2021 Peel Climate Change Performance Measurement System

Final Report

Prepared in consultation with KPMG

November 2022

Credit Valley Conservation
inspired by nature

Toronto and Region Conservation Authority

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1.0 Introduction

Since 2007, the Region of Peel has provided climate change special levy funding to address unfunded and underfunded activities that mitigate the impacts of climate change. As leaders in developing holistic, science-based solutions to environmental concerns at a watershed scale, Conservation Authorities are uniquely positioned to pursue efforts that have historically cut across sectors, stakeholder groups and political jurisdictions. In 2016, Peel Council requested the establishment of performance indicators to further assess the effectiveness of achieving the desired climate change outcomes. Toronto and Region Conservation Authority (TRCA) began developing the Performance Measurement System and Key Performance Indicators (KPIs) in 2019 in collaboration with Credit Valley Conservation (CVC) and the Region of Peel. TRCA retained KPMG Canada to provide expertise in performance measurement.

The Measurement System project establishes a consistent methodology to align Peel Conservation Authority (CA) programs. Shared KPIs have been developed to measure the collective performance of TRCA and CVC climate change initiatives. The Measurement System evaluates the initiatives' success in achieving shared outcomes that support their respective strategic goals in alignment with the Region's Climate Change Master Plan (CCMP). The Measurement System aligns 44 cost centres between TRCA and CVC into eight (8) program areas each with their own KPI as well as greenhouse gas (GHG) emissions reduction. The resulting methodology and indicators draw from best practices in the field of performance measurement, placing a high emphasis on simplicity and ease of implementation. The trade-off to this approach is the loss of comprehensiveness around the more nuanced co-benefits that result from actions taken to address climate change. However, the high-level analysis of the Measurement System will significantly improve the transparency and performance measurement of programs delivered by both Peel CAs with the special levy funding.

This performance report provides a summary of the accomplishments of the Peel Climate Change Performance Measurement System Project during 2021, specifically:

- How well each of the Program Areas and the initiative are performing;
- Useful information that can be used to identify Program Areas for improvements; and
- A demonstration of accountability for the use of Climate Change Initiative funding.

The next step in the development of this performance measurement system will be to set targets for each of the KPIs as well as any recommended changes for further alignment improvements.

2.0 Performance Measurement Results by Program Area

The following table summarizes the performance indicators calculated for the main objectives of each Program Area. All indicators are calculated on a 1 to 5 scale, where 5 = Very Effective, and 1 = Not Effective (Figure 1). Details regarding each Program Area can be found in Appendix A.

Figure 1: Peel Climate Change Performance Measurement System Scale

ADAPTATION PERFORMANCE REPORT

Climate Science

OBJECTIVE: Reduced negative impacts of climate change (due to useful and effective plans for protection and recovery measures).

OVERALL INDICATOR	OVERALL INDICATOR SCORE
The usefulness of program area outputs for planning or implementing protection and recovery measures.	3.79 Effective

ACTIONS – The projects and activities contributing to this program area are quite diverse and include applied research, knowledge dissemination and advice, and training for external (municipalities) and internal (CAs) users on climate change impacts and possible mitigation measures. Focus areas include water quality, flooding, erosion, extreme heat, and ecosystem biodiversity.

RESULTS

There was a wide range within the individual scores for the outputs rated. Six (6) representative outputs scored a 4 or 5, suggesting that many of the activities under this program area are potentially useful to very highly useful in implementing measures to reduce the negative impacts of climate change. The selection of a rater who had limited knowledge of one of the representative outputs resulted in a lower rating for that output and the overall indicator score.

Outputs for this program area are critical to developing and applying monitoring and implementation measures for climate change adaptation. They provide useful resources to reduce the negative impacts of climate change through actions and the provision of expert advice. Additionally, outputs provide sound research for the development of business cases and other rationales for use in explaining and justifying climate change adaptation measures to a variety of stakeholders and other audiences.

Flood Management

OBJECTIVE: Mitigated risk of flooding (resulting from the construction and maintenance of structural flood protection measures and the usefulness of flood protection information).

