

# Stormwater management

September 2020

Under the *NWT Waters Act*, the City of Yellowknife requires a water licence from the Mackenzie Valley Land and Water Board (MVLWB) to draw water from local water bodies and to deposit waste into the environment. The City is applying to renew its water licence. This factsheet is part of a series designed to provide residents and stakeholders with information on the licence renewal application in support of public engagement.

## Background

The City of Yellowknife maintains and manages infrastructure that collects and diverts stormwater such as catch basins, stormwater drainage pipes, and ditches. It also works to minimize the impact of urban stormwater on the environment through monitoring, pollution control measures and public education initiatives that aim to inform the residents of what they can do to protect stormwater quality.

Part 6 of the City's Water and Sewer Services By-law No. 4663 describes what types of water residents are permitted to put into the storm drainage system (e.g., rainwater, personal car washing, gardening) and what types of waters are prohibited (e.g., very hot water, commercial car wash waste, wastewater, contaminants). It also outlines the responsibilities for notification and clean-up if there is an unauthorized release into the stormwater drainage system.

The City of Yellowknife does not currently treat its stormwater, but is undergoing research that will help determine if there is a need to look at potential treatment options in the future.

## What is stormwater?

*Stormwater is rainwater and melted snow that runs off lawns, streets and other land surfaces. Much of this runoff gets absorbed by plants and soils or make its way back to ponds and streams. However, the hard surfaces found in a city — such as pavement, parking lots, driveways, sidewalks and roofs — prevent this natural runoff process. This water is collected via storm drains throughout the city and is directed through an underground pipe system to local waterbodies.*

## What the water licence regulates

The water licence regulates the discharge of stormwater to local waterbodies through the following:

- The City's Stormwater Management Plan; and
- Monitoring and reporting requirements for stormwater.

The City is required to monitor stormwater quality and to report results of the monitoring program as part of the annual water licence report to the MVLWB.



## Key document

There is one key document that will be submitted for this aspect of the water licence: *Stormwater Management Plan*.

This plan describes the City of Yellowknife's stormwater system and the infrastructure that collects and diverts stormwater and how the City maintains that infrastructure. It also describes how the City works to minimize the impact of urban stormwater on the environment. The Stormwater Management Plan must include best management practices to address stormwater issues in current and future development, a stormwater monitoring program, and a discussion on back-up power of sewage lift stations.

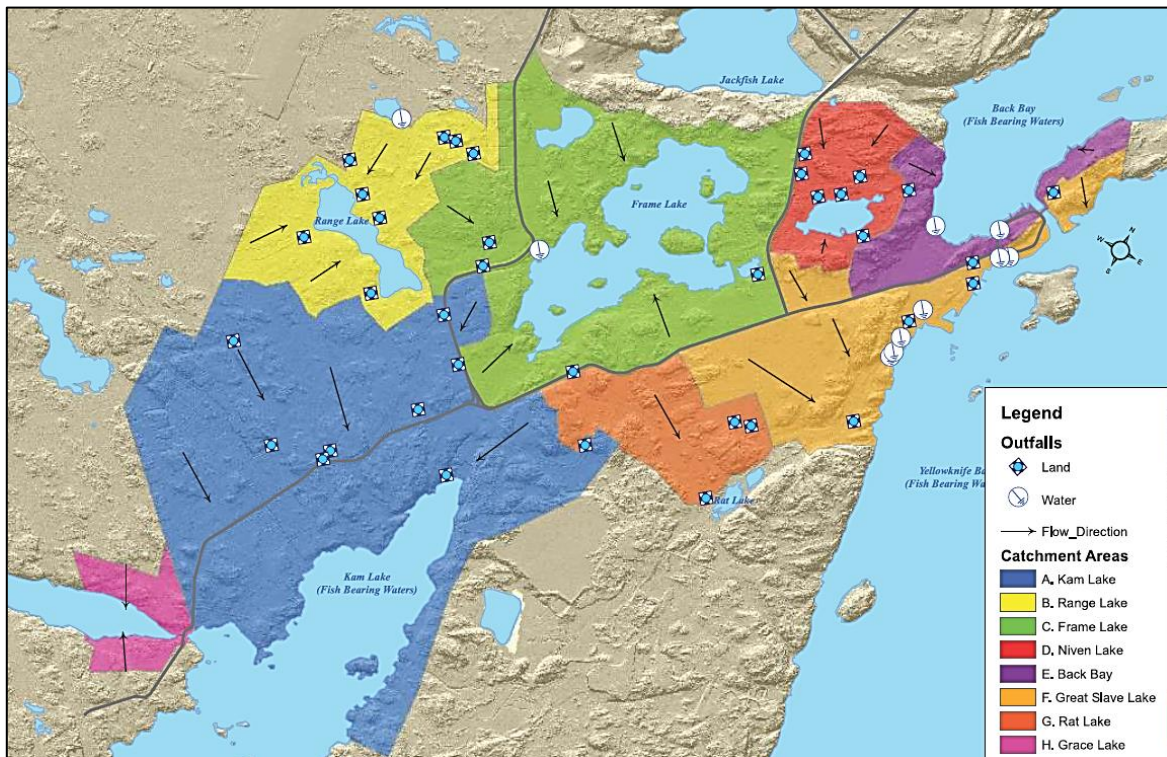
Key components of the plan are:

- objectives for stormwater management;
- information on waterbodies where the stormwater goes;
- components of the stormwater system;
- snow disposal practices;
- pollution control measures;
- sediment and erosion controls;
- stormwater monitoring and sampling program; and
- public education program.

