



ADOPTION OF NATURAL INFRASTRUCTURE IN THE WATER SECTOR

A Summary Report on Current Status

**A CWWA REPORT BASED ON A
SURVEY OF ITS MEMBERS 2023**



CANADIAN WATER AND WASTEWATER ASSOCIATION

Introduction

There is growing recognition of the importance of Natural Infrastructure¹ (NI) in achieving water management goals in watersheds and communities. It can play important roles with respect to water supply, water quality improvement and stormwater management. In addition to targeted infrastructure outcomes, Natural Infrastructure can provide a range of co-benefits to the environment and the economy, as well as community health and well-being. Many municipalities, watershed management organisations, water utilities and senior levels of government have initiated programs designed to promote and implement Natural Infrastructure projects and approaches so that these benefits may be widely recognized.

The adoption of Natural Infrastructure practices is relatively recent and has been adopted, planned and implemented in a number of different ways by various organisations. To some degree, this is not surprising given the wide range of climatic conditions and geographic circumstances across Canada. Some organisations have been carrying out Natural Infrastructure projects for some time, whilst others may just be starting to plan their first, and wondering how they should begin. Given a wide range of objectives, circumstances and familiarity, the Canadian Water & Wastewater Association (CWWA) felt it would be useful to examine our members' needs in this developing practice. Accordingly, CWWA carried out a survey of our membership to understand key issues, current practices and "user requirements" in the planning and implementation of Natural Infrastructure programs, as well as perceived benefits. The objectives of our survey were to:

Assess level of knowledge and adoption of Natural Infrastructure in the water sector

Gauge priorities and needs of CWWA membership on this subject

Determine next steps for CWWA, such as:

- Knowledge sharing
- Development of a Position Statement
- Communications with government
- Identification of potential partnerships with other organisations

One of the challenges in carrying out such a survey is that, in these early days of adoption, what one means by "natural infrastructure" can differ between organisations and/or within organisations. For consistency across many responses, we asked participants in the survey to use a definition of NI used by the Canadian Council of Ministers of the Environment (CCME).

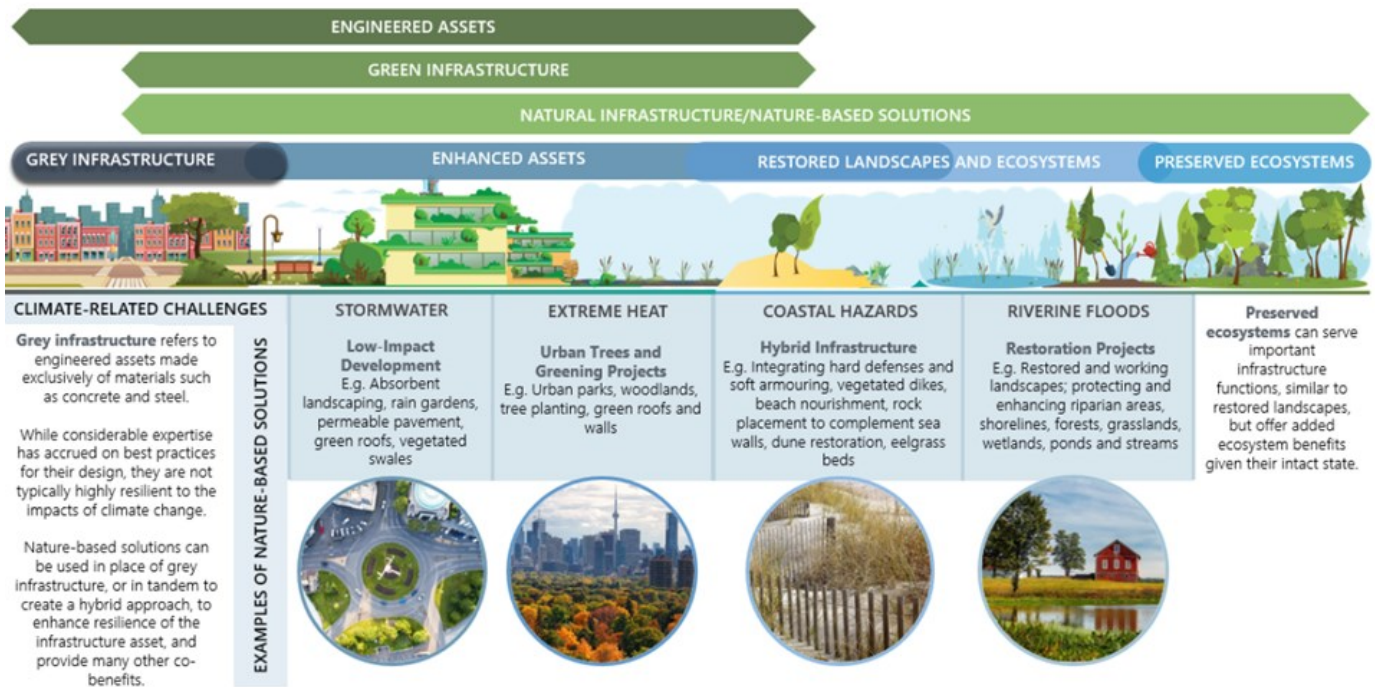
¹For the purposes of this Report, the term Natural Infrastructure is used as a general term to encompass Green Infrastructure, Low Impact Development, and other similar nature-based approaches.

INTRODUCTION AND EXECUTIVE SUMMARY

From the CCME Natural Infrastructure Framework: “CCME has defined Natural Infrastructure as the use of preserved, restored or enhanced elements or combinations of vegetation and associated biology, land, water and naturally occurring ecological processes to meet targeted infrastructure outcomes (CCME 2018).”

CCME also provides a typology of infrastructure types to show that there is a spectrum with increasing use of nature-based solutions within the mix of infrastructure elements as one moves closer to preserved ecosystems:

Figure 1. Typology of Infrastructure Types



INTRODUCTION AND EXECUTIVE SUMMARY

The survey was carried out between January 27, 2023 and February 28, 2023 comprised of 60 questions (depending on how many examples were provided). The survey was organized into five sections:

- Respondent & Organisation Information
- Organisational Knowledge & Capabilities
- Experience & Examples
- Planning & Funding
- Closing Questions & Comments

Executive Summary of Results

CWWA received a great response rate to the survey with 129 organisations participating. The respondents largely represented utilities, both municipal and independent, but also representatives consultants, suppliers, and government. The size of respondents' organisations ranged from those serving a population of over 1 million to those serving as little as 5,000 people. Provincially, there was a good Canada-wide response to the survey, however, there were no responses from the Northwest Territories, Nunavut or Yukon. There were no responses directly from First Nations although there were two responses from Indigenous Services Canada.

Participants also responded to an invitation to share details of their Natural Infrastructure (NI) projects and/or programs. In total, 35 examples were provided.

The survey questions and summaries of the responses received are provided in the following pages and the examples submitted are presented in Appendix A.

From review and analysis of the survey results, the following key points became apparent:

- a) Responses were largely received from organisations serving a larger population (and consequently larger capacity systems), even though there is a much larger number of smaller municipalities across Canada. This likely reflects that larger organisations have greater capacity to both implement Natural Infrastructure projects and to respond to surveys such as this.
- b) Few respondents indicated that they use a single definition of Natural Infrastructure across their organisation. It appears that multiple terms and definitions are used to describe Natural Infrastructure across the country. Most organisations prefer to use a published definition, rather than making their own, and multiple respondents referred to CCME's definition. The results indicate that, while there is a general understanding of what constitutes Natural Infrastructure, there is still a need for universally-accepted terminology and definition.

INTRODUCTION AND EXECUTIVE SUMMARY

- c) The vast majority of respondents recognized Natural Infrastructure as a possible solution to their infrastructure challenges.
- d) The majority of responses indicated that their objectives for implementing Natural Infrastructure programs and projects were for well-established initiatives; namely watershed protection, flood and erosion management, stormwater management and receiving water quality improvement, with many projects intended to fulfil several of those purposes. Other purposes included: reducing overflow to rivers, erosion risk management, restoration and resource management, research and enhancing wetlands for wildlife.
- e) Survey responses indicate that a wide range of municipal groups may participate in NI programs and projects, for example, public works, transportation, parks & recreation, facilities, engineering, planning & development departments, as well as watershed planning & protection organisations, and local, non-governmental watershed groups.
- f) Although the majority (about two-thirds) of respondents indicated their organisation had a formal asset management program, 15% of the respondents were unsure if they did, and another 22% indicated that they did not. The fact that a third of organisations responding either do not have an asset management program or their staff are unsure if they have one shows there is still a need to increase awareness and funding for asset management; that conclusion likely applies to all aspects of the organization and not just Natural Infrastructure.
- g) The most common barrier identified by survey respondents was a lack of “knowledge” to adequately support greater implementation of NI initiatives. Lack of knowledge was defined in several ways, including:
 - a lack of understanding of the benefits and performance of NI;
 - a lack of expertise/knowledge to properly plan, design, and maintain NI; and
 - a lack of standards for adoption of NI.
 - Many respondents also indicated that the lack of funding was also a barrier.
- h) Many of the current needs identified by respondents were in response to the knowledge gaps identified above. Specifically, tools to help evaluate the benefits of NI (including cost benefits); standards and specifications for the design of NI; and better guidance/information on where, when and what type of NI should be incorporated in order to maximize benefits. Similar to the previous observation, additional provincial/federal funding programs, specifically focused on promoting implementation of NI programs and projects, would also help advance its uptake.

