NOVA SCOTIA FEDERATION OF MUNICIPALITIES

Nova Scotia Federation of Municipalities

Guidance Document: Stormwater Management in African Nova Scotian Communities

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Acknowledgement Statement

We would like to begin by acknowledging that we are in Mi'kma'ki the ancestral territory of the Mi'kmaq people. We also recognize the enduring presence of the people of African descent, who have been part of Nova Scotia for over 400 years. We honour and offer gratitude to those ancestors of African descent who came before us and shaped the history of this land.

Appreciation

We want to thank everyone who shared their time, knowledge and lived experience with us throughout this process. Without your insights, questions, and buy-in into this process, this document would not have been possible.

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Who We Are

Client - Nova Scotia Federation of Municipalities (NSFM)

NSFM's mission is to enable effective local government for Nova Scotia's communities by facilitating strategic advocacy, collaboration, and education.

Project and Engagement Lead - FBM

FBM Architecture Ltd. (FBM) is an established Halifax-based architectural, planning, and interior design firm dedicated to people-driven design—an equity-driven principle that centers the client, user, builder, and community in every project.

Technical Consultant - Dillon Consulting Ltd.

Dillon's core business involves the planning, design, and management of communities, infrastructure, and environmental assets for public and private sector clients. Dillon's Water Resources team brings demonstrated capacity in flood studies, stormwater management, and infrastructure adaptation across Atlantic Canada.

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LaMeia Kinnects Consulting leads culturally responsive engagement processes that support equitable planning and decision-making with African Nova Scotian communities.

Disclaimer

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1.0 Introduction

This section covers:

- Why Was This Guidance Document Created?
- Who Is This Document For?
- How Was This Document Created?

1.1 Why was This Guidance Document Created?

This guidance document was developed to support municipalities in understanding and addressing stormwater management challenges in African Nova Scotian communities across the province. African Nova Scotian communities have long been subjected to systemic neglect, discriminatory land use planning, and chronic underinvestment by federal, provincial, and municipal governments.

Racism and discrimination are at the root of these conditions and have left African Nova Scotian communities disproportionately exposed to flood risk and other challenges associated with stormwater runoff. This document seeks to explore how African Nova Scotian communities are not only navigating these realities but are uniquely positioned to lead the conversations needed to address them. This work must be done in collaboration with municipalities as local leaders in equitable infrastructure design and development.

The information in this document is intended to promote equitable and respectful engagement, elevate insights from African Nova Scotian communities, and explore solutions to long standing stormwater management challenges. It is especially relevant to communities where historic underinvestment and discriminatory planning have resulted in heightened flood risk or environmental exposure to contaminated runoff. **African Nova Scotian communities are ready to lead the path forward with municipalities. This requires sustained investment in relationship building and community capacity.**

For the purpose of this guidance document, **stormwater is defined as water that flows over the surface of the ground or through drainage systems rather than soaking into the soil**. It can be generated from ground water upwelling, ice melt, or precipitation events including rain and snow.

This Guidance Document is meant to support municipal policy development, infrastructure planning, and community relationship building around stormwater management in and with African Nova Scotian communities. It serves as a guide for how municipalities policies affect communities, and it provides support for municipalities and ANS communities to work together toward shared stormwater management objectives and long-term resilience.

1.2 Who is This Document For?

As a first-of-its-kind resource in Nova Scotia, we recognize that this Guide is a starting point for ongoing discussion, collaboration, and action to advance equity in infrastructure planning. Its development was informed by conversations with a diverse range of contributors, including engineers, elected officials, residents of African Nova Scotian communities, land trust advocates, planners, and professionals working to integrate equity into planning and decision-making. These conversations brought forward a range of perspectives and raised two important questions: Who is this Guide for and what is its purpose?

This Guide will be valuable to:

- **Provincial and municipal elected officials** working in flood adaptation, stormwater management, or equitable capital planning;
- **African Nova Scotian community residents and community champions** seeking to engage and collaborate with government;
- **Provincial and municipal staff** whose work intersects technical engineering, community planning, and equitable climate adaptation; and
- **Public- and private-sector professionals** involved in climate adaptation and equity, diversity and inclusion who may not have a technical engineering background.

This Guide introduces stormwater management, explores how African Nova Scotian communities relate to stormwater today, and provides examples of environmental racism that have shaped infrastructure outcomes across the province. To make these concepts accessible, we use case studies throughout the Guide to illustrate both challenges and opportunities. Together, these topics provide the context needed for municipalities to understand how historical injustices continue to influence present-day planning and why equitable approaches (such as those discussed in **Section 4.0**) are essential to support climate resilient communities.

While these examples of environmental racism that have shaped infrastructure outcomes across the province may evoke a range of emotions, we chose them because they highlight the resilience, leadership, and perseverance of African Nova Scotian communities. Above all, they demonstrate the positive change that is possible when governments and practitioners commit to doing better with communities.

See FloodAdaptNS.ca for more information

1.3 How was this Document Created?

This project took place between March and June of 2026, with community outreach occurring in May and June of 2026. This guidance document was created through a combination of desktop research and engagement with community advisors and knowledge keepers from across Nova Scotia, as well as conversations with municipalities.

Our approach to this work was exploratory from the start. Our priority was to engage the community before drawing any conclusions. We wanted to understand whether stormwater management was a topic that resonated with African Nova Scotian communities, what it meant in the context of their daily lives, and whether this was a conversation African Nova Scotian community members felt was important. **This work has a limited scope and does not represent the full breadth of African Nova Scotian communities across the province. It is a starting point — an opening for conversations that municipalities will need to engage in and support communities in shaping and leading.**

Throughout this process we held space for complexity. Tensions were present from the beginning, specifically around the timing of the project, trust related to questions about who this work is for, and discussion about what meaningful engagement on these topics looks like. We were continuously asking ourselves questions about the right approach, identifying where there were opportunities to draw connections between stormwater management and the broader environmental and infrastructure challenges African Nova Scotian communities are navigating, and where the gaps in understanding, resources, and relationships remain.

To that end, our engagement focused on listening, both to African Nova Scotian community members and municipal staff. We connected with community advisors and knowledge keepers to hear about their lived experiences with water, drainage, and flooding; their awareness of and relationship with municipal stormwater processes and the conditions under which meaningful engagement on these topics would feel possible. We also connected with municipal public staff from across the province to learn about how stormwater is currently managed in their communities and how equity-deserving groups are involved in these processes. These conversations, alongside our desktop research, form the foundation of this guidance document.

The following section explores how we approached each of these conversations and our initial insights from these discussions. Specific engagement insights are included throughout the document to add depth and voice to the desktop and technical research compiled.

1.3.1 Pre-Engagement Community Conversations

The pre-engagement conversations with African Nova Scotian community leaders were designed to understand where this work fits within the broader landscape of community-led

efforts and discussions around water and environmental issues already underway. Recognizing that grassroots leaders have long been engaged in this work, these pre-engagement sessions were intended to explore whether there was resonance with this topic and identify what an appropriate approach would look like to align with, rather than duplicate or disrupt, existing community momentum. Ultimately, these pre-engagement conversations helped determine whether stormwater management was a dialogue worth having, and on what terms African Nova Scotian communities wanted to engage.

We hosted five pre-engagement interviews with community leaders in the following areas:

- Halifax Regional Municipality: North Preston and the surrounding Preston Township communities, Hammonds Plains, Dartmouth, and Halifax
- South Shore Region: Shelburne
- Southwest Region: Weymouth Falls and Sunnyville

Pre-engagement ANS Community Insights

These pre-engagement conversations highlighted that stormwater management was not a term that resonated with many community members. Instead, participants shared experiences related to heavy rain, flooding, and the broader impacts of climate change on their communities. Use of the term stormwater management began to click with communities after discussions about lived experiences with water.

1.3.2 Municipal Conversations

We interviewed public works staff from four municipalities from the northern, valley, western and Cape Breton regions of Nova Scotia to define the systems that allow stormwater management issues to be identified and for equitable infrastructure investments to be prioritized (or not) in municipalities, and to identify opportunities, challenges, needs, and topics for deeper collaborative discussion in the half day workshop. While not representative of each municipality in the province, these conversations provided value insights into the state of stormwater management across Nova Scotia.

To complement our case study writeups and verify key details, we also spoke with select municipal case study contacts. These discussion findings have been incorporated into the respective case study writeups.

Municipal Engagement Insights

Through our interview outreach, staff spoke of the fact that stormwater management tends to be reactionary in nature. Although not explicitly stated, we sensed municipalities would benefit from continued support to build their capacity to deliver on equity initiatives, including integrating the role of equity-deserving groups into infrastructure planning.

1.3.3 African Nova Scotian Community Interviews

This guidance document is shaped by the lived experiences and insights of community advisors and local knowledge holders with experience working across Nova Scotia, who generously shared their stories with us. **It is important to acknowledge that these conversations were never intended to tell the full story of African Nova Scotian communities, but rather to open the discussion within the scope of this project.** A limited number of voices cannot represent the breadth and diversity of the African Nova Scotian experience, and we hold that tension consciously. We recognize this document is a starting point, not a conclusion.

These conversations were centered on how African Nova Scotian communities have experienced stormwater events across time. Together we explored questions like: *Have you or people around you ever dealt with flooding, water pooling, icy conditions, or drainage problems? What impact did that have on your daily routine?*

We also spoke about community awareness of municipal stormwater management processes, asking: *Before today, had you ever heard of the term "stormwater management"? What do you think it means?* These questions helped surface how accessible or inaccessible these systems and conversations have been for African Nova Scotian communities.

From there, we explored the relationship between communities and municipal processes, asking: *When you've raised a drainage or flooding concern with the municipality, what happened?* These exchanges surfaced genuine confusion and skepticism, while also identifying opportunities, challenges, and areas for deeper collaborative discussion. These conversations laid the groundwork for a broader community-led conversation explored further in the half-day, Common Currents workshop.

1.3.4 Common Currents Half Day Workshop

To further deepen our understanding of how municipalities and ANS communities experience and navigate infrastructure challenges together, we invited municipal staff, locally elected officials, non-profit groups working in climate change, equity and diversity professionals, and African Nova Scotian community advisors to attend a half day workshop on June 15th 2026 in Wolfville. We had 15 attendees with the majority being from African Nova Scotian communities.

Participants in the half-day workshop resided across five of the seven regions of the province, as classified by African Nova Scotian Affairs (ANSA): Preston, Central, Northern, Northeast, and Southwest and Annapolis Valley. Unfortunately, we did not have representation from the Cape Breton or Southwest and South Shore regions. This gap has been noted for future engagements. Through this process, we were reminded that participants carry deep historical roots and family ties to other regions and that African Nova Scotian identity and sense of belonging is not confined by municipal or provincial boundaries.

This geographic range was matched by a mix of professions, roles, and ages. Students and researchers sat alongside faith leaders, sociologists, advocacy workers, community development leaders, and those working in policy and/or politics. With youth and elders in the room, the intergenerational representation made the workshop a unique opportunity to bring municipal staff into direct conversation with African Nova Scotian community residents not just across sectors, but across generations of community knowledge and experience.

Notably this this workshop was not a formal consultation with municipalities on any recommendations put forward in the guide, but rather a conversation-based session between African Nova Scotian community advisors and municipal representatives. Our goal was to better understand the stormwater management landscape in African Nova Scotian communities and to explore how municipalities can best engage with communities on stormwater management topics.

The workshop was focused on reviewing and refining the draft Guidance Document through a series of discussion prompts meant to support constructive and collaborative dialogue. These prompts per section of the guide included:

- **Section 1: Stormwater Management in Nova Scotia**
    - What was something you have heard or saw so far that resonated with you? Why?
    - How have you seen stormwater topics communicated to communities by municipalities?
    - What other municipal stormwater challenges might exist? What do they look like in community?

- **Section 2: African Nova Scotian Community Context**
    - Who commonly champions water related advocacy in your community? What does this work look like? Is this connected to other initiatives?
    - What is the top challenge and top opportunity for improving how stormwater is managed in African Nova Scotian communities?
- **Section 3: Applying an Equity Lens to Stormwater Management Projects and Engagement**
    - If you could write a vision for how stormwater is managed in African Nova Scotian communities in 20 years time, what would that look like? Does this vision differ for rural and urban communities? If so, how?
    - What would need to happen for your vision to become reality? What role do municipalities and communities play? *(Due to time constraints, participants did not get to discuss this question explicitly though it came up throughout the other conversations).*



1.3.5 Reviewer Feedback Conversations

Our intention after the half-day Common Currents workshop was to provide participants an opportunity to comment on how we incorporated the lived experiences and insights shared there. While every effort has been made to fairly and accurately integrate learnings from workshop attendees, we were unable to facilitate a process whereby participants provided feedback on their contributions in the context of the final document.

Our experience, as well as other research, confirms that the process of collecting, incorporating, validating, and reporting feedback from community engagement is often underestimated. Yet this is an invaluable component of engagement, ensuring community voice is retained in a culturally appropriate and accurate way. We understand this is important for contributors, facilitators, and for the success of projects, and we recommend municipalities have engagement timelines that facilitate multiple rounds of feedback.

2.0 Stormwater Management Backgrounder

This Section Covers:

- What is Stormwater Management?
- How can Stormwater be Managed?
- Who is Responsible for Stormwater Management?
- What is a Storm Event?
- Historical Standards for Stormwater Design in Nova Scotia
- Impacts of Development and a Changing Climate
- Challenges and Solutions in Nova Scotia Municipalities

2.1 What is Stormwater Management?

Stormwater management is the practice of controlling water runoff to prevent flooding, reduce pollution, and recharge groundwater using techniques like ditches, ponds, permeable surfaces, sub surface pipes, and planted areas. In other words, it is a means or method of conveying stormwater to a designated collection point. Stormwater management infrastructure can vary depending on the targeted management scale and can include subsurface systems like storm sewers and surface systems like ditches and vegetated areas. Common infrastructure can look like:

Lot-level: These features are commonly located on private property and represent the first line of defense in reducing the "first flush" of potential pollutants on the ground surface and volume.

Community level: Once water leaves a private lot, it commonly enters the community network managed by the municipality or utility. This can vary between regions and municipalities.

Municipal level: Acting as a larger integrated network, the municipality commonly manages the cumulative impact of upstream systems.

While the specific configuration of these assets varies across Nova Scotia based on local topography, soil conditions (such as high bedrock or clay), and municipal capacity, the fundamental objective remains the same: to manage precipitation as a resource rather than a waste product.

By integrating these various scales of infrastructure, municipalities can move beyond traditional decision-making models to build long-term resilience. Applying this framework consistently can help communities, regardless of their size or historical investment levels, to protect themselves with a functional, equitable drainage network that can withstand the intensifying storms associated with a changing climate.

Notably, a key technical boundary for this project is distinguishing stormwater from other flood types. Stormwater management focuses on municipal and neighbourhood-level drainage and localized runoff. Stormwater is not:

Coastal Flooding: This is caused by high tides, storm surges, or sea-level rise.

Riverine Flooding: This occurs at a "watershed scale" when large rivers or streams overtop their banks due to long-duration events.

Figure 2-1 visualizes the different stormwater generation processes that can be seen in developed areas. The figure shows how precipitation can move over both impervious surfaces, like roads, roofs, and other hard surfaces, and pervious surfaces such as lawns, gardens, and treed areas. When precipitation falls on pervious surfaces, it may infiltrate into the ground, be taken up by plants, or be stored in local small depressions, which generates less stormwater runoff than rain that falls on impervious surfaces. In urban centers, stormwater systems usually direct runoff to catchbasins and buried pipes that make up a network leading to an outfall on a river, lake, or ocean. In rural areas, stormwater systems consist of ditches, swales, and culverts that also ultimately direct runoff towards an outlet.

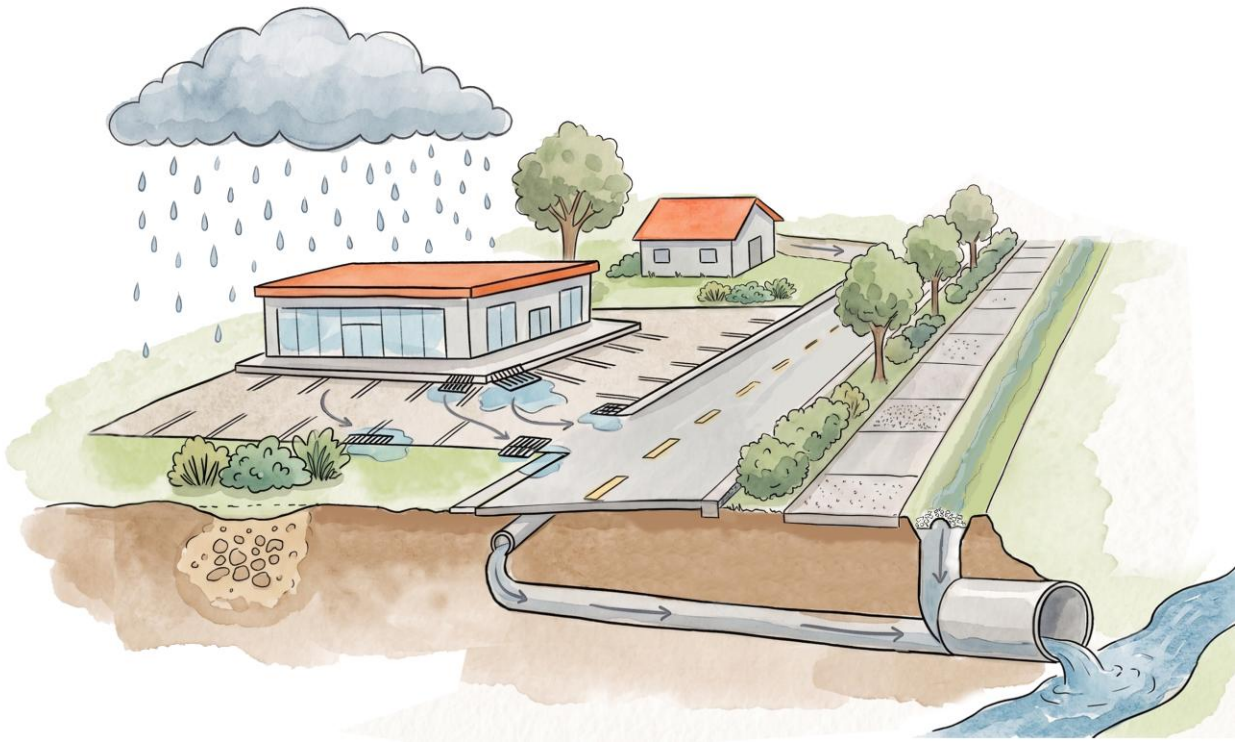


Figure 2-1 Stormwater runoff visualization

2.2 How Can Stormwater Be Managed?

Stormwater management can look different at the lot level, community level, and municipal level. **Table 2-1** provides examples of these management methods and is not an exhaustive list.

Table 2-1 Stormwater management techniques at lot level, community level, and municipal level

Lot Level – Private Properties	
Eavestroughs and Downspouts	Directing roof runoff away from foundations and toward absorbent surfaces.
Trees	Using the canopy to intercept rainfall and roots to promote deep soil infiltration.
Rain gardens and Bioretention	Specialized landscaped depressions designed to capture, filter, and absorb runoff.
Swales	Shallow, vegetated channels that slow down and move water across a property.
Rain barrels	Temporary storage for roof runoff to be reused for irrigation, reducing the immediate load on a collection system.
Grading	Shaping the land so water flows away from buildings and toward designated drainage areas.
Community Level – Initial Collection System	
Ditching	Open channels alongside roads that collect and convey water; these are common in Nova Scotian communities.
Culverts (driveways, and roads)	Pipes under driveways or roads that allow water to pass through the ditching network.
Storm Sewers	A dedicated network of pipes and catch basins designed specifically for precipitation.
Combined Sewers	Older systems that carry both stormwater and raw sewage; these are prone to Combined Sewer Overflows (CSOs) during heavy rain. Combined sewers are not recommended for new systems; legacy systems still exist and require mitigation.
Stormwater Ponds	Large basins that store water, slowing its release to prevent downstream flooding and allowing sediment to settle. Stormwater ponds can be classified into two types; a detention pond, which stores water and conveys it simultaneously, and a retention pond which is designed to store water for greater periods of time.
Municipal Level- Larger Integrated Municipal or Utility Owned Network	
Integrated Network	The coordination of pipes, ponds, and natural watercourses to maintain a consistent level of service across the region.
Outfall Protection	Engineering measures (like armour stone) at the point where pipes discharge into rivers or the ocean to prevent erosion and habitat destruction.
Larger Scale Storm and Combined Sewer Systems	Large trunk sewers that act as the backbone of an urban core, requiring careful management to address climate change projections and growing system inflow.

2.3 Who is Responsible for Stormwater Management?

Effective stormwater management requires coordination across multiple jurisdictions and scales, from the individual property owner who directs roof runoff into a rain barrel, to the municipality that maintains roadside ditches and storm sewers, to the province, which sets the legislative environment within which municipalities operate. Understanding who is responsible for what is a practical first step for any municipality seeking to improve drainage outcomes in their communities.

At the **provincial level**, the Environment Act and the Municipal Government Act establish the authority for environmental protection, land use planning, and the delegation of infrastructure responsibilities to municipalities. The Province of Nova Scotia does not currently prescribe stormwater design standards for Nova Scotia municipalities. Nova Scotia Environment and Climate Change administers approvals for works that may affect watercourses, which can include stormwater outfalls and drainage channel modifications. The province's Public Works Department also manages stormwater on provincial roads, highways and bridges.

