2018 INTEGRATED WATERSHED MANAGEMENT UPDATE

2018 Report

Contents

1. INTRODUCTION

1.1 PLANNING FOR A HEALTHY WATERSHED

A healthy, resilient watershed provides clean, reliable water and is vital for current and future generations in Calgary and the surrounding region. The Bow River watershed, which includes the Bow and Elbow rivers, is a natural system interacting with our built environment. Activities within Calgary and upstream of our city influence river flows, river health, water quality downstream, and the many users that depend on the watershed. This interconnectedness must be considered when working together to address the impacts of city-building on watershed management. Human activities can impact the health and sustainability of our water resources as well as the ability to adapt a changing climate. Increased water demand, potential water shortages, flooding, stormwater management, and water quality issues influence each other, affecting Calgary and the surrounding region.

As the provider of drinking water and wastewater treatment to nearly one in three Albertans, The City of Calgary (The City) is dedicated to implementing the Government of Alberta's *Water for Life Strategy* through an integrated water management framework. An integrated watershed management approach helps manage the interconnection between human activities and the watershed, while considering the environment, economy and society. The City relies on this approach to protect water resources, minimize impacts on Calgary's water resources, and to ensure a resilient water future.

Working with the Province, regional partners, stakeholders and citizens, The City aims to protect the water supply, use water wisely, keep rivers healthy and build resiliency to flooding. The City's Water Utility (the Utility) delivers on this commitment through three lines of service: water treatment and supply, wastewater collection and treatment, and stormwater management.

Increased pressure on watersheds from growth in the region as well as the impacts of a changing climate make watershed management one of Calgary's most critical resiliency challenges. The Utility's commitment to watershed protection considers the needs of a growing customer base and balancing the economic, social and environmental impacts of our decisions, programs, and actions. Sustainable management and building resiliency of our shared water resources is the driving force behind an integrated watershed management approach.

1.2 OUR GOALS

The Utility's integrated watershed framework works to achieve the following goals to protect public health and the watershed:

1. **Protect our water supply** by reducing risks to our water source.
2. **Use water wisely** through responsible and efficient use.
3. **Keep our rivers healthy** by reducing impacts of city-building on the rivers.
4. **Build resiliency to flooding** through mitigation, emergency planning and building awareness.

Our integrated watershed management framework (Figure 1.1) is designed to be flexible in delivering these goals while also responding effectively to emerging issues and customer needs. We use adaptive management to evaluate progress, risks and the effectiveness of our services. This approach guides business decisions and investment planning for a sustainable watershed. This report describes the 2018 actions taken to achieve the goals, how our actions support the services we deliver to customers, and address The City's watershed challenges and priorities.

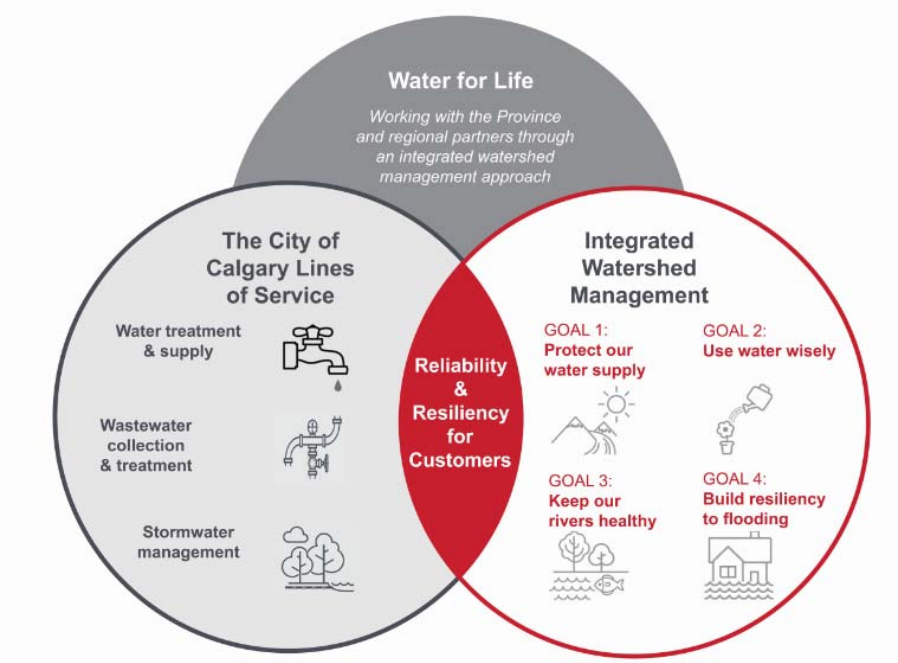

FIGURE 1.1 THE UTILITY'S INTEGRATED WATERSHED MANAGEMENT STRATEGIC FRAMEWORK

1.3 ALIGNMENT WITH CORPORATE PRIORITIES

The Water Utility's watershed management goals are aligned with One Calgary's Council Directive of **A Healthy and Green City**, and **A City of Safe and Inspiring Neighbourhoods,** which we work to achieve across the utility's three lines of services (Figure 1.2).

A Healthy and Green City: Calgary is a leader in caring about the health of the environment and promotes resilient neighbourhoods where residents connect with one another and can live active, healthy lifestyles.

- 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, developers, businesses and the First Nations.

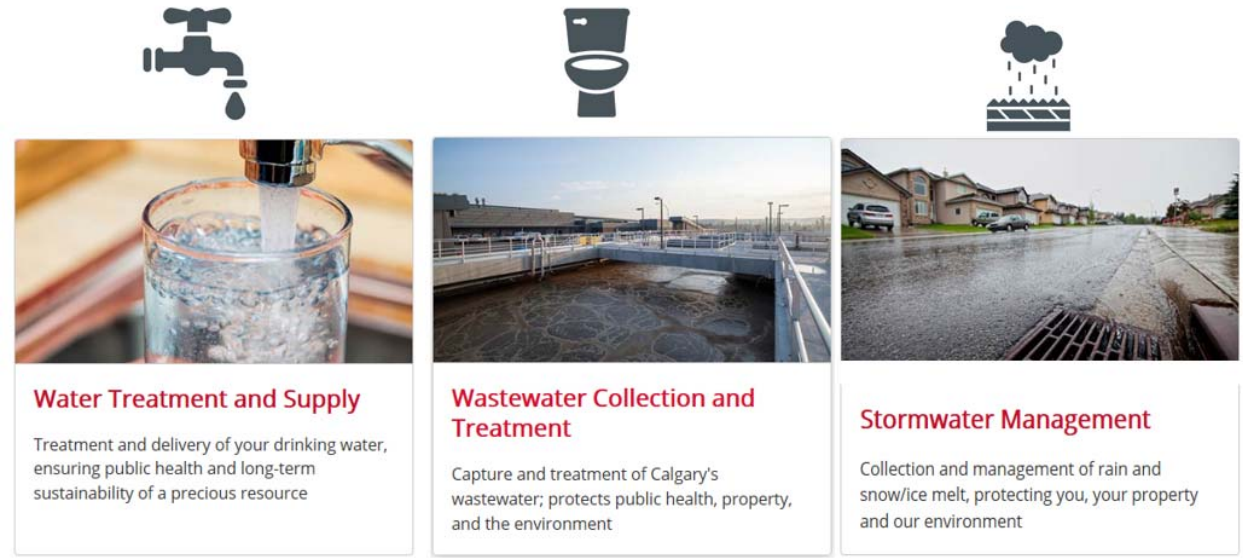

FIGURE 1.2 THE CITY ADVANCES ITS INTEGRATED WATERSHED MANAGEMENT APPROACH THROUGH THE UTILITY'S THREE LINES OF SERVICE

This work is also aligned with The City's Climate Resilience Strategy Water Management actions (preparing for increasing risks of flooding, drought and declining water supply) and programs (River Flood Mitigation and Resiliency, Stormwater Management, Long Term Water Supply) as well as the Natural Asset Management and Adaptation action to protect natural assets. The Corporate Resilience Strategy will also support watershed protection through its Infrastructure and Environment resilience themes. Examples of how The Utility's work helps achieve corporate priorities are highlighted throughout this report.

2. GOAL #1: PROTECT OUR WATER SUPPLY

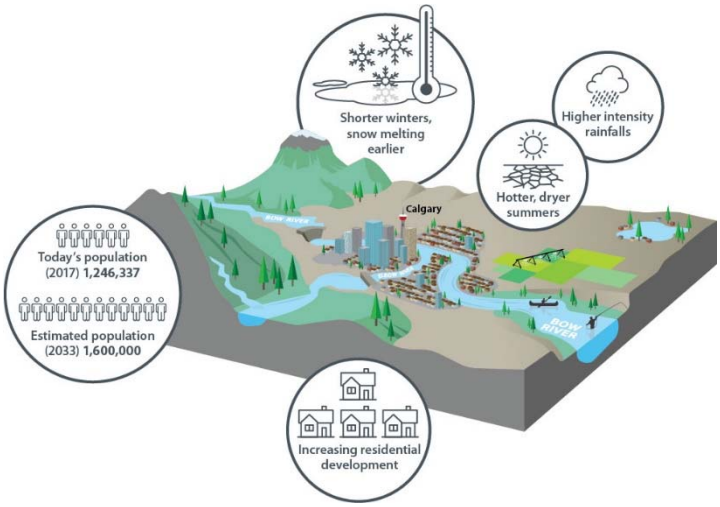

FIGURE 2.1 CALGARY'S ELBOW AND BOW WATERSHEDS

A safe and secure water supply is critical for economic and urban growth in Calgary and the region. Our watershed is prone to drought and Calgary's future water supply is limited because of climate change impacts and the provincial closure of the South Saskatchewan River Basin to new surface water licences. An integrated water supply management approach will help identify risks facing our water supply for both quality and quantity, and recommend actions to address challenges.

