

2021 Watershed Management Report



April 2022

Introduction

A healthy watershed now and in the future

Calgary is a river city. Our community relies on the Bow and Elbow Rivers as the source for clean reliable drinking water. The watershed provides recreational, cultural, and aesthetic value for Calgarians to enjoy. Increasing pressure on our rivers, creeks, streams, and wetlands from growth in the region and a changing climate make water management one of Calgary’s most important challenges. The City of Calgary is committed to ensuring a healthy and resilient watershed to make life better now and for future generations of Calgarians.

Our work helps achieve the Watershed Management Goals and Outcomes in Calgary’s 2021 Environmental Strategy:

1. Protect our water supply to ensure a water secure future.
2. Use water wisely to use our water resources more efficiently.
3. Keep our rivers healthy to reduce the impacts of urbanization.
4. Build resilience to flooding to protect safety and property.

Climate change impacts every aspect of watershed management. We are building a culture of climate change by accounting for it in programs, projects, and plans for service delivery that support Calgary’s Climate Resilience Strategy, Council’s Climate Emergency Declaration, and the Resilient Calgary Strategy.

We continue to prioritize actions, make investments, and work with internal and external partners to ensure a resilient watershed. With guidance from Council, we continue to consider the needs of a growing city and region to maximize the economic, social and environmental benefits of our decisions, programs, and investments.

This report includes a snapshot of 2021 highlights on four strategic goal areas. The report includes targeted updates for 2021 and planned areas of focus for 2022.



Figure 1. Watershed Management occurs across The City’s three lines of water utility services.

GOAL #1: Protect our water supply



Growth in Calgary and the region depends on a safe, reliable, and secure water supply. High quality water in the rivers helps the city reduce the costs of treating our drinking water while protecting our aquatic environments. Water security actions ensure water supply for future generations. Source water protection and drought management planning provide long-term sustainability of water resources in a changing climate and growing region. The biggest risks to our source water are upstream stormwater and wildfire.

2021 Highlights

We continued to advance actions driven by the Source Water Protection Policy, including:

- Advocated for regional source water protection.
- Partnered with regional municipalities to assess impacts of chemicals in fire fighting products on source water.
- Continued participation in the multi-jurisdictional Bears paw Reservoir Trilateral Task Force focused on protecting the reservoir.
- Initiated work on a Watershed Investment Strategy which will add another tool to protect Calgary's source water.

Continued work on amending our water licence to increase operational efficiency at the Bears paw Water Treatment Plant.

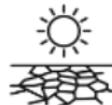


Regional growth depends on sustainable water management. In 2021 we represented Calgary's source water interests in multiple intermunicipal planning circulations.



We also advocated for watershed protection policies and water security actions to be included the Calgary Metropolitan Region's Growth and Servicing plans which were completed in 2021.

In the summer of 2021, we monitored watershed conditions and worked closely with major water users to balance hydrological, agricultural and municipal water demand and protect aquatic environments while experiencing low river flows during an unprecedented heat wave.



Our monitoring program indicates that Calgary continues to have high quality source water in the Bow and Elbow Rivers.

2022 Planned actions

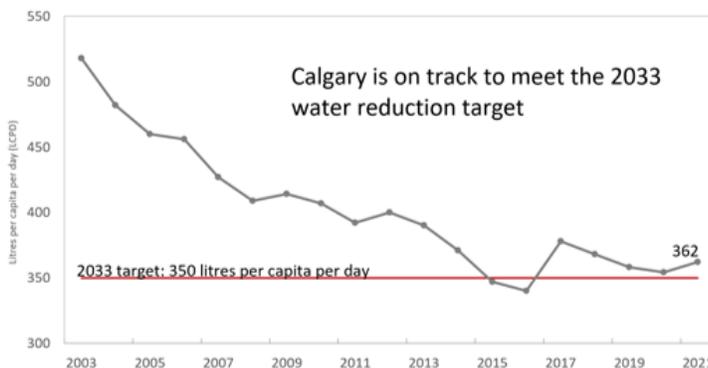
- Continue working with partners and neighbours on regional watershed protection including the Calgary Metropolitan Region, Alberta Water Council, watershed stewardship groups, and Watershed Planning and Advisory Councils.
- Continue to advance the development of a Watershed Investment Strategy to support protection and watershed stewardship activities upstream and in Calgary.
- Complete public engagement and aim to complete the Drought Management Plan.

