

# 2020 WATERSHED MANAGEMENT REPORT



Prepared by the Water Resources Business Unit

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# 1. INTRODUCTION

## 1.1 A HEALTHY WATERSHED NOW AND IN THE FUTURE

The City of Calgary is committed to ensuring a healthy and resilient watershed to make life better for current and future generations of Calgarians. Our community relies on the Bow and Elbow Rivers as the source for our safe, clean, reliable drinking water.

The 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 critical resiliency challenges.

With guidance from Council, our actions consider the **needs of a growing customer base in Calgary and the region, and maximizing the economic, social and environmental benefits of decisions, programs, and investments.** Water resources are shared with other municipalities, First Nations, rural users, agriculture, and other industry, which requires a collaborative, flexible approach to managing the watershed.

The water in the Bow and Elbow Rivers travelled from the land upstream of Calgary. The Bow River drainage area, also called a **watershed** covers 7800km<sup>2</sup>. The Elbow River watershed covers is 1200 km<sup>2</sup>.

Working with the Government of Alberta, regional partners, stakeholders and citizens, we aim to protect the water supply, use water wisely, keep rivers healthy and build resiliency to flooding. We deliver on this commitment through the Utility’s three lines of service: water treatment and supply, wastewater collection and treatment, and stormwater management (Figure 1.1).



FIGURE 1.1 THE CITY'S WATERSHED MANAGEMENT

The Utility continues to deliver high quality drinking water and manage wastewater and stormwater during the COVID-19 pandemic. To protect the health of citizens and staff, procedures and delivery methods were adapted to continue to provide drinking water, wastewater treatment and stormwater management services.

This report describes the 2020 actions taken to achieve watershed management goals, how these actions support the services delivered to customers and addresses watershed challenges and priorities. A snapshot of the 2020 highlights and 2021 actions are found in Figure 1.2.

FIGURE 1.2 THE CITY'S 2020 WATERSHED MANAGEMENT HIGHLIGHTS AND 2021 PLANNED ACTIONS

## GOAL #1: Protect our Water Supply

Growth in Calgary and the region relies on a safe, reliable, and secure water supply. Our Water Security Framework, a new Source Water Protection Policy, and development of a Drought Management plan will help provide long-term sustainability of water resources in a changing climate and growing region.

### 2020 Highlights



The **Source Water Protection Plan and Policy** was approved by Council in 2020. We designed this policy to provide clear and consistent application of source water and riparian area protection in city and regional planning processes and decision making.



Our monitoring indicated that Calgary continues to have **high quality source water** in the Bow and Elbow Rivers. High quality water coming into our treatment plants is important because it allows us to provide **reliable, safe water for customers and reduces cost for water treatment.**



We advocated for watershed protection policies and water security actions to be included in the **Calgary Metropolitan Region Board's Grown and Servicing plans** because regional growth depends on sustainable water management.



Calgary is in a drought-prone region, so we developed mitigation and response strategies to address Calgary's drought risk. We also conducted stakeholder workshops to help create a **Drought Management Plan** to be proactive about understanding and managing drought **which can help reduce the economic, environmental and social impacts of drought.**

### 2021 Planned Actions

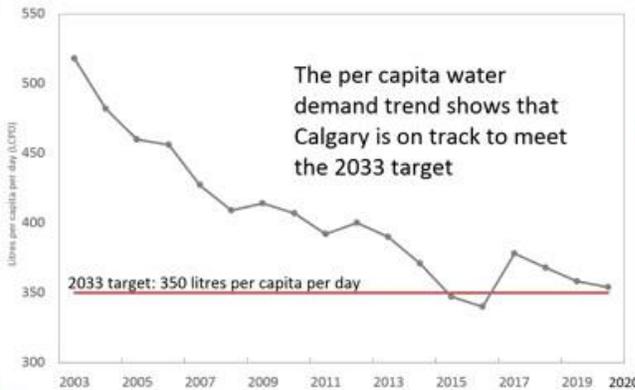
Advance initiatives under the Source Water Protection Plan: Wildfire Source Water Task Force strategy, emergency and preparedness plans for contaminant spills, a Watershed Investment Strategy framework, and an outreach and education plan. Continue climate and hydrology research and modelling, finalize the Drought Management Plan, continue working with CMRB to finalize and implement Regional Growth and Servicing Plans.

## GOAL #2: Use Water Wisely



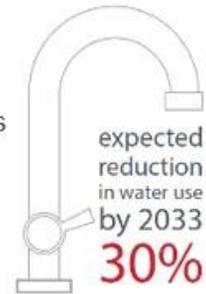
Effective water efficiency and conservation programming enables The City to continue to supply customers with the water they need. Initiatives to reduce water consumption help to manage operational costs, defer infrastructure upgrades, accommodate growth, and address climate change impacts. The City's efforts on water conservation and plant efficiency has kept us on track to achieve Calgary's water conservation targets.

### 2020 Highlights



The per capita water demand trend shows that Calgary is on track to meet the 2033 target

We began to implement a **Water Loss Strategy** to coordinate Utility efforts to reduce leaks across the system to save water which reduces water treatment and distribution costs and energy use.



We updated the annual **Summer Outdoor Watering Campaign** to include **drought awareness** messaging to promote efficient water use and build drought resiliency.



### 屋主水务指南系列 降水径流管理系统

We made YardSmart and Homeowner Water Guides **accessible** to multi-cultural communities by translating **into six additional languages**.

Water audit training and pilots were conducted to help develop a **Water Efficient Business Program** which will support businesses with water bill savings.

### 2021 Planned Actions

Continue to implement the Water Loss Strategy, continue to align drought, climate change, stormwater and conservation initiatives to build resiliency, develop Drought Education Strategy, use demand forecast models to support peak day campaign, implement actions in the Water Efficient Business Program.



## GOAL #3: Keep our rivers healthy



Pollutants in rivers can negatively 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.

### 2020 Highlights

Despite some minor delays due to Covid-19, progress made on **major upgrades** to the Bonnybrook Wastewater Treatment Plant.

Upgrades will accommodate growth, help protect the environment, and improve energy efficiency.



**100%**

regulations met for treated wastewater returned to the river

We completed stakeholder engagement to develop a new **Stormwater Management Strategy**, which will be drafted in 2021. The strategy will provide new opportunities to address stormwater and city-building challenges.

The **Stormwater Pollution Prevention Program** reduced soil from construction sites reaching our rivers by 23,024 tonnes in 2020. This helps us to meet regulatory requirements and keeps our rivers healthy.

Calgary remained under The City's benchmark for Total Suspended Solids (TSS) loadings into the Bow River from stormwater.

This demonstrates **the effectiveness of The City's stormwater quality investments and programs** to keep our rivers healthy.

Riparian monitoring shows that restoration projects are **improving the health of riparian areas and protecting our waterways**.



The **Gravel Lane Study** identified potential solutions to reduce sediments from unpaved lanes reaching our rivers, helping to keep our rivers healthy.

### 2021 Planned Actions

Complete additional major upgrades of Bonnybrook Wastewater Treatment Plant (WWTP), initiate ammonia toxicity study and design studies for the Fish Creek WWTP, update the Stormwater Management Strategy, continue monitoring for the Riparian Health Index, continue cleaning of stormwater ponds, In 2021-2022, with wetland compensation funding, Parks and the Utility will collaborate on restoring the Inglewood Bird Sanctuary Lagoon Reconnection and Bow Habitat Station BP Coldwater Stream.



## GOAL #4: Build Resiliency to Flooding



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

### 2020 Highlights

The detailed design for the **Downtown Flood Barrier** and **Upper Plateau Separation** resilience projects were completed. These projects will improve flood resiliency in these communities. We **secured \$20.8 million** from Infrastructure Canada for these projects.

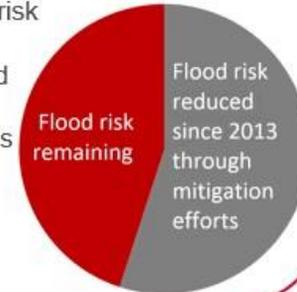
We continued **advocacy for upstream flood mitigation** and prepared to participate in the 2021 regulatory hearing on the Springbank Reservoir flood mitigation project.

**Upgrades to the Glenmore Dam** were completed to increase resiliency to flooding and drought.



We secured about **\$34 million** from the Government of Alberta for **Community Drainage Improvement** and **Local Drainage Improvement** programs to reduce damage from localized stormwater flooding.

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.



### 2021 Planned Actions

Continue to implement key community-level flood mitigation infrastructure projects, explore policy tools to support anticipated flood hazard mapping updates, continue advocating for Provincial upstream flood mitigation reservoirs, and continue delivery of the Community Drainage Improvement and Local Drainage Improvement programs.

## 1.2 ALIGNING WITH CORPORATE PRIORITIES

The City's watershed management goals are aligned with One Calgary's Council Directives of **A Healthy and Green City**, and **A City of Safe and Inspiring Neighbourhoods**.



Advancing watershed management goals aligns to the following One Calgary Council Directives:

- Integrated watershed management is essential to protect public health and the environment, while strengthening our resiliency to a changing climate.
- Calgary must develop our communities with a focus on achieving future water security and a sustainable water supply.
- Watershed management must be integrated into our land use policies, plans and decisions.
- Accomplishing sustainable, effective watershed management within Calgary and the region will also require working collaboratively with other orders of government, adjacent municipalities, residents, Watershed Planning and Advisory Councils (WPACs), stakeholders, landowners, the development industry, businesses and the First Nations.

The Utility's Watershed Management programs also help achieve outcomes of the Resilient Calgary Strategy and the Climate Resilience Strategy.

## 1.3 RESILIENT WATER MANAGEMENT AND CLIMATE CHANGE

Climate change is shifting precipitation patterns. Calgary will experience higher intensity storms, hotter, drier and longer summers, and earlier melting of the mountain snowpack.