### *City of Yellowknife stormwater objectives*

- Maintain or enhance the stormwater quality by establishing and implementing appropriate stormwater management practices;
- Prevent future flood damages by ensuring proper design and management methods are in place;
- Understand stormwater quality and its impact on the receiving aquatic environment by conducting a stormwater quality monitoring program, and expand or modify the program in response to system expansion, regulatory input, or monitoring program results;
- Identify system upgrade needs by reviewing and analyzing the existing storm sewer infrastructure and maintenance strategies; and
- Preserve the natural and beneficial functions of the natural drainage

### Where does our stormwater go?



Yellowknife has several lakes within its municipal boundaries. These lakes are the receiving bodies of stormwater captured and diverted by the City’s stormwater drainage system. The main waterbodies considered in the Stormwater Management Plan are: Kam Lake, Range Lake, Frame Lake, Niven Lake, Rat Lake, Grace Lake, and Great Slave Lake (including Yellowknife Bay and Back Bay).

### Key updates

Three key changes that the City has made to its stormwater monitoring and management in the Plan to prepare to renew its water licence are:

#### 1) A new “Natural Settings” section (Section 4)

This section gives more information about the waterbodies that receive the stormwater and what we know about the water quality of those waters, which will allow us to better understand any potential impacts from stormwater.

This includes information on:

- Climate, e.g., temperature, types and seasonality of precipitation;
- Natural settings, e.g., ecoregion, geology, relief, vegetation;
- Water quality and fish presence in receiving waters; and
- Human uses and historical water quality impacts on receiving waters.

**About snow...**

Snowmelt forms an important part of the stormwater produced in Yellowknife. The City maintains three snow dumps: two for City use, and one for registered contractors. The snow dumps are located on Deh Cho Boulevard and at the City Solid Waste Facility.

Melt from the snow dump on Deh Cho Boulevard drains primarily to the existing Deh Cho Boulevard stormwater sampling point.

Melt from the snow dumps at the SWF is captured by the existing Surveillance Network Program sampling stations. As the City-use snow dump at the SWF is close to a nearby quarry, steps have been, and will continue to be taken to ensure runoff does not enter the quarry area.

**2) Monitoring program update (Section 11)**

This section was updated based on a third-party review of the sampling program.

Updates include:

- Specifying the objectives of the monitoring program, notably:
  - Meet the requirements of the MVLWB
  - Support the City's efforts to educate the public and control potential sources of pollution in stormwater
  - Address resident concerns regarding discharge quality at specific locations
- Providing more detail on stormwater sampling sites
- Clarifying the sampling methods and updating the list of substances (i.e., parameters) that the samples are tested for
- Adding a map of the sampling sites and receiving water catchments
- Listing guidelines that will be used to evaluate the monitoring results

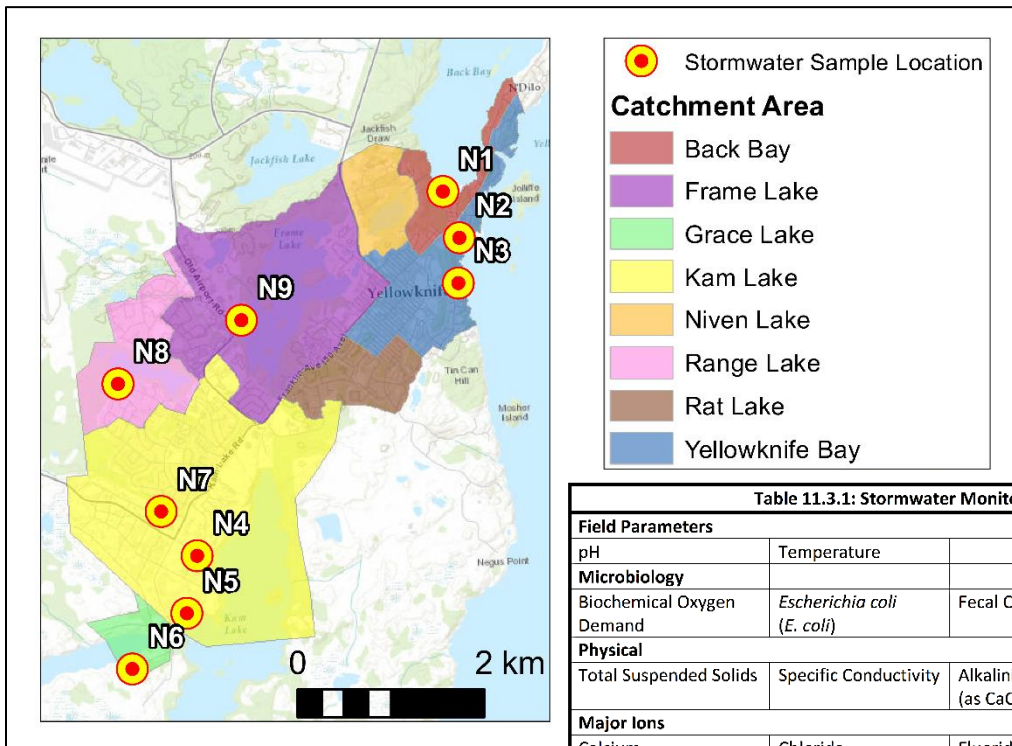
**3) Other edits (throughout the document)**