GOAL #2: Use water wisely

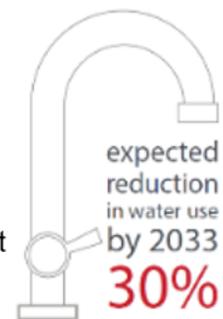


Water efficiency and conservation programs help reduce water consumption, which achieves multiple objectives. It helps The City meet the needs of our growing city, manage operational costs, defer infrastructure upgrade and address climate change impacts. The City's efforts on water conservation and drinking water plant efficiency has kept us on track to achieve Calgary's water conservation targets.

2021 Highlights



Our highest daily demand for water coincided with the heat wave on June 28 when demand hit 820,000,000 litres, remaining below our water treatment plant capacity.



We launched outdoor water efficiency communications early in response to a heat wave.



We completed training and research on institutional, commercial, and industrial building cooling systems, which can use significant volumes of water. This will help businesses improve water efficiency and save on water bills.



Through an academic partner, we identified water efficiency programming options that consider pressures on water security such as drought and climate change.

We created a Native Wildflowers Plant Guide to reduce water needs and support pollinators.

We piloted QR code signage at garden centres to help Calgarians shop for water wise plants.

2022 Planned actions

- Promote water-wise plants for resilient and efficient landscaping by expanding digital resources and live demonstration garden sites.
- Continue development of a Water Efficient Business Program.
- Program design in 2022 will focus on water efficiency initiatives that offer benefits to drought and stormwater management to help adapt to climate change.



GOAL #3: Keep our rivers healthy



Pollutants in rivers can impact fish and wildlife, the ecosystem and drinking water. The City works diligently to manage risks through efficiencies in wastewater treatment, mitigating the impacts of city-building on stormwater quantity and quality, and protecting the riparian areas adjacent to rivers, creeks and wetlands.

2021 Highlights

Upgrades to Calgary's three Wastewater Treatment Plants to protect our rivers and support population growth are on track and on budget.

Phase one of the Plant D expansion at the Bonnybrook Wastewater Treatment Plant progressed significantly, increasing plant capacity and incorporating technologies to improve wastewater quality. Phase two has begun.

We kept sediment from construction out of the rivers and rolled out a new initiative to support industrial, commercial and institutional facilities in reducing stormwater pollution.



These programs help keep our rivers healthy and ensure we are meeting our regulatory obligations.

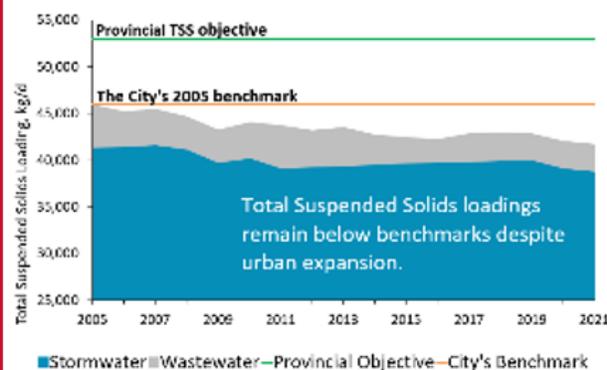
Average city-wide riparian health score



67%

Target is 72% by 2026

Over 50 riparian and bank restoration projects were active in 2021, bringing the total projects that improve riparian health to over 170 since 2007.



Calgary remained under benchmarks for Total Suspended Solids and Total Phosphorous loadings into the Bow River from stormwater and treated wastewater.

Gravel lanes produce up to 11% of sediment loading into our waterways. We initiated pilot projects to determine how to reduce impacts of gravel lanes on river health.

2022 Planned actions

- Expansion of Bonnybrook's Cogeneration Facility is scheduled to be completed in 2022, which will use biogas for energy, helping to offset greenhouse gas emissions.
- Phase 2 of The City's Riparian Monitoring Program will be completed, providing 5 years data on riparian health trends and the efficiency of riparian planting and bioengineering techniques in Calgary.
- We will continue the gravel lanes pilot projects in 2022.