The City is taking action to mitigate emissions at treatment plants, adapt to the increased risk of floods or droughts, protect source water, and manage increasingly intense storm events.

Climate change impacts every aspect of watershed management. The Utility's responsibility includes mitigating treatment plants emissions, providing reliable clean drinking water, adapting to increased risk of floods or droughts, and managing the impacts of increasingly intense storm events.

Understanding this responsibility, we are building a culture of climate change action across water utility and planning services to consider climate impacts in programs, projects, strategies and plans that will support the delivery of services, the Climate Resilience Strategy and the Resilient Calgary Strategy.

In 2020, the Utility chartered the work needed to develop an effective Water Utility Climate Resilience Plan to integrate climate change considerations into the Utility's day to day work. Throughout the year, the Utility supported Environment

and Safety Management in their development of a corporate-wide Climate Resilience Training program and collaborated on specific climate resilience projects including collaborations with the Elbow River Watershed Partnership and SAIT's Integrated Watershed Management program. We supported several climate related public outreach activities including the Mayor's Expo and Eco-leaders Conference & Climate Symposium.

Priorities in 2021 include finalizing water-focused staff climate change training and completing an updated water utility specific climate resilience plan and supporting actions to ensure we sustain our momentum in climate resilience into the future.

## 2. GOAL #1: PROTECT OUR WATER SUPPLY

### *The value of ensuring a water secure future*

Supporting growth in the Calgary region requires a safe, reliable, and secure water supply. The region is prone to drought and future water security may be impacted by population growth, a changing climate, regulatory limits and surface water licence limitations, all of which can increase pressures between water supply and demand. Our Water Security Framework addresses water security risks including impacts to both water quality and quantity and allows us to continue to take actions to address these challenges.

### 2.1 WATER SECURITY

Calgary's Water Security framework supports the One Calgary Directive to develop our communities with a focus on **achieving future water security and actions the Water Utility's Water Treatment and Supply service commitment to provide long-term sustainability of water resources.**

The Framework identifies three major risks that impact the region's water security:

- A changing climate introduces uncertainty regarding water quality and quantity in the future, particularly around disruptive and costly events such as drought and wildfire.
- Regulatory and water licence limits impact river water availability to Calgary's Water Treatment Plants within a 20-year timeframe.
- Population and economic growth pressures continue to change the balance of water supply and demand.

2020 highlights from the Framework's six critical actions to protect long-term water security include:

- The **Source Water Protection Plan and Policy** was approved by Calgary City Council in 2020, detailed in section 2.3 below. The City drafted drought mitigation and response strategies in

2020 with feedback from stakeholders to support the development of a **Drought Management Plan** in 2021.

- Global Water Futures presented the results of a complex climate and hydrologic modelling study of the Bow River in December 2020. This work will help inform The City's **long-range water supply planning** by incorporating climate change considerations.
- In 2020, a review was initiated to address The City's **water licence limitations**. Further work to align with operational and infrastructure requirements is a 2021 priority.
- In 2020, the Utility advocated for watershed protection policies and water security actions in the **Calgary Metropolitan Region Board (CMRB) Growth and Servicing plans**. The Utility also continued to support watershed management messaging in intermunicipal planning circulations and maintained strong partnerships with the Government of Alberta.
- In 2020 March, the Government of Alberta completed Phase 1 of the **Bow River Reservoir Options study** that examined three potential locations for a water supply and flood mitigation reservoir on the Bow River upstream of Calgary. The Government of Alberta announced \$15M in funding for the Phase 2 study in 2020 which is now underway to identify a preferred site for more detailed study. The City is part of the Bow River Working Group that provides input on the project.

Next steps on each of these actions for 2021 are outlined in Table 2.1 at the end of this section.

## 2.2 DROUGHT RESPONSE AND MANAGEMENT

Although Calgary did not experience drought conditions in 2020, the overall risk that drought will occur in the future remains. **Calgary is located in a drought-prone, growing region, and a changing climate will cause more frequent and severe droughts in the future.**

In 2020, as part of the development of the Drought Management Plan, we created an extensive set of drought mitigation and response strategies to optimize water supply, demand and Utility operations; support a prosperous and equitable economy; protect natural infrastructure; and strengthen partnerships in a shared watershed.

Feedback and input were gathered from internal and external stakeholders (Figure 2.1) and interviews with select business units were conducted to increase internal drought readiness.

Looking to 2021, residential and industrial, commercial and institutional (ICI) customer research on perceptions and knowledge of drought risk and impacts will be completed. This contributes to the development of the Drought Management Plan and drought education and communications to increase business and citizens' trust and support for investment in drought mitigation and response strategies.

The City of Calgary also continued to represent the Large Urban sector on the Alberta Water Council Drought Simulation Project which is now fully funded by a Clean Resources grant through Alberta Innovates.



FIGURE 2.1 EXAMPLES OF STAKEHOLDER IDEAS GATHERED AT DROUGHT MANAGEMENT WORKSHOPS

## 2.3 SOURCE WATER PROTECTION

### *The value of protecting Calgary’s source water*

The vision of Calgary’s Source Water Protection Plan is that *“Our source watershed continues to provide clean, high quality water to the region, through proactive stewardship and management”*. As Calgary’s population continues to grow, so does the demand and impacts on the rivers. The Plan’s four key goals and targeted priority actions aim to proactively protect the quality of our source water supplies.

The **Source Water Protection Policy was unanimously approved by Council** on 2020 October 5 (UCS 2020-1007). The Policy provides clear, strategic direction to the Corporation, and guidance for the consistent application of source water and riparian area protection in city and regional planning processes and decision making. The Source Water Protection Plan and the Riparian Action Plan are the two implementation plans under the new Policy.

Other high priority source water protection activities in 2020 included:

- Initiation of a Watershed Investment Strategy to incentivize upstream source water stewardship actions and riparian protection. The project will examine and evaluate options, costs and administrative processes that would be needed to develop a watershed investment program. Key elements of this work include a land acquisition framework, a partnership and micro-grant program framework, and sustainable finance options.

- Run-off from landscapes burned by wildfires contaminating water supplies is one of the biggest risks to Calgary’s source water. Following a collaborative Source Water Wildfire Task Force report, The City began work to develop an emergency and preparedness plan for wildfires in the upper watersheds, a chemical assessment of fire retardants used in the source watershed, and water quality monitoring following the wildfire in the M.D. of Bighorn in the fall of 2020.

## 2.4 WATER QUALITY

### *The value of safe and reliable drinking water*

The Utility works hard to ensure all Calgarians have a safe and reliable supply of drinking water. Calgary's water treatment plants operate 24 hours a day, 365 days a year. As water travels from the mountains and foothills, through our water treatment plants, across the city through the distribution system and to customer taps, Calgary’s water is tested at every step to ensure its quality is maintained and meets or is better than the Guidelines for Canadian Drinking Water Quality. Monitoring results on key drinking water quality parameters can be found at [www.calgary.ca/water](http://www.calgary.ca/water).



100%  
regulations met for treated  
drinking water quality

### 2.4.1 CALGARY’S SOURCE WATER QUALITY

Both the Bow River near the Bearspaw Dam and the Elbow River near the Glenmore Reservoir provide very high-quality water supply to The City’s water treatment plants. The federal Water Quality Index (WQI) is used to track conditions, which translates data from multiple water quality parameters into a score. The **Bow River typically has ‘Excellent’ water quality, while the Elbow River typically has ‘Good’ water quality.** The lower flow rates of the smaller Elbow River result in higher sensitivity to water quality conditions, so guidelines are more often exceeded. Over the last decade, consistently high WQI ratings have been observed near the water treatment plants (Figure 2.2). This means the water is easier to treat before it goes to customer taps.

Watershed Monitoring Program data from 1981 to current day is now available on The City’s Open Data Portal. This has improved accessibility to daily water quality data and provides increased transparency for citizens.

Two major events that occurred during 2020 will be the focus of monitoring efforts for 2021. A wildfire approximately 100 kilometers upstream of Calgary in the Ghost watershed burned approximately 2420 hectares of land. Sampling results detected no major changes in water quality conditions, however ongoing detailed monitoring work will continue in 2021 to determine if water quality changes after the wildfire and the subsequent risk to downstream water treatment process. While the Ghost watershed is a small overall contributor to the Bow River supply, the findings from this monitoring work will help inform broader management strategies of the City of Calgary’s Wildfire – Source Water Partnership Task Force.

During September to October 2020, there was a geosmin-related taste and odour event in the Bearspaw Reservoir that resulted in a significant rise in drinking water 311 complaints from citizens. Geosmin is a naturally occurring and harmless substance that can be responsible for the muddy “off” taste in drinking water. The Utility responded to this event with increased field and laboratory testing. Investigation into the source of taste and odour compounds is being incorporated into 2021 field monitoring plans.

As our source watersheds continue to undergo pressures related to land use change and development, the risk of stormwater contamination to Calgary’s drinking water supplies remains a primary focus of water quality monitoring efforts in 2021.

