



Stormwater Action Plan

October 20, 2023

PURPOSE

An action plan to accelerate achievement of shared stormwater management goals.

Stormwater Collaborative
Edmonton Metropolitan Region

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1.0 Executive Summary

Today, flooding is the most frequent and costliest natural disaster across Canada. The related risks for municipalities continue to increase because of growth, climate change, aging infrastructure, and outdated stormwater networks. Flooding can have significant impacts on health and safety, critical infrastructure, homes, businesses, and the environment across the Region. Municipalities will need to work together and with other regional partners to address complex issues, implement more sustainable solutions, and mitigate the adverse impacts of flooding in the Edmonton Metropolitan Region (Region).

The Edmonton Metropolitan Region Board (EMRB) plans for long-term sustainability of the Region through the development and implementation of a regional growth plan and the metropolitan region servicing plan (MRSP). The MRSP recommended initiation of regional collaboratives in priority servicing areas, including stormwater management. The Stormwater Collaborative (collaborative) is comprised of representatives from each of the 13 member municipalities working together to advance a shared vision of a Region with protected natural assets and resilience from the impacts of stormwater.

To help advance this shared vision, the collaborative has updated the Stormwater Action Plan (action plan) to reaffirm the purpose of the collaborative and the goals to be achieved in working together. To ensure continued alignment with regional priorities, the action plan also outlines a common and repeatable approach that will be used to seek approval for regional projects.

The action plan includes a summary of the initiatives undertaken to date and summarizes what has been achieved since approval of the collaborative's initial action plan in 2021. It also provides an overview of considerations applied by the collaborative in identifying strategic initiatives to be considered, including:

- Key provincial and federal government initiatives influencing the direction of stormwater management in the Region.
- Emerging trends and advancements that pose new challenges and opportunities for municipalities.
- Recent stormwater management achievements from across the Region.

With these considerations in mind, the collaborative has outlined the strategic initiatives it believes are the highest priority and best undertaken regionally. These initiatives reflect discrete projects with a defined start and end date as well as ongoing activities intended to share best practices, support knowledge transfer, and strengthen strategic partnerships.

The stormwater roadmap lays out a high-level schedule to complete projects that require funding over the next four years. The roadmap is intended to illustrate the collaborative's longer-term plan as well as to help obtain endorsement for the priorities as outlined. Next steps include completing the work to support the Regional Flood Risk Assessment and initiating a project charter for a review of bylaws for stormwater management funding models.

2.0 Stormwater Collaborative

In 2019, the Edmonton Metropolitan Region Board unanimously approved the inaugural Metropolitan Region Servicing Plan (MRSP)¹. The MRSP represents the ongoing work of the Board toward fulfilment of its mandate as a growth management board under the Edmonton Metropolitan Region Board Regulation and is an essential plan to support implementation of the Edmonton Metropolitan Region Growth Plan². Moreover, the MRSP represents a commitment to working together with a focus on responsible growth.

To help achieve enhanced municipal collaboration and service coordination, the MRSP recommended the initiation of collaboratives in regionally significant municipal service areas, including stormwater management. The Stormwater Collaborative (collaborative) is comprised of representatives from each of the 13 member municipalities (See Appendix A for a list of collaborative members). The collaborative leverages regional efforts and expertise, provides a supportive forum to foster research, share best practices, and enable evidence-based decisions and actions.

The important work of the collaborative is guided by the MRSP Standing Committee (committee), comprised of elected officials appointed from across the member municipalities. The committee provides ongoing guidance and direction to the collaboratives and monitors development, opportunities, and challenges for each service area to ensure continued alignment with regional priorities and the growth plan.

2.1 Vision

The collaborative is guided by a vision statement for stormwater management that reflects the desired future state and demonstrates alignment with the vision of the Edmonton Metropolitan Region Growth Plan and the MRSP Guiding Principles (See Appendices B and C):

“The Edmonton Metropolitan Region will have protected natural assets while achieving resilience from stormwater impacts.”

Effective stormwater management safeguards infrastructure, homes, businesses, and public spaces. Beyond flood management, these services contribute to livability, engagement, and community resilience in the Region. Like all municipal services, stormwater management contributes to vibrant, healthy communities and a competitive regional economy.

2.2 Purpose

Today, flooding is Canada’s most common and costly natural disaster. Canada’s National Risk Profile also indicates flooding risk remains a significant issue due to population growth, climate change, aging infrastructure, and outdated stormwater networks. In Canada, responsibility for managing flood risk is shared between all levels of government, industry sectors, non-government organizations, communities, and individuals. New strategies and ways of working together are needed to address complex issues, implement more sustainable solutions, and mitigate the adverse impacts of flooding in the Edmonton Metropolitan Region (Region).

¹ Edmonton Metropolitan Region Board. 2019. [Metropolitan Region Servicing Plan](#).

² Edmonton Metropolitan Region Board. 2020. Edmonton Metropolitan Region Growth Plan: [Re-Imagine. Plan. Build](#). Accessed June 21, 2021.

The Region is one of the fastest growing in Canada and is expected to welcome 1 million more people and add more than 470,000 new jobs over the next 25-30 years. As the population grows, more land is developed for housing, commercial areas, and infrastructure. This urbanization leads to more impervious surfaces which can hinder rainwater infiltration and evapotranspiration while also limiting the space available for expanded stormwater infrastructure. When rainwater has fewer places to naturally infiltrate into the ground, it flows into storm drains and sewers, increasing the volume and velocity of runoff during storms.

Existing stormwater systems, designed for lower population densities may be overwhelmed by the increased demands of growth. At the same time, aging infrastructure can require increased maintenance due to structural damage, corrosion, sediment accumulation, and natural wear and tear. Insufficient design and maintenance of systems can lead to deterioration, blockages, and reduced system efficiency over time.

Over the last decade, Alberta has experienced more severe weather events than any other region in Canada³. More frequent and intense weather events increase the risk of flooding in the Region, which can impact stormwater and other municipal infrastructure. Flooding can damage critical infrastructure like water treatment plants, sewage systems, telecommunications, electrical and natural gas infrastructure, and healthcare facilities as well as impact the structural integrity of roads, bridges, and other public infrastructure. Damage to utility infrastructure can lead to outages, leaks, and other hazards. Transportation routes, airports, and railways may become impassable or inaccessible. Repairing damaged infrastructure is costly and time-consuming for municipalities, diverting resources from other essential services and projects.

