

## PIEVC Program & Resources

CWWA – Niagara Falls – November 2023

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*In association with:*



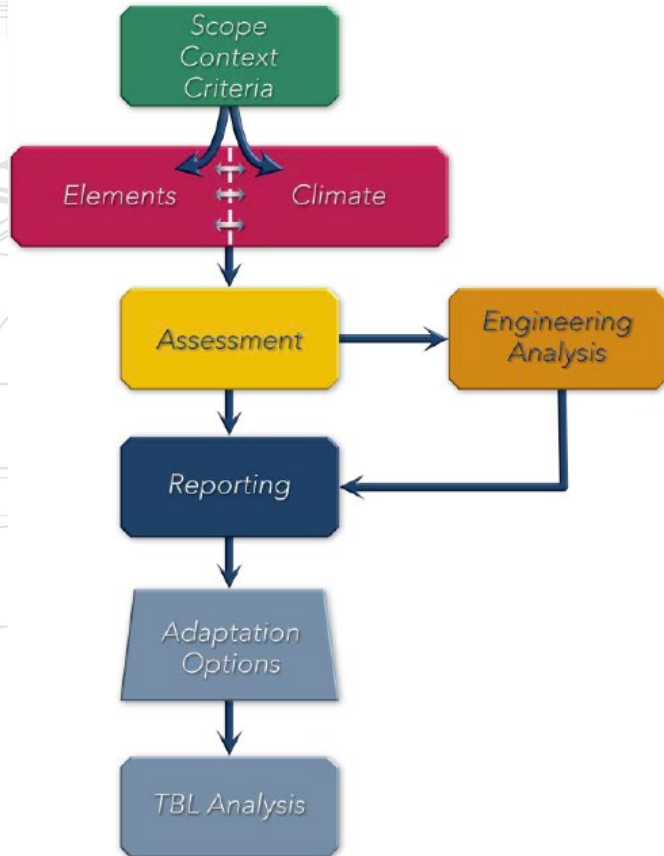
The PIEVC Process: Method for assessing, understanding, and reporting vulnerability of infrastructure, buildings to climate risks

1. Publicly available resources, free access for public infrastructure, buildings
2. Publication of assessment reports (wherever possible)
3. Significant Canadian expertise and large national, international PIEVC community of users
4. Integrated into policy, frameworks, standards, guidelines



# PIEVC PROGRAM

Developed beginning in 2005 by Engineers Canada with assistance from NRCan:



- Develop a clear picture of the infrastructure, system, building, etc. to be assessed
- Understand critical thresholds of the infrastructure elements and system
- Review historical and future climate information and establish climate change informed likelihoods of climate events
- Characterize the impacts and estimate the consequences of climate events on elements, system
- Identify higher risk interactions and further evaluate the nature of risk
- Inform engineering judgement about potential adaptations

# PIEVC PROGRAM

- March 2020: PIEVC Program Alliance (ICLR, CRI, GIZ)
- MOU b/w ICLR and OFNTSC in 2021 – Facilitate Protocol in the First Nations Infrastructure Resilience Toolkit (FN-IRT)
- MOU b/w ICLR and CFIA in 2023 – Facilitate ongoing participation in PIEVC Program, training initiative with CRI