Watershed protection aligns with the Provincial Water for Life Strategy, South Saskatchewan Regional Plan and supports the work of the Calgary Metropolitan Region Board (CMRB) growth and servicing plans of which The City is a partner.

2.1 WATER SUPPLY MANAGEMENT

Development of a Water Security Strategy and Plan was initiated in 2018 to create a roadmap that connects various water management plans, initiatives and concepts to build water supply solutions for the future. This initiative will ensure sustainable, long-term water supplies for Calgary and the region while providing greater resiliency to drought and climate change.

FIGURE 2.2 THE BEARSPAW RESERVOIR SUPPLIES WATER FOR CALGARY AND REGIONAL CUSTOMERS

The Water Security Strategy and Plan will identify actions to achieve shared outcomes among The City, region and the Province:

- Improve water supply availability by increasing storage capacity, enhancing operational flexibility by addressing water licence diversion limits and examining the potential for water reuse options for Calgary and the region.
- Coordinate water supply and demand planning through cooperation with the Province and regional.
- Improve watershed health by protecting Calgary's source watersheds, restoring ecosystems, decreasing pollutants in our waterways and mitigating flood impacts.
- Increase public understanding of the importance of a reliable water supply for Calgary's economy and resilience.

- Increase drought and climate resilience through scenario planning and developing flexible mitigation and adaptation strategies.

The City will be reviewing and finalizing the Water Security Strategy and Plan in 2019.

2.2 CLIMATE IMPACTS ON WATER MANAGEMENT

Climate change will alter how and when we receive precipitation in Calgary's watershed, affecting both water quantity and water quality. Mountain snowpack melting may occur earlier in the year, precipitation will fall with greater intensity, and summers will become hotter, drier and longer. With increasing temperatures and drought conditions, water demands will undoubtedly increase. Increasing threat of wildfire in our source watersheds is a risk to our source water quality.

Water management practices and storage capacity for both extreme flood and drought are priorities in preparing for climate change, and we are taking action to plan for an uncertain climate future. While we can't reduce the uncertainty of the future, we can plan for a wide range of plausible future events and ensure flexibility to adjust plans and actions along the way. In 2018, we identified impacts climate change will have and the implications on water management and the Water Utility. A number of mitigation and adaptation actions were identified and incorporated into 2019 work plans.

Priorities over the next business cycle include technical analysis to support changes to how water infrastructure and programs are designed and prioritized, ongoing collaboration with stakeholders on climate adaptation initiatives, and tracking and reporting on climate adaptation progress in the Utility. These actions will be integrated into existing and planned programs and projects with actions being included in the business planning process for 2019-2022.

2.3 DROUGHT RESPONSE AND MANAGEMENT

Higher summer temperatures and below-average precipitation persisted into 2018. Flows in the Bow and Elbow rivers were below-normal from June to September. These river flows combined with high fire risk advisories required a drought response that approached the 'Advisory' phase of the Internal City of Calgary Drought Advisory Phase (Figure 2.4). While normal Water Utility operations were maintained, watershed monitoring and collaboration efforts with watershed stakeholders were increased. River flows recovered in fall 2018, however the Utility continues to prepare for future drought conditions.

FIGURE 2.4 CALGARY'S FOUR DROUGHT ACTION PHASES

In 2018, the Water Utility initiated a Drought Risk and Vulnerability Assessment. This work builds on the Climate Adaption Plan, current drought response actions and lessons learned from drought prone sectors in the US and worldwide. The risk and vulnerability assessment will underpin a larger step-wise process to identify key drought mitigation and response strategies in a Corporate Drought Management Plan that will be developed during the 2019-22 business cycle.

2.4 SOURCE WATER PROTECTION

As part of The City's source-to-tap approach to provide safe, clean drinking water, a Source Water Protection Plan was finalized in 2018 (Figure 2.3). The Plan includes a compelling vision, four key goals, and targeted priority actions to proactively protect the quality of our source water supplies.

Implementation of high priority actions in 2018 included:

1. A **Wildfire-Source Water Task Force** was set up to address the potential for wildfires in our source watershed contaminating water supplies due to runoff from burned landscapes, which has been identified as one of the biggest risks to Calgary's source water. Experts in water, land and fire management from The City, Alberta Agriculture and Forestry, Parks Canada, and academia investigated the feasibility of new tactics and tools to reduce the impact of wildfires on water resources in our watershed and development of recommendations is underway.

- A **Task Force for the Bearspaw Reservoir** was convened, including representatives from The City of Calgary, Rocky View County and TransAlta. The Task Force has made headway reaching consensus on issues, management principles, and requirements to manage the growing risks of recreational uses and other activities on and surrounding the Bearspaw Reservoir on Calgary's source water quality.

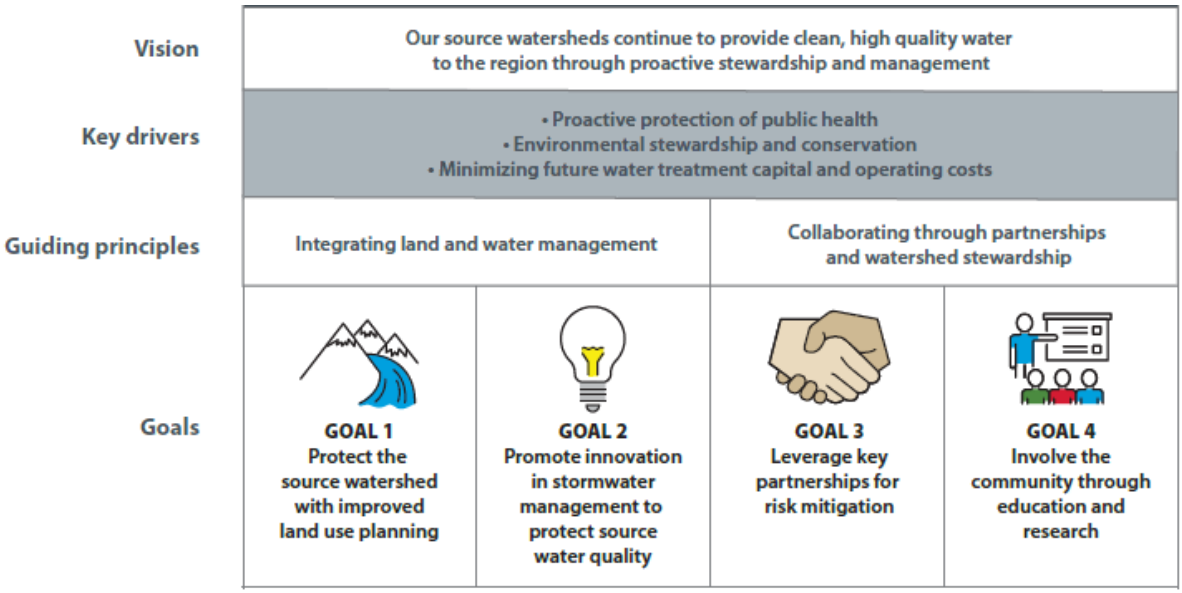

FIGURE 2.3 CALGARY'S SOURCE WATER PROTECTION PLAN

Starting in 2019, The City will initiate a watershed investment strategy to investigate mechanisms to incentivize conservation and restoration of vulnerable watershed areas, reducing potential future impacts on Calgary's source water. This is an action identified in the Source Water Protection Plan.

2.5 WATER QUALITY

The City's source-to-tap view of water quality means that as water travels from the mountains and foothills, through our water treatment plants across the city through the distribution system and to customer taps, the water is tested at every step to ensure its quality is maintained. Calgary's drinking water is safe and reliable, 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.

FIGURE 2.5 THE CITY TESTS DRINKING WATER FROM SOURCE TO TAP

The City of Calgary operates its water treatment and distribution system, which includes the Glenmore and Bearspaw treatment plants and a water distribution and transmission system, under the approval of the Environmental Protection and Enhancement Act. The current approval expires September 1, 2020. The City will submit an application to renew the approval for another 10 years to Alberta Environment and Parks (AEP) and will work with them to set the terms and conditions in 2019. Obtaining approval from AEP ensures that The City continues to operate its water treatment and distribution system in accordance with environmental regulations.

Customer commitment: *Customers receive high-quality, safe drinking water and a protected water supply for the future.*

2.5.1 CALGARY'S SOURCE WATER QUALITY

Source water quality continues to be very good near The City's water treatment plants. 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 Water Utility uses the federal Water Quality Index (WQI) to track conditions, which translates data from multiple water quality parameters into a score from 0-100, along with a descriptor (Excellent, Good, Marginal, Poor). The Bow River typically has 'Excellent' water quality, while the Elbow River typically has 'Good' water quality. Over the last decade, consistently high WQI ratings have been observed near The City's water treatment plants (Figure 2.6). Safeguarding our high quality source water provides the first line of defense in a multi-barrier approach to providing safe, clean drinking water.