Flooding can represent a significant risk to public safety. Currents, debris, and submerged hazards can pose immediate physical danger and lead to accidents, injuries, and even fatalities. Severe weather events can overwhelm emergency response services and cause power outages that affect essential services, such as hospitals, emergency shelters, and communication systems. Damage to critical health and social infrastructure can also reduce access to clean water and medical services. Pathogens, contaminants, and waterborne diseases can also spread during and after flooding events.

The costs of flooding to the public can also be substantial. Flooding can damage or destroy homes, vehicles, and personal belongings, resulting in financial losses and emotional distress. The process of rebuilding and recovering from flooding can be daunting and time-consuming, requiring individuals to navigate insurance claims, repairs, and adjustments to daily life. Citizens may be unaware of their risk or how best to protect themselves and their property.

More frequent and intense flooding also has negative impacts on the environment as floodwater can erode soil, destroy, or disrupt habitats for plants and animals, and alter natural geomorphology. Stormwater runoff can also carry pollutants, debris, and sediments from roads, lawns, industrial areas, and construction sites into water bodies, negatively impacting water quality.

In response to the increased frequency and intensity of floods, the federal and provincial governments are making changes to existing disaster recovery programs. New cost-sharing formulas and limits to funding impact the direct costs borne by municipalities and citizens in emergencies. Downloading of costs to other orders of government and citizens is intended to incentivize more sustainable development and proactive investment in adaptation efforts. According to the 2020 report *Investing in*

³ Insurance Bureau of Canada. Presentation to the Metropolitan Region Servicing Plan Standing Committee: Severe weather and emerging issues in the insurance industry. Delivered February 17, 2023.

Canada's Future: The Cost of Climate Adaptation at the Local Level, municipalities will have to spend a total of \$5.3 billion per year on climate adaptation initiatives to reduce the impacts of climate change in Canada.

Combined, these factors provide powerful incentives for regional collaboration. The collaborative provides a forum together to share knowledge, best practices, and lessons learned. It also provides a mechanism to bring experience and expertise from urban planners, engineers, and policymakers together to advance sustainable stormwater practices into municipal maintenance and development plans. Through cooperation, member municipalities can stretch limited resources and maximize return on investment for the Region. To support this purpose, the collaborative has outlined the work it proposes to undertake as well as the partnerships needed to protect citizens, businesses, infrastructure, and assets based on the outcomes from the work.

2.3 Goals

Within the Stormwater Collaborative Framework, members documented their agreement on how they would work together to build and achieve their shared goals. The collaborative identified the following goals to guide their work:

1. To develop and maintain a regional action plan for stormwater that drives progress towards a shared regional vision of protected natural assets while achieving resilience from stormwater impacts.
2. To establish interim measures of success to track progress in achieving regional stormwater priorities and to assess the performance of the collaborative against its stated goals.
3. To foster collaboration through shared accountability for risk, investment, and prioritization of projects and services.
4. To enable collaborative success through shared alignment, accountability, and established processes.
5. To align prioritization and funding of stormwater projects and strategic initiatives at the regional and sub-regional level.
6. To maximize value through effective management and allocation of regional stormwater resources.
7. To strive for community resiliency from flood-related impacts and provide public education regarding flood-related risks.

Building on work already completed within individual municipalities and across the Region, the collaborative agreed to identify or confirm relevant actions of regional significance. Actions viewed as having regional significance are those that:

- Require agreement across the Region to drive consistency, efficiency, or economies of scale.
- Would exceed existing staff complements or require technical expertise not available within all member municipalities.
- Require funding outside of existing municipal budgets or capacity for member municipality contributions.
- Would be more successful executed as a Region or would benefit from a unified voice.

2.4 Approach

Each year, through the EMRB annual budgeting process, funds for MRSP initiatives are identified. Following budget confirmation, the collaborative engages in a strategic planning process to assess, prioritize, and propose regional opportunities. Prioritization is based on the expected economic, environmental, and social benefits to the Region, combined with additional consideration given to:

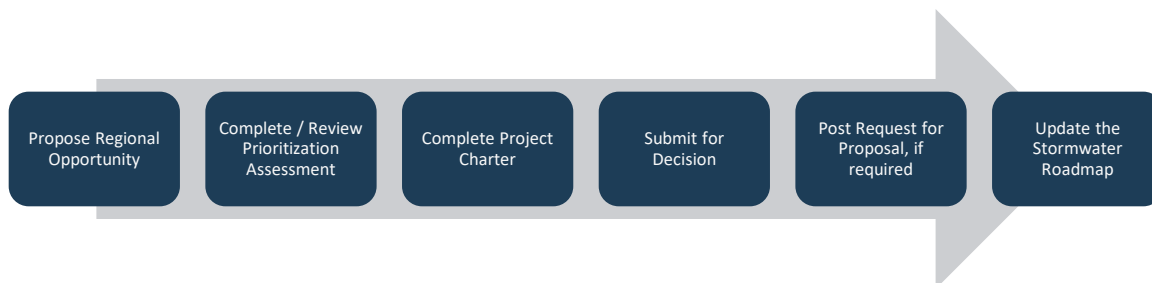
- current capacity
- resource availability
- schedule efficiency
- potential champions and partners

Actions identified as the highest priority are outlined within the action plan. Actions can range from discrete projects with a start and end date (e.g., a regional flood risk assessment) to ongoing initiatives (sharing best practices and advocacy activities). Projects that require funding are added to the Stormwater Roadmap (roadmap) that provides a high-level schedule for completing the work. Ongoing initiatives represent internal work that is likely to evolve over time (e.g., building a strategic partnership) and are only constrained by the capacity of the collaborative to advance them.

The committee reviews and endorses the action plan to ensure alignment with the growth plan and the MRSP and provides high-level support for the work. The standing committee then recommends the action plan to the Board for approval.

While approval of the action plan represents high-level support, all projects that require funding must be approved through a formal project approval process (as shown in Figure 1) prior to initiation.