OVERALL INDICATOR	OVERALL INDICATOR SCORE
The usefulness of program area outputs for predicting and mitigating flood impacts, as well as the benefits of flood protection infrastructure that is developed.	4.54 Very Effective

ACTIONS – The actions contributing to this program area involve the development and dissemination of information regarding flood probabilities, potential flood impacts, and flood mitigation options as well as construction and maintenance of flood protection infrastructure.

RESULTS

All outputs selected from the research programs in this program area were rated between 4 and 5, indicating that many activities within this program area ranked from potentially useful to very highly useful in predicting and mitigating flood impacts as well as developing flood protection infrastructure. The program that supports the construction and maintenance of flood protection infrastructure was found to have a very high return on investment based on berm upgrades which protect affected lands and properties to the 500-year event.

Outputs for this program area provide valuable information to help prioritize flood mitigation measures, pond cleanout, and infrastructure repair and upgrade. Outputs also provide accurate, up-to-date mapping to identify future flood risks and inform municipal planning documents. Overall, outputs contribute directly to the identification of flood risks and inform successful flood risk mitigation.

Erosion Management

OBJECTIVE: Mitigated risk of erosion (reduced risk of damage to infrastructure from erosion due to the maintenance and construction of erosion control structures).

OVERALL INDICATOR	OVERALL INDICATOR SCORE
The extent of implementation and maintenance of effective erosion risk reduction measures.	5.00 Very Effective

ACTIONS – The projects and activities contributing to this program area involve the maintenance of existing erosion control infrastructure and the construction of new erosion control structures to protect high priority sites where Region of Peel sanitary infrastructure or watermains may be at risk.

RESULTS

Erosion Risk Management (ERM) activities were scored based on the extent to which the annual plan was implemented. The program area received a score of 5, as all remedial works were implemented as planned in 2021. As targeted, 214 infrastructure hazard monitoring sites in Region of Peel were inspected before the end of the monitoring season, as well as an additional 28 sites that received repeated post-storm inspections. The ERM team encountered challenges related to pandemic restrictions, however all 2021 targets and objectives were achieved without delay.

Restoration and Natural Heritage Science

OBJECTIVE: Reduced impacts of climate change related extreme weather events on flooding, erosion, water quality degradation, and species and natural features (due to restoration projects and the usefulness of restoration-related research).

OVERALL INDICATOR	OVERALL INDICATOR SCORE
Reduced impacts of climate change related extreme weather events through enhancements to the natural heritage system and the usefulness of research information for implementing climate change protection measures.	4.08 Very Effective

ACTIONS – The projects and activities in this program area include a wide range of restoration projects (aquatic and wetland restoration, riparian and valley restoration, stream and natural channel restoration, and terrestrial restoration), as well as Low Impact Development (LID) and natural green infrastructure projects and two research programs (urban natural heritage, and biodiversity conservation and management).

RESULTS

Outputs from restoration projects which reduce the negative impacts of extreme weather events generally scored high, with five projects scoring 4 and one 5. Projects within high climate change vulnerability areas tended to score higher, but most projects were assessed to have a measurable impact on flooding and water quality degradation mitigation at a regional scale.

Outputs from research projects also scored very well, with users indicating that the outputs were either already used to inform climate change mitigation and adaptation in the Region of Peel or will be used in the near future. The outputs – which include best practice guides, policies and strategies – provide highly useful guidance for site prioritization, species selection, impact assessments and plan review.

Forest Management

OBJECTIVE: Increased forest health and ability to withstand climate related extreme weather events (due to the removal of hazard trees and increased forest resilience).

OVERALL INDICATOR	OVERALL INDICATOR SCORE
The extent of implementation of hazard tree removal plans and the increased ability of forests to withstand extreme weather events resulting from forest management measures.	4.92 Very Effective

ACTIONS – The projects and activities in this program area include a wide range of forest monitoring, inventory, management planning, outreach, and stewardship as well as active management projects and programs to address hazard trees, forest health and disease prevention, canopy expansion, invasive species, and resilience to extreme events.

RESULTS

All programs in this program area scored between 4 and 5, indicating that the associated projects and activities have a significant influence on improving forest health and reducing the negative impacts of extreme weather events with the municipalities affected. Tree plantings in particular were cited as having a high value based on their significant influence on reducing the negative impacts of extreme weather events.

