (see Table 26 below).

Table 26: Breakdown of 15 Cohorts and Their Use of Co-Benefits in their Projects

Do Not Use Co-Benefits (9)	Only Reference Co-Benefits (4)	Explicitly Use Co-Benefits (7)
Clean Foundation (Adaptation Initiative)	ICLEI (2/8 Adaptation Plans): Town of Caledon and City of Peterborough	ICLEI (6/8 Adaptation Plans): Towns of Conception Bay South Portugal Cove St. Philips and Qualicum Beach, Cities of Prince George, Ucluelet, and Windsor
Fraser Basin Council (Climate Projections for BC Northeast Region)	Fraser Basin Council (Vulnerability Assessments)	Ontario Parks Association (Green Infrastructure Visualization, Economic Analysis, and Recommendations)
MIRARCO (3/5 Risk Assessments): Greater Sudbury, Timmins, Thunder Bay	MIRARCO (2/5 Risk Assessments): North Bay and Sault Ste. Marie	Smart Prosperity Institute (Natural Asset Technical Reports)
Quest (Risk Assessments)	Conservation Corps Newfoundland and Labrador (3/5 Adaptation Plans): Mount Pearl, Port Blandford, Portugal Cove-St. Philips	Ouranos Inc. (Cost-Benefit Analysis Platform in Erosion and Submersion)
Grand River Conservation Authority (Water Report)		Selkirk College (Knowledge Briefs)

All One Sky (Water Report)		Nature Québec (greening projects)
Quinte Conservation Association (Drought Plan)		
Conservation Corps Newfoundland and Labrador (2/5 Adaptation Plans): Conne River, Grand Falls-Windsor		
Institut National de la Recherche Scientifique (Risk Assessments)		

7.3 The CAPG Experience

Fifteen CAPG projects were funded, spanning regional to provincial to Canada-wide scales (see Table 27). The completion reports were queried to assess the cohort experience among all fifteen projects and were used to identify Key Success Factors (KSFs). The completion reports were self-reporting questionnaires developed for project leads and participants by MCIP to get a sense of benefits, challenges and key successes of the CAPG program, and were filled out by the service providers, not the municipalities.

Table 27: Geographic Distribution of CAPG Projects

Project Types (# of deliverables)	Consultant	Geography
Water Report	Grand River Conservation Authority	Regional, AB
Water Report	All One Sky	Regional, AB
Vulnerability Assessments	Fraser Basin Council	Regional, BC

Capacity-building Initiative (Knowledge Briefs and State of Climate Adaptation)	Selkirk College	Regional, BC
Adaptation Plans	Conservation Corps Newfoundland and Labrador	Regional, NL
Green Infrastructure Visualization, Economic Analysis, and Recommendations	Ontario Parks Association	Regional, ON
Drought Plan	Quinte Conservation Association	Regional, ON
Cost-benefit Analysis Tool	Ouranos Inc	Regional, QC
Capacity-building Initiative (greening projects)	Nature Québec	Regional, QC
Risk Assessments	Quest	Across Canada
Capacity-building Initiative (Adaptation Initiative)	Clean Foundation	Same Province, NS
Risk Assessments	MIRARCO	Same Province, ON
Adaptation Plans	ICLEI	Across Canada
Natural Asset Technical Reports	Smart Prosperity Institute & MNAI	Across Canada

7.3.1 Top 5 CAPG Enabling Factors

The most consistently identified success factors related to relationships with the consultants and fellow stakeholders/municipalities. As many of the municipalities were small and already struggling with lack of capacity and resources and low political will from Council and staff members, many found that the CAPG funding, in combination with pressure from the public to act on climate change, helped to spur action that would likely not have occurred otherwise. Participants appreciated applying an established framework and methodology to develop their capacity. Quality consultants that were able to provide this and to respond to the contextual needs of participants, helped to mobilize smaller municipalities with little to no climate action experience to advance their climate adaptation planning. The top five key success factors are:

1. Flexibility and adaptability with service providers,
2. Using established framework and methodology,
3. Climate-related events provided windows of opportunity to find funding and apply political pressure to pursue climate action,
4. Appointing a consistent and dedicated liaison with the service providers, and
5. Engagement and peer learning helped to build the capacity of staff in this cohort model, especially when from the same region.

7.3.2 Top 10 Positive Outcomes of CAPG

Municipalities greatly benefitted from the cohort experience and identified many positive outcomes. Most communities particularly appreciated the networking, partnerships and knowledge acquisition that resulted from the cohort-based approach.

The top ten cited success factors of this approach are as follows:

1. Developed collaboration, peer networking, and unique partnerships.
2. Created forums and committees that otherwise would not have existed.
3. Developed plans with practical policies and plan implementation in mind.
4. Helped with knowledge acquisition, filling knowledge gaps, and building capacity and literacy.
5. Provided access to advice and resources.
6. Promoted regional alignments, preventing project duplication and saving resources (e.g., one climate projections report for multiple municipalities).
7. Improved capacity for climate communication internally and externally.
8. Developed thinking about increased resilience in planning over time.
9. Developed and/or identified case studies/best practice for the region.
10. Moved toward implementation as a cohort.

Again, considering that many smaller communities were involved in CAPG, there was a full appreciation of the fact that the project would not have occurred without the joint procurement model.

7.3.3 Top 7 Challenges & Barriers of CAPG

Most of the challenges of the cohort-based approach centred around lack of capacity, resources, and time, despite the MCIP funding. In addition, several municipalities found that there was a lack of support from the public and from municipal staff, who did not see climate change as a priority. In addition, maintaining engagement and peer exchange was identified as a struggle for municipalities that were not in the same local area. The top seven challenges and barriers identified relate to:

1. Need for more time for planning due to complexity and competing priorities.
2. Organizational pressures (elections, staff turnover, etc.).
3. Lack of staff capacity to be consistently involved; in particular, a lack of climate and sustainability expertise and resources, especially in smaller municipalities.
4. Lack of understanding of and/or scepticism about climate change among senior leadership.
5. Remote sessions, due to Covid or regional distribution, not being as impactful as in-person sessions.
6. Difficulty maintaining momentum and engagement due to number of partners, competing priorities, and across distances and/or time zones.
7. Different capacities and competencies in the cohort meant municipalities were at different stages.

7.3.4 Top 5 Improvements for the Future of CAPG

Regarding future improvements, some municipalities would have appreciated more time, a clear methodological framework and process, and an advanced schedule. Unprecedented circumstances brought on by COVID-19 (2020-2021) contributed to additional delays.

The service providers stated five key areas for improvement wherever possible:

1. More time devoted to the planning and scheduling process.
2. Clear methodological framework, process and schedule (provide templates, etc.).
3. Point person at the municipality to spearhead project.
4. More resources for smaller communities to participate.
5. More in-person sessions where possible.

7.3.5 Key Lesson: Joint Procurement and Collaborative Approaches Generate Climate Momentum in Smaller Communities

Cohort municipalities in the same region that utilized the same climate data and projections jointly procured relevant data at a fraction of the cost and time than they would have otherwise. In particular, small municipalities gained the ability to develop risk and/or vulnerability assessments and natural asset/green infrastructure inventories. With the Fraser Basin Council project, for instance, six municipalities completed vulnerability assessments using one regional climate change projections report. This experience saved both time and resources and ensured a level of regional capacity building that likely would not have occurred otherwise.

7.3.6 Key Lesson: Regional Cohorts Offer More Streamlined Services

It was noted that this type of cohort approach is most valuable when communities are in the same geographic area. In more widely distributed projects, diverse hazard exposure, unique vulnerabilities, and different risk priorities presented challenges to service providers to get beyond the varied climate and modelling data and into more specifics about municipal needs and priorities (e.g., demographic and regulatory structures). For instance, in the case of natural assets, the types being considered led to widely varied modelling needs:

- MNAI and Smart Prosperity Institute (producing Natural Asset Technical Reports) reported collaborative challenges with participating municipalities across the country because the scenarios and modelling needs were very different based on risk and vulnerabilities particular to each geographic region.
- MIRARCO (producing Risk Assessments) also found geographic distance to be a challenge due to differences in economic and demographic structures, as well as a lack of exposure to each other's work since interactions occurred digitally.

It was suggested that convening municipalities based on geographic proximity and similar projected climate impacts would help to streamline capacity-building and assessment processes.

7.3.7 Identified Next Steps

Strategic next steps to help ensure that the value of the CAPG program is mobilized are:

- Maintain communication with municipalities from the cohorts to build momentum and maintain committee engagement.
- Begin early to identify funding for implementation - plans are only successful when they are implemented.
- Identify best practices for incorporating findings and results into existing and future projects, plans, reports, etc., across the municipal organization to help facilitate implementation.
- Share knowledge and resources, including both successes and challenges, using a mixture of online methods and in-person events.

7.4 Equity Considerations in CAPG

Five CAPG cohorts considered equity in their projects:

- **Greening projects aim to create favourable environments for human health, particularly for vulnerable populations, in a changing climate (Nature Québec).**

- **The importance of understanding impacts on and responses for vulnerable populations are among areas for further considerations in the State of Climate Adaptation Reports (Selkirk College, BC).** They recommend publicly accessible buildings or refuges as a response to poor air quality and extreme heat events, since rural communities may have few locations if any that would be suitable. They note that while this is not a legislated responsibility for local governments, they can play a supportive role in establishing these facilities.
- **Equity considerations are included in actions relating to wildfire and emergency response (Conservation Corps Newfoundland and Labrador).**
- **Adaptation plans include an Impact Prioritization piece, where community climate impacts are prioritized based on Vulnerability and Risk Assessments (ICLEI Canada).** Each impact was ranked based on its total social, economic, and environmental consequences, its overall risk ranking, and its vulnerability level. Social impacts take into the account those groups that are more impacted by climate impacts.
- **Equity is used as a goal of the Green Infrastructure Visualization, Economic Analysis, and Recommendations, and access to green space with a focus on equity is a guiding principle of the plan (the Ontario Parks Association).** Community-based urban agriculture projects are recognised as being able to help support environmental equity and justice.

7.5 Nature-based Solutions in CAPG

Six of the 13 analysed CAPG cohorts include NbS. All eight municipal adaptation plans guided by ICLEI Canada included NbS, and the Municipal Natural Assets Initiative (MNAI) worked with six municipalities to protect natural assets, such as forests, foreshores, and riparian areas, to support municipal stormwater drainage and flood protection services. For instance, the Town of Florenceville-Bristol (NB), the City of Oshawa (ON), and the District of Sparwood (BC) used catchment areas, riparian areas, and natural ponds to reduce soil erosion. Four of the adaptation plans from the Conservation Corps Newfoundland and Labrador cohort had at least one action using NbS, with the exception of Town of Portugal Cove-St. Philips (NL). They align with NbS actions found in other plans in other programs.

The Ontario Parks Association cohort worked with six Ontario municipalities on green infrastructure solutions for site-specific systems such as rain gardens, green roofs, and street trees. For instance, the City of Brampton proposed to convert the Riverstone Golf Club into a recreation facility, re-naturalizing the golf course to create a conservation area

with recreational trails featuring 10,000 trees and a naturalized floodplain and wetland area with educational features.

Selkirk College produced a knowledge brief and a report on natural asset management for municipalities in the Kootenays region of southeastern British Columbia. The *Toward Natural Asset Management in Kootenays: Summary of Inventory Results and Recommendations* report summarizes the results of a project to develop natural asset inventories with six local governments, and documents steps they can take to implement full natural asset management initiatives. It also includes a natural assets inventory.

Nature Québec’s *Milieux de vie en santé (MVS)* program provided support for five municipalities in Québec emphasizing green infrastructure and NbS projects aimed at reducing the urban heat island effect and atmospheric pollution (Villes de Lévis, Québec, Victoriaville, Sherbrooke and Drummondville).¹⁸ Strategies focused on increasing urban greening, canopies, biodiversity and reflective surfaces, encouraging active transportation, sustainably managing stormwater, and creating convivial environments. For example, Ville de Lévis proposed a greening project at the Parc Saint-Laurent with the aim to preserve biodiversity, increase canopy index, optimize rainwater management, and improve user experience.

Table 28: Use of NbS in Adaptation Plans by ICLEI Canada and by Conservation Corps Newfoundland & Labrador

ACTIONS AND STRATEGIES	MUNICIPALITIES
Incorporate natural assets or green infrastructure in design and stormwater management or development projects to reduce flood risk (8)	ICLEI: Town of Caledon, Conception Bay South and Qualicum Beach, District of Ucluelet, Cities of Peterborough, Prince George, and Windsor Conservation Corps NL: City of Mount Pearl
Expand tree planting to reduce extreme temperatures and stormwater risk (7)	ICLEI: Towns of Caledon, Conception Bay South and Portugal Cove St Philips, Cities of Prince George, Peterborough, and Windsor Conservation Corps NL: City of Mount Pearl
Minimize hazardous land acquisition to prevent flood risk, sea level rise, or erosion (5)	ICLEI: Cities of Peterborough, Windsor and Prince George, District of Ucluelet, Town of Caledon

¹⁸ Ville de Drummondville (QC) and Shrebrooke (QC) did not submit a project, and Drummondville did not submit a completion report. Only Ville de Lévis (QC) sent a report outlining the services offered by Nature Québec.

Improve existing green infrastructure/tree canopy to reduce risk of extreme temperature and extreme weather (4)	ICLEI: Town of Caledon and Ucluelet, Cities of Prince George and Windsor
Low-impact development and green infrastructure practices/development to address geologic and flooding hazards (5)	ICLEI: Cities of Peterborough and Windsor, Town of Qualicum Beach Conservation Corps NL: Conne River – Miawpukek First Nation, Town of Port Blandford
Create edible landscapes to increase food security (2)	ICLEI: Cities of Peterborough and Prince George
Plant native trees (3)	ICLEI: Towns of Conception Bay South and Qualicum Beach, City of Windsor
Vegetation impact around interface zones to reduce impact from large scale fire (1)	Conservation Corps NL: Town of Grand Falls-Windsor
Wetlands on private properties adjacent to river and tributaries (1)	Conservation Corps NL: City of Mount Pearl
Green infrastructure inventory and assessment	Conservation Corps NL: City of Mount Pearl

Table 29: Use of NbS in Natural Asset Technical Reports by the Municipal Natural Assets Initiative & Smart Prosperity Institute

ACTIONS AND STRATEGIES	MUNICIPALITIES
Reduce flood risk using floodplain	City of Courtenay
Reduce soil erosion using catchment areas	Town of Florenceville-Bristol
Erosion control from more frequent storm events using riparian area and stream banks	City of Oshawa
Increased water storage capacity using two interconnected watersheds	Village of Riverside-Albert
Stormwater management using watershed	Town of Riverview
Erosion and sediment discharge control using natural pond at the outlet of a culvert	District of Sparwood

Table 30: Use of NbS in Green Infrastructure Visualization, Economic Analysis, and Recommendations by the Ontario Parks Association

ACTIONS AND STRATEGIES	MUNICIPALITIES
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Site and neighbourhood-specific systems that feature living and engineered elements designed to manage stormwater and provide other benefits, such as rain gardens, green roofs, and street trees	Cities of Barrie, Brampton, Guelph, London, Toronto, and Waterloo
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Table 31: NbS Actions in Milieux de vie en santé (MVS) program by Nature Québec

ACTIONS AND STRATEGIES	MUNICIPALITIES
Green alleys Greening public spaces (urban oasis)	Ville de Québec
Greening parking lot	Ville de Victoriaville
Green alleys Green parking lots Urban parks	Ville de Lévis

8. Climate and Asset Management Network

The Climate and Asset Management Network (CAMN) funds were focused on ways to embed climate-readiness into municipal asset management. All 20 cohort municipalities were English communities and submitted reports as part of this funding program, producing a total of 29 reports/plans and 26 completion reports, all of which were coded and analyzed.

The program had two phases organized by FCM through workshops, seminars and online learning in a cohort setting. Phase 1 related to the development of a new asset management policy, strategy and governance framework, or the amendment of an existing framework. Phase 2 supported municipalities to put lessons learned into action, for example, through a Levels of Service (LoS) report.

Eighteen municipalities were funded under Phase 1, and seven under Phase 2 (see Table 32); two municipalities did not submit reports. County of Grand Prairie (AB) submitted an incomplete Phase 1 completion report, and a maturity report of work to date, but no plan for Phase 1. The District of North Vancouver (BC) submitted a completion report for Phase 2, but no report to accompany it.

Seven municipalities submitted documentation for both Phase 1 and Phase 2 of the funding program: the City of Saint John (NB), District of North Vancouver (BC), City of Thunder Bay

(ON), City of Kitchener (ON), City of Kenora (ON), City of Guelph (ON), and Cowichan Valley Regional District (BC).

Table 32: CAMN Projects Completed to Date

MCIP Deliverables		Total expected	No. Submitted	No. Coded & Analysed	No. of CR Submitted	No. of CR Coded & Analysed	Proportion Deliverables Analysed	Proportion CR Analysed
CAMN	English	20	20	20	26	26	100%	100%
	French	0	0	0	0	0		
Total		20	20	20	26	26	100%	100%

Table 33: Phase 1 & 2 Projects

Phase 1	Complete	Incomplete	Total
Asset Management strategies/policy/frameworks	18	0	18
Phase 2			
Projects	7	0	7

Asset management can emphasize either adaptation and mitigation across built and natural assets, or both together. For instance, a mitigation approach evaluates energy and emissions from existing facilities, buildings and fleets. An adaptation approach evaluates the resilience of these assets and their levels of service under the projected impacts of climate change over time to better vulnerabilities, key risks, and opportunities to extend the operational lifespan and/or a new investment. Assessing both resilience-building and low carbon solutions at the same time in planning and decision processes is called a low carbon resilience (LCR) approach and is considered best practice in asset management. The identification and condition assessment of natural assets addresses both adaptation and mitigation. Using NbS to minimize flood and heat risks, sequester carbon, avoid emissions and costs of expanded infrastructure is a low carbon resilient strategy, as it can absorb excess rainfall and/or heat, help to extend the lifespan of infrastructure (e.g. retention ponds) and lower cooling/heating emissions (e.g. shading) over time.