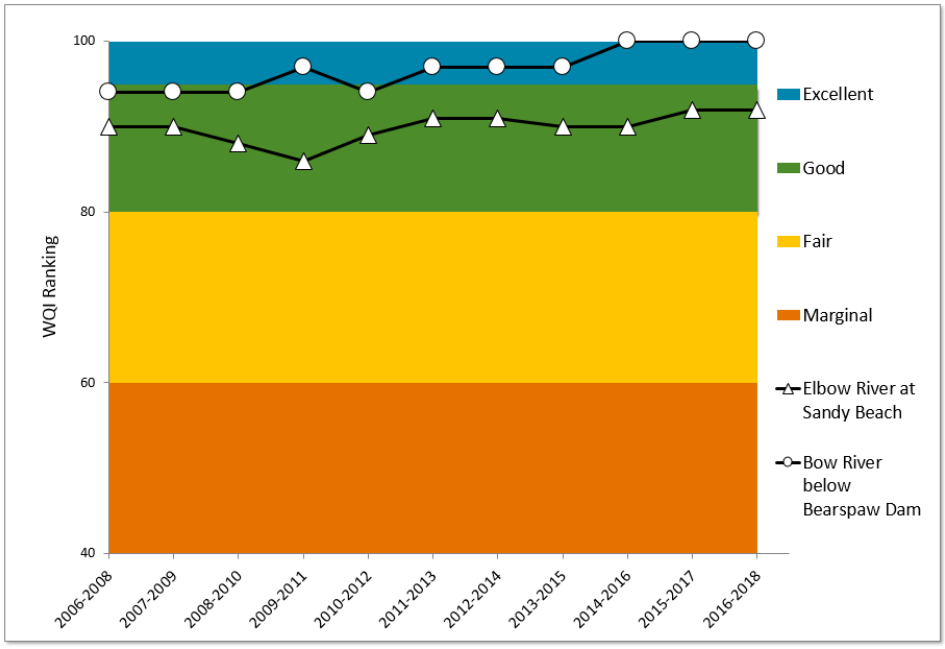

FIGURE 2.6 WATER QUALITY INDEX - CALGARY'S SOURCE WATER

2.5.2 LEAD SERVICE CONNECTION AND WATER QUALITY IMPACTS

Calgary's water quality team closely monitors drinking water daily from the river, to our treatment plants and throughout the distribution system, which delivers water to homes and businesses. Lead is not found in our source water in the Bow or Elbow rivers. Prior to 1950, lead was commonly used for water service piping. Copper and plastic pipes have since replaced lead. A service connection is the water pipe that connects from The City's water main to the piping inside residences and businesses. The service connection is on both public and private property. A lead service connection is a connection made out of lead piping.

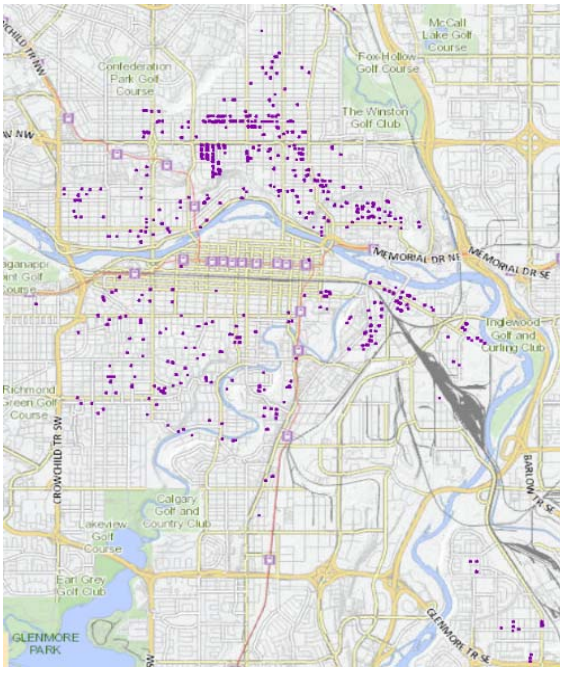

FIGURE 2.7 LEAD SERVICE PROPERTIES

The City is aware of 551 active lead service lines out of a total of 336,452 active water service lines - about 0.16 per cent of the total service count (Figure 2.7). These service lines are predominantly confined to the inner city area. For many years, The City has been managing lead through several initiatives including the Tap Water Sampling Program and Customer Rebate Program for filtration devices. Lead service connections are

typically replaced when nearby water mains are replaced, when sites are redeveloped and when determined necessary through the Tap Water Sampling Program.

Health Canada officially updated their guideline for lead in drinking water on March 8, 2019. The new guidelines will change the health risk-based maximum acceptable concentration (MAC) from 10 ug/L to 5 ug/L. The Water Utility is working closely with AEP on their policy in response to the federal change to understand the requirements and determine what adjustments are required in our long standing management program to ensure compliance.

2.6 REGIONAL COLLABORATION

Regional servicing

The City is dedicated to ensuring reliable and resilient water servicing for Calgary and its regional customers. The Water Utility provides drinking water for about one in three Albertans and has been providing water services outside of its corporate boundaries since 1961. The City continues to receive and address formal requests for extension of services outside of the Calgary's boundaries. The City retains full ownership of its water licences and has reserved roughly two percent of Calgary's annual water allocation for existing regional customers through 2022.

Calgary Metropolitan Region Board members include City of Airdrie, The City of Calgary, City of Chestermere, Town of Cochrane, Foothills County, Town of High River, Town of Okotoks, Rocky View County, Town of Strathmore and Wheatland County.

The City's new policy on Regional Water, Wastewater and Stormwater Servicing (CP2018.01) affirms that regional servicing should support fiscally responsible regional planning that balances economic and social development with environmental protection. Development of collaborative regional servicing plans need to balance the needs of all stakeholders while supporting vibrant communities. Continued growth and development in the Calgary region are highlighting the need to manage the cumulative effects on the watershed, including protecting the quality of Calgary's raw water sources. The need to protect these resources must be balanced with a strategic approach to available infrastructure capacity and future investments.

Calgary Metropolitan Region Board

The CMRB was established on January 1st, 2018 with a membership of 10 municipalities in the Calgary metropolitan region. It is mandated to promote the long-term sustainability of the Calgary Metropolitan Region, ensure environmentally responsible land-use planning and growth management, coordinate regional infrastructure investment and service delivery, and promote the economic well-being and competitiveness of the region. In 2018, the CMRB developed an Interim Growth Plan and Interim Regional Evaluation Framework (IREF) for the region. The Board is required to develop a long-term Growth Plan and Servicing Plan by January 2021. The City is working closely with the Board to ensure there is sufficient water supply, wastewater treatment and stormwater management to support current and future

The City provides water servicing to Airdrie, Chestermere, Strathmore and parts of Tsuu T'ina Nation and Foothills County. The City provides wastewater servicing to Airdrie, Chestermere, Cochrane, and parts of Tsuu T'ina Nation and Rocky View County.

regional growth and economic prosperity. This regional forum provides a further opportunity for the integrated watershed management priorities of The City to be recognized and implemented beyond Calgary's boundaries.

Bow River Working Group

The Water Utility continues to participate in the Bow River Working Group (BRWG) that made recommendations for flood and drought mitigation in the Bow River watershed in an August 2017 report to Alberta's Minister of Environment and Parks. A number of 'quick wins' were identified to improve flood and water supply resiliency in the region if implemented. Additionally, a proposed flood-focused reservoir upstream of Calgary would have short-term water supply benefits for Calgary, with three locations identified for further study. In 2018, The City advocated for implementation of the report recommendations. In 2019, the Province committed to re-engage the BRWG in its Bow Basin Water Management Options Project. This AEP project will begin the process of assessing the feasibility of three potential storage options including a new Glenbow reservoir downstream of Cochrane, a new reservoir in the Morley area, and expanding the storage capacity of the Ghost Reservoir. Given the important role upstream storage on the Bow River could play in The City's flood resilience and water supply security, The City is actively involved with this collaborative group. More on this initiative is detailed in UCS2019-0653.

2.7 PRIORITIES IN 2019

Table 2.1 summarizes activities The City plans to take to continue protecting our water supply in 2019.

Table 2.1 Goal #1: Protect Our Water Supply – 2019 focus

2019 Planned Actions
Finalize the Water Security Strategy and Plan.
Technical analysis on rainfall intensity, ongoing collaboration and engagement on climate adaptation initiatives, and pilot a Utility Climate Change Education program for Water staff.
Complete Drought Risk and Vulnerability Assessment.
Source water protection • Report on the recommendations of the Wildfire-Source Water Task Force. • Obtain Council direction on the Bearspaw Reservoir, and conduct consultations on management options. • Initiate a watershed investment strategy to investigate mechanisms to incentivize conservation and restoration of vulnerable watershed areas. • Integrate source water protection priorities in regional land use plans under development by the Calgary Metropolitan Region Board.
Work with Planning and Transportation to advance Council's Integrated Watershed Management Directive through improved policy and guidebook development in the Next 20 (MDP) update.

Continue to participate in the Bow River Working Group on the Bow Basin Water Management Options feasibility study and advocate for an upstream reservoir to manage flood and water supply.
Adjust the existing lead management program to comply with the new Health Canada Guidelines on lead.

3. GOAL #2: USE WATER WISELY

3.1 WATER EFFICIENCY PLAN

Just over a decade ago, Calgarians were using more water per person than many other cities. Our booming population and rapid economic growth placed heavy demands on our water supply, and in 2003, Calgarians were using 518 liters per person, per day, compared to the Canadian average of 335 liters per day.

Committed to using water wisely, The City developed and approved the 30-in-30 Water Efficiency Plan in 2005 and set the stage for long-term sustainable water management. Our goal is to hold withdrawals from the river steady at 2003 levels, even with population growth. To do this, the plan charted a path of programs and initiatives to reduce water consumption by 30 per cent over 30 years. We are on track to meet this goal by investing in water efficiency.