Figure 1. Stormwater Collaborative Project Approval Process



As the collaborative confirms the capacity to undertake the work, a project charter is developed. The project charter must contain sufficient information to determine if the value of the expected outcomes justifies the time and cost associated with completing the work. Although the project must be considered regionally significant, participation in a project will be voluntary for each municipality. A project may not benefit all municipalities equally; however, the project charter must be supported by the collaborative before it can move forward for decision.

Following confirmation of collaborative support, a completed project charter is submitted to the committee for review and guidance. If the committee recommends and endorses the project, it is submitted to the Board for approval and to authorize the resources needed to complete the work.

The action plan is updated each year to reflect progress, review and confirm priorities, and adjust the 4-year roadmap (as required).

3.0 Stormwater Initiatives

The collaborative held its first bi-monthly meeting in March 2021 and the Board approved the first stormwater action plan on August 12, 2021. Since its initiation, the collaborative has been focused on developing a foundational assessment of flood risk in the Region. Building on the data available from municipalities, open data sources, and insurance industry flood mapping, the assessment will characterize flood risk across the Region to assist municipalities in demonstrating, preparing for, and mitigating the risks associated with flooding.

A project charter to complete the regional flood risk assessment was approved by the Board on April 14, 2022, and a project manager was engaged in August of 2022. Since approval, four discrete projects under (or related to) the larger regional flood risk assessment umbrella have been completed or are underway. This section provides a brief overview of each initiative as well as the additional capabilities anticipated for the collaborative and the Region. Tackling these foundational projects first helped to highlight high priority projects for the future and will enable greater insight into opportunities across the Region over time.

3.1 Regional Approach to Intensity, Duration, Frequency (IDF) Curves

IDF curves describe the likelihood of a range of extreme rainfall events for a given location and are a central element for stormwater management system design. In municipalities throughout the Region, four different sets of IDF curves are currently in use. In October of 2022, the collaborative engaged Dr. Thian Yew Gan to review how IDF curves, and their application to stormwater infrastructure design, differ across the Region and to assess the value of developing a single, consistent set of IDF curves. A secondary objective was to determine whether climate scaled IDF curves should be incorporated into municipal design standards to help protect municipalities against the anticipated effects of a warming climate.

The final report, completed in February 2023, identified best practices for IDF curve derivation and confirmed the value of a regional approach. As findings indicated that the derivation method and rainfall records used by EPCOR to develop their 2020 IDF curves align with best practices, closely fit observed data within the Region, and will be updated every five years, municipalities may wish to align design and construction standards with EPCOR, as they deem appropriate.

The report also noted that the design storms currently used for computer modeling in the Region should be consistently referenced throughout municipal standards. In addition, by verifying designs against past rainfall events, municipalities can identify areas that may be at greater risk of future flooding and adjust designs accordingly. Finally, the report suggested that until climate scaled IDF curves become more reliable, municipalities may be better served by mitigating the expected impacts of climate change in the future through alternative strategies such as adaptive infrastructure and incorporating freeboard into designs.

3.2 Regional Flood Risk Model

Building on the success of EPCOR's flood risk model, a granular flood risk model using geographic information systems (GIS) data has been developed for the Region. The model can be used to conduct indicator-based assessments that simultaneously consider the likelihood and consequences of specific flooding events.

As a complement to traditional cost-effectiveness or cost-benefit analysis and stormwater management planning, the model supports a more holistic view of risk by considering health and safety, social, and environmental impacts in addition to the financial costs. Municipalities can use findings from the flood risk model to identify areas where additional investigation or an enhanced assessment is required to confirm flood risk. The model can also provide information on the health and safety, social, and environmental impacts often needed to supplement applications for infrastructure funding.

3.3 Stormwater Performance Measures

The regional flood risk model is helping to inform the Key Performance Indicators (KPIs) needed to monitor and measure stormwater management in the Region. In combination with KPIs from past regional projects (e.g., the Blackmud/Whitemud Surface Water Management Study), regional data and climate initiatives currently underway provide additional guidance on KPIs. Collectively, these initiatives are contributing to the development of a common framework to monitor and measure stormwater management across the Region. This framework will include description, documentation, and validation of specific measures along with data sources and/or supporting calculation methodologies.

Once there is agreement regarding KPIs, visualization tools will be used to develop user-friendly and intuitive self-serve tools for understanding flood risk, mitigation priorities, and performance management within a stormwater metrics dashboard.

3.4 Climate Risk Vulnerability Assessment (CRVA)

The CRVA is a comprehensive evaluation that identifies and analyzes the potential risks and vulnerabilities resulting from climate change. The CRVA, now underway, seeks to understand the nature and likelihood of future climate-related hazards and the potential impacts of these hazards on the Region, including those from stormwater and river flooding. Initial results indicate that the risks from river and stormwater flooding to the economy, the built environment, the natural environment, and citizen health and well-being are rated as high or very high.

While the CRVA is not an initiative of the collaborative, members participated in the project workshops and informed the suite of regional adaptation actions, strategies, and recommendations for the Region. In addition, relevant risk rankings developed through the CRVA have been used to inform flood consequence ratings assigned in the regional flood risk model and adaptation actions recommended by the CRVA will be reflected in the flood risk assessment final report. The CRVA is expected to be complete by December 2023. The collaborative's work will continue to align with the CRVA as it proceeds.

4.0 Stormwater Outlook

The field of stormwater management is continuously evolving. In addition to the forces of population growth and climate change, regulatory and funding changes at the provincial and federal levels have been important drivers of change in stormwater management. There are also advancements and innovative new solutions that present opportunities for municipalities. Municipalities also continue to evolve stormwater management in ways that can offer lessons learned and signal opportunities for expansion across the Region. This section of the action plan highlights key considerations for the collaborative as it plans its work moving forward.

4.1 Provincial and Federal Government Initiatives

There are currently provincial and federal initiatives that have had or are expected to have significant impacts on stormwater management in the Region. These initiatives are outlined below:

Disaster Recovery Funding

Since 2015, the federal government has significantly reduced the availability of federal support through the Disaster Financial Assistance Arrangements⁴. However, they recently proposed new funding to identify high-risk flood areas and to modernize the program.