The adaptation or mitigation plan coding frameworks outlined in section 4 were applied to the CAMN plans depending on area of focus. The cohort experience and project methodologies were coded in and analyzed from the completion reports. In addition to co-benefits and LCR flags, codes were used to identify where and how natural assets were referenced within the reports, and in what level of detail. Query terms for adaptation and mitigation specifically for CAMN were refined and added to the Lexicon (see Appendix 6).

Identifying whether Phase 1 reports were new asset management frameworks or amendments to existing ones helped to identify how climate change was integrated in asset management planning. The plans from Phase 1 are a combination of existing and new plans (see Table 34). Eight plans were revised from existing asset management or policy documents, and 12 plans were created specifically because of the MCIP funding.

Table 34: CAMN Phase 1 - Municipalities that Integrated Climate Change into Existing Asset Management Frameworks vs Creating New Ones

Asset Management Framework	Municipality
Existing	City of Prince George
	City of Saint John
	City of Kitchener
	City of New Westminster
	Cowichan Valley RD
	City of Kenora
	City of Yellowknife
	District of North Vancouver
New	City of Corner Brook
	City of Saskatoon
	Capital RD
	City of Selkirk
	District of Summerland
	City of Wetaskiwin
	Cowichan Valley RD
	Township of Langley
	City of Guelph
	City of Kenora
	City of Kitchener
	City of Saint John

8.1 CAMN Phase 1 Highlights

Both Phase 1 and 2 reports were coded, however the reports submitted for each Phase address different project types. The following findings are split into two parts: the first analyses Phase 1 documentation and the second analyzes Phase 2 submissions.

8.1.1 Adaptation Coding in Phase 1

Submitted Phase 1 reports include Corporate Management Asset Strategies and Policies, Asset Management Strategies, a Maturity Report, State of Infrastructure report, and a Capital Prioritization Process report. Table 35 below summarizes the different reports and communities that have provided documents for Phase 1.

Table 35: Submitted Phase 1 Documents by Municipality

Document Type	Municipality
Asset Management Strategy/Framework	City of Corner Brook
	City of Prince George
	City of Saskatoon
	City of New Westminster
	Capital RD
	City of Yellowknife
	City of Guelph
	District of Summerland
	City of Thunder Bay
Corporate Policy or Plan	Town of Halton Hills
	City of Thunder Bay ¹⁹
	City of Kitchener
	Cowichan Valley RD
	District of North Vancouver
	City of Wetaskiwin
	City of Selkirk
	City of Toronto
State of Infrastructure Report	City of Saint John
Capital Prioritization Process	City of Kenora
Maturity Report	County of Grand Prairie ²⁰

Adaptation considerations were coded under three categories: integration of climate projections and hazards, plan integration, and other considerations. Plan integration evaluated whether submitted documents were integrated within existing statutory, corporate strategy and planning, and/or or climate-related documents. Other

¹⁹ City of Thunder Bay (ON) submitted an Asset Management report, which focused on an analysis of data, software and hardware used by their staff for asset management in addition to their policy document.

²⁰ County of Grand Prairie (AB) provided an incomplete completion report, and the submitted Phase 1 report was a document outlining progress and work to date on the development of an asset management plan.

considerations coded for actions or strategies that did not fit within the previous two coding sectors (see Table 36).

Table 36: Climate Change Adaptation Project Types in Municipal Asset Management

Coding	Municipality
Other Considerations (10)	City of Prince George
	City of Thunder Bay
	City of Kitchener
	City of New Westminster
	District of North Vancouver
	City of Selkirk
	City of Toronto
	Cowichan Valley RD
	Capital RD
	District of Summerland
Plan Integration (10)	City of Corner Brook
	Town of Halton Hills
	City of Prince George
	City of Saskatoon
	City of Thunder Bay
	City of Kitchener
	City of New Westminster
	Capital RD
	District of North Vancouver
	Cowichan Valley RD
Climate Change Hazards (8)	City of Selkirk
	Town of Halton Hills
	City of Prince George
	City of Thunder Bay
	City of Kitchener
	Capital RD
	Cowichan Valley RD
	City of New Westminster

Municipalities that integrate climate change into existing areas of asset management and municipal core service delivery are considered best practice in asset management for aligning climate vulnerability and risk and energy efficiency and emissions reduction over

time. For instance, in the corporate policy documents from the City of Thunder Bay (ON), City of Toronto (ON), and Cowichan Valley Regional District (BC), climate risks and vulnerabilities for assets and potential adaptations with social, economic, and environmental co-benefits were noted as key considerations for a renewed asset management policy. In the Cities of Thunder Bay (ON) and Toronto (ON), the anticipated costs of climate impacts and identified adaptation and mitigation opportunities were aligned with disaster planning and contingency funds. In the Cities of Saskatoon (SK), Thunder Bay (ON), New Westminster (BC) and the Cowichan Valley Regional District (BC), integrating adaptation and mitigation strategies from other climate action documents with strategic asset management strategy and processes ensured that climate change and asset management strategies were aligned.

Climate impact and risk assessment, emissions reduction opportunities, and natural assets

Different methods were used to identify climate vulnerabilities and risks in asset management. In some cases, a risk and vulnerability assessment was conducted to better understand climate impacts on assets and services, such as in the City of Prince George (BC), Town of Halton Hills (ON), and City of Kitchener (ON). In other cases, emissions reduction goals and natural assets were integrated into decision making, such as in the Cowichan Valley Regional District (BC), City of Prince George (BC), and District of North Vancouver (BC). Of note, natural asset inventories and assessments could be used as either an adaptation or mitigation strategy. Best practice is to apply criteria for both in asset management, referred to as a low carbon resilience approach.

The use of policy statements

Some municipalities provided broad policy statements around the need to consider climate change impacts, hazards and risks in asset management planning. The City of Prince George (BC) suggested a review of regulations and design standards for updates to support climate change adaptation and mitigation goals as necessary. The City of Kitchener (ON) acknowledged climate risk factors for assets and the need for adaptation strategies to secure assets and enhance asset lifecycles over time. The City of New Westminster (BC) provided a statement that directs decision makers to consider environmental and climate factors over the life cycle of a proposed asset. All three municipalities aimed to advance policies that address climate change in asset management, providing guidance and directing decision-making to consider adaptation and resilience in asset management.

Climate risk identification and prioritization, with limited adaptation strategies.

Eight municipalities identified climate change hazards as a concern, and specific areas of risk, but were not explicit about adaptation responses across assets. The City of Selkirk (BC) was the only municipality that provided direct actions to address asset vulnerabilities

related to flood risks from increased precipitation (see table 37 below), including upgrades to existing drainage infrastructure to manage future increases in rainfall and water flow. The remaining municipalities provided broader climate change actions that consider the impacts on their assets and potential integration with asset management; however, there is a lack of direct actions identified in many of the asset management plans. Some municipalities, such as the Cities of Prince George (BC) and New Westminster (BC), propose future adaptation integration work, and the Town of Halton Hills (ON), City of Kitchener (ON), City of Thunder Bay (ON) and Capital Regional District (BC) are looking to consider climate impacts within decision making.

Table 37: Climate Hazards and Adaptation Actions Addressed in Phase 1 Reports

Hazard Type	Municipality	Actions
Flooding	City of Selkirk	<ul style="list-style-type: none"> ● Sewers: separate combined sewers to better manage increased stormwater based on climate change data. ● Land drainage: identification of areas that may be over capacity based on future precipitation predictions to be prioritized for service.
Statement/ actions directed at climate change	Town of Halton Hills	<ul style="list-style-type: none"> ● Town needs to be aware of changing issues such as increased peak demands on the stormwater system and will implement strategies to deal with any issues as they occur.
	City of Prince George	<ul style="list-style-type: none"> ● Integrate vulnerability to climate change into the City's risk frameworks and management processes. ● Climate change impacts are considered in capital planning decisions. ● Conduct a high-level climate change vulnerability and risk assessment for each major asset class to identify significant issues. ● Conduct a review of City regulations and design standards and identify opportunities for updates to support climate change adaptation and mitigation goals.
	City of Kitchener	<ul style="list-style-type: none"> ● Risk factors associated to climate change are also analyzed and integrated into adaptation strategies.

	City of New Westminster	<ul style="list-style-type: none"> • Listed potential factors due to changing climate/environment. • Protect against land use related hazards and associated risks (OCP policy: emergency management programs that protect infrastructure from hazards). • Formalizing a commitment to integrate climate change response with implemented asset management practices.
	Capital RD	<ul style="list-style-type: none"> • Acknowledges the more frequent weather-related events due to climate change. • Levels of service need to consider long and short-term delivery requirements as they relate to climate change.
	City of Thunder Bay	<ul style="list-style-type: none"> • Consider the social, economic, and environmental risks and vulnerabilities of municipal infrastructure assets including risks relating to climate change and the actions that may be required.
	Cowichan Valley RD	<ul style="list-style-type: none"> • Conducted a risk assessment for asset systems and provided a table summarizing the climate risk and service area impacts.

8.1.2 Mitigation Coding in Phase 1

Phase 1 reports that address emission reductions as part of their asset management planning were coded based on the mitigation coding framework noted in section 4). Strategic mitigation actions were identified across five emissions sectors, related to improving energy efficiency and lowering emissions in design standards, transitioning to zero-carbon transportation, managing levels of service while considering GHG emissions, and diverting waste (see Table 38). The City of Prince George (BC) identified a suite of actions relating to efficiency in design standards for new buildings, advancing low impact design and planning decisions, and ensuring that energy and emissions are part of asset management and levels of service planning.

Table 38: Key Sectors and Mitigation Actions Addressed in Phase 1 Reports

Sector	Municipality	Actions
Solid Waste	City of Corner Brook	<ul style="list-style-type: none"> Wastewater improvements through conservation and quality. Develop and implement plans to reduce 5% of solid waste through diversion of waste.
	District of Summerland	<ul style="list-style-type: none"> Recycling depot is an existing asset.
Buildings	City of Prince George	<ul style="list-style-type: none"> Replacement of assets with energy efficient and low emission replacements. Land use decisions that consider energy use/GHG emissions. Update city regulations/design standards to align with mitigation goals.
Transportation	City of Corner Brook	<ul style="list-style-type: none"> City fleet that will move towards eco-friendly sustainable transportation.
Infrastructure	City of Corner Brook	<ul style="list-style-type: none"> Roof top gardens (strategic priority).
	City of Prince George	<ul style="list-style-type: none"> Replacement of assets with energy efficient and low emission replacements.
	City of Selkirk	<ul style="list-style-type: none"> Development and data collection of pathways for interconnection with active transport and sidewalk network.
	District of Summerland	<ul style="list-style-type: none"> EV charging stations are an existing asset Reporting for GHG emissions on districts infrastructure.
Energy	City of Corner Brook	<ul style="list-style-type: none"> Renewable energy (strategic priority).
	City of Prince George	<ul style="list-style-type: none"> Use renewable energy to provide space heating and hot water to 11 downtown buildings.
Policy statements about mitigation,	City of Saskatoon	<ul style="list-style-type: none"> Development of plans (i.e., mitigation and adaptation) that contribute to emission reduction/mitigation outside the AM plan/policy.

without actual actions		<ul style="list-style-type: none"> • Medium- and long-term goals are to continue incorporation of climate change mitigation goals/strategies.
	City of New Westminster	<ul style="list-style-type: none"> • Reduce transportation energy use and related GHG emissions (no actual strategies given for how to do this). • Ensure relevant policies are included in the AMP. • Reducing ecological footprint. • OCP related policy (tied to transportation assets): reduce transportation energy use and related GHG emissions.
	Capital RD	<ul style="list-style-type: none"> • Define, maintain, and manage LoS (Levels of Service) that consider GHG emissions.
	District of North Vancouver	<ul style="list-style-type: none"> • Take actions to reduce carbon emissions.
	County of Grand Prairie	<ul style="list-style-type: none"> • Will consider the environment and manage assets to be sustainable and factor in impacts on environment
	City of Toronto	<ul style="list-style-type: none"> • The City will consider mitigation approaches to climate change including GHG emissions reduction goals and targets
	City of Thunder Bay	<ul style="list-style-type: none"> • Consider the social, economic, and environmental risks and vulnerabilities of infrastructure assets, and actions, including mitigation approaches.
	Cowichan Valley RD	<ul style="list-style-type: none"> • Guiding principle for the AM development includes mitigation strategies for evaluating actions and alternatives
	City of Guelph	<ul style="list-style-type: none"> • AM objectives: implement appropriate climate change mitigation strategies to manage risks

8.1.3 Incorporating Natural Assets in Phase 1

Natural Assets are recognized as a best practice for climate action due to the integration of adaptation and mitigation benefits. There were two different depictions of natural assets:

1) those that support broad municipal service delivery, relating to drainage and other infrastructure service enhancement (see Table 39 below), and

2) those identified as green spaces via recreational areas and parks (see Table 40 below).

Table 39: Broad Use of Natural Asset Strategies across Municipal Asset Management and Service Delivery

Actions and Strategies	Municipality
Use of NA for stormwater management	City of Corner Brook
Use of green buildings/Infrastructure	City of Corner Brook
	City of New Westminster
	City of Yellowknife
Integration of NA into AM plan and service delivery	City of Prince George
	City of Saskatoon
	District of North Vancouver
	City of New Westminster
Development of Natural Asset Plan and or Green Infrastructure Plan	City of Prince George
	District of Summerland
	City of Saskatoon
Build a NA inventory	City of New Westminster
	District of Summerland
	City of Prince George
	City of Selkirk
Inclusion of NA within principles, goals, or objectives for AM plan	City of New Westminster
	City of Yellowknife
	District of North Vancouver
	City of Yellowknife
Policy related to NA	City of Corner Brook
	City of Selkirk
Updating existing design standards or development regulations to include NA	City of Prince George
	City of Corner Brook

Table 40: Specific Identification and Inventory of Natural Assets, as Green and Outdoor Spaces, in Parks and Recreation

Actions and Strategies	Municipality
Provision of outdoor spaces and parks, or listing their park and open space assets	City of Kitchener
Development of Master plans or Service level reports for parks and recreation	City of Saskatoon
Inventory of park and open space attributes (no mention of NA or use of them outside leisure)	City of Thunder Bay
Mention of NA, but no detail provided in their strategic application	Capital RD
	Cowichan Valley RD
	District of North Vancouver
	City of Toronto
	City of Wetaskiwin

8.2 CAMN Phase 2 Highlights

Phase 2 CAMN funds were designed to facilitate engagement in key climate change and asset management areas that required more analysis. These funds were applied to municipal Levels of Service reports, Asset Management Reviews and Recommendations, ArcGIS tools, and Climate Change Risk Assessment Frameworks (see Table 41).

Table 41: CAMN Phase 2 Report Types across Municipalities

Report Type	Municipality
Levels of Service (LoS) report	Cowichan Valley RD
	Township of Langley ²¹
	City of Guelph
Climate Change Risk Assessment Framework	City of Kenora
Arc GIS tool (no report in file)	District of North Vancouver ²²
Level of Service framework progress report	City of Kitchener
AM Data review and recommendations/Condition Rating Manual/Risk Rating Manual	City of Saint John

²¹ Township of Langley (BC) provided a Levels of Service report for their park operations only.

²² District of North Vancouver (BC) noted their Phase 2 application is for an ArcGIS tool; no documentation was provided to support this planned Phase 2 project.

8.2.1 Adaptation Coding in Phase 2

Reports that included climate projection and hazards, plan integration, and other considerations were coded using the adaptation framework outlined in previous sections (see section 4). The reports submitted for Phase 2 were more comprehensive in their coverage of climate change hazards and risks than in Phase 1. Comprehensive levels of service analysis require a breakdown of the factors that influence a municipalities level of service over time, including age-based deterioration of infrastructure and projected climate hazards and impacts. Different hazards were addressed in asset management and risk assessments were initiated (see Table 42). For instance, the Cities of Kenora (ON) and Saint John (NB) submitted a climate risk assessment report in addition to their Levels of Service reports, providing an analysis of projected impacts to assets and services at a more granular scale. Cowichan Valley RD (BC) and the Township of Langley (BC) addressed both resilience and low carbon goals in policy changes, levels of service accounting, and investment planning.

Table 42: Breakdown of Actions Found in Phase 2 Reports Addressing Climate Change Hazards

Hazard Types	Municipality	Actions
Flooding	City of Guelph	<ul style="list-style-type: none"> • Use of hydraulic modelling to understand resiliency of wastewater, storm sewer and stormwater network to adverse weather events.
Extreme Temperature	Township of Langley	<ul style="list-style-type: none"> • Use of heat- and drought-resistant vegetation when selecting designs and making capital planning decisions.
Drought	Township of Langley	<ul style="list-style-type: none"> • Use of heat- and drought-resistant vegetation when selecting designs and making capital planning decisions.
Extreme Weather	City of Saint John	<ul style="list-style-type: none"> • Evaluation of weather-related risk events for historic and expected future climate conditions to help identify asset vulnerabilities. • Quantifying historic environmental loads related to rainfall, wind speed, storm surges, sea level, flood inundation, and extreme/average temperatures.
	City of Guelph	<ul style="list-style-type: none"> • Use of wastewater hydraulic model to determine resilience of the network for flooding and environmental impacts.