Through infrastructure investments, bylaw adjustments and water efficiency programs, we have managed to keep our water demand relatively constant, despite population growth overtime. This allows The City to defer costly infrastructure expansion and reduces stress on our rivers. (Figure 3.0)

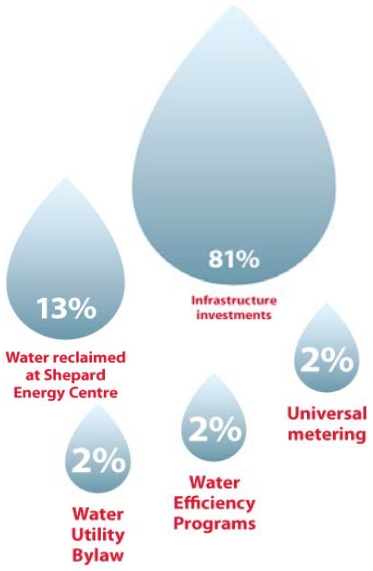

FIGURE 3.0 WATER DEMAND IN CALGARY HAS DECREASED THROUGH VARIOUS PROGRAMS AND INVESTMENTS

The City has delivered a number of programs since 2005 to encourage conservation and water savings for citizens. These programs and citizen action have contributed to keeping water demand on track to meet our Water Efficiency Plan goals and have reduced the need to upgrade infrastructure at this time. These programs have also provided customers with savings on their monthly bills through reduced water consumption.

In 2018, The City continued implementing the recommendations from the 2016 Water Efficiency Plan (WEP) update.

2018 program highlights:

- Improved water use planning and forecasting and data analysis to understand customer water use patterns (particularly high water users, business customers and Calgary Housing Corporation).
- Updated and expanded the residential water leak detection program to support high water use messaging.
- Increased focus on peak day specific messaging to reduce outdoor water use.
- Continued to deliver YardSmart program in collaboration with partner organization to reduce outdoor water use.
- Expanded Multi-family Toilet Replacement Rebate Program.
- Collaborated with Calgary Housing Corporation to reduce water use at multi-family properties.

FIGURE 3.1 WATER CONSERVATION EDUCATION BOOTH AT A COMMUNITY EVENT

In 2018, we also interacted with over 3,500 citizens sharing water conservation messages, stormwater education and watershed literacy at events such as Earth Hour, the Mayor's Environment Expo, the Calgary Home & Garden Show and other community events. The City provided public tours of the Glenmore Water Treatment Plant to 160 Calgarians throughout 2018. Citizens and youth audiences were also engaged in water conservation and watershed protection messaging through the programs and education efforts of The City's numerous watershed education partners.

3.2 CALGARY'S WATER USAGE

The 2006 Water Efficiency Plan's current "water neutral" goal is to accommodate Calgary's future population to 2033, with the same amount of water removed from our rivers in 2003. Water efficiency measures implemented by The City, as well as changes in available water efficient technology and citizen behavior change have been successful in helping remain below this benchmark of 212,500 million litres (ML) since 2003. Despite a service population increase of 25,000 people in Calgary and region in 2018, and another relatively warm and dry summer, water withdrawn from the Bow and Elbow rivers decreased slightly from 2017 (Figure 3.2).

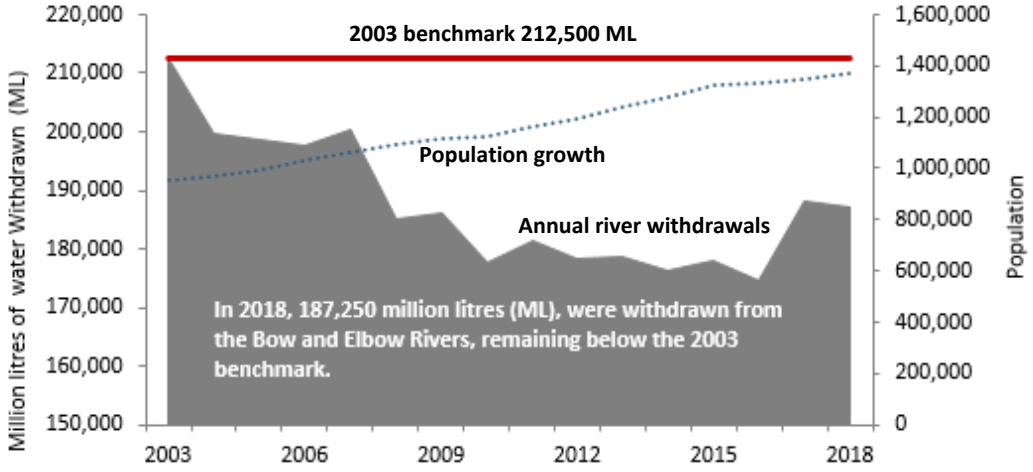

FIGURE 3.2 TOTAL ANNUAL RIVER WITHDRAWAL FROM THE BOW AND ELBOW RIVERS RELATIVE TO CALGARY'S POPULATION

3.3 CALGARY'S PER CAPITA WATER DEMAND

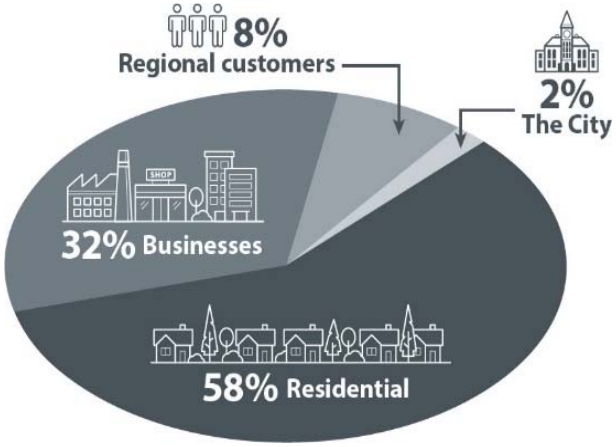

FIGURE 3.3 CALGARY'S 2018 WATER DEMAND BY CUSTOMER

Single-family and multi-family customers make up 58 per cent of Calgary's water demand, followed by business customers that comprise 32 per cent of the total water customer base (Figure 3.3).

Per capita water demand is the average volume of water used per person per day. In 2018, Calgary's overall water use, including all residential, business and municipal, was 362 litres per capita per day (lpcd). This represents a 30 per cent decrease in per capita per day use since 2003 and is well on track to meet the 2033 target of 350 lpcd (Figure 3.4).

Hot, dry summers in 2017 and 2018 contributed to an increase in per capita demand from the 2016 low, due to increased outdoor water use and water used for industrial cooling over the summer months. Single-family residential demand decreased to 210 lpcd in 2018, the lowest on record for this customer group, and meeting the corporate 2020 sustainability target for single-family residential water use of 210 lpcd.

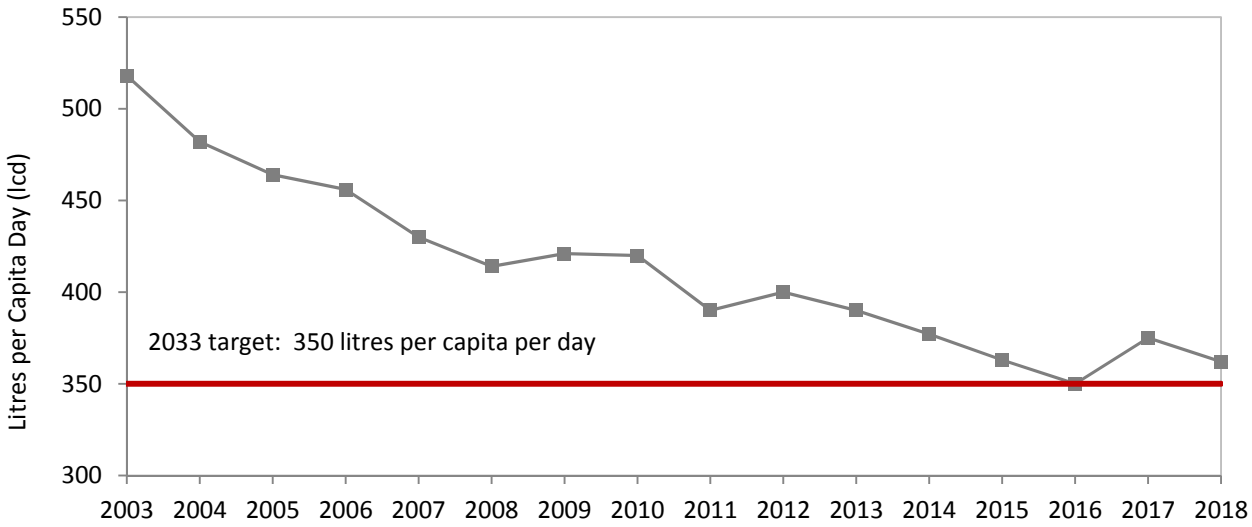

FIGURE 3.4 - CALGARY'S TOTAL PER CAPITA WATER DEMAND, 2003 - 2018

Fixing household leaks is one way to reduce per capita water demand. Our residential leak detection programming was expanded to support high water use messaging in early 2018. The original Fix a Leak program grew to include information and messaging for large-scale leaks and to communicate the unexpected effects on a monthly water bill. This led to beginning the development of a series of information modules on home water management for residential customers to make changes in their own homes and yards. This work will be completed in 2019.

Water savings of 72 million litres were achieved at multi-family properties in 2018, reducing per capita water demand. More than 860 toilets were replaced through the Multi-unit Toilet Replacement Rebate program at multi-family properties resulting in over 48 million litres of water saved in 2018. We also worked with Calgary Housing Corporation (CHC) to review water use at 10 multi-family properties. This collaboration resulted in over 24 million litres of water savings to date at a single property.