GOAL #4: Build resilience to flooding



The City's Flood Resilience Plan includes a combination of upstream, community, and property-level flood mitigation working together to make Calgary more resilient to river flooding considering climate uncertainty and continued urban development. The Community Drainage Improvement program and other initiatives increase stormwater capacity to minimize localized flooding risks to address climate impacts and densification in communities.

2021 Highlights

We started construction on the Downtown Flood Barrier and Upper Plateau Separation projects in 2021. Once completed, they will significantly reduce the risk of flooding in Calgary's downtown and the communities of Sunnyside and Hillhurst.

The Sunnyside Flood Barrier will be constructed through the integrated Memorial Parkway Program. Design will continue throughout 2022 and construction is expected to start in 2023.

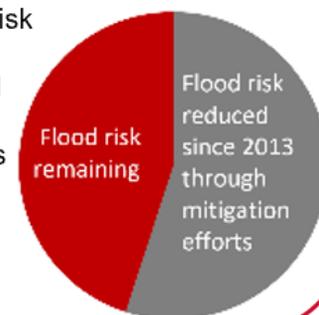
The Government of Alberta's Springbank Off-Stream reservoir started construction. Once it is functional, it will work with the Glenmore Reservoir to eliminate the risk of flooding up to a 2013 flood event.

The Government of Alberta Bow River Reservoir Options study remains underway. A report is expected in late 2023 that may recommend a potential new reservoir site for further study.



\$21.6M in Community and Local Drainage improvements were completed in 2021, reducing the risk of localized stormwater flooding in communities including Sunnyside, Hillhurst and Tuxedo.

Since the 2013 flood, The City's river flood mitigation efforts have reduced flood risk by over 50%, improving safety and reducing damages, costs and disruptions from floods.



2022 Planned actions

- Support the Government of Alberta's progress on the Springbank Off-Stream Reservoir, Bow River Reservoir Options Study, and Flood Hazard Area map updates.
- Continue construction of community flood mitigation infrastructure projects.
- Conduct engagement for the Calgary River Valleys Plan update which will consolidate municipal floodplain policy.
- Continue prioritized investments in Community and Local Drainage Improvements.

Area of focus: Planning a resilient river city

The confluence of the Bow and Elbow Rivers (Moh'kinstsis) have drawn people to its banks for thousands of years, shaping our community as we know it today. Decades of housing, workplaces, businesses, infrastructure and institutions vital to the city's quality of life and economy exist within the floodplain. At the same time, our river valleys encompass large networks of parks and open spaces. This includes important ecological corridors and natural infrastructure that provide citizens important connections to nature and sacred spaces. River valleys are essential to our city and at the core of our city's appeal as a place to live and do business.



Calgary's river valleys are a dominant landform in our community. They are spaces where we live, work and play.

As Calgary has grown, our relationship with the rivers and the landscape has evolved. Calgary's River Valleys Plan (1984) contains a range of policies to guide long-term development, recreational use, and conservation of Calgary's rivers, creeks and adjacent lands. There has however been significant change in the last 40 years, including our experience with the 2013 flood. Looking ahead, new Provincial flood hazard area maps, continued growth pressure and land use decisions in our city, and a changing climate presents an opportunity to update and reimagine our Calgary River Valleys Plan. This update will ensure we continue to anchor our river valleys in long-term city planning decisions and resiliency.

Updating this Plan will challenge us to think boldly about how we develop and regulate around our river valleys in a way that balances safety and resilience while ensuring they remain great places to live and enjoy. It will require resolving tensions and trade-offs between the diverse needs of our river valleys, including:

- developing and maintaining viable communities,
- reducing risk to property,
- attracting business and industry,
- protecting river ecologies and natural functions,
- adapting to climate change, and
- providing access to nature, recreation and spaces for celebration.

Planning for our river valleys must also uphold equity and inclusion and build reconciliation as a foundation in river valley planning decisions.

