2013 WATER REPORT

Counting on our water from the river to the tap and back.

Water is our most valuable natural resource and The City takes its responsibility of managing it seriously. **Plants, pipes, pumps and people work 24/7, 365 days a year to protect public health by providing clean drinking water and safely treating waste for over one million Calgarians.**

During the largest flood in recent memory, Calgarians were able to turn on the tap and receive safe and clean drinking water thanks to The City's dedicated team of experts and forward-thinking investment in infrastructure such as upgrades to our water treatment plants. This dedication, long-term vision and planning ensures consistently high quality drinking water, stormwater and wastewater systems and protects the health of our rivers, now and for generations to come.

This Water Report highlights The City's actions and commitment to protect public health and our rivers. It also showcases how citizens and partners are helping to conserve and protect our precious water resources.

calgary.ca | contact 311

Protecting what's precious. Land. Air. Water.

Onward! By 2033, per capita water use will be reduced from 2003 levels by 30 per cent.

THE CITY OF CALGARY

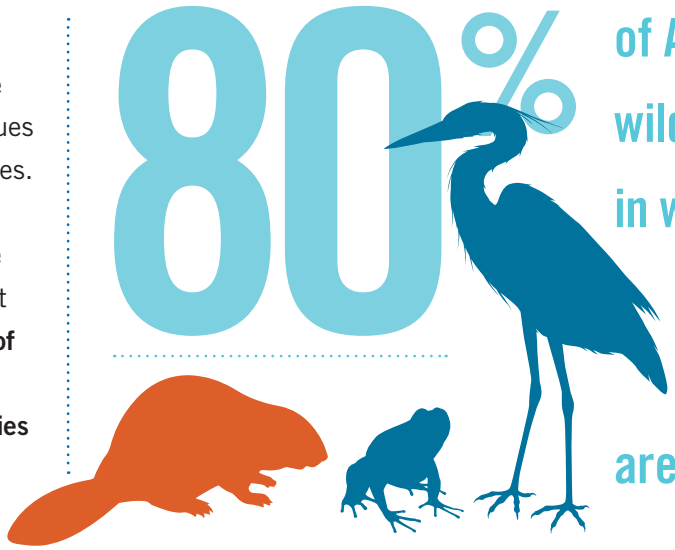
OUR WATERSHED

We're All Downstream

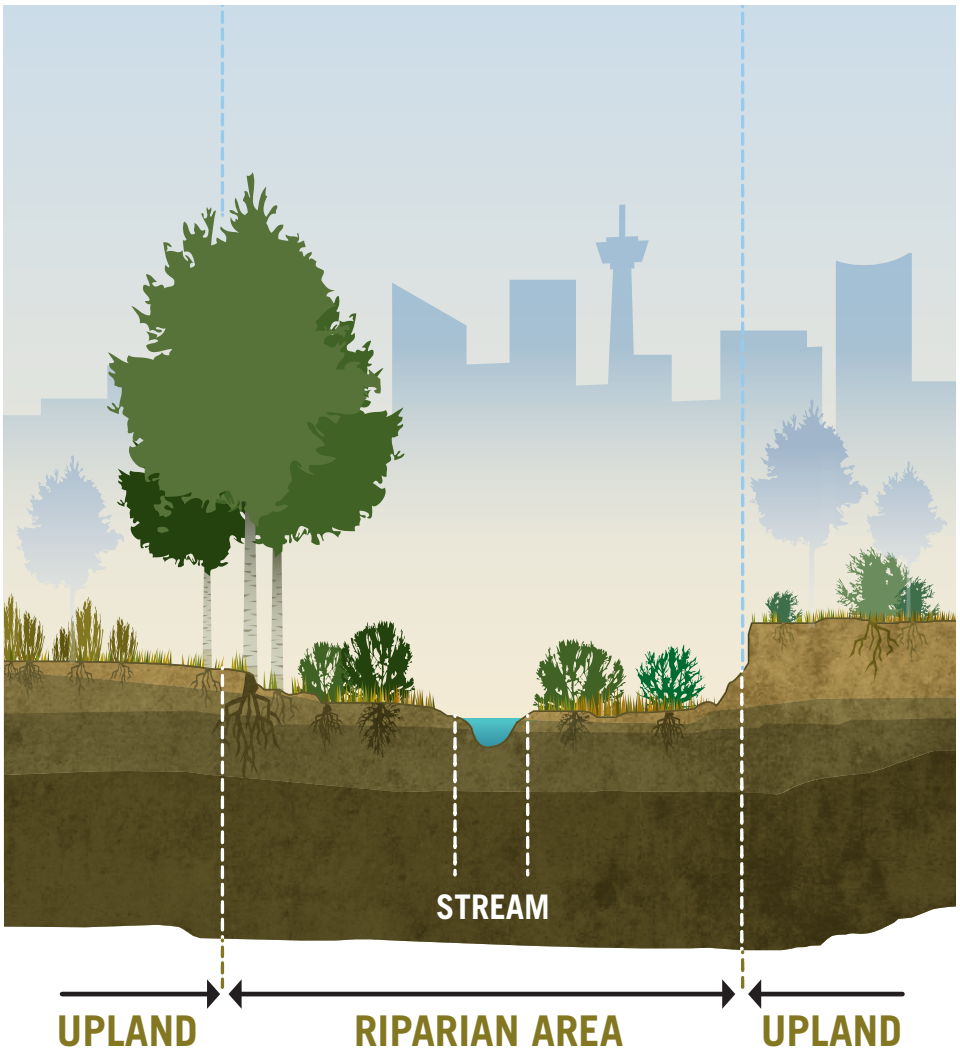
Calgary's roots are at the confluence of the Bow and Elbow Rivers, and our city continues to grow around these two safe water supplies.