- i) Respondents provided many excellent examples to share with our members as guidance. All these examples and a reference matrix are available in Appendix A.
- j) With respect to how CWWA can best assist, respondents viewed CWWA's role as both an *information provider* and *facilitator*. It was suggested that as an information provider, CWWA could curate existing knowledge and best practices for the adoption of NI and make those resources (e.g., online resources, training programs/manuals, webinars, conference sessions) available to stakeholders. As a facilitator, CWWA could promote the benefits, successes, and best practices of NI, both to adopters (e.g., municipalities and utilities) as well as to potential funding providers (e.g., upper levels of government). In addition, CWWA could leverage its relationships with governments and other stakeholders, as well as its membership's expertise, to ensure effective standards for NI are developed.
- k) From the response to the survey and the high quality of the information received, it is apparent that Natural Infrastructure concepts and practices are of significant interest to CWWA's members and other stakeholders. Respondents also indicated that CWWA has an important role to play in furthering the adoption of Natural Infrastructure and realization of the benefits that can result. Accordingly, it is intended that CWWA will now develop a Position Statement with respect to Natural Infrastructure using the survey results. They will also be used to guide our future activities. Keep an eye on CWWA's website for future developments!

Thank You & Listing of Participants

The CWWA and its Utility Leadership Committee would first like to thank all of the respondents who took the time to complete the survey and to provide such helpful examples. This valuable information will greatly support the advocacy and knowledge-sharing efforts of the CWWA.

We would also like to acknowledge the tremendous work of our Joint Working Group that developed, oversaw and analyzed the results of this survey. This Working Group is made up of members from both the CWWA Utility Leadership Committee and the CWWA Climate Change Committee. Special thanks to Utility Leadership Chair Carl Bodimeade (Hatch) and Kara Parisien (CWWA).

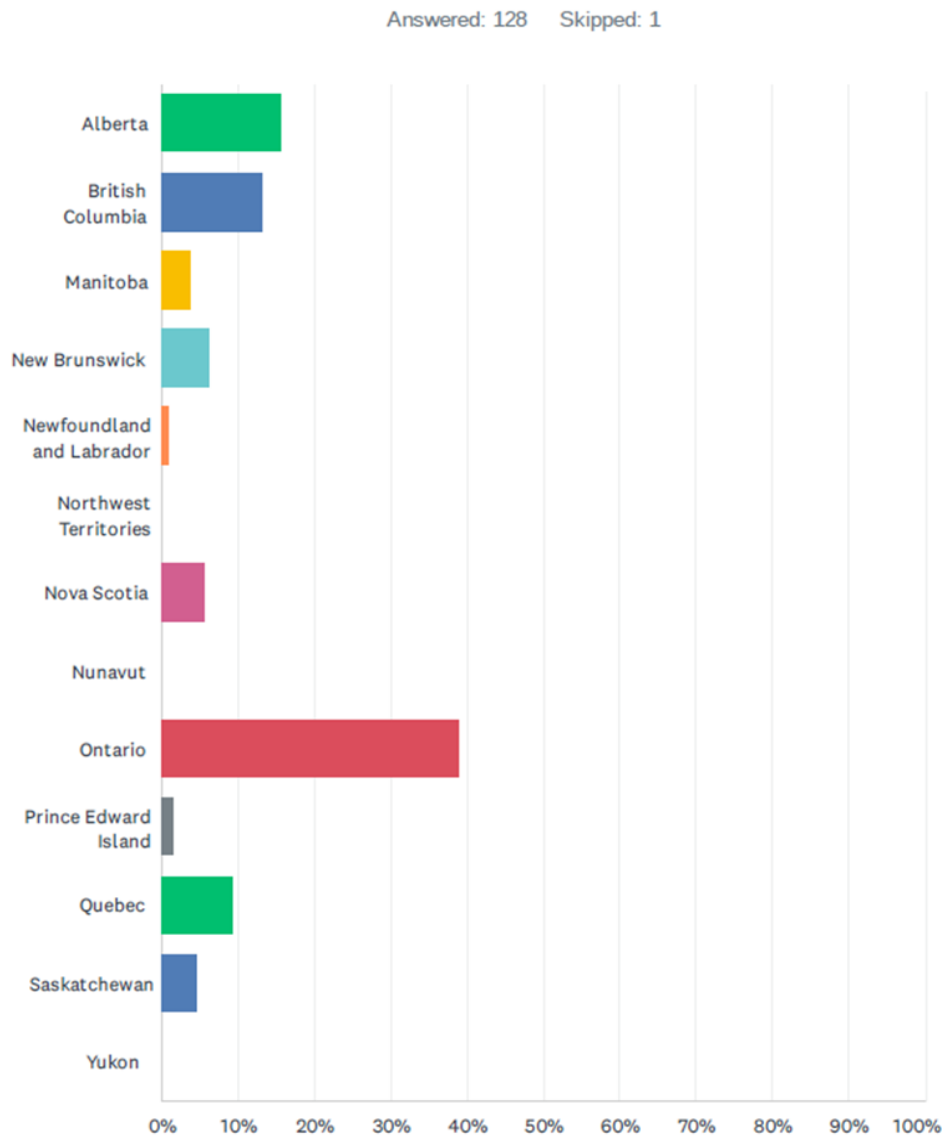
Working Group Members include:

Carl Bodimeade (Hatch)
Madeleine Butschler (Professional
Education Advisor)
Don Corbett (Region of Waterloo)
Bu Lam (City of Kitchener)
Wayne MacDonald (Cape Breton
Regional Municipalities)

Hiran Sandanayake (City of Ottawa)
Amy Winchester (CBCL Limited)
Robert Haller (CWWA)
Kara Parisien (CWWA)

Part 1: ORGANISATION AND CONTACT DETAILS

Question 4: In what province or territory are you located?

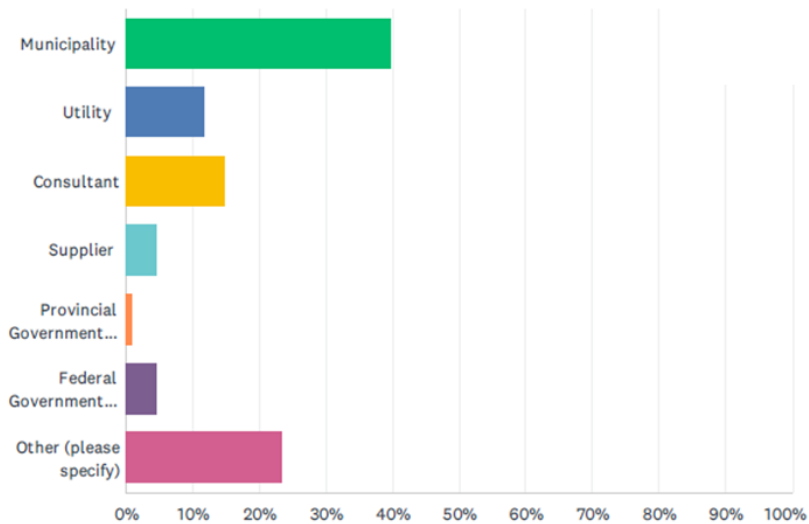


Question 4 Summary

The total number of individual survey responses received (129) was filtered to include Municipal and Utility responses only – (61) as these would be have a specific location (i.e., be located in one province or territory). Although responses were received from across Canada, when the number of organisations selected is considered in relation to the provincial/territorial population, Newfoundland and Labrador, Quebec, and Ontario were underrepresented. Also, no responses were received from Nunavut, the Northwest Territories, or Yukon.

Part 1: ORGANISATION AND CONTACT DETAILS

Question 5: Type of organisation

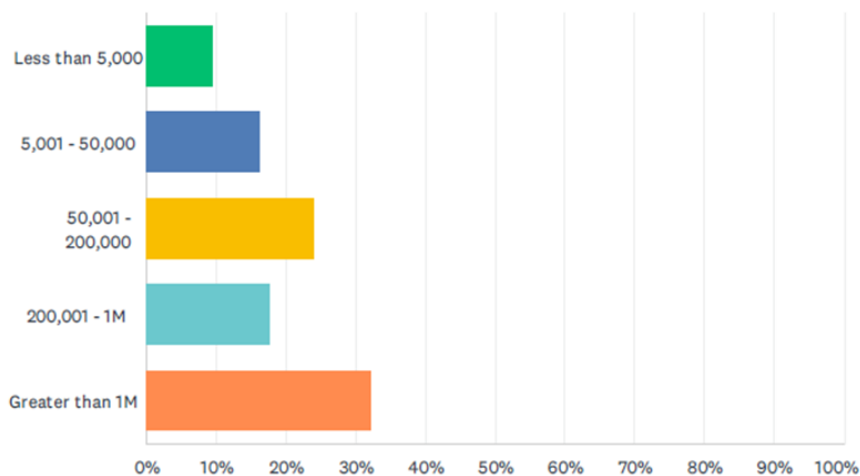


Question 5 Summary:

69 of the responses were from municipalities and utilities with the remainder from a variety of sectors such as higher levels of government, private consulting, suppliers, academia, and public agencies.