CLIMATE  
RISK  
INSTITUTE

 Institute for Catastrophic  
Loss Reduction

Building resilient communities

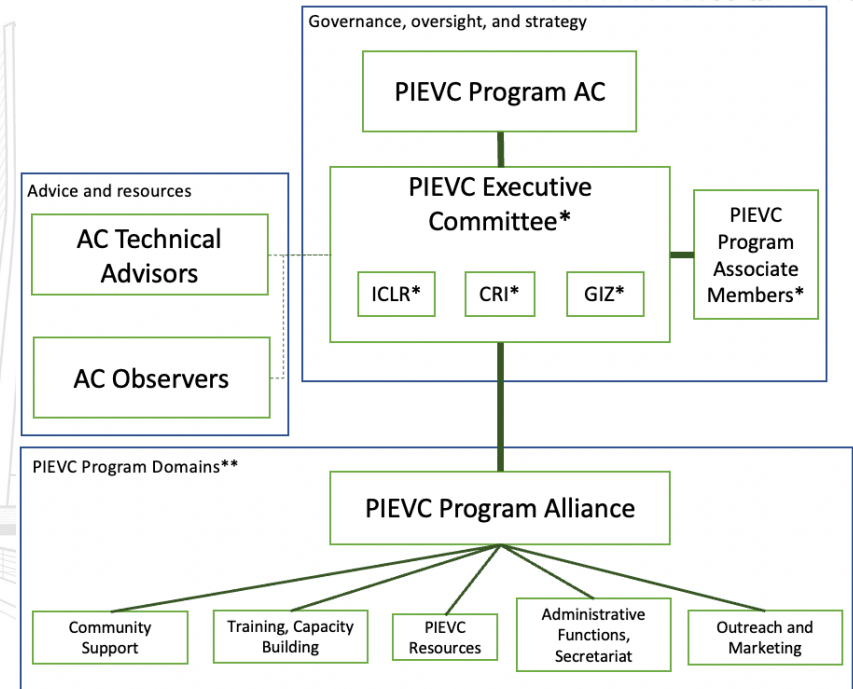
 Deutsche Gesellschaft  
für Internationale  
Zusammenarbeit (GIZ) GmbH

 ONTARIO FIRST NATIONS  
TECHNICAL SERVICES  
CORPORATION

 cfia 120 AÑOS  
Colegio Federado de Ingenieros y de Arquitectos de Costa Rica

## PIEVC Program Advisory Committee

- Provide strategic direction, independent critical review for all aspects of the Program, promote PIEVC Program
- ~50 Participants from federal, provincial, municipal government, consulting firms, not-for-profits, climate services



\*Functions and responsibilities are defined in the PIEVC Program Alliance Agreement  
\*\*As defined in the PIEVC Program Strategy (Vision, Goals, and Programming)

# PIEVC PROGRAM

PIEVC Engineering Protocol  
For  
Infrastructure Vulnerability Assessment and Adaptation  
to a Changing Climate  
PRINCIPLES and GUIDELINES

Version PG-10.11 (June 2016)

## Update: June 2024 (INFC MoU)

Page 1 of 184

Blueprint for Catastrophic Loss Reduction

PIEVC® FAMILY OF RESOURCES  
PIEVC High Level Screening Guide

A guide to completing screening level climate change risk assessments using the PIEVC Process

Beta Version 1.01 - Nov. 30, 2022

## PIEVC Report Analysis Utility

BETA

This utility allows users to explore findings for all PIEVC assessment reports submitted to the PIEVC Program from January 2016 to August 2021. The Utility was designed to increase accessibility of findings in PIEVC Protocol assessment reports available at [www.pievc.ca](http://www.pievc.ca)

Institute for Catastrophic Loss Reduction  
Building resilient communities.

CLIMATE RISK INSTITUTE

If you have any questions or comments about this utility, please contact [pievc@iclr.org](mailto:pievc@iclr.org) and include "PIEVC Utility" as the subject.

Author Contact Us How to Cite

The Utility was created by Mohsen Moradi, under the guidance of Prof. Andrew Binns, of the University of Guelph's School of Engineering, and was funded by the Institute for Catastrophic Loss Reduction.

PIEVC® FAMILY OF RESOURCES  
» CATALOGUE «  
A Guide for Selecting Climate Risk Assessment Methods, Data, and Supporting Materials

Published by the PIEVC Global Partnership:  
Institute for Catastrophic Loss Reduction  
CLIMATE RISK INSTITUTE  
giz  
Urban Resilience  
The Resilient, Modern Communities  
Water Supply and Infrastructure Institute

PIEVC® FAMILY OF RESOURCES  
» PIEVC GREEN PROTOCOL «  
Integrating Ecosystem-based Adaptation into Infrastructure Climate Risk Assessments