The rivers' journey begins west of us in the mountains and we are just one stop on that route all the way to Hudson Bay. **The City of Calgary takes great pride in protecting the river to ensure that downstream communities – like Medicine Hat and Saskatoon – also have access to high quality drinking water.**

80% of Alberta's wildlife relies in whole or in part on riparian areas to survive.



Source: Cows and Fish



Riparian Areas - Where Land and Water Meet

The banks and green areas that border our rivers and creeks are known as riparian areas. Although sometimes they are only a few metres wide, their importance and impact is far reaching. Riparian areas act as transition zones between the water and land and play an important role in protecting the river. They prevent excessive erosion, act as natural flood plains, provide river bank stabilization and also offer aesthetic, economic and recreational benefits.

The City is committed to working with stakeholders to achieve a shared vision for riparian management and developed a Riparian Strategy outlining the vision, goals and approaches to protect Calgary's riparian areas.

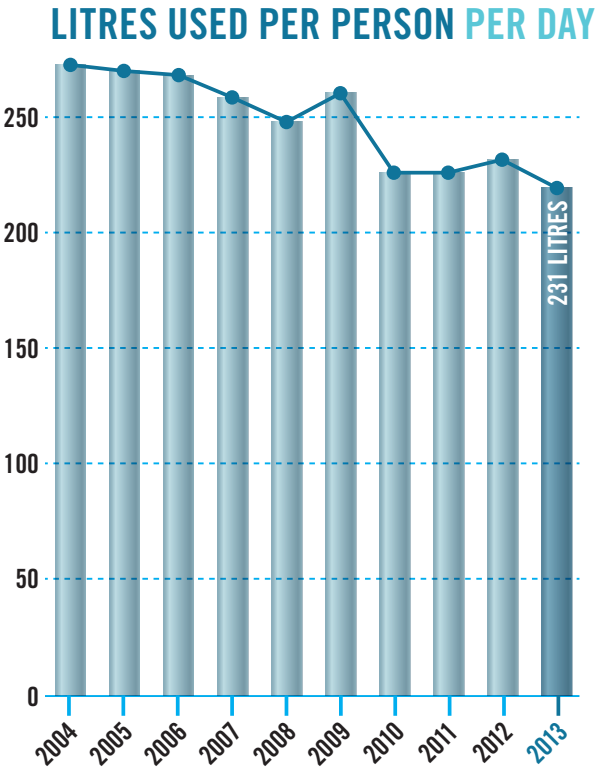
WATER CONSERVATION

Blueprint for the Future

With the unprecedented population growth that Calgary has experienced over the past decade, it is increasingly important to use water wisely to meet future demand. By conserving water, the environmental impact on the Bow and Elbow Rivers is minimized and demands on existing and future water infrastructure are reduced.