Question 6: Size of population served

Answered: 62 Skipped: 67

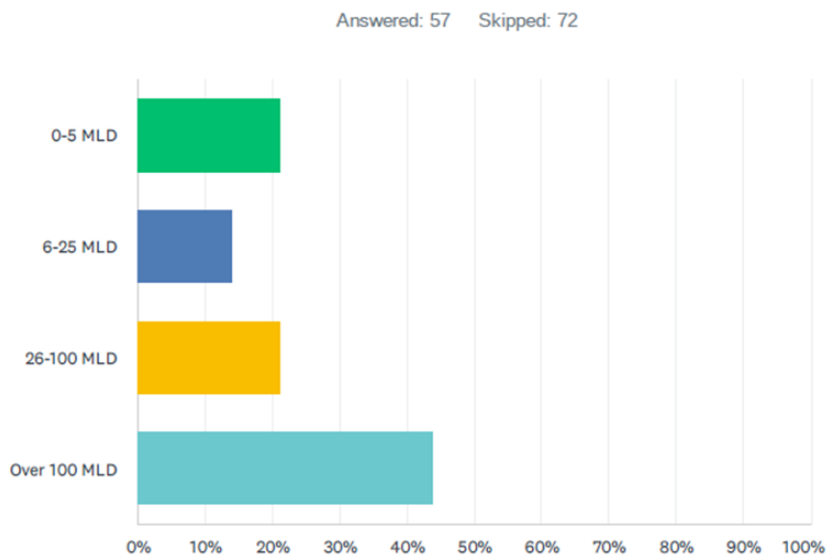


Part 1: ORGANISATION AND CONTACT DETAILS

Question 6 Summary:

Although responses were received from organisations serving small, medium, and large populations, the number of responses was weighted towards larger population respondents, even though there is a much larger number of smaller municipalities across Canada. This likely reflects that larger organisations have greater capacity to both implement Natural Infrastructure projects and respond to surveys such as this.

Question 7: Based on a yearly average how many Mega Litres of water or wastewater per day (MLD) is processed?

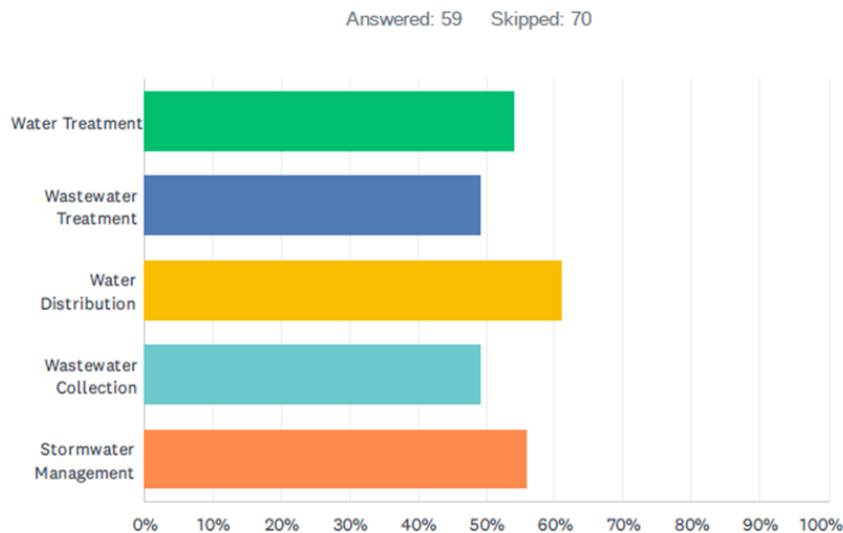


Question 7 Summary:

Similar to Question 6, respondents with larger capacity systems (a consequence of having larger populations) are over-represented, likely due to their greater internal resources.

Part 1: ORGANISATION AND CONTACT DETAILS

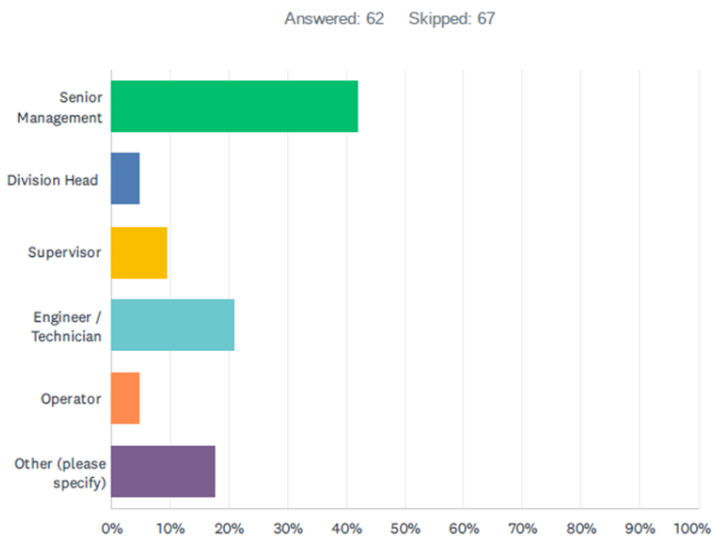
Question 8: I have responsibility for (click all that apply)



Question 8 Summary:

There was a good distribution of service area responsibility in the responses with most respondents having responsibility for more than one service area.

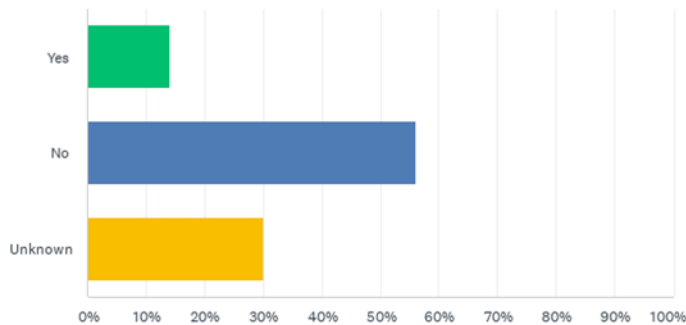
Question 9: I work in this role



Question 9 Summary:

By role, ~40% of respondents worked in senior management, ~20% in engineering, ~20% are division heads, supervisors, and operators. The remainder are urban planners, project managements, advisors, watershed planners, environmental scientists and analysts, and hydrogeologists.

Q10: Does your organisation use a single corporate definition of Natural Infrastructure (NI)?

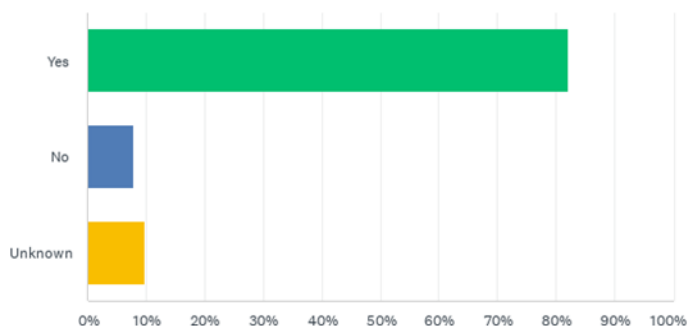


Question 10 Summary:

Few respondents reported that their organisation has a single corporate definition of NI. It appears that there are multiple terms and definitions used to describe natural infrastructure across the country. Most organisations prefer to use a published definition, rather than making their own, and multiple respondents referred to CCME's definition. The results indicate that, while there is a general understanding of what Natural Infrastructure constitutes, there is a need for universally-accepted terminology and definition.

Q11: Does your organization consider NI to be a possible solution to some of its infrastructure challenges?

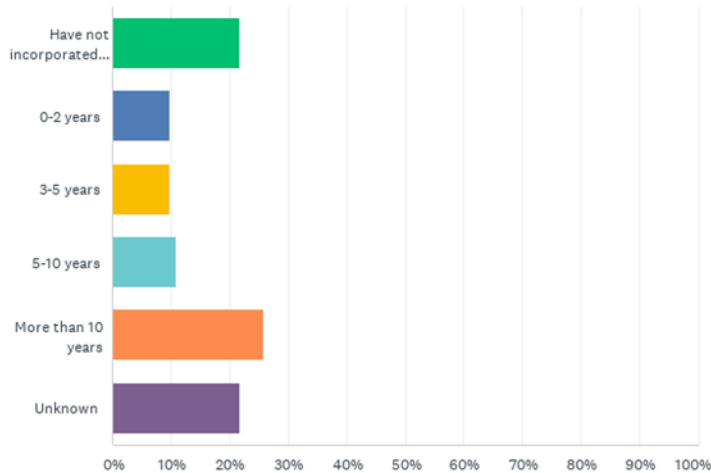
Question 11 Summary:



The vast majority of respondents recognized NI as a possible solution to infrastructure challenges.