Changes at the federal level have impacted provincial liability for disaster recovery costs. The Disaster Recovery Program (DRP) is a last resort to help Albertans recover from uninsurable loss and damages resulting from a disaster. Effective 2021, the Government of Alberta established a cost-sharing mechanism and set lifetime funding limits within the DRP.

Changes to both federal and provincial funding programs are intended to promote investment in climate mitigation and adaptation as well as infrastructure maintenance. These changes are also intended to restrict development in high-risk areas. As a result, municipalities must plan for and absorb additional costs of disaster recovery. The increasing costs and frequency of disaster events, in addition to ongoing changes to funding levels, creates budgeting uncertainties for municipalities in the Region.

Disaster Mitigation and Adaptation

In 2018, the Government of Canada launched the Disaster Mitigation and Adaptation Fund (DMAF) to support large-scale infrastructure projects that reduce the impacts of natural disasters and climate change-related events. This fund aims to enhance the resilience of communities by investing in projects that prevent or mitigate damage from future disasters. These projects include initiatives to upgrade existing infrastructure and incorporate resilience features in new construction⁵. Since 2015, \$6.5 billion has been invested with an expected additional investment from other orders of government.

Flood Mapping

Under the National Adaptation Strategy, the Government of Canada is investing \$164 million in its Flood Hazard Identification and Mapping Program (FHIMP) through to 2028⁶. This program helps provinces and

⁴ Government of Alberta. March 2023. Stakeholder Fact Sheet – Changes to the Disaster Recovery Program. Accessed July 2023.

⁵ Environment and Climate Change Canada. June 2023. [Funding climate change adaptation](#). Accessed July 2023.

⁶ Natural Resources Canada. [Flood Hazard Identification and Mapping Program](#). Accessed July 2023.

territories develop authoritative flood hazard maps to inform decision-making in support of land use planning, flood mitigation and adaptation, resilience building, and protection of lives and properties⁷.

At the provincial level, the government of Alberta is leveraging the FHIMP to create high resolution maps illustrating flood extents modeled for a range of river flooding scenarios (1:2 – 1:1000-year floods). Identified floodways can be used to inform land use decisions around major creeks and rivers in Alberta. Building off the flood hazard mapping, a Flood Damage Assessment Study is examining the buildings and infrastructure located within at-risk regions to estimate potential financial damages.

Improved flood mapping and risk data can be incorporated into the regional flood risk model to improve accuracy and completeness over time. In addition, enhanced data can be used to complement other regional strategies, such as emergency management or building flood risk awareness.

Water Quality Regulation

As part of Budget 2023, the Government of Canada announced establishment of a new Canada Water Agency that will begin work to modernize the *Canada Water Act*. The announcement also included renewal and expansion of the Freshwater Action Plan, which supports regionally specific measures to protect freshwater reserves across the country.

In 2021, Alberta announced two new plans to monitor water quality on several rivers in the province, including the North Saskatchewan. These new frameworks are intended to set limits for contaminants that would require the government to act if those thresholds are exceeded.

As municipalities are responsible for implementing and enforcing regulations, policies, and practices defined by other orders of government, changes defined at the federal and provincial level may have significant impacts across the Region. Expanded requirements for testing and monitoring are expected to add administrative burden and changes to thresholds may require municipalities to undertake unplanned mitigation activities. It is not yet clear how other orders of government intend to fund these additional responsibilities for municipalities.

High-Flood Risk Insurance

Canada's Budget 2023 proposed \$31.7 million to stand-up a low-cost flood insurance program, aimed at protecting households at high risk of flooding and without access to adequate insurance. This includes offering reinsurance through a federal Crown corporation and a separate insurance subsidy program. The government is currently working with the provinces as well as the Insurance Bureau of Canada and other industry stakeholders to develop the program⁸.

4.2 Emerging Trends and Advancements

While there are many challenges for municipalities in addressing growing pressures on stormwater systems, innovative new solutions are helping municipalities to increase infrastructure resilience. Understanding emerging trends and advancements in stormwater management will help the Region maximize the economic, social, and environmental benefits achieved. Important trends and technologies include (but are not limited to):

⁷ Office of the Prime Minister. May 24, 2023. [Keeping our waters clean now and into the future](#). Accessed July 2023.

⁸ Public Safety Canada. May 2023. [National Risk Profile Backgrounder: Floods](#). Accessed July 2023.

One Water⁹ - This systems-based approach to water resource management takes a holistic approach that recognizes the entire water cycle, including drinking water supply, stormwater, and wastewater as well as its interactions with other natural systems. Integrated water management aims to achieve water sustainability by considering the different interactions between all components and optimizing their use.

Nature-Based Solutions - Nature-based solutions involve using natural ecosystems to manage stormwater. This can include restoring and protecting natural waterways, enhancing wetlands, and implementing practices that work with the natural flow of water.

Green Infrastructure – Building on lessons learned from nature-based solutions, green infrastructure practices, such as rain gardens, permeable pavements, green roofs, constructed wetlands, and other low impact development (LID) techniques have gained popularity as effective methods for managing stormwater. These approaches mimic natural processes and help reduce runoff while improving water quality and enhancing urban landscapes.

Smart Infrastructure - Incorporating sensors and smart technology into stormwater infrastructure allows for real-time monitoring and management. This enables quicker responses to changing conditions and better coordination during flood events. Smart Infrastructure also provides enhanced knowledge of actual system performance for use in long-term updates and model calibration.

Resilience Planning - By incorporating resilience principles into stormwater management, communities can reduce the risks of flooding, minimize damage, and maintain essential functions during and after disruptive events.

Urban Retrofitting - As municipalities grow, existing infrastructure can be retrofitted to accommodate increased stormwater runoff. Retrofitting projects can involve redesigning streets, adding green infrastructure, and modifying drainage systems.

Public Engagement and Education: There's a growing emphasis on involving the public in stormwater management through educational campaigns, community projects, and participatory planning. Engaging with the community helps raise awareness and build support and uptake for sustainable stormwater practices both on public and private lands.