Municipalities are responsible for the construction and maintenance of public stormwater infrastructure within their boundaries. This can include roadside ditches, culverts, storm sewers, and stormwater management ponds located in public right-of-way or on municipal land. In Halifax Regional Municipality (HRM), Halifax Water, the regulated water utility, provides stormwater services to defined urban service areas and has developed its own technical design standards. Outside HRM, stormwater management is typically handled by municipal public works departments.

At the **property level**, landowners are responsible for managing runoff generated on their own lots before it enters the municipal system. This includes grading, eavestroughs, downspouts, and any lot-level retention features. Depending on the municipality and the type of property, this can mean handling the post-development runoff volumes to maintain pre-development peak flow and, increasingly, volume targets.

> *For examples of property level stormwater interventions,* ***Section 5.2:*** *Resident Stormwater Management Resources*

2.4 What is a Storm Event?

Infrastructure is typically designed to handle storms up to a defined magnitude, expressed as a return period or annual exceedance probability (AEP). Stormwater systems are commonly grouped into major and minor systems as follows:

Minor System: This includes the ditches, catchbasins, and pipe networks that handle frequent, smaller rainfall events. These are typically designed for higher probability events such as the 1-in-5-year storm (20% AEP).

Major System: This involves overland flow routes intended for less frequent, more significant events that can result in damage to infrastructure. These are typically designed for lower probability events such as the 1-in-100-year storm (1% AEP).



Figure 2-2. A stormwater management pond is typically considered part of a major stormwater system



Figure 2-3 Culverts are typically considered part of a minor stormwater system. These driveway culverts failed when the area received flow greater than what they were designed for.

A 1% AEP designation represents a "1-in-100-year storm", describing a statistical probability rather than a fixed chronological schedule. This means that in any given year, there is a 1% chance of an event of this magnitude or greater occurring, regardless of how many years have passed since the last major flood. Because these are independent events, experiencing an extreme storm today does not "reset the clock" or mathematically reduce the risk of a similar event occurring the following year.

However, climate change is disrupting the assumption of stationarity, causing these high-intensity storms to occur much more frequently than historical engineering models originally predicted. As precipitation patterns shift due to climate change, statistical thresholds derived from historical records can become less reliable predictors of future conditions, meaning infrastructure designed to historical standards may be increasingly undersized.

Pre-engagement ANS Community Insights

Experiences with flooding varied across communities. For some, flooding was described as a challenge of the past, while for others it remains an ongoing issue following significant rainfall. Participants often spoke about the experiences of neighbors and the wider community, reflecting a shared understanding of climate impacts rather than focusing solely on individual experiences.

Workshop Engagement Insights

Valuable questions that arose through the workshop related to how stormwater damages impact communities included:

- *How do we build connected communities where there is a genuine sense of belonging, especially given the unexpected and often unknown nature of storm events, and the many competing demands already placed on residents, businesses, and municipalities?*
- *How do we measure the full scope of impact when stormwater damage occurs? For example, property damage to local residents and business owners, and health consequences that could follow including contamination, mold exposure, stress, and loss of employment.*
- *What supports are needed for residents facing evacuation and relocation as a result of stormwater-related damage?*
- *How can engagement with communities be meaningful and effective when residents don't feel fully informed from the outset?*

2.5 Historical Standards for Stormwater Design in Nova Scotia

There are currently no province-wide stormwater management guidelines in Nova Scotia; guidance documentation is limited to major centers like HRM. The traditional approach to stormwater management has been to capture and convey; that is, remove stormwater from the system as quickly as possible using “grey” infrastructure. Modern stormwater management utilizes “green” infrastructure to slow the flow of rainwater, allowing stormwater to infiltrate into the natural soils. By implementing these Nature-based Solutions, the environment is used as a “sponge”, mitigating flood risk while creating multifunctional green spaces. **Section 5.5** highlights some history of stormwater management in Nova Scotia and illustrates that formal stormwater design standards in Nova Scotia are largely concentrated within or near HRM, where Halifax Water's specifications provide clear technical benchmarks for how infrastructure must be sized, designed, and built. Other municipalities mention storm drains or drainage within broader municipal bylaws, design or servicing documentation, but guidelines for design criteria are limited.

Outside of the municipalities that have adopted formal stormwater management guidelines, engineers and municipalities rely primarily on the CSA national standard or professional judgment, as there are no provincially adopted guidelines that prescribe specific design storms, sizing methodologies, or water quality treatment requirements. Some municipalities that manage combined sewers also refer to the Atlantic Canada Water and Wastewater Associations (ACWWA) design guidelines for sizing wastewater infrastructure. This variation in the regulatory landscape means that stormwater infrastructure across the province can differ in design approach and performance, particularly in smaller and rural municipalities where dedicated technical capacity may be more limited.

Municipal Engagement Insights

We heard through our municipal interviews that some municipal bylaws require new developments to provide stormwater management plans identifying how they will manage stormwater on site and how new private infrastructure will connect to the existing municipal system. We heard that the policy goal tends to aim to match post-development flow to pre-development flow so there is no increase in stormwater entering municipal stormwater infrastructure.

2.6 Impacts of Development and Changing Climate

The relationship between land development and a changing climate creates a complex set of challenges for stormwater management. In a natural state, landscapes such as forests and grasslands act as sponges, absorbing precipitation through infiltration and evapotranspiration. When these areas are developed, the replacement of natural soils with impervious surfaces such as asphalt, concrete, and roofing fundamentally alters the hydrologic cycle.

Municipal Engagement Insights

From our municipal interviews, we heard that rural municipalities are increasingly talking about water retention due to drought conditions. Encouraging green infrastructure (e.g. rain barrels, rain gardens) was viewed as an opportunity area that some municipalities are incorporating into green development standards. We also heard there is a growing need to communicate to the public what they can do on their property to slow and absorb stormwater, and the benefits of doing so.

As the percentage of impervious cover increases, the landscape loses its ability to attenuate flow, resulting in a direct increase in the volume of surface runoff. This increase in runoff volume affects both water quality and quantity. The associated increase in the velocity of stormwater can result in erosion, which impacts both the land being eroded and the areas that will receive sedimentation downstream. Runoff from developed land tends to carry pollutants such as total suspended solids, nutrients, and contaminants from industrial or waste sites and from roads. The appropriate management of stormwater from developed sites must address both stormwater volume and the chemical and biological load it carries to the receiving environment.

The challenges posed by development are further compounded by shifting climate patterns. Traditional engineering has historically relied on the concept of stationarity, which assumes that historical rainfall data provides a reliable blueprint for future conditions. However, as the atmosphere warms and holds more moisture, the intensity and frequency of storm events are changing. We are seeing greater precipitation variability, where dry periods are interrupted by high-intensity rainfall events that deliver substantial volumes of water in very short durations. This shift means that infrastructure designed for the climate of the past may no longer be sufficient to manage the rainfall patterns of the present and future.

Technically, the primary risk during these intense events is the occurrence of surcharging within the drainage network. Most stormwater systems are designed to operate under gravity flow, where water moves freely through pipes and ditches. When the input of water from a storm exceeds the system's physical capacity, the hydraulic grade line rises above the crown of the pipes, forcing the system into pressure flow. This transition can lead to localized flooding, often referred to as pluvial flooding. Because this type of flooding is driven by the limits of the conveyance network rather than the overflowing of a water body, it can occur in high-elevation areas or neighborhoods far removed from rivers and coastlines. It can also be more difficult to predict than riverine or coastal flooding.

Municipal Engagement Insights

We heard that a complicating factor for managing stormwater in older developed communities is that stormwater is often directed into infrastructure that also handles sanitary waste. We heard that a common issue reported by residents is sanitary sewer backups or overflow which happens when stormwater enters the combined wastewater systems, and backups cause waste and water to be pushed back into homes. We heard that separating sanitary systems from stormwater systems is very costly though beneficial, especially for reducing energy demands for treating combined wastewater.

For those living within these areas, the impacts of development and climate change are experienced through the disruption of daily life and threats to property. Residents may experience the inundation of basements, the temporary loss of access to essential transportation corridors and services, and the degradation of local parks and ravines. These experiences often create a sense of vulnerability, as flooding can occur in areas previously thought to be at low risk. For a community, the frequent exceedance of drainage capacity results in a cumulative economic and social strain, necessitating a more integrated approach to infrastructure resilience and public safety.

Pre-engagement ANS Community Insights

While flooding was recognized as an important issue, many participants questioned why the conversation was focused on stormwater management. Extreme heat, drought, wildfires, and emergency preparedness were frequently identified as equally, or more, pressing concerns. Across several conversations, participants emphasized the importance of evacuation planning and community readiness.

2.7 Challenges and Solutions in Nova Scotia Municipalities

Municipalities across Nova Scotia face a variety of challenges when addressing stormwater management, such as the vast coastline, aging infrastructure, and increases in the frequency of high-intensity rainfall events. Older urban centers were originally built with pipes conveying both sewage and rainwater; during heavy storms this resulted in systems overflowing, discharging untreated sewage.

The influence of the coast can have a significant impact on stormwater infrastructure. Sea-level rise and storm surges push ocean water back into the drainage pipes, impairing performance during high tide conditions. Coastal resilience plans have been implemented to protect coastal communities. These plans include raising roadways, creating a physical barrier to prevent seawater from entering the stormwater system.

Municipalities have implemented a variety of upgrades to address stormwater management. Storm sewer separation projects have been completed to separate storm and sewer water; this ensures that sewage is treated prior to being discharged. Culverts and piped systems are assessed and upgraded as needed to accommodate the increase in high-intensity rainfall events.

Stormwater management ponds have been implemented throughout new developments and upgrades to existing infrastructure. These ponds can provide storage during high-intensity events, while releasing the water at a controlled rate. This approach helps to prevent the downstream infrastructure from becoming overwhelmed during high-intensity events.

Further, many municipalities have shifted from primarily "grey" infrastructure (pipes and concrete) to a hybrid approach that emphasizes NBSs and Low Impact Development (LID). This approach can include LID options such as rain gardens, bioswales, and permeable pavers. These features promote infiltration of water into the soil, which reduces runoff while helping to raise the groundwater table.

Technical challenges and best practices can apply to all communities. See the municipal case studies contained in **Section 5: Resources** for more information on how stormwater is currently managed in Nova Scotian municipalities.

3.0 African Nova Scotian Communities & Stormwater Management

This Section Covers:

- African Nova Scotian Community Context
- Systematic Infrastructure Challenges in African Nova Scotian Communities
- Climate Change and Compounding Risk
- African Nova Scotian Water-Related Case Studies

3.1 Introduction

This section intends to outline some historical, demographic, and environmental context of African Nova Scotian communities to ground this stormwater management work in the realities African Nova Scotian communities are living. Without this context, municipalities risk repeating the same patterns of neglect that have defined infrastructure planning in African Nova Scotian communities for generations. Recognizing community histories, long-standing infrastructure gaps, and localized environmental hazards is crucial for designing[1] inclusive and effective climate and water policies[2].

3.2 African Nova Scotian Community Context

African Nova Scotians are a distinct people whose histories, legacies, and contributions have enriched Mi'kma'ki (Nova Scotia) for over 400 years[3]. They are descendants of people of African descent who were enslaved and later freed by French and British colonists and Loyalist settlers, Black Loyalists from the United States, Nova Scotian colonists of Sierra Leone, Maroons from Jamaica, and Black Refugees of the War of 1812[4]. Although institutionalized racism restricted many ancestral African Nova Scotians to rural areas, the effects of those decisions continue to shape where and how communities live today. Despite decades of forced displacement and systemic exclusion, African Nova Scotian communities have remained deeply rooted, resilient, and culturally significant across both rural and urban Nova Scotia.

[2] https://climateinstitute.ca/publications/environmental-racism-and-climate-change/
[3] https://www.dal.ca/about/mission-vision-values/african-nova-scotian-connections.html
[4] https://climateinstitute.ca/publications/environmental-racism-and-climate-change/

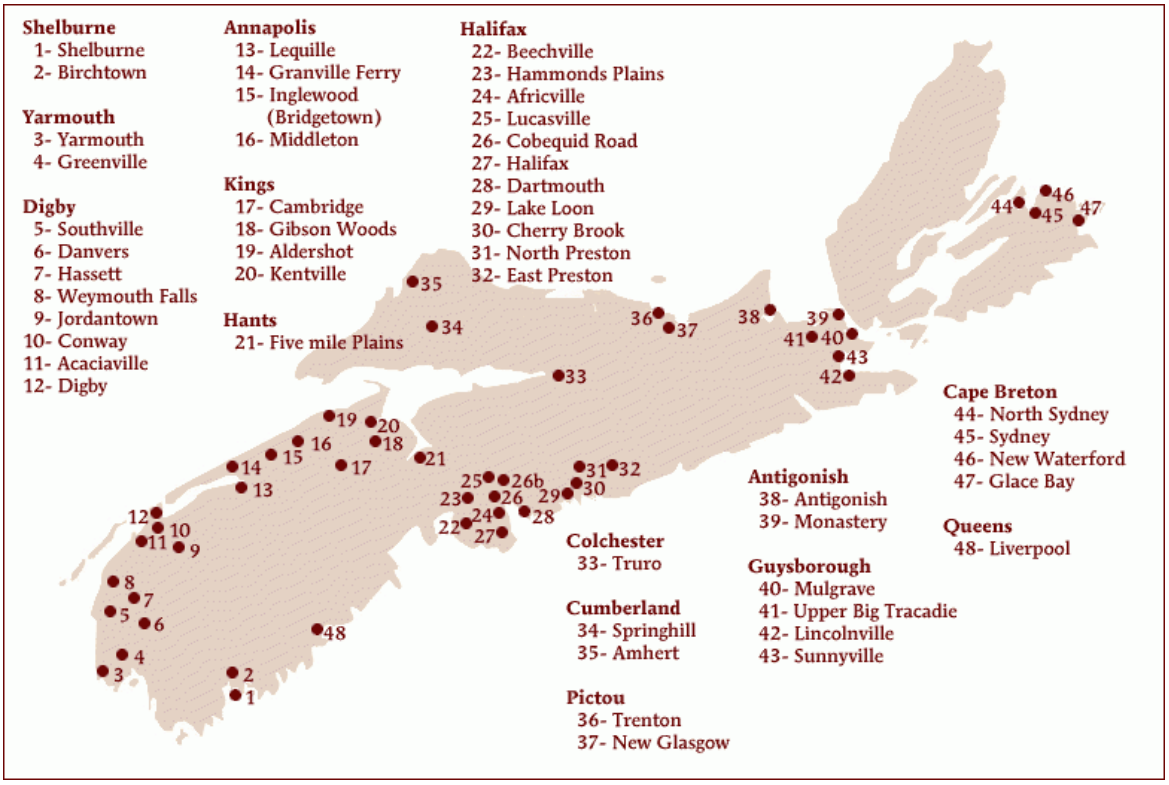


Figure 3 Historic ANS communities by county. Source: St. Francis Xavier University (n.d.)

Each ANS community has a distinct history and relationship with the local environment, and their historic boundaries have evolved over time. Today, these areas are home to descendants of the foundational settlers, as well as other long-time residents, and immigrants from a range of backgrounds[5].

Historic ANS communities have a deep, enduring connection to their local environments and have demonstrated leadership in climate and water protection. For example, residents in South Shelburne successfully advocated for the closure of the Morvan Road Landfill in 2016, and communities in the Prestons opposed municipal waste sites that threatened local water supplies[6].

[5] https://climateinstitute.ca/publications/environmental-racism-and-climate-change/
[6] https://climateinstitute.ca/publications/environmental-racism-and-climate-change/

Despite this leadership, historic ANS communities continue to experience the effects of environmental racism, insecure land titles, and infrastructure neglect - factors that directly shape stormwater management needs.

Inequitable land-use planning has disproportionately placed toxic sites, landfills, and industrial hazards near rural and isolated ANS communities. In addition, communities such as Africville were intentionally denied essential municipal services, including paved roads, sewage systems, and potable water, increasing environmental vulnerability[7]. This legacy must be reflected in modern infrastructure planning.

Infrastructure deficits and environmental racism are reflected in lived experience. Past examples of engagement, sourced from reviewed literature, articles, and reports are referenced throughout this section.

While many historic African Nova Scotian communities are referenced by overarching regional or town names, their actual physical footprints frequently cross present day municipal borders. Municipalities must therefore undertake further localized research to accurately identify, map and engage with their African Nova Scotian residents both within and beyond historic ANS community boundaries.

[7] https://climateinstitute.ca/publications/environmental-racism-and-climate-change/

ANS Community Interview Insights

African Nova Scotian communities are starting from lived experience of weather and water, not technical language. *Heavy rain, snow, and snowmelt are part of everyday life that people are already paying close attention to because of how they affect getting around, staying safe, and going about daily routines. The term stormwater management is not widely used or familiar in African Nova Scotian communities, but the real-life experience of water pooling, poor drainage, and localized flooding is well understood.*

Across African Nova Scotian communities, people consistently pointed to certain areas where water tends to gather when it rains hard or when snow is melting. These are familiar, repeated patterns that communities know from years of living in the same places and observing how water moves through streets, yards and communities.

Weather events are often described in African Nova Scotian communities as something people plan around. Heavy rain or snowmelt can mean changed plans, harder travel, missed appointments, or difficulty getting to services. Over time, these disruptions are often seen as part of seasonal life rather than unusual events.

Within African Nova Scotian communities, people also spoke about how they look out for each other when weather gets difficult. Neighbours check in, share updates about road conditions, and help each other get where they need to go. This informal support is an important part of how communities get through weather-related challenges.

Some participants shared that when issues are reported to their local representatives, it is not always clear what happens next. ***Across African Nova Scotian communities, there was a strong interest in clearer communication, follow-through, and knowing that concerns raised by community members are being heard and acted on.***

Overall, what we heard is that African Nova Scotian communities understand water issues very well through lived experience. ***The opportunity is to connect that knowledge with how stormwater systems are planned, maintained, and communicated.***

3.3 Systematic Infrastructure Challenges in African Nova Scotian Communities

Many African Nova Scotian communities have faced distinctive infrastructure planning and adaptation challenges shaped by a long history of exclusion from land ownership protections, public services, and decision-making processes. These systemic conditions affect how communities experience flooding, stormwater management, water and wastewater servicing, and exposure to environmental hazards. As a result, infrastructure vulnerability in these communities cannot be understood solely as a technical issue; it must also be understood in relation to inequity, land dispossession, and uneven access to public investment.

3.3.1 Environmental Racism and Systemic Inequity

Environmental racism refers to the disproportionate exposure of racialized and marginalized communities to pollution, contamination, and climate-related hazards as a result of inequitable policies and the ongoing effects of racism and colonialism[8]. In the context of African Nova Scotian communities, this concept helps explain why infrastructure deficits, flood risk, and environmental burdens are often tied not only to geography, but also to historic patterns of exclusion from services, land security, and public investment.

Municipal Engagement Insights

Through our interviews, we heard that municipal infrastructure planning initiatives rarely explicitly consider equity-deserving groups in the process. Participants consistently reported a lack of municipal data and mapping on where these communities are, though most participants had a general sense of where these communities are. Generally, they reported a lack of clarity on how to consider equity-deserving groups in infrastructure planning processes beyond typical public engagement requirements.

[8] https://climateinstitute.ca/publications/environmental-racism-and-climate-change/

3.3.2 Nova Scotia's Report on Environmental Racism and Canada's National Strategy to Assess, Prevent and Address Environmental Racism and Advance Environmental Justice

Under the 2021 Environmental Goals and Climate Reduction Act, the Nova Scotia Government announced they would be taking action to address environmental racism and climate change in equity deserving communities. In 2022 the Panel on Environmental Racism was formed, appointing community leaders to make recommendations to the provincial government on addressing generations of environmental wrongdoings in Indigenous and African Nova Scotian Communities. Recommendations made by the Panel are intended to inform government decisions to uphold a healthy, safe, and sustainable environment, as well as equal protection from environmental harm and the impacts of climate change.

While no public-facing version of the Report has yet been released, the Panel shared the Draft Report with the Department of Environment and Climate Change and the Office of Equity and Anti-Racism in 2024, which is currently under review by governmental departments.

On a national level, the Environment and Climate Change Canada's 2026-27 Departmental Plan outlined intent to deliver Canada's first *National Strategy to Assess, Prevent and Address Environmental Racism and Advance Environmental Justice.* The draft strategy was released in June 2026 while the final strategy is expected to be released in Fall 2026.

3.3.3 How Systemic Inequity Shapes Infrastructure Conditions

Systemic inequity is embedded in both formal policies and informal practices that shape who benefits from public infrastructure, who is protected from environmental harm, and whose concerns are prioritized in planning and infrastructure management processes. Even where discriminatory intent is not explicit, infrastructure systems often reproduce long-standing inequities when they are designed without accounting for the histories and current realities of underrepresented communities[9].

Water Service Boundaries

Water service boundaries are another important expression of inequity. Some communities have historically been excluded from the full benefits of municipal servicing, even while nearby areas received investments in potable water, wastewater systems, roads, and drainage[10]. These service gaps can leave residents more dependent on private wells, septic systems, ditches, and

[9] https://www.municipal-ideas.ca/44270/widgets/186307/documents/155132
[10] https://www.enrichproject.org/projects-2/building-capacity-around-climate-change-preparedness-in-african-nova-scotian-communities/

informal drainage networks that are less resilient during heavy rainfall and more difficult to maintain over time.

Toxic Site Location

Toxic site location and water concerns further illustrate how environmental burdens have been unevenly distributed. Where waste sites, industrial uses, or contaminated lands are located near African Nova Scotian communities, stormwater runoff and groundwater pathways can become pathways of exposure and concern[11]. In these contexts, water management is not only about flood prevention; it is also tied to environmental health, trust in public systems, and the cumulative effects of land-use decisions made without meaningful community involvement.