Part 2: ORGANISATIONAL KNOWLEDGE & CAPABILITIES

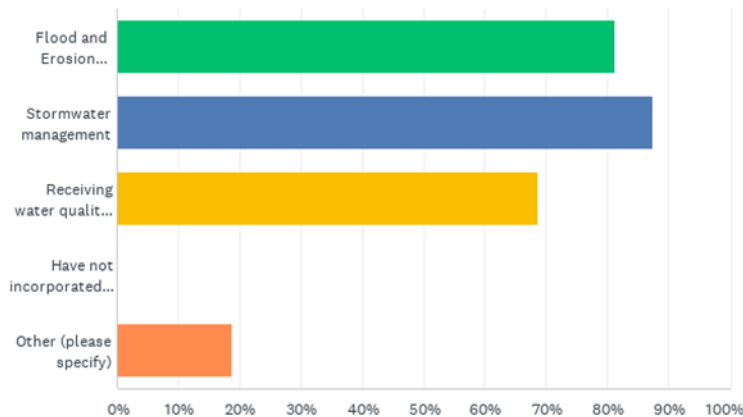
Q12: How long has your organisation been incorporating NI into programs and projects:



Question 12 Summary

Approximately 25% of respondents indicated that they have been incorporating NI concepts and practices for more than 10 years. Approximately 10% of respondents each indicated they have been incorporating NI for less than 2 years, 2 to 5 years or 5 to 10 years. However, there are also a large number of respondents who either have not incorporated NI or do not know how long they may have been incorporating it.

Q13: For what purpose has your organisation incorporated NI into projects? (Check all that apply.)



Part 2: ORGANISATIONAL KNOWLEDGE & CAPABILITIES

Question 13 Summary

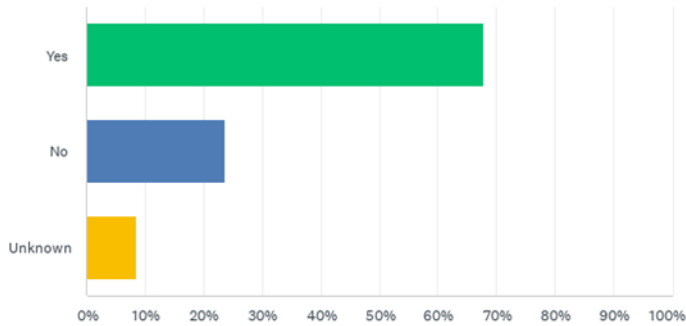
Responses show that there are some well-established purposes for the use of NI : namely flood and erosion management, stormwater management and receiving water quality improvement, with many projects fulfilling several of those purposes. Other purposes included: reducing overflow to the rivers, erosion risk management, restoration and resource management, research, and enhancing wetlands for wildlife.

Q14: Please list the principal departments or groups in your organisation that directly participate in natural infrastructure programs and projects?

- Local watershed non-government organisation
- Engineering
- Infrastructure and Operations
- Public Works
- Planning and Development
- Transportation
- Parks and Recreation
- Watershed Planning and Protection
- Facilities
- Climate and Environment
- Fish and Fish Habitat Protection Program

Part 2: ORGANISATIONAL KNOWLEDGE & CAPABILITIES

Q15: Does your organisation have a formal infrastructure asset management program?



Question 15 Summary

Although the majority (about two-thirds) respondents' organisations have a formal infrastructure asset management program, 5% of the respondents were unsure if they had a formal asset management program, and another 22% do not have a formal program. This indicates there is still a need to increase awareness and funding for asset management.

PART 3: NATURAL INFRASTRUCTURE EXAMPLES

In Part 3 of the survey, respondents were asked to provide examples of NI projects, along with details about their implementation. These are included in Appendix A.

Part 4: CLOSING QUESTIONS & COMMENTS

Q55: What, if any, are the barriers to implementation of NI in your organisation's experience, for example, lack of information or organisational interest, funding, etc.?

The most common barrier identified by survey respondents was a lack of “knowledge” to adequately support greater implementation of NI. In particular, lack of knowledge was defined in several ways, including:

- a lack of understanding of the benefits and performance of NI;
- a lack of expertise/knowledge to properly plan, design and maintain NI; and
- a lack of standards for adoption of NI.

Many respondents also indicated that a lack of funding was also a barrier.

Q56: What would your organisation find helpful to progress forward in applying NI as an approach: What are the current gaps, and what are the current needs:

Many of the current needs identified by respondents were in response to the knowledge gaps identified in Question 55. Specifically noted were tools to help evaluate the benefits of NI (including cost benefits); standards and specifications for the design of NI; and better guidance/information on where, when and what type of NI to incorporate to maximize benefits.

Similar to Question 55, additional provincial/federal funding programs specifically geared toward NI implementation would also advance the uptake of NI.

Q57: How do you think CWWA could best assist your organisation in addressing those gaps and needs?

Respondents viewed CWWA's role as both an *information provider* and *facilitator*. As an information provider, CWWA could curate existing knowledge and best practices for the adoption of NI and share these resources with municipalities (e.g., online resources, training programs/manuals, webinars, conference sessions). As a facilitator, CWWA could promote the benefits, successes, and best practices of NI both to infrastructure adopters (e.g., municipal utilities) as well as to potential funders (e.g., upper levels of government). Further, CWWA could leverage connections and membership expertise to ensure effective standards for NI are developed. 58: Is there a need for more funding to implement NI in the water sector?

Part 4: CLOSING QUESTIONS & COMMENTS

Q58: Is there a need for more funding to implement NI in the water sector? If yes, what could CWWA do to further advocate on your organisation's behalf?

Respondents overwhelmingly indicated more funding was needed to advance NI in the sector, and further that CWWA could advocate to upper levels of government to make funding targeted to NI a priority. In addition, respondents felt that CWWA could lead/advocate for the development of policies to promote NI adoption, and act as a convenor/connector of experts in the field to focus efforts to bring NI into the mainstream.

Q59: Please note up to three references or sources of knowledge on NI you would recommend to other CWWA members:

Many great resources were recommended referencing research and case studies. These resources and more will be gathered and then made available through an open resource library on the CWWA website.



INTRODUCTION

Introduction:

We are thankful for those who took the time to share their case studies, examples, real life experiences. We received so many and from contributors in a range of roles and initiatives. The following section summarizes the results that were shared. Please note:

- Not all respondents answers all the questions, therefore those questions were removed from the results.
- To avoid changing contributors' words, editing was limited, for example to where clarifying and consistency was needed.
- Responses that did not provide an example were removed from the results.

We've created a matrix to allow users to easily sort and review these examples based on type, benefit, province etc. You can access it here.

[Matrix Examples columns removed.xlsx](#)

CITY OF CALGARY

Province: Alberta

Type of Organization: Municipality

Website: <https://www.calgary.ca/home.html>

Project 1

Brief Description of Project:

Natural Asset Evaluation

Completion Date: 2021

Stakeholders: All across City of Calgary

What are the anticipated benefits and how will they be tracked?

Natural infrastructure provides numerous societal, economic and environmental benefits, many of which can be assessed and quantified to describe a service economic value.

Difficulties Encountered:

Developing consensus approach to evaluation methods + moving to integrating into asset management.

Funding and/or Cost sharing Programs:

No.

Has your organization delivered, or does it intend to deliver, NI projects using alternative delivery models, such as public private partnerships or in conjunction with non-profit organizations?

May be considered for the future.

CITY OF CALGARY

Project 2

Brief Description of Project:

Watershed Investment - The City of Calgary is building a grant program to support the protection, restoration and enhancement of NI upstream of it's water treatment plants outside of the city's boundaries.

Who Owns the Asset?

Outside of the city in source watershed. Mix of private and public lands.

Who is/was responsible for implementation?

Natural Environment and Adaptation Section, part of the Planning and Development Division.

Who is/or will be responsible for maintenance?

Same. Likely partner with external foundation to administer grant program.

What are the anticipated benefits and how will they be tracked?

Developing program targets for protection, restoration and enhancement of NI, as well as targets for funding leveraging. Goals and evaluation criteria tied to priority downstream services provided by NI.

Difficulties Encountered:

Challenges in measuring impact; challenge in securing sustained funding.

Funding and/or Cost sharing programs:

No

Has your organization delivered, or does it intend to deliver, NI projects using alternative delivery models, such as public private partnerships or in conjunction with non-profit organizations?

Yes. Seeking to partner with external foundation for grant administration and reporting.