3.4 PEAK DAY DEMAND

Peak day demand is the one day each year that Calgarians use the most water. Typically, this occurs in the summer months, as water demand spikes due to increased outdoor watering and industrial cooling needs. The ability for The City to meet peak day demand means water treatment, storage and distribution infrastructure must be built to this capacity. Keeping this value low ensures that The City can continue to meet these water requirements without requiring additional infrastructure. In 2018, Calgary's peak day demand occurred on July 16, at 754 million litres which is below the 950 million litre capacity of The City's water treatment plants (Figure 3.5). This is a decrease from 2017 (762 ML) but represents one of the highest values seen since 2007.

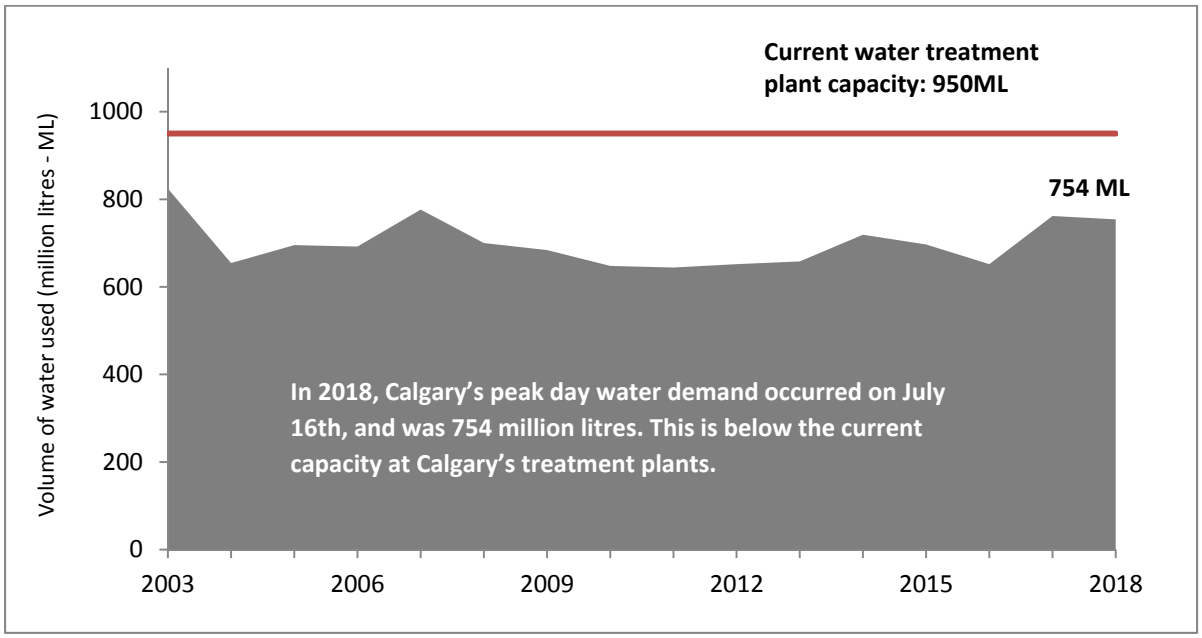

FIGURE 3.5 - PEAK DAY DEMAND – MAXIMUM VOLUME OF WATER USED IN CALGARY IN ONE DAY

Emphasis on outdoor water conservation and making low water use landscaping choices played an important role through the warm summer months in an effort to reduce peak day demand. The YardSmart program completed customer research early in 2018, and continued working with partners to deliver water wise landscape design workshops in addition to expanding its peak day specific messaging to target outdoor watering over the summer months. In 2018, the Yard Smart program reached over 5,000 Calgarians through rain barrel sales, public event booths and partner-led workshops.

3.4.1 SYSTEM LEAK DETECTION

Non-revenue water is a term used to describe water that's treated and distributed, but not billed to a customer. This includes water lost through system leakage and main breaks and water used for delivery of City services. To reduce non-revenue water loss, as well as protect property, the environment, and drinking water quality, we conduct leak detection testing on City infrastructure. In addition to addressing main breaks and other leaks that present themselves, leak detection testing is a critical part of our infrastructure maintenance program, as water from leaks in underground pipes with good soil drainage does not typically reach the surface and can go unnoticed for a long time. Leaks identified through the leak detection program are scheduled for repair. Leak detection and repair completion rates are monitored on a section-by-section basis. In 2018, City crews surveyed 50 km of water mains and identified and fixed five leaks, leading to estimated water savings of 119,000 litres per day.

3.5 PRIORITIES IN 2019

The City will continue working with customers to encourage responsible and efficient use of water. Activities planned for 2019 are summarized in Table 2.1.

Table 2.1 Goal #2: Use Water Wisely – 2019 Priorities

2019 Planned Actions
Deliver the Homeowner Water Guide series.
Deliver education to citizens about the Water Utility, leaks and high water consumption, outdoor water use and the importance of water conservation including messaging to new Canadians.
Expand peak day demand messaging to target the reduction of outdoor water use during hot, dry summer months, and continue to deliver YardSmart programming and expand program reach into new markets.
Begin work on revising Water Efficiency Plan targets and goals.
Continue aligning water efficiency, demand forecasting and infrastructure planning.
Expand programming for business and multi-family customers and continue to deliver the Multi-unit Toilet Replacement Rebate program.

4. GOAL #3: KEEP OUR RIVERS HEALTHY

The Elbow and Bow rivers supply drinking water, provide recreation, and support aquatic ecosystems within Calgary and beyond our boundaries. Goal #3 focuses on keeping the Bow and Elbow Rivers healthy through managing sediment, pollutants, and nutrients from entering the rivers. Protecting Calgary's waterways is guided by Provincial sediment management and pollutant loading objectives for the Bow River. A survey conducted by The City of Calgary in 2016 found 83 per cent of Calgarians consider Calgary's river areas important and 79 per cent supported The City investing in healthy river areas.

Reliable stormwater service provides the foundation to a healthy and green city. The Utility's stormwater line of service aims to ensure that property is protected from flooding and ensure watersheds are healthy. Our Stormwater Management Strategy is focused on mitigating the impacts that city-building has on stormwater by reducing the volume of stormwater and increasing the quality of stormwater runoff when entering the rivers. Excess nutrients, sediment, bacteria and other pollutants that enter our rivers can negatively impact fish and wildlife, the ecosystem and drinking water. We work diligently to manage these risks and protect the areas adjacent to rivers and creeks.

We are continuously working to improve the way stormwater is managed, and water's influence on city-building. Managing water quality is a major component of our alignment to the Provincial South Saskatchewan Regional Plan. This section highlights the results of these efforts in 2018 for both wastewater and stormwater management.

4.1 WASTEWATER MANAGEMENT

4.1.1 APPROVAL TO OPERATE

The City operates its three wastewater treatment plants (Bonnybrook, Pine Creek and Fish Creek) and a wastewater collection system under the Environmental Protection and Enhancement Act. A Provincial approval applies to the construction, operation and reclamation of our wastewater system. The current approval expires 2019 October 1. Obtaining this approval from the Province ensures that we continue to operate in accordance with environmental regulations. Discussions with the Province are underway to establish the terms and conditions of the renewed approval.

4.1.2 WASTEWATER TREATMENT PLANTS

In 2018, The City's wastewater treatment plants continued to produce treated effluent compliant with Provincial regulations. Major upgrades to the Bonnybrook Wastewater Treatment Plant are ongoing to ensure continued compliance with regulatory requirements and support population growth (Figure 4.1). In 2018, the Major Electrical Upgrades Project was completed, increasing infrastructure resiliency and electrical capacity to accommodate future growth.

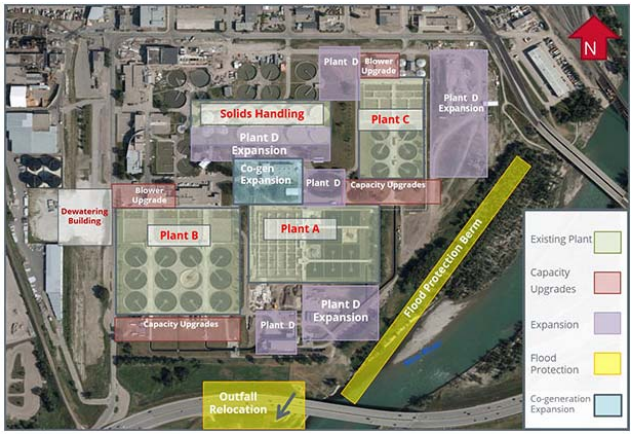

FIGURE 4.1 KEY PROJECT AREAS FOR BONNYBROOK UPGRADES

Four new secondary clarifiers and an upgraded sludge digester were commissioned to increase both liquid and solid stream treatment capacity at Bonnybrook. Construction of the Plant D Secondary Treatment project began in the summer of 2018 and is progressing well. This project will increase treatment capacity of the plant by 20 per cent when it becomes operational in 2021.

Significant progress was also made on the construction of the Bonnybrook flood protection barrier in 2018. The barrier will provide flood protection for the critical wastewater treatment infrastructure at the plant. In 2019 a design study for upgrades at the Fish Creek Wastewater Treatment Plant will be initiated. 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.

Customer commitment: *wastewater from toilets, sinks and drains is collected from homes and businesses, treated, and returned to the river.*

4.1.3 WASTEWATER BUSINESS CUSTOMERS

Some industrial, commercial, and institutional (ICI) establishments produce wastewater that may have a higher concentration and contain different contaminants that cause it to exceed wastewater quality guidelines – this is called high-strength wastewater. The City's Wastewater Loading Management Program aims to improve management of high-strength wastewater from ICI customers, as this wastewater is technically challenging and expensive to manage and treat.