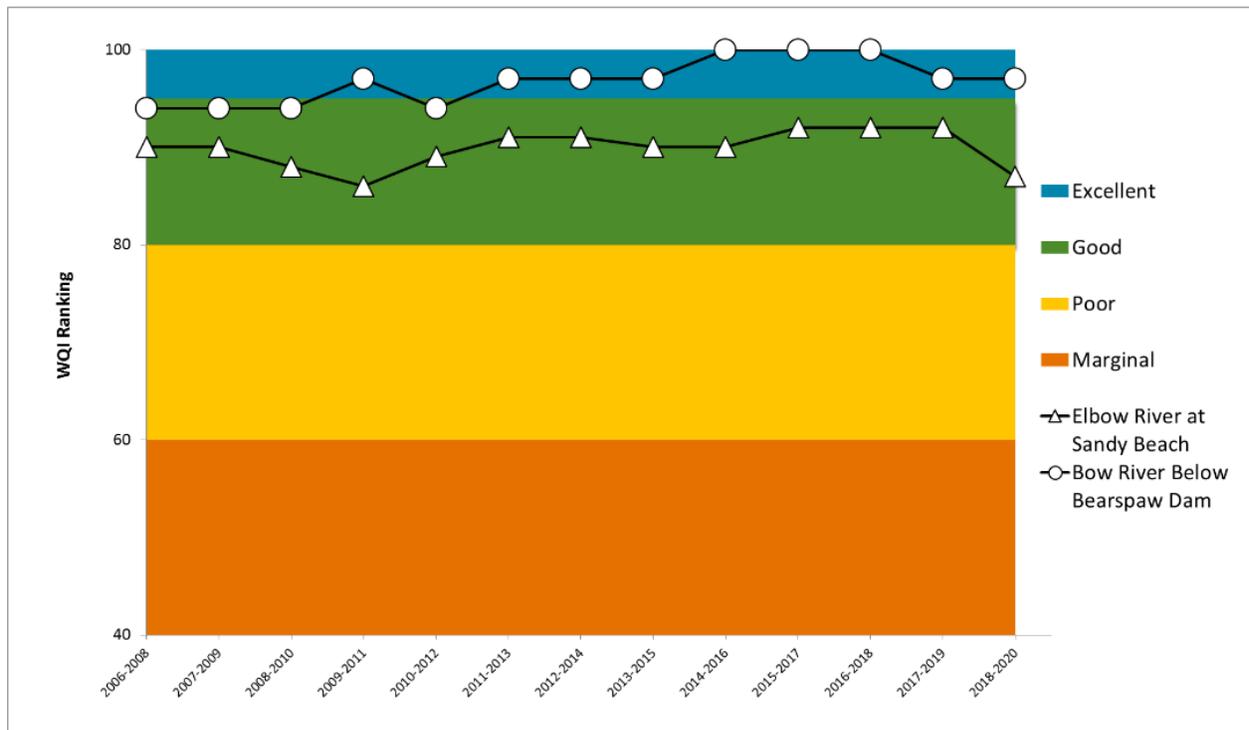


FIGURE 2.2: WATER QUALITY INDEX - CALGARY'S SOURCE WATER

## 2.5 REGIONAL COLLABORATION

The Utility’s regional program manages regional issues from strategy to operations across water, wastewater and stormwater lines of service working collaboratively with Government of Alberta and regional partners.

### Regional Servicing

We have been providing water and wastewater services outside of Calgary’s boundaries since 1961. In 2020, The City completed the first ever annual accounting true-up with regional customers to ensure alignment and 100% cost recovery between billing charges to regional customers and the Utility’s costs to deliver their water and wastewater services. The City worked collaboratively with regional customers



on compliance to the Master Servicing Agreements, on hydrogen sulphide (H<sub>2</sub>S) management in some wastewater locations, provided key messages about water odors when naturally occurring geosmin levels were temporarily elevated in source water, and hosted an online drought management session.

Staff monitor infrastructure and servicing projects throughout the region. Of note in 2020, Foothills County and the Town of Okotoks announced their collaboration on a \$34M sub-regional drinking water project that will supply raw water from the Bow River to be treated and used in Okotoks and specific locations in Foothills. Given this new water intake will be located approximately 20 km southeast of Calgary's municipal boundary, we are assessing the project as it proceeds through detailed design.

### **Regional planning**

City staff continued to be involved in the Calgary Metropolitan Regional Board (CMRB) to manage Calgary's water interests as the CMRB Growth Plan and Service Plan are developed. The Plans will be finalized in 2021 and should advance regional opportunities for integrated watershed management. Water staff provide technical review and recommendations on regional and intermunicipal planning circulations on a continual basis to ensure The City's integrated watershed management interests are considered in the development plans of neighboring municipalities.

### **Partnerships**

In 2020, The City formally signed on to the Cooperative Stormwater Management Initiative (CSMI), a cooperative of three municipalities and the Western Irrigation District to build and operate a stormwater conveyance system in the east Calgary region. This system will accommodate urban and rural runoff from the three municipalities, minimizing flood risk, and keeping stormwater separate from water intended for agricultural use. The project will be built over 25 years, and construction timelines for Calgary's portion of CSMI infrastructure will align with East Belvedere development timing.

Our relationship with the Government of Alberta involves many staff to carefully manage and foster long-term, successful relationships, particularly with counterparts in Alberta Environment and Parks.

## 2.6 PRIORITIES IN 2021

Table 2.1 summarizes the activities to be taken in 2021 to continue protecting our water supply.

**Table 2.1 Goal #1: Protect Our Water Supply – 2021 Focus**

2021 Planned Actions
Continue to advance complex climate and hydrology research and modelling to support future water supply planning.
Evaluate options and implement actions to address water licence limitations on high demand days.
Continue work with the CMRB to develop and implement Regional Growth and Servicing Plans while continuing to advocate for source water protection policies and actions through the CMRB and in regional planning and development circulations.
Remain an active member of the Bow River Working Group and continue to advocate for an upstream water management reservoir on the Bow River.
Complete drought focused customer research and initiate development of Drought Management Plan.
Continue to implement actions of the Source Water Protection Plan and Policy.
Continue to refine the wildfire risk assessment and advance implementation actions of the Wildfire-Source Water Task Force Strategy.
Initiate work to develop a Source Water Protection Outreach and Education Plan.
Develop an emergency and preparedness plan for contaminant spills in the source watershed.
Completion of a proposed Watershed Investment Strategy framework.
Work closely with regional water and wastewater servicing customers on the Cost of Service Study for the next business cycle, 2023-2026, and on a rate true-up for 2020. Both are intended to ensure full cost recovery in accordance with master servicing agreements and Alberta Utility Commission guidance.

### 3. GOAL #2: USE WATER WISELY



Significant investments over the past 30 years have helped ensure Calgary’s water security despite population growth and a changing climate and today our per capita target is 350 litres per day. This foresight on water conservation and plant efficiency has kept Calgary on track to achieve water conservation targets. Effective water efficiency and conservation programming enables The Utility to continue to supply all Calgarians with the water they need, even as our population increases over time.

#### 3.1 WATER EFFICIENCY PLAN

##### *The value of water conservation initiatives*

The 30-in-30 Water Efficiency Plan continues to guide sustainable water management with a goal to maintain Calgary’s total water use at 2003 levels through 2033. **Citizen-focused initiatives continue to keep water demand on track to meet our Water Efficiency Plan goals, while also providing customers’ savings on their monthly bills.**

In 2020, The Utility undertook a comprehensive review of the Water Efficiency Plan to identify opportunities to build upon existing programs with new recommendations for water conservation solutions in residential outdoor settings and the business sector. These recommendations will align with existing work in climate change, drought, stormwater and land use planning.

##### Measuring The Water We Use



Tracking water use is important for the efficient management of our water resources. Customers can track their use on their water bill in cubic metres. The utility also tracks the total amounts used in Megalitres.

1,000 litres = 1m<sup>3</sup> (cubic metre)

1,000,000 litres = 1ML (megalitres)

2020 highlights:

- Reached hundreds of thousands of Calgarians through residential water leak detection, YardSmart water wise landscaping and Garden Bed designs and summer outdoor watering campaigns which incorporated drought awareness educational messages.
- Translated the Homeowner Water Guide and YardSmart brochure series into six additional languages.
- Delivered pilot water use surveys to a small number of business customers.
- Participated in industry-wide cooling tower research to further knowledge of our business customers and their technology.
- Continued delivery of the multifamily toilet replacement program.
- Supported the local irrigation industry to deliver efficient outdoor water use education sessions.

#### 3.2 CALGARY’S WATER USAGE

In 2020, COVID-19 shifted how water was consumed compared to previous years. Overall, the total water use decreased from last year. In 2020, a total of 186,571 million litres were withdrawn from the

Bow and Elbow Rivers, remaining below the 2003 Water Efficiency Plan benchmark of 212,500 million litres as shown in Figure 3.1.

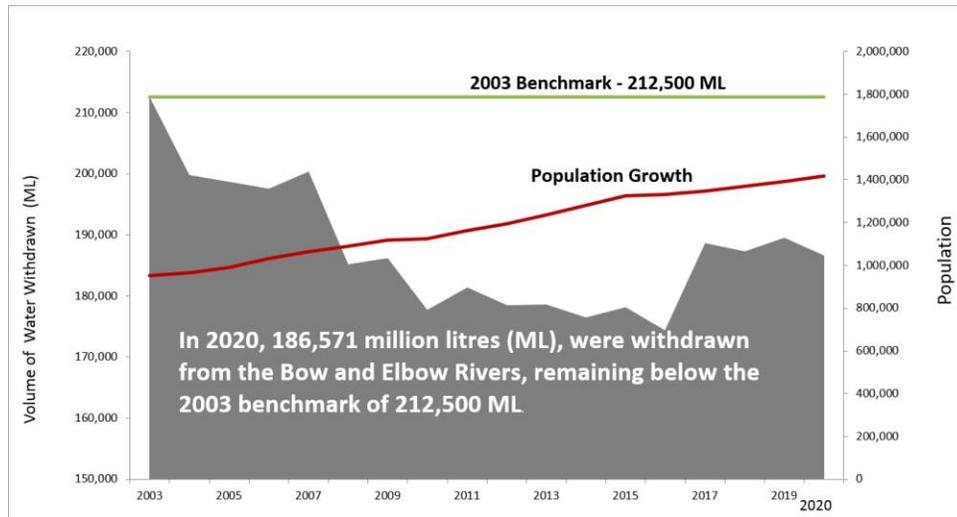


FIGURE 3.1 RIVER WITHDRAWALS OVER TIME, 2003 - 2020

### 3.3 CALGARY’S PER CAPITA WATER DEMAND

Most of Calgary’s water demand is made up of single-family and multi-family customers, followed by business customers (Figure 3.2).