CITY OF CALGARY

Project 3

Brief Description of Project:

The Bioengineering Demonstration and Education Project (BDEP). The City has implemented over 100 riparian restoration/bioengineering projects. These projects have been implemented since 2007 and each year new projects are initiated.

Completion date: 2018

Stakeholders: City of Calgary, Alberta Environment

Who owns the asset? The Province/The City of Calgary

Who is/was responsible for implementation? The Province/ The City of Calgary

Who is/or will be responsible for maintenance?

The City of Calgary

What are the anticipated benefits and how will they be tracked?

Riparian health improvement, flood mitigation, increase in biodiversity. The City is implementing a 10-yr monitoring plan.

Difficulties Encountered:

Some maintenance issues like invasive species.

Funding and/or Cost sharing programs: Alberta Environment

What aspects of the project is the funding being used for?

Design engineering; Project implementation

Has your organization delivered, or does it intend to deliver, NI projects using alternative delivery models, such as public private partnerships or in conjunction with non-profit organizations?

Yes. The City works with watershed stewardship groups to implement riparian projects.

CITY OF CALGARY

Project 4

Brief Description of Project:

The City has implemented over 100 riparian restoration/bioengineering projects. These projects have been implemented since 2007 and each year new projects are initiated.

Completion date: 2023

Stakeholders: in addition to The City of Calgary, some projects have been completed by watershed stewardship groups

Who owns the asset? The City if located in City lands above the legal bank

Who is/was responsible for implementation? Most projects implemented by The City

Who is/or will be responsible for maintenance? The contractor during the warranty period. The City after that.

What are the anticipated benefits and how will they be tracked?

Riparian health improvement, fish habitat enhancement, flood mitigation. The City has a comprehensive monitoring program

Difficulties Encountered:

A few projects have failed but most have succeeded.

Funding and/or Cost sharing programs: Some projects have received Provincial grants

What aspects of the project is the funding being used for?

Design engineering; Project implementation, maintenance

Has your organization delivered, or does it intend to deliver, NI projects using alternative delivery models, such as public private partnerships or in conjunction with non-profit organizations?

The City works with NGOs, watershed groups

CITY OF CALGARY

Project 5

Brief Description of Project:

The City of Calgary and The Government of Alberta area are supporting and encouraging the adoption of bioengineering techniques to stabilize stream banks and restore riparian areas. Calgary.ca/bdep

Completion date: 2017

Stakeholders: The City of Calgary, Government of Alberta, Consultants, other community and nonprofit Partners

Who owns the asset? The City of Calgary

Who is/was responsible for implementation? The City of Calgary

Who is/or will be responsible for maintenance? The City of Calgary

What are the anticipated benefits and how will they be tracked?

Annual bioefficiency tracking and monitoring

Difficulties Encountered:

Community buy-in, maintenance, construction windows, vandalism, plant survival, beavers.

Funding and/or Cost sharing programs: Government of Alberta

What aspects of the project is the funding being used for?

Design engineering; Project implementation, Training and capacity building, Education & Outreach

Has your organization delivered, or does it intend to deliver, NI projects using alternative delivery models, such as public private partnerships or in conjunction with non-profit organizations?

CITY OF CALGARY

Project 6

Brief Description of Project:

LID Implementation

Completion date: 2010

Stakeholders: All City Business Units, development industry, Government of Alberta, Alberta Low Impact Development Partnership

Who owns the asset? Either City of Calgary or private property owners, depending on type of asset

Who is/was responsible for implementation? Either City of Calgary or private property owners, depending on type of asset

Who is/or will be responsible for maintenance? Either City of Calgary or private property owners, depending on type of asset

What are the anticipated benefits and how will they be tracked?

Various, depending on asset. Tracking mechanism is being developed

Difficulties Encountered:

Resistance by development industry due to lack of clarity on how to implement as well as initial capital construction costs. Lack of locally relevant life-cycle costing information. Lack of quantified data re co-benefits.

Funding and/or Cost sharing programs: Unknown

What aspects of the project is the funding being used for?

Design engineering; Project implementation, Training and capacity building, Education & Outreach

Has your organization delivered, or does it intend to deliver, NI projects using alternative delivery models, such as public private partnerships or in conjunction with non-profit organizations?

May be considered in the future

CANADIAN STANDARDS ASSOCIATION

Province: Ontario

Type of Organization: Non-Government

Website: <https://www.csagroup.org/>

Project 1

Brief Description of Project:

National Standard of Canada (under development) Methodologies for Natural Asset Management

Completion date: 2023

Stakeholders: Regulators, municipalities, Non-Government Organizations (NGOs), consultants.

Who owns the asset? N/A

Funding and/or Cost sharing programs:

Standards Council of Canada

What aspects of the project is the funding being used for?

Standards development

CAPE BRETON REGIONAL MUNICIPALITY

Province: Nova Scotia
Type of Organization: Municipality

Website: <https://www.cbrm.ns.ca/>

Project 1

Brief Description of Project:

Washbrook Floodwater Mitigation Project, intended to store stormwater in upper and middle reaches of Wash Brook Watershed in Sydney, Nova Scotia.

Completion date: 2024

Stakeholders: CBRM

Who owns the asset? CBRM/Province of Nova Scotia

Who is/was responsible for implementation?

CBRM

Who is/or will be responsible for maintenance?

CBRM

What are the anticipated benefits and how will they be tracked?

Increase the time of concentration for lower and middle reaches of Washbrook, likely be tracked from visual observations.

Difficulties Encountered: Difficult Construction

Funding and/or Cost sharing programs: DMAF

What aspects of the project is the funding being used for?

Design engineering; Project implementation

Has your organization delivered, or does it intend to deliver, NI projects using alternative delivery models, such as public private partnerships or in conjunction with non-profit organizations?

No

CAPE BRETON REGIONAL MUNICIPALITY

Project 2

Brief Description of Project:

Membertou First Nation bio retention area. Implemented as part of a commercial development to achieve limited stormwater impact to the Wentworth Creek Watershed.

Completion date: 2012

Stakeholders: Membertou First Nation

Who owns the asset? Membertou First Nation

Who is/was responsible for implementation?

Membertou First Nation

Who is/or will be responsible for maintenance?

Membertou First Nation

What are the anticipated benefits and how will they be tracked? Visual observation of downstream watercourse.

Difficulties Encountered:

No difficulties, very positive project.

What aspects of the project is the funding being used for?

Design engineering; Project implementation

CAPE BRETON REGIONAL MUNICIPALITY

Project 3

Brief Description of Project:

Charlotte Street Redevelopment Project. A downtown commercial area street redevelopment in Sydney, NS. Street Trees utilized to absorb stormwater as part of stormwater infrastructure upgrades.

Completion date: 2024

Stakeholders: CBRM/Develop Nova Scotia/SDBA

Who owns the asset? CBRM

Who is/was responsible for implementation?

CBRM

Who is/or will be responsible for maintenance? CBRM

What are the anticipated benefits and how will they be tracked?

Visual observations

Difficulties Encountered:

None

Funding and/or Cost sharing programs: Province of Nova Scotia/Government of Canada

What aspects of the project is the funding being used for?

Design engineering; Project implementation

CITY OF MONTREAL

Province: Quebec

Type of Organization: Municipality

Website: <https://montreal.ca/en/>

Project 1

Brief Description of Project: Pierre-Dansereau parc

Completion date: 2020

Stakeholders: The City, the local borough, the University of Montreal (partner)

Who owns the asset? The City

Who is/was responsible for implementation? The City

Who is/or will be responsible for maintenance? The Borough

What are the anticipated benefits and how will they be tracked?

To Protect a sector receiving a large amount of water during heavy rain, the parc works has a retention pond (only during the rains), the rest of the time, the park is accessible to citizens. It works, during the heavy rains we had people that went to tracked the compartment of the water on site, after 24hours the water was gone.

Difficulties Encountered:

The concept was kind of new, we needed to think outside of the box in applying what had been done elsewhere but adapted to our situation.

Funding and/or Cost sharing programs:

Unknown

Has your organization delivered, or does it intend to deliver, NI projects using alternative delivery models, such as public private partnerships or in conjunction with non-profit organizations?

Yes. The project was new, so we didn't received grant funding for it. But it helped us to receive a grant from the provincial government to finance NI projects and build a team (Équipe Infra-Vertes) that's mission is to include NI in projects city wide (With criterias etc.)

CITY OF MONTREAL

Project 2

Brief Description of Project:

Implementation of draining Forebay to secure pedestrians and to infiltrate rain water in the ground instead in the sewage system.

Completion date: 2022

Stakeholders: The City and the Boroughs

Who owns the asset? The City

Who is/was responsible for implementation? The City and the Boroughs

Who is/or will be responsible for maintenance? The Boroughs

What are the anticipated benefits and how will they be tracked?

Reduce water overflow to the rivers.

Difficulties Encountered:

The first ones built weren't optimized enough.

Funding and/or Cost sharing programs:

Provincial government

What aspects of the project is the funding being used for?