3.3.4 Land Title Challenges

Land title challenges remain a significant issue in some African Nova Scotian communities. Insecure or unclear land ownership can limit residents' ability to access financing, qualify for infrastructure programs, obtain permits, or undertake property-level flood mitigation measures[12]. On a broader scale, unresolved title issues can also complicate drainage improvements, road upgrades, and other community-scale stormwater interventions by creating uncertainty around jurisdiction, responsibility, and long-term stewardship[13].

For over 200 years, many African Nova Scotians have been living on land passed down by their ancestors without clear land title. Many ancestral African Nova Scotians that arrived as free people or refugees were promised land in exchange for fighting in the War of 1812. When they arrived, they were often provided a license of occupation or tickets of location. These tickets and licenses were designed with an expiry date – leaving these settlers without clear title to the lands they were given[14]. Having title to land means that you own the land, and clear title provides legal certainty that an individual owns that land. This lack of land title has created barriers for many to get a mortgage, pass on their property in a will, sell their land, or access housing grants.

In a decision by the Supreme Court of Nova Scotia in the 2020 hearing of *Downey v. Nova Scotia,* Justice Campbell illustrates how issues of land title persist today.

> *African Nova Scotians have been subjected to racism for hundreds of years in this province. It is embedded within the systems that govern how our society*

[11] https://climateinstitute.ca/publications/environmental-racism-and-climate-change/
[12] https://novascotia.ca/land-titles/
[13] https://www.mdpi.com/2076-0760/11/7/281
[14] https://www.cmhc-schl.gc.ca/observer/stories/117-land-trust-unites-community-secures-future-african-nova-scotians

operates. That is a fundamental historical fact and an observation of present reality.

That has real implications for things like landownership. Residents in African Nova Scotian communities are more likely to have unclear title to land on which they may have lived for many generations. That is because in those communities, informal arrangements were more common. Financial and other obstacles made it less likely that people in those communities would retain lawyers and surveyors to research title, register deeds or wills, or to survey boundaries. People may have lived on land for generations without having title registered. No one else might claim it and it may be that no one in the community disputes their entitlement to it. But they still have no formal title[15].

Notably the Province of Nova Scotia has a Land Titles Initiative which helps residents in the communities of North Preston, East Preston, Cherry Brook/Lake Loon, Lincolnville and Sunnyville get clear title to their land at no cost[16].

What is a Community Land Trust?

Community land trusts (CLT) originated during the civil rights movement, invented by a diverse group of black farmers, professionals, and activists in southwest Georgia, USA. The first community land trust, *New Communities Incorporated*, was established in 1969 in Albany, Georgia as a response to ongoing displacement of black farmers by white landowners, stemming from anti-black discrimination. In simple terms, the goal was to offer secure, affordable access to land and housing for Black households. At the time, the 6,000 acres of land owned by New Communities Incorporated was known to be the largest area of land owned by Black Americans[17].

[15] https://canliiconnects.org/fr/commentaires/71809

[16] https://novascotia.ca/land-titles/

[17] https://www.communityland.ca/clts-and-black-communities/

The Canadian Network of Community Land Trusts defines a community land trust as *an organization trusted to steward land on behalf of a given community*. They describe land trusts as:

- **Using community governance**
- **Managing community-serving real estate portfolios**
- **Securing land within community ownership**
- **Enabling long-term affordability**

Land trusts can support a variety of uses, driven by community-based land stewardship including:

- **Stabilizing rents in gentrifying neighborhoods**
- **Asserting community agency in land use decisions**
- **Advocating on behalf on communities**
- **Preventing land loss in communities impacted by land speculation**

As of 2023, there were 40 active community land trusts in Canada, with continued establishment led by Black communities. Prominent community land trusts led by African Nova Scotians include:

- **Upper Hammonds Plains Community Land Trust**
- **Weymouth Falls Community Land Trust**
- **DownTheMarsh Community Land Trust (Truro)**
- **New Roots Community Land Trust (North End Halifax)**
- **Acoma Holdings**

3.4 Climate Change and Compounding Risk

Climate change is intensifying the infrastructure pressures already experienced in many African Nova Scotian communities. Heavier rainfall, flooding, erosion, and service disruptions do not affect all communities equally; their impacts are shaped by existing conditions such as inadequate drainage, deferred maintenance, insecure land tenure, limited servicing, and proximity to environmental hazards[18]. In this way, climate-related stormwater risk is compounded by systemic inequity[19]. Recognizing these relationships is essential to planning stormwater management approaches that are not only technically effective, but also equitable and responsive to lived experience.

Together, these examples show that infrastructure challenges in African Nova Scotian communities are inseparable from broader histories of environmental racism, service exclusion, and uneven public investment. They also demonstrate that stormwater management must be approached as both an infrastructure issue and an equity issue.

Pre-engagement ANS Community Insights

Participants wanted to better understand who was leading this work and how it connected to other climate and environment related initiatives already underway in African Nova Scotian communities. Many emphasized the importance of aligning engagement efforts and creating opportunities for more holistic conversations about climate resilience, rather than discussing stormwater management in isolation. Participants also expressed interest in bringing these conversations directly into communities and offering virtual engagement opportunities to reach a broader audience and strengthen collaboration across community-led initiatives.

[18] https://www.mdpi.com/2076-0760/11/7/281
[19] https://www.enrichproject.org/projects-2/building-capacity-around-climate-change-preparedness-in-african-nova-scotian-communities/

Workshop Engagement Insights

When asked to envision the future of stormwater management in African Nova Scotian communities, participants brought forward a range of visions grounded in equity, community leadership, and long-term structural change. These visions included:

Community Leadership and Capacity Building

Community-led projects with a capacity-building focus on trainings, upskilling, and skill-sharing opportunities for residents.

Community-led work that has direct impact on policy and the governance acts that shape decision-making and progress.

Governance and Representation

A stormwater network connecting government with local community advocates and knowledge leaders.

A joint committee to develop contract documents, community benefit agreements, communication plans and other opportunities for community residents to influence design and development in the early stages of a project or process.

Designated seats for African Nova Scotian voices on advisory groups and sub-committees.

Accountability and Recognition

Recognition and reparations for communities located on high-risk lands.

Further work with engineers to understand their historical role in environmental racism.

Greater awareness of how environmental racism plays into planning and development decisions.

Cont.

Workshop Engagement Insights – cont.

Government Support and Rural Focus

Government incentives, such as grants and cross-departmental collaboration, to support this work.

More focus on rural areas, recognizing that infrastructure issues and policies differ from those in urban communities. There are opportunities to look globally for examples from other parts of the world, particularly around environmental issues and drought.

Together, these visions point to a future where stormwater management is not just a technical or municipal responsibility, but a shared undertaking with local residents. *These approaches centre community knowledge, address historical harm, and have the potential to build lasting infrastructure that considers equity from the start.*

3.5 African Nova Scotian Water Related Case Studies

While this document is focused on stormwater management, the topic cannot be separated from the broader history of water-related planning and infrastructure decisions that have shaped African Nova Scotian communities across the province. In many cases, present-day flooding, drainage issues, and infrastructure vulnerability are tied to longstanding patterns of exclusion from municipal servicing, inequitable maintenance, land-use decisions, and exposure to environmental hazards. Crucially, these systemic challenges have always been met with the enduring resilience, leadership, and perseverance of African Nova Scotian communities.

At the same time, examples that speak exclusively to stormwater management in historically African Nova Scotian communities are relatively limited, particularly where community boundaries have changed over time or where infrastructure systems now serve broader mixed areas. For that reason, the case studies below are intended to illustrate the wider landscape of water management inequity that is directly or adjacently relevant to stormwater planning.

Together, these case studies demonstrate two key realities:

- **The Context of Infrastructure:** How stormwater issues in African Nova Scotian communities are shaped by both technical infrastructure conditions and the complex social, historical, and governance contexts in which those systems operate.
- **Community-Led Action:** How local advocacy and community leadership continue to drive systemic change, highlighting the proactive and powerful ways these communities navigate, adapt to, and overcome environmental inequities.

3.5.1 Case Study: Regional Overview (The ENRICH Project Findings)

Context

This case study draws upon the 2024 report, *Building Capacity Around Climate Change Preparedness in African Nova Scotian Communities*, led by Dr. Ingrid Waldron and Sumia Ali through the ENRICH Project. The initiative involved engaging 12 African Nova Scotian communities in workshops to assess their vulnerabilities and preparedness for climate change. During these narrative-based workshops, participants highlighted inadequate stormwater management and flooding as critical climate threats. In flood-prone areas, severe storm events drive deep concerns regarding housing stability and financial insecurity.

The Challenge

African Nova Scotian communities are facing compounding threats from extreme weather and systemic infrastructure neglect:

Impacts of the July 2023 Floods: In July 2023, extreme rainfall dropped 200-250mm of water across parts of the province over just two days, causing devastating floods. Residents in East Preston reported experiencing enormous, unprecedented floods that severely damaged several basements. Similarly, the community of Beechville faced considerable property damage and increased insurance costs as a direct result of this flooding.

Municipal Maintenance Gaps and Halifax Water Fees: Participants highlighted severe inequities regarding municipal maintenance zones. In Cherry Brook, residents pointed out that they pay annual fees to the Halifax Water Authority for ditch maintenance, but the ditches (which serve as their primary stormwater drainage) are left unmaintained. This perception of a service gap in rural areas prompt concern from some residents, particularly while they continue to pay the necessary stormwater fees.

Systemic Exclusion and Infrastructure Deficits: Communities noted a historical and ongoing exclusion from government planning. Participants from Greenville emphasized that their rural roads lack the proper infrastructure and natural barriers to withstand heavy rain, leaving them highly susceptible to being washed away.

Emergency Service Response Times: The rural location of many communities paired with historic infrastructure deficits has raised notable concern over municipal and emergency service response times. Residents expressed fear that, during a severe flood or weather event, they are the "last ones on the road" to receive an ambulance or emergency support.

Response

Through research and advocacy, the ENRICH Project documented how climate change exacerbates these inequities. By hosting audio-recorded community workshops and analyzing the lived experiences of African Nova Scotians, the project successfully identified systemic maintenance gaps and the socioeconomic impacts of the July 2023 floods. In response to these findings, the project is translating this community feedback into actionable policy briefs and presentations designed to influence policy that supports infrastructure upgrades.

Key Insights

Infrastructure Vulnerabilities: Findings from the ENRICH project indicate a critical lack of adequate stormwater drainage across several African Nova Scotian communities. In areas like Yarmouth, this is compounded by rising sea levels and shoreline erosion, leaving vital roadways and homes highly vulnerable to washouts and raising fears of community displacement.

Addressing Maintenance Gaps: There is a direct call for municipal accountability regarding neglected infrastructure. Participants in Cherry Brook specifically identified the Halifax Water Authority as failing to perform adequate ditch maintenance despite continuing to collect annual stormwater fees from residents. Consequently, the project's formal recommendation urges HRM (where stormwater systems are overseen by Halifax Water) to take active responsibility for maintaining existing infrastructure and creating new stormwater drainage systems.

Financial and Safety Impacts of Floods: With climate change driving massive flood events (such as those in July 2023), communities are facing severe financial burdens, including property damage, lack of flood insurance coverage, and rising insurance costs. Furthermore, limited infrastructure (such as single-road access in and out of subdivisions like Beechville) heightens safety concerns and the risk of isolation during climate emergencies.

Demand for Climate Justice: Addressing these systemic stormwater, infrastructure, and financial inequities requires a climate justice framework. This framework mandates the inclusion of African Nova Scotian voices in city planning and policy-making to ensure equitable resource distribution and climate disaster preparedness.

3.5.2 Case Study: Upper Hammonds Plains Community Land Trust (UHPCLT) & Water Access

Context

Upper Hammonds Plains is a historic African Nova Scotian (ANS) community established in 1815 by Black Refugees from the Chesapeake Bay area who fought in the War of 1812. The community has a long history of self-reliance, having formed its own school, volunteer fire department, and community development association over the decades[20].

The Challenge

The community has endured decades of systemic exclusion from vital municipal services, most notably regarding safe drinking water. In the 1970s, the provincial government expropriated approximately 300 acres of communal land (the Melvin Lands) from Upper Hammonds Plains to construct the Pockwock Lake Water Treatment Plant. During this expropriation, the community's land was appraised at a significantly lower value than neighboring White-owned lands.

Despite the water treatment plant being built directly on their historic lands, the main water transmission pipe deliberately bypassed Upper Hammonds Plains to supply the growing city of Halifax. As a result, the community was denied access to the municipal water supply for 25 years. It wasn't until 1996, when tests revealed that 47% of the community's local wells were contaminated with harmful bacteria, that the municipality-initiated plans for a central water supply. This sparked the historic "Water Fight", a prolonged legal and community battle in which residents successfully fought the Halifax Regional Water Commission over exorbitant, prohibitive frontage fees and the unjust diversion of project savings to a neighboring White subdivision[21].

Response

Today, the Upper Hammonds Plains Community Land Trust (UHPCLT) is actively addressing modern infrastructure gaps and working to protect the community from ongoing development

[20] https://cdn.halifax.ca/sites/default/files/documents/city-hall/regional-council/240910rc15114.pdf
[21] https://www.uhpclt.com/info-history/

pressures. Through persistent advocacy, the UHPCLT is spearheading a Community Action Plan to reclaim community control over local land use and rectify deep infrastructure deficits. The Trust is mobilizing to establish community-owned spaces, advocate for fundamental infrastructure like sidewalks and public transit, and push back against recent, unprecedented multi-unit housing developments that are pricing legacy residents out of the area.

Key Insights

The Impact of Systemic Racism: Longstanding lack of land title and the 'water fight' are examples of unfair treatment and systemic racism experienced in Upper Hammonds Plains. Historically, the government gave Black settlers small, rocky pieces of land and refused to give them official ownership deeds, which trapped families in poverty for generations. Years later, the government took community land to build a water treatment plant, but piped the clean water directly to Halifax, leaving Upper Hammonds Plains without municipal water for 25 years. These events highlight how government actions have historically taken valuable resources from Black communities while denying them basic services in return.

Reclaiming Community Resilience: The UHPCLT illustrates the critical role of Community Land Trusts in stabilizing historically marginalized neighborhoods. By acquiring and retaining land in trust, the UHPCLT removes it from the speculative real estate market, thereby locking in permanent access to affordable housing, promoting community-led development, and acting as a powerful countermeasure against gentrification and market-driven displacement.

3.5.3 Case Study: Morvan Road Landfill, Shelburne

Context

The African Nova Scotian community in the South End of Shelburne traces its roots back to Black Loyalists evacuated from the United States after the Revolutionary War. Beginning in the 1940s, the community was forced to deal with the legacy of the Morvan Road Landfill, a municipal dump placed directly uphill from their homes.

The Challenge

For 75 years, the landfill accepted residential, industrial, and medical waste from across eastern Shelburne County. Situated directly uphill from the South End community, the landfill has caused severe, ongoing issues with water contamination. Although the community successfully campaigned to close the facility in 2016, the accumulated toxic waste was never addressed through a formal remediation plan. Consequently, residents attribute disproportionately high rates of cancer, liver disorders, and kidney diseases to the hazardous materials, such as heavy metals and volatile organic compounds, leaching from the site into the environment.

Rainwater runoff has further exacerbated these issues by carrying contaminants directly into local food sources and habitats. As detailed in the Genes and Geography report, community members actively lived this reality. Highlighting the direct impact of the rain on their environment, one participant recalled, "Yeah, because if it rains, it's going to affect the soil (...) And we ate a lot of rabbits and stuff out of the woods, and deer meat". Another resident noted how animals exposed to the dump "went into everybody's house around the neighborhood and they ate over gardens", cementing the link between the site's runoff and the contamination of their localized food systems.

Response

Decades of community pressure, spearheaded by local advocates, successfully forced the closure of the landfill in 2016. However, the community continues to advocate for long-term solutions, demanding that the government remediate the Morvan Road Landfill site and provide compensation for the harm inflicted. Supported by human rights groups like Amnesty International, their relentless advocacy has prompted a major, multidisciplinary research project—highlighted by McMaster University—to test the site for harmful materials and examine the genetic impacts of toxin exposure on residents. Furthermore, their efforts have drawn federal attention, contributing to the advancement of national legislation (Bill C-226) designed to assess and prevent environmental racism across Canada.

Key Insights

The history of the Morvan Road Landfill demonstrates that for racialized communities, water management is often a critical matter of public health and toxic exposure, not just property damage. The deliberate, disproportionate placement of hazardous industries near marginalized neighborhoods, defined by organizations like the Canadian Climate Institute as environmental racism, means that water runoff from uphill sites can carry life-threatening contaminants. This highlights how essential equitable infrastructure and environmental policies are to protect the health and well-being of vulnerable populations.

3.5.4 Case Study Key Takeaways

Taken together, these case studies show that stormwater management in African Nova Scotian communities must be understood within a broader landscape of inequitable water governance, infrastructure investment, and land-use decision-making. In both rural and urban contexts, communities are experiencing flooding, drainage failures, contaminated runoff concerns, and limited-service access through systems that have often been under-maintained, unevenly extended, or designed without meaningful community input.

The examples also demonstrate that the relevant stormwater context is not limited to conventional drainage infrastructure alone; it includes ditch maintenance, road washouts, service boundaries, source water access, and the ways uphill land uses or hazardous sites can create downstream risks for residents.

For this guidance, these findings reinforce the need for stormwater management approaches that are historically informed, responsive to community experience, and attentive to how technical decisions can either reproduce or reduce inequity.

4.0 Applying an Equity Lens to Stormwater Management & Engagement

This section covers:

- Introduction
- Leveraging Local and National Engagement Best Practices
- Municipal Capacity Challenges
- Case Studies in Municipal Equitable Infrastructure

4.1 Introduction

This section shifts from documenting current stormwater management practices, and the *inequities* experienced in African Nova Scotian communities, to considering how stormwater management projects and engagement processes can respond *more equitably* in practice. Applying an equity lens means recognizing that flooding and drainage challenges are not experienced uniformly, and that technical decisions about infrastructure, maintenance, funding, and land use can either reinforce or reduce long-standing disparities. The following sections identify practical approaches for municipalities, and project partners to design stormwater initiatives that are more responsive to community context, historical inequity, and the co-benefits that matter most to residents.

Workshop Engagement Insights

Water-related advocacy in African Nova Scotian communities is supported by a range of formal and informal champions. These include advisory committees that specifically represent Black communities, community-based organizations, and individual residents who take on advocacy roles based on their lived experience with local water and infrastructure challenges.

In some contexts, there are also designated representation structures within municipal processes, such as a designated seat on community planning and rezoning advisory committees in Truro. Elected officials further contribute by bringing forward or responding to community-raised concerns within formal decision-making spaces.

*Workshop participants also raised the question of whether there should be **more designated seats or structured representation for African Nova Scotian voices** within advisory and planning bodies to strengthen consistency and accountability in advocacy.*

4.2 Leveraging Local and National Engagement Best Practices

There is a rich and rapidly growing sector of community engagement focused on climate change and green infrastructure. African Nova Scotian voices are actively leading these conversations and municipalities are working to integrate equitable practices and policies into management and adaptation planning.

This section explores how ANS communities have been involved in climate and flooding work, how equity impact assessments can be used by municipalities, and best practices in equitable community engagement. This section is intended to inform municipal engagement efforts on stormwater management, while also providing inspiration for how ANS communities can continue to lead in this area of climate resilience.

4.2.1 Summary of 'What We Know': Previous Engagement Initiatives with ANS Communities

Municipalities can draw on several recent and highly successful engagement initiatives that have amplified ANS voices in climate and flooding issues:

Building Capacity Around Climate Change Preparedness in African Nova Scotian Communities (The ENRICH Project): Led by Dr. Ingrid Waldron and partners, this landmark multi-year initiative held workshops across 25 ANS communities between 2023 and 2024[22].

- *Key Insight:* The project identified a critical underrepresentation of African Nova Scotians in climate conversations, despite their disproportionate vulnerability to its impacts.
- *Actionable Output:* The initiative launched the "African Nova Scotian Climate Justice Ambassadors Program" in 2025, an intensive module-based training program equipping community members to develop localized Climate Resilience Community Plans[23]. Municipalities should actively seek to integrate these grassroots plans into their broader SWM frameworks.

[22] https://ccecj.ca/resource/the-african-nova-scotian-climate-justice-ambassadors-program-project-report/#:~:text=In%202023%2C%20the%20ENRICH%20project,25%20African%20Nova%20Scotian%20communities.
[23] https://www.enrichproject.org/projects-2/building-capacity-around-climate-change-preparedness-in-african-nova-scotian-communities/#:~:text=The%20report%20details%20the%20findings,disproportionate%20vulnerability%20to%20its%20impacts.

Workshop Engagement Insights

When we asked workshop participants 'how have you seen stormwater topics communicated to communities by municipalities?' participants opinions were mixed on whether this is happening and there was a reoccurring question of "do you [residents] know where to look to be informed and if [they are] impacted [by stormwater issues]?". Some reported "there is no communication coming into our communities" for community members to know what's happening or to educate themselves, while others talked about some councils, county councillors, non-profits (for specific projects), community health boards and ratepayers associations sharing info on stormwater. We heard that "communication within the community [is] not accessible". We also heard that "communities often lack foundational knowledge surrounding disaster preparedness and climate adaption/mitigation" and that "adding an 'equity lens' is complex and challenging – might need to change the foundations of the work rather than adding a lens retroactively".

Centre for Environmental Justice (CEJ) – Shelburne, NS: Formed to address the legacy of the Morvan Road dump, the CEJ is a prime example of community-led environmental organizing.

- *Key Insight:* They prioritize "Afrocentric-integrated healing and wellness practices" alongside advocacy for infrastructure remediation.
- *Actionable Output:* The CEJ actively develops community-based risk management plans, displacement strategies, and disaster preparedness initiatives, proving that communities are already doing the heavy lifting on climate adaptation.