		<ul style="list-style-type: none"> Stormwater and sewer network hydraulic model should be completed to determine resilience of stormwater network to wet weather events.
Climate hazards referenced, with no specific adaptation actions	City of Saint John	<ul style="list-style-type: none"> Provided a table listing all potential climate hazards with intent to address response through future workshops.
	City of Kenora	<ul style="list-style-type: none"> Risk models used to determine potential risks from climate change and extreme weather events.
		<ul style="list-style-type: none"> Tables highlighting the assets that have been determined to face the greatest threat from extreme weather events, with risk rating for each.
		<ul style="list-style-type: none"> Identification of problem areas identified flooding impacts from repeated and frequent extreme weather events. Risk identification helps to assign failure rating to assets located in these problem areas.
	Cowichan Valley RD	<ul style="list-style-type: none"> Through a risk assessment sea level was identified and the anticipated service impacts and Level of Service (LoS) impacts were listed.
		<ul style="list-style-type: none"> Through a risk assessment longer and more intense storms were identified and the anticipated service impacts and LoS impacts were listed.
		<ul style="list-style-type: none"> Through a risk assessment warmer and drier were identified and the anticipated service impacts and LoS impacts were listed.

8.2.2 Mitigation Coding in Phase 2

Phase 2 reports that address emission reductions as part of their asset management planning were coded based on the mitigation coding framework (identified in Section 4). Selected strategic mitigation actions across five emissions sectors are outlined below (see Table 43), and range from improving energy efficiency in buildings and advancing alternative transportation options to sequestering carbon and capturing emissions from waste streams and landfills.

Table 43: Key Sectors and Mitigation Actions Addressed in Phase 2 Reports

Sector	Municipality	Actions
Solid Waste	Cowichan Valley RD	<ul style="list-style-type: none"> Understanding how changes to collection and types of materials collected can help meet long term waste management goals. Increase recovery of waste sources to minimize emissions. Monitor social response to strategies to reduce solid waste or improved benefits. Investment in new infrastructure to reduce GHG from waste streams and landfill sites.
	Township of Langley	<ul style="list-style-type: none"> Expand waste separation.
Transportation	Cowichan Valley RD	<ul style="list-style-type: none"> Increased access to transit and active transport options, site infrastructure for low carbon transport. Ease of access for residents to amenities, municipality facilities, and in walking distance to them.
	City of Guelph	<ul style="list-style-type: none"> Performance measures developed for GHG emissions. Data collection for level of accessibility of transportation networks.
	Township of Langley	<ul style="list-style-type: none"> Organize and deploy parks and trails that limit unnecessary vehicular travel between locations for GHG emission reduction.
Energy	City of Saint John	<ul style="list-style-type: none"> Resource tracking that includes expenditure of resources (e.g., costs, energy, GHG) to modify, rehabilitate, maintain, and operate assets.
	Cowichan Valley RD	<ul style="list-style-type: none"> Development of a table to summarize mitigation impacts for LoS. Includes elimination of carbon intensive activities, transition to low carbon energy sources, reduction of total energy usage.
Buildings	Cowichan Valley RD	<ul style="list-style-type: none"> Includes performance measures for buildings for energy use and emissions. Enhance ability of buildings to offset climate change through improved management practices and supporting infrastructure.
Infrastructure	Cowichan Valley RD	<ul style="list-style-type: none"> Increase number of trees for carbon capture, increase forestry potential of existing lands.

		<ul style="list-style-type: none"> ● Conversion to more efficient lighting technology (LED). ● Installation of on route charging infrastructure for EV vehicles. ● Accessibility to parking, public parking, electrical vehicle charging, secure bike storage and close to transit.
	Township of Langley	<ul style="list-style-type: none"> ● Reduce emissions from parks operations.

8.2.3 Incorporating Natural Assets in Phase 2

Natural asset considerations were only applied in a narrow way in the Phase 2 reports. The City of Saint John (NB), Cowichan Valley RD (BC), City of Guelph (ON), and Township of Langley (BC) focused on parks and recreation as natural assets to be inventoried within their asset management planning. The Cities of Saint John (NB) and Guelph (ON) expressed the need for a more comprehensive natural asset inventory.

8.3 Identifying the Strategic Use of Co-Benefits in Asset Management

Co-benefits in the CAMN funding program were coded at a high-level across 17 co-benefit themes. Seven municipalities identified additional benefits that could occur from integrating adaptation and/or mitigation goals into asset management. These municipalities were the City of Corner Brook (NL), City of Kitchener (ON), City of Saint John (NB), City of New Westminster (BC), Cowichan Valley RD (BC), City of Prince George (BC), and City of Saskatoon (SK). Livability, equity, and green spaces were the most cited co-benefits across municipalities that were integrating climate action into asset management (see Table 44).

Table 44: Types of co-benefits identified in the Phase 1 and Phase 2 documents

Identified Co-benefit	# of municipalities that identified this co-benefit in their project
Livability	3
Cost Savings	2
Air Quality	1
Human Health	1
Water Efficiency	1
Biodiversity	2
Equity	3
Green Spaces and Recreation	3

Job Creation	1
Clean Energy	1
Carbon Storage	1
Reduce Waste	1
Water Quality	2

8.3.1 Using Co-benefits and Triple Bottom Line Approaches

Three local governments referenced that taking climate action in asset management contributed to livability. For example, the City of Saint John (NB) referenced their Transportation and Environment program as providing the vision for green, safe and accessible neighborhoods. The maintenance and enhancement of parks and public spaces was cited as contributing to livability. The City of New Westminster (BC) incorporated existing objectives from other municipal plans to guide the objectives of the AM strategy. These objectives included livability - supporting social well-being, community engagement and walkability. Cowichan Valley RD (BC) identified livability as a co-benefit through ‘service statements,’ detailing the intended benefits of each service area. For instance, public safety was enhanced with improved lighting and public transit infrastructure, including accessibility of transit, and provision of facilities that support community social, cultural and recreational needs.

Six municipalities referenced attention to triple bottom line outcomes when considering climate change in asset management. These were the City of Corner Brook (NL), Town of Halton Hills (ON), City of Saskatoon (SK), City of New Westminster (BC), Capital RD (BC), and City of Kenora (ON). This provides guidance for thinking through alignments in objectives across municipal strategies and plans, and for identifying co-benefit opportunities across social, environmental, and economic areas. Advancing a more detailed and comprehensive list of co-benefits, building upon Table 44, can provide more direction.

8.4 Key Successes and Challenges in the CAMN Program

Twenty CAMN projects were funded. The reports were coded for adaptation and mitigation actions. The completion reports were queried to assess the cohort experience and used to identify Key Success Factors (KSFs) that participants viewed as critical to the success of the CAMN program, as well as challenges that were overcome. Areas that suggest support for moving plans to implementation were also considered.

8.4.1 Top Seven CAMN Success Factors

Developing knowledge and understanding of climate change in asset management policy facilitates data development, cross-departmental awareness, and the buy-in needed for

decision making. Senior leaders play a fundamental role in encouraging cross-departmental participation. For instance, in Cowichan Valley RD (BC), the support of the Chief Administrative Officer's ensured interdepartmental cooperation. In the City of Yellowknife (NWT), a senior administrator supported the momentum in the working group. The City of New Westminster (BC) had support for integrating climate change into asset management as a strategic priority for Council.

The top seven success factors are identified below, with the most cited relating to support from senior leadership and Council:

1. Support from senior leadership and Council (11/20)
2. Working across departments in the development process (8/20)
3. Hiring consultants /industry experts (5/20)
4. Learning from other communities and their practices and data (4/20)
5. Dedication staff working on the project, a team lead (4/20)
6. Networking as part of the learning experience (3/20)
7. Workshops and facilitation for staff (3/20)

8.4.2 Top Four Benefits of CAMN

Municipalities, in general, found that they greatly benefitted from the cohort experience and identified many positive outcomes, of which the top four cited were:

1. Networking with other Canadian municipalities (16/20)
2. Webinars and workshops were beneficial for learning and connecting (13/20)
3. Increase in knowledge amongst staff and Council on asset management through network participation (5/20)
4. Exposure to innovative tools for local governments (3/20)

8.4.3 Top Five Challenges & Barriers of CAMN

Several municipalities noted challenges with this approach related to capacity. For instance, it was noted that understanding climate projection data and ways of moving it forward across departments was challenging. The top five challenges cited are as follows:

1. Time allocation to working on the project (7/20)
2. Having enough staff capacity to work on the project (7/20)
3. Understanding what asset or risk management is and how different departments could implement it (6/20)
4. Accessibility to data (5/20)

5. Connecting with other departments for successful integration (3/20 cases), and/or with the community (North Vancouver)

8.4.4 Identified Next Steps

A few different areas of concern or opportunities for improvement emerged from participating municipalities, including:

1. Coordinate municipalities based on asset management experience
2. Minimize the time and distance to travel for workshops
3. Emphasize peer learning and sharing between communities
4. Make improvements to the Partners for Climate Protection (PCP) hub page to bring in more engagement between communities
5. Create more time for more meetings to share ideas and work
6. Develop more templates and tools to ease the process in a more efficient manner
7. Have a workshop specifically for Phase 2 municipalities to share more fully developed ideas and areas of progress
8. Wrap up workshop or seminar to share the final product for Phase 1 and 2

8.5 Equity Considerations in CAMN

Three CAMN projects were identified for their considerations of equity.

- **A Triple Bottom Line (TBL) decision-making process guides the Asset Management Strategy (City of New Westminster, BC).** The TBL decision-making process includes social responsibility, and the Strategic Asset Management Plan and related supporting documents will inform decision-making so that issues such as access, equity, health, and safety can be considered during service/asset planning.
- **Equity considerations (aging populations, shifting population demographics, affordability, equitable access to transportation, green spaces, etc.) are part of future factors to take into consideration (Cowichan Valley RD, BC).**
- **Asset Management Strategy and Governance Framework uses Sustainable Service Delivery as a guiding principle (City of Corner Brook, NL).** This helps the municipality to consider both the short-term and long-term consequences of their actions, rather than just the short-term gains. This approach brings attention to the full life cycle of assets and encourages inter-generational equity in the calculation of costs and benefits.

8.6 Nature-based Solutions in CAMN

Eight of the twenty Climate Asset Management Network (CAMN) plans included NbS. Natural assets were identified as helping to build resilience in municipal drainage infrastructure and stormwater services while also supporting ecosystem protection and carbon sequestration. For instance, the City of Corner Brook (NL) investigated using natural assets in stormwater management, developed a natural asset policy, and updated design standards to include natural assets and green building/infrastructure in their asset management planning.

Table 45: Key Areas where Municipalities are Integrating Nature-based Solutions into Asset Management Planning

ACTIONS AND STRATEGIES	MUNICIPALITIES
Use of green buildings/infrastructure	Cities of Corner Brook, New Westminister, and Yellowknife
Integration of natural assets into asset management plan and service delivery (e.g., stormwater management)	Cities of Prince George, Saskatoon, Corner Brook and New Westminister, District of North Vancouver
Development of natural asset plan and/or green infrastructure plan	Cities of Prince George and Saskatoon, District of Summerland
Inclusion of a natural asset inventory	Cities of New Westminister, Prince George and Selkirk, District of Summerland
Inclusion of natural assets within principles, goals, or objectives for asset management plan	Cities of New Westminister and Yellowknife, District of North Vancouver
Policy related to natural assets	Cities of Corner Brook and Selkirk
Update to existing design standards or development regulations to include natural assets	Cities of Prince George and Corner Brook

8.7 Best Practice CAMN

8.7.1 Development of a comprehensive asset management strategy and roadmap

- The City of Prince George (BC) applied a sustainability lens in asset management that includes adaptation, mitigation as well as social, environmental, and economic considerations. It integrates concepts of climate risk, and emissions, alongside

corporate values for sustainability. A natural asset inventory and condition assessment was included as part of the comprehensive assessment. In addition, this asset plan included a detailed action plan with departmental roles and responsibilities and timing for actions, preparing the plan for implementation.

- The City of New Westminster (BC) used a TBL approach in their decision making to understand synergies and trade-offs in asset decisions. To support this, three scenarios were developed to assess the future state of assets in their asset management strategy: identification of current services (current state), assessment of these services (transition), and prioritization (future state). These scenarios are framed to support the prioritization and development of both asset areas and levels of service. Four key climate-related initiatives encouraged comprehensive planning, including a climate change committee, risk framework and register, a natural asset inventory and climate change adaptation strategy.
- The District of North Vancouver (BC) tied asset management planning to the corporate strategic plan and policy to reduce climate risks and emissions and build resilience. Natural assets are viewed as an approach that reduces climate risks and emissions, and when applying life cycle costing to assets over time, help save on infrastructure expansion, operating and maintenance costs over time.

8.7.2 Developing a comprehensive risk assessment framework

- The City of Saint John (NB) submitted a condition rating manual for assets, a data report, and a risk rating. Together with the Phase 1 State of Infrastructure report, these cohesively work together to provide a method and strategy for addressing the built infrastructure in the city. This provides an in-depth understanding of the City's assets, plus an assessment of climate risk, cost, and life cycle that can be used to prioritize asset management and capital project decisions over time.
- The Cowichan Valley RD (BC) engaged with municipalities to better understand where potential gaps in services are and could be for residents under changing conditions. When evaluating opportunities for enhancing service delivery, they explored low to zero emissions options. The results prioritized areas of poor service quality and the Regional District will dedicate resources and funding towards improvements.

9. Capital Projects

Capital projects were funded either with the aim to reduce GHG emissions at the level of an entire region, a neighbourhood or an individual site, either within the community or through municipal operations, including, or to reduce the vulnerability of an asset or group of assets.

Table 46 Capital Projects Completed to Date

MCIP Deliverables		Total expected	No. Submitted	No. Coded & Analysed	No. of CR Submitted	No. of CR Coded & Analysed	Proportion CR Analysed
Capital Projects	English	25	20	20	20	20	84%
	French	18	18	16	18	16	
Total		43	38	36	38	36	

Municipalities were not required to submit the final deliverables as part of the funding requirements, so most only sent photos and completion reports. For this reason, coding and analysis was only done using the completion reports, which means that the analysis is not as detailed as it was for the other programs (a detailed analysis of the level of integration and understanding of co-benefits and equity considerations, or identifying best practice projects was not possible, for instance). The same coding framework was used for the Capital Projects program as for the Studies program but applied to the completion reports as opposed to the final deliverables.

A total of 38 out of 43 capital project completion reports were submitted as of May 13, 2022, but only 36 were coded and analysed. The two completion reports that were not included in the submission were from Communauté maritime des Îles-de-la-Madeleine and Ville de Saint-Constant, both from the Projet SAUVÉR – SSé in Québec.

9.1 Breakdown by Sector and Project Type

The capital projects submitted spanned only four out of six of the emissions reduction sectors, with solid waste and agriculture not represented. Of the 38 capital projects submitted to date, the greatest percentage pertained to transportation (42%) followed by infrastructure (32%), buildings (24%), and energy systems (3%). Each of the sectors are broken down into project sub-codes. Twelve capital projects were adaptation focused, 24 were mitigation-focused,²³ and two were both adaptation- and mitigation-focused. Thirty-

²³ The City of Toronto (ON) completion report says that the project was adaptation-focused but it is actually mitigation-focused (energy efficiency retrofit of a decommissioned brick factory).

five out of 36 of the analysed projects included systems and/or processes (indicators) that are in place to collect data and effectively monitor project performance.²⁴

9.1.1 Infrastructure

Twelve capital projects were related to infrastructure. There were slightly more projects for green infrastructure (7) projects than for grey infrastructure (5) projects (see Table 47), the opposite of the Studies program. Interestingly, six out of the seven projects for green infrastructure were from Québec. Of the total infrastructure projects submitted, six out of twelve, or 50%, related to stormwater management.

Table 47: Infrastructure Project Types Breakdown

Infrastructure (12)			
Grey (5)		Green (7)	
Stormwater management	4	Stormwater management	2
Flood mitigation	1	Greening projects (to reduce runoff and UHI)	5

9.1.2 Transportation

Of the 16 capital projects related to the transportation sector, ten were part of a regional car sharing program in Québec called Projet SAUVÉR – SSé (see Table 48). The program aims to reduce GHG emissions, provide a car-sharing service to communities that have little or no public transit or taxi service, optimize the use of municipal vehicles, reduce the size of the municipal fleet, reduce transportation and fuel costs, create a sense of community and promote smart and green technologies. One of the goals of the project is to establish a functional basis for a green electric road in Québec. In addition, there were two projects that focused on municipal fleet electrification. The remaining projects focused on broader transportation infrastructure: one pertained to EV charging infrastructure, one to active transportation infrastructure, one to public transit improvements, and one to a multi-use path.

²⁴ The one project without indicators is from Ville de Dieppe (NB), which decided not to go forward with the project due to the cost.

Table 48: Transportation Project Types Breakdown

Transportation (16)			
Electric vehicle charging infrastructure	1	Active transportation infrastructure	1
City fleet vehicle electrification	2	Public transit improvements	1
Car sharing	10	Roadway planning to include active transport and/or shared mobility	1

9.1.3 Buildings

In the buildings sector, all nine capital projects were for existing buildings. Eight focused on improving energy efficiency of public buildings or in one case, through a home energy retrofit program (see Table 49). There was also one project to relocate a recreational swimming pool to higher elevation due to flooding issues.

Table 49: Building Project Types Breakdown

Buildings (9)			
Home energy retrofit program	1	Public building energy efficiency retrofit	7
Relocation	1		

9.1.4 Energy Systems

There was only one capital project that related to the energy sector from the City of North Bay (ON) (see Table 50), which looked at the possibility of micro-grid district energy through the construction of a Community Energy Park (CEP) in order to increase resilience to extreme weather events.