Outputs for this program, including tree plantings and invasive species control, contribute directly to forest resilience. Stakeholders indicated that they would like to see greater collaboration and alignment between Conservation Authorities and other landowners and managers, specifically in smaller urban settings.

Green Infrastructure

OBJECTIVE: Reduced risks of degradation of water resources and terrestrial natural systems (due to water quality and/or quantity problems such as floods and stormwater overload).

OVERALL INDICATOR	OVERALL INDICATOR SCORE
Reduced risks of major water resource degradation.	4.31 Very Effective

ACTIONS – Projects in this program area include stormwater management (SWM) and LID research and evaluation projects, demonstration projects and information dissemination regarding these emerging technologies, and neighbourhood stormwater management projects.

RESULTS

Six (6) representative SWM/LID projects scored high, indicating that the expertise provided through in-field evaluations of emerging SWM/LID technologies, demonstration projects, and knowledge transfer projects is highly to very highly useful or potentially useful. The role of these projects in providing municipalities with guidance towards implementing SWM/LID to meet increasingly stringent stormwater management criteria was identified as very important.

All three Sustainable Neighbourhood Action Program (SNAP) projects scored a 4, with evaluators indicating that SNAP projects were highly useful or potentially useful in identifying specific SWM/LID retrofit opportunities. Evaluators also highlighted the Sustainable Technologies Evaluation Program (STEP) and SNAP's effective leveraging of grant funding to support SWM/LID implementation.

KNOWLEDGE AND AWARENESS PERFORMANCE REPORT

School Programs

OBJECTIVE: Positive changes in the behaviour of students regarding support for and participation in climate change adaptation and mitigation activities.

OVERALL INDICATOR	OVERALL INDICATOR SCORE
The extent of changes in knowledge, awareness, and attitudes of students.	4.36 Very Effective

ACTIONS – The activities and outputs contributing to this program area include the planning and delivery of climate change related education and awareness programs to students.

RESULTS

Most school programs were offered online as a result of the COVID-19 pandemic. Virtual programming was guided by CA staff and included hands-on, teacher-led components to enhance student learning and attentiveness. Additionally, due to the late start of data collection for the Performance Measurement system, surveying was not aligned with program delivery and evaluation. In many cases, surveying followed program delivery by several months, resulting in a lower response rate.

The majority of students and teachers surveyed either agreed (4) or strongly agreed (5) that school programs increased students' knowledge and awareness of climate change issues, laying an effective foundation for behaviour change. Hands-on programming which enabled student engagement with local natural environments received positive feedback, as well as programming which promoted tangible actions to increase positive habits. 1,423 trees were planted through school programs. Teachers responded well to professional development sessions which support engagement of schools in environmental leadership and climate action initiatives within the context of a national certification program.

Community Engagement and Stewardship

OBJECTIVE: Positive changes in behaviour regarding support for and participation in climate change adaptation and mitigation activities.

OVERALL INDICATOR	OVERALL INDICATOR SCORE
The extent of changes in knowledge, awareness, and attitudes of program participants.	

ACTIONS – The activities and outputs contributing to this program area include the planning and delivery of climate change related education and engagement programs to the community.

RESULTS

Delivery of some programs was limited or modified due to COVID-19 public health restrictions. Additionally, due to the late start of data collection for the Performance Measurement system, surveying was not aligned with program delivery and evaluation. In many cases, surveying followed program delivery by several months, resulting in a lower response rate.

All six (6) representative programs were scored 4 or higher, indicating a very positive impact. Participants reported that they were likely to change their behaviour and encourage others to change their behaviour. Programming involved outdoor activities and experiential learning with a focus on community-level climate action. Climate actions taken by participants included planting trees and participating in land and water stewardship, both on public lands and urban and rural residential properties.

MITIGATION PERFORMANCE REPORT

Greenhouse Gas (GHG) Emissions Reduction

OBJECTIVE: GHG emissions reduced through climate change initiative programs that have significant activities directed toward GHG emissions reduction or have GHG emissions reduction/carbon sequestration as a tangible co-benefit.