Other edits were made throughout the document to bring it up-to-date, improve readability and address comments from regulators and stakeholders. For example:

- Updating the City population estimates
- Updating sampling methods
- Clarifying linkages to City's bylaws
- Adding a map of location where stormwater clean-out material is deposited at Fiddlers Lagoon

## Stormwater management

### Stormwater sampling program details



There are currently 9 stormwater sampling locations in Yellowknife, as shown on the map above. These sites were selected in order to:

- Identify runoff profiles corresponding to land use;
- Identify pollutant hotspots;
- Support reporting requirements by the MVLWB;
- Identify sites and methods to make sampling more consistent; and
- Address resident concerns.

Samples collected from these locations are tested for a wide variety of substances, as summarized in the figure above

**Table 11.3.1: Stormwater Monitoring Parameters**

Field Parameters			
pH	Temperature		
Microbiology			
Biochemical Oxygen Demand	<i>Escherichia coli</i> ( <i>E. coli</i> )	Fecal Coliforms	
Physical			
Total Suspended Solids	Specific Conductivity	Alkalinity, Total (as CaCO <sub>3</sub> )	Total Dissolved Solids
Major Ions			
Calcium	Chloride	Fluoride	Hardness
Magnesium	Potassium	Sodium	Sulphate
Nutrients			
Ammonia as Nitrogen	Nitrate as Nitrogen	Nitrite as Nitrogen	Total Phosphorus
Organic			
Hydrocarbons			
Trace Metals, Total			
Aluminum	Antimony	Arsenic	Barium
Beryllium	Cadmium	Cesium	Chromium
Cobalt	Copper	Iron	Lead
Lithium	Manganese	Mercury	Molybdenum
Nickel	Rubidium	Selenium	Silver
Strontium	Thallium	Titanium	Uranium
Vanadium	Zinc		



## Analysis of monitoring trends and future decisions

The City's stormwater sampling locations have not been consistent over time due to changes in the objectives of the sampling program, so they are not included with the City's Surveillance Network Program (SNP) at this time.

The City has hired a consultant to do a 3-year stormwater monitoring program and trend analysis, which will also assess potential impacts to fish-bearing receiving waters. The project started this year and a report is expected in 2023. This report will include comparison of stormwater quality to Canadian Council of Ministers of the Environment Water Quality Guidelines for the protection of Aquatic Life and Health Canada's Guidelines for Canadian Recreational Water Quality.

Once the trend analysis is completed, the City will be able to decide if the current locations will become long-term sampling locations to be included in the SNP. The study will also help the City determine if there is a need to look at potential treatment options. Additional studies may then be required to better understand how stormwater mixes with lake water and what the impacts are.

Section 12 of the Stormwater Management Plan has been updated to explain how the City plans to use stormwater monitoring program results to decide on future treatment strategies.

### Question and Answer

#### Why is Yellowknife stormwater not treated?

*No municipality treats all of their stormwater, but larger municipalities tend to apply stormwater treatment in some locations. Treatment can include stormwater ponds, treatment wetlands, or oil and grit separators. Low-impact development practices can also be used to promote rain infiltration.*

*The City of Yellowknife is still in the early stages of understanding stormwater quality and would like to make sure to collect consistent data before spending tax dollars on potentially expensive stormwater treatment infrastructure. It is important to know which substance(s) (if any) pose problems, where they are posing a problem, and the best location and treatment technology to reduce impacts.*

*In the meantime, the City continues to use its bylaws, pollution control measures, and public educations to reduce potential impacts of stormwater.*

#### Have questions or comments?

The City has posted information on each of the components of the water licence renewal at [www.yellowknife.ca/WaterLicenceRenewal](http://www.yellowknife.ca/WaterLicenceRenewal) and will be soliciting feedback from interested residents and stakeholders via email, letter and our online engagement tool [PlaceSpeak](#). Additional details on engagement opportunities will be provided in the weekly Capital Update and via Twitter and Facebook.

Questions about the renewal process can be directed to Madison Warren, Municipal Engineer at [waterlicence@yellowknife.ca](mailto:waterlicence@yellowknife.ca).