Table 50: Energy System Project Types Breakdown

Energy Systems (1)			
Micro-grid district energy	1		

9.2 Identifying the Strategic Use of Co-Benefits in Capital Projects

The coding to identify the strategic use of co-benefits in capital projects was not as detailed as for the other projects - only the completion reports were used for the analysis, since the submission of the project files or deliverables were not a requirement of the funding program. Questions 18 and 19 of the completion reports asked municipalities to “Please identify any economic/social benefits resulting from the implementation of this capital project.” This means that this analysis of the strategic use of co-benefits in the capital projects is not fully representative of the actual use of co-benefits in the municipalities’ capital projects, as it does not show to what level of detail the co-benefits have been applied to the project.

Of the 36 capital project completion reports analysed for this question, 28 identified co-benefits of their projects. Cost savings was the most cited co-benefit, by almost 50% more than the next most cited co-benefit, livability (see Table 51). Job creation, human health, and green spaces and recreation were the next most cited co-benefits.

Table 51: Types of Co-benefits Identified Capital Project Completion Reports

Identified Co-benefit	Number of municipalities that identified this co-benefit in their project
Cost Savings	16
Livability	9
Job Creation	8
Human Health	7
Green Spaces & Recreation	5
Air Quality	4
Equity	4
Property Values	2
Biodiversity	1
Water Efficiency	0
Food Security	0
Clean Energy	0
Pollutant Capture	0
Water Quality	0
Congestion	0
Reduce Waste	0
Carbon Storage	0

9.3 Key Successes and Challenges in the Capital Projects Program

The completion reports of the capital projects were queried together to identify key success factors (KSF), challenges & barriers, and innovations related to the process, as well as stated next steps. This analysis highlights what was viewed as important and/or difficult in the development of the Capital Projects program.

9.3.1 Top Eight Key Success Factors

Similar key success factors were found across the other program types, with community, staff and Council engagement, partnerships, expertise from staff and consultants, resourcing and capacity, and following frameworks being cited as critical to the project.

1. Following a framework and methodology (20/36), including a clear plan/process and objectives or a key individual to assist with coordination, as well as having clear, coherent, and timely communication.
2. Partnerships with external organizations (20/36), including:
 - a. Cross sectoral partnerships,
 - b. Other governmental partnerships, and
 - c. Academic partnerships.
3. Hiring quality consultants (16/36).
4. Resourcing and capacity (20/36), including FCM's financial assistance.
5. Community engagement (9/36).
6. Senior leadership support/buy-in (10/36).
7. Staff engagement, knowledge and expertise (4/36).
8. Committees with different skill sets and experience (2/36).

9.3.2 Top Five Key Challenges & Barriers

Key challenges listed in the completion reports centred around lack of data, resource and capacity, difficulties with the methodology, as well as difficulties in maintaining engagement. These were similar challenges and barriers to those identified across many of the other program types.

1. A lack of data availability or the questionable quality of data (23/36).
2. Resourcing and capacity (19/36), including competing priorities on staff time and resource constraints.
3. Methodological challenges (17/36), including scope creep, short timelines or poor timing, and uncertainty in novel approaches.
4. Community engagement (6/36), including difficulties coordinating with external partners.

5. Staff engagement (4/36), including inconsistent participation.

9.3.3 Identified Next Steps

The main next steps identified for capital projects to date were:

1. Data collection and monitoring (13/36).
2. Long-term plan (13/36).
3. Perform additional research (4/36).
4. Secure funding for implementation internally or externally (3/36).
5. Build awareness with municipal staff and/or Council, and community members (4/36).

9.5 Best Practice Capital Projects

- **Ville de Montréal (Bâtiment 7), QC, led a blue-green alley project which experimented with a shared governance structure between the public and private domain as well as a participatory planning approach for sustainable stormwater management.** The design of the project was designed in a participatory way, where five local organisations worked with residents of the property on which the project was being conducted. Residents were included in the design, conceptualisation and management of the project through a series of workshops. Some of the designs were left purposefully undesigned so that the community could spontaneously plant, design and ideate. This included a walkable path, rain gardens and a boardwalk, as well as childcare services overlapping with the alley. The designs themselves were innovative in that they made the stormwater management visible while being interesting to look at, promoting reconnection with the urban landscape. Integrating community organisations left tom projects that are closer to the needs of the community itself.
- **The Region of Peel, ON, outlines the information required and the specific and necessary steps to implement low impact development (LID) in “LID Implementation Process for Regional Road Right-of-Ways”.** This report provides a standardized approach that regional municipalities should follow for implementing LID in regional road right-of-ways (retrofit and/or new design) based on the Grey to Green Road Retrofit Guide.
- **The City of North Bay, ON, used emerging microgrid technology to build the first utility-scale microgrid in Canada, the North Bay Community Energy Park.** This was the first resiliency hub in North America, combining distributed energy resources,

energy storage solutions, and a cutting-edge microgrid control system. This microgrid represents the forefront of energy resiliency solutions. The creation of a local development, implementation and support team that can now expand their knowledge and support of micro-grid integration into other Northern Ontario municipalities and utilities has been a particularly major advancement.

- **Projet SAUVÉR – Ssé is a regional EV car sharing program with ten partner municipalities in Québec : Communauté maritime des Îles-de-la-Madeleine, Ville de Mercier, Ville de Varennes, Ville de Carleton-sur-Mer, Ville de Maniwaki, MRC de Pontiac, Municipalité de Saint-Charles-sur-Richelieu, Municipalité de Saint-Constant, and Municipalité de Saint-Siméon.** The program not only reduces emissions for municipal and community transportation, but also provides more sustainable transportation options to communities that have little or no public transit or taxi service, as well as improve and create a sense of community. One of the goals of the project is to establish a functional basis for a green electric road in Québec. All ten municipalities have confirmed that they will continue with the project after the pilot phase.
- **The City of Saint John took an innovative and integrated approach to ensure that capital project is aligned with Council Priorities, the Climate Change Action Plan, Asset Management Plan, Municipal Plan and economic growth strategy.** This approach has proven successful and the City was able to achieve the expected environmental, social and economic objective set by Council.

9.5 Equity Considerations in Capital Projects

There were five municipalities that stood out for their considerations of equity in the development of their capital projects.

- **Engagement with Indigenous communities informs ways to overcome barriers to electric vehicle adoption and address gaps in rural regions of Alberta (City of Medicine Hat’s Peaks to Prairies initiative, AB).** As part of the pilot, a site within the Stony Nakoda First Nation was considered for a band or Nation-owned location. There were several possible sites for the fast-charging stations, and the final location was identified at the Bearspaw Travel Centre, owned and operated by Bearspaw First Nation. This was a unique opportunity to enhance a newly constructed travel centre adjacent to the Stony Nakoda Casino, and to integrate some cultural awareness for

travellers. Signage was produced to tell the story of Bears paw First Nation, featuring artwork from a community member.

- **Alternative transportation methods (active transportation or improvements in public transit hours) for underserved areas and populations such as the physically challenged, elderly, youth, students and low-income groups (City of Victoria’s “All Ages and Abilities Bicycle Network Infrastructure Project”, BC, and the City of Prince Albert’s “Public Transit Extended Service Hours Trial”, SK).**
- **A public campaign to support energy efficient home retrofits and new residential home construction focuses on low-income residents, who often live in energy inefficient housing (Regional District of Central Kootenay’s Regional Energy Efficiency Program – REEP).** The utilities Energy Conservation Assistance Program (ECAP) was promoted, particularly for low-income residents, as a way to significantly upgrade living conditions. The Seniors Energy Efficiency Program for Nelson Hydro customers was also established as a pilot during REEP and found to be very successful.
- **The City of North Bay’s capital project involved the construction of a Community Energy Park (CEP) that connects several of the city facilities to a microgrid controller battery storage unit.** Facilities with heating, cooling, lighting and washrooms in the event of an emergency. Included in the facilities is the largest daycare facility in the North Bay, providing the ability for first responders to have a location for their families to be safe and secure during a climate change event (ice storm, heat wave, forest fire, tornados, etc.) while they are out helping other vulnerable citizens in the community.

9.6 Nature-based Solutions in Capital Projects

Seven municipalities used NbS in their capital projects. They all used green infrastructure to reduce stormwater flooding and the urban heat island effect.

Table 52: Key areas where Municipalities are Integrating Nature-based Solutions into Capital Projects

ACTIONS AND STRATEGIES	MUNICIPALITIES
Wetland features added to the facility’s grounds to adapt to stormwater flooding and sea-level surge occurrences will result in the enhancement	City of Saint John

of an existing wetland, which will ultimately result in the provision of a more natural ecosystem service to the region's communities.	
Low impact development strategies for stormwater management: rain gardens, infiltration galleries, bioswales, oil/grit separators for road treatment	City of Kitchener
Greening parking lots	Ville de Rivière du Loup, Municipalité de Saint Charles Borromée, Ville de Laval
Greening roads	Ville de Beloeil
Blue-green alleys	Ville de Montréal (Bâtiment 7)

10. Staff Grants

Staff Grants funding was used to hire a new or existing staff person to work on both greenhouse gas emissions reductions and climate adaptation in their municipality.

Table 53 Staff Grants Completed to Date

MCIP Deliverables		Total expected	No. Submitted	No. Coded & Analysed	No. of CR Submitted	No. of CR Coded & Analysed	Proportion Deliverables Analysed	Proportion CR Analysed
Staff Grants	English	54	46	43	46	46	76%	76%
	French ²⁵	10	7	6	7	7		
Total		64	53	49	53	53		

Of the 53 municipalities that were awarded staff grants, 29 mitigation plans, 22 adaptation plans, and two site-specific adaptation-focused studies were submitted as of May 13, 2022. Ville de Joliette (QC) is marked as having produced a mitigation plan in the MCIP project list, but they also submitted an adaptation plan, raising the total deliverables count from 53 to 54. Four municipalities did not include final plans in their submissions.²⁶ The plans were coded using the same coding framework as the Plans program.

²⁵ In this count, Ville de Joliette (QC) is counted as having submitted one project.

²⁶ City of Red Deer (AB), Municipality of Chatham-Kent (ON), and Ville de Montréal - Arrondissement Saint-Laurent (QC) did not submit final plans, and City of Revelstoke (BC) withdrew from the program.

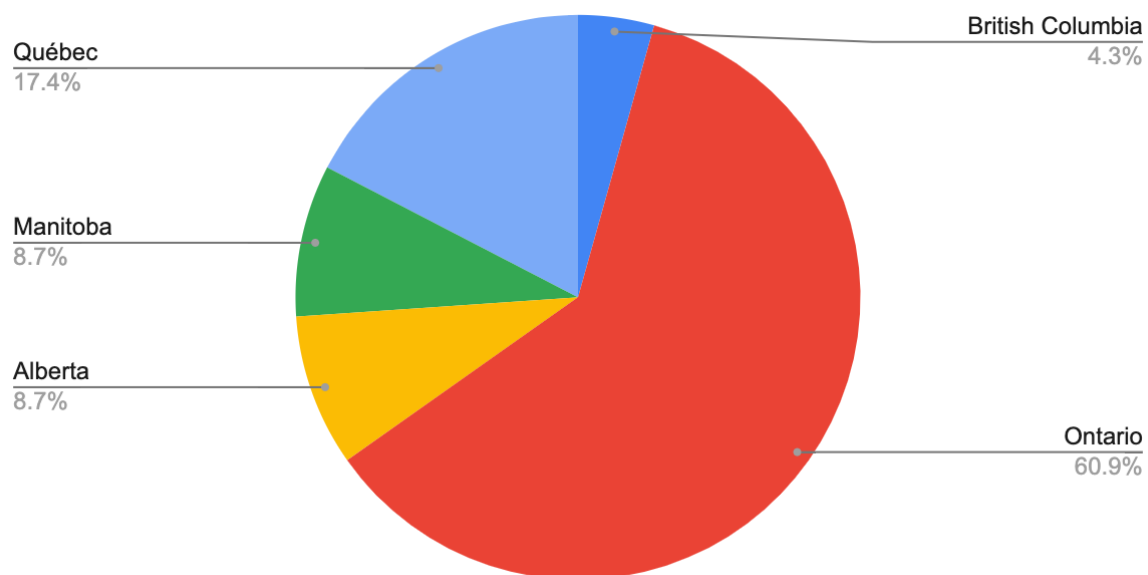
Adaptation Plans

10.1 Common Adaptation Actions Based on Hazard Types

Twenty-two municipalities submitted adaptation plans, and two submitted adaptation-focused flood assessment studies (Town of Whitby, ON, and City of Peterborough, ON).²⁷

The regional distribution of MCIP-funded adaptation Staff Grants was heavily weighted towards Ontario, with 61% (14) adaptation plans and one study. 17% (4) were from Québec, 9% (2) from Alberta and from Manitoba each, and 4% (1) from British Columbia (see Figure 8).

Figure 8: Provincial Distribution of Adaptation Plans (English and French)



All 22 of the submitted adaptation plans from the Staff Grants program included actions (the flood assessment studies had no actions). A total of 40 key actions (use by three or more municipalities) were identified across the seven hazard types. Extreme temperature, flooding, and extreme weather were the three main climate hazards addressed by the majority of the municipalities, but common actions towards general climate change impact (19) had almost triple the amount of common actions geared towards extreme temperature (7), extreme weather (3), drought (3) and geologic events (1). There were no common actions found for forest fires and sea level rise. In the completion reports, several

²⁷ The Whitby study focused on site-specific recommendations to re-grade an existing Town-owned pathway to minimize the risk of floodwater spilling over in the Town of Whitby (ON). The Peterborough study focused on watershed planning and future flood assessment recommendations.

municipalities talked about their inexperience with climate action, which could explain the general nature of many of their actions (such as increase public awareness of climate change, integrate climate projections into other planning processes, or form partnerships for ecological protection). Only twelve of the 53 municipalities performed comprehensive risk and vulnerability assessments.

Figure 9 below highlights the nine municipalities with the highest number of adaptation actions across each hazard type. The District Municipality of Muskoka (ON) addressed comprehensive adaptation actions across three of the seven hazard types as well as general climate change actions, and had the greatest number of common adaptation actions.

Figure 9: Nine Municipalities with the Greatest Number of Common Adaptation Actions

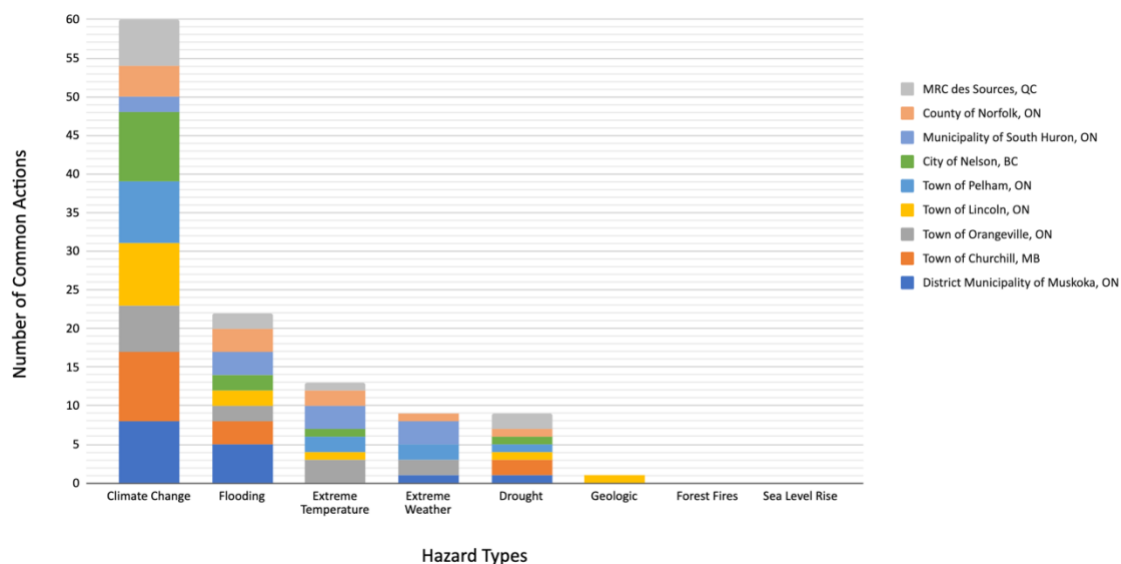
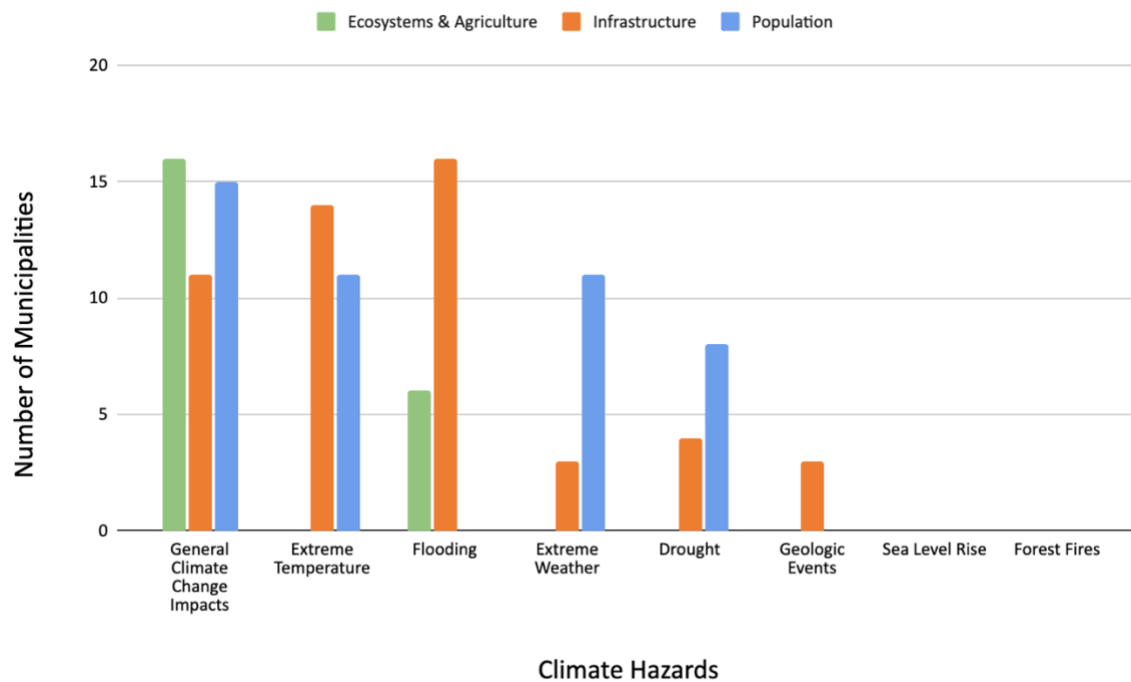


Figure 10 below shows how in the Staff Grants program, common adaptation actions geared towards ecosystem and agricultural vulnerabilities were limited to general climate change impacts and flooding. Infrastructural and population vulnerabilities had a much stronger emphasis.