OVERALL INDICATOR	OVERALL INDICATOR SCORE
Extent of GHG reduced through emissions reduction and carbon sequestration.	An indicator scoring system that will allow the assessment of the effectiveness of this cross-cutting program area is under development. Total GHG emissions reduction/sequestration is provided as an interim indicator until a more effective indicator is developed.

ACTIONS – Activities and outputs contributing to this program area include engagement of the public, community groups, business and government actions to reduce GHG emissions or sequester carbon. GHG reduction activities are carried out in many of the program areas. In this initial year, the focus of this section was on activities in four program areas – Climate Science, Forest Management, Green Infrastructure, and Community Engagement and Stewardship. These activities included both those carried out by individuals (for example, tree plantings and home retrofits) and those carried out by corporations (for example, building retrofits and fuel switching).

RESULTS

In this first year of the Performance Measurement system, a straightforward total GHG emissions reduction and carbon sequestration value has been generated. In future years, this value will be evolved into an indicator that allows the evaluation of the effectiveness of the program area.

Estimated annual GHG emissions reduction due to building retrofit and fuel switching projects in 2021:
5,060 tCO_2e/year.

Estimated average annual sequestration in subsequent years due to trees and shrubs planted in 2021:
248 tCO_2e/year.

Total emissions reduction/sequestration of **5,308 tCO_2e/year.**

Appendix A: Program Area Reports

CLIMATE SCIENCE

OBJECTIVE: Reduced negative impacts of climate change (due to useful and effective plans for protection and recovery measures).

OVERALL INDICATOR	OVERALL INDICATOR SCORE
The usefulness of program area outputs for planning or implementing protection and recovery measures.	**3.79**
	Effective

1.0 Actions

The projects and activities contributing to this program area are quite diverse and include applied research, knowledge dissemination and advice, and training for external (municipalities) and internal (CAs) users on climate change impacts and possible mitigation measures. Focus areas include water quality, flooding, erosion, extreme heat, and ecosystem biodiversity.

2.0 How the indicator score was calculated

The calculation was based on the ratings of three (3) programs or parts of programs:

(1) Water and Climate Change Risk Assessment [101-008] (internal component only)
(2) Real Time Water Quality [101-046]
(3) Climate Science Applications Program [129-93]

Nine (9) outputs were selected from the three programs. A description was provided to an intended user of that output, who rated the usefulness (or potential usefulness) of the output to plan or implement adaptation measures on a 1-5 scale. These ratings were averaged, after weighting them by the program budgets, to calculate the indicator score.

3.0 Explanation of the rating

There was a wide range within the individual scores for the outputs rated. Six (6) representative outputs scored a 4 or 5, suggesting that many of the activities under this program area are potentially useful to very highly useful in implementing measures to reduce the negative impacts of climate change. The selection of a rater who had limited knowledge of one of the representative outputs resulted in a lower rating for that output and the overall indicator score.

Outputs for this program area are critical to developing and applying monitoring and implementation measures for climate change adaptation. They provide useful resources to reduce the negative impacts of climate change through actions and the provision of expert advice. Additionally, outputs provide sound research for the development of business cases and other rationales for use in explaining and justifying climate change adaptation measures to a variety of stakeholders and other audiences.

FLOOD MANAGEMENT

OBJECTIVE: Mitigated risk of flooding (resulting from the construction and maintenance of structural flood protection measures and the usefulness of flood protection information).

OVERALL INDICATOR	OVERALL INDICATOR SCORE
The usefulness of program area outputs for predicting and mitigating flood impacts, as well as the benefits of flood protection infrastructure that is developed.	**4.54** **Very Effective**

1.0 Actions

The actions contributing to this program area involve the development and dissemination of information regarding flood probabilities, potential flood impacts, and flood mitigation options as well as construction and maintenance of flood protection infrastructure.

2.0 How the indicator score was calculated

The calculation was based on the ratings of five (5) programs or parts of programs:

Research Programs:
(1) Climate Change Flood Risk Assessment [101-045]
(2) Flood Forecasting and Warning [101-043]
(3) Water and Climate Change Risk Assessment [101-008]
(4) Flood Remedial Works [129-19] (non-infrastructure portion only)

Flood Protection Infrastructure:
(5) Flood Remedial Works [129-19] (flood protection infrastructure portion only]

The calculation was carried out in two parts.