Public-Private Partnerships: Collaborations between government agencies, private companies, and community organizations are being explored to address complex stormwater challenges effectively.

4.3 Regional Achievements

Across the Region, municipalities continue to evolve stormwater management. Keeping current with these advancements maximizes opportunities to learn from and expand benefits across the Region.

Stormwater Integrated Resource Plan

As implementation of the City of Edmonton's Stormwater Integrated Resource Plan (SIRP) continues, EPCOR will continue to evolve its supporting flood risk model. In recent years there has been substantial movement on the capital and operational programs developed through SIRP. There has been one complete dry pond retrofit into mature neighbourhoods and four more are under design. A substantial

⁹ The terms One Water and Integrated Resource Planning can be used interchangeably.

amount of green infrastructure has been constructed throughout the City of Edmonton, many in partnership with the City's Neighbourhood Renewal teams in 17 neighbourhoods.

There has been an expansion of the monitoring network and EPCOR is initiating work on a "Smart Ponds" program to retrofit over 100 wet ponds with smart controls. EPCOR has also begun an initiative to add gates to outfalls that are in high-risk areas for river flooding and has been working to develop emergency response plans for high-risk areas. There is also a free home flood inspection program available to all single-family residential properties, where EPCOR will work directly with homeowners to understand the flood risks at their own lot level and suggest interventions. This program also includes a backwater valve subsidy for properties that require this intervention. Through SIRP, EPCOR has been successful in securing \$76M in Disaster Mitigation and Adaptation funding on two separate occasions which has contributed to five flood mitigation projects in the City of Edmonton.

The collaborative will continue to benefit from advancements to the SIRP and will determine if they can be applied to enhance the completeness and/or accuracy of the regional flood risk model.

Stormwater Master Plans

The City of Leduc recently completed a stormwater master plan which is a comprehensive strategy that outlines a long-term approach to managing stormwater within the municipality. It serves as a guide for decision-making, investment, and implementation of stormwater management practices and infrastructure. This plan will help effectively plan for and manage stormwater runoff, reduce flooding risks, improve water quality, and enhance the overall resilience of the area's water management systems.

In 2022, the Carrot Creek Regional Drainage Master Plan was completed. This was a collaborative planning report, led by St. Albert with collaboration from Morinville and Sturgeon County. Carrot creek is a watershed starting near Morinville and connecting through Sturgeon County and St. Albert and outfalling into Big Lake. The study conducted a geomorphic assessment of Carrot Creek and identified areas prone to erosion. Hydraulic modeling was done with a 1:100-year flow event to assess flow characteristics. From there, stormwater management strategies were developed that will protect the creek from erosion while continuing to support long-term residential and non-residential development. Recommendations were drafted and the three municipalities (St. Albert, Morinville, and Sturgeon) came to a consensus agreement on acceptable discharge rates for new development to help protect and support the watershed.

Parkland County completed a Stormwater Master Plan (Plan) in 2023. The Plan focused on three areas:

- Basin Identification
- Regulatory Review
- System Management

The outcome is a Council approved strategic planning document that will provide a vision and direction for managing stormwater across Parkland County.

The City of Beaumont also completed a Utilities and Stormwater Management Master Plan in 2023. The study assessed the existing systems and provided servicing schemes for water, wastewater, and stormwater systems for the ultimate development horizon (2048 and beyond). The stormwater model was developed in Personnel Computer Storm Water Management Model (PCSWMM) to assess the City's stormwater infrastructure. The 5-year 4-hour Chicago Distribution storm was simulated to assess the minor system, the 100-year 24-hour Huff Distribution was simulated to assess the major system, and two additional Huff Distributions design storms, 5-year 24-hour and 25-year 24-hour, were also simulated

to assess the major stormwater system over a shorter return period. This updated plan is being presented to City Council for approval and implementation.

City of Spruce Grove is also currently undertaking a Stormwater Master Plan that is expected to be completed in December of 2023.

A study was also completed on the Whitemud/Blackmud drainage basin with Alberta Environment, the North Saskatchewan Watershed Alliance (NSWA), the City of Edmonton, City of Beaumont, City of Leduc, Leduc County, and Strathcona County. The study identified areas of flooding and mitigations that could be done, as well as identified run off values to use for new development. The report is now available on the NSWA website.

Stormwater master plans improve the granularity of the municipalities' flood risk mapping, increasing the potential utility of the regional flood risk assessment model in the future as well.

Stormwater Projects

The Town of Devon completed a Stormwater main lining project in 2021. The main had significant infiltration as the invert had rotted out in places within the corrugated steel pipe. The lining was much more cost effective compared to a full removal and replacement, as well as less disruptive to the traffic or neighboring businesses. Devon recently experienced issues with the aging of existing outfalls and experienced a failure on one bank during a heavy rain event. The failure required immediate response to protect the integrity of the bank and re-establish flow to prevent further damage. To develop a longer-term plan, Devon is looking to complete a study for the existing storm outfalls to determine a replacement strategy. A preliminary design and costing exercise is required to determine the best replacement solution, which could potentially include the consolidation of existing outfalls.

Parkland County is set to present a final draft of their new "Surface Drainage and Lot Grading Bylaw" and "Lot Grading Policy" in early 2024 to the Council for final approval. Parkland County currently does not have a drainage or grading bylaw/policy and regularly receives input from concerned residents and business owners regarding drainage and stormwater management. The proposed bylaw and policy would establish a clear process and direction for how surface drainage and lot grading is managed in Parkland County. The proposed bylaw is not intended to direct or control landowners in how they use their own properties, but rather a means to guide and inform best practices to make sure that there are no negative impacts to adjacent or downstream neighbours.

Strathcona County is embarking on a stormwater modelling project, set to analyze the entire urban service's area stormwater system, using updated IDF curves and to capture potential impacts of climate change.

City of Spruce Grove completed a full assessment of all the water ponds within the city and identified their limitations and future upgrade requirements. The first project from this study will be completed in 2024 with more in the future budget plans.

5.0 Stormwater Actions 2023 – 2027

Building on the regional work to-date and considering the outlook for stormwater management, the collaborative outlined the initiatives it believes are the highest priority and are best undertaken regionally. These initiatives reflect discrete projects with a defined start and end date as well as ongoing activities to strengthen strategic partnerships, enhance public education, and improve success in accessing infrastructure and sustainability funding across the Region.