Design engineering; Project implementation; Training and capacity building

The project is ongoing for 2022-2023-2024-2025... actually the City was already building green Forebay to protect pedestrians at intersections, but our plan is to make all the new Forebays with the capacity to infiltrate water in the ground.

CITY OF OTTAWA

Province: Ontario

Type of Organization: Municipality

Website: <https://ottawa.ca/en>

Project 1

Brief Description of Project:

Sunnyside Avenue bioretention cells: Three bioretention "rain garden" cells were installed within curb extensions within the right-of-way as a retrofit pilot project. The bioretention cells included design elements to add greenspace, enhance the streetscape and capture and treat stormwater runoff. Additionally, the curb extensions provide traffic calming function.

Completion date: 2015

Stakeholders: City of Ottawa and MECP (ECA approval for stormwater management)

Who owns the asset? City of Ottawa

Who is/was responsible for implementation? City of Ottawa (Design & Construction)

Who is/or will be responsible for maintenance? City of Ottawa (Stormwater Management Branch)

What are the anticipated benefits and how will they be tracked?

Add greenspace, enhanced streetscape, and capture and treat stormwater runoff. The bioretention cells were designed to provide 5mm of volume control, enhanced level of quality treatment and have the retrofit objective to provide as much quantity control as possible. Monitoring wells were installed in each bioretention cell. A maintenance and monitoring program was developed. Monitoring was completed for the first 3 years post-construction to identify if the bioretention cells are meeting performance expectations. Ongoing annual inspection and maintenance will be completed.

Difficulties Encountered:

The bioretention cells have generally met the performance expectations, receiving and infiltrating the majority of run-off.

Funding and/or Cost sharing programs:

No

CITY OF OTTAWA

Project 2

Brief Description of Project:

Hemmingwood Way bioretention cells: Six bioretention "rain garden" cells were installed within curb extensions within the right-of-way as a retrofit pilot project. The bioretention cells included design elements to add greenspace, enhance the streetscape and capture and treat stormwater runoff. Additionally, the curb extensions provide traffic calming function.

Completion date: 2022

Stakeholders: City of Ottawa and MECP (ECA approval for stormwater management)

Who owns the asset? City of Ottawa

Who is/was responsible for implementation?

City of Ottawa (Design & Construction)

Who is/or will be responsible for maintenance?

City of Ottawa (Stormwater Management Branch)

What are the anticipated benefits and how will they be tracked?

Add greenspace, enhanced streetscape, and capture and treat stormwater runoff. The bioretention cells were designed to provide as much volume control as possible, enhanced level of quality treatment and provide quantity control for the 5 year design storm. Monitoring wells were installed in each bioretention cell. A maintenance and monitoring program is being developed. Monitoring will be completed to identify if the bioretention cells are meeting performance expectations. Ongoing annual inspection and maintenance will be completed.

Difficulties Encountered:

Snow plow damage to bioretention cells.

Funding and/or Cost sharing programs:

No

CITY OF OTTAWA

Project 3

Brief Description of Project:

Bank Street stormwater management soil cells: This pilot project is to install 4 new stormwater management (SWM) soil cells and 10 new trees at two locations in an urban right-of-way.

Completion date: 2023

Stakeholders: City of Ottawa and MECP (ECA approval for stormwater management)

Who owns the asset? City of Ottawa

Who is/was responsible for implementation? City of Ottawa (Design & Construction)

Who is/or will be responsible for maintenance?

City of Ottawa (Stormwater Management Branch)

What are the anticipated benefits and how will they be tracked?

The expected outcomes of the project include reducing and treating the 27mm design storm runoff from an existing urban area through infiltration, filtration and evapotranspiration, improving tree canopy, diversifying tree plantings to increase resilience to pests and disease, and contributing to local biodiversity protection. A monitoring and maintenance plan will be developed to track the performance of the soil cells.

Difficulties Encountered:

None at this time. Construction planned for 2023 but not yet complete.

Funding and/or Cost sharing programs:

We applied for Government of Canada "Natural Infrastructure Fund" but have not heard back yet on our application.

CITY OF THUNDER BAY

Province: Ontario

Type of Organization: Municipality

Website: <https://www.thunderbay.ca/en/index.aspx>

Project 1

Brief Description of Project:

The Hinton Avenue Low Impact Development was the largest Green Infrastructure facility we have constructed to date. This project converted an unproductive mown grassed area and an under-utilized recreation space into a functional and productive stormwater treatment facility with significant vegetation & naturalization.

Completion date: 2020

Stakeholders: City of Thunder Bay, Lakehead Region Conservation Authority, EcoSuperior, EarthCare Thunder Bay

Who owns the asset? City of Thunder Bay

Who is/was responsible for implementation?

City of Thunder Bay

Who is/or will be responsible for maintenance?

City of Thunder Bay

What are the anticipated benefits and how will they be tracked?Total storage volume of 616m³; Estimated annual runoff volume treated / infiltrated of 7,500m³

Difficulties Encountered:

- Plant mortality was an issue until the City took over planting.
- Soil testing is required to ensure that good soil is not taken away from the site
- Sediment needs to be removed from pre-treatment areas before spring melt
- Natural groundwater spring was encountered which required some adjustments to design during construction.

Funding and/or Cost sharing programs:

Federal Government - Clean Water And Wastewater Fund (75%)

CITY OF THUNDER BAY

What aspects of the project is the funding being used for?

Project implementation

Has your organization delivered, or does it intend to deliver, NI projects using alternative delivery models, such as public private partnerships or in conjunction with non-profit organizations?

Yes. We currently offer a rain garden subsidy for residential properties through a non-profit organization.

DUCKS UNLIMITED CANADA

Province: Ontario

Type of Organization: Consultant (Not For Profit)

Website: <https://www.ducks.ca/> (

Project 1

Brief Description of Project:

We restore wetlands on private/public that provide a variety of benefits to wildlife and society. These projects are subsidized by DUC but mainly implemented by the landowners. Since 1975, we've completed over 800 wetland projects in Ontario.

Completion date: 2023

Stakeholders: Private landowners, Conservation Authorities, Nature Conservancy of Canada, MNRF, MECP, DFO, MTO and many more.

Who owns the asset? Usually privately owned

Who is/was responsible for implementation?

Shared responsibility between DUC and the landowners

Who is/or will be responsible for maintenance?

Usually the landowner, but could be DUC

What are the anticipated benefits and how will they be tracked?

Biodiversity, ground water recharge, water quality improvement, flood attenuation. These benefits have been tracked by our research scientists. Not all wetlands are tracked.

Difficulties Encountered:

Limited funding

Funding and/or Cost sharing programs:

If Yes – Please list the organization(s)

Conservation Authorities, MNRF, MECP, Nature Smart Climate Solutions Funde

What aspects of the project is the funding being used for?

Project implementation

DUCKS UNLIMITED CANADA

Has your organization delivered, or does it intend to deliver, NI projects using alternative delivery models, such as public private partnerships or in conjunction with non-profit organizations?

Yes. Already doing this.

HALIFAX REGIONAL MUNICIPALITY

Province: Nova Scotia

Type of Organization: Municipality

Website: <https://www.halifax.ca/>

Project 1

Brief Description of Project:

A rain garden was constructed in a small park next to a lake in urban Dartmouth.

Completion date: 2021

Stakeholders: Design consultant, Public Works, Development Engineering, Parks and Recreation

Who is/was responsible for implementation?

HRM – Planning and Development

Who is/or will be responsible for maintenance?

Parks and Rec department

What are the anticipated benefits and how will they be tracked?

Better water quality for Lake Banook - however monitoring was not taken into account at time of construction

Difficulties Encountered:

Lack of monitoring plan, it was designed and built in a hurry and the contractor did make some errors during construction (e.g. slope, soil type).

Funding and/or Cost sharing programs?

Unknown

Has your organization delivered, or does it intend to deliver, NI projects using alternative delivery models, such as public private partnerships or in conjunction with non-profit organizations?

HALIFAX REGIONAL MUNICIPALITY

Yes. We are hoping to expand our use of NI and are open to all sorts of partnerships.

METRO VANCOUVER

Province: British Columbia

Type of Organization: Municipality

Website: <https://metrovancover.org/>

Project 1

Brief Description of Project:

GVWD secured a 999 year lease with the Province of BC to protect 60,000ha of land for the purposes of long term water supply for the residents of the MV area. The water supply lands are closed to the public and industry and MV is responsible for protection from trespass, monitoring forest health, and wildfire suppression. Preservation of natural ecosystem function is a key goal.

Completion date: 1927 - Seymour and Capilano Water Supply Areas, 1942 - Coquitlam Water Supply Area

Stakeholders: Greater Vancouver Water District, Province of BC

Who owns the asset? Province of BC - Land is under long term lease (999 years) to GVWD

Who is/was responsible for implementation?

GVWD

Who is/or will be responsible for maintenance?GVWD

What are the anticipated benefits and how will they be tracked?

Preservation of vast tracks of forested land in a relative undisturbed state.