Part 1 – Three outputs were selected from each of the four research programs (programs (1)-(4)). A description of each output was provided to an intended user of that output, who rated the usefulness (or potential usefulness) of the output for developing flood protection measures on a 1-5 scale. The rating for each of these four programs was the average of their output ratings.

Part 2 – The value of the land and property that has been protected from flooding due to program 5 (flood protection infrastructure) was estimated. This program was rated on a 1-5 scale, based on the value of protected land and property compared with the funding that was used for infrastructure activities.

Overall outcome indicator - The five ratings were averaged, after weighting them by the program budgets.

3.0 Explanation of the rating

All outputs selected from the research programs in this program area were rated between 4 and 5, indicating that many activities within this program area ranked from potentially useful to very highly useful in predicting and mitigating flood impacts as well as developing flood protection infrastructure. The program that supports the construction and maintenance of flood protection infrastructure was found to have a very high return on investment based on berm upgrades which protect affected lands and properties to the 500-year event.

Outputs for this program area provide valuable information to help prioritize flood mitigation measures, pond cleanout, and infrastructure repair and upgrade. Outputs also provide accurate, up-to-date mapping to identify future flood risks and inform municipal planning documents. Overall, outputs contribute directly to the identification of flood risks and inform successful flood risk mitigation.

EROSION MANAGEMENT

OBJECTIVE: Mitigated risk of erosion (reduced risk of damage to infrastructure from erosion due to the maintenance and construction of erosion control structures).

OVERALL INDICATOR	OVERALL INDICATOR SCORE
The extent of implementation and maintenance of effective erosion risk reduction measures.	**5.00** **Very Effective**

1.0 Actions

The projects and activities contributing to this program area involve the maintenance of existing erosion control infrastructure and the construction of new erosion control structures to protect high priority sites where Region of Peel sanitary infrastructure or watermains may be at risk.

2.0 How the indicator score was calculated

The calculation was based on the rating of one (1) program:

(1) Erosion Maintenance Projects [129-35]

The calculation of this indicator involved determining the extent to which the erosion control plan for the year had been implemented. This was done by assigning points to various categories of planned activities once the plan was finalized and then, at the end of the year, calculating the points associated with the actual projects that were carried out during the year. The indicator was the ratio of the points achieved to the points planned, converted to a 5-point scale.

3.0 Explanation of the rating

Erosion Risk Management (ERM) activities were scored based on the extent to which the annual plan was implemented. The program area received a score of 5, as all remedial works were implemented as planned in 2021. As targeted, 214 infrastructure hazard monitoring sites in Region of Peel were inspected before the end of the monitoring season, as well as an additional 28 sites that received repeated post-storm inspections. The ERM team encountered challenges related to pandemic restrictions, however all 2021 targets and objectives were achieved without delay.

RESTORATION AND NATURAL HERITAGE SCIENCE

OBJECTIVE: Reduced impacts of climate change related extreme weather events on flooding, erosion, water quality degradation, and species and natural features (due to restoration projects and the usefulness of restoration-related research).

OVERALL INDICATOR	OVERALL INDICATOR SCORE
Reduced impacts of climate change related extreme weather events through enhancements to the natural heritage system and the usefulness of research information for implementing climate change protection measures.	**4.08** **Very Effective**

1.0 Actions

Projects and activities in this program area include a wide range of restoration projects (aquatic and wetland restoration, riparian and valley restoration, stream and natural channel restoration, and terrestrial restoration), as well as Low Impact Development (LID) and natural green infrastructure projects and two research programs (urban natural heritage, and biodiversity conservation and management).

2.0 How the indicator score was calculated

The calculation was based on the ratings of nine (9) programs:

Restoration and Protection Programs:

(1) Aquatic and Wetland Restoration – Peel [301-330]
(2) Wetland – Climate [129-36]
(3) Riparian and Valleyland - Climate [129-37]
(4) Stream Restoration – Climate [129-46]
(5) Terrestrial – Climate [129-45]
(6) Natural Channel Project Implementation [128-69]
(7) Green Infrastructure – Climate [129-44]

Applied Research Programs:

(8) Urban Natural Heritage [301-355]
(9) Biodiversity Conservation and Management [301-357]

The calculation was carried out in two parts.