In 2020, we faced a shift in water use as a result of COVID-19. Beginning in mid-March, many Calgary businesses were shut down, and Calgarians were asked to stay home. This resulted in an **overall decrease in business water use and an increase in residential water use**. As most of Calgary’s water demand is from residential customers, single family residential water use was estimated to increase to 212 litres per capita per day (lpcd) from 197 lpcd in 2019. This increase reflects increased handwashing, use of home appliances, cleaning, spending time in our backyards as many moved to working from home. Despite this shift,

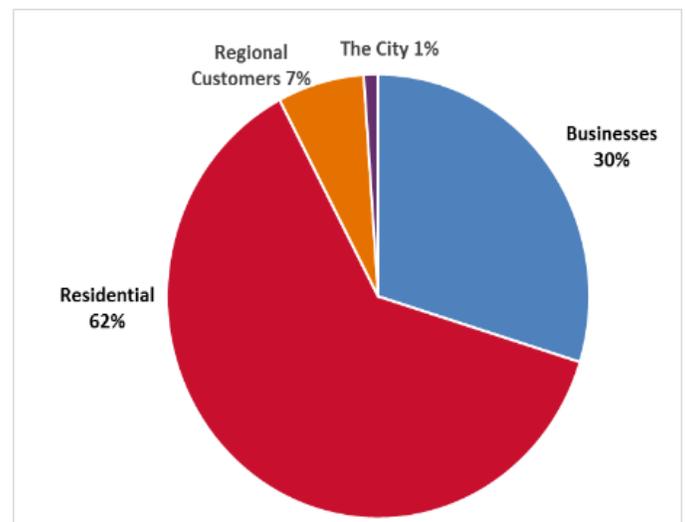
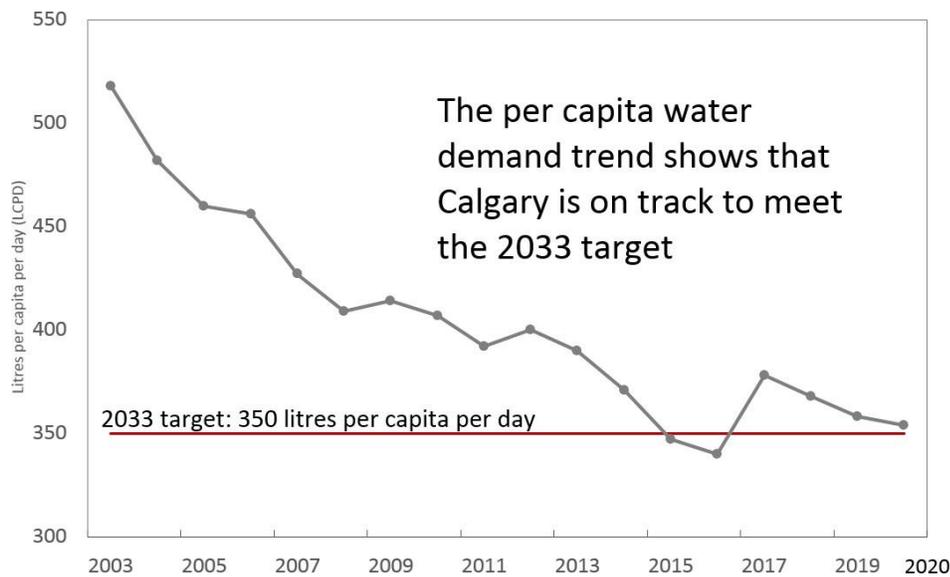


FIGURE 3.2 2020 WATER USE BY CUSTOMER GROUP

Calgary’s per capita water demand decreased to 354 lpcd, keeping Calgary well on track to meet the 2033 target of 350 lpcd (Figure 3.3).



**FIGURE 3.3 PER CAPITA DAY DEMAND ACROSS ALL CUSTOMER GROUPS**

In 2020, despite the impacts of COVID-19 on in-person opportunities to engage with citizens, The Utility continued to foster a conservation ethic in Calgarians through online focused media campaigns. A new approach of using YouTube video ads reached upwards of 700,000 unique users during each campaign period.

We also continued development of the Water Efficient Business Program supports business customers to become more environmentally and financially sustainable. A pilot project to deliver water use surveys for businesses was launched in the fall of 2020. The impacts of the COVID-19 pandemic and a lagging economy has increased the need for ongoing support to businesses as we move into 2021.

The multifamily toilet replacement rebate program continued in 2020. Despite lower participation than in previous years because of COVID-19, water savings of 2.1 million litres was achieved across nine locations. This program will continue in 2021 and is available to any multi-unit building in Calgary to replace 13L or greater toilets with high-efficiency toilets.

### 3.4 PEAK DAY DEMAND

The one day in a year that customers use the most water is referred to as the peak day demand. This typically occurs in the summer months, as water demand can spike from outdoor watering and cooling activities. In 2020, Calgary’s peak day water demand was 655 Megalitres (ML) which occurred on August 17th. This amount remains below the 950 ML threshold which is the current capacity of Calgary’s water treatment plants (Figure 3.4).

We partner with customers to conserve water and reduce peak day demand. An emphasis on efficient outdoor water use and making low water use landscaping choices played an important role in saving water through the summer months. The YardSmart Program continued delivering its peak day

messaging to target outdoor watering. In 2020, through continued work with partners, the YardSmart program delivered ten Water Wise landscape design workshops, several free online sustainable gardening and outdoor watering talks, and sold 1319 rain barrels.

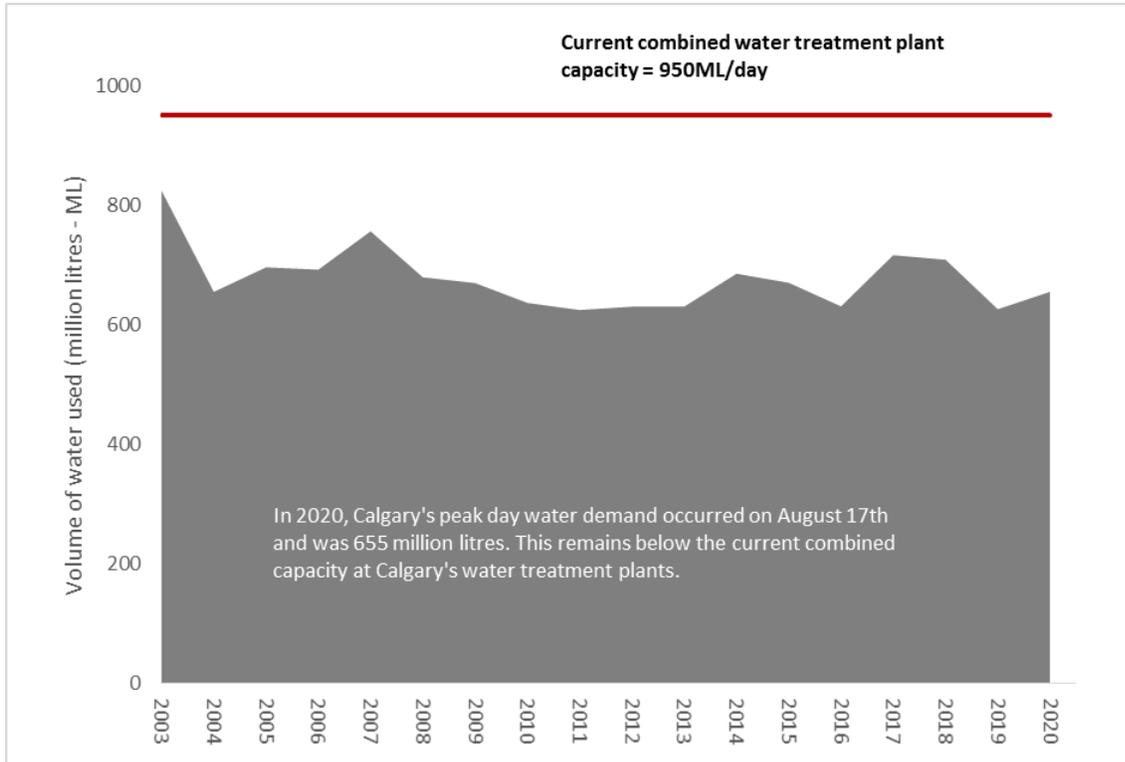


FIGURE 3.4 - PEAK DAY DEMAND – MAXIMUM VOLUME OF WATER USED IN CALGARY IN ONE DAY

### 3.5 WATER LOSS MANAGEMENT

Non-revenue water is a term used to describe water that’s treated and distributed, but not billed to a customer. This includes three types of non-revenue water:

- Real losses is water lost through system leakage and pipe breaks.
- Apparent losses is water lost through inaccurate metering and systematic data handling issues associated with billing.
- Water used for delivery of City services such as pipe flushing and firefighting which is not considered lost.

The Utility has several proactive initiatives to reduce non-revenue water loss, as well as protect property, the environment, and drinking water quality.

#### Water Loss Strategy

In 2020, The City began implementation of the **Water Loss Strategy** to focus and coordinate water loss management efforts across water utility services, and established a target water loss of 250 L/service



connection/day by 2030 from 2019 levels. Achieving this target will result in nearly a 30 per cent reduction in Utility water loss. The initial activities of the strategy are to better understand current level of losses and water loss management maturity through documentation updates. Specific to managing apparent losses, The Utility also conducts meter testing and replacement and review of billing data to reduce the inaccurate meter data and billing to customers.

### Leak Detection and Pipe Repairs

The City conducts proactive asset management of its water infrastructure, such as pipe condition assessments, pipe replacements, and corrosion prevention. In addition to addressing pipe breaks and other leaks that present themselves, the leak detection and feeder pipe inspections are critical pieces of our infrastructure maintenance program. Identifying leaks prior to the surfacing of the leak can reduce the overall leak run time and the volume of water lost, and reduces the likelihood for catastrophic failure. Distribution leak locators surveyed more than 400 km of pipes in 2020, identifying over 20 leaks or breaks requiring repair.