The City is working hard to maintain its water efficiency goal that will see The City service its growing population and customer base over a 30-year time period (2003-2033) without exceeding the amount of water that was diverted from the Bow and Elbow Rivers in 2003. Through efforts by The City, partners, businesses and Calgarians, we are on track to meet this goal.

IN 2013 EACH CALGARIAN USED 231 LITRES OF WATER EVERY DAY IN THEIR HOMES



Proactive Pipe Maintenance Equals Cost and Water Savings

With over 4,800 kilometres of pipes to transport drinking water to Calgarians, maintaining those pipes is critical to ensuring water efficiency and seamless service to Calgarians. Through leading edge pipe inspection tools and advanced data analysis, we are replacing the right pipes at the right time, saving money and water. In fact, since 1997 the number of water main breaks has been reduced by half.

We also protect certain pipes from breaking by placing simple corrosion prevention devices that can be installed without the need for heavy excavation or significant costs. It's a highly effective prevention measure to reduce the break rate of these pipes by 80 per cent.

H_2otels

Thanks Calgary! Thousands of you, and businesses too, took advantage of The City's toilet replacement rebate program in 2013, including hotels that swapped out 550 inefficient toilets leading to a **water savings totalling 50 million litres per year.**

STORMWATER

DID YOU KNOW?

The City maintains approximately 45,000 storm drains that can get clogged with leaves and garbage. You can help by not littering and by using a broom and dustpan instead of a hose to keep your driveway and sidewalks clean.

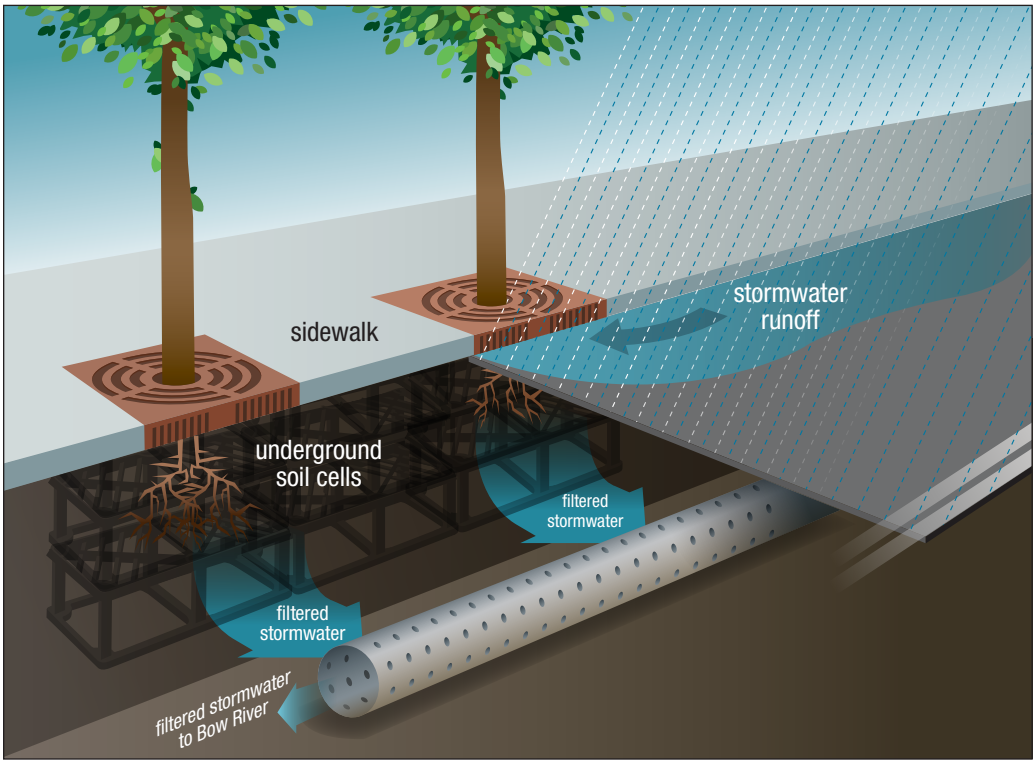
Trickle Down Theory

Stormwater is rainwater or melted snow that flows over rooftops, roadways and driveways, and across the land until it is routed into drainage systems and ultimately into our creeks and rivers. In natural surroundings, water or snowfall on the land is either absorbed into the ground or evaporates. However, in our urban landscape the amount of water that can be absorbed into the ground is reduced making the management of stormwater runoff very important.