5.1 Asset Management Best Practices

Stormwater asset management involves assessing the condition, performance, and value of a municipality's stormwater infrastructure assets, such as pipes, culverts, detention basins, pump stations, low impact developments, and other facilities. The goal is to ensure effective management, maintenance, and planning for stormwater systems.

As stormwater management evolves, the approaches to asset management (or operational and maintenance planning) have advanced as well. As a result, the collaborative would like to conduct a review of the different approaches implemented across the Region, including the advantages, disadvantages, and relative associated costs of different stormwater asset management approaches.

The project will also outline best practices in stormwater asset management, including:

- asset identification and classification
- condition assessment
- performance evaluation
- risk assessment
- regulatory compliance
- financial analysis
- lifecycle management
- prioritization and planning
- implementation and monitoring
- decision-making and reporting
- continuous improvement

The project is intended to provide municipalities with a resource to explore methods to improve stormwater infrastructure performance through collaboration between engineering teams, subject matter experts, GIS specialists, operations staff, and financial managers.

5.2 Low Impact Development (LID) Infrastructure Guidance

Low impact development (LID) refers to a set of sustainable design and land use practices that aim to manage stormwater runoff and minimize its impact on the environment. LID approaches emphasize working with natural systems and incorporating green infrastructure to reduce the volume and discharge of stormwater, improve water quality, and promote environmental sustainability through enhanced biodiversity.

While LID practices can have many benefits, they can also have challenges or unintended consequences for municipalities. For example, effectiveness during shoulder seasons in cold weather climates may prevent LID practices from proportionally replacing traditional stormwater management.

Unintended consequences can include:

Unexpected maintenance requirements (For example, rain gardens, bioretention areas, and permeable pavements features that become clogged with debris, sediment, and pollutants, reducing their effectiveness, and potentially causing localized flooding; impacts of road salt on soil structure and plant survival).

Solutions that lack proper infiltration (For example, areas with certain soil types, high water tables, or contamination concerns) can lead to poor performance or impact groundwater quality.

Leaching of pollutants that can occur when contaminated stormwater not adequately treated by the LID solution impact soil and groundwater.

Some LID features (For example, rain gardens) can unintentionally result in the **spread of invasive species**.

Aesthetic and property value concerns can result when LID features are less visually appealing than more traditional landscaping.

Additional training and maintenance costs may be incurred by municipalities as some LID solutions require expertise or specialized training to implement or maintain.

Incompatibility with existing infrastructure can pose cost and performance challenges, particularly when retrofitting older developments.

Lack of available space (For example, LID solutions may need to compete for space within the road's right of way with other design features such as bike lanes or enhanced mobility networks).

Lack of public support can lead to challenges in resourcing and approvals, community buy-in, or required behavior change (e.g., reduced use of fertilizers, proper disposal of pet waste, etc.).

Regulatory and zoning barriers may prevent adoption of LID practices.

The project will outline factors that urban and rural municipalities must consider when assessing potential LID strategies and solutions. In addition, the project will develop a municipal toolkit including technical information, design guidelines, case studies, educational materials, and practical resources for LID practices. The goal is to help municipalities prevent unintended consequences or unexpected costs when implementing LID solutions.

5.3 Water Quality Program Development

Municipal water quality programs play a vital role in ensuring that communities have access to clean, safe, and reliable drinking water. The scope and components of a municipal water quality program can vary based on the size of the municipality, available resources, and local water quality challenges.

A water quality program is a comprehensive and organized initiative undertaken by a local government to monitor, manage, and improve the quality of its water resources. These programs are designed to ensure that the water supplied to residents, businesses, and industries meets regulatory standards, is safe for consumption, and supports a healthy environment. As the Province moves towards developing and implementing water quality regulations, EMRB municipalities will need guidance on how to develop, resource, monitor and report on water quality.

This project will provide municipalities with an overview of current federal and provincial water quality regulation as well as insight into potential future changes that may have an impact on municipalities in the Region (e.g., agriculture industry, rainwater re-use policies, resources etc.). The project will also provide an overview of best practices for municipal water quality programs including testing and monitoring, data management, and community engagement. In addition, the project will also provide guidance for coordinating with other governmental agencies, environmental and conservation organizations, and other regional stakeholders to address water quality issues that extend beyond municipal boundaries.

5.4 Bylaw Review – Stormwater Management Funding Models

Stormwater management funding models are financial strategies and mechanisms used by member municipalities to fund the planning, construction, operation, and maintenance of stormwater management systems and infrastructure. These systems are essential for controlling and mitigating the adverse impacts of stormwater runoff on the environment, public health, and property. Stormwater management funding models vary depending on local regulations, priorities, and available resources.

Consideration should be given to how stormwater planning/engineering, initial capital construction, replacement capital construction, operation and maintenance costs for various drainage assets and studies can be shared between various funding sources (developer contributions, off-site levies, responsibility of private property owners, utility customer rates, and the tax base). There are numerous drainage assets to consider on both public and private property (catch basins, lift stations, underground gravity/force main piping, manholes, catch basin grates, culverts, concrete swales, grassed swales, oil and grit interceptors, third-pipe collection systems, private sump forcemains, roadway curb and gutter, retaining wall seepage/drainage piping, stormwater management facilities, outfalls, floodways, flood channels and flood mitigation structures). There are also numerous studies to consider including utility master plans and flood mitigation studies. Some municipalities have higher utility rates for larger properties with high percentages of hard-surfacing, and some municipalities provide reduced utility rates for properties with rain barrels, soft surfacing, and LID improvements.

The collaborative proposes to complete a jurisdictional scan of funding models used across the Region and within other regions in Canada. Comparing stormwater funding models involves evaluating their effectiveness, equity, sustainability, and practicality in meeting the stormwater management needs of a specific jurisdiction. Factors to be considered will include (but are not limited to) revenue generated, equity, regulatory compliance, administrative cost, flexibility, and environmental impacts. The review will also address the impact of different stormwater funding approaches on the design of capital and operating programs as well as strategies to effectively balance proactive and reactive management of stormwater systems. This assessment will provide a guide for member municipalities to make informed decisions regarding potential funding approaches and support for periodic review and adjustments that are necessary to ensure responsible stormwater management.