Workshop Engagement Insights

Water-related advocacy is often grounded in lived experience and carried through relationship-based and community-driven approaches. It is not always formalized, but instead emerges through ongoing engagement with local issues and needs. This work typically includes:

- *Participation in Black community advisory committees and municipal advisory structures*
- *Advocacy through community-based organizations responding to local environmental and infrastructure concerns*
- *Individual residents speaking up about drainage, flooding, and stormwater impacts in their neighbourhoods*
- *Engagement from school-based advocacy groups, where youth and education initiatives intersect with environmental awareness*
- *Informal collaboration and shared concern with First Nations and Indigenous communities on overlapping water and land issues*

Overall, this advocacy reflects a strong foundation of place-based knowledge, lived experience, and community care, often responding directly to visible or recurring local challenges.

Sustainable Communities Challenge Fund (NS): This provincial fund explicitly prioritizes applications from ANS, Mi'kmaw, and other racialized communities for climate adaptation streams, highlighting a widespread institutional recognition that targeted funding is essential for equipping historically underserved areas to cope with flooding and extreme weather.

- *Key Insight*: Issues of equity, affordability, and health and wellness are closely connected to climate challenges. There is a critical need for targeted support for communities that disproportionately experience the negative effects of climate change and face barriers to mitigation efforts.
- *Actionable Output*: The fund's Climate Change Adaptation Stream provides resources for local initiatives, including climate-ready infrastructure, ecosystems, nature-based solutions, and community coordination. Municipalities can use this as an avenue to collaborate with ANS organizations and co-apply for funding to implement community-led flood protections.

Community Land Trusts: Building on previous discussions, CLTs are community-led non-profit organizations that acquire and hold land in perpetuity for the benefit of local residents. In the context of African Nova Scotian communities, they serve as a vital tool to secure land sovereignty, combat historical displacement, and mitigate environmental racism.

- *Key Insight*: Land ownership and climate vulnerability are deeply intertwined. When historically marginalized communities control their land, they are empowered to implement protective environmental measures and resilient infrastructure without the threat of climate gentrification.
- *Actionable Output*: Municipalities can actively support ANS Community Land Trusts by facilitating land transfers, aligning zoning policies, and partnering with these trusts to co-manage green infrastructure projects that remain permanently governed by the community.

Workshop Engagement Insights

Water-related advocacy in African Nova Scotian communities is often connected to broader areas of community work, even when these linkages are not always formalized. These connections include ***community planning and development processes, environmental and climate resilience initiatives, housing and infrastructure discussions, and efforts related to cultural and historic site protection****.*

There is also an important connection to ***broader equity and inclusion work****, particularly around strengthening African Nova Scotian representation in decision-making spaces and improving how community knowledge is reflected in planning processes.*

In addition, advocacy efforts often align with ***First Nations and Indigenous-led environmental and land stewardship initiatives****, creating opportunities for shared learning, collaboration, and stronger collective voice on water-related issues.*

Overall, while these efforts are often happening across different spaces, there is an opportunity to better ***link and coordinate advocacy across initiatives****, so that community priorities are more consistently reflected in planning, investment, and policy decisions.*

4.2.2 Considerations Based on Best Practices for Engaging Racialized Communities

Traditional, top-down engagement models often fail to capture the unique vulnerabilities and historical contexts of marginalized communities. When municipalities engage racialized and marginalized communities in infrastructure and stormwater management planning, moving beyond traditional consultation toward equitable collaboration is a necessary step in addressing historical inequities. National engagement best practices include:

Addressing Environmental Racism: Guided by evolving federal frameworks, modern engagement acknowledges that historical zoning and infrastructure decisions have disproportionately exposed racialized communities to environmental hazards. Municipal infrastructure planning must prioritize rectifying these historical inequities, not just managing future baseline risks.

Legislative Context: Bill C-226 Officially titled the *National Strategy Respecting Environmental Racism and Environmental Justice Act*, Bill C-226 is a landmark piece of Canadian federal legislation that officially became law after receiving Royal Assent. The Act legally requires the development of a national strategy to assess, prevent, and address environmental racism. Celebrated as a landmark victory for environmental justice, this signals a major shift for municipalities: environmental and infrastructure planning must now recognize that hazards have historically impacted marginalized, racialized, and Indigenous communities disproportionately, and must ensure meaningful, equitable involvement from these communities in all decision-making processes.

The Intersection of Health and Climate Vulnerability: Structural determinants of health (income, housing quality, access to services) directly impact a community's sensitivity to climate hazards like flooding. Best practices treat stormwater and flood management not solely as engineering problems, but as urgent public health and social justice priorities.

Compensated, Mutual Learning: Avoid extractive "survey-taking." Engagement should be viewed as mutual learning. Compensate community members for their time and lived expertise, and ensure dialogue continues from the initial SWM planning phase through to project implementation.

Culturally Responsive Infrastructure: Engagement must reflect community care. Infrastructure planning should support the ways specific communities gather, live, and interact with the land, ensuring spaces feel safe and culturally relevant.

Trauma-Informed Practice: Recognizing that discussions around environmental racism and historical displacement are deeply sensitive, municipalities must adopt trauma-informed facilitation. This means creating transparent, safe environments that validate community grievances regarding past infrastructure failures without being defensive.

Narrative and Data Sovereignty: Engagement must respect that communities own their stories and localized knowledge. When communities develop grassroots adaptation plans, municipalities should integrate these frameworks respectfully, ensuring the community retains agency over how their lived experiences are utilized and shared.

Key practices for trauma-informed work[24]

1. **Create a Safe Environment** – this must be informed by pre-work with participants.
2. **Informed Consent, Agency, and Transparency** – the scope, purpose and outcomes of the process must be clear to offer informed consent in the process.
3. **Providing Choice** – support participants sense of agency and control of the process.
4. **Non-Judgmental Listening** – participants are the experts of their own lived experience.
5. **Sensitivity to Triggers and Re-traumatization** – do the background research and approach sensitive topics with care.
6. **Support Resources** – provide resources to help support participants in aftercare.
7. **Trust, Collaboration, and Reliability** – move "at the speed of trust".
8. **Cultural Humility and Contextual Awareness** – practice cultural humility, honor others, and be open to learning.
9. **Complexity, Strength, and Wholeness** – focus on the strengths and complexity of individuals rather than solely on their trauma.
10. **Ethical Storytelling** – support people's ability to shape and tell their stories in a way that best reflects their truth.

[24] https://voiceofwitness.org/resources/trauma-informed-storytelling-practices/

Workshop Engagement Insights

Through the workshop, participants raised several important questions that speak to both governance and implementation challenges around stormwater management:

1. Should there be a stormwater management network that connects communities, different levels of government, and private landowners?

2. How do we ensure accountability is not only stated, but enforced and measurable across systems?

3.. How can policy processes be made more accessible and responsive to community influence?

4. What does meaningful recognition and reparations look like for communities that have been placed in higher-risk and under-resourced conditions?

5. How do we better account for rural versus urban differences in stormwater planning and investment?

6. How can the engineering and planning fields more directly confront and address their role in environmental racism and inequitable outcomes?

7. How can conversations begin at the household level and scale outward, building shared understanding and collective action over time?

4.2.3 Key lessons from our Project Engagement

A foundational part of most community engagement processes is reflecting on the work that was done, analyzing how challenges were addressed, and celebrating the successes of the project. This work has been deeply valuable for exploring with ANS community members how stormwater affects them and their communities, and these conversations have added a depth of lived experience to this Guidance Document that otherwise would not have been possible. However, this engagement is only the start of a much-needed conversation between ANS communities and municipalities.

To support municipalities in working with communities and developing successful engagement models, we've shared below the key engagement insights gleaned through this work:

- **Each of the 52 historic African Nova Scotian communities must be treated as a unique entity rather than a homogenous group, specifically acknowledging the distinct needs of rural versus urban areas.**
    - This means working with local community members to understand their distinct needs, history and relationship to water and stormwater.
- **Building trust requires a significant, dedicated time commitment that may not always align with rigid project timelines, especially when local events or tragedies take priority.**
    - This means working "at the speed of trust" and being willing to slow work down or change project timelines in order to bring community along with the process. See **Section 5.7** for the stormwater management one-pager created to support our community engagement.
- **It is essential to remain flexible; a community's unavailability does not indicate a lack of interest, and pushing for urgency without clear reasoning can damage trust.**
    - This means being transparent from the beginning of the process regarding what the project is, why it's happening, how it impacts community, how community can be involved, and what the possible outcomes are.
- **Participants should be compensated fairly for their time, and provided with a range of engagement options, including both in-person and virtual formats.**
    - This means accounting for the dual burden that African Nova Scotian community members often carry in engagement settings. Often, community participants act not only as local residents seeking technical stormwater solutions, but also as historians, advocates, and protectors of community heritage. Equity-focused and trauma-informed engagement requires a number of considerations on behalf of

municipalities to ensure the weight of emotional labour experienced by participants is recognized, accounted for, and appropriately accommodated.
    - This means that planning for stormwater management is not simply a technical exercise for ANS communities – this work is deeply tied to environmental racism, drought, safety, community autonomy, and more. Municipal engagement efforts that do not recognize and appropriately plan for these community realities risk excluding and alienating the very communities that equitable stormwater investments are meant to serve.
    - This means compensation is an integral part of respectful equity-focused engagement. This can include providing honoraria, supporting travel, accommodation or other expenses incurred from participation, including the time individuals take to review documents, and attend engagement sessions.
    - Where possible, this means supporting ANS businesses and venue spaces in ANS communities to provide hospitality and hosting services.
    - This means respecting participant's time by building on existing reports and previous engagement efforts, rather than asking communities to re-explain their history. Including a facilitator with deep knowledge and experience with ANS communities can aid in connecting lived experiences with flooding and climate resilience more broadly.
- **Engagement must be purposeful and action-oriented, ensuring it integrates with—rather than replaces—pressing community concerns like drought response.**
    - This means avoiding tokenistic and extractive engagement practices that may not directly benefit ANS communities. Successful engagement with African Nova Scotian communities around stormwater management must be directly tied into, and strengthen, existing community efforts including but not limited to climate resilience.
- **There is a significant gap in local stormwater knowledge and advocacy networks, leaving many residents unsure of who to turn to for water-related support.**
    - This means that for ANS communities to engage meaningfully on stormwater management topics, municipalities must first foster resilient connections in community and explore how they can support community capacity to engage in these conversations. This can include showing up in person, meeting community where they are at and building from there. See **Section 5.3** for stormwater management resources for residents.
- **Meaningful "after care," including transparent reporting and information verification, is a required to ensure engagement is not extractive.**

- This means sharing back what was heard directly with communities, and giving communities time to process, share, discuss and report back on whether they feel their voices were accurately reflected. This allows time for project refinements before recommendations and insights are shared with decision makers and the broader community.

In short, meaningful engagement with African Nova Scotian communities means pairing active listening with transparent and meaningful action. Communities are keen to be part of these conversations and work with municipalities, but municipalities need to have supports in place to make these safe spaces for community members to meaningfully engage in.

Workshop Engagement Insights

*We heard that key **opportunities** to improve how stormwater is managed in ANS communities include:*

Strengthening connected, community-led approaches to stormwater planning, education, and long-term relationship building

*A key opportunity is to advance more connected and collaborative approaches to stormwater management in African Nova Scotian communities, where **community voice, trust, and shared understanding are central to decision-making**. Workshop discussions emphasized that effective solutions depend not only on technical fixes, but also on **building stronger relationships and a greater sense of belonging within communities**.*

Continued…

Community Connection and Sense of Belonging

There is an opportunity to support the development of ***more connected communities where residents feel heard, included, and valued in shaping local stormwater decisions****. A guiding question raised in the workshop was: How do we build connected communities where people feel a sense of belonging? Strengthening this sense of connection can improve engagement and support more collective problem-solving.*

Relationship Building and Trust

A key insight is that ***trust and effective collaboration require time and ongoing investment****. Opportunities exist to prioritize the* ***continuity of relationships*** *between community members, local organizations, and government partners. Moving away from one-time engagement toward sustained interaction can strengthen credibility, responsiveness, and shared ownership of solutions.*

Community Knowledge and Education

Improving ***education and awareness of stormwater systems and climate-related risks*** *presents an opportunity to increase* ***community knowledge and capacity****. When residents have better access to information, they are better positioned to participate in planning processes and contribute meaningfully to decision-making.*

Unity and Shared Understanding

There is also an opportunity to foster ***greater unity within African Nova Scotian communities****, even where perspectives may differ. Creating inclusive spaces for dialogue and shared learning can help reduce internal disconnects and support more aligned approaches to local priorities.*

Future Growth and Long-Term Resilience

As communities evolve, there is an opportunity to view ***future growth as a pathway to stronger, more coordinated stormwater management****. By embedding collaboration, shared knowledge, and community leadership into planning processes, future development can contribute to* ***more resilient, responsive, and community-informed infrastructure outcomes****.*

Improving ***education and awareness of stormwater systems and climate-related risks*** *presents an opportunity to increase* ***community knowledge and capacity****. When residents have better access to information, they are better positioned to participate in planning processes and contribute meaningfully to decision-making.*

Workshop Engagement Insights

*We heard that key **challenges** to improve how stormwater is managed in ANS communities include:*

Limited coordination, awareness, and shared understanding of stormwater risks and responsibilities

*Stormwater management in African Nova Scotian communities is challenged by a combination of systemic and engagement-related barriers. A key issue is the **lack of accessible information and community awareness** regarding stormwater systems, climate-related risks, and appropriate mitigation measures. This limits residents' ability to fully participate in planning and decision-making processes.*

*In addition, **jurisdictional complexity between municipal, provincial (Province of Nova Scotia), and private landowners** creates confusion over roles and responsibilities. This often results in gaps in maintenance, weak enforcement, and delays in addressing infrastructure issues.*

*Workshop participants identified a **disconnect between technical planning processes and community knowledge**, where residents' lived experience is not consistently recognized or integrated. This can contribute to lower engagement, mistrust, and at times differing views within communities on priorities and solutions.*

These challenges are further complicated in areas where historic sites and culturally significant spaces must be preserved while also managing stormwater risks and infrastructure needs.

4.3 Municipal Capacity Challenges

4.3.1 Existing Challenges

Municipalities face a number of challenges when it comes to stormwater management. Efforts to support equitable infrastructure planning with African Nova Scotian communities must recognize and respond to these challenges which look different in each community:

1. **Infrastructure as a compounding deficit: aging assets vs shifting environmental pressures (design load)**

   The Reality of Asset Decay: Standard infrastructure planning operates on the assumption that an asset will perform predictably throughout its engineered lifespan, but as wastewater collection networks, culverts, and stormwater channels degrade, their structural capacity naturally diminishes—a core operational challenge outlined in the NSFM Asset Management Portal.

   The "Design Load" Squeeze: Climate change is actively rewriting the operational thresholds these systems must endure, creating a sudden surge in the operations, cleaning, and maintenance hours required just to prevent routine structural failure, as monitored across national infrastructure pilots by the PIEVC Program Assessments Hub.

   Systemic Interconnectedness: When extreme, short-duration precipitation events hit, the impacts are rarely isolated to a single drainage ditch, triggering cascading failures across multiple service categories simultaneously (such as backing up wastewater treatment systems and wiping out secondary transportation corridors), a front-line dynamic detailed by the FCM Climate and Sustainability Hub.

Municipal Engagement Insights

We heard that proactive stormwater infrastructure planning is difficult to get on municipal agendas and budgets because it's not an exciting or popular investment. We heard that stormwater management is often viewed as a part of the transportation network and at the municipal level, it is commonly located in the road right of way (ROW). We heard clearly that in rural municipalities, stormwater infrastructure in provincial ROW's is outside of municipal jurisdiction. Lack of alignment between municipalities, and between municipalities and the province, can negatively impact the effectiveness of stormwater management efforts.

2. The Data Scarcity Barrier & Portfolio Screenings

Proactive stormwater management requires precise predictive modeling, yet many smaller Nova Scotian local governments lack basic asset baseline data.

The Portfolio Asset Blindspot: Resource-limited municipalities frequently struggle to map physical climate risks holistically across their entire infrastructure portfolios, defaulting instead to fractured, reactionary, piece-by-piece engineering reviews, a systematic barrier addressed by the AIM Network Infrastructure and Asset Management Resource Portal.

Outdated Engineering Models: Traditional infrastructure sizing has long relied on the concept of *stationarity*—the assumption that historical weather patterns from the past 50 to 100 years provide an accurate blueprint for future conditions—leaving systems severely undersized as shifting coastlines and precipitation anomalies disrupt traditional models, a phenomenon analyzed via the PIEVC Engineering Protocol Framework.

The Scale Match Disconnect: While global or provincial climate models are readily available, scaling that complex data down to predict how a specific neighborhood culvert or ditch will behave during an intense localized downpour is a high-cost technical hurdle that smaller public works units cannot execute without the modeling templates provided in the Nova Scotia Municipal Climate Change Action Plan Guidebook.

Municipal Engagement Insights

We heard that reoccurring problem areas and systematic solutions can be difficult to identify when municipalities don't use or have access to tracking systems which allow problems and solutions to be quickly recorded and geolocated on map. Sometimes staff don't see the value in logging work that is complete and is not expected to cause further problems.

We heard from a municipality that did have georeferenced data based on what happened during a major flood event, that they were able to identify areas most in need of investment in their long-range planning.

3. Policy Operationalization & Jurisdiction Friction

Translating a high-level climate strategy into enforceable municipal bylaws creates significant regulatory friction.

The Policy Implementation Gap: While many Nova Scotian councils have integrated environmental goals into their historic text plans, moving these strategies from text documents into day-to-day capital budgeting and operations remains incredibly difficult for small-population regions, as demonstrated by the case studies in the Cumberland County Municipal Climate Change Action Plan.

Jurisdictional Splitting: Stormwater does not obey political boundaries, yet its management is severely fragmented between provincially owned secondary highways, privately owned rail beds, and municipally owned side streets, making it difficult for local public works units to implement structural solutions independently.

The Risk of Regulatory Overreach: Tightening land-use bylaws, enforcing low-impact development zoning rules, or designating formal flood-prone zones near coastlines or marshes frequently sparks immediate pushback from property owners. This forces councils to balance climate safety against the perceived threat of devalued property lines and potential reductions in local tax revenue, a structural friction point examined by the AIM Network Executive Management Directory.

4. Public Perception and Awareness: The "National Flood Blindspot"

Effective stormwater management relies on a shared-responsibility model where lot-level management (on private property) serves as the first line of defense. However, engineering models often assume private properties will absorb or control a baseline volume of water. However, lack of general public risk awareness and knowledge, and systemic contractor shortages can prevent this from happening, pushing municipal stormwater systems into a chronic state of overflow.

Public Perception & True Spatial Risk: A stark disconnect exists between public awareness and actual risk exposure in Canada, severely handicapping local infrastructure planning. While research from the University of Waterloo Partners for Action (P4A) Network indicates that 83% of Canadians agree homeowners bear personal responsibility for flood protection, data within the full P4A Canadian Voices on Changing Flood Risk National Survey Report reveals that less than 30% actually implement lot-level protection measures like rain gardens or proper lot grading. This passivity is fueled by a massive underestimation of spatial risk: a national survey managed via the Intact Centre

Home Flood Protection Program found 62% of Canadians are unconcerned about flooding, yet 80% of major Canadian cities sit partially or fully on active floodplains. Most alarmingly, P4A studies show that 94% of homeowners in high-risk zones are completely unaware of their exposure, and only 21% believe their localized risk will increase over the next 25 years. This "blindspot" creates immense public friction when under-resourced municipal teams attempt to pass proactive climate bylaws or establish stormwater asset management fees.

Workshop Engagement Insights

When we asked workshop participants what other stormwater challenges exist and what do they look like in community, we heard about a range of issues such as drought, fire stations using ANS community water, no grants or support for fixing drilled wells ("this should be reparations"), property damage, health issues caused by damage (e.g. mold), insurance issues, forced evacuation or relocation, and how hard it can be to get people engaged, especially when there is limited education and knowledge of stormwater safety and risk in community. Participants also spoke about how there should be collaboration and knowledge sharing between municipalities when it comes to stormwater management, and the importance of taking time to invest in relationship and trust building with communities. We also heard that "emergency preparedness people should be around the tables today" given that stormwater isn't an isolated topic and this work relates deeply to how water is handled in ANS communities. We heard that there are people talking about "getting rid of water" instead of trying to keep it. There were questions about how stormwater jurisdiction works and how enforcement works.

Regulatory Friction & Workforce Bottlenecks: When municipalities attempt to update flood maps or enforce climate-resilient zoning, they frequently encounter intense public resistance driven by immediate financial anxiety rather than environmental disagreement. Public feedback compiled in the Halifax Regional Municipality Sackville and Little Sackville Rivers Floodplains Engagement Hub highlights that vocal homeowner opposition centers on fears of devalued property lines, restricted development rights, and surging overland insurance premiums triggered by new 1-in-20 year floodway or 1-in-100 year flood fringe designations, as detailed in the HRM Sackville Rivers Proposed Floodplain Regulations Presentation. Compounding this regulatory friction is a severe regional labor shortage: data tracked via the Intact Centre Climate Adaptation Resource Repository shows that 1 in 5 property owners identify difficulty securing trusted professionals as a primary barrier to executing home floodproofing retrofits. Because Nova Scotia holds the highest number of flood-at-risk properties in Atlantic Canada, this private-side contractor bottleneck continually forces public works teams to deplete limited internal capacity answering routine, household-level drainage complaints that should be managed by the private market.

5. Grant Administration Friction & Capital Matching

Even when funding exists at the provincial or federal level, the mechanics of navigating public sector financing creates an administrative bottleneck.