The inspection program assesses the condition of large diameter pipes in the system. In 2020, in-line inspections were conducted on 5.1 kilometers of feeder main, which discovered and repaired three leaking locations on the large-sized pipes and associated valves. A condition inspection conducted on 1.7 kilometers of the large sized pipe that runs through the Glenmore Reservoir dam to southwest Calgary found it is in good condition.

## 3.6 PRIORITIES IN 2021

We will continue working with customers to encourage responsible and efficient use of water. Activities planned for 2021 are summarized in Table 3.1.

**Table 3.1 Goal #2: Use Water Wisely – 2021 Focus**

2021 Planned Actions
Implement Water Loss Strategy to reduce volume of water loss in the utility.
Utilize water demand forecast modeling to support peak day management programming initiatives.
Develop implementation plans for strategic water conservation initiatives that support drought, climate change and stormwater priorities.
Implement Water Efficient Business Program. Complete pilot water use surveys and development of rebate initiative.
Promote the YardSmart Garden Bed Design Series.
Develop new partnerships for program delivery, while continuing to support current partner initiatives such as partnering with the irrigation industry to support efficient outdoor water use.
Continue delivery of the multifamily toilet replacement rebate program.
Complete research with residential, ICI and regional customers to inform the development of the Drought Education Strategy.
Continue to increase internal drought readiness through aligned communications and new resources for City staff.

## 4. GOAL #3: KEEP OUR RIVERS HEALTHY

### *The value of wastewater, stormwater and riparian improvements to keep rivers healthy*

Calgary is situated on two relatively small rivers, and ongoing efforts are needed to keep our waterways healthy. Excess nutrients like phosphorus and ammonia, sediment, bacteria and other pollutants that enter our rivers can negatively impact fish and wildlife, the ecosystem and drinking water. Managing water quality is a major component of our alignment to the Provincial South Saskatchewan River Basin Regional Plan and protecting Calgary’s waterways is guided by Provincial objectives for the Bow River. We work diligently to manage these risks through efficiencies in wastewater treatment, mitigating the impacts of urbanization on stormwater, and protecting the areas adjacent to rivers and creeks.

## 4.1 WASTEWATER MANAGEMENT

### 4.1.1 WASTEWATER TREATMENT PLANTS (WWTP)



100%  
regulations met for treated  
wastewater returned to the river

The Utility operates its three wastewater treatment plants (Bonnybrook, Pine Creek and Fish Creek) and a wastewater collection system. We are continuously optimizing operational efficiency while ensuring our commitment to a clean and healthy river.

Major upgrades to the Bonnybrook Wastewater Treatment Plant are ongoing to protect our rivers by ensuring continued compliance with regulatory requirements and support population growth (Figure 4.1).

**Progress on these upgrades continue to be on time and on budget**, with the exception of the Cogeneration Facility Expansion at the Bonnybrook Wastewater Treatment Plant. This project experienced an 85 day schedule delay related to the COVID-19 Pandemic. The delay was mostly a result of slowdowns in manufacturing of major pieces of process equipment due to plant shutdowns and/or the implementation of COVID-19 safety protocols at the manufacturing sites.

The following projects are progressing and scheduled to complete construction, be commissioned and in service in 2021:



**FIGURE 4.1: MAJOR UPGRADES AT BONNYBROOK WILL HELP ACCOMMODATE GROWTH AND IMPROVE WATER QUALITY FOR DOWNSTREAM USERS.**

### **Cogeneration Facility Expansion**

Major portions of the Cogeneration Facility are scheduled to be in-service Q3 2021. Biogas from wastewater treatment will generate both electricity and high-pressure steam for a new turbine for use within Bonnybrook. Not only does this reduce the plant's overall utility costs, it also increases electrical reliability by providing on-site power generation, and offsets greenhouse gas emissions. The heat generated by the turbine is used to produce steam, which is fed back into the plant to facilitate other wastewater treatment processes.

### **Plant D Expansion**

- Secondary treatment phase 1 – This project will increase the treatment capacity for future growth at the plant by 20 per cent when operational. This project is scheduled to be in-service by the end of 2021.
- Low pressure gas holder – Phase 1 of this project was commissioned December 2020. Phase 2 is scheduled to be commissioned and in-service mid-Q2 2021. This system stores and supplies biogas to the future Cogeneration Facility.
- Primary treatment– This project will increase the treatment capacity at the plant in conjunction with the Secondary Treatment project and is scheduled to be in-service mid- 2021.
- Ultraviolet disinfection - Six new treatment channels in the ultraviolet light disinfection building will be commissioned in Q2 2021 to increase both the treatment quality and liquid stream treatment capacity to accommodate future growth. Two treatment channels were previously commissioned in 2019 and four were commissioned in 2020.
- Outfall upgrade and expansion - The new, upsized twin outfall will provide for additional treatment capacity for future growth Bonnybrook and additional flood protection for the critical wastewater treatment infrastructure at the plant. The new outfall is located on the Bow River approximately one kilometer south of the Calf Robe Bridge and is scheduled to be commissioned late Q1 or early Q2 2021.
- Digesters upgrades Phase 1 – The upgraded digesters at Bonnybrook will reduce the amount of solids generated by wastewater treatment processes and will provide biogas to help fuel the Cogeneration Facility. This project is scheduled to be in-service mid-2021.

The design study for upgrades at the Fish Creek Wastewater Treatment Plant is in progress. The primary objective of this study is to evaluate and select a technology for treating ammonia to meet the Federal Wastewater Systems Effluent Regulations and treat peak wet weather flows. The design study for upgrades at the Pine Creek Wastewater Treatment Plant kicked off in late 2020 and is in progress.



#### 4.1.2 WASTEWATER BUSINESS CUSTOMERS

Some Industrial Commercial Institutional (ICI) customers produce wastewater that may have a higher concentration and contain different contaminants that exceed Wastewater Bylaw requirements. This is called high-strength wastewater. **The Wastewater Loading Management Program aims to improve management of high-strength wastewater from business customers, as this wastewater is technically challenging and expensive to manage and treat.** The program identifies and implements cost-effective, resource-efficient, reliable and equitable strategies that meet customer needs for wastewater load management and optimize use of wastewater treatment plant capacity.

The Utility advanced this program in 2020 by completing the options analysis for the management of high-strength wastewater loadings to Calgary's wastewater treatment plants. A comprehensive flow monitoring and sampling program concluded in 2020 with high-strength wastewater monitoring. A final report and recommendation review will be completed in early 2021. The work will form the basis of how The City moves forward with wastewater management solutions for customers based on their individual needs.

### 4.2 TOTAL LOADING MANAGEMENT

The **Total Loading Management Plan (TLMP)** is a planning tool used to manage impacts from our wastewater and stormwater loadings on the Bow River. The TLMP identifies total suspended solids (TSS) and total phosphorus (TP) as the key parameters that require management to mitigate environmental impact to Calgary's watershed.

The Utility continuously collects data and perform analysis to submit annual report to the Government of Alberta as part of the approval to operate our wastewater treatment plants. The City also reassesses water quality related threats every five years to determine if there are other water quality parameters that require management to protect Bow River aquatic habitat. The next update is planned for 2024 and work on this will start in 2021.

#### 4.2.1 MODELLING AND ANALYSIS

Water quality data analysis and modelling are important tools that is used to predict and measure Calgary's wastewater and stormwater impacts on our rivers, creeks and streams. The studies help us meet Provincial water quality guidelines and inform decision making for future wastewater and stormwater infrastructure requirements.

##### **Bow River Water Quality Model upgrade**

The Utility is moving the Bow River Water Quality Model (BRWQM) to a new simulation platform to allow us to better scale the watershed sensitive risks and optimize water infrastructure investment decisions.

##### **City-wide stormwater loading targets**

We developed a new, fine-resolution stormwater management model to simulate Calgary's non-point source loadings going into the Bow River. In 2021, The Utility is collaborating with University of Calgary to update and improve the model's output.

These models and data are also guiding The City to address the Government of Alberta’s South Saskatchewan Regional Plan (SSRP) and Maximum Allowable Loads (MAL) study. In 2021, we will continue a study on ammonia toxicity to inform the development guidelines appropriate for Calgary’s watershed.

#### 4.2.2 TOTAL SUSPENDED SOLIDS IN THE BOW RIVER (TSS)

Stormwater and treated wastewater contain total suspended solids (TSS), which include organic and inorganic materials. These materials enter waterways and can impact water quality and aquatic habitat. Figure 4.2 shows that Calgary has remained under the Provincial objective for TSS loadings into the river from stormwater and wastewater sources.