5.5 Bylaw Review – Water Quality Requirements

Stormwater management (or drainage) bylaws are local regulations established by municipalities to address the management of stormwater runoff within their jurisdiction. These bylaws are designed to mitigate flooding, erosion, and water pollution caused by excessive stormwater runoff that can result from urban development, impervious surfaces, and other factors. Stormwater bylaws establish requirements to protect public safety, property, and the environment.

Stormwater management bylaws vary across the Region. Bylaws can address a wide range of factors, such as specific design criteria, permits and approvals and enforcement and penalties. The collaborative is proposing to complete a jurisdictional scan of regional bylaws. This will include a detailed examination of similarities and differences including delivery models and outcomes achieved.

5.6 Ongoing Actions

The collaborative also identified several ongoing activities that can be advanced through information exchange, sharing best practices, and leveraging in-house or local expertise available across the Region.

5.6.1 Strategic Partnerships

Environment and Climate Change Canada indicates that every \$1 invested in adaptation measures saves up to \$15 across the economy. This suggests that all levels of government benefit from aligned policies, regulation, and investment supporting the sustainable practices and infrastructure needed to protect the Region from flooding and other climate-related hazards¹⁰. In addition, the Region has new opportunities to work with the private sector to access expertise, explore innovative solutions, and fund capital projects.

The collaborative is also in a unique position to build strategic partnerships with non-governmental organizations focused on the environment, resource conservation, disaster relief, and community development as well as connect with academic and research institutions and industry associations to build capacity and resilience across the Region.

5.6.2 Regional Stormwater Public Education Campaign

A stormwater public education campaign is an initiative aimed at raising public awareness about the importance of managing stormwater runoff and encouraging responsible behaviors that help protect water quality and the environment. These campaigns play a crucial role in empowering individuals and communities to become stewards of their local water resources.

Sharing resources across the Region could help achieve the following:

- Coordinate education and public awareness campaign material regarding stormwater infrastructure safety across the Region (e.g., not skating on storm ponds).
- Public awareness on the purpose of stormwater infrastructure and how residents can minimize their impact on its function.
- Educating the public about the sources and impacts of stormwater pollution, as well as the role individuals and communities play in mitigating it.
- Encouraging responsible practices such as proper disposal of household chemicals, picking up pet waste, and reducing the use of fertilizers and pesticides in landscaping.
- Engaging with local communities, schools, businesses, and organizations to promote stormwater-friendly practices and projects.
- Inspiring individuals to adopt behavior changes that reduce their contributions to stormwater pollution, such as reducing car washing on impervious surfaces or installing rain gardens.

¹⁰ Insurance Business. February 28, 2020. [IBC reveals cost of municipal investment in climate change adaptation](#). Accessed August 25, 2023.

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- Informing the public about local stormwater regulations and the importance of compliance to prevent fines and environmental damage.
- Collaboration between municipalities, government agencies, nonprofits, and other stakeholders to leverage resources and expertise in delivering the campaign's message.
- Ability to track and monitor the effectiveness of the campaign through data collection and analysis.

A regional campaign could leverage municipal and regional communication channels, including websites, social media, educational materials, workshops, community events, and public service announcements to expand the potential reach and effectiveness the program.

5.6.3 Infrastructure and Sustainability Funding

Both the federal and provincial government have recognized the importance of stormwater management and have introduced funding programs to support communities in their efforts to upgrade and improve stormwater infrastructure. However, the funding landscape can be complex, fragmented, and difficult to successfully navigate. Even when funding opportunities are identified with sufficient time to apply, submissions can be labour intensive and may require specialized data or technical skills to complete.

With limited resources available to address very high demand, municipalities seeking public funding must be strategic in their approach. The collaborative would like to investigate strategies to improve the Region's ability to successfully compete for available funds. More specifically the project would result in:

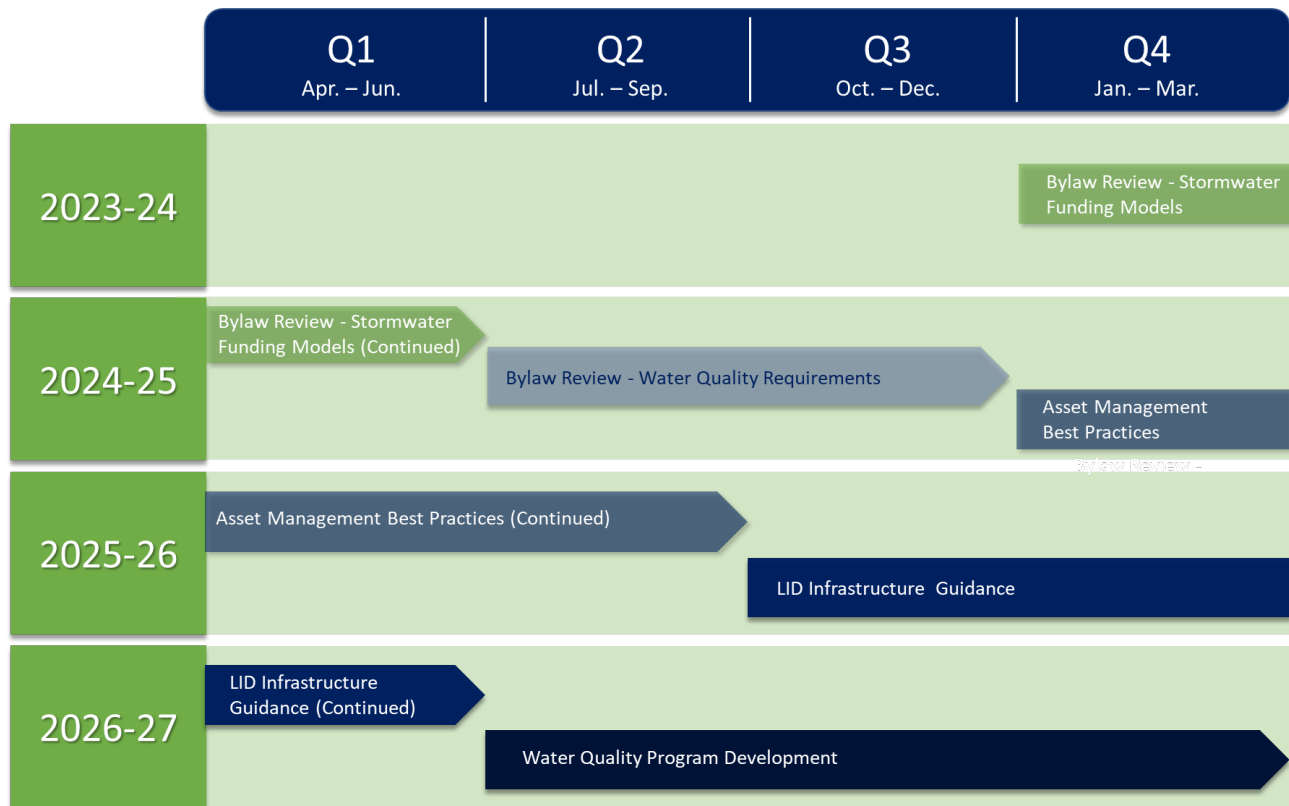
- A scan of relevant public and private funding organizations.
- An inventory of available grants, subsidies, or programs.
- A summary of eligibility and data requirements.
- Guidance on building a strong case for the project.
- Building strategic partnerships and networks.
- Tactics for effectively conveying the value and impact of an initiative.
- Best practices for grant and/or proposal writing.