Published by the PIEVC Global Partnership:  
Institute for Catastrophic Loss Reduction  
CLIMATE RISK INSTITUTE  
giz  
Urban Resilience  
The Resilient, Modern Communities  
Water Supply and Infrastructure Institute

BETA

PIEVC® FAMILY OF RESOURCES  
» LARGE PORTFOLIO ASSESSMENT MANUAL «  
A Guide for Prioritizing a Large Portfolio based on Climate Vulnerability

Beta Version

BETA

A grid of 20 assessment reports including:

- Water, Water, Tap, Tap: Urban Climate Risk Assessment
- Report: City of Calgary Water Supply and Demand Forecasting and Climate Change Implications
- Infrastructure Vulnerability to Climate Change - Fraser Sewerage Area
- Toronto Hydro-Electric System Limited Climate Change Vulnerability Assessment
- Toronto Hydro-Electric System Public Infrastructure Engineering Vulnerability Assessment P301 Case Study
- Climate Change Vulnerability Assessment of Ontario's Electrical Transmission Sector
- Belvedere Port Authority Climate Change Risk Assessment - Belvidere, NH
- Review of the Resilience of the Region de Québec: Étude de résilience des infrastructures aux effets climatiques et météorologiques extrêmes
- Esplanade Graving Dock Climate Change Risk Assessment Executive Summary
- Climate Change Impacts on Water and Wastewater Infrastructure of Adirondack
- Parsons Airport Climate Change Risk Assessment Report
- Water, Water, Tap, Tap: Urban Climate Risk Assessment
- Six Lower Mainland B.C. Buildings Climate Change Risk Assessment
- City of Orange Hill Water Resources Infrastructure Assessment Phase 0 - Pilot Study



~90 assessment reports available via

[www.pievc.ca](http://www.pievc.ca)

# PIEVC PROGRAM

Infrastructure category	2008 to March 2020	March 2020 to present
Buildings (all types, inc. affordable housing, fire halls, commercial, service roads)	23	17
Water, wastewater, stormwater	22	10
Transportation (highways, canals, bridges, rail, streets, mass transit, etc.)	12	11
Urban transit systems	1	6
Coastal infrastructures and ports (inc. search and rescue stations)	13	11
Airports (inc. associated infrastructure)	7	6
Utilities (inc. power distribution, wind, solar energy)	5	3
Indigenous/First Nations	8	1
Other (inc. screening, portfolio, asset management)	1	11
<b>Total</b>	<b>92</b>	<b>76</b>

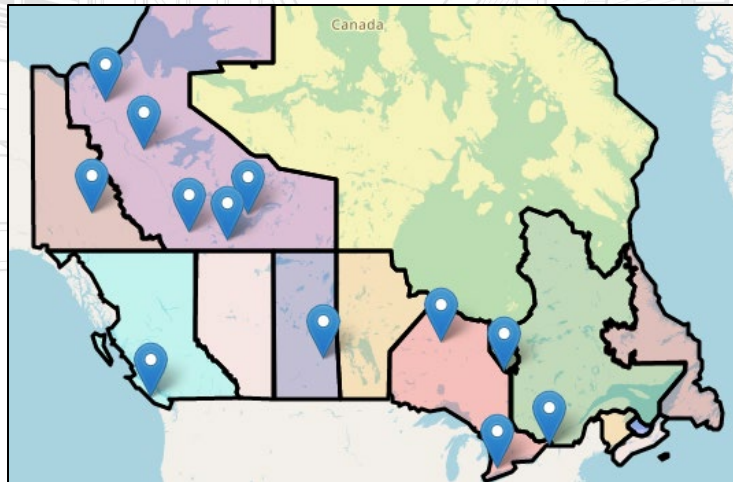
*The above represents a fraction of actual application*