Land use planning and development are also a fundamental part of Calgary's approach to building flood and climate resilience and support our Flood Resilience Plan, Next Generation Planning Program and Climate Strategy. An updated Calgary River Valleys Plan will create coordinated and consistent river valley land use direction and policies and direct potential updates to the Municipal Development Plan, local area plans, Land Use Bylaw, and other relevant planning documents and regulations.

City-wide engagement, including with Indigenous communities, residents and businesses in flood risk communities, community and civic stakeholders and developers will be a central and key part of the process. Engagement will help us gain a broader understanding of the importance and value of Calgary's river valleys, which will form the foundation for the update to the Calgary River Valley Plan and new policy development. We will be seeking input on a range of policy scenarios for river valley areas (ranging from greenfield, brownfield and developed) and help communities understand the implications of the new flood maps. This multi-year project will continue between 2022-2024.

Area of focus: Water security – a dry year for Calgary

Our water supply is changing: As flow and water quality in the Bow and Elbow Rivers shift with a changing climate, a vibrant Calgary continues to need safe, clean water for human well being, ecosystem resilience and economic sustainability. To guide a water secure future, a [Water Security Framework](#) was developed to address the risks of a changing climate, water licence limits, and population growth.

We are making progress on the six priority actions in the Framework (Figure 2). In 2021, Calgary’s heat wave and the results from our drought research study highlighted the importance of the priority action for drought management for continued water security.



Figure 2. The Water Security Framework 6 priority actions.

2021 Heat Wave: Western Canada experienced an unprecedented heat wave with dry conditions that continuing into 2022. In late June and early July 2021, Calgary experienced record-breaking temperatures over 36° C and the highest single-day demand for water in nearly 20 years.

Record high water demand during the heat wave required water treatment plant operators to keep operations running smoothly. In addition, we asked Calgarians to voluntarily reduce their outdoor water use to help our treatment plants keep up with demand. The City’s operations also took extra steps to conserve water by reducing watering of grass and flowers, keeping grass long, and watering overnight. When temperatures subsided, we launched our summer outdoor watering campaign early promoting actions from the [Homeowner Water Guide](#), preparing Calgarians in case dry conditions escalated again.

Drought Resilience: In 2021 our water treatment plants were able to manage the high-water demand. Droughts continue to be a top climate risks for Calgary. Adapting our city to the reality of living in a drier climate is key to ensuring that future droughts are less disruptive, and we have a reliable water supply for future generations. In 2021, we worked with a research consultant to conduct a survey, interviews and focus groups with residents, and industrial, commercial and institutional organizations to understand perceptions and expectations from The City about drought. Two main findings from the research were that Calgarians value a safe reliable water supply but may not perceive drought as a risk, and that to build and maintain trust in our water supply, customers want proactive, clear, detailed drought communication and action from The City.



As we draft an updated Drought Management Plan in 2022, engagement will explore building awareness of Calgary as a city susceptible to droughts. The Plan will explore how to increase resilience by reducing outdoor water use and incorporating new water conservation targets and programs in support of a climate-resilient Calgary.

Area of focus: Stormwater management

Over the past decade Calgary has experienced some of the most variable and intense weather in Canada. To ensure Calgary is well positioned to manage stormwater now and in the future, the Stormwater Management Strategy draft was completed in 2021. The Strategy combines the learnings and experience of operating Calgary’s stormwater management system with robust engagement with a variety of key stakeholders. The Strategy will help Calgary meet service commitments, support climate goals, enhance service value to citizens and businesses and sustain collaboration, innovation and accountability through a systems-based approach (Figure 3).

Delivering on the Strategy will reduce flooding, mitigate pollutants, ensure continued regulatory compliance, provide recreation opportunities, preserve wildlife habitat, protect source water and watersheds for Calgarians and downstream users. This includes investing in grey, green and natural infrastructure and ensuring the services provided are cost-efficient and fair for new and existing communities. Green stormwater infrastructure uses natural features such as green roof and rain gardens to help reduce the volume of and remove contaminants from stormwater.

Success will be gained through a sustained effort between The City, citizens, property owners, businesses, industry, environmental organizations and watershed partners to protect Calgary’s water and watersheds. Building on The City’s ongoing commitment to reduce impacts to our watershed and rivers, the focus for 2022 is to finalize the Stormwater Management Implementation Plan.