These ongoing activities will be undertaken throughout the year dependent on the capacity of the collaborative and regional experts and partners.

6.0 Stormwater Roadmap

The roadmap is the culmination of analysis of operational realities, emerging trends and technologies, regional priorities, and collaborative capacity translated into specific, actionable projects to support stormwater management within the Region. The roadmap is also intended to set attainable goals and take realistic, incremental steps to provide value and encourage action when change can be accelerated through regional collaboration. The roadmap is intended to secure high-level commitment to the priorities outlined, as well as the resources and support needed to execute the work.

Figure 2. Stormwater Roadmap



7.0 Next Steps

The collaborative continues to make progress on its approved action plan through the flood risk assessment project.

While the flood risk model has been developed, additional data provided by the municipalities may continue to be added to enhance accuracy and completeness over time. In addition, work continues to develop a common framework for stormwater KPI's and to validate measures, data sources, and methodologies. Findings from the model and supporting projects will be summarized within a flood risk assessment final report that is expected to be completed by December, 2023. The final report is expected to outline future recommendations as well as additional work that may be required to support the flood risk model longer-term, such as a maintenance and reporting strategy or to develop an enhancement schedule.

Following approval of the action plan, the collaborative will also begin developing the project charter for a review of bylaws addressing funding mechanisms for stormwater management.

APPENDIX A: Collaborative Members

- Beaumont – **Ryan Orlovsky**, Manager, Utility and Facility Operations (Member); **Aaron Lewicki**, Director, Infrastructure (Alternate)
- Devon – **Sean Goin (Co-Chair)**, Manager of Infrastructure (Member); **Paresh Dhariya**, General Manager of Planning and Operations (Alternate)
- Edmonton – **Mathew Langford (Co-Chair)**, Manager of Stormwater Planning, EPCOR (Member); **Susan Ancel**, Director, One Water Planning, EPCOR (Alternate)
- Fort Saskatchewan – **Brad McDonald**, Manager, Infrastructure Strategies (Member); **Janel Smith-Duguid**, General Manager of Infrastructure and Planning Services (Alternate)
- Leduc – **Ryan Graham**, Manager, Infrastructure (Member); **Shawn Olson**, Director, Engineering and Environment Planning (Alternate)
- Leduc County - **Des Mryglod**, Director of Engineering and Utilities (Member); **Shailesh Modak**, Manager of Utilities (Alternate)
- Morinville – **Jordan Betteridge**, Manager, Infrastructure Services (Member)
- Parkland County – **Matthew Good**, Land Development Engineering (Member)
- Spruce Grove – **Mark Hussey**, Director of Engineering (Member); Rae-Lynne Spila, Municipal Engineer (Alternate)
- St. Albert – **Regan Lefebvre**, Senior Manager, Utilities (Member)
- Strathcona County – **Jessica Dalton**, Manager, Land Development Engineering (Member)
- Sturgeon County - **Jeff Yanew**, Manager of Utility Services (Member)

APPENDIX B: Growth Plan: 50 Year Vision

50 YEAR VISION

The Edmonton Metropolitan Region is the dominant hub for northern Alberta and is recognized globally for its economic diversity, entrepreneurialism, leadership in energy development, environmental stewardship and excellent quality of life.

The Region is anchored by a thriving core that is interconnected with diverse urban and rural communities.

The Region is committed to growing collaboratively through the efficient use of infrastructure, building compact communities, and fostering economic opportunities and healthy lifestyles.



Source: *Edmonton Metropolitan Growth Plan: [Re-Imagine. Plan. Build.](#)*

APPENDIX C: Metropolitan Region Servicing Plan Guiding Principles

Creating a common understanding of the shared servicing challenges is vital to creating an environment where municipalities can think and act in the best interest of the Region. The Metropolitan Region Servicing Plan¹¹ (MRSP) Principles reflect the regional imperative for working together and will provide critical guidance for the planning, investment, and coordination of the delivery of metropolitan services. The MRSP Principles are aligned with the guiding principles of the growth plan.

The MRSP Principles are to:

- Lead with a metropolitan mindset for the greater good.
- Pursue leading and innovative research, technology, and best practices.
- Build, collect, and share regionally relevant data, information, and knowledge.
- Prioritize regionally scaled service investments informed by evidence.
- Leverage sub-regional service initiatives to benefit the Region.
- Recognize the unique municipal service contexts.
- Guarantee the safety and wellness of citizens.
- Act in a regional manner with a unified voice.

¹¹ Edmonton Metropolitan Region Board. 2019. [Metropolitan Region Servicing Plan](#). Accessed June 2021.