FIGURE 4.2 PINE CREEK WASTEWATER TREATMENT PLANT

The program identifies and implements cost-effective, resource efficient, reliable and equitable strategies that meet customers' needs for wastewater load management while at the same time contributing to optimal use of existing wastewater treatment plant capacity. The City continued to advance the program in 2018 by increasing its high-strength wastewater sampling and monitoring, and investigate opportunities to build on the program in 2019.

4.2 TOTAL LOADING MANAGEMENT

When pollutants are introduced into the waterways, water quality and river health can be impacted. Pollutants can also cause maintenance issues for The City's wastewater and stormwater infrastructure. The City's 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 City's Total Loading Management Plan (TLMP) aims to ensure that pollutant loadings to the Bow River remain below certain levels by guiding future stormwater and wastewater control practices and infrastructure decisions.

4.2.1 TOTAL SUSPENDED SOLIDS IN THE BOW RIVER

Stormwater and treated wastewater contain total suspended solids, which include organic and inorganic materials. These materials enter our waterways and can impact water quality and aquatic habitat. Figure 4.3 shows that The City 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 total suspended solids to the Bow River compared to wastewater effluent. The City's Stormwater Management Strategy's goal is to maintain TSS loadings from stormwater in the Bow River at or below 2005 levels, even as the city and region grow. In 2018, estimated TSS loadings from stormwater to the Bow River were 39,918 kg/day, which is below the 2005 benchmark and well within the Province's TSS objective of 52,920 kg/day.

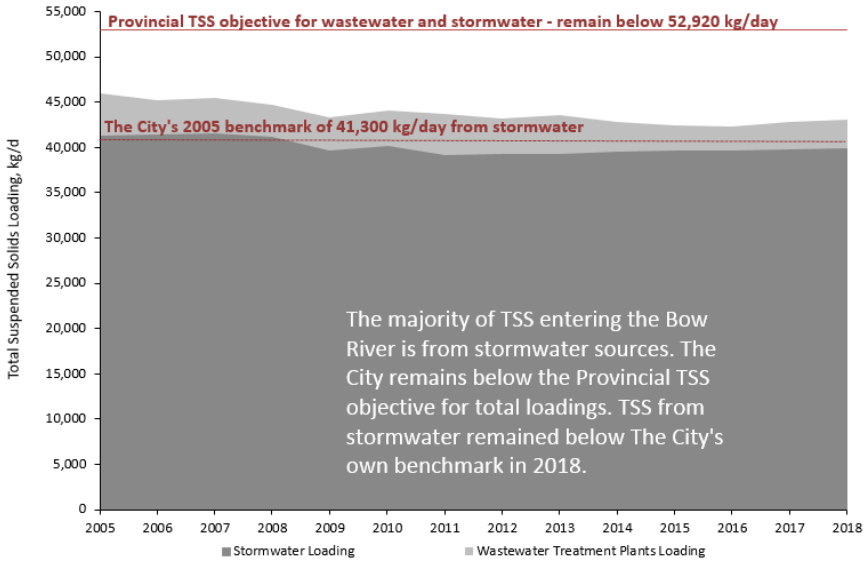

FIGURE 4.3 TOTAL SUSPENDED SOLIDS (TSS) LOADING TO THE BOW RIVER FROM STORMWATER AND WASTEWATER

4.2.2 PHOSPHORUS IN THE BOW RIVER

Impacts to fish and other aquatic life can occur when there is excess phosphorus in the waterways. Too much phosphorus can cause accelerated plant growth, algae blooms and low dissolved oxygen which is detrimental to aquatic life. The City's TLMP 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 4.4 shows the reported amount of TP entering the river from both stormwater and wastewater to be below the Provincial objectives in 2018. Treated wastewater contributes more than double the amount of TP to the Bow River compared with stormwater sources.

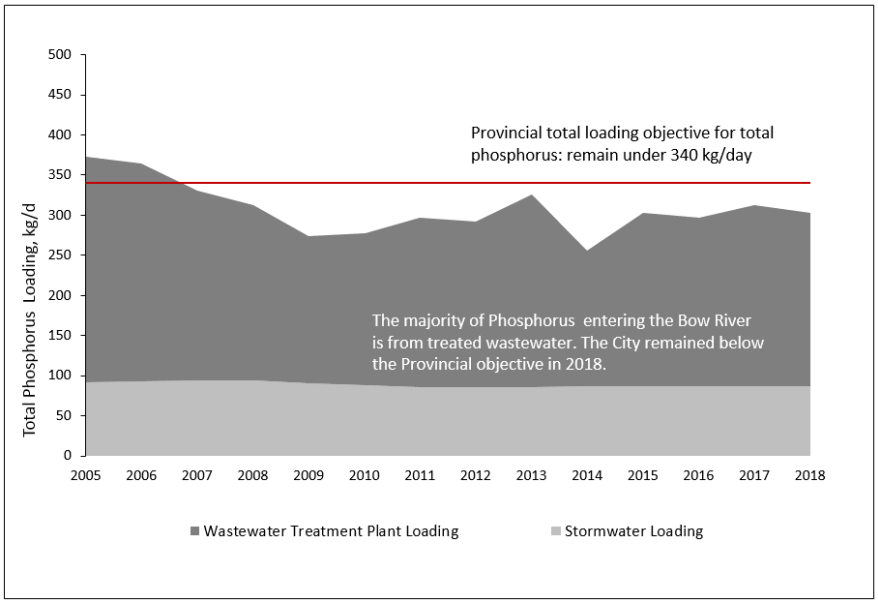

FIGURE 4.4 TOTAL PHOSOPHORUS LOADINGS TO THE BOW RIVER FROM STORMWATER AND TREATED WASTEWATER

4.3 STORMWATER MANAGEMENT

When it rains on urban landscapes, impervious surfaces like buildings, parking lots, driveways, and roads prevent the water from soaking into the ground. When water can't be absorbed through the surface, it creates runoff along our roads and into our stormwater system. Along the way, it picks up pollutants. The ultimate goal of stormwater management is to maintain the health of our watershed by mitigating the effects of city-building. The Water Utility strives to do this by working with the building industry to manage the volume, quality, and flow rates of stormwater. This helps reduce the risk of flooding, maintain healthy riparian areas, and protect water quality.

The Water Utility collects and manages stormwater, water from rain or snow/ice melt, by moving it through storm drains, pipes and ponds. Parts of Calgary's stormwater system is designed to limit the sediment going into the river, ensuring healthy rivers and river banks, which allows the quality of the rivers to be maintained for Calgarians and downstream users.

Stormwater retention ponds are extremely effective in managing sediment. As well, wetlands, stormwater quality retrofits and green stormwater infrastructure projects are effective in contributing to reducing TSS loadings to Calgary's rivers and streams.

4.3.1 STORMWATER MANAGEMENT STRATEGY UPDATE

Stormwater management is a key consideration in building Calgary's vibrant, safe and resilient communities. The City's stormwater management system has benefitted from investments put in place over the last decade or so, including innovative stormwater quality retrofits, the Community Drainage Improvement Program (CDI), and green stormwater infrastructure. These and other stormwater and land management practices have helped manage impacts of a growing city.

As The City's understanding of stormwater impacts and best practices has improved and the impacts of climate change increase, an update of the 2005 Stormwater Management Strategy is required. A refined strategy will align The City's customer-centric focus with our integrated watershed management approach to guide future investments and practices in stormwater management.

To inform this update, The City began engagement with internal and external stakeholders including businesses, the building industry, non-government agencies, academia, regional municipalities, regulators and customers in fall 2018. The process focused on increasing understanding stakeholder values and perspectives, and building a stronger understanding of stormwater management challenges and opportunities for Calgary. The second phase of engagement will work with stakeholders to identify short, medium and long-term actions that will help enhance how stormwater is managed in the future. The input from stakeholders will inform The City as it considers technical expertise, best management practices, and a Triple Bottom Line analyses to update the Stormwater

Customer commitment: *stormwater from rain and melting snow is collected and diverted, reducing flooding. Stormponds and green infrastructure remove pollutants and return water to water bodies.*

Management Strategy. The Strategy will also align with other corporate strategies and policies such as the updated Municipal Development Plan, The City's Climate Resilience Strategy, and the Corporate Resilience Strategy.

4.3.2 STORMWATER QUALITY RETROFIT INVESTMENTS

FIGURE 4.6 BOWMONT PARK - STORMWATER ENTERS THE PARK THROUGH THIS CIRCULAR NAUTILUS POND™, WHERE SEDIMENT PARTICLES ARE PREVENTED FROM ENTERING THE BOW RIVER.

The City constructs stormwater quality retrofit projects such as wet ponds or constructed wetlands across the city. These projects improve the quality of water by removing solids and other pollutants before it enters our rivers. The Bowmont East Stormwater Quality Retrofit pond in Dale Hodges Park became operational in 2018. The project reduces the amount of sediment entering the Bow River from this stormwater catchment in NW Calgary by approximately 50 per cent (Figure 4.6).

The Riverbend Trunk pond is being constructed to accommodate increased road runoff, facilitate future development, manage flows and provide stormwater treatment for industrial areas, which to date have not received treatment. Design of this facility was completed in 2018, with construction completion scheduled for 2019.

The oil-grit separator portion of the 37th Street Stormwater Quality Project was completed in 2018. This project will provide stormwater treatment for a currently untreated area. It will improve water quality in the environmentally sensitive Weaselhead Flats and the Glenmore Reservoir, which provides Calgary's drinking water.

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 flood mitigation by holding stormwater and releasing it slowly back into the stormwater system, reducing peak flows. The City's Pond Condition Assessment Program wrapped up in 2018, with approximately 26 per cent of wet ponds and wetlands analyzed since 2015.