Application Fatigue: Provincial and federal support mechanisms operate on strict, application-based, matching-cost criteria, meaning small municipal teams often lack the dedicated staff hours required to compile highly detailed hydrological scopes and navigate complex portals like the FCM Green Municipal Fund Portal.

The "Shovel-Ready" Requirement: Modern infrastructure programs heavily favor projects that are entirely shovel-ready and have already completed upfront technical engineering work, which leaves resource-constrained municipalities in a loop where they cannot afford the design costs needed to qualify for capital grants, a systematic funding bottleneck identified across communities by the FCM Local Leadership for Climate Adaptation Initiative.

Municipal Engagement Insights

We heard through our municipal interviews that municipalities see the value in developing proactive stormwater management guidelines, but major challenges include limited staff time, funding and expertise to do the work. We heard that a lack of guidance from the province and overarching municipal plans and policies (like sustainability or climate change plans) contributes to a general sense that these guidelines would need to be created from the ground up which is a significant barrier to action, especially in smaller municipalities.

Some municipal participants also noted that public appetite for additional planning restrictions is very limited and new restrictions would likely be met with public resistance and confusion. New standards would need to be publicly visible and clearly identify what is expected of key actors like the municipality and developers.

We also heard that there is a continued need for long term continuous funding for major municipal infrastructure projects like stormwater (especially in those communities with combined wastewater systems) as well as continuous funding to support individual property owners in their local stormwater management efforts.

4.3.2 Actionable Strategies for Capacity-Constrained Staff

Opportunities for capacity-constrained municipalities to move toward equitable infrastructure planning around stormwater management include leveraging crowd-sourced data, pre-engineered policy templates, and existing non-application federal-provincial funding allocations.

1. Leverage "Citizen Science" and Lived Experience to Augment Internal Data Gaps

Small-scale municipal teams frequently struggle with spatial data gaps because they lack the high-resolution terrain mapping, specialized software, or staff hours required to execute complex hydrological models. Municipalities can bypass these high upfront consulting costs by transforming crowd-sourced resident observations into actionable engineering data.

- **How it Works in Practice:** Municipalities can launch simplified online intake forms or localized social media campaigns asking community members to submit timestamped smartphone photos, videos, and GPS coordinates of water levels immediately following heavy rain or rapid snowmelt events.
- **The Operational Benefit:** This community-driven data provides engineers with the exact empirical data points required to calibrate and ground-truth baseline flood models at no or low capital cost. This method directly captures real-time flooding and drainage backups that static satellite maps frequently miss.
- **Property Adaptation Alignment:** To help residents actively reduce the lot-level runoff volume currently surcharging public systems, municipalities can direct property owners to the self-guided toolkits and checkup checklists hosted on the Intact Centre Home Flood Protection Program.'

Further engagement with African Nova Scotian communities is needed to identify ways to invite community into this process without furthering extractive engagement patterns and while respecting and reflecting the lived experience of community.

2. Formally Adopt Pre-Engineered Standard Templates and National Guidelines

To reduce the "ground-up" policy barrier—where local Public Works departments feel they must design storm drainage regulations completely from scratch— there is an opportunity for municipalities to adopt pre-existing, engineering benchmarks by incorporating the within localized land-use and subdivision bylaws.

- **How it Works in Practice:** Instead of drafting independent technical specifications, municipalities can insert an immediate, legally binding clause into local subdivision

bylaws stating that all new residential and commercial site designs must explicitly comply with recognized external templates.

- **The Operational Benefit:** By mandating compliance with the Halifax Water Design Specifications (HWDS) Portal or the national guidelines found in the CSA W211:21 Stormwater Management Standards via CSA Group Store for example, the municipality can reduce the technical and financial burden of proving a project will result in a "zero-net-increase" in downstream peak runoff.
- **Policy Operationalization Templates:** Local administrators can find specific, step-by-step wording templates to seamlessly embed these external engineering requirements directly into their baseline capital planning cycles by reviewing the Nova Scotia Municipal Climate Change Action Plan Guidebook.

3. Tap into Widespread Peer-Learning Coalitions and Allocation-Based Streams

With discretionary infrastructure grants like the Municipal Innovation Program (MIP) and the Flood Risk Infrastructure Investment Program (FRIIP) no longer being offered, municipalities can lean on stable, predictable, non-application funding transfers and shared organizational support groups to secure qualified planners and adaptation specialists.

- **How it Works in Practice:** Rather than attempting to fund independent internal climate adaptation offices, municipal staff can join province-wide knowledge exchange networks like the Clean Foundation Municipal Climate Learning Group (MCLG).
- **The Operational Benefit:** Operating as a structural extension of the Nova Scotia Community Climate Capacity Program, the MCLG provides resource-constrained communities with free, direct access to a centralized team of adaptation specialists, custom policy libraries, and one-on-one virtual coaching to help advance local drainage strategies.
- **Financing the Upgrades:** To get physical projects off the ground without navigating complex matching-grant frameworks, municipalities can directly deploy their annual, non-application funding transfers from the newly structured Nova Scotia Build Communities Strong Fund Community Stream (previously known as the Canada Community-Building Fund). This predictable allocation can be legally banked, pooled, or borrowed against to finance local resilience upgrades, execute hydrological feasibility studies, and construct nature-based stormwater solutions.

4.3.3 Equity Impact Assessment (EIA)

Another tool that can help shape engagement and equitable infrastructure projects more broadly is an equity impact assessment (EIA). This is a tool developed by the Nova Scotia Office of Equity and Anti-Racism (OEA) to support government in identifying and addressing systemic inequity and racism. The EIA helps guide government departments through a process that encourages meaningful engagement with affected communities and asks questions that seeks to uncover potential impacts. The tool helps government to:

1. *Change how they design policies, programs, and services to better meet the needs of underrepresented and underserved communities; and*
2. *Review and improve existing policies, programs, and services that may be perpetuating systemic inequity and racism.*

As policy helps guide decisions or actions, dictates how resources are allocated and how services are designed or delivered (including for infrastructure, water management, and stormwater management), it is important to recognize when systemic inequity is reflected in written and unwritten policies, beliefs, and decisions.

The EIA helps government departments:

Analyze how policy design and implementation may affect underrepresented and underserved communities;

Identify and remove barriers; and

Find opportunities to strengthen equity and inclusion.

Equity Impact Tool Questions

1. Problem Definition

- *What is the problem?*
- *What are the reasons government should solve this problem?*

2. Defining Solutions and Actions to Take

- *What are we trying to accomplish by solving this problem?*
- *What is the proposed solution(s) to this problem?*
- *What are the current policy responses to the problem? How do existing policies address, maintain, or create inequities between different groups?*
- *How does this proposal address equity gaps in current policy responses?*

3. What are the expected impacts of our actions?

- *What are the expected impact?*
- *Who has been involved in assessing what the impact will be?*

4. Implementation

- *Who is going to be involved in the implementation of this program/policy (internally and externally)?*
- *If this program/policy is approved, how will the changes and their impacts be made transparent and fully accessible to the community or communities this policy will affect?*

5. Evaluation and Accountability

- *What evaluation and monitoring mechanisms are going to be included in this project?*
- *What has been done to ensure that this policy is adaptable and open to change and experimentation to meet the historic, current, and emerging needs of underrepresented and underserved communities?*

4.4 Case Studies in Municipal Equitable Infrastructure Initiatives

The case studies below highlight municipal and community-based initiatives that offer useful examples for applying an equity lens to stormwater management. While they differ in scale, geography, and governance context, each illustrates a practical strategy for connecting stormwater planning to broader goals such as affordability, accessibility, community stewardship, public health, and climate resilience. Together, they help identify approaches that may be relevant when designing stormwater projects in or alongside African Nova Scotian communities.

4.4.1 Case Study: The Community Action Plan Model (Beechville)

Context

Beechville is a historic African Nova Scotian community founded by Black Refugees escaping slavery during the War of 1812. Despite being promised land for their military service to the British, settlers were frequently denied clear legal titles and were issued small, infertile lots. This initial denial of land tenure created generational vulnerability and contributed to land expropriation and shrinkage, and targeted industrial runoff from the nearby Bayers Lake Industrial Park.

The Challenge

There is an extensive history of external expropriations, shifting boundaries, and land loss that affected Beechville over the 20th century. Large sections of land were historically designated for regional environmental protection or municipal resource absorption to protect municipal watersheds, placing restrictive zoning on Black-owned properties and limiting their internal development and local infrastructure connection. Additionally, the Bayers Lake Business Park was built directly above the lower-elevation residential core of Beechville, leading to significant structural and hydrologic impacts including topic stormwater runoff, as documented by the ENRICH Project.

Over two centuries, aggressive industrial and residential developments, paired with municipal expropriation and highway construction, reduced the community's original boundaries from roughly 2,000 hectares down to just 200 hectares. This historical land loss was further compounded by severe land encroachment and infrastructure pressures from rapid surrounding developments in Halifax, which threatened the remaining fabric of the community.

Response

To address these deeply rooted inequities, the Halifax Regional Municipality (HRM) established the African Nova Scotian Community Action Program (ANSCAP) to create the Beechville Community Action Plan as its foundational pilot model. Rather than applying standard municipal zoning and stormwater grids, the municipality partnered directly with the community to establish custom land-use bylaws and map out targeted infrastructure upgrades. This equitable component includes:

- Protecting local waterbodies and natural habitats from industrial runoff.
- Expanding parkland and placing municipal land under community control.
- Rectifying historic boundary encroachments through a comprehensive community boundary review.

Key Insights

The Beechville model demonstrates the necessity of moving away from standardized zoning in communities shaped by environmental racism in favor of highly customized, community-led infrastructure and land-use planning. These changes allow community to have greater control over how water (including but not limited to stormwater) is managed in community for decades to come.

The success of this equitable approach is significant: HRM has formally mandated that the Beechville Community Action Plan model will serve as the exact blueprint used to address municipal service and infrastructure gaps in other historic Black communities, including Lucasville and Upper Hammonds Plains.

4.4.2 Case Study: East Preston Recreation Centre Bioswales (HalifACT)

Context

The East Preston Recreation Centre is a 14,000 square community facility owned by HRM with recreation services delivered through a hybrid model of community partners, volunteers, and not-for-profits. The community centre offers a variety of spaces including a gymnasium, licensed kitchen, multi-purpose space, fitness centre, Lions club space, and seniors space. The facility supports community meetings and acts as an overall hub in the community. It also serves as a designed emergency comfort centre during extreme weather events.

The Challenge

For generations, municipal infrastructure planning has treated heavy rainfall as a nuisance to be moved away as quickly as possible. During intense storms, rain hitting the recreation centre's hard surface such as its expansive roof and paved parking lot would run off rapidly. This fast-moving water overloads local ditches and storm drains, picking up sediment, bacteria, fertilizers, and other pollutants along the way and carrying them into nearby lakes and streams. In areas that have historically been underserved by modern municipal infrastructure upgrades, relying on outdated drainage systems leaves communities highly vulnerable to localized flooding and the increasingly severe impacts of a changing climate.

During intense rain events, stormwater rapidly blanketed the area around the Recreation Centre because the regional ditch systems could not drain it fast enough. The most prominent example of this occurred during the historic Nova Scotia floods of July 2023, a catastrophic 1-in-1,000-year rain event. As documented in the HalifACT "Where the Water Goes" Case Study, intense rain events regularly turned the centre's parking lot into an unmanageable pond. This flash pooling effectively cut off safe vehicular and pedestrian access to the building's main entrances.

Response

In the fall of 2024, the Halifax Regional Municipality (HRM) installed two bioswales at the East Preston Recreation Centre. Bioswales are shallow, vegetated channels designed to capture and manage runoff. This project was supported directly by the municipality's HalifACT team, HRM's ambitious, long-term climate action plan aimed at reducing emissions and enhancing community resilience. Categorized under HalifACT's "Prepared & Resilient Communities" theme, the project also aligns with the broader objectives of the Halifax Green Network Plan and complements ongoing community-led initiatives in the area, such as the East Preston Active Transportation Plan and community bike playground. Because the recreation centre serves as a vital community hub for the historic African Nova Scotian community of East Preston, it was identified as an ideal location to demonstrate decentralized, nature-based climate adaptation.

Guided by the principle of letting the landscape do what it is built to do, the bioswales are engineered to mimic natural water cycles. Instead of channeling water away, they invite water in. As stormwater flows off the pavement, it is directed into the bioswales where specialized soil mixtures and native plants work together to trap sediment and filter out chemical and biological pollutants. This gives the water the necessary time to slow down and soak safely back into the ground.

Key Insights

- **The Use of "Revolutionary Infrastructure":** As noted by urban anthropologists, bioswales represent a shift toward "revolutionary infrastructure"—small, locally attuned interventions that quietly reorganize our relationship with land and water. They push back against the old habit of paving over land and prove that making space for water is more sustainable than fighting it.
- **Stacking Community Benefits:** Beyond just managing flood risks and easing the effects of drought, the bioswales deliver multiple co-benefits. The soil and plants act as a natural filtration system protecting local waterbodies, while simultaneously creating small pockets of habitat that boost local biodiversity for insects and birds.
- **Equitable Climate Action:** By executing this project at a highly utilized African Nova Scotian community centre, the municipality successfully integrated localized climate adaptation with social equity. It demonstrates how municipal climate funds can be actively deployed to build resilience in communities that need it most, aligning technical stormwater management with broader community well-being.

4.4.3 Case Study: Fletchers Creek Sustainable Neighbourhood Action Plan (SNAP) in Brampton, Ontario

Context

The City of Brampton partnered with the Region of Peel, Credit Valley Conservation (CVC), residents, businesses, and schools to develop a neighbourhood-scale plan for climate action called the Sustainable Neighbourhood Action Plan (SNAP). Focused on the Fletchers Creek area, this 258-hectare mature urban neighbourhood is home to nearly 8,800 people living in single-family houses, townhomes, and high-rise buildings. The community-driven plan aims to guide the neighbourhood toward urban renewal and climate resilience while deepening residents' connections to nature.

The Challenge

The Fletchers Creek neighbourhood is characterized by extensive pavement and minimal vegetation. During heavy rains, stormwater rapidly runs off these impervious surfaces into the creek, leading to localized flooding, erosion, and pollution that threatens the habitat of the endangered redside dace fish. Drainage issues heavily impacted community spaces; for example, the playing field at Glendale Public School frequently became too waterlogged for students to use. Furthermore, the area is identified as a heat-vulnerable neighbourhood in the city.

Response

The Fletchers Creek SNAP prioritized green infrastructure and low-impact development as cost-effective stormwater management measures. To create impactful change, the City and its partners implemented two major natural infrastructure pilot projects:

> **Glendale Public School Rain Garden:** Constructed with the participation of over 300 staff, students, and parents, this rain garden uses a treatment train approach to capture and infiltrate 200 cubic metres of runoff from the schoolyard and roof. It has enhanced existing topsoil, added bird-friendly plants, and is estimated to be the largest rain garden in Canada.
>
> **Haggert Avenue Bioretention Cells:** The City and CVC collaborated to build three bioretention cells designed to capture, clean, and cool stormwater runoff directly from the street before it reaches Fletchers Creek or the municipal storm sewer.

Combined, these projects service 19,690 square meters of new drainage area and feature 85 newly planted native trees and shrubs alongside 5,000 wildflowers and grasses.

Key Insights

Delivering Equitable Co-Benefits to Vulnerable Areas: By installing green infrastructure, the city simultaneously addressed chronic stormwater issues and provided critical social benefits. The projects solved the school's drainage problem (restoring the children's play area), created new public amenities with benches and pathways, and increased the cooling tree canopy in a heat-vulnerable area of the city.

Community and Youth Engagement as a Catalyst: Bringing the community to the table to build the SNAP ensured the plan addressed local interests directly. The pilot projects engaged over 600 people—including youth, residents, and corporate volunteers—providing hands-on learning about green stormwater retrofits and setting a visible example for homeowners to implement similar projects on their own properties.

Planning and Contracting for Success: A major takeaway was the absolute necessity of advance stakeholder engagement so that project goals and priorities are explicitly defined before the design stage. Furthermore, successful natural infrastructure implementation requires frequent on-site construction oversight and hiring contractors who either have specific green infrastructure experience or are eager to learn the techniques.

4.4.4 Case Study: Stormwater Assessment and Management Program (S.W.A.M.P.) in Southwest Nova Scotia

Context

Developed by the Clean Annapolis River Project (CARP), the Stormwater Assessment and Management Program (S.W.A.M.P.) is an initiative designed to help households and communities across Southwest Nova Scotia tackle stormwater challenges using practical, nature-based solutions. The program focuses on building long-term community knowledge, improving climate resilience, and ensuring healthier waterways by partnering directly with homeowners, municipalities, and local community hubs.

The Challenge

As climate change drives increased precipitation and flooding events, communities in Nova Scotia are facing critical vulnerabilities. Excess stormwater runoff from human-made impervious surfaces overburdens current municipal sewer systems, resulting in significant water quality issues like E. Coli contamination, nutrient loading, and suspended sediment. Furthermore, when applying an equity lens, there is a distinct challenge in ensuring that infrastructure investments provide compounding benefits such as food security and accessibility to equity-deserving populations.

Response

To mitigate these challenges, S.W.A.M.P. implements natural infrastructure—such as rain gardens, bioswales, and wetlands—that slows water flow, filters contaminants, and creates storage for floodwaters. CARP's response pairs direct residential adaptation support with high-impact community demonstration projects. A prime example of equitable infrastructure integration is the partnership at Beacon United Church in Yarmouth:

> **Stormwater Mitigation:** To address the large volume of runoff coming from the church's roof and mitigate local flooding, CARP constructed a 50-square-metre rain garden planted with over 350 water-tolerant, native plants to safely redirect water away from municipal sewers.
>
> **Intersection with Community Equity (The Community Garden):** This green infrastructure sits alongside the church's highly successful community garden, which features 162 active beds. The garden serves as a community asset by producing large yields of fresh food that are shared with neighbours. The site site is expanding its inclusive design by installing raised beds specifically to accommodate gardeners with accessibility needs.

Other key responses include a region-wide Home Assessment Program that provides homeowners with tailored action plans for property-specific flooding, and further demonstration sites at Digby's 'Hospital Hill' Park, Raquette Pond, and NSCC Middleton.

Key Insights

Layering Infrastructure with Social Equity: The Beacon United Church project demonstrates how municipal or grant-funded stormwater initiatives can be co-located with social infrastructure (like community gardens). This layered approach ensures that land used for climate resilience simultaneously addresses intersecting equity issues like food insecurity and accessibility.

Leveraging Community Hubs for Demonstration: Installing natural infrastructure at prominent, highly utilized community locations effectively demonstrates how these systems capture and filter runoff. The presence of active community members (such as the gardeners and grant-funded students at Beacon Church) fosters natural stewardship and broader community buy-in for green infrastructure.

Empowering Residential Adaptation: Offering individualized, property-specific home assessments provides homeowners with the exact tools and action plans they need to confidently implement natural infrastructure. This limits the knowledge barrier, framing natural infrastructure as an accessible, low-cost solution for managing residential flooding.

4.4.5 Case Study: Integrated Watershed Management in Halifax Regional Municipality (HalifACT)

Context

The Halifax Regional Municipality (HRM) is experiencing rapid population growth and climate change impacts, leading to extreme weather, severe rainfall, and extensive flooding. To build regional resilience, HRM adopted HalifACT, an ambitious climate action plan that sets targets for improving green infrastructure and natural asset management. A core component of HalifACT (Action 34) mandates working purposefully and collaboratively with the Mi'kmaq and other groups seeking reconciliation, explicitly including African Nova Scotian communities. As part of these efforts, HRM partnered with the Natural Assets Initiative (NAI) to pilot a natural asset management strategy in the 135 km² Nine-Mile River Watershed.

The Challenge

Climate projections for the Halifax region include higher temperatures, more heat waves, more rain and snow, and an increasing number of more severe storms, flooding events, and wildfires[25]. This increasing frequency of severe storm events is anticipated to put increased stress on stormwater management and existing infrastructure capacity.

Historically, addressing these issues by parceling out sections of a watershed based on ownership or jurisdiction has proven ineffective, as upstream mismanagement inevitably pollutes downstream waterways. Furthermore, rapid development has increased impervious surfaces (like asphalt), exacerbating stormwater runoff, erosion, and degradation of aquatic ecosystems. There is a critical need to address these stormwater and flooding vulnerabilities equitably, particularly in areas like Beechville and the historic African Nova Scotian settlements in Hammonds Plains, which are located within the developing suburban reaches of the Nine Mile River Watershed.

Response

HRM developed a Framework for Integrated Watershed Management that shifts from top-down regulation toward collaborative governance and consensus-based decision-making. The municipality designated the Nine Mile River watershed as a pilot project to implement this framework and value natural assets for stormwater management. Key elements of this equitable response include:

> **Inclusive Governance:** The framework mandates the creation of a Steering Committee comprised of representatives from all key interest groups, explicitly including

[25] https://cdn.halifax.ca/sites/default/files/documents/about-the-city/energy-environment/HRM_HaliFACT_vNew%20Logo_.pdf

Indigenous nations and African Nova Scotian communities. This ensures that the planning process, from visioning to outcomes, is reached by consensus and includes the voices of equity-deserving populations.

Prioritizing Nature-Based Solutions: The management plan explicitly prioritizes the use of green infrastructure and nature-based solutions to manage overland stormwater flow and reduce flood risk before resorting to hard infrastructure.

Targeting Vulnerable Watersheds: By focusing on the Nine Mile River, HRM is prioritizing a natural area of high cultural importance that directly intersects with early African Nova Scotian settlements, aiming to provide these neighbourhoods with sustainable stormwater management, climate resilience, and co-benefits like recreation and improved water quality.