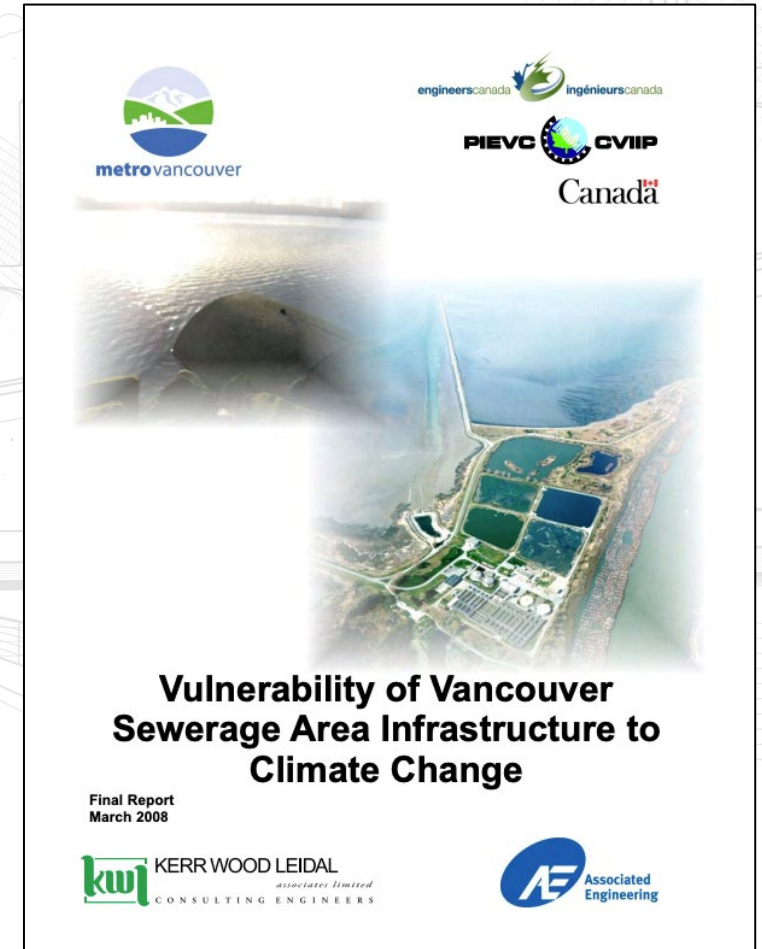
# PIEVC PROGRAM

Vancouver Sewerage Area (VSA) vulnerability assessment – one of the first PIEVC Protocol applications (2008)

31 PIEVC assessments have focussed on water (wastewater, stormwater, water); 10 have been initiated since 2020



*Published wastewater assessment locations using PIEVC, 2015 to 2021*



Available via [www.pievc.ca](http://www.pievc.ca) - assessments



# PIEVC PROGRAM

## Engineers and Geoscientists BC/BC MOTI

- Professional practice guidelines – highways and climate change vulnerability

## Infrastructure Canada

- Climate Lens

## Canadian Councils of Ministers of the Environment

- Best practices for vulnerability assessment

## City of Calgary

- Standardized/local method for assessing asset vulnerability

## CSA S900.1:18

- Climate Change adaptation for Wastewater Treatment Plants

## Province of Ontario, MECP

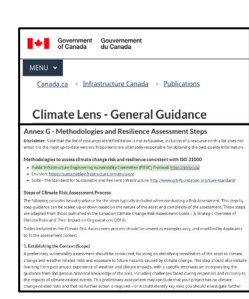
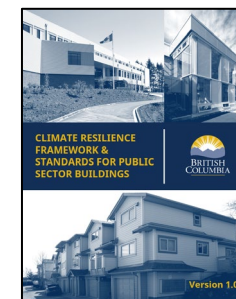
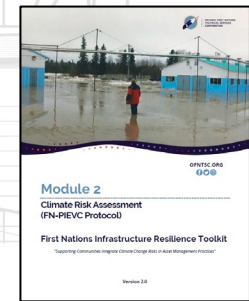
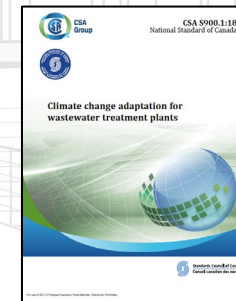
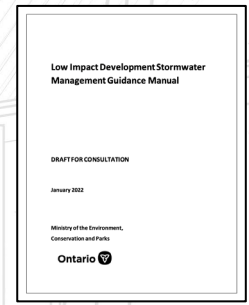
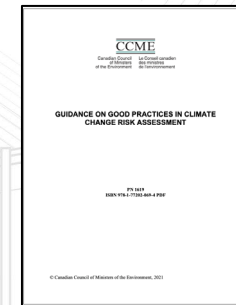
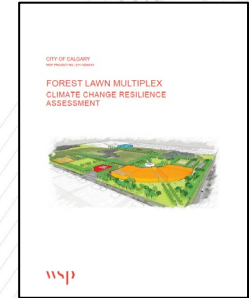
- Ontario's Low Impact Development Stormwater Management Guidance Manual (Draft)