Nurturing a Strategy

The City of Calgary's Stormwater Management Strategy was created to ensure we protect our rivers and our watershed as our city continues to grow. The strategy outlines measures to protect wetlands, river habitat, control erosion, prevent flooding and maintain our water quality. Our goal is to ensure that sediment accumulation in our rivers are either at or below 2005 levels regardless of how much Calgary's urban landscape grows.

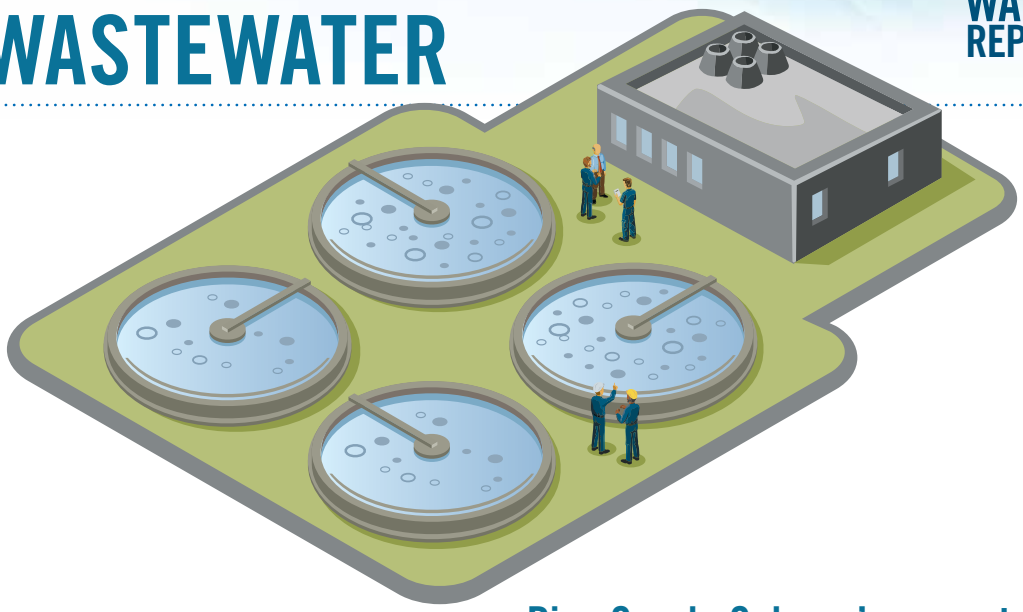
We're on track to meet this goal through measures such as the management of around 200 engineered storm ponds and wetlands as well as other innovative technologies and practices including Low Impact Development (LID), a building practice that works with nature to manage stormwater where it falls.



Going Underground

Kensington is home to many fashionable restaurants and shops but the latest hot new trend in that community isn't visible at street level. Under the newly tree-lined streetscape of 2nd Avenue and 10th Street are soil cells. Unique underground cells provide the trees with vast amounts of absorbent soil beneath the sidewalk. And this new, low impact infrastructure holds and treats the stormwater before it's discharged into the Bow River.

WASTEWATER



Pine Creek, Calgary's newest wastewater treatment plant, treats up to 100 million litres of wastewater everyday.

Top-rated

The City's three wastewater treatment plants treated approximately 332,000 litres of water every minute in 2013, so it's comforting to know that the treated wastewater going back into the Bow River consistently meets or does better than all environmental and regulatory requirements. In fact, Calgary has the highest ranked level of wastewater treatment among major Canadian cities.

Staying Ahead

As we go about our daily routines, it's easy to be unaware of what happens to the substances we flush down our drains every day. But The City's team of experts specializes in safeguarding the systems and infrastructure that keep our water flowing clean and safe through the pipes and equipment designed to treat it. The Bonnybrook Wastewater Treatment plant is undergoing upgrades that look well ahead to the future to help address wastewater demands and regulations that will serve future generations of Calgarians.