Urban runoff from stormwater contributes a significantly higher proportion of TSS to the Bow River compared to wastewater effluent. In 2020, estimated TSS loadings from stormwater to the Bow River were 39,471 kg/day, which is below The City’s 2005 benchmark. **This demonstrates the effectiveness of The Utility’s stormwater quality investments and pollution prevention programming considering population growth and urban expansion.**

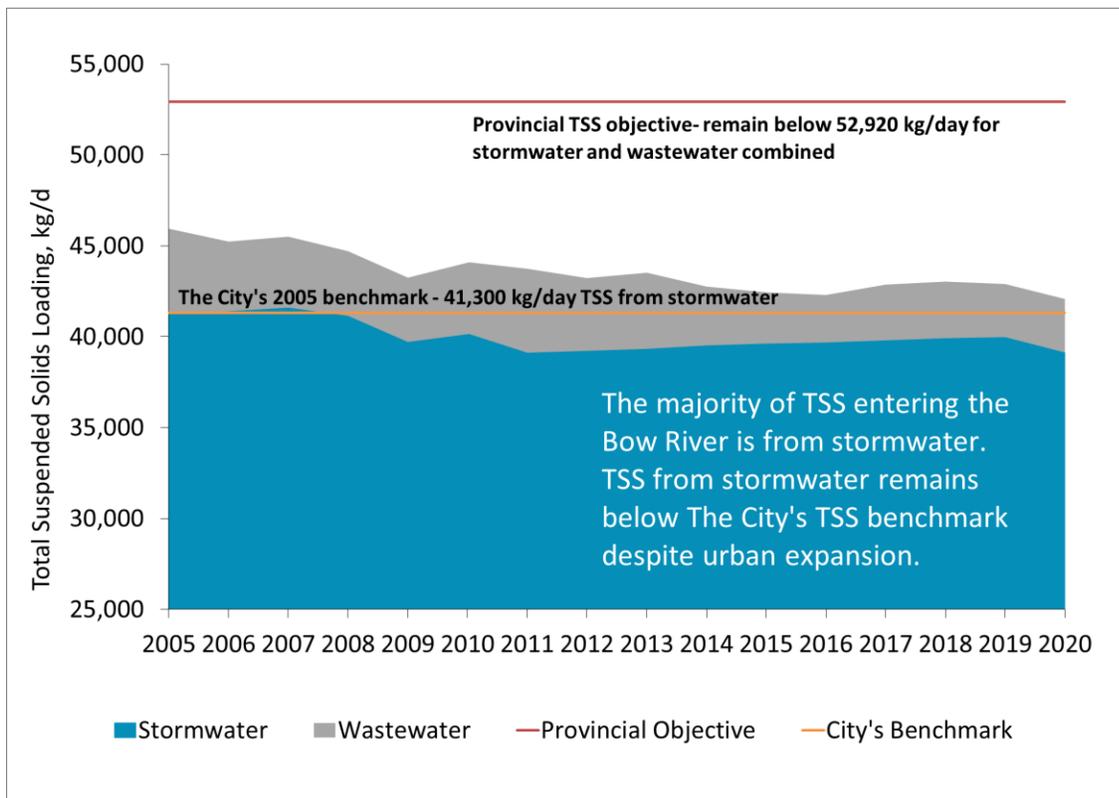


FIGURE 4.2 TOTAL SUSPENDED SOLIDS (TSS) LOADING TO THE BOW RIVER FROM STORMWATER AND WASTEWATER

### 4.2.3 PHOSPHORUS IN THE BOW RIVER

Too much phosphorus in waterways can cause accelerated plant growth, algae blooms and low dissolved oxygen, which is detrimental to aquatic life. The Utility’s Total Loading Management Plan has a total loading objective for Total Phosphorus (TP) to ensure Calgary’s aquatic habitats remain healthy and safe. The primary source of TP entering the Bow River in Calgary is from treated wastewater effluent, with the remaining amount contributed by stormwater. Figure 4.3 shows the reported **amount of TP entering the river from both stormwater and wastewater to be below the Provincial objectives in 2020, demonstrating that our wastewater treatment continues to be effective.** Treated wastewater contributes more than double the amount of TP to the Bow River compared with stormwater sources.

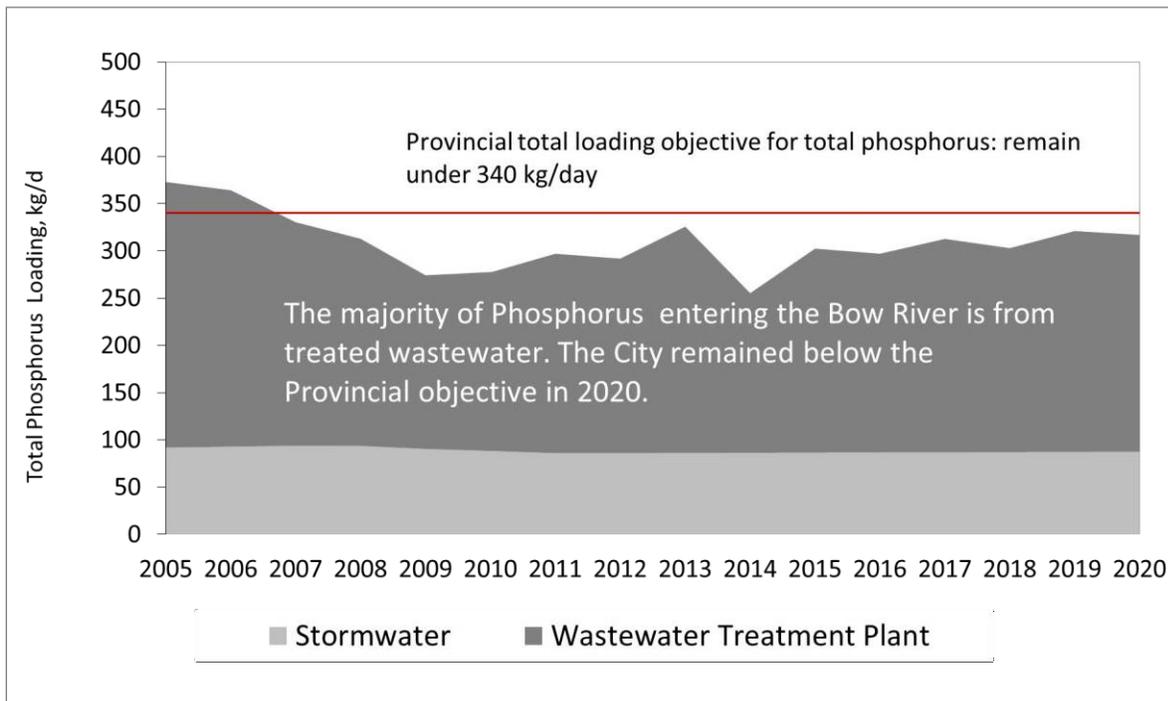


FIGURE 4.3 TOTAL PHOSOPHORUS LOADINGS TO THE BOW RIVER FROM STORMWATER AND TREATED WASTEWATER

## 4.3 STORMWATER MANAGEMENT

### *The value of stormwater management initiatives*

Many municipalities are facing increasing concerns about extreme storms, changing climate and a resilient watershed. Communities are seeking strategies to better manage stormwater runoff, improve local water quality, and decrease pressure on the stormwater system. Water is also increasingly recognized as a community resource, one that can be harnessed to make cities more vibrant, safe and sustainable. Stormwater management is the effort to reduce the impacts of urbanization by decreasing runoff from rainwater or melted snow and address water quantity and quality improvements. Stormwater management has evolved significantly and Calgary's continued growth present unique challenges. Recognizing these factors, The Utility initiated an update to its 2005 Stormwater Management Strategy that will continue in 2021.

#### 4.3.1 STORMWATER MANAGEMENT STRATEGY UPDATE

The Stormwater Management Strategy update will guide the transformation of stormwater management for Calgary by **setting a strategic course for how stormwater is managed over the next 20 years**. The Utility must evolve how stormwater is managed and valued in our city. Best practices continue to transition towards managing stormwater as a valuable water resource that is vital to Calgary's sustainability, resiliency and community livability.

Using a customer-centric approach, we engaged with internal and external stakeholders including businesses, the building and development industry, non-government agencies, academia, regional municipalities, regulators, communities and customers to inform the Strategy. Engagement was completed in 2020 by transitioning to an online process. The input gathered from engagement created a shared stormwater management vision, principles and goals for Calgarians and prioritized strategic actions to advance innovation and build customer relations and trust.

The Stormwater Management Strategy will align with other corporate strategies and policies and set the direction for many Utility-led initiatives such as the Watershed Health Index (WHI) and Green Stormwater Initiative (GSI) strategy. The Stormwater Management Strategy will be completed for the end of 2021.

#### 4.3.2 STORMWATER QUALITY RETROFIT INVESTMENTS

The Utility constructs **stormwater quality retrofit projects** such as wet ponds or constructed wetlands to **improve water quality by removing solids and other pollutants before it enters our rivers**. These projects help improve stormwater management in established communities. The Bebo Grove Storm pond construction was completed in 2020. This pond will help manage both the volume of water and the sediment removal efficiency of the stormwater Votier's flat Ponds.

Oil and grit separators are underground chambers that remove oil and sediment grit before the runoff reaches our rivers. In 2021, two large oil & grit separators will be installed as part of the Sunnyside Upper Plateau Separation project, and the relocation of the stormwater outfall that is currently near



Ogden Road and the rail bridge crossing over the Bow River. They will remove 80 per cent of sediment particles to help improve the quality of the water before it reaches the Bow River.

The South Highfield stormwater quality retrofit pond design was completed in 2020 and construction is expected to be completed in 2022.

#### 4.3.3 STORMWATER PONDS

Calgary's stormwater drainage system contains over 300 wet and dry storage ponds. These ponds **reduce the amount of sediment and other pollutants entering our rivers. They also provide some localized flooding mitigation** by holding stormwater during high rainfalls, releasing it slowly back into The City's stormwater system. The City's Pond Condition Assessment identified the need for regular maintenance of Calgary's ponds to ensure they are operating effectively, meeting water quality and stormwater volume requirements.

In 2020, we cleaned multiple stormwater ponds, including the Royal Oak and the Shepard Regional Center ponds. In addition, work has commenced on pond repairs to remedy deficiencies that were identified in the Pond Condition Assessments. Ponds also served to mitigate two unplanned releases by capturing sediments from the Stoney Trail construction and sewage from the Valley Ridge lift station pipe failure.

The Utility is also working towards innovative approaches to manage stormwater ponds, including solar powered pond monitoring, power generation turbine installation at pond outlets, and real-time control of pond outflow. The application of real-time control on the Priddis Slough will ensure stormwater releases to both Pine Creek and the Bow River will not impact the downstream riparian environment.