Difficulties Encountered:

External pressures for access, increasing volume of public trespass.

Funding and/or Cost sharing programs:

Water rates

What aspects of the project is the funding being used for?

Funding is used for all operational programs aimed to protect water quality.

Has your organization delivered, or does it intend to deliver, NI projects using alternative delivery models, such as public private partnerships or in conjunction with non-profit organizations?

Yes.

METRO VANCOUVER

Project 2

Brief Description of Project:

Green roofs at Metro Vancouver facilities

Completion date: Varies. Completed roofs included Barmston Maple Ridge Pump Station and Seymour Capilano Filtration Plant. New roof being integrated into design of North Shore Wastewater Treatment Plant

Stakeholders: Typically Metro Vancouver and local jurisdiction

Who owns the asset? Metro Vancouver

Who is/was responsible for implementation?

Metro Vancouver

Who is/or will be responsible for maintenance?

Metro Vancouver

What are the anticipated benefits and how will they be tracked?

Intercept rain water and put to beneficial use by removing storm water from the collection system. Improved stormwater quality and peak reduction. Potential for offset of potable water use. Monitoring and reporting varies.

Difficulties Encountered:

Heavy maintenance for the first several years so planting could get established. Maintenance to maintain full effectiveness can be a challenge.

Funding and/or Cost sharing programs:

Offset capital costs.

METRO VANCOUVER

Project 3

Brief Description of Project:

Urban waterways maintained by Metro Vancouver in designated, Board-approved Drainage Areas. Portions of Still Creek, Brunette River, Chub Creek, Deer Lake Brook, Eagle Creek, Stoney Creek, Schoolhouse Creek South, Noble Creek, Axford Creek, Ottley Creek, Kyle Creek, Hatchley Creek, Sundial Creek, Goulet Creek, Williams Creek, Elginhouse Creek, Dallas Creek

Completion date: 1956-2023

Stakeholders: Metro Vancouver, local member jurisdictions (Vancouver, Burnaby, Coquitlam, Port Moody, New Westminster) where facilities are located, First Nations, Residents, DFO, Streamkeepers

Who owns the asset? Metro Vancouver and member jurisdictions

Who is/was responsible for implementation?

Metro Vancouver and member jurisdictions

Who is/or will be responsible for maintenance?

Metro Vancouver, member jurisdictions and relevant third parties

What are the anticipated benefits and how will they be tracked?

Salmon and other fish migration, wildlife corridors, neighborhood amenities, species at risk refuges, natural flood plains, alleviating flood risks in adjacent neighborhoods, improved water quality.

Difficulties Encountered:

Operation and maintenance roles (MV and members), priorities between stakeholders, increased runoff from adjacent impervious areas exceeding channel capacity, securing funding for enhancements, Managing operations in conjunction with others.

Funding and/or Cost sharing programs:

Funding based on annual levies to drainage area members (listed in #3 above).

CITY OF NANAIMO

Province British Columbia
Type of Organization: Municipality

Website: <https://www.nanaimo.ca/>

Project 1

Brief Description of Project:

A key objective for the City of Nanaimo related to understanding and maximizing municipal services from the Buttertubs Marsh Conservation Area, a 55 HA/133 acre reclaimed wetland/floodplain in the center of the City. Prior to the MNAI pilot, City efforts related to the Marsh focused primarily on maintaining open water habitat, inventorying and restoring natural biodiversity, and removing invasive species.

Completion date: 2017

Stakeholders: City of Nanaimo, Municipal Natural Assets Initiative

Who owns the asset: City of Nanaimo

Who is/was responsible for implementation? City of Nanaimo

Who is/or will be responsible for maintenance? City of Nanaimo

What are the anticipated benefits and how will they be tracked?

Storm water management; cobenefits include habitat, rare species, recreation.

Difficulties Encountered:Cost of study

Funding and/or Cost sharing programs:FCM

What aspects of the project is the funding being used for?

Feasibility study

Has your organization delivered, or does it intend to deliver, NI projects using alternative delivery models, such as public private partnerships or in conjunction with non-profit organizations?

Unknown

CITY OF NANAIMO

Project 2

Brief Description of Project:

The Millstone is a landmark stream and a 'natural commons' feature in the region. The stream corridor is the key esthetic and ecological landscape for the Millstone River Greenway. The 'commons' is a foundational concept. The EAP focus is on riparian integrity to maintain the stream's functioning condition. The EAP benchmark assessment provides a starting point for strategy development to systematically invest in restoring riparian woodlands and tall vegetation. Worth of Millstone River as a Natural Commons Worth is defined as the social, ecological and financial values residents and property owners attribute to the stream as a Natural Commons. The primary measure of 'worth' is the community's investment in maintenance and management. Financial Value of the Natural Commons The Natural Commons Asset (NCA) is a land use and is defined as the setback zone required by provincial regulation. The EAP methodology uses BC Assessment data to find financial value. Metrics are expressed in \$ per m² and \$ per lineal metre. Influence of the Stream on Parcel Values In a developed area, a stream with a functioning riparian zone may influence the assessed value of parcels abutting the stream. Within the City of Nanaimo, assessed values of residential parcels are 4% to 8% higher than those for parcels located away from the stream

Completion date: 2021

Stakeholders: City of Nanaimo, Regional District of Nanaimo, Partnership for Water Sustainability in BC, Vancouver Island University

Who owns the asset? Province of BC

Who is/was responsible for implementation?

City of Nanaimo, Regional District of Nanaimo

Who is/or will be responsible for maintenance?

City of Nanaimo, Regional District of Nanaimo

What are the anticipated benefits and how will they be tracked?

Definition of an annual investment for maintenance (targeting 1% of the value of the stream).

Difficulties Encountered: Communicating more broadly.

Funding and/or Cost sharing programs: No

What aspects of the project is the funding being used for?

Feasibility study; Training and capacity building

PEMBINA VALLEY WATER COOPERATIVE

Province Manitoba
Type of Organization: Utility
Website: <https://pvwc.ca/>

Project 1

Brief Description of Project:

PVWC built a 1000 acre foot pond to store raw water adjacent to the Red River at Morris, MB

Completion date: 1997

Stakeholders: Pembina Valley Water Cooperative and 14 owner municipalities

Who owns the asset: Pembina Valley Water Cooperative (PVWC)

Who is/was responsible for implementation?

PVWC

Who is/or will be responsible for maintenance?

PVWC

What are the anticipated benefits and how will they be tracked?

Half year water supply in drought situation (used in 2021 drought) and raw water supply in flood (used for 3 months in 2022 flood).

Difficulties Encountered:

The pond needs to be aerated to keep MN levels down and prevent algae growth.

Funding and/or Cost sharing programs:

No

What aspects of the project is the funding being used for?

Feasibility study; Design engineering; Project implementation; Training and capacity building

Has your organization delivered, or does it intend to deliver, NI projects using alternative delivery models, such as public private partnerships or in conjunction with non-profit organizations?

No

REGION OF PEEL

Province: Ontario

Type of Organization: Municipality

Website: <https://www.peelregion.ca/>

Project 1

Brief Description of Project:

We constructed a bioswale within the median of a regional road that treats water from 5.62 hectares.

Completion date: 2018

Stakeholders: Credit Valley Conservation, Federation of Canadian Municipalities

Who owns the asset? Region of Peel

Who is/was responsible for implementation?

Region of Peel

Who is/or will be responsible for maintenance?

Region of Peel

What are the anticipated benefits and how will they be tracked?

Stormwater treatment. Being monitored by Credit valley Conservation.

Difficulties Encountered:

Difficulties around designing and building around utilities, setting up the maintenance program.

Funding and/or Cost sharing programs: Federation of Canadian Municipalities

What aspects of the project is the funding being used for?

Design engineering; Project implementation.

Has your organization delivered, or does it intend to deliver, NI projects using alternative delivery models, such as public private partnerships or in conjunction with non-profit organizations?

No

REGION OF PEEL

Project 2

Brief Description of Project:

Construction a large bioretention facility to treat stormwater runoff from a regional road.

Completion date: 2020

Stakeholders: Credit Valley Conservation, Ministry of Natural Resources and Forestry

Who owns the asset? Region of Peel

Who is/was responsible for implementation?

Region of Peel

Who is/or will be responsible for maintenance?

Region of Peel

What are the anticipated benefits and how will they be tracked?

Water quality and quantity

Difficulties Encountered:

Difficulties during construction, problems with as-constructed elevations, plant survival.

Funding and/or Cost sharing programs:

Provincial and Federal Government

What aspects of the project is the funding being used for?

Design engineering; Project implementation

Has your organization delivered, or does it intend to deliver, NI projects using alternative delivery models, such as public private partnerships or in conjunction with non-profit organizations?

No

REGION OF YORK

Project 1

Province: Ontario

Type of Organization: Municipality

Website: <https://www.york.ca/>

Brief Description of Project:

Partially funded through Infrastructure Canada's Disaster Mitigation and Adaptation Fund, York Region has a natural infrastructure project to plant over 400,000 trees including urban trees and the creation of 100 hectares of new woodland. The project also includes installing LID (soil trenching) along 35km of Regional roadway. The purpose is to mitigate extreme heat and flooding from climate change.