FIGURE 4.7 SAFETY SIGNAGE AT A STORM POND

The program identified the need for regular maintenance to ensure that the ponds are operating effectively. The program also identified five wet ponds that require structural modifications to function properly, meet regulatory requirements and ensure safety standards are met. In 2018, effort continued on two wet ponds to define options for modifications and improvements. This work is continuing in 2019 with work on the additional three

ponds expected to be phased over the 2019-2022 business cycle. These projects include design, construction, maintenance and addressing operational challenges such as algae growth.

4.3.4 GREEN STORMWATER INFRASTRUCTURE

Green stormwater infrastructure (GSI), also known as low impact development, uses natural processes to treat stormwater and allows water to be absorbed and filtered by soil and vegetation. GSI is an opportunity, in conjunction with Calgary's existing stormwater management infrastructure, to improve Calgary's ability to adapt to climate change and increase resiliency to stormwater flooding. The Water Utility is aligning its natural and green stormwater infrastructure work with the Corporate Resilience Strategy.

FIGURE 4.8 GSI USES NATURAL PROCESSES TO TREAT STORMWATER

Initial stakeholder engagement on the update of the Stormwater Management Strategy indicated strong support for advancing GSI in Calgary. Water Resources supports research activities associated with bioretention, resilient landscaping and stormwater capture and use.

Over the last several years, The Water Utility has collaborated on or supported the installation of many GSI projects and pilots across Calgary, including the Mountview-Winston Heights and Bridgeland rain gardens, Water Centre soil cells and permeable pavement pilots. The most recent examples include rain gardens in Oakridge and bioswales in Lincoln Park. We continue to maintain and learn from the older installations and are monitoring some of them in collaboration with the Alberta Low Impact Development Partnership.

4.3.5 GRAVEL LANE SEDIMENT ABATEMENT STUDY

A recent study shows that gravel surfaced lanes are disproportionately large sources of stormwater pollution in Calgary. It's estimated they generate up to 11 per cent of total sediment (TSS) loadings in our waterways but compromise only 1.4 per cent of Calgary's land area. The City is undertaking a collaborative pilot study between the Water Utility and Transportation Department, along with other City stakeholders on various approaches to reduce gravel lane sediment generation. Phase I will evaluate gravel lanes and alternatives, identify pilot sites, collect baseline data and develop a preliminary action plan, designs and cost estimates. Phase 2 includes the implementation pilot designs at three locations and monitoring the effectiveness with respect to TSS reduction.

4.3.6 EROSION AND SEDIMENT CONTROL

Construction activity in Calgary exposes highly erosive subsoil, which is easily transported away by wind and water. In 2018, to protect the watershed and storm infrastructure from the impacts of construction site sediment, City staff reviewed 601 Erosion and Sediment Control (ESC) Plan applications resulting in the approval of 289 ESC Plans which are expected to reduce soil loss from those construction sites by 26,252 tonnes per year while construction is occurring. Soil losses then generally decrease once sites are stabilized with natural vegetation, buildings, roads, etc. During 2018, there were a total of 840 construction sites in Calgary with an active approved ESC Plan. City staff performed 305 inspections at 168 of those sites.

FIGURE 4.9 EROSION AND SEDIMENT CONTROL DURING CONSTRUCTION HELPS PROTECT THE WATERSHED AND STORM INFRASTRUCTURE.

Customer service improvements for the year included rollout of the 2017 City of Calgary ESC Guidelines, and creation of Standard Specifications for ESC. The revised Guidelines now include technical education components and examples of drawings while the specifications house the technical requirements to be used during both the ESC Plan preparation and field implementation phases. Both documents support our development customers to more easily navigate ESC in Calgary. These revisions and new documents came into effect fully on July 1, 2018.

4.4 RIPARIAN ACTION PROGRAM

Riparian zones are the areas of land along the edges of rivers, creeks, and other waterbodies. The City's Riparian Action Program (RAP) delivers on the Municipal Development Plan's (MDP) goal of greening the city and MDP objectives related to green infrastructure, watershed protection and ecological networks. Protection and management of riparian areas aligns to the Natural Infrastructure pillar of Corporate Resilience and to the Corporate Climate Strategy and complements the Flood Mitigation and Resiliency Program. The RAP was developed to implement a comprehensive and coordinated approach to protect riparian areas in Calgary and contains three specific program areas: (i) Riparian Health Restoration and Monitoring, (ii) Riparian Land Use Planning and (iii) Outreach and Education. The sections below summarize the activities conducted in 2018 to support the goals and objectives of the RAP.

FIGURE 4.10 RESTORATION OF A RIPARIAN AREA ON THE ELBOW RIVER

4.4.1 RIPARIAN HEALTH RESTORATION

In 2018, The City continued its efforts to improve and restore riparian areas through bioengineering and riparian planting projects along major rivers and creeks. Bioengineering is an approach to river bank engineering that incorporates living plant materials in combination with natural and synthetic support materials for slope stabilization and erosion reduction. Riparian planting projects consist of site-specific practices using native vegetation with deep-rooted plants that stabilize the riparian area. Restoration projects lead to a more resilient riparian ecosystem able to provide protection against floods, erosion and improve water quality.

The City has implemented over 100 riparian restoration projects since 2007 including bioengineering and riparian planting projects. These projects are part of a strategic and collaborative approach between City business units, external partnerships and the community to improve riparian health. In 2018, The City designed or completed approximately 25 restoration projects.

4.4.2 RIPARIAN AREAS AND AQUATIC HABITAT

In 2018, The City continued to advance its Fish Habitat Compensation Program. This program prioritizes key projects to offset the loss of fish habitat caused by 2013 flood recovery projects. The Quarry Park Fish Habitat Project was completed, receiving public support in demonstrating improvements to aquatic habitat (Figure 4.11). The Bowmont West Fish Habitat Project was substantially completed in 2018, with final plantings and a formal reconnection of the newly constructed channel to the river planned for spring 2019. The Elbow Island Fish Habitat Project will begin construction in summer 2019. . The Inglewood Bird Sanctuary Reconnection Project also kicked off in 2018 and is moving forward to regulatory approvals. This project will improve water quality, reduce water level fluctuations in the lagoon and improve fish habitat.

FIGURE 4.11 QUARRY PARK FISH HABITAT IMPROVEMENTS

AEP and The City of Calgary partnership project - the Bioengineering Demonstration and Education Project (BDEP) – began construction in March 2018 and will be completed in the spring of 2019 (Figure 4.12). The design and education features make the project a national and global site for its innovative bioengineering techniques and treatments. Other bioengineering education initiatives being implemented in 2019 include the installation of interpretive signage, a BDEP website, and pilot education programs with Calgary Parks and Trout Unlimited.

FIGURE 4.12 THE BIOENGINEERING DEMONSTRATION AND EDUCATION PROJECT SITE 1 BEFORE (LEFT) AND AFTER (RIGHT). (PHOTO CREDIT (RIGHT): KERR WOOD LEIDAL)

4.4.3 MONITORING RIPARIAN HEALTH

Monitoring of riparian areas is one of the key actions of the RAP to measure the improvement of riparian health over time. The 2026 City-wide riparian restoration target is an average riparian health score of 72 per cent. The City of Calgary initiated a 5-year Riparian Monitoring Program in 2017, and field monitoring work started in 2018.

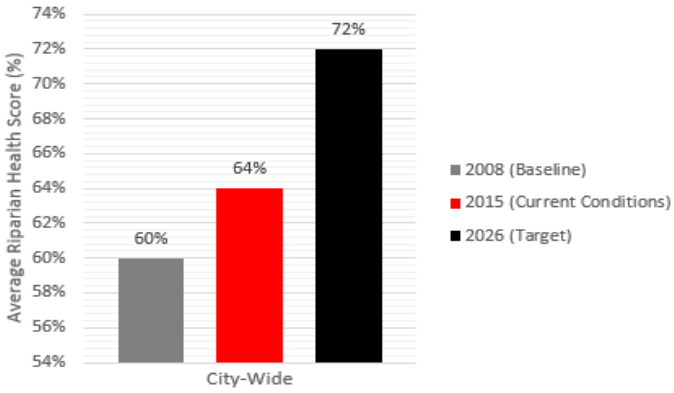

FIGURE 4.13 AVERAGE CITY WIDE RIPARIAN HEALTH SCORE

Over 90 Riparian Health Inventory (RHI) sites will be monitored to identify healthy areas and to flag areas where action is needed to improve health. In 2018, the first six RHIs were conducted encompassing approximately 50 hectares of riparian habitat. Additional sites will be monitored in subsequent years, and a comprehensive analysis will be done in 2022, the final year of the Program.

FIGURE 4.14 AN EXAMPLE OF A SUCCESSFUL BANK RESTORATION SITE ALONG THE ELBOW RIVER

In addition to the RHI, the Utility also examined the effectiveness of 19 bank restoration projects and 15 riparian planting projects in 2018. In total, fifty-five bank restoration sites and 30 riparian planting projects will be monitored to assess effectiveness of restoration efforts over the five-year program.

4.4.4 EDUCATION AND OUTREACH

In 2018, new partnerships were established to advance the Riparian Outreach and Education program. The RiverWatch River Ambassador Program engaged 4,087 pathway users in river awareness conversations and took 542 citizens on interpretive floats down the Bow River. This program will be offered again in 2019. Volunteers planted nearly 1,300 native plants and shrubs during restoration projects on the Bow and Elbow Rivers, and citizens learned about the importance of healthy riparian areas through workshops and presentations. A new Healthy Rivers Story Map was also completed, providing Calgarians with a digital connection to our rivers and the opportunity to learn about the importance of Calgary's watersheds, rivers and riparian areas.