## Ontario First Nations Technical Services Corporation

- Module 2 of First Nations Infrastructure Resilience Toolkit (FN-IRT)

## BC Climate Action Secretariat

- Climate Resilience Framework and Standards for Public Sector Buildings (BC CAS)

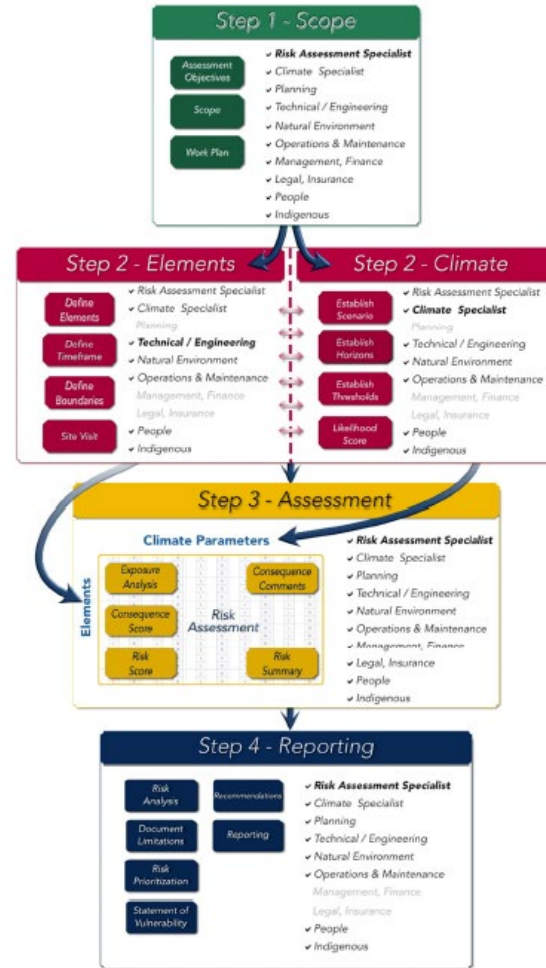


**Cost/application considerations**

**Development: 2020-2021**

## PIEVC High Level Screening Guide:

- Facilitate high-level assessments
- Supports Climate Lens assessment(s)
- Open, on-line access (via [pievc.ca](http://pievc.ca))
- Presentation of the PIEVC Process, but with:
  - Simpler format
  - Readily accessible climate resources
  - 7-12 week workplan





## High Level Screening Guide

Released in Feb., 2022

>520 registered users as of Nov. 10, 2023

\*Application presentations via: [pievc.ca/pievc-high-level-screening-guide/](https://pievc.ca/pievc-high-level-screening-guide/)