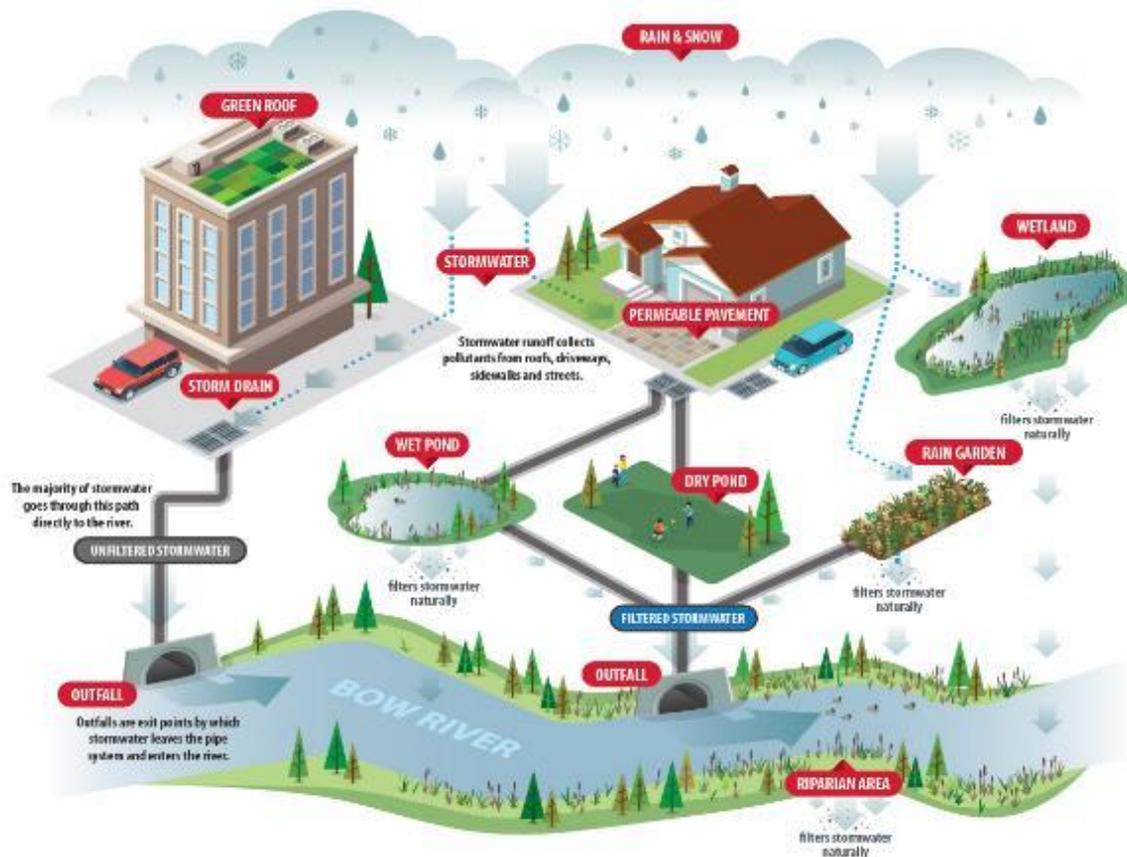


Figure 3. Calgary’s stormwater management system reduces the impact of flooding, pollution and stream erosion. Our stormwater practices improve the quality and decrease the volume of stormwater entering waterways.

Area of focus: The importance of reservoirs in water management

Reservoirs are critical water management structures in the Bow River Basin. The City operates water treatment plants at two reservoirs: one at the Glenmore Reservoir on the Elbow River and a second at Bearspaw Reservoir on the Bow River. Both supply Calgarians and regional customers with drinking water. New gates installed at Glenmore Dam in 2020 doubled the storage of the reservoir. This also reduces the flood risk along the Elbow River and enables us to store more water heading into winter when flows into the reservoir are at their lowest levels. Managing reservoirs involves constant monitoring of water quality to ensure safe and high-quality water for our citizens. It also means protecting our source watersheds through careful land use planning near reservoirs and initiatives to minimize contaminants in our source water supply.