FIGURE 4.15 RIVER AMBASSADORS AT THEIR POP-UP BOOTH (LEFT) AND ON THE RIVER (RIGHT) (PHOTO CREDIT: RIVERWATCH)

4.4.5 RIPARIAN LAND USE PLANNING

In 2018, comprehensive mapping of Calgary's non-permanent streams was completed. These streams are an important stormwater management feature, and contribute to healthy riparian areas. About 64% of these important watershed features have been lost to development in Calgary over the last 100 years. Research to improve our understanding of these complex systems in an urban context has also been completed in cooperation with the University of Calgary. Improving the protection of Calgary's waterways and riparian corridors – including non-permanent streams – will be a key focus of the next business cycle.

4.5 WATERSHED MANAGEMENT PARTNERSHIPS

The City supports 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). Collectively, these watershed management plans and partnerships provide important frameworks and support actions to improve watershed health.

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. In 2007, Council approved the original Nose Creek Watershed Management Plan, which provides a framework balancing urban development with watershed protection. In 2018, the Nose Creek Partnership completed their review and update of the original Nose Creek Watershed Management Plan. Recommendations in the updated Plan include actions to improve stormwater management and water quality, retain riparian areas and wetlands in urbanizing areas and preserve biodiversity in the watershed. Member municipalities (City of Airdrie, Rocky View County and The City of Calgary) are currently working through their respective approval processes which will be completed in 2019.

Elbow River Watershed Management Partnership
With development and other changes and pressures on the watershed, the 2009 Elbow River Watershed Management Plan is due for an update. An Elbow River State of the Watershed Report will provide the basis for the development of an updated Plan. The Report will provide a snapshot of current conditions of the watershed including natural resources, human activities, environmental data, knowledge gaps and stakeholder concerns. The Elbow River Watershed Partnership has completed phase 1 of the Report by engaging stakeholders and experts to develop the terms of the Report. In 2019, the project plan will be finalized and a project team, stakeholders, volunteers and contractors will be assembled.

When updated, the Elbow River Watershed Management Plan will identify watershed issues and provide recommendations so that stakeholders can make informed decisions to protect, restore and maintain watershed health. The City will continue to provide funding, data and subject matter expertise and have representation on the project team (both technical and steering committees).

4.6 WATER REUSE

The City continues to work with our internal and external partners on re-using rainwater and stormwater. This program enables rainwater and stormwater reuse for internal plumbing and irrigation. In 2018, we applied draft standards to projects to enable water reuse to proceed in a safe and cost-effective manner. This ensures that proposed reuse systems are effective at managing risks associated with public health, environmental protection and prevent cross contamination into The City's water infrastructure. The City continues to work closely with the Province as they continue to develop Provincial policy and guidelines on water reuse.

4.7 WATERSHED HEALTH INDICATORS

We are currently in the process of strengthening The City's urban watershed health indicators to more accurately reflect the status of our watershed resources and provide an accurate evaluation of watershed health. A new system of indicators will build on our existing watershed monitoring programs, while balancing scientific defensibility, policy relevance and simplicity of communication. The City has partnered with researchers at the Southern Alberta Institute of Technology (SAIT) to review our existing monitoring programs with local and international expertise. This ongoing research will ultimately lead to a robust system of watershed health indicators for Calgary, enhancing our ability to make informed and integrated decisions about sustainability at the science-policy interface.

FIGURE 4.16 NEW INDICATORS WILL IMPROVE OUR KNOWLEDGE OF WATERSHED HEALTH

4.8 PRIORITIES FOR 2019

To continue reducing the impacts on the watershed and keeping our rivers healthy, The City's focus areas for 2019 are summarized in Table 4.2.

Table 4.2 Goal #3: Keep Our Rivers Healthy – 2019 focus

2019 Planned Actions
Continue to negotiate with AEP on The City's Approval to Operate wastewater treatment plants and continue major upgrades of Bonnybrook Wastewater Treatment plant.
Initiate a design study for upgrades at the Fish Creek Wastewater Treatment Plant to select a technology for treating ammonia.
Continue stakeholder engagement to inform an update of The City's Stormwater Management Strategy.
Continue to invest in Stormwater Quality Retrofit projects: Design South Highfield stormwater quality retrofit pond to reduce pollutants from this industrial area. Start construction of the Bebo Grove Storm Pond and diversion trunk in the Woodland-Woodbine neighbourhood.
Continue to implement riparian restoration projects and strengthen partnerships with City business units based on a collaborative approach.

Continue to implement the Riparian Monitoring Program to measure riparian health over time and understand the effectiveness of restoration practices. Initiate monitoring work for the Bioengineering Demonstration Project as part of the Riparian Monitoring Program
Final plantings and a formal reconnection of the newly constructed channel to the river for the Bowmont West Fish Habitat Project planned for spring 2019.
Deliver an expert workshop and related research to refine the approach to Watershed Health Indicators, to inform the development of a robust system of watershed health indicators for Calgary.

5. GOAL #4: BUILD RESILIENCY TO FLOODING

5.1 RIVER FLOOD MITIGATION AND RESILIENCE PROGRAM

As of 2018, the Water Utility's focus is now on implementing its Flood Resilience Plan that was approved by City Council in 2017. The plan includes a number of projects that, in conjunction with efforts by the Province and the federal government, serves as the path to a flood Corporate Resilience. The plan is part of our integrated approach to watershed management and remains a top priority under One Calgary. As the Water Utility works to implement community flood mitigation measures, it is committed to listen to and engage with flood-affected communities to gather their input and ensure any potential trade-offs are understood before any major projects proceed.

FIGURE 5.1 FLOOD MITIGATION IS A TOP PRIORITY FOR CITY COUNCIL

The City continues to implement the 27 recommendations made by an independent Flood Expert Management Panel as directed by Council in 2014. Currently, all of the recommendations are either complete or underway. The remaining recommendations still underway continue in alignment with or as part of other initiatives within The City of Calgary, such as the development of the Corporate Resilience Strategy.

The Province announced an additional $15M in funding through the Alberta Community Resilience Program for flood mitigation projects on 2018 May 1. Funding awarded in 2018 includes funds to support construction of the Downtown flood barrier, as well as the Upper Plateau Separation, which will mitigate significant local and river flood risk for the community of Sunnyside, and building resiliency in the replacement of the 9th Avenue bridge. Additional funding was announced 2019 March 6 for the both projects. As of 2019, the total funds received by The City of Calgary is approximately $69.1M, in support of 13 projects. The City completed five of the 13 projects in 2018, and the remaining eight projects are underway.

The City continues to work closely with the Province to advocate for and provide technical support for timely construction of upstream flood mitigation for Calgary. This includes supporting the Springbank Off-Stream Reservoir (SR1) project and participating on the Technical Advisory Committee for the Environmental Assessment of SR1 currently being undertaken by Canada Environmental Assessment

Agency. The City is also The City of Calgary is supportive of the completion of a Provincial feasibility study for upstream reservoir options on the Bow River and continues to collaborate with the Province through the Bow River Working Group.

5.2 LOCALIZED FLOODING AND THE COMMUNITY DRAINAGE IMPROVEMENT PROGRAM

Local stormwater flooding occurs in communities when drainage infrastructure cannot manage the volume of stormwater resulting from rain, or snow and ice melt. Localized flooding can also occur due to a restriction in the underground system or a surface grading issue. The City organizes response strategies to mitigate these extreme events and the Community Drainage Improvements (CDI) program invests in stormwater infrastructure improvements with a focus on established communities with the highest risk of local stormwater flooding.

The CDI program prioritizes projects based on flood risk, potential impacts to the community and the cost-effectiveness of the proposed infrastructure upgrades. Investment decisions under CDI are evaluated based on which projects provide the greatest benefits to customers and communities. This is measured based on reduction of damages caused by local flooding as well as social, economic and environmental impacts.

Starting in 2019 with the community of Renfrew, The City will be using an integrated stormwater management approach to complement its existing CDI approach. Rather than solely focusing on infrastructure investments to reduce stormwater flooding, the integrated stormwater management studies will focus on improving stormwater management with focus on improving flood control, reducing water quality impacts, future redevelopment and densification considerations, considering climate change impacts, enhancing asset management, and identifying green stormwater infrastructure opportunities. The study is anticipated to be completed in spring 2019.

The City also continued the Lot Drainage Improvement Project in 2018. The project focuses on understanding the extent and nature of residential lot drainage issues, developed content for a guide to lot drainage for property owners highlighting roles, responsibilities, tools, and techniques to improve drainage on private properties, and identify opportunities to provide education to relevant stakeholders. The project will clarify roles and responsibilities and include changes to the lot grading process and technical requirements to better support developers and builders in providing positive drainage at the time of construction completion. The City plans to complete a residential Guide to Lot Drainage and present potential revisions to the Lot Grading Bylaw in 2019.

A comprehensive update on river and stormwater flooding efforts undertaken by The City can be found in the 2018 Flood Resiliency and Mitigation Annual Update (UCS2019-0653).

5.3 PRIORITIES FOR 2019

In 2019, The City 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 – 2019 focus

2019 Planned Actions
Continue to build resiliency through delivery of key flood mitigation infrastructure, connecting with flood-affected community members on potential flood mitigation projects and reviewing The City's flood-related policies.
Advocate with the Province on the need for upstream mitigation, funding of flood mitigation projects and continuation of the TransAlta agreement.
Support delivery of the Community Drainage Improvement program and work on implementing integrated stormwater management initiatives within CDI and other drainage programs.