Figure 10: Number of Municipalities Applying Common Adaptation Actions Across Three Key Risk and Vulnerability Areas

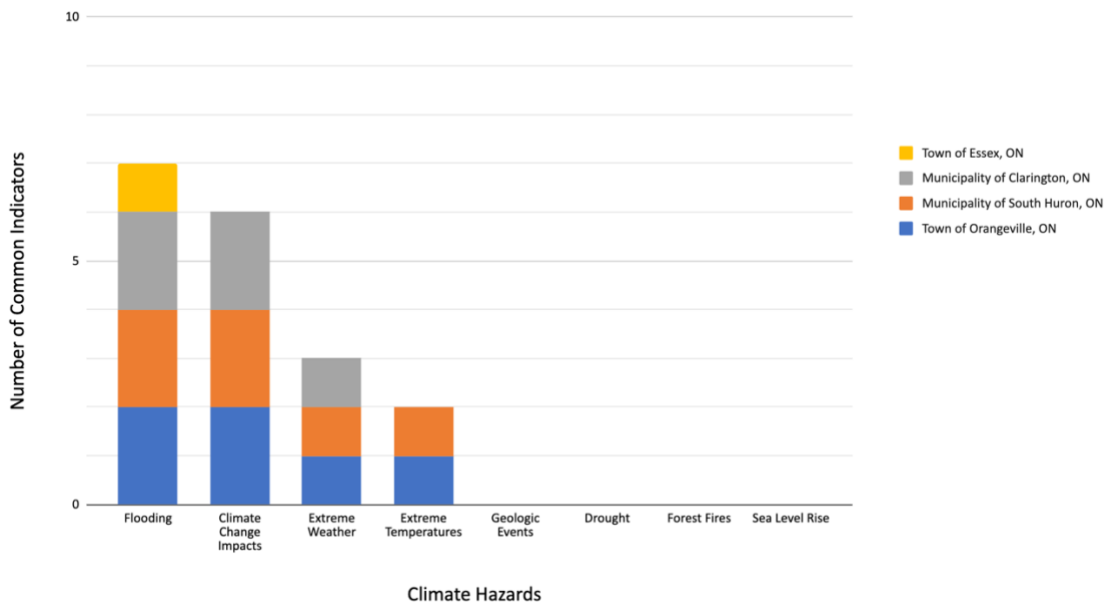


10.2 Summary of Common Adaptation Indicators

Of the 22 adaptation plans and two studies analysed, 50% or eleven municipalities included indicators (the study did not have indicators). Only municipalities from Ontario (6) and Québec (4) included indicators in their plans. While this is a slightly larger percentage than in the Plans program, municipalities tend to not plan for implementation in their planning processes.

Four municipalities used common indicators (used by two or more municipalities) across climate hazard types, suggesting some share confidence in these approaches for measuring adaptation progress. Most of the common indicators were aimed at measuring adaptation progress in minimizing the impacts of flooding, followed by general climate change impacts, extreme weather and extreme temperature. No common indicators were found for the other climate hazards. This is consistent with the common actions identified from the adaptation actions from the Plans program. Figure 11 showcases the most common indicators being used across priority hazards.

Figure 11: Municipalities with the Greatest Number of Common Indicators



Only seven common indicators were identified. No common indicators were found for drought, geologic events, sea level rise and forest fires, which themselves had few actions addressing them. Six out of the seven of the common indicators, or 86%, can be applied to the common actions identified. For our purposes here, common indicators in Table 54 below are proxies for their municipalities’ mitigation priorities and goals, emphasizing intentions to monitor progress on mitigation once implemented²⁸.

Table 54: Key Indicators Compiled for each Climate Hazard

1. General Climate Change Impact		
1.a) Tree canopy coverage (%)	1. b) Number of plans that include climate adaptation considerations (#)	
2. Extreme Weather		
3. a) Number of service disruptions (#)		

²⁸ The full list of actions and indicators are not seen in the analysis; the intent was to capture the most common actions and indicators across the plans as a means to provide a snapshot of data that is most usable and transferable to municipalities across Canada.

3. Flooding		
4. a) Number of properties experiencing flooding (#)	4. b) Uptake of LID features (# or %)	4. c) Permeable surfaces (# or %)
4. Extreme Temperatures		
7. a) Public reached from preparedness or awareness campaigns (#)		
No common indicators were found for drought, geologic events, sea level rise or forest fire actions.		

More detail on which municipalities used which common actions and indicators can be found in Appendix 4.

10.3 Identifying the Strategic Use of Co-Benefits

Eleven out of the 22 (48%) adaptation plans and one study included co-benefits explicitly or by reference. The flood assessment study also referenced co-benefits. Six referenced the concept of co-benefits in the executive summary or introductory section of the plan but did not go into further detail, while the remaining six used specific co-benefits to support their actions. However, those that explicitly applied co-benefits to their actions did not all do so with every action. The regional distribution of those that explicitly applied co-benefits included four from Ontario, one from BC, and one from Québec. Twelve plans did not have any references to or acknowledgement of co-benefits. References to co-benefits were found in only one of the four French adaptation plans that were analysed. See table 55 below.

Table 55: Breakdown of Communities that Do Not Use, Only Reference, or Apply Co-Benefits in their Adaptation Plans

Do Not Use Co-Benefits (12)	Only Reference Co-Benefits (6)	Explicitly Use Co-Benefits (6)
Ville de Joliette	Town of Lincoln	County of Huron

Count of Norfolk	City of St. Catharines	Town of Essex
Town of Pelham	District Municipality of Muskoka	Municipalité de Chelsea
City of Peterborough	Town of Orangeville	Township of Bonfield
Brazeau County	Town of Churchill	Municipality of Clarington
Ville de Mont-Tremblant	Town of Whitby (flood assessment study)	City of Nelson
MRC des Sources		
Town of Bruderheim		
City of Owen Sound		
Rural Municipality of East. St. Paul		
Municipalité de l'Anse-Saint-Jean		
Municipality of South Huron		

10.4 Equity Considerations in Staff Grants Adaptation Plans

Equity considerations were found in 15 of the 22 (65%) analysed adaptation plans and one study from the Staff Grants program.

- Actions for indigenous reconciliation (Town of Churchill, MB).** Actions included strengthening Indigenous self-determination in climate change decisions, policy-making and assessment processes, supporting regional Indigenous climate change and stewardship strategies, promoting Indigenous-driven climate change research and monitoring while also attributing credit, and ensuring climate information is available to all indigenous stakeholders to inform evidence-based decision-making.
- Four municipalities included equity considerations as part of their plan development.** The District of Muskoka (ON) included equity as one of the guiding principles of their plan, the Town of Orangeville (ON) use equity as a criteria for its action prioritisation, the Municipality of Clarington (ON) used equity as one of its

action evaluation criteria, and the City of Nelson (BC) made equity a part of its decision-making criteria and plan vision.

- **Emergency preparedness actions related to protecting vulnerable populations such as the elderly, low-income groups, and Indigenous peoples from extreme temperature and extreme weather event (Town of Lincoln, ON, County of Norfolk, ON, Town of Pelham, ON, City of St. Catharines, ON, County of Huron, ON, Town of Essex, ON, Town of Bruderheim, AB, City of Owen Sound, ON, Municipalité de l’Anse-Saint-Jean, QC, and Township of Bonfield, ON).** Actions ranged from mapping vulnerable populations, to ensuring they have access to cooling centres and other safe venues during emergencies, to check-in programs during extreme heat periods.

10.5 Best Practice in Staff Grants Adaptation Planning

Best practice plans in the Staff grants program were identified using the same criteria as in the Plans program.

Table 56: Best Practices in Staff Grants Adaptation Planning

Municipality	Plan Type	Best Practice Examples
Municipality of Clarington (ON)	Corporate Climate Action Plan	<ul style="list-style-type: none"> • Has both adaptation and mitigation actions and evidence of integration of the two planning processes.
City of Nelson (BC)	A Bold and Agile Climate Plan for a Healthier and Safer City	<ul style="list-style-type: none"> • Uses the low carbon resilience approach, which integrates the adaptation and mitigation planning processes into one, links actions to wider community co-benefits, and includes equity considerations as part of its decision-making criteria and plan development.
Town of Churchill (MB)	Climate Change Adaptation Strategy	<ul style="list-style-type: none"> • Includes actions for indigenous reconciliation, recognising that equity cannot happen without reconciliation and ensuring the restoration of Indigenous people’s health, wellness, self-determination and sovereignty, which were eroded through historical and ongoing colonization.

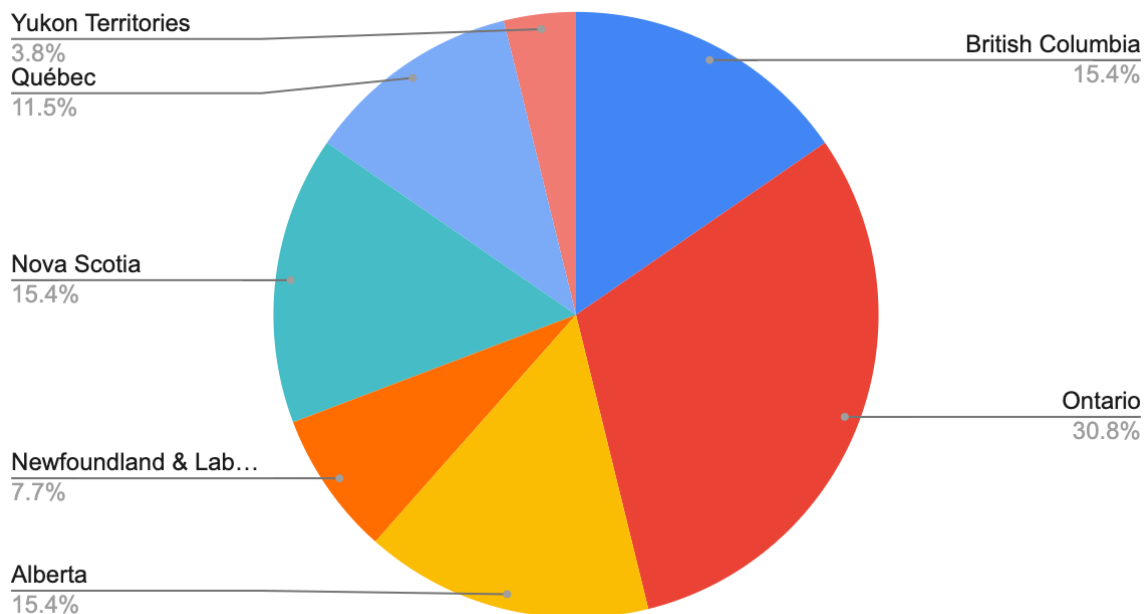
City of St. Catharines (ON)	Corporate Climate Change Adaptation Plan	<ul style="list-style-type: none"> • Identifies emissions reductions as a co-benefit of some adaptation actions. • Includes actions using nature-based solutions. • Aims to achieve a “green recovery” after the impact of COVID-19, which supports the flow of economic stimulus into the local economy, supports diversity and equity, creates sustainable jobs, supports mental and physical health and long-term well-being, and protect and restore the natural environment while increasing biodiversity and ecological value. • Paris actions with a description, lead department, supporting department, current practice, anticipated start, duration, estimated resources and staff effort required, possible metrics, and a milestone progress plan.
Municipalité de Chelsea (QC)	Plan d’adaptation aux changements climatique	<ul style="list-style-type: none"> • Applies co-benefits explicitly. • Includes indicators and both adaptation and mitigation actions • Includes nature-based solutions • Contains a description, responsible department, co-benefits or “systems” being addressed, cost and effort intensity, progress, and indicators for each objective and action.
Town of Orangeville (ON)	Corporate Climate Change Adaptation Plan	<ul style="list-style-type: none"> • Includes timeline, divisions, outcomes, vulnerability score, likelihood rating, TBL consequence rating out of 20, sensitivity ratings, adaptive capacity, and rationale for each action.

Mitigation Plans

10.6 Common Mitigation Actions Based on Emissions Sectors

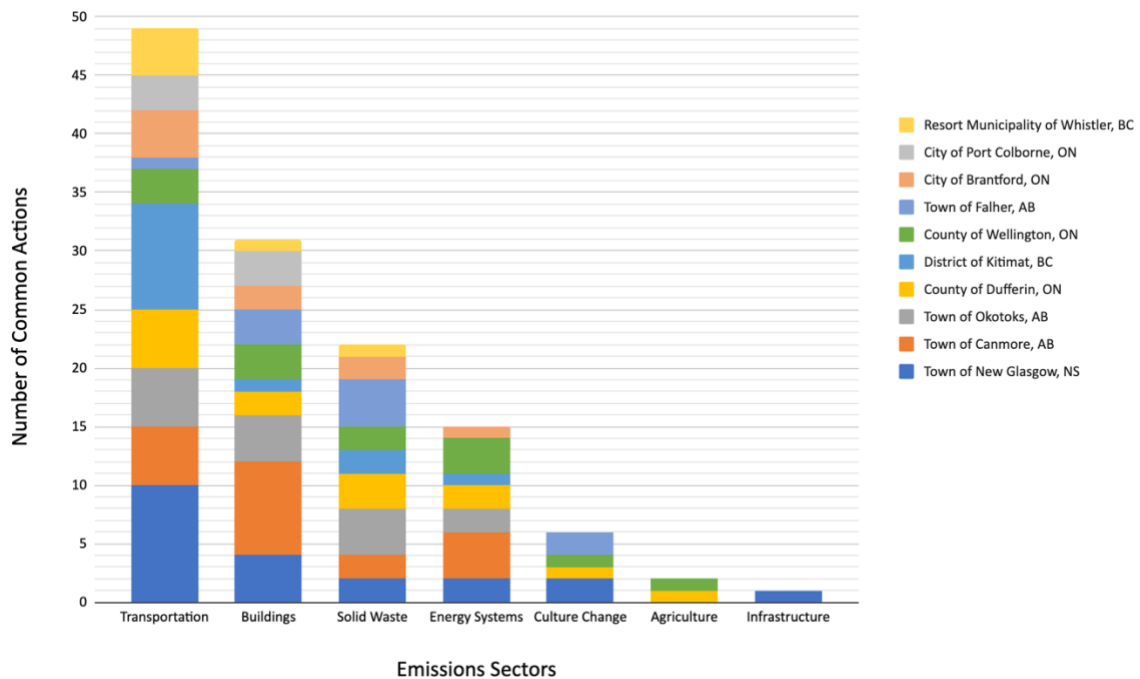
Twenty-six municipalities submitted mitigation plans. The regional distribution of MCIP-funded Staff Grants mitigation plans was much more even than the adaptation plans. Ontario covered with 31% (8) of the mitigation plans, 15% (4) were from British Columbia, Alberta and Nova Scotia each, 12% (3) were from Québec, 8% (2) from Newfoundland & Labrador, and 4% (1) was from the Yukon Territories (see Figure 12).

Figure 12: Provincial Distribution of Adaptation Plans (English and French)



All but one of the submitted mitigation plans from the Staff Grants program included actions. The City of Whitehorse (YT) did not include actions, only a GHG inventory. A total of 40 key actions (use by three or more municipalities) were identified across the six emissions sectors. Figure 13 below showcases the top 10 municipalities with the most comprehensive number of common mitigation actions and their distribution across each sector. The Town of New Glasgow (NS), Town of Canmore (AB), and Town of Okotoks (AB) are the top three municipalities with the greatest number of key actions across all emissions sector categories. Most mitigation actions across these and other municipalities address the transportation, buildings, and solid waste sectors. Unlike the mitigation plans from the Plans program, there were no common actions towards emissions reductions in grey or green infrastructure, only towards transportation infrastructure such as increasing availability of EV charging stations.