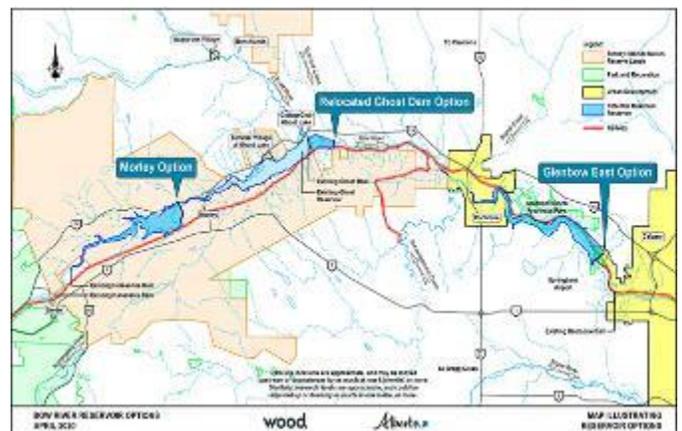


New higher gates at the Glenmore dam have doubled the reservoir's storage, providing valuable water supply and flood mitigation on the Elbow River.

The City works closely with the Government of Alberta, TransAlta Corporation, and other major water users on reservoir operations to maintain water for all users. TransAlta operates a network of dams and reservoirs upstream of Calgary on the Bow River that provide hydroelectricity, regulate river flows, and provide recreational opportunities. A careful balance among all uses must be managed as the region's population grows and climate change influences weather patterns. Southern Alberta is no stranger to severe, multi-year droughts and climate experts predict that rising temperatures will cause snow to melt earlier in the year, leading to a longer, hotter outdoor water use season. Over time, this will make it more difficult for our existing reservoirs to satisfy water demands, while presenting risks to our long-term water security. We manage this by working together to coordinate reservoir operations year-round, releasing water in spring when snow melt is high to minimize the risk of flooding, and refilling them to ensure the region has enough drinking water to get through the late summer and winter.

To continue building climate-related drought and flood resilience, the Government of Alberta is working on two major projects:

- Currently under construction, the Springbank Off-Stream Reservoir will work with the Glenmore Reservoir to store water during flooding, slowly releasing water back into the Elbow River. Construction is expected to be complete by 2024.
- The Bow River Reservoir Options study is evaluating the feasibility of three sites for a new reservoir on the Bow River upstream of Calgary to reduce the impact of both flood and drought. A report is expected in late 2023 that could recommend one site for further study. This reservoir is an important long-term milestone for climate resilience for Calgary that is at least 14 years away. If pursued, design and regulatory review would need to be completed before a preferred option could be approved and funded.



The Government of Alberta's Bow River Reservoir Options Study is examining three potential sites for a new reservoir upstream of Calgary on the Bow River for water supply and flood mitigation.

The City is a key stakeholder in both of these projects, and we continue to work with the Government of Alberta to share information, advocate for The City's interests, and stay informed of developments on both projects.

Conclusion

The City continues to work with internal and external partners to ensure the resilience of our watersheds to make life better for Calgarians. Our actions and investments help to address increasing pressure on rivers, creeks, streams and wetlands from human activity, urbanization and a changing climate. Continuing to proactively address watershed management requires collaboration and innovation.



In 2022, we will make further progress on our four goals to:

- Protect our water supply from the pressures of growth, contamination of drinking water, and climate impacts.
- Proactively manage drought risk to make Calgary resilient to future drought conditions through an update to the Drought Management Plan.
- Reduce water use to accommodate growth and build resilience to changes in future water availability.
- Address stormwater and city-building challenges through implementation of innovative practices that support the Stormwater Strategy.
- Protect the health of rivers, creeks, stream, riparian areas and wetlands through a combination of infrastructure investments, pollution prevention and our riparian protection initiatives.
- Mitigate flood risk to protect the health and safety of people, businesses and infrastructure.

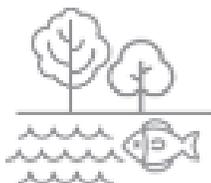
GOAL 1: Protect our water supply



GOAL 2: Use water wisely



GOAL 3: Keep our rivers healthy



GOAL 4: Build resiliency to flooding

