
Get to Know Your Watershed...

Information on the Middle River and
Carter's Brook Protected Watersheds



Published by:
Bathurst Sustainable Development



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**Your Environmental
Trust Fund at work!**



Cover photo: Source: NB Department of Environment

*Photo inset: Aerial view of Bathurst and the drinking water reservoirs.
Source: NB Department of Environment*

Table of contents

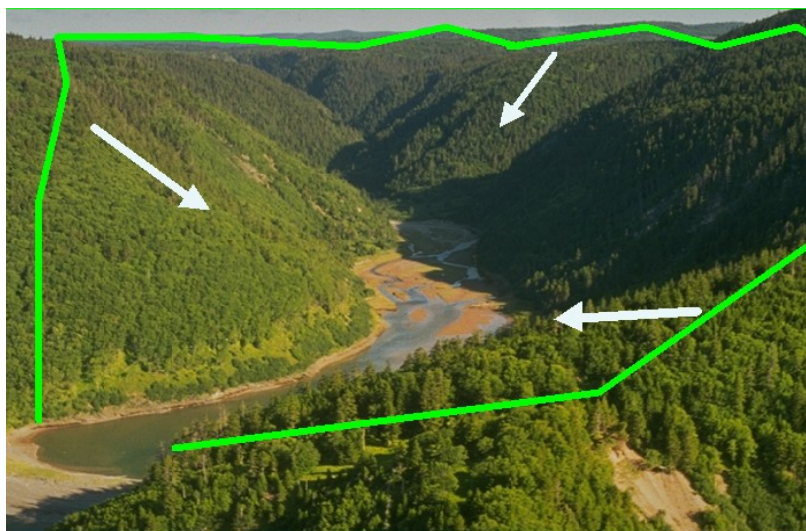
Introduction	4
What is a watershed?	4
Why are watersheds so important?	5
Where does our water come from?	6
Impacts on watershed health	7
Impacts of climate change on fresh water resources	8
What is being done to protect watersheds?	8
What is protected within a watershed?	9
Riparian areas	11
Benefits of riparian zones	13
Checking the health of well water	13
Be prepared!	15
Stewardship opportunities	15
Conclusion	16
Important phone numbers and contacts	17
Regulations	18
Easy steps to prevent watershed pollution	19
Indoor water use calculation worksheet	20
Outdoor water conservation	22
Harvesting rain water	24
Average monthly discharge of the Middle River	26
References and resources	28

Introduction

This booklet is intended to share information with local citizens about Middle River and Carter's Brook Watersheds, which are the source of drinking water for the City of Bathurst and the Town of Beresford. The booklet also provides information on how we can all be stewards of our watershed, how to protect well water and ideas for water conservation.

What is a watershed?

The term watershed describes an area of land that drains down-slope to the lowest point. The water moves through a network of drainage pathways, both underground and on the surface. Generally, these pathways converge into streams and rivers, which become progressively larger as the water moves on downstream, eventually reaching an estuary and the ocean.



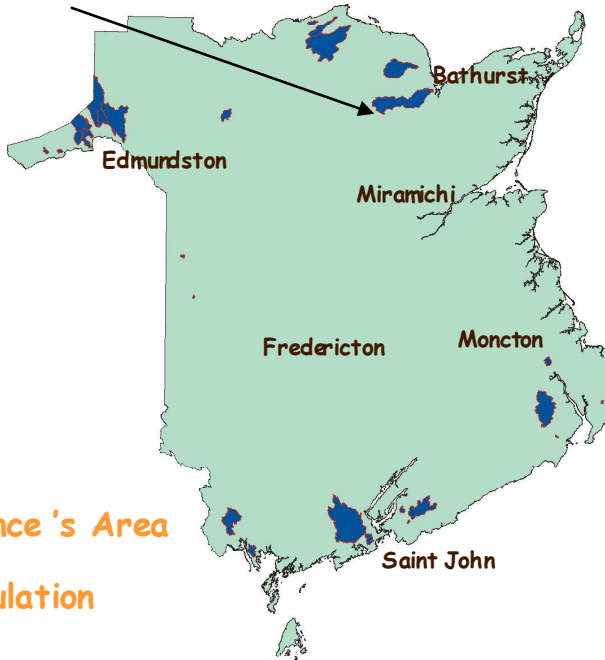
Source: Watershed Protection Program, Department of the Environment.

Watersheds are more than just drainage areas in and around our communities. They are necessary to support habitat for plants and animals, and they provide drinking water for people and wildlife. They also provide the opportunity for recreation and enjoyment of nature.¹

Protection of the natural resources in our watershed is essential to maintain the health and well being of all living things, both now and in the future.

¹Santa Clara Valley Urban Runoff Pollution Prevention Program

Middle River & Carter's Brook watersheds



30 Watersheds

21 Municipalities

4% of the Province's Area

40% of the Population

Map showing the location of Middle River & Carter's Brook watersheds in New Brunswick. Source: NB Department of Environment.

Why are watersheds so important?

Healthy watersheds are critical and vital for a healthy community to exist. Scientists and leaders now recognize that the best way to protect our vital natural resources is to understand and manage them on a watershed basis.