#### 4.3.4 GRAVEL LANE SEDIMENT ABATEMENT STUDY

Gravel back lanes produce disproportionate amount of total sediment (TSS) loadings into Calgary's rivers. These sediments can become trapped in stormwater infrastructure and increase maintenance costs. Many of Calgary's residential areas have gravel as the surface in their back lanes. It's estimated that gravel lanes generate up to 11 per cent of TSS loadings in our waterways but comprise only 1.4 per cent of Calgary's land area.

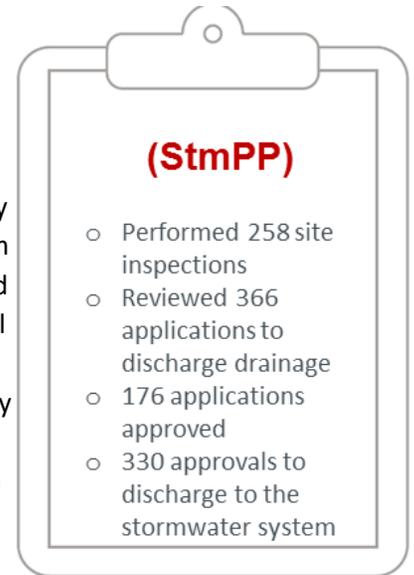
In 2020, we completed a **collaborative study between the Water Utility and the Transportation Department, along with other City stakeholders on approaches that could reduce gravel lane sediment from reaching Calgary's waterways.**

Phase 2 of the study will use pilot projects to explore the effectiveness of asphalt and infiltration trenches, chip seals and higher quality gravel in Community Drainage Improvement communities. Citizen surveys and engagement will be conducted in 2021 to gather input on the social impact assumptions identified in Phase 1 of the study.

### 4.3.5 STORMWATER POLLUTION PREVENTION PROGRAM (STMPP)

The Stormwater Pollution Prevention (StmPP) program **ensures customers and staff plan, implement, and monitor effective practices to reduce stormwater pollutant loadings from construction activity and ensure regulatory compliance.**

Construction activity in Calgary exposes highly erosive subsoil, which is easily transported by wind and water. In 2020, to protect our watershed and storm infrastructure from the impacts of construction site sediment, staff reviewed 366 Erosion and Sediment Control Plan applications resulting in the approval of 174 ESC Plans. Approved ESC Plans are estimated to reduce soil loss from active construction sites by 23,024 tonnes per year. Soil losses then generally decrease once sites are stabilized with natural vegetation, buildings, roads, etc. During 2020, there were a total of 640 construction sites in Calgary with an active approved ESC Plan. StmPP performed 258 inspections at 185 of those sites.



In 2020, StmPP reviewed 330 applications to discharge drainage from construction, commercial, and industrial sites and operational activities to storm infrastructure.

To improve communication during the COVID-19 pandemic, StmPP provided monthly e-newsletter communication to customers providing updates on service delivery changes, education on construction practices, and updates to processes.

There was continued collaboration with Community Standards (Bylaw) and Law to enhance customer compliance by referring non-compliant files to Bylaw for enforcement under the Drainage Bylaw.

## 4.4 RIPARIAN ACTION PROGRAM

Riparian areas are natural assets that provide many ecological, social and economic benefits including water quality protection, resilience to flood and drought, biodiversity enhancements and recreational opportunities. The Utility’s Riparian Action Program (RAP) is a comprehensive and coordinated approach to protect riparian areas in Calgary.

#### 4.4.1 RESTORING RIPARIAN AREAS

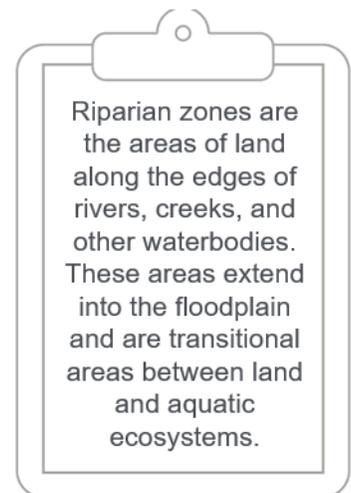
##### ***The value of restoring riparian areas***

Riparian restoration projects lead to a more resilient natural infrastructure that provides protection against floods and erosion and improves water quality. In 2020, we continued efforts to improve riparian health and restore riparian areas through bioengineering and riparian planting projects. Bioengineering is an approach to riverbank engineering that incorporates living plants with natural and synthetic support materials to stabilize slopes and reduce erosion. Riparian planting projects use native vegetation with deep-rooted plants that stabilize riparian areas.

Approximately 55 riparian planting and bioengineering projects were designed, built or maintained by The City in 2020. Since 2007, approximately 100 restoration projects have been completed. These projects are mainly located on the Bow River, Elbow River and Nose Creek. Some of the projects are part of a partnership between the Water Utility and Parks. Sharing of internal resources and expertise provides financial benefits and ensures business units meet their respective goals and objectives more effectively.

The riparian restoration projects include some sites from the Fish Habitat Compensation Program, which offset the loss of fish habitat caused by the 2013 flood.

Wetlands are a critical part of Calgary’s landscape and character that create valuable environmental, social and economic benefits. Between 2004 and 2015, The City collected \$34.9M compensation from developers for wetlands damaged or destroyed by development and is obligated to restore 84.6 hectares of wetlands in return. The Government of Alberta took control of wetlands compensation programming and fund collection in 2015. In 2021, The City and the Government of Alberta came to an agreement on regulatory challenges and how the funds can be used. Under the agreement, aquatic ecosystem resilience projects can be used to fulfil The City’s restoration obligation, which allows the completion of restoration more quickly. The City is advancing fourteen projects in various stages of design/execution. In 2021-2022, we will apply approximately \$13.6 million of our compensation fund for 21.1 hectares of obligation credit, including the Inglewood Bird Sanctuary Lagoon Reconnection and Bow Habitat Station BP Coldwater Stream projects.

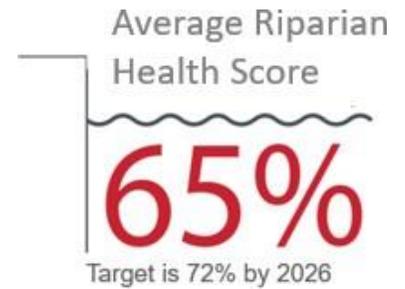


Riparian zones are the areas of land along the edges of rivers, creeks, and other waterbodies. These areas extend into the floodplain and are transitional areas between land and aquatic ecosystems.

#### 4.4.2 MONITORING RIPARIAN HEALTH

2020 marked the third year of The Utility’s 5-year Riparian Monitoring Program. We track progress towards its 2026 riparian health restoration target and to prioritize future restoration and conservation efforts as part of an adaptive management approach. Over 100 sites are being monitored over 5 years to evaluate riparian health trends.

Thirty-nine sites were monitored in 2020, covering approximately 32 km of bank length and 188 hectares of riparian habitat located mainly along the Bow River, Elbow River, Nose Creek and West Nose Creek. The 2020 analysis showed an improvement in riparian health compared to baseline (2007-2010) conditions. **The results demonstrate that the restoration investments made by The City are improving the health of our waterways.** Figure 4.4 is an example of how the riparian health has been improved through a restoration project on the Elbow River.



We also monitor restoration techniques to inform how to design and implement future projects. 2020 monitoring showed that the majority of the techniques used were successful.



Figure 4.4: Example OF WELL established native vegetation and excellent survival rates after restoration work on the Elbow River  
PHoto Credit: Cows and Fish

## Bioengineering Demonstration and Education Project (BDEP)

2020 marked the second year of monitoring work at the BDEP site. The work includes examining post-construction monitoring of fish and fish habitat, wildlife, riparian health and bioengineering structural integrity over a 10-year period.

In general, vegetation appears to be establishing well (Figure 4.5). Both fish and wildlife continue to use the constructed habitat enhancements, and riparian health is improving.



FIGURE 4.5: VIEW OF THE BDEP SITE FROM THE SOUTHEAST BRT BRIDGE (IN INGLEWOOD) OVER THE BOW RIVER. PHOTO CREDIT: KERR WOOD LEIDAL LTD.

### 4.4.3 RIPARIAN EDUCATION AND OUTREACH

*“Love, love, love the biodiversity interpretive signage on the Bow River just west of the bird sanctuary. Every time I walk by I learn something new about the project and the ecological restoration of that riparian environment. Also appreciate that some of the signs are on boulders. That works well and the height appeals to me as it allows children to learn directly. It is all so thoughtfully done. Great job!”*

Citizen 3-1-1 Comment

In 2020 riparian education initiatives included the installation of interpretive signage and the launch of a project website for the multi-award winning Bioengineering Demonstration and Education Project (BDEP) to provide on-site and remote access to information to citizens and educators.

The Utility hosted two webinars on the 2019 Riparian Monitoring Program Results and the Bioengineering Demonstration and Education Project – 2019 Monitoring Results to build professional development on riparian projects.

We continue to support its partnership with Trout Unlimited Canada’s Stream Rehabilitation Program and other partners to foster collaborative efforts to protect and enhance riparian areas in our watersheds.

## 4.5 WATERSHED MANAGEMENT PLANNING PARTNERSHIPS

Watershed management plans and partnerships **provide important frameworks and support actions to improve watershed health in the region.** We participate with regional partners, stakeholders and watershed groups on many watershed planning initiatives. City Council has endorsed three watershed management plans: the Bow Basin Watershed Management Plan (2008), the Elbow River Watershed Management Plan (2008) and the Nose Creek Watershed Water Management Plan (2007, updated in 2019).

### **Nose Creek Watershed Management Partnership**

The Nose Creek watershed is one of Calgary's most sensitive watersheds and it continues to experience significant land development pressures. Moving forward from Council's endorsement of the updated Nose Creek Watershed Water Management Plan in 2019, the Partnership completed the first phase of a hydraulic and hydrologic modeling project of the watershed and conducted a wetland inventory. The Partnership also secured two Government of Alberta grants that will allow for the continued advancement of second phase of modeling work.