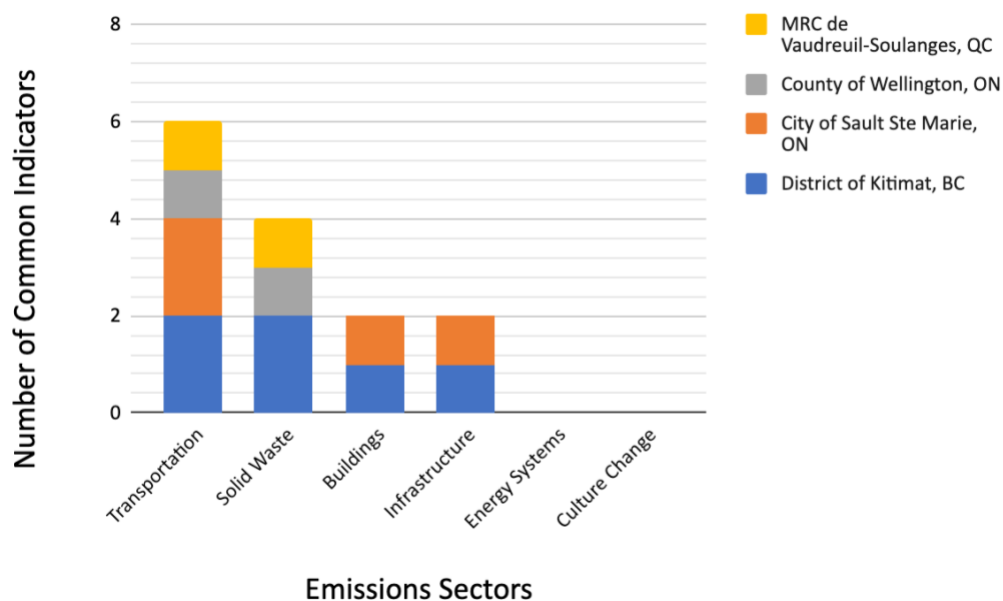
Figure 13: Ten Municipalities with the Greatest Number of Common Mitigation Actions and Comprehensive Actions Across Emissions Sectors



10.7 Summary of Common Mitigation Indicators

Of the 26 mitigation plans analysed, eleven (42%) municipalities from Ontario (4), Nova Scotia (2), Alberta (3), Québec (1), and BC (1) included indicators in their plans.

Figure 14: Municipalities with the Greatest Number of Common Indicators



Only eight common indicators (in two or more mitigation plans) were found and analyzed across the seven emissions sectors²⁹ (see Table 57 below). The common indicators found across the sectors are consistent with the common actions, and seven out of eight, or 88% of them, can be applied to the common actions identified. No common indicators were found for agriculture and culture change, which had very few actions across the mitigation plans.

Table 57: Common Indicators Compiled for each Mitigation Sector

1. Buildings		
2. a) Number of buildings meeting codes or standards (#)		
2. Energy Systems		
4. a) GHG emissions (CO2e)		
3. Infrastructure		
5. a) Tree canopy coverage (%)		
4. Solid Waste		
6. a) Waste diverted (kg or %)	6. b) Organics diverted (kg or %)	
5. Transportation		
7. a) Number of EV's registered or purchased in the community (#)	7. b) Number of municipal EV's (#)	7. c) Active transportation infrastructure installed (km)
No common indicators were found for agriculture or culture change actions.		

²⁹ The full list of actions and indicators are not seen in the analysis; the intent was to capture the most common actions and indicators across the plans as a means to provide a snapshot of data that is most usable and transferable to municipalities across Canada.

More detail on which municipalities used which common actions and indicators can be found in Appendix 5.

10.8 Identifying the Strategic Use of Co-Benefits

Sixteen out of the 26 (62%) mitigation plans included co-benefits explicitly or by reference. Of those, nine referenced the concept of co-benefits in the executive summary or introductory section of the plan but did not go into further detail, while seven used specific co-benefits to support their actions. However, it should be noted that those that explicitly applied co-benefits to their actions did not all do so with every action. The regional distribution of those that explicitly applied co-benefits included four from Ontario, one from BC, one from Alberta, and one from Nova Scotia. Ten plans did not have any references to or acknowledgement of co-benefits. No references to co-benefits were found in the three French mitigation plans that were analysed. See table 58 below.

Table 58: Breakdown of Communities that Do Not Use, Only Reference or Apply Co-Benefits in their Mitigation Plans

Do Not Use Co-Benefits (10)	Only Reference Co-Benefits (9)	Explicitly Use Co-Benefits (7)
City of Whitehorse	Town of New Glasgow (Corporate)	Town of New Glasgow (Community)
Town of Drayton Valley	District of Kitimat	Municipality of North Perth
Town of Canmore	Town of Falher	City of Brantford
Town of Yarmouth	City of Quesnel	County of Wellington
MRC de Vaudreuil-Soulanges	Town of Wolfville	Town of Okotoks
MRC de Pontiac	City of Port Colborne	Resort Municipality of Whistler
Township of Tay Valley	Township of West Lincoln	County of Dufferin
Town of Deer Lake	City of Sault Ste. Marie	
Town of Portugal Cove-St. Philips	District of Central Saanich	
Ville de Joliette		

10.9 Equity Considerations in Staff Grants Mitigation Plans

Six out of the 26 mitigation plans, or 22%, that were analysed from the Staff Grants program included equity considerations in their plan. This is two thirds less than the number of adaptation plans with equity considerations.

1. **The plan is built upon an equity and justice framework (County of Dufferin, ON).** Equity considerations were included in the action planning, engagement and implementation processes of the plan.
2. **A focus area on social equity in the plan draws attention to the need to consider social equity at all stages of municipal climate action planning (Town of New Glasgow, NS).** The Town’s Community Plan had actions provide for gender and racial sensitivity training for civil servants engaged in the development and implementation of resilience strategies, at least two equity assessments for priority Town-wide transformation climate actions, engagement with equity- and reconciliation-seeking groups, and raise awareness about vulnerable populations and climate impacts and the need for collaboration, equity and a just transition.
3. **Equity and accessibility considerations are included in transportation-related actions (Town of Okotoks, AB, Resort Municipality of Whistler, BC, District of Central Saanich, BC, and Township of Tay Valley, ON).**

10.10 Best Practice in Staff Grants Mitigation Planning

Best practice plans in the Staff grants program were identified based on the same criteria as in the Plans program.

Table 59: Best Practices in Staff Grants Mitigation Planning

Municipality	Plan Type	Best Practice Examples
County of Dufferin (ON)	Climate Action Plan	<ul style="list-style-type: none"> • Builds upon two core frameworks: low carbon resilience (LCR) and equity and justice.
Town of New Glasgow (Community) (NS)	Community Climate Action Plan & GHG Emissions Reduction Target	<ul style="list-style-type: none"> • Includes adaptation and mitigation actions. • Emphasizes the business case of using co-benefits • Emphasizes the health impacts of climate change throughout plan.

		<ul style="list-style-type: none"> Has a focus on social equity, which provides for gender and racial sensitivity training, two equity assessments for priority Town-wide transformation climate actions, engagement with equity- and reconciliation-seeking groups, and raise awareness about vulnerable populations and climate impacts and the need for collaboration, equity and a just transition.
Municipality of North Perth (ON)	GHG Reduction Plan	<ul style="list-style-type: none"> Used the UN SDGs to guide actions in plan development by considering how each action meets an SDG. Identifies co-benefits of actions, including those related to adaptation or resilience building
Town of Okotoks (AB)	Climate Action Plan	<ul style="list-style-type: none"> Integrates adaptation and mitigation planning into one plan. <ul style="list-style-type: none"> Contains sections on “Health, Wellness and preparedness”, “Water Conservation and Management” and “Ecosystems and Local Food” Aims for low-carbon, resilient building design. Includes a target, a timeline, and description for each action. Selected each action based on ability to achieve multiple co-benefits under the One Planet Living Framework. Includes an equity lens in the development of the plan and most notable in transportation actions. Includes indicators with associated source document.

10.11 Nature-based Solutions in Staff Grants Adaptation & Mitigation Plans

Table 60 below shows the municipalities from the Staff Grants program which provided NbS in their adaptation and mitigation plans.

Table 60: Key uses of Nature-based Solutions in Staff Grants Adaptation & Mitigation Planning

ACTIONS AND STRATEGIES	MUNICIPALITY
Tree planting/canopy target (14)	Adaptation: County of Norfolk, Town of Pelham, Municipality of Clarington, City of St. Catharines, Town

	<p>of Essex, City of Owen Sound, Rural Municipality of East St Paul, Municipality of South Huron</p> <p>Mitigation: Dufferin County, Town of Falher, Town of Okotoks, Town of Yarmouth, Municipality of North Perth, City of Sault Ste Marie</p>
Habitat/ecological area restoration and creation/protection of ecological networks (11)	<p>Adaptation: County of Norfolk, Orangeville, City of Nelson, Town of Essex, Ville de Mont Tremblant, Ville de Joliette</p> <p>Mitigation: Dufferin County, Town of Falher, Wellington, Town of Okotoks, City of Sault Ste Marie</p>
Explore incorporating green infrastructure into asset management plan (9)	<p>Adaptation: County of Huron, County of Norfolk, Town of Pelham, Town of Orangeville, Municipality of Clarington, City of Nelson, Municipality of South Huron</p> <p>Mitigation: Town of New Glasgow, Dufferin County</p>
Protect and conserve water resources or wetlands (9)	<p>Adaptation: District Municipality of Muskoka, County of Norfolk, Town of Orangeville, City of St. Catharines, MRC des Sources</p> <p>Mitigation: Dufferin County, City of Brantford, Town of Okotoks, District of Kitimat</p>
Low impact development/permeable pavements (9)	<p>Adaptation: Town of Lincoln, County of Norfolk, Town of Pelham, City of St. Catharines, Town of Essex, Ville de Joliette</p> <p>Mitigation: Dufferin County, City of Brantford, Municipality of North Perth</p>
Increase or conserve green spaces (8)	<p>Adaptation: Town of Pelham, Municipality of Clarington, Town of Essex, Ville de Joliette</p> <p>Mitigation: Dufferin County, Town of Okotoks, District of Kitimat, Municipality of North Perth</p>
NbS for stormwater management (7)	<p>Adaptation: District Municipality of Muskoka, Town of Orangeville, City of St. Catharines, Brazeau County, Town of Churchill, Ville de Joliette</p> <p>Mitigation: Municipality of North Perth</p>
Urban forest and/or biodiversity plan (7)	<p>Adaptation: City of Nelson, St. Catharines, Town of Churchill, MRC des Sources, Municipality of South Huron</p> <p>Mitigation: Dufferin County, Town of Okotoks</p>

Natural assets inventory (6)	Adaptation: District Municipality of Muskoka, Town of Lincoln, City of Nelson, Brazeau County Mitigation: Town of New Glasgow, Town of Okotoks
Tree protection (6)	Adaptation: City of Nelson, Town of Essex, MRC des Sources, Ville de Joliette Mitigation: Town of New Glasgow, Dufferin County
Expanding green infrastructure on roadsides, parking lots and/or school yards (4)	Adaptation: County of Huron, Ville de Mont Tremblant, Ville de Joliette Mitigation: Town of Okotoks
Green roofs (4)	Adaptation: Town of Pelham, City of Nelson, MRC des Sources Mitigation: City of Brantford
Plant native vegetation (4)	Adaptation: District Municipality of Muskoka, County of Norfolk, Town of Essex, Town of Churchill
Green infrastructure in new and existing development (4)	Adaptation: Town of Orangeville, Municipality of Clarington Mitigation: County of Wellington, Town of Okotoks
Naturalisation (4)	Adaptation: Municipality of South Huron Mitigation: Town of New Glasgow, Town of Okotoks, Municipality of North Perth
Citizen science program to collect biodiversity data (3)	Adaptation: City of Nelson, Town of Churchill Mitigation: Town of Okotoks
Community gardens (3)	Adaptation: Town of Lincoln Mitigation: Town of Falher, Okotoks

10.12 Key Success and Challenges in the Staff Grants Program

10.12.1 Top Eight Key Success Factors

Similar key success factors were found across the other program types, with community, staff and Council engagement, partnerships, expertise from staff and consultants, resourcing and capacity, and following frameworks being cited as critical to the project. The Staff Grants program included a number of networks or working groups which municipalities found very useful.

1. Staff engagement, knowledge and expertise (24/53), as well as staff motivation and enthusiasm.
2. Community engagement (21/53)

- a. In the Town of Drayton Valley, residents were hostile to clean energy (the focus of its Local Energy Stewardship Plan) so a key strategy was to match the narrative of the audience by renaming the position from Energy Program Coordinator to Climate Change Coordinator, in order to focus on the co-benefits of climate action like reduced costs and healthier communities.
3. Partnerships with external organizations (19/53), including:
 - a. Cross sectoral partnerships,
 - b. Other governmental partnerships, and
 - c. Academic partnerships.
4. Establishing committees and working groups (16/53).
5. Resourcing and capacity (11/53), including FCM's financial assistance.
6. Senior leadership support/buy-in (11/53).
7. Data availability and quality (9/53).
8. Following a framework and methodology (5/53), including a clear plan/process or a key individual to assist with coordination, as well as having clear, coherent, and timely communication.

10.12.2 Top Five Key Challenges & Barriers

Key challenges listed in the completion reports centred around lack of data, resource and capacity, difficulties with the methodology, as well as difficulties in maintaining engagement. These were similar challenges and barriers identified across many of the other program types.

1. Resourcing and capacity (19/53), including competing priorities on staff time and resource and budget constraints.
2. A lack of data availability or the questionable quality of data (18/53).
3. Staff engagement (11/53), including inconsistent participation for some municipalities.
4. Community engagement (10/53), including difficulties coordinating with external partners, and community members not seeing the benefits of municipal climate action planning.
5. Resistance from senior leadership and difficulty in communications and awareness (10/53).

10.12.3 Identified Next Steps

The main next steps identified relate to securing a budget, getting Council approval and implementing the plan.

10.12.4 Permanent Positions Created

Twelve municipalities created permanent positions out of the positions born from the Staff Grants, while three municipalities made the committees that arose from the program permanent.

10.12.5 Peer-learning Experience

Forty-six municipalities, or 87%, found the peer-learning experience from the Communities of Practice to be extremely beneficial. There was some negative feedback from those municipalities, which was limited to lack of time, lack of more formal training, different priorities due to size, existing expertise and geography for some municipalities, and online learning and collaboration not being as effective as in-person sessions. The Niagara Adapts in particular, a local partnership between Brock University and municipalities in the Niagara Region, received a lot of praise.

10.12.6 Key Identified Improvements

Three key areas of improvement were highlighted:

1. The need for more time, training and resources for small municipalities with little to no experience with climate planning.
2. Municipalities commented on the need for further help with implementation, suggesting that implementation training be part of the program. This feedback aligns with the lack of indicators included in many of the plans and projects that were produced in multiple programs, highlighting a widespread lack of
3. Not allocating funding based on the binary of adaptation or mitigation. The County of Huron (ON) and Town of Canmore (AB) specifically highlight how both strategies are needed to take effective action and that it can be difficult to separate two streams. Ten municipalities were flagged for the use of integrated adaptation and mitigation planning approaches in their plans, showing movement towards this best practice.

11. Transition 2050

Transition 2050 (T2050) funding was issued as cohort-oriented grants, focusing on projects that transition toward a carbon neutral pathway by 2050, in line with the targets established by the Paris Agreement. By integrating climate goals into various aspects of municipal planning and sharing new information with their peers, communities of all sizes can deliver better environmental, economic, and social value to Canadians over the long term. Service providers mostly worked with cohort municipalities within the same region, or within the same province. Only one cohort worked with municipalities across different provinces. Table 61 below shows a summary of all T2050 coding and analysis completed to date.

Table 61: T2050 Projects Completed to Date

MCIP Deliverables		Total expected	No. Submitted	No. Coded & Analysed	No. of CR Submitted	No. of CR Coded & Analysed	Proportion Deliverables Analysed	Proportion CR Analysed
T2050	English	11	11	9	11	9	77%	77%
	French	2	2	1	2	1		
Total		13	13	10	13	11 ³⁰		

Ten out of 13 T2050s have been coded and analyzed as of May 13, 2022, with the exception of SADC (Société d'Aide du Développement des Collectivités), MRC de Maskinongé (QC), Clean Nova Scotia Foundation (only one plan was submitted), and CUSP (Canadian Urban Sustainability Practitioners). These will be omitted from the analysis. In addition, four cohorts had incomplete deliverables. They were the Newfoundland and Labrador Environmental Industry Association Inc, Clean Air Partnership, The Natural Step Canada, and QUEST.

The T2050 program resulted in a variety of mitigation-related plans, capacity-building initiatives, and peer-learning experiences (see Table 62). The mitigation plans were coded based on the mitigation plan coding framework outlined in Section 4. Given the range of deliverables, sub-codes were developed for each of the project types outlined below (see the Lexicon of Query Terms in Appendix 6). In addition, the completion reports were coded and analysed for key strengths and challenges from this program as compared to municipalities producing reports or plans on their own and what was notable about the peer learning network-building experience. Because four cohorts sent incomplete deliverables, the number of deliverables shown in the table below is not accurate.

³⁰ While Clean Nova Scotia only submitted one final deliverable, they did submit completion reports.

Table 62: T2050 Project Breakdown

Project type (total # of deliverables)	Cohort / Consultant (# of deliverables)
Mitigation Plans (18)	Clean Nova Scotia Foundation (7) ³¹
	Newfoundland and Labrador Environmental Industry Association Inc (6)
	ReThink Green (2)
	West Kootenay EcoSociety (1)
	Reep Green Solutions (1)
	City Green Solutions Society (1)
Capacity-building Initiatives (7)	CUSP (0)
	SADC de la MRC de Maskinongé (0)
	Quest (1)
	Vivre en Ville (1)
	The Natural Step Canada (1)
	Clean Air Partnership (4)
Peer-learning experience (1)	Toronto and Region Conservation Authority (1)

11.1 Highlights by T2050 Project Type

11.1.1 Mitigation Plans

Clean Nova Scotia Foundation developed and delivered comprehensive greenhouse gas (GHG) inventories, developing skills, capacity, and knowledge necessary to develop an action plan to advance deep GHG reductions within seven municipalities across Nova Scotia (Town of Mahone Bay, County of Inverness, District of Chester, County of Cumberland, West Hants Regional Municipality, Town of Windsor, Town of Wolfville).

³¹ Only one was submitted.

- Only the Town of Mahone Bay submitted a mitigation plan,
- Only the Town of Mahone Bay, Count of Cumberland, Town of Wolfville, and District of Chester submitted completion reports.