Partners for a Sustainable Future

In partnership with the University of Calgary, Pine Creek Wastewater Treatment Plant is home to a research facility that advances thinking around our wastewater assets. The partnership fosters development of a new age of water resource literacy with an emphasis on investing in learning, training and preparing for a sustainable future.

DID YOU KNOW?

The City maintains over 7,000 kilometres of wastewater pipes. An innovative process, using special tubing that is cured with steam, allows wastewater pipes to be refurbished with excellent long-term results and at a tenth of the cost of regular methods.

WATER QUALITY

DRINKING WATER FROM THE WATER TREATMENT PLANTS WAS 100,000x CLEANER THAN FLOOD WATER COMING IN

Clean and Safe Drinking Water

Calgarians can count on the quality of our water. At no time was this more evident than in the spring during the largest flood to impact Calgary in recent memory. Thanks to The City's dedicated team of expert operators and technicians, as well as forward-thinking investment in upgrades for our water treatments plants, Calgarians were able to turn on their taps and enjoy safe and clean drinking water during the flood event.

In 2013, our experts carried out over 117,000 tests for drinking water; analyzing samples from locations upstream of water treatment plants and from within the city-wide distribution system.

KEY DRINKING WATER PARAMETERS 2013

TREATED WATER AT PLANT

ON TARGET

Water quality parameter	Units	Drinking water	Limit [a]	Major source
BASIC WATER CHEMISTRY				
Colour	TCU [b]	<2	≤15 [e]	Erosion of natural deposits in watershed.
Hardness as $CaCO_3$	mg/L	140 – 245	500 mg/L [e]	Erosion of natural deposits in watershed.
pH	pH	6.8 – 8.2	6.5 – 8.5 [e]	Influenced by the dissolved minerals in water and water treatment.
Temperature	°C	1.3 – 19.4	≤15°C [e]	Surface water temperature.
Total dissolved solids	mg/L	177 – 294	≤500 [e]	Erosion of natural deposits in watershed.
Turbidity	NTU [c]	<0.05 – 0.16	1.0 [g]	Suspended particles in solution.
INORGANIC SUBSTANCES				
Aluminum	mg/L	0.0189 – 0.2889	0.1 [f]	Plant treatment.
Arsenic	mg/L	<0.0005 – 0.0005	0.01	Erosion of natural deposits in watershed.
Barium	mg/L	0.0306 – 0.0833	1.0	Erosion of natural deposits in watershed.
Cadmium	mg/L	<0.0005	0.005	Erosion of natural deposits in watershed.
Calcium	mg/L	35 – 69	No limit	Erosion of natural deposits in watershed.
Free chlorine residual	mg/L	0.75 – 1.36	≥0.2	Plant treatment.
Chromium	mg/L	<0.0005 – 0.0021	0.05	Erosion of natural deposits in watershed.
Copper	mg/L	<0.0005 – 0.0017	≤1.0 [e]	Erosion of natural deposits in watershed.
Fluoride	mg/L	0.06 – 0.28	1.5	Naturally occurring. [j]
Iron	mg/L	<0.050	≤0.3 [e]	Erosion of natural deposits in watershed.
Lead	mg/L	<0.0005	0.01	Erosion of natural deposits in watershed.
Magnesium	mg/L	10 – 19	No limit	Erosion of natural deposits in watershed.
Manganese	mg/L	<0.0005 – 0.0143	≤0.05	Erosion of natural deposits in watershed.

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PER CENT OF CALGARIANS SURVEYED ARE SATISFIED WITH THE QUALITY OF OUR DRINKING WATER.

Source: 2013 Citizen Satisfaction Survey

WATER QUALITY

INORGANIC SUBSTANCES (continued)

Mercury	mg/L	<0.00005	0.001	Erosion of natural deposits in watershed.
Nickel	mg/L	<0.0005 – 0.0017	No limit	Erosion of natural deposits in watershed.
Nitrate as Nitrogen	mg/L	0.042 – 0.183	10	Erosion of natural deposits in watershed.
Nitrite as Nitrogen	mg/L	<0.0044 – 0.0080	1.0	Erosion of natural deposits in watershed.
Potassium	mg/L	0.35 – 1.54	No limit	Erosion of natural deposits in watershed.
Sodium	mg/L	1.4 – 14.4	≤200 [e]	Erosion of natural deposits in watershed.
Sulfate	mg/L	36 – 124	≤500 [e]	Erosion of natural deposits in watershed.
Zinc	mg/L	<0.0030 – 0.0123	≤5.0 [e]	Erosion of natural deposits in watershed.