The Partnership remains a model for inter-municipal collaborative watershed management across the province and is viewed by the Government of Alberta and partner municipalities as a successful example of working together to protect a stressed watershed. Work will be undertaken in 2021 to refine the governance of the partnership and to further strengthen the relationship between members. New projects to be undertaken in 2021 include a water quality monitoring project and to complete a bathymetry analysis of the creek.

### **Elbow River Watershed Partnership**

The Elbow River Watershed Partnership (ERWP) completed the draft Elbow River State of the Watershed Report that will support and enhance environmental management plans and effective practices within the watershed. The Utility provided data used in the draft report. The report is expected to be reviewed and finalized by the ERWP Board in 2021.

The ERWP Board facilitated re-establishment of vegetation along the eroded streambanks of Silvester Creek. This will help to reduce sediment input into the stream and keep our rivers healthy and build resiliency to flooding.

While the ERWP's Freshwater Field Program was cancelled due to COVID-19 limitations, a virtual program comprised of online videos were created to enhance outreach targeted at Grade 8 and Grade 9 students. The program is a curriculum-based field study where participants are challenged to predict and then discover the nature of and challenges facing watershed management issues within the Elbow and Bow River Basins. This online program adds flexibility to field study programs in-person or online in the coming years and creates the new opportunity to expand to new audiences that have not previously had access to this education opportunity.

## 4.6 PRIORITIES FOR 2021

To continue reducing the impacts on the watershed and keeping our rivers healthy, The Utility’s focus areas for 2021 are summarized in Table 4.2.

**Table 4.2 Goal #3: Keep Our Rivers Healthy – 2021 focus**

2021 Planned Actions
Continue implementing major upgrades of Bonnybrook Wastewater Treatment plant.
Initiate ammonia toxicity study to inform guideline negotiations. Make refinements to BRWQ model.
Complete a draft of the updated Stormwater Management Strategy by the end of 2021.
Continue monitoring and evaluating progress toward the 2026 average riparian health score target.
Continue implementing bioengineering and riparian restoration projects.
Undertake Phase 2 Nose Creek Watershed Hydraulic / Hydrologic modeling work.
Initiate Phase 2 of the Watershed Health Indicators project.
A draft green stormwater infrastructure strategy will be completed by 2022.
Design and construction of the Highfield Stormwater Facility (SWQR).
Continued cleaning of Stormwater Ponds – Hidden Valley pond and Valley Ridge wetland.
Work with Parks and external partners to begin implementation of 14 wetland restoration projects with funding from the Wetland Compensation Fund.
Leveraging wetland compensation funding for Shepard Berm restoration and other wetland habitat upgrades.

## 5. GOAL #4: BUILD RESILIENCY TO FLOODING



### 5.1 RIVER FLOOD MITIGATION AND RESILIENCE PROGRAM

A comprehensive update on river and stormwater flooding efforts undertaken by The City can be found in the 2020 Flood Resiliency and Mitigation Annual Update.

2020 marked a significant milestone in The Utility’s efforts to reduce flood risk on the Elbow River with the completion of the Glenmore Dam automated gates installation. This work is the most significant advancement for flood protection along the Elbow River since the Dam was built 85 years ago.

The addition of the higher gates allow for greater control of flows through Calgary during a flood event. The gates were fully functional for the 2020 runoff season which reduced the risk of flooding to Elbow River communities during the May through July flood risk season. The new higher gates also double the volume of available water storage at the Glenmore Reservoir, providing future water supply resilience. (Figure 5.1)



**FIGURE 5. UPGRADES TO THE GLENMORE RESERVOIR INCLUDED NEW AUTOMATED METAL TO ALLOW MORE WATER STORAGE IN THE RESERVOIR.**

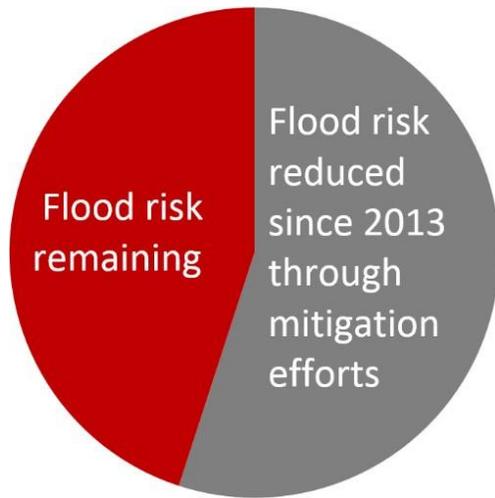


FIGURE 5.2 REDUCTION IN FLOOD RISK THROUGH FLOOD MITIGATION INVESTMENTS

As of the end of 2020, The Utility has successfully reduced its flood risk by over 50 per cent as shown in Figure 5.2. This will be further reduced as additional flood mitigation work is completed by The Utility, as well as through flood mitigation investments made by the Government of Alberta.

In 2020, we continued working closely with communities on key community flood mitigation projects. The Utility undertook robust, comprehensive community engagement and technical studies were completed to increase understanding of hydrological conditions in communities.

The following was also achieved in 2020:

- Completion of detailed design for the Downtown flood barrier and advancing preliminary design for the Upper Plateau Separation and Sunnyside flood barrier projects. These projects are critical to building Calgary’s flood resilience.
- Securing \$20.8M from Infrastructure Canada’s *Investing in Canada* Infrastructure Program for the Downtown flood barrier and Upper Plateau Separation flood mitigation projects. This funding offsets the financial impacts experienced by the early termination of the Alberta Community Resilience Program.
- Securing approximately \$33M in Municipal Stimulus Program funding from the Government of Alberta for The Utility’s Community Drainage Improvements program. This funding will help accelerate upgrades to The Utility’s stormwater infrastructure in areas built before 1988, reducing flooding due to intense rainfall.
- Successful transition to a shared forecasting platform with the Government of Alberta. This allows for more accurate forecasting and enhances The City’s ability to respond to potential flood events.
- Continuing to work closely with the Government of Alberta on upstream mitigation for the Elbow and Bow Rivers. **Ensuring upstream mitigation is constructed remains the most crucial outstanding component of Calgary’s overall flood strategy.**

Calgary’s Flood Resilience Plan includes a combination of upstream, community, and property-level flood mitigation to ensure that Calgary becomes **more resilient to river flooding**, in the face of **climate uncertainty**.

Major milestones were also reached in watershed scale flood mitigation projects being led by the Government of Alberta:

- The Natural Resources Conservation Board announcing the Springbank Off-stream Reservoir Project's formal regulatory hearing on March 22, 2021. This is one of the final major approvals required before the Government of Alberta can proceed with construction of the project. The City is a directly affected stakeholder and will be participating in the hearing.
- Completion of Phase 1 of the Bow River Reservoir Options study, which is assessing the feasibility of three potential site of a new reservoir on the Bow River upstream of Calgary and initiating Phase 2 of the study, which will recommend one option to proceed to further study.

Starting in 2020, The Utility began reviewing floodplain policy and regulations for flood-prone areas. This work aims to modernize Calgary's approach to policy and regulations for development in the floodplain, and balance urban planning interests to support river communities. Updating Calgary's floodplain policy and regulations will reflect Calgary's commitment to building and maintaining safe, vibrant, and resilient river communities.

## 5.2 LOCALIZED FLOODING AND THE COMMUNITY DRAINAGE IMPROVEMENT PROGRAM

The Utility manages stormwater to protect public safety and reduce damage to property from flooding. Communities with high stormwater flooding risk are managed through the Community Drainage Improvements (CDI) program, while areas with specific stormwater flooding concerns are supported through Local Drainage Improvements (LDI).

The CDI program increases stormwater capacity to **minimize localized flooding** risks, address to address **climate impacts** and **future densification** in mature communities.

The Government of Alberta announced approximately \$33M in funding from its Municipal Stimulus Program in 2020 December to accelerate the delivery of projects identified in The Utility's CDI and LID programs. These projects will reduce risk of flooding and improve resiliency against the impacts of climate change by accelerating construction of stormwater system upgrades in established communities. The Utility also continues to invest in studying areas at risk of stormwater flooding to identify areas of future investment and identifies and prioritizes future stormwater investments through this process.

### 5.3 PRIORITIES FOR 2021

In 2021, The Utility will continue to build resiliency to river flooding and implement actions to reduce stormwater flooding, as summarized in Table 5.1.

**Table 5.1 Goal #4: Build Resiliency to Flooding – 2021 focus**

2021 Planned Actions
Continue to work with communities to mitigate and reduce flood risk.
Explore potential policy tools and options in advance of future flood hazard mapping updates from the Government of Alberta.
Continue the research and development of a future flood risk awareness and education program for Calgarians.
Continue advocacy efforts with the Government of Alberta on the need for upstream mitigation on the Bow and Elbow Rivers.
Reduce stormwater risk through accelerated delivery of the Community Drainage Improvement and Local Drainage Improvement programs with Municipal Stimulus Program funds.

## 6. CONCLUSION

The Utility continues to progress on its commitment to ensuring the resiliency of our watersheds to make life better for Calgarians. Investments made to date are addressing the increasing pressure on our rivers, creeks, streams and wetlands from growth in the region and a changing climate. Continuing to proactively address these challenges remains one of Calgary’s most critical resiliency challenges. With guidance from Council, we will continue to consider the needs of a growing customer base in Calgary and the region, and maximizing the economic, social and environmental benefits of decisions, programs, and investments.

In 2021, we will make further progress to:

- Protect our water supply from the pressures of growth, contamination of drinking water, and climate impacts.
- Prepare to manage drought risk and impacts.
- Reducing water use to accommodate growth and build resiliency to changes in future water availability.
- Protect river health and accommodate future growth.
- Address stormwater and city-building challenges.
- Protect the health of rivers, creeks, stream, riparian areas and wetlands.
- Mitigate flood risk to protect the health and safety of people, businesses and infrastructure.