Newfoundland and Labrador Environmental Industry Association Inc provided training and collaborative workshops for six municipalities across Newfoundland to create and implement local climate action plans in a collaborative way (Town of Baie Verte, Town of Torbay, Town of Bauline, Town of Channel-Port aux Basque, Town of Paradise and Town of Stephenville).

- The Towns of Baie Verte and Torbay submitted final versions of their climate action plans. Four municipalities submitted versions of their plans.

ReThink Green worked with five municipalities in Ontario to enhance municipal staff literacy on climate mitigation, and develop municipal energy profiles, GHG inventories and climate policy resources for the region through the Smart Green Communities program. The two deliverables were a Regional Energy & Emissions Planning Project (REEP) for the Manitoulin Island Region (comprising of Township of Billings, Town of Gore Bay and Municipality of Central Manitoulin) and for the North Shore Region (comprising of Town of Spanish and Town of Northeastern Manitoulin and the Islands)³².

- The REEP includes suggestions on actionable items that individuals, communities and municipalities can implement, but it is intended to serve as a baseline assessment to inform the development of future actions regarding opportunities that exist for individuals, households, businesses, and communities to prepare, adapt, and effectively mitigate the effects of climate change.

West Kootenay EcoSociety identified pathways and frameworks to make progress towards renewable energy goals through the West Kootenay 100% Renewable Energy Plan and a Renewable Energy Playbook, in partnership with nine municipalities in the West Kootenay region of British Columbia (Corporation of the Village of Slocan, City of Castlegar, City of Nelson, City of Rossland, Regional District of Central Kootenay, Village of New Denver, Village of Waterfield, Village of Kaslo and Village of Silverton).

- Villages of Kaslo and Silverton did not submit completion reports.
- The nine municipalities have passed resolutions pledging to reach 100% renewable energy by 2050 across community-wide energy use in transportation, heating & cooling, electricity and waste management.

³² There may be more municipalities involved than the one listed, but completion reports for only these municipalities were submitted.

Reep Green Solutions championed the development of the ClimateActionWR Strategy, a 30 year community climate action strategy, under the ClimateActionWR collaborative, in partnership with Sustainable Waterloo Region and eight municipalities in the Waterloo Region of Ontario. The municipalities included were City of Cambridge, City of Kitchener, City of Waterloo, Region of Waterloo, Township of North Dumfries, Township of Wellesley, Township of Wilmot, Township of Woolwich.

- The Strategy identifies four calls to action that result in six Transformative Changes to reduce climate impacts locally and beyond, with the goal of transitioning to an equitable, prosperous, resilient low carbon Waterloo Region. Many of the strategies associated with the Transformative Changes are at the systemic level, and will be brought to life through the agency and influence of the local municipalities.
- The Principles for Designing a Low Carbon Future are intended to guide the development of each municipality's own strategies and actions and for each Transformative Change, the strategy provides examples of actions based on the principles.
- Accompanying the submission of the ClimateActionWR Strategy was a feasibility study, "Active Transportation Hubs in Waterloo Region: A Research Pilot Project," that looks into the feasibility of adding community active transportation hubs as a means of increasing active travel mode share for utilitarian trips under five km in the Cities of Cambridge, Kitchener, and Waterloo.

City Green Solutions worked with the Home Performance Stakeholder Council to lead a Residential Retrofit Acceleration Project which had the goal of mobilizing government and industry collaboration to develop strategies and projects to double the greenhouse emissions reductions achieved from residential retrofits in program communities by 2021, while establishing a clear path to achieving medium term and 2050 targets. The nine partner municipalities were City of Campbell River, District of Central Saanich, Comox Valley Regional District, Cowichan Valley Regional District, Capital Regional District, Township of Esquimalt, Regional District of Nanaimo, District Saanich, and City of Victoria, located in Vancouver Island, BC.

- The submitted deliverable was titled "Vancouver Island Air Source Heat Pump Market Acceleration Strategy", and is a plan to reduce emissions through more efficient energy consumption in residences.
- The strategy contains a list of actions and aims to transform the heat pump market by identifying barriers for adoption of heat pumps, and opportunities and strategies to support and accelerate adoption and implementation.

11.1.2 Peer-learning Experiences

The Toronto and Region Conservation Authority (TRCA) led a collaborative peer learning course on Community-engaged Energy Planning in Ontario. A total of 24 participants attended the first collaborative bootcamp and included at least one representative from each partnering municipality; City of Guelph, City of Brampton, Town of Caledon, City of Markham, City of London, City of Vaughan, City of Peterborough, City of Hamilton, City of Mississauga. However, only four municipalities (City of Guelph, City of Brampton, City of Caledon and City of Markham) submitted completion reports.

- The Collaborative Peer-learning Bootcamp from Phase 2 was the only submitted deliverable.
- The project focused on the application, refinement and development of recommendations for mainstreaming the TRCA's neighbourhood and business zone engagement models, as effective strategies for low carbon mobilization at the municipal scale.
- The project acts as a response to demand amongst partner municipalities for guidance and support in developing place-based and implementation-focused engagement at the local scale to meet objectives established in municipal climate action and community energy plans.

11.1.3 Capacity-building Initiatives

Vivre en Ville led a capacity-building initiative with six municipalities in Québec, to help each municipality to develop an emissions reduction action plan, drawing on the development, transport and building sectors in particular, and to begin implementation.

They were Ville de Candiac, Ville de Plessisville, Ville de Nicolet, Ville de Victoriaville, Ville de Longueuil, and Ville de Québec.

- No plans were submitted, only a report summarising the workshops and tools.
- In addition to developing various spaces and collaborative activities for this community of practice, Vivre en Ville provided the community of practice with tools adapted to its needs, and supported each municipality in the development and implementation of its action plan through personalized support.

Quest fostered collaboration with five municipalities from New Brunswick and Alberta in its Municipalities and Utilities Partnering for Community Resilience project, which piloted a renewable energy protocol to support the implementation of renewable energy with local utilities and/or energy service providers that meet community low carbon objectives. The municipalities were City of Moncton, City of Saint John, Regional Municipality of York, Region of Waterloo, and Town of Canmore.

- The project led to a climate risk and vulnerability assessment and a recommendation report including measures on adopting policies and practices, augmenting risk-based decision-making, improving infrastructure, land-use planning, asset planning, energy planning and reliability measures, increasing public education, communication, coordination, and emergency preparedness and response during prolonged power outages; informed the development and/or implementation of climate adaptation plans and emergency management plan with a focus on energy infrastructure and energy supply; and developed new tools blending different methodologies.
- One deliverable titled “Accelerating the Implementation of Renewable Energy” is a guidebook to provide municipalities with the means to support rapid and responsible development of local renewable energy sources.

Clean Air Partnership led the Climate Action Support Centre (CASC) through three distinct streams (PACE – Property Assessed Clean Energy/LIC – Local Improvement Charge financing, Green Development Standards, and Corporate Energy), in partnership with nine municipalities in Ontario (Town of Halton Hills, City of Guelph, Town of Newmarket, City of London, City of Peterborough, Municipality of Clarington, City of Burlington, Town of Whitby, and City of Vaughan).

- Deliverables included for use by the municipalities were an implementation toolkit for green development standards, a Process Report Framework, a Monitoring Report Framework, and a Monitoring and Evaluation (M&E) Framework to examine the effectiveness of Local Improvement Charge Pilot Programs.

The Natural Step Canada led the Energy Futures Lab Project, an Alberta-based coalition of diverse innovators and leading organizations working to accelerate the energy system transition, with Town of Devon, Town of Drayton Valley, City of Grand Prairie, and Town of Hinton.

- The submitted deliverable was the Energy Futures Roadshow presentation, designed to support Albertan communities to explore their unique opportunities and challenges arising from the energy transition. It outlines how municipalities can prepare and implement municipal action plans for deep emission reductions and contributing to a governance framework to overcome roadblocks.

11.2 Identifying the Strategic Use of Co-Benefits

A high-level review showed that co-benefits were mentioned in eight of the ten analysed cohort projects as a way to justify mitigation projects. Two cohorts only referenced co-benefits and four applied them more explicitly them in their projects. The cohorts that

explicitly used co-benefits were mostly those service providers helping municipalities produce mitigation plans. See table 63 below.

Table 63: Breakdown of T2050 Cohorts and Their Use of Co-Benefits in their Projects

Do Not Use Co-Benefits (2)	Only Reference Co-Benefits (4)	Explicitly Use Co-Benefits (4)
Vivre en Ville	Toronto and Region Conservation Authority	Reep Green Solutions
The Natural Step Canada	City Greens Solutions Society	West Kootenay EcoSociety
	Quest	Clean Air Partnership
	Newfoundland and Labrador Environmental Industry Association Inc	ReThink Green

11.3 The T2050 Experience

Thirteen T2050 projects were funded, spanning regional to provincial to Canada-wide scales (see Table 64 below). The eleven cohort completion reports were queried to assess the cohort experience among all 13 projects and used to identify Key Success Factors (KSFs). CUSP and SADC de la MRC de Maskinongé (QC) are omitted from this analysis because they did not include deliverables or completion reports. The completion reports were self-reporting questionnaires that were developed by MCIP to get a sense from project leads and participants about benefits, challenges and key success of the CAPG program. These were filled out by the service providers, not the municipalities.

Table 64: Geographic Distribution of T2050 Projects

Project Types	Consultant	Geography
Mitigation Plans	West Kootenay EcoSociety	Regional, BC
Mitigation Plans	City Green Solutions Society	Regional, BC
Mitigation Plans	ReThink Green	Regional, ON
Mitigation Plans	Reep Green Solutions	Regional, ON

Mitigation Plans	Clean Air Partnership	Regional, ON
Peer-learning Experience	Toronto and Region Conservation Authority	Regional, ON
Capacity-building Initiative	Vivre en Ville	Regional, QC
Capacity-building Initiative	The Natural Step Canada	Same Province, AB
Mitigation Plans	Newfoundland and Labrador Environmental Industry Association Inc	Same Province, NL
Mitigation Plans	Clean Nova Scotia Foundation	Same Province, NS
Capacity-building Initiative	Quest	Across Canada

11.3.1 Top 5 T2050 Enabling Factors

The 2050 program received very similar feedback to the CAPG program. The most consistently identified success factors related to relationships with the consultants and fellow stakeholders/municipalities. As many of the municipalities were small and already struggling with lack of capacity and resources, many found that the T2050 funding helped to spur action that would likely not have occurred otherwise. Participants appreciated applying an established framework and methodology to develop their capacity. Quality consultants that were able to provide this and to respond to the contextual needs of participants, helping to mobilize smaller municipalities with little to no climate action experience or support to advance their climate mitigation planning. The top five key success factors are:

1. Flexibility and adaptability with service providers.
2. Using established framework and methodology.
3. Engagement and peer learning helped to build the capacity of staff in this cohort model.
4. Sharing resources and ability to acquire data more easily.
5. Accountability.

11.3.2 Top 8 Positive Outcomes of T2050

Municipalities greatly benefitted from the cohort experience and identified many positive outcomes. Most municipalities found that the cohort experience was the most beneficial part of the program, due to the networking, partnerships and knowledge acquisition that

resulted, as well as the savings in time and cost. The top eight cited success factors of this approach are as follows:

1. Developed collaboration, peer networking, and unique partnerships, allowing staff to learn from each other and share their struggles.
2. Created networks that otherwise would not have existed.
3. Helped with knowledge acquisition, filling knowledge gaps, and building capacity and literacy.
4. Provided access to advice and resources.
5. Promoted regional alignments, preventing project duplication and saving resources.
6. Developed and/or identified case studies/best practice for the region.
7. Put pressure on relevant industries eg. residential retrofits.
8. Working with other municipalities and a service provider gave authority and accountability, which helped to achieve buy-in.

Again, considering that many smaller communities were involved in T2050, there was a full appreciation of the fact that the project would not have occurred without the joint procurement model.

11.3.3 Top 6 Challenges & Barriers of T2050

Most of the challenges of the cohort-based approach centred around lack of capacity, resources, and time, despite the MCIP funding. The top six challenges and barriers identified relate to:

1. Need for more time for planning due to complexity, competing priorities, and number of municipal partners.
2. Organizational pressures (elections, staff turnover, etc.).
3. Lack of staff capacity to be consistently involved; in particular, a lack of climate and sustainability expertise, technical restraints and resources, especially in smaller municipalities.
4. Remote sessions, due to Covid or regional distribution, not being as impactful as in-person sessions.
5. Difficulty maintaining momentum and engagement due to number of partners, competing priorities, and across distances and/or time zones.
6. Different capacities, competencies and municipality sizes in the cohort meant municipalities were at different stages and had different needs.

Some municipalities pointed out that working with different sized municipalities from different provinces helped smaller municipalities to gain legitimacy and learn from the larger municipalities with more specialised human and physical resources. Considering the diversity of the types of T2050 projects and that there was also the opposite feedback, that cohorts should have municipalities of similar size, expertise and capacity, it may be that whether this is a challenge or a success factor depends on the type of project being worked on.

11.3.4 Top 5 Improvements for the Future of T2050

Regarding future improvements, some municipalities would have appreciated more time, a clear methodological framework and process, spin-off funding, and support with implementation. Unprecedented circumstances brought on by COVID-19 (2020-2021) contributed to additional delays. Some municipalities would have liked

The service providers stated five key areas for improvement wherever possible:

1. More time devoted to the planning and scheduling process.
2. More resources for smaller communities to participate.
3. Spin-off funding to ensure long-term success.
4. Support for implementation planning.
5. More in-person sessions where possible.

11.3.5 Best Practice T2050 Project: TransformWR

TransformWR leveraged community input, technical advice, and collaboration with municipal partners to guide the Region's 30-year transition to a low carbon future that is equitable, prosperous, and resilient.

- The project brought together four townships into the collaborative for the first time and has benefitted them in terms of peer learning, and equity is featured as a key part of the strategy's vision and equity-seeking groups were specifically sought to inform the strategy from their perspective.
- It showcases a promise of a flourishing community that sees economic and social prosperity as fundamentally connected to ecological health.
- There is an emphasis on community engagement, with 1600 community members informing the work from a variety of backgrounds, ages, sectors, job titles and education levels.
- The strategy is clearly laid out, with principles and visions guiding the strategy, providing inspiration and instilling a sense of community.
- Actions are targeted towards community, businesses and organisations as well as individuals.

- It includes companion documents and toolkit resources, and the two pilot projects provide an example for the role that municipalities can play regarding innovation and GHG emissions reductions related to transportation and the existing building stock.

11.4 Equity Considerations in T2050

The following two cohorts stood out for their integration of equity in their projects.

- 1. Inclusion and community engagement are a key part of the plan, and strive to ensure the benefits of actions are extended to those who are less privileged and/or who are underrepresented in policy- and decision-making processes (West Kootenay EcoSociety 100% Renewable Energy Plan, BC).** Each “Big Move” includes a discussion of risks of exclusion and opportunities for inclusion.
- 2. A series of guiding principles and six transformational changes to support the development of municipal mitigation plans (Reep Green Solutions TransformWR Strategy, ON).** One of the transformational changes is the commitment to leverage GHG emissions reductions to increase equity, prosperity and resiliency for all. Equity is a key piece of its guiding principles: prioritising the improvement and wellbeing of and reducing impacts on equity-deserving groups, and designing for access and facilitating community ownership, for example. One of its strategies is to prioritize increasing equity throughout GHG reduction planning, through actions such as incorporating education on sustainability justice and equity into climate action planning, and funding a climate justice committee led by community members from equity-seeking groups.

11.5 Nature-based Solutions in T2050

Only two T2050 cohorts included NbS in their projects. Most focused on emissions reductions through energy efficiency retrofits in buildings.

Table 65: Key Areas Where Cohorts are Integrating Nature-based Solutions into T2050 Projects

ACTIONS AND STRATEGIES	COHORT
Workshop on green infrastructure and stormwater	Vivre en Ville
Review/update municipal plan and development regulations to ensure no preclusions to, or to encourage or require: tree planting, green roofs	Newfoundland and Labrador Environmental Industry Association Inc

12. Concluding Remarks

FCM's Municipalities for Climate Innovation Program (MCIP) is one of the most well-resourced and influential funding programs for local governments in Canada. It supports municipalities across diverse geographies in all provinces and territories to investigate and plan for ways to reduce climate risk and emissions and build community resilience over time.

This report aims to evaluate the effectiveness of this investment over 2016-2021 to support the update of MCIP's Performance Measurement Framework. It helps to identify advantages and challenges in the eight MCIP programs, recommend ways of tracking progress on climate actions, results and outcomes, and highlights key findings to accelerate effective climate action.

A qualitative architecture was developed to code, query and analyse MCIP deliverables, including primary data from plans, reports, and studies and self-assessed completion reports, from across all eight program areas. This analysis provides a preliminary evaluation of five of the eight program areas, focusing on climate actions and results from 286 municipalities, or 89% of MCIP deliverables, and the overall effectiveness and impact of MCIP.

These preliminary findings show the ways that MCIP funding has substantially increased climate action and innovation in municipalities, large and small, across Canada. The results from this analysis have helped to identify best practices, frameworks, and metrics to streamline and accelerate effective climate action with the overall goal of reducing projected climate risks and emissions in diverse municipalities.

Highlights include hundreds of adaptation and mitigation actions being proposed to reduce risks across eight hazard areas, three risk types, and emissions across seven sectors. The identification of common adaptation and mitigation actions in Adaptation and Mitigation Plans, Climate and Asset Management Networks and Staff Grants, showcases similar strategies being proposed in municipalities across the country. Common indicators, though less prevalent, help to track the progress of actions when implemented. The identification of the co-benefits of climate actions build support for climate action in other priority areas, such as health, livability, and cost savings.