Key Insights

Holistic, Interconnected Planning: Managing stormwater through an inclusive, watershed-wide lens is much more effective for maximizing service delivery and community protection than managing isolated parcels of land.

Equity Through Consensus: Implementing a consensus-based governance model ensures that infrastructure planning does not overlook equity-deserving communities. Actively including African Nova Scotian and Indigenous representatives in steering committees builds trust and results in stronger, more easily implemented management plans.

Green Infrastructure as Core Service: Utilizing existing natural assets (like wetlands and riparian zones) as core stormwater infrastructure is a practical, multi-barrier approach to managing climate risk at the source. It reduces the need for expensive ecosystem restoration later while directly benefiting the health and resilience of adjacent racialized and suburban neighborhoods.

4.4.6 Case Study Key Takeaways

Together, these municipal case studies show that applying an equity lens to stormwater management is not limited to where projects are built, but also includes how they are funded, governed, designed, and maintained over time. Across the examples, several consistent lessons emerge: effective projects reduce the financial burden on residents by assigning public responsibility to historic infrastructure deficits; they pair flood mitigation with broader community benefits such as greenspace, food security, accessibility, heritage protection, and public amenities; and they rely on early, meaningful engagement so that local knowledge shapes both problem definition and project design.

The case studies also reinforce the value of integrated approaches that connect stormwater planning with land-use policy, watershed management, natural infrastructure, emergency preparedness, and climate adaptation funding. Rather than treating flooding as an isolated engineering problem, these examples demonstrate how municipalities can use stormwater projects to address intersecting vulnerabilities and deliver more equitable outcomes. For this guidance, they suggest that equity-focused stormwater practice should combine technical effectiveness with community partnership, complementary policy tools, and a clear commitment to reducing—not reproducing—existing inequities.

Municipal Engagement Insights

We heard through our municipal interviews that municipalities with Equity, Diversity, Inclusion and Accessibility (EDIA) staff or committees often champion engagement and relationship initiatives between the municipality and community organizations, and work across departments to integrate equity into plans and policies. However, we also heard that rural municipalities in NS rarely explicitly consider climate change and equity-deserving groups in infrastructure planning, but there could be opportunities to build on existing programs like Property Assessed Clean Energy (PACE), funding mechanisms like council and municipal service grants, and climate resilience initiatives.

5.0 Resources

This section covers:

- Glossary
- Resident Stormwater Management Resources
- African Nova Scotian and Equity-Focused Engagement Resources
- Backgrounder: Snapshot of African NS History and Demographics
- Stormwater Management and Environmental Guidelines
- Known Sources of Stormwater Management Guidance and Select Bylaws in Nova Scotia
- Provincial and Federal Programs for Flood Adaptation
- Community One Pager on Stormwater Management
- Backgrounder: The Water Cycle
- Case studies in Stormwater Management
    - Town of Kentville
    - Fall River
    - Municipality of East Hants
- Supplemental Case Studies
    - Town of Amherst
    - Municipality of Clare
    - HRM (Upper Bisset Run Watershed)

5.1 Glossary

Term	*Definition*
AEP	Annual Exceedance Probability; the chance that a rainfall or flood event of a given size will occur in any given year.
ANS	African Nova Scotian; a distinct people descended from the 52 historic, land-based Black communities in Nova Scotia.
Bioretention	A stormwater practice that uses a shallow landscaped area with engineered soil and vegetation to capture, filter, and infiltrate runoff.
BMPs	Best Management Practices; measures used to control stormwater quantity, improve water quality, and reduce erosion.
Catch basin	A grated structure that collects surface runoff and directs it into a storm sewer system.
Citizen science	Community-generated observations or data, such as photos, flood markers, and local records, used to inform planning and analysis.
CLT	Community Land Trust; a community-governed organization that holds land for long-term community benefit, affordability, and stewardship.
Combined sewer overflow (CSO)	A discharge that occurs when a combined sewer system carrying stormwater and sewage exceeds capacity during wet weather.
Conveyance	The movement of stormwater through infrastructure such as ditches, swales, culverts, pipes, and channels.
CSA W211	A Canadian stormwater management standard that provides guidance on quantity control, water quality treatment, and low impact development.
Daylighting	The process of uncovering a buried or piped stream and restoring it as an open surface watercourse.
DMAF	Disaster Mitigation and Adaptation Fund; a federal program that supports projects that reduce risks from natural hazards and climate impacts.
EIA	Equity Impact Assessment; a tool used to identify barriers, inequities, and opportunities to improve inclusion in policies, programs, and projects.
Environmental racism	The disproportionate exposure of racialized and marginalized communities to pollution, contamination, and climate-related hazards due to inequitable policies and practices.
Equity lens	An approach to planning and decision-making that considers how policies, projects, and investments may affect communities differently, especially those historically underserved.
Evapotranspiration	The combined process by which water evaporates from land and water surfaces and is released by plants into the atmosphere.
First flush	The initial portion of runoff during a storm, which often carries the highest concentration of pollutants washed from impervious surfaces.
Grey infrastructure	Conventional engineered systems, such as pipes, culverts, catch basins, and concrete channels, used to move stormwater.
HEC-HMS	Hydrologic Engineering Center's Hydrologic Modeling System; software used to simulate rainfall-runoff processes in watersheds.
HEC-RAS	Hydrologic Engineering Center's River Analysis System; software used to model water flow, flood levels, and hydraulic conditions in rivers and channels.
HRM	Halifax Regional Municipality.

HWDS	Halifax Water Design Specifications; the main municipal stormwater design standard referenced in the document for the Halifax service area.
Hydraulic grade line	A line representing the elevation to which water would rise in a pipe or drainage system under pressure.
Impervious surface	A hard surface, such as asphalt, concrete, or rooftops, that prevents water from soaking into the ground and increases runoff.
Infiltration	The process by which water soaks into the soil rather than flowing over the land surface.
LID	Low Impact Development; practices that manage runoff close to where it falls by promoting infiltration, storage, filtration, and evapotranspiration.
LiDAR	Light Detection and Ranging; a remote sensing method used to create detailed elevation and terrain data.
Major system	The overland flow routes and supporting infrastructure designed to carry larger, less frequent storm events when the minor system is exceeded.
Minor system	The initial stormwater drainage network, such as ditches and storm sewers, designed to handle frequent rainfall events.
NBS	Nature-Based Solutions; approaches that use or restore natural systems, such as wetlands, vegetation, and soils, to manage stormwater and reduce flood risk.
NSFM	Nova Scotia Federation of Municipalities.
OEA	Nova Scotia Office of Equity and Anti-Racism.
Outfall	The point where collected stormwater is discharged from a pipe or channel into a receiving water body or drainage feature.
PCSWMM	A computer modelling software used to analyze urban drainage systems, stormwater runoff, flooding, and hydraulic performance.
Peak flow	The highest rate of runoff during a storm event, often used to size drainage infrastructure and assess flood risk.
Pluvial flooding	Flooding caused when intense rainfall overwhelms local drainage systems, leading to ponding and overland flow.
Retention pond	A stormwater pond designed to hold water for an extended period to reduce downstream flows and improve water quality.
Return period	A statistical measure of how often a storm or flood event of a certain size is expected to occur on average, expressed in years.
Runoff	Water from rain, snowmelt, or other precipitation that flows over land instead of infiltrating into the soil.
SMR	Stormwater Management Report; a technical report prepared to show how a development will meet stormwater design requirements.
Stationarity	The assumption that past climate and weather patterns are stable enough to predict future conditions.
Stormwater	Water that flows over the surface of the ground or through drainage systems rather than soaking into the soil. It can be generated from ground water upwelling, ice melt, or precipitation events including rain and snow.
Stormwater management pond	A basin designed to temporarily store and release runoff at a controlled rate and, in some cases, improve water quality.
Swale	A shallow vegetated channel that slows, stores, and conveys runoff.

Systemic inequity	Persistent unequal outcomes created or reinforced by policies, practices, and institutions, even without explicit discriminatory intent.
Watershed	An area of land that drains water to a common outlet, such as a stream, river, wetland, or lake.

5.2 Resident Stormwater Management Resources

Who do I contact about stormwater management in my community?

- Reach out to your local municipal **public works department** if you have an urgent concern about public stormwater management infrastructure.
- Reach out to your **local elected official** – they are your representative on Council. Look for municipal councillor contact information on your local municipalities website.
- Reach out to your **municipalities equity, diversity, inclusion (EDI) and/or accessibility staff** to talk about equity and accessibility concerns related to stormwater management.

Members of the public can also request to speak at a municipal council meeting. Look on your local municipalities website for how to request to speak or present at council. Typically, these presentations are limited to 5 minutes and must be scheduled in advance with the municipal clerk.

CBRM & ACAP Cape Breton Homeowner's Guide to Flood Prevention and Recovery: A comprehensive local guide created in partnership between the Cape Breton Regional Municipality Wastewater Operations and ACAP Cape Breton. It provides homeowners with practical, budget-friendly strategies to audit residential stormwater movement and protect properties from overland surges.

- Homeowner's Guide to Flood Prevention and Recovery

Intact Centre on Climate Adaptation - Climate-Ready Infographics for Flooding: A highly visual, nationwide residential database featuring interactive graphics and clear, 3-step checklists to guide urban, suburban, and rural tenants through executing basic home flood-proofing retrofits.

- Flooding Infographics

Insurance Bureau of Canada (IBC) Personal Flood Mitigation Resources: A consumer-focused national resource outlining critical risk management definitions, the distinction between sewer backup and overland coverage, and clear steps to safeguard household electrical systems from baseline water damage.

- Water Damage and Flood Protection Resource Portal
- Reducing the risk of Water Damage Mitigation Infographic
- Water Damage on the Rise Infographic

5.3 African Nova Scotian & Equity-Focused Engagement Resources

The ENRICH Project (Environmental Noxiousness, Racial Inequities and Community Health Project): A landmark multi-year initiative led by Dr. Ingrid Waldron and Sumia Ali that documents the structural impacts of climate hazards and infrastructure neglect in African Nova Scotian communities. They administer the African Nova Scotian Climate Justice Ambassadors Program, which trains local leaders to build grass-roots community resilience plans.

- Building Capacity Around Climate Change Preparedness in African Nova Scotian Communities (2024 Report)
- The African Nova Scotian Climate Justice Ambassadors Program: Project Report

Centre for Environmental Justice (CEJ) – Shelburne, NS: Born out of the successful campaign to close the Morvan Road Landfill, the CEJ acts as a vital bridge between citizens and government. The Centre prioritizes Afrocentric-integrated healing and wellness practices alongside community-led hazard mitigation and disaster preparedness planning.

- Centre for Environmental Justice (via CCECJ)

Upper Hammonds Plains Community Land Trust (UHPCLT): A model for grassroots land stewardship working to rectify historic water security deficits, reassert community control over local land use, and prevent market-driven displacement of legacy residents.

- Upper Hammonds Plains Community Land Trust

African Nova Scotian Road to Economic Prosperity Plan (REP): A community-driven economic strategy that includes explicit focus areas on securing land titles, improving community infrastructure, and fostering equitable municipal partnership.

- African Nova Scotian Road to Economic Prosperity
- HRM 2025 Update - ANS Road to Economic Prosperity Action Plan

Nova Scotia Office of Equity and Anti-Racism (OEA) Toolkit:

- **Equity Impact Assessment (EIA) Guide & Tool**: A framework that guides government departments and municipal partners through an auditing process to ensure written and unwritten policies do not perpetuate structural racism or infrastructure disparities.
    - Available via the OEA Engagement Platform and the AMANS Municipal IDEAS Tool Repository.
    - Municipal and Village Equity and Anti-Racism Plans
- **Public Engagement Guidebook**: Provides actionable best practices for building long-term, respectful, and transparent relationships with historically underserved and marginalized populations.

    - Available via the OEA Engagement Platform
- **Equity and Anti-Racism Self-Assessment Too**l: Designed to help local public bodies evaluate internal operational biases before establishing capital investment strategies.
    - Available for municipal planning applications on the Municipal IDEAS -Useful Resources Hub.
    - Nova Scotia Equity and Anti-Racism Strategy

African Nova Scotian Community Action Planning (ANSCAP) Framework: A collaborative structural reporting tool designed to integrate African Nova Scotian historical context and community housing vulnerabilities directly into official municipal planning strategies.

- HRM African Nova Scotian Community Action Program
- Halifax Planning and Development: Public Engagement Guidebook

Prominent Canadian climate, infrastructure and equity literature

- Turning the Tide: How flood risk transparency can drive equitable outcomes in Canada. Canadian Climate Institute (2024).
- IISD Policy Analysis — Five Reasons Climate Change Adaptation Is a Challenge for Rural Canada and What We Can Do About It
- FCM & Insurance Bureau of Canada (IBC) — Investing in Canada's Future: The Cost of Climate Adaptation at the Local Level
- The Canadian Infrastructure Report Card (CIRC) (2019)

5.3 Backgrounder: Snapshot of African Nova Scotian History and Demographics

There are 52 historic, land-based African Nova Scotian communities established by original Black settlers between the 1600s and the early 1900s[26]. These foundational settler groups include, but are not limited to:

1. **Caribbean and African Workers (~1713–1758):** The first Black community, consisting of 381 enslaved and free individuals at the Fortress of Louisbourg on Île-Royale (now Cape Breton). Many were brought from Africa or French-speaking colonies in the Caribbean.
2. **Black Planters (~1760s):** An estimated 150 enslaved and free Black individuals who arrived alongside the New England Planters.
3. **Black Loyalists (~1783–1784):** Approximately 3,000 individuals who fled the American Revolution after the British promised them freedom and land in exchange for their service[27].
4. **Jamaican Maroons (~1796):** Nearly 600 individuals who were exiled from Jamaica to Nova Scotia.
5. **Black Refugees (~1813–1834):** Roughly 2,000 African Americans who fled the War of 1812 to settle in the Maritimes.
6. **Later Caribbean Migrants (1920s):** Arrivals who migrated to work in Cape Breton's coal mines and steel factories. *(Note: Earlier Caribbean workers are captured in the Louisbourg timeline above).*

[26] https://bccns.com/our-history/#:~:text=Canada's%20first%20and%20only%20all,steel%20factories%20and%20coal%20mines
[27] https://www.historymuseum.ca/teachers-zone/african-nova-scotians-20th-century-canadian-legacies/african-nova-scotian-communities/african-nova-scotian-communities-map/

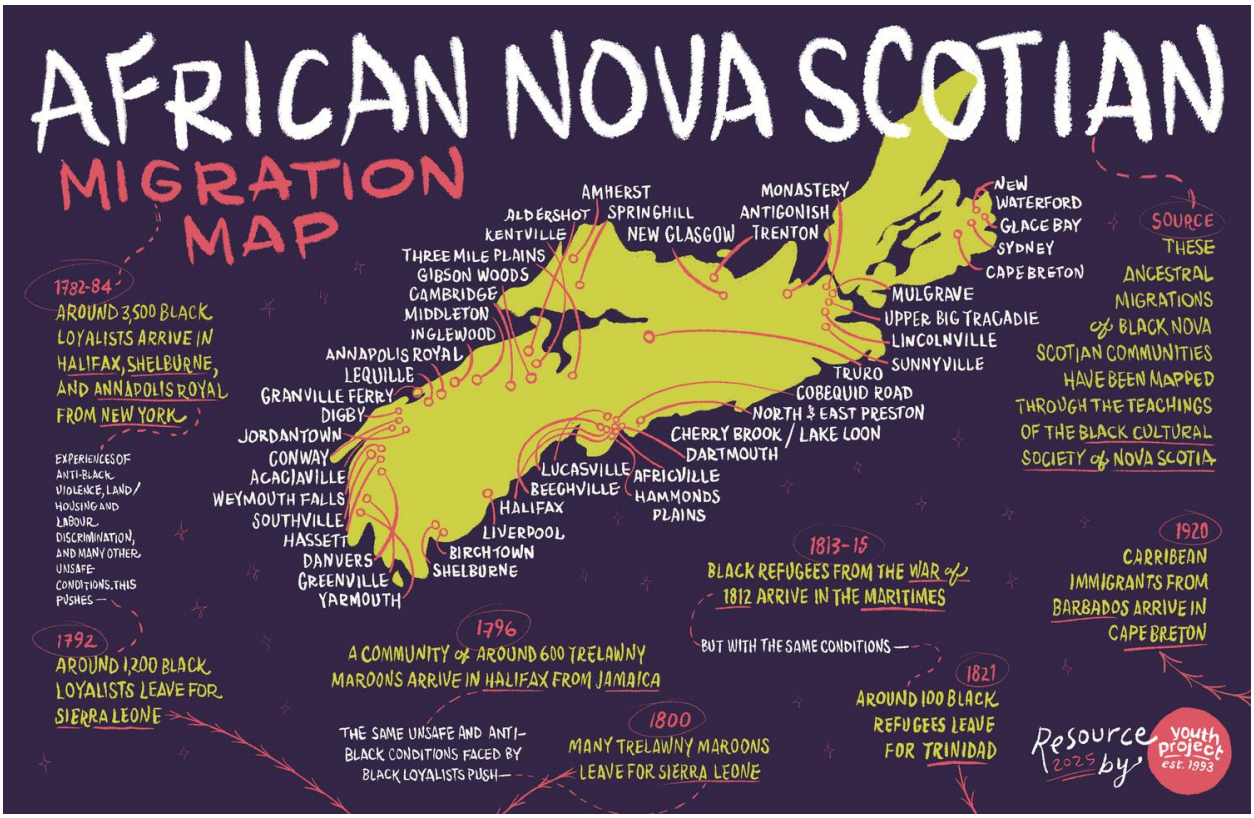


Figure 5-1 Source: Youth Project (2025) https://www.youthproject.ns.ca/resource-ans-map

5.3.1 Terminology and Demographics

Accurate terminology matters in stormwater planning when working across a range of communities. “African Nova Scotian” refers to the distinct people descending from the 52 historic, land-based Black communities[28]. “Black Nova Scotian” is a broader term that includes all people of African descent in the province, including recent immigrants[29].

According to the 2021 Census, the Black population in Nova Scotia was recorded as 28,220 people, with 72.9% residing within the Halifax Regional Municipality (HRM)[30]. To quantify the historic African Nova Scotian community specifically, demographic data relies on the "third generation or more" Canadian metric as a statistical proxy. In Nova Scotia, 59.5% of the Black population falls into this third generation-or-more category, underscoring the deep, historical roots of the ANS population compared to other regions[31].

[28] https://bccns.com/our-history
[29] https://www150.statcan.gc.ca/n1/pub/89-657-x/89-657-x2024005-eng.htm
[30] https://anseconomicprosperity.com/uploads/ANS-INDEX-May2024-FINAL.pdf
[31] https://www150.statcan.gc.ca/n1/pub/89-657-x/89-657-x2024005-eng.htm

5.3.2 Historic African Nova Scotian Communities within Halifax Regional Municipality (HRM)

North Preston	Halifax	Lucasville
East Preston	Beechville	Cobequid Road
Cherry Brook	Africville	Maroon Hill
Lake Loon	Hammonds	
Dartmouth	Plains	

5.3.3 Historic African Nova Scotian Communities outside HRM by Municipality

County	Communities
Shelburne	Shelburne, Birchtown
Yarmouth	Greenville, Yarmouth
Digby	Danvers, Southville, Hassett, Digby, Jordantown, Acaciaville, Weymouth Falls, Conway
Annapolis	Middleton, Inglewood (Bridgetown), Granville Ferry, Lequille
Kings	Aldershot, Kentville, Gibson Woods, Cambridge
Hants	Five Mile Plains
Colchester	Truro
Cumberland	Springhill, Amherst
Pictou	Trenton, New Glasgow
Antigonish	Antigonish, Monastery
Guysborough	Mulgrave, Upper Big Tracadie, Lincolnville, Sunnyville
Cape Breton	New Waterford, North Sydney, Sydney, Whitney Pier, Glace Bay
Queens	Liverpool

5.4 Stormwater Management & Environmental Guidelines

Halifax Water Design Specifications & Construction Guidelines: The baseline standard in Nova Scotia for multi-scale technical sizing, regulating minor networks (1-in-5-year storm) and overland major systems (1-in-100-year storm) while setting clear targets for first-flush pollutant capture.

- Technical Specifications: Halifax Water Specifications & Forms Portal

CSA W211:21 — Stormwater Management (Standards Council of Canada): A national blueprint governing peak flow attenuation, source control, and low-impact development (LID). It serves as the de facto technical reference for rural or small Nova Scotian municipalities lacking localized engineering guidelines.

- Reference Store: CSA W211:21 Standard via CSA Group

Stormwater Assessment and Management Program (S.W.A.M.P.) – Clean Annapolis River Project (CARP): A proactive initiative operating in Southwest Nova Scotia that provides property-level flood assessments for rural homeowners and constructs green infrastructure demonstration sites (such as bioswales and rain gardens) paired with community food-security assets.

- Program Portal: CARP Stormwater Management Hub

Ecology Action Centre (EAC) Stormwater Management Techniques: A technical manual outlining alternative decentralized drainage designs, permeable surfacing, and stream daylighting options to mitigate climate-induced pluvial flooding.

- Stormwater Management Techniques Workbook

HalifACT Framework for Integrated Watershed Management: A holistic framework shifting from top-down regulation to a consensus-based, multi-jurisdictional steering model that explicitly values wetlands, riparian zones, and natural assets as core infrastructure.

- **Framework for Integrated Watershed Management in the HRM (includes staff report)** – This is a "User Manual" and policy guide to direct consensus-based, inclusive watershed planning between interest groups, utilities, and African Nova Scotian/Indigenous communities.
- **A Framework for Integrated Watershed Management (Council Presentation)** – The visual and logical breakdown explaining the transition to watershed-scale

boundaries, specifically outlining the selection metrics for the Dartmouth Lakes and Nine Mile River pilots.