Completion date: 2028

Stakeholders: Local municipalities, conservation authorities and environmental non-profit organizations.

Who owns the asset? York Region, Conservation Authorities and local municipalities.

Who is/was responsible for implementation? York Region and partners

Who is/or will be responsible for maintenance? Owners of the assets

What are the anticipated benefits and how will they be tracked?

Mitigation of heat and flooding as well as carbon sequestration and storage. Tracked through canopy and woodland cover mapping and forest studies that model water interception, carbon sequestration and storage. Separate heat maps are also created and modelling is done to understand impact of trees on reducing ambient air temperatures.

Difficulties Encountered: Increasing cost to deliver.

Funding and/or Cost sharing programs: Infrastructure Canada - DMAF program

What aspects of the project is the funding being used for? Project implementation

Has your organization delivered, or does it intend to deliver, NI projects using alternative delivery models, such as public private partnerships or in conjunction with non-profit organizations?

Through our Greening Strategy, we partner with non-profits, local municipalities and CAs to plant trees and secure lands for conservation, including source water protection areas and properties with significant environmental features, including hydrological features.

REGION OF YORK

Project 2

Brief Description of Project:

York Region manages 2500 hectares of forested lands broken into 24 forest tracts in accordance with the It's In Our Nature: Management Plan for the York Regional Forest. The primary goal is the strengthen ecological integrity of the forest and the environmental benefits provided such a protecting source water areas and mitigating flooding.

Completion date: 2023

Stakeholders: York Region

Who owns the asset? York Region N

Who is/was responsible for implementation? York Region

Who is/or will be responsible for maintenance? York Region

What are the anticipated benefits and how will they be tracked?

The Region assess the function of canopy and woodland cover as per previous example.

Difficulties Encountered: Cost of land to increase the forest.

Funding and/or Cost sharing programs: Infrastructure Canada

What aspects of the project is the funding being used for? Project Implementation

Has your organization delivered, or does it intend to deliver, NI projects using alternative delivery models, such as public private partnerships or in conjunction with non-profit organizations?

See previous example

REGION OF YORK

Project 3

Brief Description of Project:

The Donald Cousens Parkway Low Impact Development Retrofit Pilot Project seeks to integrate Low Impact Development (LID) stormwater management practices with York Region's standard practice of boulevard street tree planting. The proposed trench on Donald Cousens Parkway will extend for 200 m, with sections of clear stone and sections of growing media. Curb inlets installed upstream from existing catch basins will direct the water from the roadway into the boulevard. The trench system surfaces will also be graded to allow surface ponding in the boulevard and infiltration back into the local water table.

Completion date: 2023

Stakeholders: Aquafor Beech, The Regional Municipality of York (Natural Heritage and Forestry Services, Electrical)

Who owns the asset? York Region Natural Heritage and Forestry Services

Who is/was responsible for implementation? York Region Natural Heritage and Forestry Services

Who is/or will be responsible for maintenance? York Region Natural Heritage and Forestry Services

What are the anticipated benefits and how will they be tracked?

This stormwater drainage solution is a green stormwater infrastructure installation, which will maximize flood control volumes, improve water quality, decrease erosion, and improve infiltration and groundwater recharge. Infiltration will be increased by capturing the first 5mm of stormwater on site, while attempting to capture and filter the entirety of the water quality control volume in the case of an event with 25 mm of runoff. This provides water quality control benefits to stormwater runoff from the drainage areas contributing to the site catch basins. Ministry of Environment, Conservation and Parks (MECP) Level 1 treatment would be considered met or exceeded by the provided storage, such that even in a 27 mm storm event, the system would retain the water quality benefit. This represents 90% of current rainfall events in southern Ontario. The construction and monitoring of the pilot project will provide a vital opportunity to test the proposed LID tree soil trench specifications, allowing for potential implementation at additional sites in the future. This would provide an even larger benefit by improving water quality at more locations in the future while meeting additional environmental objectives of maintaining tree canopy cover in the road boulevard, which provides numerous benefits to the community such as mitigating heat island effects and improving air quality.

REGION OF YORK

Difficulties Encountered:

Funding and/or Cost sharing programs: Ministry of Environment, Conservation and Parks

What aspects of the project is the funding being used for? Project Implementation

Has your organization delivered, or does it intend to deliver, NI projects using alternative delivery models, such as public private partnerships or in conjunction with non-profit organizations?

unknown

REGIONAL DISTRICT OF EAST KOOTENAY

Province: British Columbia
Type of Organization: Municipality

Website: <https://www.rdek.bc.ca/>

Project 1

Brief Description of Project:

Baptiste Lake Dam

Completion date: 1960

Stakeholders: Local Improvement District

Who owns the asset? Now, RDEK

Who is/was responsible for implementation?

Local ID initially, now RDEK

Who is/or will be responsible for maintenance?

RDEK

What are the anticipated benefits and how will they be tracked?

Water source for community water system.

Difficulties Encountered:

Managing turbidity in surface water source.

Funding and/or Cost sharing programs:

Federal & Provincial granting agencies

What aspects of the project is the funding being used for?

Feasibility study; Design engineering; Project implementation

Has your organization delivered, or does it intend to deliver, NI projects using alternative delivery models, such as public private partnerships or in conjunction with non-profit organizations?

Unknown

REGIONAL DISTRICT OF EAST KOOTENAY

Project 2

Brief Description of Project:

Elk River flood mitigation

Completion date: 2022

Stakeholders: RDEK, Local property owners

Who owns the asset? RDEK

Who is/was responsible for implementation?

RDEK

Who is/or will be responsible for maintenance?

RDEK

What are the anticipated benefits and how will they be tracked?

Reduction of inundation of neighboring properties during freshet events.

Difficulties Encountered:

Funding and/or Cost sharing programs:

Federal and Provincial granting agencies

What aspects of the project is the funding being used for?

Design engineering; Project implementation

SCHECKENBERGER & ASSOCIATES LTD.

Province: Ontario

Type of Organization: Consultant

Website: <https://shenberger.net/>

Brief Description of Project:

Natural Infrastructure Pilot Study for Town of Oakville. Assessed the stormwater management benefits of remnant streams in the town's urban core in providing conveyance, treatment and flood mitigation. Monetized these functions and compared them to grey infrastructure solutions.

Completion date: 2018

Stakeholders: Town of Oakville; Conservation Halton; NAI

Who owns the asset? Town of Oakville

Who is/was responsible for implementation? N/A

Who is/or will be responsible for maintenance?

Town of Oakville

What are the anticipated benefits and how will they be tracked?

SWM – not planned to be tracked as this was a pilot

Difficulties Encountered:

Numerical tools needed to be created at a highly resolute scale to provide the data from which to assess performance. Establishing surrogate water quality treatment metrics for a remnant channel provided challenging.

Funding and/or Cost sharing programs: Natural Assets Initiative

What aspects of the project is the funding being used for?

Feasibility study, pilot

Has your organization delivered, or does it intend to deliver, NI projects using alternative delivery models, such as public private partnerships or in conjunction with non-profit organizations?

No. I am a consultant and not an owner operator of NI

TORONTO WATER

Province: Ontario

Type of Organization: Municipality

Website: <https://www.toronto.ca/city-government/accountability-operations-customer-service/city-administration/staff-directory-divisions-and-customer-service/toronto-water/>

Brief Description of Project:

Toronto Water has many wet and dry stormwater management ponds. Example is Earl Bales Park Stormwater Management Wet Pond: a stormwater management facility designed to enhance runoff quality and provide detention erosion protection through runoff detention.

Completion date: 2010

Stakeholders: City of Toronto, TRCA

Who owns the asset? Toronto Water

Who is/was responsible for implementation?

City of Toronto

Who is/or will be responsible for maintenance?

Toronto Water

What are the anticipated benefits and how will they be tracked?

Anticipated water quality targets achieved.

Funding and/or Cost sharing programs:

Unknown

Has your organization delivered, or does it intend to deliver, NI projects using alternative delivery models, such as public private partnerships or in conjunction with non-profit organizations?

Unknown

UNIVERSITY OF OTTAWA

Province: Ontario

Type of Organization: Academic

Website: <https://www.uottawa.ca/en>

Brief Description of Project:

Large green wall in Faculty of Social Sciences Building. 6 stories (78 feet high) and certainly when built the tallest in North America and received many awards (LEED). 2000 plants 12 different species.

Completion date: 2014

Stakeholders: University of Ottawa

What are the anticipated benefits and how will they be tracked?

Biofilter and improves building performance.

Difficulties Encountered:

Seems to be stable these days but plants take regular care.

Funding and/or Cost sharing programs:

Unknown

Has your organization delivered, or does it intend to deliver, NI projects using alternative delivery models, such as public private partnerships or in conjunction with non-profit organizations?

Unknown