In some municipalities, a bare minimum of climate awareness was pursued; others demonstrated more comprehensive evaluation, process innovation, and best practice. For instance, municipalities that prioritized adaptation and mitigation actions, indicators, and

co-benefits were planning to track progress and embed climate action across areas of policy, planning and decision-making. This sequencing was viewed as a proxy to shift plans toward action and was viewed as best practice in plan development.

The integration of adaptation and mitigation action planning and co-benefits helped to prevent contradiction, align risk and emission reduction goals, streamline planning resources, and build cross-departmental awareness and buy-in, all viewed as contributing to conditions for shared accountability toward implementation.

The identification, inventorying and condition assessment of natural assets in asset management emerged as a critical best practice in the Climate and Asset Management Network (CAMN), helping to reduce municipal flood and heat risk, and avoid costly and emissions-intensive expansion of infrastructure.

In addition, MCIP cohort programs CAMN, CAPG and T2050 streamlined and scaled climate action across multiple municipalities, encouraging shared procurement and peer learning. This cohort approach was most effective when climate data was regionally based and hazard, risk and action identification in adaptation planning and/or emissions reduction opportunities were bound by common geographies and regulatory and policy environments. These programs were particularly effective in small municipalities, enabling them to share resources where they would otherwise lack capacity.

Best practice and innovation were identified across all eight program types, signalling key opportunities to streamline frameworks and methodologies and to improve the effectiveness of actions, results and outcomes in future MCIP funding.

To date, the MCIP funding has helped to develop frameworks, actions, tools, innovative processes, and cohort-oriented collaborations that have, overall, advanced climate awareness, adaptation and mitigation planning, and new collaborative opportunities in municipalities across the country. This is a crucial outcome of MCIP and can be developed further. The effectiveness of this funding, and the plans, studies and reports that were enabled by it, will ultimately be determined by the overall results of implementation and measurement of key progress indicators regarding avoided damage costs of climate change in infrastructure, populations, and ecosystems, and in successful decarbonization across municipalities.

A critical next step for MCIP for the development of its programs will be developing best practice frameworks for municipalities to assist them to move climate action into implementation and tracking their progress. Reducing climate exposure and risk, and

accelerating decarbonization in our communities, are crucial steps in supporting a just, equitable, and resilient transition toward sustainability. We therefore hope that this qualitative analysis can be used to further refine and accelerate MCIP's programs.

Appendices

Appendix 1. The Climate Resilience Reporting Framework 2.0

The ACT team has updated existing indicators in the Performance Measurement Framework based on the analysis to date. The indicator updates we have proposed are derived from the results of our analysis and reflect common actions and indicators that Canadian municipalities have identified and are using to promote resilience and emissions reductions in their communities.

We have proposed two tiers of indicators, primary and supplemental, to provide MCIP with a diversity of options to use for evaluation and the option to provide more detailed indicators wherever possible. ‘Primary indicators’ provide a broad understanding of how municipalities are acting on climate change and measuring progress; ‘supplemental indicators’ provide an additional level of detail.

Wherever possible, indicators representing the most common and replicable adaptation and mitigation actions, as well as measures of adaptation and mitigation progress, have been integrated into one table for coherence and to prevent duplication.

Tier 3: Impacts	Aims to combine the information gathered in Tiers 1&2 to identify the overall impact of MCIP’s 8 funding programs, including key success factors and challenges for climate action in funded municipalities across Canada.		
Tier 2: Results	Identify projected results of Tier 1 actions on policy, planning, business practices and decision processes, including key process innovations or best practices, that suggest movement toward implementation.		
Tier 1: Adaptation & Mitigation Actions	Look to understand key climate adaptation and mitigation actions developed by municipalities. The focus is on common climate actions being undertaken in communities, based on hazards for adaptation and sectors for mitigation.		
Impacts	Number of municipalities influenced	# of municipalities that have developed new plans # reduced GHG emissions	Plans, CAMN, Studies, CAPG, Capital Projects, Staff Grants, T2050

	# of municipalities that have revised existing plans (# of adaptation, mitigation or integrated plans)	Plans, CAMN, Studies, CAPG, Capital Projects, Staff Grants, T2050
	# of municipalities that noted collaborative efforts with other communities in achieving climate outcomes	CAMN, CAPG, T2050, Completion Reports
	# of communities producing plans through joint procurement	Plans, CAMN, CAPG, T2050, Completion Reports
	# of best practice communities that emerge from plan development process	Plans, CAPG, CAMN, Studies, T2050
	# or % of total hectares of municipal land protected from climate hazards	Plans, CAPG, CAMN, Studies, Staff Grants, Capital Projects
	# of tonnes of revised GHG emissions avoided through MCIP-funded projects	Plans, CAMN, Studies, Staff Grants, Capital Projects, T2050
	# of municipalities that conducted studies related to climate adaptation or mitigation # of municipalities that developed reports specific to an emission sector	Plans, CAMN, Studies, CAPG, Capital Projects, Staff Grants, T2050
	# of municipalities with increased internal awareness and capacity (Staff Grants)	Staff Grants, Completion Reports

	Existence of inter-municipal or intersectional committees focused on adaptation	Cohort model advantages, challenges, and areas for improvement	CAPG, CAMN, T2050, Completion Reports
	Number of climate-ready municipalities	# of municipalities applying climate change in asset management plan	CAMN
		# of municipalities with completed capital projects that account for projected climate impacts over time - reduce vulnerability/build resilience	Capital Projects
		# of municipalities embedding climate projections into corporate capital and investment decisions to avoid short and long-term service disruptions (e.g., policy/process changes)	Plans, CAMN, Studies, CAPG, Capital Projects, Staff Grants, T2050
		# of municipalities implementing or moving toward implementation of their climate action plans	Plans, CAPG, Staff Grants, T2050
		%/# of implementation of climate projections/data in plans, strategies, or regulations	Plans, CAPG, CAMN, Studies, Staff Grants, Capital Projects
		\$/# of corporate investment in capacity development for climate change	Plans, CAMN, Studies, CAPG, Capital Projects, Staff Grants, T2050
		# of projects that account for climate change impacts	Plans, CAPG, CAMN, Studies, Staff Grants, Capital Projects

	# of municipalities that used climate projections	Plans, CAPG, CAMN, Staff Grants, Capital Projects, T2050
Number/type of climate related impacts identified and feasible for implementation in municipalities	Amount (\$) saved and identified benefits to municipalities	Plans, CAPG, CAMN, Studies, Staff Grants, Capital Projects, T2050
	#/% of municipal residents protected from climate hazards	Plans, CAPG, CAMN, Studies, Staff Grants
Municipalities fostering cooperation and involvement with internal staff, stakeholders, and industry leaders to produce streamlined climate change action	# of municipalities that invest in institutional capacity to implement their adaptation or mitigation actions	Staff Grants
	# of municipalities that have partnered with key stakeholders, or industry leaders to promote implementation of the plan, or to develop the plan	Completion Reports
	# of municipalities that have developed a steering committee-for the development of the plan or for implementation of it	Completion Reports
	# of municipalities that retained consultants for assistance in development of climate change resilience, or government guidance	Completion Reports
Municipalities better prepared to mitigate GHG emissions from key emission sectors	% of municipalities that are focusing on mitigating emissions from key emissions sectors (agriculture, buildings, energy	Plans, CAMN, Studies, Capital Projects, Staff Grants, T2050

	as a result of MCIP funding	systems, infrastructure, transportation, and solid waste)	
		# of municipalities applying climate change / emissions reductions in asset management plan development	CAMN
		\$/# of corporate investment in capacity development for climate change	Plans, CAMN, Staff Grants
	Dollar value of climate-related impacts avoided	Dollar estimates (\$) of avoided costs of damage and other benefits over short and long-terms	Plans, CAMN, Studies, CAPG, Capital Projects, Staff Grants, T2050
	Number/type of emissions reductions by sector identified and feasible for implementation in municipalities	# of emissions inventories created for each sector	Plans, Staff Grants, T2050
		Costs saved from energy performance and emissions reductions measures (\$)	Plans, CAMN, Studies, Staff Grants, T2050
	Number of hectares of natural assets protected in municipalities across Canada	# of municipalities that have nature-based solutions in their plans	Plans, CAMN, Studies, CAPG, Capital Projects, Staff Grants, T2050
Proportion of greenhouse gas emissions (GHGs) reduced/prevented per year (tonnes of CO ₂ eq/year)	# of municipalities with emissions reduction targets that match or exceed national targets	Plans, CAPG, CAMN, Studies, Capital Projects, T2050	
Results	Number of municipalities with approved adaptation	# of municipalities with an approved integrated climate action plan	Completion Reports

	and/or mitigation plans		
	Number of municipalities with resilience and/or efficiency standards for new buildings	# of climate plans (adaptation, mitigation, or integrated) that include both resilience and efficiency in buildings	Plans, CAPG, CAMN, Staff Grants, T2050
	Next steps that communities have taken to move their plan forward	# of municipalities that have Council approval for their plan	Completion Reports
		# of plans that have secured budgets	
		# of plans with established monitoring and evaluation	
	Adaptation and/or mitigation best practice for communities	# of plans that directly connect or integrate their plan, study, report to other existing strategies and documents.	Plans, CAMN, Studies, CAPG, Capital Projects, Staff Grants, T2050
		# of plans that include natural assets	Plans, CAMN, Studies, CAPG, Capital Projects, Staff Grants, T2050
		# of adaptation focussed plans that include mitigation actions # of mitigation focussed plans that include adaptation actions	Plans, CAMN, Studies, CAPG, Capital Projects, Staff Grants, T2050
		# of plans that include equity as part of their plan development	Plans, CAMN, Studies, CAPG, Capital Projects, Staff Grants, T2050
		# of plans that use emission retrofits or standards as part of GHG reduction	Plans, CAMN, Studies, Staff Grants, T2050

	Comprehensive plan development	# of plans that have incorporated a risk or vulnerability assessment to develop their adaptation plan	Plans, CAPG, CAMN, Staff Grants
		# of plans that incorporate GHG modelling	Plans, CAMN, Staff Grants, T2050
		# of projects that integrate GHG emissions reductions	Plans, CAMN, Studies, Staff Grants, T2050
	Performance indicators used by municipalities to monitor and evaluate over time (proxy for projected benefits)	# of municipalities that provide indicators in their plans	Plans, CAMN, Studies, CAPG, Capital Projects, Staff Grants, T2050
		# of municipalities that provide evaluative and monitoring strategies in their plans	Plans, CAMN, Studies, CAPG, Capital Projects, Staff Grants, T2050
		# of municipalities that have/have not provided indicators in their plans	Plans, CAMN, Studies, CAPG, Capital Projects, Staff Grants, T2050
		# of municipalities measuring total GHG emissions reductions (tonnes CO ₂ e/year)	Plans, Staff Grants, T2050
		# of municipalities meeting electricity and power demands with renewable energy (kWh/year)	Plans, Staff Grants, Capital Projects, T2050
		# of municipalities diverting organics and/or reducing waste from landfill (tonnes/year)	Plans, Staff Grants, T2050
		# of municipalities increasing % of population using public transportation or carpooling (multi-modal km trips/year)	Plans, Staff Grants, Capital Projects, T2050

	Number/type of innovative practices, tools, and technologies (ideas to be accelerated, scaled-up and/or replicated)	# of municipalities that developed data collection tools to help gather new data or close data gaps	Plans, CAMN
		# of municipalities that develop programs to help residents implement adaptive measures in their homes and businesses.	Plans, Staff Grants
		# of municipalities that used regional climate projections to identify impacts and hazards in a comprehensive manner	Plans, Studies, CAPG, Staff Grants
	Key indicators used to monitor effective, efficient adaptation practices, products and technologies generated	# of municipalities that have improved corporate decision processes as a result of the project (e.g., or policy, bylaw changes)	Plans, CAPG, CAMN, Studies, Staff Grants, T2050
	Number of policies, plans or programs that introduced or adjusted mainstream climate risks	# of municipalities that incorporate changes to guidelines, procedures, standards, or bylaws to address resiliency and risk for new or existing development	Plans, CAPG, CAMN, Studies, Staff Grants
	Number of policies, plans or programs that introduced or adjusted mainstream GHG reduction	# of municipalities that incorporate climate change into guidelines, procedures, standards, or bylaws to address emissions reductions in new or existing development	Plans, CAPG, CAMN, Studies, Staff Grants, T2050

	Key success factors to planning and implementation	# of municipalities that developed interdepartmental collaboration for plan development	Plans, CAPG, Staff Grants, T2050, Completion Reports
		# of municipalities that developed engagement programs, workshops, and/or spaces for plan development with stakeholders	Plans, CAPG, Staff Grants, T2050, Completion Reports
		# of municipalities that used input from residents, businesses, and stakeholders to help develop their plan	Plans, CAMN, Studies, CAPG, Capital Projects, Staff Grants, T2050, Completion Reports
	Key challenges and barriers to planning and implementation	# of municipalities that learned and adapted from failures of engagement and implementation with the public	Plans, CAMN, Studies, CAPG, Capital Projects, Staff Grants, T2050, Completion Reports
		# of municipalities that overcame and addressed internal challenges with departments and staff	Completion Reports
	Adaptation and Mitigation Actions	Number of municipalities that conduct and update risk and vulnerability assessments (using multiple hazards and risk areas)	# of actions that address existing or future vulnerabilities in infrastructure, populations, and ecosystems
# of corporate plans that integrate climate risk and vulnerability analysis			Plans, CAPG, CAMN, Studies, Staff Grants
# of asset management plans that develop inventories of built and natural assets			CAMN

		# of asset management plans that integrate climate risk assessment to assess current and future levels of service	
	Number/type of actions identified	# of actions that address drought, extreme temperature, extreme weather, flooding, forest fires, geologic and sea level rise. # of actions that address GHG reductions in agriculture, buildings, energy systems, infrastructure, solid waste, and transportation	Plans, CAPG, CAMN, Studies, Capital Projects, Staff Grants
	Innovative adaptation planning methods that contributed to project development	# of municipalities that extended their resources to advance innovation or experimentation ³³	Completion Reports
		# of municipalities that provide novel engagement strategies	Plans, CAMN, Studies, CAPG, Capital Projects, Staff Grants, T2050
	Number of mechanisms identified which could potentially fund adaptation and/or mitigation	% Common strategies used to adapt to specific climate impacts and reduce emissions	Plans, CAPG, Staff Grants, T2050
		# of municipalities that collaborated between institutions, intergovernmental groups, businesses, or indigenous communities	Plans, CAMN, Studies, CAPG, Capital Projects, Staff Grants, T2050, Completion Reports
		# of municipalities that invest in program development to	Plans, CAMN, Studies, Staff Grants, T2050

³³ Innovative or experimental areas: actions and initiatives conducted by municipalities that extend beyond the prescribed work for their funding program.

		enhance and inform about emissions saving and green practices	
	Key areas where climate is integrated into development planning	Atypical or innovative strategies used to adapt to specific climate impacts	Plans, CAPG, CAMN, Staff Grants, T2050, Completion Reports
		# of municipal plans that embed climate risk and resilience strategies into statutory documents and/or plans	Plans, CAMN, Studies, CAPG, Capital Projects, Staff Grants, T2050
		# of corporate decision processes that include climate action as a result of the project (e.g., or policy, bylaw changes)	Plans, CAMN, Studies, CAPG, Capital Projects, Staff Grants, T2050
		# of municipalities with ongoing climate change action efforts (e.g., working groups, committees, regular implementation meetings, etc.)	Plans, CAMN, Studies, CAPG, Staff Grants, T2050
		# of studies that develop resources to address climate change impacts # of studies that develop resources to address emissions	Studies
		# of actions that account for plan, standards, and/or bylaw updates or revisions to accommodate for climate risk and resiliency	Plans, CAPG, CAMN, Staff Grants, T2050
		# of actions that incorporate GI/LID for new and existing	Plans, CAPG, CAMN, Staff Grants, T2050

		buildings	
		# of actions that include green space or vegetation development, or coverage amounts for new development and resiliency	Plans, CAPG, CAMN, Staff Grants, T2050
		# of actions that have addressed agricultural practices as part of climate resiliency	Plans, CAPG, CAMN, Staff Grants, T2050
		# of actions that seek to increase knowledge and awareness of climate change	Plans, CAPG, CAMN, Staff Grants, T2050
		# of actions that provide energy efficient or retrofits for new and existing buildings	Plans, CAMN, Staff Grants, T2050
		# of actions that develop decentralised / district energy generation or shifts to renewable energy	Plans, Staff Grants, T2050
		# of actions that install or expand green, grey and EV charging infrastructure	Plans, Staff Grants, T2050
		# of actions that divert or reduce waste reduction, and improve waste collection and landfill gas capture	Plans, Staff Grants, T2050
		# of actions that improve, expand, and electrify transportation, and support the switch to electric vehicles	Plans, Staff Grants, T2050

To access the large appendices below (Appendix 2 – 5), click the [Appendix folder](#) to view in Google Drive.

Appendix 2: Detailed table of Adaptation Plan Actions & Indicators

Appendix 3: Detailed table of Mitigation Plan Actions & Indicators

Appendix 4: Detailed table of Staff Grants Adaptation Plan Actions & Indicators

Appendix 5: Detailed table of Staff Grants Mitigation Plan Actions & Indicators

Appendix 6: Lexicon of Query Terms

Appendix 7: Nvivo Guide

This Nvivo Guide was developed to ensure consistency in coding, query terms, and analysis throughout the qualitative analysis. Continued triangulation approaches are encouraged as multiple analysts continue to perform the qualitative analysis on the remaining MCIP deliverables. Some coding tips are included to support this process.

ACT is a state-of-the-art research-to-practice hub for climate change and sustainability solutions. We work across sectors to mobilize relevant knowledge for practice. We do this by advancing public and private sector partnerships, coordinating and co-creating leading-edge research for practice, mobilizing policy relevant knowledge to help us all go further faster on climate and sustainability action.