5.5 Known Sources of Stormwater Management Guidance and Select Bylaws in Nova Scotia

Jurisdiction	*Guideline / Standard*	*Year*	*Key Technical Provisions*
Halifax Water (HRM)	Halifax Water Design Specifications (HWDS)	2025	• The primary comprehensive municipal stormwater design standard in Nova Scotia. • Minor system design storm: 1-in-5-year (20% AEP). Major system: 1-in-100-year (1% AEP). • Covers pipe sizing, detention and retention pond design, low-impact development (LID) requirements, first-flush water quality capture, and erosion and sediment control. • Requires a Stormwater Management Report (SMR) prepared by a licensed professional engineer as a condition of any development application within the Halifax Water service area.
Municipality of East Hants	Municipal Standards	2025	• Establishes minimum design and construction criteria required for municipal service infrastructure, including water, wastewater, and transportation systems, in East Hants. • Specifies the climate change scenario to be used to design major and minor systems within the Municipality. •
Municipality of the County of Kings	Municipal Service Systems Specifications Manual	2025	• Establishes the technical engineering regulations for managing storm drainage and protection across the municipality's mixed urban and agricultural landscapes.
Halifax Water (HRM)	Design and Construction Guidelines	2011/ 2016/ 2020/ 2022, 2025	• Halifax Water, after officially forming in 2007, released its first set of stormwater design guidelines in 2011. • Became the utility-owned guide, governing all stormwater requirements for all new developments in HRM. • Guidelines are regularly updated
Standards Council of Canada (national reference)	CSA W211:21 — Stormwater Management	2021	• A nationally recognized stormwater design standard applicable across Canada, including in NS municipalities that have no local equivalent. • Sets design objectives for quantity control (peak flow attenuation) and quality treatment (pollutant removal), and provides guidance on LID and best management practices (BMPs). • Not legally binding in NS unless referenced in a development agreement, engineering contract, or

			municipal bylaw — meaning its application is discretionary. • Increasingly cited by NS engineers and municipalities as the de facto design reference outside HRM.
HRM	Administrative Order 2020-010-OP — Stormwater Management Standards for Development	2020	• The bylaw that gives the HWDS its legal force for new development in HRM. • Requires all development applications to demonstrate through an SMR that post-development peak flows do not exceed pre-development levels. • Addresses both stormwater quantity (flood control) and quality (sediment and nutrient removal). • No equivalent development stormwater requirement exists in any other NS municipality.
Town of Wolfville	Stormwater Management Design Guidelines	2019	• Prepared by Hatch Ltd., the guidelines establish criteria and engineering standards for stormwater infrastructure. • The document specifically focuses on mitigating flood risks, controlling erosion, and protecting local water quality by enforcing zero-net-increase in peak runoff for new developments.
HRM	Stormwater Management Guidelines	2006	• These guidelines provided developers, contractors, and municipal reviewers with the first comprehensive toolbox of Best Management Practices (BMPs) for stormwater quantity, quality, erosion, and base flow control within the HRM. • A central thesis of the 2006 guidelines was the recommendation of hierarchical source and conveyance controls.
Federation of Canadian Municipalities	National Guide to Sustainable Municipal Infrastructure	2003	• Intended to support Municipalities apart of the Federation of Canadian Municipalities • Covered 5 initial target areas, stormwater included covering collection, treatment and disposal. • Covered Best Management Practices and Run-Off Controls
Town of Wolfville	Stormwater Management Design Guidelines	2019	• Guidelines for major and minor system sizing and design, including design guidance on stormwater management features such as LIDs • Requires consideration of climate change impacts on precipitation patterns and sea level rise.
HRM	Municipal Design Guidelines (Red Book), First Edition	2000	• Consolidation of pre-amalgamation municipal road and basic drainage standards. • Still referenced in some older development agreements and in municipalities that adopted HRM standards informally as a starting point. • Did not include explicit water quality requirements.

5.6 Provincial & Federal Funding Programs for Flood Adaptation

Sustainable Communities Challenge Fund (SCCF): A provincial grant stream that actively prioritizes climate adaptation, flood mitigation, and emergency preparedness applications originating from African Nova Scotian, Mi'kmaw, and historically marginalized communities.

- Grant Portal: Sustainable Communities Challenge Fund

Build Communities Strong Fund Community Stream for Municipalities (formerly the Canada Community-Building Fund): A provincial fund that provides stable, upfront allocation-based funding that local governments can pool, bank, or borrow against to finance core infrastructure and capacity-building projects, which explicitly covers the planning, design, construction, and revitalization of wastewater and stormwater collection, treatment, and management systems.

- Build Communities Strong Fund

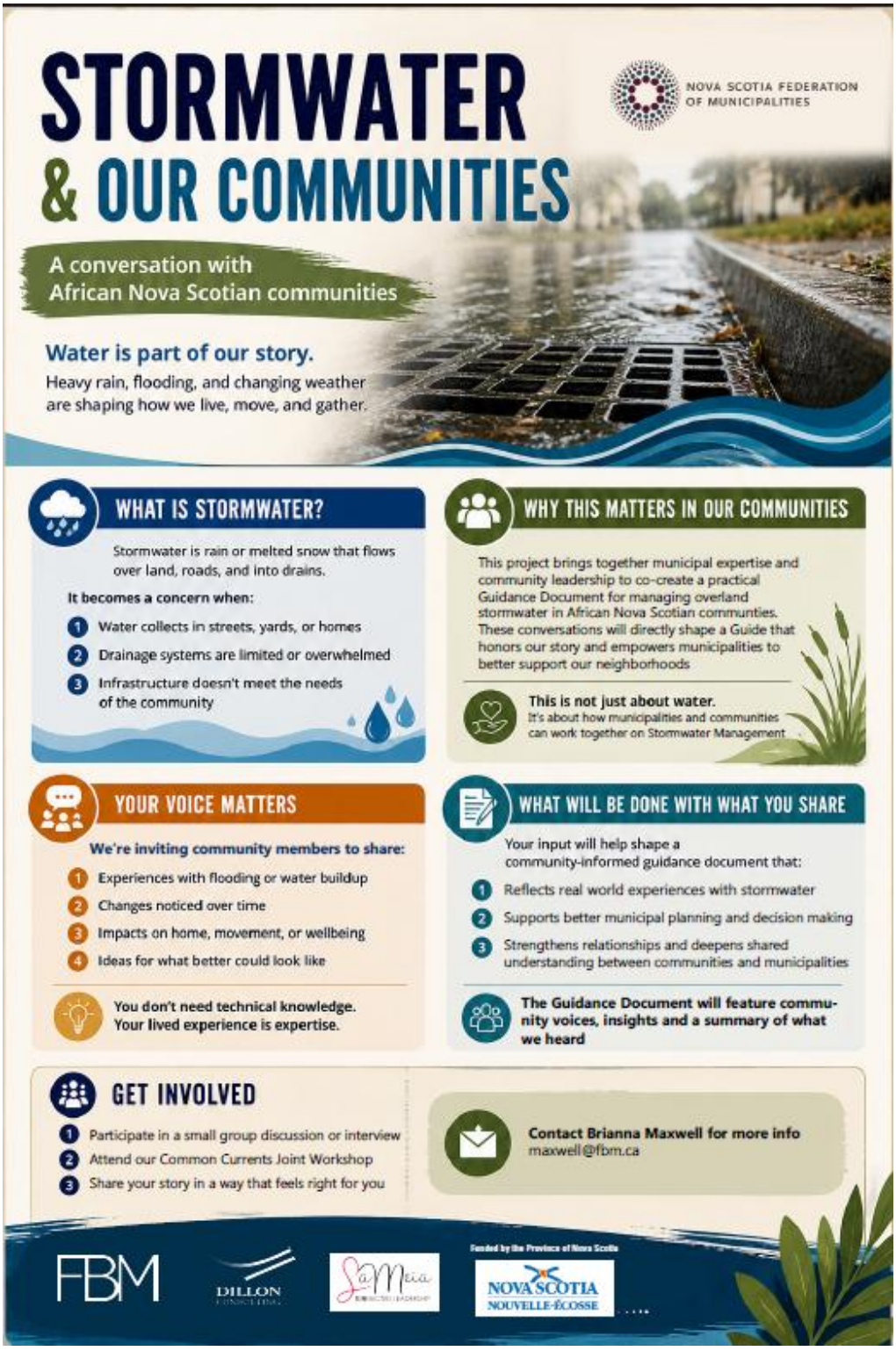
FCM Green Municipal Fund — Local Leadership for Climate Adaptation: A federal funding stream that provides municipal grants and loans to help communities create climate risk assessments, design equity-informed adaptation plans, and implement nature-based or structural solutions to mitigate localized flood risks.

- Funding Opportunities



Need help finding funding? See NSFM's Funding Portal or contact fundnavigator@nsfm.ca for assistance

5.7 Community One Pager on Stormwater Management



5.8 Backgrounder: The Water Cycle

To understand stormwater, it helps to understand the water cycle. The water cycle can be described as the continuous movement of water through the environment. As shown in **Figure 5-2**, water evaporates from surface water bodies, such as oceans, lakes, and rivers, rises into the atmosphere, and eventually falls back to earth as precipitation in the form of rain, snow, or sleet. Once it lands, water can typically do one of four things:

1. Soak into the ground (infiltration);
2. Be absorbed by plants and released back into the air (evapotranspiration);
3. Be temporarily stored in depressions or wetlands; or
4. Flow across the surface toward a stream, ditch, or drain. This last pathway, water moving across the land surface, is what we call stormwater runoff, and it is the focus of this guidance document.

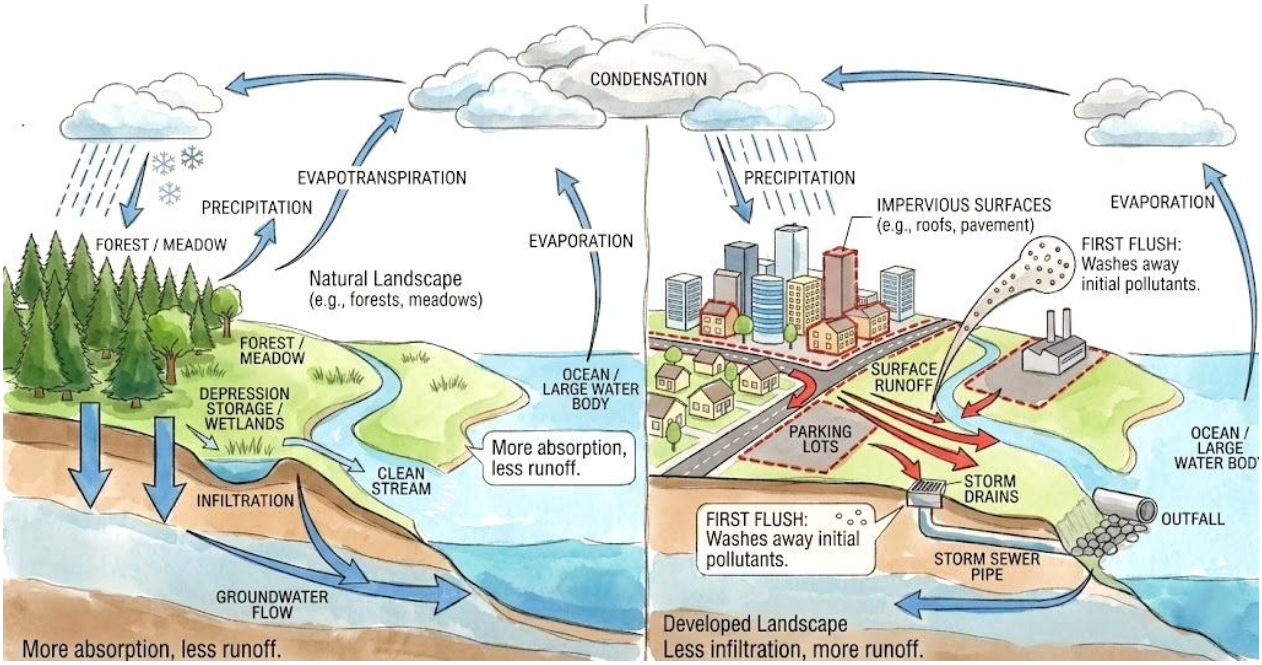


Figure 5-2 Water cycle diagram

In natural landscapes like forests or meadows, more rainfall can be absorbed than it can in urban landscapes. Soils act like sponges, roots pull water deep into the ground, and trees intercept rain before it even hits the surface. In these conditions, a smaller portion of storms becomes runoff, whereas developed landscapes react differently.

When forests are cleared and natural soil is replaced with roads, rooftops, parking lots, and compacted ground, little to no water can infiltrate. These hard, sealed surfaces are called impervious surfaces, and they are the primary reason stormwater can become a problem. As seen in **Figure 5-3**, instead of being absorbed, rainfall rapidly flows across these surfaces, until it reaches a drain, ditch, or low-lying area.

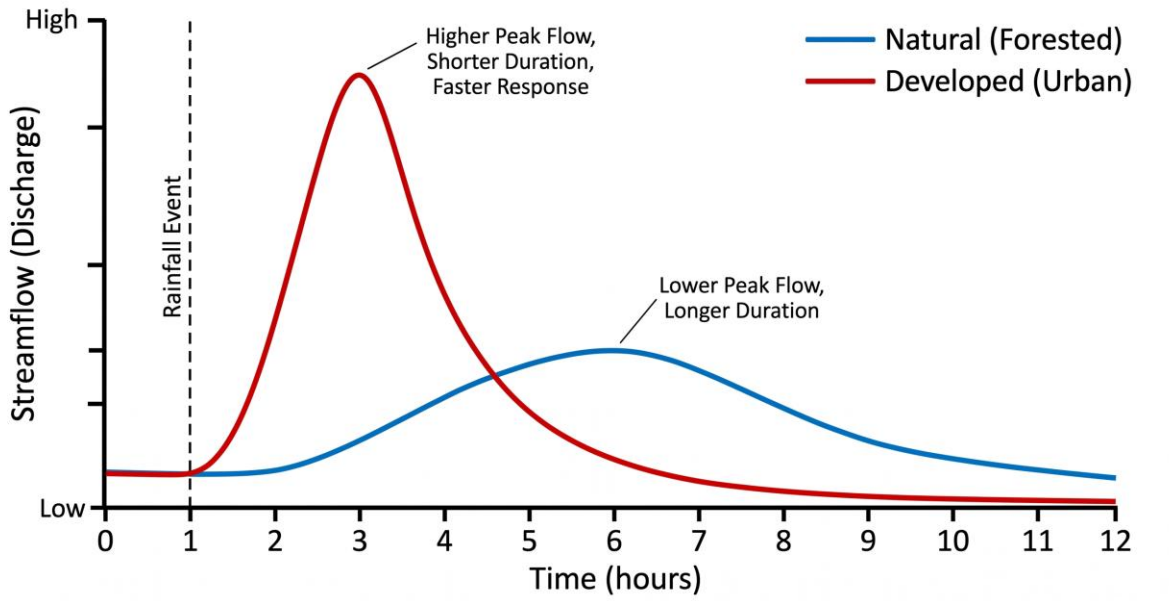


Figure 5-3 Conceptual stormwater response comparison

The more impervious surface in a community, the more runoff is produced and the faster it can arrive in the drainage system. That sudden surge of water is what fills pipes and ditches, backs up into basements, and floods roads and yards.

One important concept worth understanding is the first flush. The very first portion of rainfall in any storm washes away material that has built up on impervious surfaces since the last rain: road grime, oil, fertilizers, bacteria, and sediment. This means the earliest runoff from a storm carries the highest concentration of pollutants. In 2020, HRM released a requirement that developments of a certain size must retain the first 10 millimeters of rainfall on-site, a practice that is becoming an industry standard within Nova Scotia. Managing the first flush is a step that addresses stormwater quality treatment alongside quantity control, particularly in communities located near industrial sites, busy roads, or historically contaminated lands.

5.9 Case Studies in Stormwater Management: Nova Scotia Municipalities

Stormwater case studies provide a practical framework for identifying structural vulnerabilities, regulatory gaps, and operational engineering adaptations across Nova Scotia's diverse municipal landscapes. Rather than evaluating drainage problems as isolated weather anomalies, these real-world examples demonstrate how municipal infrastructure decisions, localized topographies, and historical land-use approvals directly impact community flood exposure.



Case Study: Town of Kentville (Residential Development near Park Street)

Context

Kentville is a town in the Annapolis Valley with a population of about 14,905 residents. The town has a mixed drainage network: the busy centre of town relies on traditional underground concrete storm pipes, while the lower-density areas surrounding it rely on open dirt ditches and culverts. All of Kentville's stormwater drains directly into the Cornwallis River. This river is highly vulnerable to downstream water levels and strong ocean tides coming from the nearby Minas Basin which leads to intermittently blocked outlets, forcing flooding upstream in some cases.

A residential development was approved without adequate stormwater management considerations downstream. This is an example where no comprehensive province-wide municipal stormwater design standard has resulted in damage to infrastructure and property.

The Challenge

Kentville’s main drainage problem started when the town approved new housing developments on steep hillsides without sufficient downstream impact assessments. Because there are no mandated, province-wide stormwater design guidelines in Nova Scotia, developers were not required to consider community-wide stormwater impacts.

The developer cleared out natural forests and fields that have lower runoff potential, replacing them with hard, sealed surfaces like asphalt roads, roofs, and driveways with higher runoff potential. This heavy runoff picked up mud and debris, forming a slurry that completely overwhelmed the ditches and pipes in older neighborhoods downstream.

The technical term for this failure is system surcharging. Because the high tides of the Cornwallis River block the town's drainage outfalls, water inside the underground pipes gets trapped. When the heavy runoff from the hill meets this trapped river water, the system goes into pressure flow. Water has nowhere to go but backward, leading to upstream flooding through manholes and catch basins.

Response

To address surcharging issues, Kentville's Public Works department launched a full Stormwater Management Master Plan. They hired engineers to create a modern strategy using four main steps:

Field Surveys: Engineering teams went out to map, measure, and inspect the physical condition and size of stormwater pipes and culverts in town. They combined this field data with high-resolution, publicly available land elevation data to get an accurate view of the landscape.

Computer Modeling: The engineering team built a digital model of Kentville's drainage system using an advanced software called PCSWMM. They incorporated the river's high tide data to simulate real-world receiving water conditions. This allowed them to see exactly where pipes were choking under pressure and test how the town would survive future climate change storms.

Hybrid Green-Grey Solutions: Using the computer model's results, the town developed a 10-year investment plan. In dense areas, they used traditional "grey" infrastructure by swapping out broken or narrow pipes for larger ones. In residential and rural zones, they introduced "green" infrastructure—such as rain gardens, naturalized swales, and stricter land-use rules—to catch and absorb rainwater where it falls in an effort to dampen downstream impacts.

Developmental Approvals: All future development approvals are now contingent on developers utilizing the Master Plan's data to prove their projects will result in zero net-increase in downstream runoff. This ensures developers to account for cumulative downstream impacts, effectively preventing the surcharging cycle

Key Insights

The Problem with Regulatory Gaps: . If a municipality has not adopted stormwater strategies, upstream development can indirectly pass flood problems down to older neighborhoods, leaving the local town and private homeowners to manage clean-up and mitigation efforts.

The Outfall Effect: It is not possible to evaluate a town's drainage pipes without looking at where the water empties out. If an outfall drains into a water body affected by ocean tides, high water levels have the potential to back up the whole system, meaning upstream pipes must be designed to handle downstream pressure.

The Power of Modern Tools: Small municipalities cannot safely manage infrastructure using guesses or outdated paper records. Combining field data with computer models like PCSWMM is a valuable first step to pinpointing underground bottlenecks and managing capital spending effectively.

Case Study: Fall River Stormwater Assessment

Context

Fall River is a rural-suburban community with an estimated population of 2,474 located within the Halifax Regional Municipality, approximately 25 km north of Halifax. The primary drainage artery through this area is a 5 km stretch of Highway 2, a key secondary highway.

Topographically, the western edge of the highway borders Fletchers Lake and Lake Thomas, while a steep natural ridge runs immediately parallel to the east of the roadway. Stormwater falling on this high ridge cascades downhill toward the lakes, forcing the Highway 2 corridor to act as a cross-drainage interceptor via a collection network of roadside ditches, underground pipes, catch basins, and cross-culverts.

The Challenge

A combination of steep terrain, undersized infrastructure, and tailwater conditions caused systemic constrictions and flooding.

During periods of high-intensity rainfall, Fall River experiences severe localized flooding that can threaten adjacent private properties, trigger road washouts, and block access to local residential streets. When storms deliver large volumes of water, runoff from the steep eastern ridge can cause localized flooding at the highway.

This natural challenge is compounded by maintenance gaps. Physical field inspections revealed that many cross-culverts and lake outfalls are broken down or blocked with dirt, sediment, and thick vegetation, reducing their active drainage capacity.

Response

The municipality undertook an assessment of integrated grey-green infrastructure solutions to manage runoff in physically constrained environments.

To establish a dependable level of service and provide the municipality with a roadmap for long-term safety upgrades, engineers executed a multi-step drainage restoration strategy:

> **Field Mapping and Asset Inspections**: Using high-precision GPS surveying tools, field crews mapped out stormwater ditches, catch basins, and culverts along the 5 km corridor to locate blockages. They documented several discharge points that were entirely buried under thorn bushes and heavy gravel buildup.

Advanced Unsteady Flow Modeling: The team constructed a digital model of the watershed using specialized PCSWMM simulation software. The engineering team simulated the rainfall-runoff relationship, internal pipe storage, and complex water backwater effects.