Part 1- One (1) project that was intended to reduce the negative impacts of extreme weather events was selected from each of the restoration and protection programs. A summary of each project was provided to a six-member expert panel, who developed a consensus rating on a 1-5 scale of the overall impact of each project on reducing the negative impacts of extreme weather events.

Part 2 – Three (3) outputs were selected for each of the research programs for a total of six (6) outputs. A description of each output was provided to an intended user of that output, who rated the usefulness (or potential usefulness) of the output for implementing climate change protection measures on a 1-5 scale. The output ratings for each program were averaged.

Overall outcome indicator - The nine (9) ratings (seven (7) impact ratings for programs 1 through 7 and two (2) usefulness ratings for programs 8 and 9) were averaged after weighting them by the program budgets.

3.0 Explanation of the rating

Outputs from restoration projects which reduce the negative impacts of extreme weather events generally scored high, with five projects scoring 4 and one 5. Projects within high climate change vulnerability areas tended to score higher. There was consensus that most projects will have a measurable impact on flooding and water quality degradation mitigation at a regional scale.

Outputs from research projects also scored very well, with users indicating that the outputs were either already used to inform climate change mitigation and adaptation in the Region of Peel or will be used in the near future. The outputs – which include best practice guides, policies and strategies – provide highly useful guidance for site prioritization, species selection, impact assessments and plan review.

FOREST MANAGEMENT

OBJECTIVE: Increased forest health and ability to withstand climate-related extreme weather events (due to the removal of hazard trees and increased forest resilience).

OVERALL INDICATOR	OVERALL INDICATOR SCORE
Increased ability of forests to withstand climate change related extreme weather events through the implementation of forest management measures.	**4.92** **Very Effective**

1.0 Actions

The projects and activities in this program area include a wide range of forest monitoring, inventory, management planning, outreach, and stewardship as well as active management projects and programs to address hazard trees, forest health and disease prevention, canopy expansion, invasive species, and resilience to extreme events.

2.0 How the indicator score was calculated

The calculation was based on the ratings of four (4) programs:

(1) Invasive Species Control Program [301-308]
(2) Peel Planting Programs [301-305]
(3) TRCA Forest Management – Peel [129-52]
(4) Reforestation Program – Private Lands [129-51]

A summary of each of the four (4) programs was provided to an expert panel composed of four member organizations, who developed a consensus rating on a 1-5 scale of the overall impact of each project towards increasing forest resilience. These ratings were averaged, after weighting them by the program budgets, to calculate the indicator score.

3.0 Explanation of the rating

All programs in this program area scored between 4 and 5, indicating that the associated projects and activities have a significant influence on improving forest health and reducing the negative impacts of extreme weather events. Tree plantings in particular were cited as having a high value based on their significant influence on reducing the negative impacts of extreme weather events.

Outputs for this program, including tree plantings and invasive species control, contribute directly to forest resilience. Stakeholders indicated that they would like to see greater collaboration and alignment between Conservation Authorities and other landowners and managers, specifically in smaller urban settings.

GREEN INFRASTRUCTURE

OBJECTIVE: Reduced risks of degradation of water resources and terrestrial natural systems (due to water quality and/or quantity problems such as floods and stormwater overload).

OVERALL INDICATOR	OVERALL INDICATOR SCORE
Reduced risks of major water resource degradation.	**4.31**
	Very Effective

1.0 Actions

Projects in this program area include stormwater management (SWM) and low-impact development (LID) research and evaluation projects, demonstration projects and information dissemination regarding these emerging technologies, as well as neighbourhood stormwater management projects.