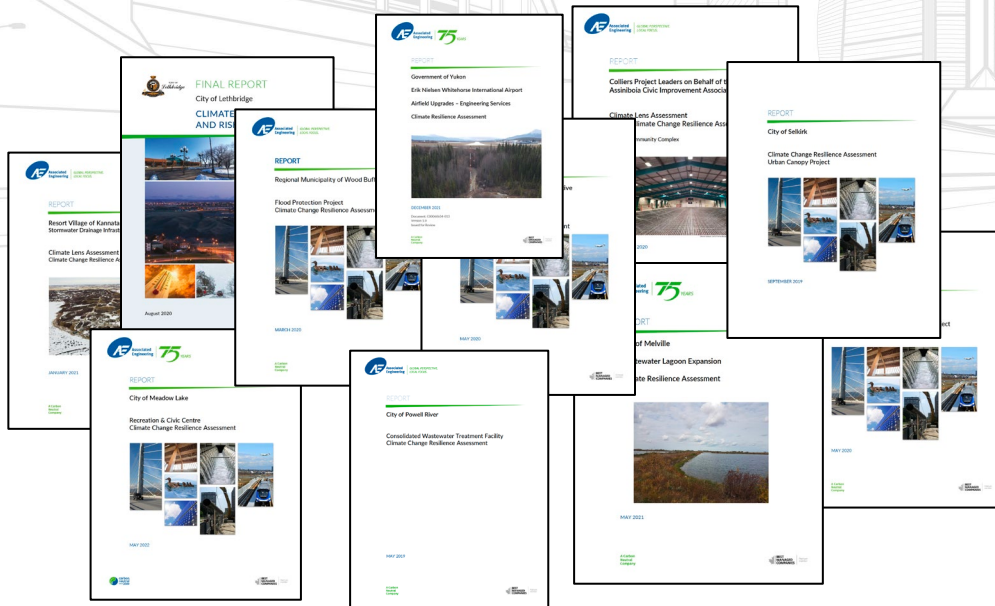
### HLSG Contributors (AC & Authors)

Category	Contributors
Municipal	FCM, CoE, Cowichan Valley RD
Federal	NRCan, TBS, ECCC, PSPC, SCC, NRC
Consulting	AE, Nodelcorp, Stantec, Wood, WSP, AECOM
Climate services	Ouranos, CCCS
Int'l	WFEO
Indigenous	CIRNAC, OFNTSC
PIEVC Alliance	CRI, ICLR, GIZ

# PIEVC PROGRAM

27 known HLSG assessments to date (no NDRA, voluntary reporting)