KEY DRINKING WATER PARAMETERS 2013

TREATED WATER AT PLANT

ON TARGET

Water quality parameter	Units	Drinking water	Limit [a]	Major source
MICROBIOLOGICAL ORGANISMS		(<1 indicates none were detected)		
E. coli.	MPN/100 mL [d]	<1	0	Domestic animals, wildlife and human waste.
Total Coliform	MPN/100 mL [d]	<1	0	Soil, domestic animals and wildlife.

TREATED WATER IN DISTRIBUTION SYSTEM

ON TARGET

Water Quality Parameter	Units	Drinking Water	Limit [a]	Major Source
VOLATILE ORGANIC SUBSTANCES				
Total trihalomethanes [h]	mg/L	0.0262	0.1	By-product of chlorination.
MICROBIOLOGICAL ORGANISMS [i]				
E. coli.	Present or absent/100 mL	Absent	0	Domestic animals, wildlife and human waste.
Total Coliforms	Present or absent/100 mL	Absent	0	Soil, domestic animals and wildlife.

a Limit stipulated by Guidelines for Canadian Drinking Water Quality (Health Canada Aug. 2012) or Alberta Government operating approval for aesthetic, health and operational reasons.

b TCU = True Colour Units.

c NTU = Nephelometric Turbidity Units, a measure of water clarity.

d MPN = Most Probable Number.

e Aesthetic objective, which is not a health-related limit.

f Federal operational guidance value, which is not a health-related limit.

g Lower limits are stipulated for some operation conditions.

h Annual average values.

i Samples collected from the distribution system are analyzed at the Provincial Laboratory for Public Health as required by Alberta Environment operating approval.

j The City of Calgary ceased fluoridation of its drinking water on May 19, 2011.

NOTE: mg/L = milligrams per litre, or parts per million (ppm).

IN 2013 OUR EXPERTS CARRIED OUT OVER 117,000 TESTS FOR DRINKING WATER

SERVICE 24/7/365

Excellent Service, Despite Mother Nature

Excellent service 24 hours a day, 7 days a week, 365 days a year and seamless delivery, despite extra demands from Mother Nature, is the commitment that Calgarians have from Calgary's Water Services team. It's what Water Services does every day. But, we should acknowledge the special response undertaken as a result of the June floods.

Before the Flood

When Calgary experienced the largest flood ever recorded on the Elbow River and the largest since 1897 on the Bow River, years of flood emergency preparation and planning were set in motion. Strategic pre-flood measures were activated such as managing the Glenmore Dam to reduce downstream impact, laying thousand of sandbags and building berms in key locations to maximize protection of people and property.

After the Flood – Cleaning and Repairs

Before and during the flood, our team worked around the clock. Just as critical, however, was the immediate and long term response. Crews spent weeks flushing silt and debris from sanitary and storm sewers in flood-impacted communities. Sixteen sanitary and storm system lift stations were restored and planning is underway to improve their resiliency.

City crews wasted no time in assessing river damage and approximately 100 sites in need of repair, stabilization or monitoring were identified. **Repairs immediately began on six critical erosion sites which are targeted for completion before the spring of 2014.** Plans to address an additional 26 vulnerable sites are in place. Repairs on 330 damaged outfalls along our rivers are also well under way.

We removed approximately 26,000 tonnes of debris from the Elbow River. Twenty five per cent of that material was recycled as compost or mulch and used in Calgary's parks. The Bow River is also undergoing clean-up and completion is scheduled for the spring of 2014.

30,000 SANDBAGS
WERE LAID BY HAND
FOR A COMBINED WEIGHT OF
600,000 KGS
EQUALING THE WEIGHT OF
120 AFRICAN ELEPHANTS

Building Resiliency

We're always looking to the future and learning from our experience. New modeling and mapping is underway to report changes in our rivers. Lessons learned have been incorporated into The City's emergency plans. And, the creation of a River Flood Mitigation Panel is bringing forward recommendations on how to mitigate future flooding.