2.0 How the indicator score was calculated

The calculation was based on the ratings of six (6) programs or parts of programs:

SWM/LID Programs:

(1) Stormwater Technologies/SWM Infrastructure Performance Risk Assessment [101-048]
(2) Integrated Water Management Implementation [101-190]
(3) Integrated Water Management Guidance and Training [101-021]
(4) Sustainable Technologies [129-99] (stormwater portion only)

Sustainable Neighbourhood Programs:

(5) Sustainable Neighbourhoods (Sustainable Neighbourhood Action Program) [301-315]
(6) Sustainable Neighbourhood Action Program (SNAP) [129-94]

Ten (10) representative projects were selected from the six (6) programs that underlie this outcome objective. Seven (7) projects were selected from SWM/LID programs and three (3) projects were selected from Sustainable Neighbourhoods programs. A description of each project was provided to an intended user of that project, who rated its usefulness (or potential usefulness) in implementing or managing a SWM/LID project on a 1-5 scale. These ratings were averaged, after weighting them by the program budgets, to calculate the indicator.

3.0 Explanation of the rating

Six (6) representative SWM/LID projects scored high, indicating that the expertise provided through in-field evaluations of emerging SWM/LID technologies, demonstration projects, and knowledge transfer projects is highly to very highly useful or potentially useful. The role of these projects in providing municipalities with guidance towards implementing SWM/LID to meet increasingly stringent stormwater management criteria was identified as very important.

All three Sustainable Neighbourhood Action Program (SNAP) projects scored a 4, with evaluators indicating that SNAP projects were highly useful or potentially useful in identifying specific SWM/LID retrofit opportunities. Evaluators also highlighted the Sustainable Technologies Evaluation Program (STEP) and SNAP's effective leveraging of grant funding to support SWM/LID implementation.

SCHOOL PROGRAMS

OBJECTIVE: Positive changes in behaviour of students regarding support for and participation in climate change adaptation and mitigation activities.

OVERALL INDICATOR	OVERALL INDICATOR SCORE
The extent of changes in knowledge, awareness, and attitudes of students.	**4.36** **Very Effective**

1.0 Actions

The activities and outputs contributing to this program area include the planning and delivery of climate change related education and awareness programs to students.

2.0 How the indicator score was calculated

The calculation was based on the ratings of six (6) programs. All programs or parts of programs were rated:

(1) Conservation Youth Corps [301-326] – Only programs with direct access to students were rated from July to December.

(2) Environmental Education [601-611] – Rated from July to December. Excludes outdoor education centre programming due to COVID-19 restrictions and closures.

(3) Albion Hills Environmental Weeks (Environmental Leaders of Tomorrow) [129-71] – Rated from July to December. Excludes outdoor education centre programming due to COVID-19 restrictions and closures.

(4) Stewardship Partnership Services [129-54] – Only Watershed on Wheels virtual classroom programming was rated from July to December. The Native Plants Program and Rain to Runoff Program were not rated.

(5) Conservation Youth Corps [128-73] - Rated from July to December.

(6) Ontario Eco Schools for Peel Region (Eco-Schools Expansion Program) [129-80] - Rated from July to December.

Each program or part of a program was rated based on surveys that measured students' knowledge and attitudes toward climate change. The ratings were averaged and weighted by the program budgets to determine the overall indicator score.

3.0 Explanation of the rating

Most school programs were offered online as a result of the COVID-19 pandemic. Virtual programming was guided by CA staff and included hands-on, teacher-led components to enhance student learning and attentiveness. Additionally, due to the late start of data collection for the Performance Measurement system, surveying was not aligned with program delivery and evaluation. In many cases, surveying followed program delivery by several months, resulting in a lower response rate.

The majority of students and teachers surveyed either agreed (4) or strongly agreed (5) that school programs increased students' knowledge and awareness of climate change issues, laying an effective foundation for behaviour change. Hands-on programming which enabled student engagement with local natural environments received positive feedback, as well as programming which promoted tangible actions to increase positive habits. 1,423 trees were planted through school programs. Teachers responded well to professional development sessions which support engagement of schools in environmental leadership and climate action initiatives within the context of a national certification program.

COMMUNITY ENGAGEMENT AND STEWARDSHIP

OBJECTIVE: Positive changes in behaviour regarding support for and participation in climate change adaptation and mitigation activities.

OVERALL INDICATOR	OVERALL INDICATOR SCORE
The extent of changes in knowledge, awareness, and attitudes of program participants.	**4.48** **Very Effective**

1.0 Actions

The activities and outputs contributing to this program area include the planning and delivery of climate change related education and engagement programs to the community.