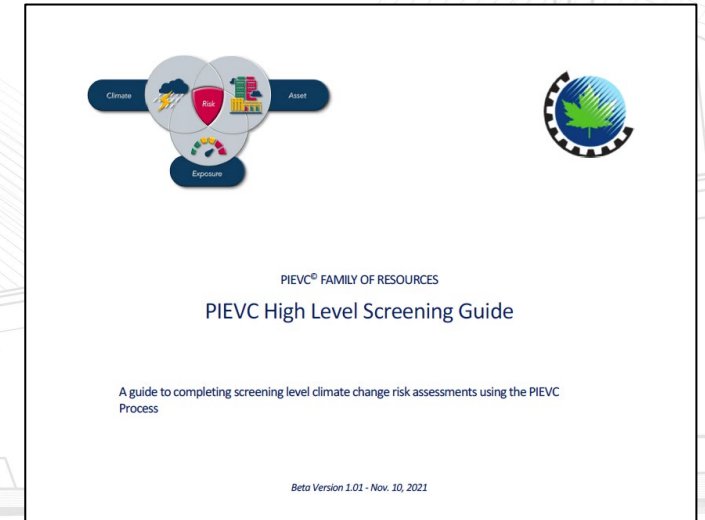
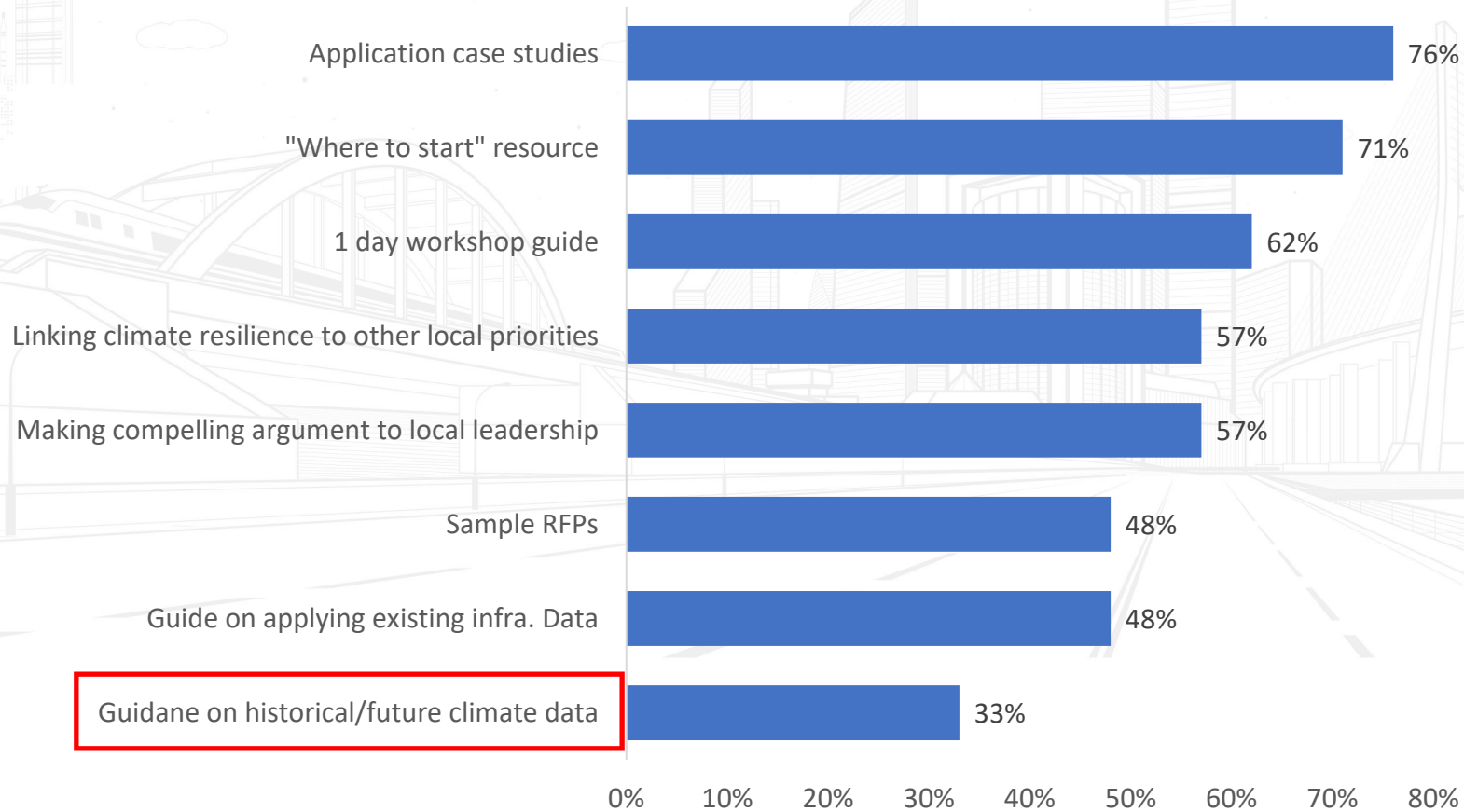
Buildings, bridges, highways, integration into adaptation planning, wastewater treatment, stormwater



Org.	Assessment, application, adoption
CBCL/PSPC	Three Ontario bridges*
Morrison	BGIS Federal Gov't Portfolio*
Hershfield/Nodelcorp	
City of Vancouver	Adapting HLSG for new buildings*
BCMOIT/IBI Arcadis	Cariboo Road Recovery Project*
Matrix Solutions	Integration into municipal adaptation plan*
UPEI (intern)	Charlottetown, Stratford Wastewater Systems*
Provincial infrastructure agency	Buildings assessments
AE	Five assessments for large AB municipality, including buildings
BC CAS	Climate Resilience Framework and Standards for Public Sector Buildings

# PIEVC PROGRAM

## PIEVC Program AC: Priorities to Support Small Community/Small Entity Application (PIEVC Program AC – Oct, 2023 – n=21)



PIEVC AC – Oct. 10, 2023: Small Community Applications

Chair: Derry Wallis, Huron County

## Climate Change and Infrastructure Risk: The PIEVC Protocol

Professional Development Course

- CRI's foundational course in climate risk and application of PIEVC Protocol.
- Multiple start dates per year.
- 5 week course; 100% virtual.
- Mix of self-paced content and live sessions with leading PIEVC Practitioners.