Targeted Pipe Upgrades (Grey Infrastructure): The municipality proposed upgrading the outlet of the system and undersized stormwater pipes to safely convey trapped water away from properties.

Low-Impact Development (LID) Testing: In accordance with municipal environmental policies, engineers evaluated options to install green infrastructure, like a roadside bio-swale. However, computer simulations showed that because the area is tightly restricted by private residential boundaries and commercial properties, the available green space was too small to change downstream runoff rates. This technical finding proved that expanding traditional underground grey pipes was the primary way to prevent street flooding.

Capital Cost Estimating: The entire conceptual upgrade plan was converted into an actionable capital cost estimate, which includes site restoration, dissipation pools, and bank stabilization to understand the capital funding need.

Key Insights

The Space Limits of Green Solutions: While nature-based solutions (LID) are highly desirable, their performance is strictly limited by available soil conditions and topography. In mature residential or commercial areas where public property boundaries are narrow, there may not be enough land to build rain gardens or swales large enough to significantly influence downstream impacts. In these space-constrained zones, widening traditional underground grey pipes remains mandatory.

The High Cost of Deferred Maintenance: Computer models often assume a storm network is clean and operating perfectly, which can mask real-world hazards. When fieldwork proves that simple debris, weeds, and mud can reduce the capacity of a large outfall pipe, it shows that regular public works maintenance schedules are just as critical as spending millions on capital construction upgrades.

The Receiving Body Advantage: When engineering upgrades accelerate stormwater flow, the final exit point is critical. Upstream drainage network can better pass water at higher volumes and speeds if they discharge into receiving basins (like large local lakes) that can accommodate the sudden volume within their normal water levels.

Case Study: Municipality of East Hants Flood Mapping Upgrades

Context

East Hants is a growing municipality with a population of approximately 26,000, located north of Halifax. The Barneys Brook watershed spans an 8.5 km drainage corridor that runs from a major provincial highway intersection down to its outfall at the Shubenacadie River. This inland river system sits approximately 40 km upstream from the ocean and is not influenced by coastal tides but is influenced by the tailwater conditions from the Shubenacadie River.

The land use across the watershed transitions significantly: the northern upper reaches are predominantly rural, consisting of dense forests and agricultural fields, while the lower southern portion of the watershed contains a mix of residential neighborhoods and industrial properties. Three provincial highways cross directly through this basin, creating significant paved, impervious lines across the natural landscape.

The Challenge

The Barneys Brook watershed is highly vulnerable to flash flooding and overland washouts during heavy rainstorms. This was vividly demonstrated during a historic regional storm event in July 2023, when roughly 250 millimeters of rain fell over a two-day period, which led to the destruction of transportation corridors, property damage, and loss of life in nearby communities.

For Barneys Brook, flood conditions are largely driven by a structural bottleneck at the very bottom of the river network, where the entire brook is forced to pass under a primary regional railway crossing through a single, restricted culvert. When intense rainfall hits the upper reaches, a large volume of water rushes down the watershed towards the more developed region of the watershed and pools against this railway embankment.

This issue is compounded by the Shubenacadie River downstream. When water levels in that larger riverine system rise, they create a heavy tailwater constraint, similar to the high tide conditions in the Kentville case study, that backs up water into the Barneys Brook channel, driving flood lines higher upstream.

Finally, physical field inspections revealed that some road culverts are in poor structural repair or are heavily blocked by mud, wild brush, and active beaver dams. These blockages restrict the drainage capacity of the pipes, which can cause water to frequently pool near municipal-owned infrastructure, and put neighbouring homes at risk.

Response

Following provincial-scale flood mapping, the municipality proceeded with a closer look at possible flood mapping upgrades to identify and prioritize the replacement of legacy infrastructure.

To establish accurate flood hazard boundaries and find practical structural solutions, the municipality launched a multi-phased flood risk study supported by provincial infrastructure investment funding. The engineering response was rolled out using a mapping and modelling approach:

Topographic Field Ground-Truthing: The project team gathered over 500 physical terrain points using high-precision GPS surveying units to validate the vertical accuracy of publicly available provincial laser-elevation data (LiDAR). They discovered that the radar maps had vertical errors under dense forest canopies and steep riverbanks, and adjusted the computer terrain models to match real-world field conditions.

Advanced Computer Simulations: Engineers developed a digital model of the land using HEC-HMS software to simulate how shifting climate conditions up to the year 2100 would amplify storm runoff volumes. They paired this with a HEC-RAS hydraulic program to run water surface profiles and map out exactly where localized flash flooding would spread.

Downstream Infrastructure Retrofits: Utilizing the computer models, the team proposed structural concepts to address the main bottleneck. They proposed upgrades to the single railway culvert to distribute extreme water volumes evenly. They also suggested upgrades for the surcharged highway intersections to safely drain water away from nearby houses.

Structured Maintenance and Partnership Planning: Recognizing that structural upgrades take time, the municipality outlined a recurring channel-maintenance program to clear out sediment and organic blockages. They also created a collaborative framework to share their hydraulic data with provincial highway departments and the private railway company to negotiate cost-sharing agreements for the construction phases.

Key Insights

The Downstream Priority Rule: Standalone engineering upgrades to upstream highway bridges or culverts are ineffective if the primary downstream bottleneck is left

unaddressed. Municipalities should prioritize clearing the lowest restriction in a river network first; otherwise, upstream investments may not provide flood protection.

The Limit of Satellite Terrain Data: Publicly available provincial elevation maps (LiDAR) are highly useful, but they should be checked. Collecting manual ground-truth survey points in heavily vegetated or steep areas is an important technical requirement to prevent building flood models on inaccurate maps.

The Hidden Risk of Deferred Maintenance: Standard engineering models calculate drainage networks under the assumption that all channels and pipes are completely clean. Because natural debris, brush, and active beaver dams can reduce outfall capacity, an active, low-cost maintenance program is just as critical for public safety as multi-million-dollar structural additions.

Case Study Key Takeaways

The technical reviews of Kentville, Fall River, and East Hants reveal that stormwater management in Nova Scotia is shifting towards a modern, data-driven approach focused on local resilience. When evaluated together, these case studies provide a snapshot at the current state of infrastructure planning in a range of community contexts, highlighting common systematic gaps, operational challenges, and policy opportunities.

The State of Stormwater Management in Nova Scotia

The localized data demonstrates that the traditional approach to stormwater management is no longer adequate to handle modern climate change realities. Across different watersheds, the province currently faces a fragmented regulatory landscape. With no comprehensive province-wide municipal stormwater design standards, individual municipalities manage growing water volumes independently. This structural gap often creates a clear division between well-funded urban service areas and smaller rural municipalities that are left with severe funding constraints and limited internal technical capacity, in addition to jurisdictional challenges related to stormwater infrastructure.

Municipal Engagement Insights

From our municipal interviews, we heard that stormwater management planning in rural communities is largely reactionary - when there are issues with stormwater infrastructure (e.g. blocked culverts), the public or elected officials contact the municipality and if it is within their jurisdiction, municipal staff work to correct the problem.

Key Infrastructure Challenges

Synthesizing the data from these three distinct regional systems highlights three overarching physical and operational bottlenecks:

The Downstream Dominance Rule: Upstream drainage networks can be restricted by the physical condition of their final outfall locations. As proven by the Shubenacadie River tailwater pressures in East Hants and the tidal blocking of the Cornwallis River in Kentville, spending capital funds on upstream pipe expansions can result in negligible flood protection if the lowest bottleneck in the system remains unaddressed.

The Space and Soil Limitations of Green Infrastructure: While nature-based solutions (LID) can be highly effective at absorbing water at the source, their performance is limited by local conditions. In mature, tightly constrained commercial and highway corridors like Fall River, there is often insufficient public right-of-way to implement large-scale green features, making targeted traditional grey pipe upgrades a continuing mechanical necessity.

The Invisible Threat of Deferred Maintenance: Standard digital engineering models operate under the idealized assumption that ditches and culverts are clean and fully functional. However, field data from Fall River and East Hants proves that debris, brush, and animal activities can reduce operational capacity, turning a potentially safe drainage network into an active flood hazard.

Core Opportunities

Despite these challenges, the empirical methodologies utilized by these municipalities outline clear pathways toward a more resilient and equitable framework:

Proactive Land-Use and Development Approvals: Kentville's implementation of a mandatory "zero net-increase" runoff rule represents a major advancement in municipal planning. By legally requiring upstream development to retain its own storm volumes, municipalities can prevent piece-by-piece development from driving systemic downstream problems.

Bridging the Landscape Data Gap: Publicly available satellite and aerial data (LiDAR) provide an excellent foundation for watershed mapping, but they may not always penetrate heavy tree canopies and they do not capture underwater surfaces. Overcoming this limitation requires manual field ground-truthing.

Leveraging Community Insight and Citizen Science: Desktop modeling is enhanced by real-time observations from community members during an extreme

weather event. Integrating photos, timestamps, and high-water marks collected directly by community groups provides engineers with empirical data needed to successfully calibrate and validate hydraulic models.

Stormwater does not follow property lines, neighbourhood boundaries, or municipal jurisdictions. To design an effective stormwater management strategy, public works departments must combine field surveys, computer modelling, development regulations, and continuous maintenance programs. Most importantly, technical teams must prioritize fixing the lowest downstream restrictions first to confirm that local capital investments deliver effective protection to surrounding properties.

5.10 Supplemental Case Studies

Town of Amherst, NS Flood Risk Mitigation Infrastructure Upgrades (2022)

Context

The Town of Amherst is built on the edge of the Tantramar Marsh, one of the largest salt marshes on the Atlantic coast. Over the last 300 years, the marsh was transformed by Acadian and later British settlers who built dikes and aboiteaux (water control gates) to turn the salt marsh into fertile agricultural land.

The northern parts of the town along the marsh have historical significance for both Acadians and African Nova Scotians. Namely the Dickey Brook watershed where many of these communities have historically resided and worked.

The Challenge

In early February 2022, the region was hit by a significant winter storm that produced several feet of snow, followed immediately by an atmospheric river of warm, heavy rain. The ground was frozen and the melting snow and the falling rain (stormwater) had nowhere to go. High tides in the Bay of Fundy meant that the aboiteaux (tide gates) along the dikes were closed for several hours. This effectively "locked" the town's stormwater inside the marsh and the sewer system with no outlet to the sea, leading to rapid inland backups. As a result, a retirement and residential care facility had an emergency evacuation, residential properties experienced sewer backups, and road closures throughout the region cut off local businesses and separated neighborhoods.

For the African Nova Scotian community in Amherst, the 2022 flood was not just a weather event; it was a demonstration of environmental vulnerability rooted in historical settlement patterns. Historically, marginalized communities were often settled on less desirable, lower-lying land. In Amherst, this includes areas near the marsh edge and Dickey Brook. The 2022 flood disproportionately threatened these homes, which are more susceptible to the "marsh-back-up" effect.

Response

In 2022, the Town of Amherst initiated several critical infrastructure and planning efforts to address increasing flood and stormwater risks in changing climate conditions:

> **Stormwater Management Study:** Triggered by the February floods, the town commissioned a focused Stormwater Management Study to identify structural weaknesses and determine the "root cause" of capacity failures and provide a costed

engineering roadmap for replacing undersized culverts and pipes. The study specifically focused on the South Albion Street (near the Industrial Park) and the Donald Avenue-Ralston Place-Dickey Street corridors, which saw the most significant damage. Additional urgent work to address stormwater infiltration into the sanitation system was completed alongside this study.

Stakeholder engagement: The town's approach to these upgrades was noted for being "bottom-up." This was characterized by a specific relationship with the community:

- **Informal Citizens' Groups:** Following the February 2022 flood, residents in the most affected areas (specifically around Donald Avenue and Ralston Place) formed informal neighborhood groups to advocate for immediate action. These groups provided "citizen science" data—photos, videos, and timestamps of water levels—that the Town's Stormwater Management Study engineering consultants used to verify their hydraulic models.
- **Public Consultation Phases:** The Town moved through two distinct phases of engagement in 2022 as part of their Stormwater Management Study and in tandem with the Municipal Planning Strategy (MPS) and Land Use Bylaw (LUB) updates (Plan Amherst). The first phase gathered raw input from these groups regarding where the system was failing. The second phase, which continued into early 2023, involved "testing" the proposed infrastructure solutions with these residents to ensure the plans addressed their lived experiences of the flood.
- **A New Beautification & Responsibility Strategy:** In addition to formal engineering, the town developed a standalone beautification strategy with resident input. This strategy encourages "shared responsibility" for public spaces, including keeping private neighborhood ditches clear of debris to assist the town's larger flood mitigation efforts.

Green Infrastructure and Nature-Based Solutions: The Town of Amherst's Municipal Planning Strategy (MPS), which was drafted and refined throughout 2022–2023, specifically introduced green infrastructure as a core tool for managing stormwater.

- **Beyond "Grey" Pipes**: The strategy acknowledges that traditional "grey infrastructure" (pipes and tanks) is no longer sufficient. It promotes nature-based solutions such as bioswales, rain gardens, and permeable surfaces to absorb water at the source.

- **Dickey Brook Restoration**: A significant part of the vision involves using the Dickey Brook corridor not just as a drainage ditch, but as a "naturalized" asset. This includes maintaining vegetation that slows down water flow during flash floods, reducing the pressure on downstream culverts. This allows the marsh area to act like a sponge during extreme rain.
- **Regulatory Support**: The Land Use Bylaw (LUB) introduced maximum lot coverage rules. These require developers to keep a certain percentage of land "green" to ensure natural infiltration.

Zoning the "Marsh Edge": The Municipal Planning Strategy officially designated the northern "marsh-edge" properties as flood-prone. By designating these as surplus or "green zones," the town prevents new houses from being built in the path of the marsh's natural flood cycle.

Aboiteau & Pumping Strategy: The town's 2022 capital budget included funding for the Laplanche Pumping Station. This is a critical piece of "marsh infrastructure" that helps pump town water over the dikes and into the sea even when the tide is high and the gates are closed.

Provincial Support: The town secured funding through the Sustainable Communities Challenge Fund and the Capital Assistance Program to offset the costs of these engineering assessments and subsequent physical retrofits.

The Town of Amherst's work overlapped with the ENRICH Project, which received provincial funding in 2023 to help 12 African Nova Scotian communities—including those in the Cumberland region—develop their own climate resilience plans. The ENRICH Project conducted specific climate justice workshops with effected residents and the African Nova Scotian community in Amherst. Key components of this project (which was separate from the Town's work but built off of it) included:

Climate Justice Ambassadors: The workshops led to a program to train local leaders to represent the community in municipal planning. This ensures that when the Town discusses "flood zones," the specific history and housing security of African Nova Scotian residents are at the table.

Collaborative Planning: While the Town manages the "grey" infrastructure (pipes), the ENRICH-led workshops were designed to ensure the "green" and "soft" infrastructure (zoning, emergency planning) directly reflects the historical and current presence of African Nova Scotians in the area.

Emergency Simulation: Workshops used interactive simulations to help residents create localized emergency plans, identifying which neighbors need help during a "rain-on-snow" event like the one seen in February 2022.

Addressing Environmental Racism: The workshops documented how historical zoning often placed African Nova Scotian and low-income housing in the "low lands" (closer to the marsh), making today's climate change a direct threat to their heritage and safety.

Through the ENRICH Project workshops, ANS residents identified that they face a "double burden":

Direct Property Damage: Water damage to older homes that may lack modern floodproofing.

Access and Isolation: Residents noted that when "the marsh" roads flood, the physical isolation can lead to "food and medical deserts," as those without reliable transportation are unable to reach services in the town centre or across the border. This was referred to as “social flood risk”.

The ENRICH workshops revealed that residents often had better "real-time" knowledge of how water moved through their neighborhoods than the town’s static maps. This led to a push for "Citizen Science," where ANS residents could provide photos and observations to help engineers calibrate new flood models.

Key Insights

Simultaneous Execution of Short and Long-Term Goals: In responding to changing climate conditions, the Town of Amherst demonstrated that long-term strategic planning and immediate physical interventions can occur at the same time.

Pivoting to Nature-Based Infrastructure: The town's planning strategy explicitly acknowledges that traditional "grey infrastructure" (such as pipes and tanks) is no longer sufficient on its own. Through the 2022–2023 drafting of its Municipal Planning Strategy (MPS), the town introduced green infrastructure as a core stormwater management tool, promoting nature-based solutions like bioswales, rain gardens, and permeable surfaces to absorb water at the source.

Validating Engineering Models with Lived Experience: Citizens became crucial data contributors, providing "citizen science" data—such as photos, videos, and timestamps of water levels—that the town's engineering consultants directly used to

verify and calibrate their hydraulic models. This proved invaluable because local residents often possessed "real-time" knowledge of how water physically moved through their neighborhoods compared to the town's static maps.

Providing a Foundation for Equity-Focused Planning: Broad municipal infrastructure initiatives can serve as a vital catalyst that supports independent, community-led capacity building. The Town of Amherst's flood mitigation work directly overlapped with and supported the ENRICH Project climate resilience workshops.

Municipality of Clare Adaptive Flood Mitigation Project at Major's Point Acadian Cemetery and Chapel

Context

The Major's Point Acadian Cemetery and Chapel (Pointe-à-Major site historique) is a historic site located within the Municipality of Clare which has significant cultural value for the local and regional Acadian community. It is located along the Fundy shoreline (St. Mary's Bay) and is adjacent to Joseph and Marie Dugas Municipal Park and local trails. Major's Point was one of six priority locations for physical and structural upgrades under the Municipalities Baie Sainte-Marie Tourism Public Spaces Master Plan (2021).

To protect this site for the future and to prepare to be featured in the 2024 Congrès mondial acadien (International Celebration of Acadian Culture Festival), the Municipality of Clare partnered with the Société historique acadienne de la Baie Sainte-Marie (a local community group) on a focused coastal adaptation project with funding from the Sustainable Communities Challenge Fund (SCCF) in 2021.

The Challenge

The cemetery and chapel have grown increasingly vulnerable to the effects of climate change, specifically coastal flooding. The chapel had already sustained previous stormsurge damage, and the site's infrastructure—which relied heavily on wooden crosses, a wooden fence, and a wooden platform—was rotting and highly susceptible to ongoing environmental degradation. The Société had a vision for this project, but lacked the funding to make it a reality.





Response

To preserve the site, the Municipality of Clare worked closely with the Société to apply for a $143,496 adaptive flood mitigation project grant broken down into six targeted milestones. The project is primarily funded by the SCCF (78.4%), with additional contributions from the Municipality of Clare and the historical society. Together, they were able to hire a landscape architect and local contractors to action work that had been initially defined through the Municipalities Tourism Public Spaces Master Plan. The Major's Point adaptation project focused heavily on upgrading materials and reshaping the land to move water off the site:

Structural Stabilization: The chapel was structurally stabilized to minimize future impacts, and previous floodwater damage was repaired.

Site Regrading: To actively minimize future flood pooling and damage, the grounds were regraded to form a "crowned surface" that redirects water, alongside improvements to the beach access trail.

Material Upgrades: Rotting wooden crosses were replaced with highly durable, hand-crafted engraved slate tombstones. The vulnerable wooden fence was replaced with an 18-inch stone wall, and the wooden platform was upgraded to a slate walkway and stepping stones throughout the cemetery.

Strategic Landscaping: A detailed landscape design was completed and implemented to introduce suitable, resilient vegetation which was resilient to both drought and flood conditions.

The work was officially completed in 2025 with a formal launch in fall 2025 where local community members came out in support of the work.





Key Insights

Land Regrading as Defense: Rather than relying solely on barriers, physically altering the topography of the site to a "crowned surface" is an effective, passive way to manage water runoff and mitigate flood risks.

Integrating Resilience with Heritage: The project demonstrates that historic preservation in coastal or flood-prone areas requires adapting traditional materials. Upgrading from wood to heavy stone and slate ensures the cemetery can withstand changing weather patterns while maintaining its cultural significance.

Collaborative Funding Models: The successful execution of this mitigation project highlights the necessity of multi-level funding, utilizing provincial/sustainability grants to cover the majority of the costs while retaining local municipal and historical society investment.

Opportunity Windows: Having the Tourism Public Spaces Master Plan in place, and a need for improvements identified (to support the Congrès mondial acadien 2024), contributed to a supportive environment for the Municipality to apply for and obtain funding. The project also benefited from community champions through the Société who could help shape and guide this work.

Halifax Regional Municipality (Upper Bissett Run Watershed)

Context

Located in Cole Harbour, a community within the Halifax Regional Municipality, the Upper Bissett Run is a large-scale urban watershed. The watercourse flows through a narrow green space corridor between residential streets that is heavily utilized for public recreation and serves as a natural connector within the neighborhood.

The Challenge

The Upper Bissett Run watershed has a history of high-intensity rainfall causing frequent road closures, surface water pooling, and residential basement and backyard flooding. An aging engineered system of stormwater piping and culverts conveying the stream under Cole Harbour Road is undersized and has historically been prone to debris blockages. During heavy precipitation events, the constrained infrastructure causes stormwater to back up, chronically flooding adjacent private residences—particularly along John Stewart Drive and Arklow Drive—as well as community green spaces and local sports fields.

Response

To address these historical drainage issues, a recently announced $6.4 million joint investment was made by the federal government, the Halifax Regional Municipality, and Halifax Water. While construction on this project has not yet begun, the planned response shifts the financial burden of flood mitigation away from individual homeowners by utilizing government disaster mitigation funding to fix historical infrastructure deficits.

The project will decommission the existing restrictive stormwater piping and upgrade the culvert at Cole Harbour Road and Bissett Run. Crucially, a section of Upper Bissett Run will be "daylighted"—meaning the piped stream will be exposed and restored as a natural watercourse above ground. Alongside this naturalized infrastructure, a new community pocket park will be created on the banks of the newly daylighted stream for residents to enjoy.