2.0 How the indicator score was calculated

The calculation was based on the ratings of six (6) programs. All programs were rated:

(1) Peel Rural Stewardship [301-314]
(2) Urban Outreach and Restoration [301-338]
(3) Regional Community Outreach [301-332]
(4) West Humber Stewardship Program - [128-74]
(5) Etobicoke-Mimico Stewardship [129-55]
(6) Etobicoke Headwaters Sub-watershed Regeneration [129-59]

Each program or part of a program was rated based on surveys that measure participants' knowledge and attitudes toward climate change. The ratings were averaged and weighted by the program budgets to determine the overall indicator score.

3.0 Explanation of the rating

Delivery of some programs was limited or modified due to COVID-19 public health restrictions. Additionally, due to the late start of data collection for the Performance Measurement system, surveying was not aligned with program delivery and evaluation. In many cases, surveying followed program delivery by several months, resulting in a lower response rate.

All six (6) representative programs were scored 4 or higher, indicating a very positive impact. Participants reported that they were likely to change their behaviour and encourage others to change their behaviour. Programming involved outdoor activities and experiential learning with a focus on community-level climate action. Climate actions taken by participants included planting trees and participating in land and water stewardship, both on public lands and urban and rural residential properties.

GREENHOUSE GAS (GHG) EMISSIONS REDUCTION

OBJECTIVE: GHG emissions reduced through climate change initiative programs that have significant activities directed toward GHG emissions reduction or have GHG emissions reduction/carbon sequestration as a tangible co-benefit.

OVERALL INDICATOR	OVERALL INDICATOR SCORE
Extent of GHG reduced through emissions reduction and carbon sequestration.	An indicator scoring system that will allow the assessment of the effectiveness of this cross-cutting program area is under development. Total GHG emissions reduction/sequestration is provided as an interim indicator until a more effective indicator is developed.

1.0 Actions

Activities and outputs contributing to this program area include engagement of the public, community groups, business and government actions to reduce GHG emissions or sequester carbon. GHG reduction activities are carried out in many of the program areas. In this initial year, the focus of this section was on activities in four program areas – Climate Science, Forest Management, Green Infrastructure, and Community Engagement and Stewardship. These activities included both those carried out by individuals (for example, tree plantings and home retrofits) and those carried out by corporations (for example, building retrofits and fuel switching).

2.0 Main principles behind the calculations

The 13 programs included in this assessment include:

Emissions Reduction:

(1) Water and Climate Change Risk Assessment [101-008] (internal component only)
(2) Sustainable Neighbourhoods (Sustainable Neighbourhood Action Program) [301-315]
(3) Sustainable Neighbourhood Action Program (SNAP) [129-94]
(4) Sector-Based Climate Mitigation Programs [129-87]
(5) Pearson Eco-Industrial Zone [129-95]

Carbon Sequestration:

(6) Peel Planting Programs [301-305]
(7) TRCA Forest Management – Peel [129-52]
(8) Reforestation Program – Private Lands [129-51]

(9) Sustainable Neighbourhood Action Program (SNAP) [129-94]
(10) Sustainable Technologies [129-99]
(11) Peel Rural Stewardship [301-314]
(12) Urban Outreach and Restoration [301-338]
(13) Regional Community Outreach [301-332]

For building retrofits and fuel switching, the calculation was based on an estimate of the annual emissions reduction expected from the actions taken in 2021.

In the case of tree and shrub plantings, tree planting activities for the current year (2021) were used to estimate the average annual sequestration in subsequent years.

3.0 Explanation of the results

In this first year of the performance measurement system, a straightforward total GHG emissions reduction and carbon sequestration value has been generated. In future years, this value will be evolved into an indicator that allows the evaluation of the effectiveness of the program area.

Estimated annual GHG emissions reduction due to building retrofit and fuel switching projects in 2021:
5,060 $tC0_2e$/year.

Estimated average annual sequestration in subsequent years due to trees and shrubs planted in 2021:
248 $tC0_2e$/year.

Total emissions reduction/sequestration of **5,308 $tC0_2e$/year.**