PROFESSIONAL &  
CONTINUING STUDIES

Courses Programs Custom Learning

Global Learning & Language Centre

## CLIM075 Climate Change and Infrastructure Risk Assessment - the PIEVC Protocol



Information → [climateriskinstitute.ca/irp-page](https://climateriskinstitute.ca/irp-page)

Registration → [pcs.royalroads.ca/climate-risk-institute](https://pcs.royalroads.ca/climate-risk-institute)

Next start date → January 8<sup>th</sup>, 2024

# PIEVC Practitioners' Network

*(PIEVC PN) (free, open access)*

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Virtual platform:

Facilitating engagement and collaboration

Webinars, virtual events, discussion forums, etc.

~300 members from 10 countries

Visit: <https://pievc-practitioners-network.earthnet.org>



Suzanne Seiling, CRI

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Institute for Catastrophic  
Loss Reduction  
Building resilient communities



CanAdapt



# PIEVC PROGRAM



Location ▾

## Case Studies

### Permafrost in the Northwest Territories

Thawing permafrost, one serious result of rapid warming in Canada's Arctic, is causing widespread impacts to northern infrastructure. Using a climate risk analysis protocol (the PIEVC Protocol), a risk assessment was undertaken to better understand the threat from permafrost degradation in the Northwest Territories.

Explore

### Assessing Highway Vulnerabilities with the PIEVC Protocol

Across Canada, engineers who design public infrastructure realised that their projects were vulnerable to climate change and in response they developed the PIEVC Protocol to address the impacts of climate variability and change for their transportation infrastructure projects. This case study shares how it was applied in BC.

Explore

### Metrolinx: Mainstreaming Climate Risk Assessment

The implementation of the PIEVC Protocol across Metrolinx, Canada's largest transit authority, supported the development of an organization-wide adaptation strategy and a commitment to the ongoing understanding of climate change impacts of specific interest to the organization.

Explore

ClimateData.ca

# PIEVC PROGRAM

Learn More about the Program

RESILIENT  
INFRASTRUCTURE IS  
CRUCIAL TO CANADA'S  
**SAFETY,  
ECONOMY AND  
FUTURE.**

## GET STARTED!

PIEVC Protocol and Resources

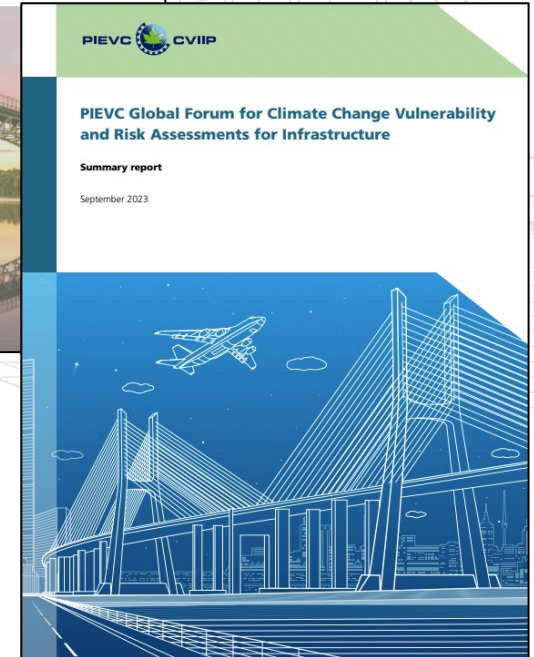
Where it has been implemented

Partner Organizations

PIEVC Protocol/HLSG Training

PIEVC PN, Global Forum, Presentations

What's New



[www.pievc.ca](http://www.pievc.ca)

[pievc@iclr.org](mailto:pievc@iclr.org)