About **40% of New Brunswickers obtain their water supply from surface watersheds.**

One contaminated watershed can mean undrinkable water for thousands of people.²

Watersheds also provide water and habitat for wildlife and have high levels of diversity of both plant and animal species making the area biologically important in helping to maintain the biological diversity of our planet.

Everything that is done in a watershed affects the watershed's system.³

² NB Department of Environment

³ Watershed Information Network, Getting to Know Your Local Watershed, A Guide for Watershed Partnerships

Where does our water come from?

In the communities of Bathurst and Beresford, residences, schools, businesses and all other buildings obtain their water either through the municipal water system supplied by the City of Bathurst or through their own private well located on their property.

For those that are on the municipal water system, the source of the water is the Middle River Watershed and the Carter's Brook Watershed. The City of Bathurst manages a water treatment system, operates two reservoirs and supplies the municipal water distribution system for both Bathurst and Beresford which supplies potable drinking water to a combined population of close to 18,000 citizens, plus commercial, institutional and industrial facilities.

The entire Middle River and Carter's Brook watersheds cover an area of approximately 22 740 hectares.⁴

The Middle River and Carter's Brook watersheds are partially located within the boundaries of the City of Bathurst but also geographically overlap the municipal boundary and extend outside of the city limits.

Only 20% of the designated watershed area and river is actually within the boundaries of the city limits of Bathurst.

The remaining river area and designated watershed area extend approximately 20 km north-west and then split into the North and South branches of Middle River. These two branches end just before where the Gloucester County line meets the junction of the Restigouche and Northumberland County lines and just a few km before Caribou Depot. The majority of the water supply for Middle River is derived from fresh water springs and seasonal runoff from snow melt and rainfall.

The major tributaries of Middle River include Cherry Brook and Six Miles Brook. The two reservoirs at the Bathurst Water treatment plant combine hold approximately 224 million liters of water. The upper reservoir holds approximately 44,000 cubic meters of water. The lower reservoir holds approximately 180,000 cubic meters of water.

The average daily consumption of water from the Bathurst reservoirs ranges from 2.5 million Imperial gallons per day in the winter to 3.4 million Imperial gallons in the summer. Between 30-40% of this water is used for flushing toilets.

The total annual **water consumption** in the **City of Bathurst (from all users)** is 335,909,000 Imperial gallons which is approximately **28,466 Imperial gallons per capita** (based on population from 2008 census 11,800) ".

The **total annual volume of water sold to the Town of Beresford in 2009** was **136,932,000 Imperial gallons per capita** (based 2006 Statistics Canada census of 4,264) ".

⁴New-Brunswick Department of Environment

Impacts on watershed health

Within a watershed area, rainwater flows through rivers, streams, creeks and storm drains, and ultimately enters untreated into harbors and our oceans. As rain water flows along the surface of the land it brings man-made pollutants encountered in the watershed, which can lead to urban runoff pollution.

Land use activities such as commercial and industrial development, agriculture, residential development and forestry activities can have an impact on the environment. The cumulative effect of several of these activities within the watershed area has the potential for impacting water quality.

Point-source pollution is the easiest form of water quality contaminants to identify because it can be traced to a specific location such as a pipe or disposal site.

Nonpoint-source pollution is more difficult to isolate and control. These sources are often hard to identify and difficult to measure. This type of pollution results from a wide variety of activities over a wide area.

Nonpoint-source pollutants are in the water that runs off crop or forest land, leachate from failing septic systems, runoff from parking lots, construction sites, irrigation systems and drainage systems.

Annual precipitation and snowfall amounts can also impact both the water quality and quantity. Seasonally drier summers added to less snow fall in winters can mean that water levels in our watershed are lower.

Photo: Aerial view of the Bathurst drinking water reservoirs. Source: NB Department of Environment.



Impacts of climate change on fresh water resources

The warming of Earth is evident in average global air and ocean temperatures. Earth is warming faster than at any time during the twentieth century.⁵

One effect of rising temperatures is the atmosphere's increased capacity to hold moisture. For every 1.8°C increase in temperature, the water-holding capacity of the atmosphere rises 7 percent. Increased moisture in the atmosphere will lead to more intense precipitation events, even when regions' annual total amount of precipitation is slightly reduced.

Climate change is expected to lead to reductions in water supply. Groundwater supplies are vulnerable to climate change impacts such as evapotranspiration losses (the loss of water to the air through evaporation and plant transpiration). Increasing temperatures may increase evaporation rates which will reduce aquifer recharge and storage. Future increases in water demand due to higher temperatures will compound the problem of how to meet increased demand from the possibility of population growth and economic development and lower water levels in the rivers. New, widespread conservation efforts and allocation policies will be essential to meet this challenge.

Climate Change can also impact fresh water resources as a result of sea level rise. Water expands when it is heated and as the Earth's oceans become warmer they expand through a process called "thermal expansion". As the salt water rises we see more occurrences of salt water intrusion on surface freshwater supplies and aquifers along our coasts.

What is being done to protect watersheds?

The responsibility of protecting water resources is shared by all levels of government. **Any development within 30 meters of the shoreline requires a Watercourse & Wetland Alteration (WAWA) permit from NB Department of Environment.**

Recognizing the need for a comprehensive, proactive approach to control development in areas that are the source of potable water such as lakes, streams, and rivers, the Province of New Brunswick developed Phase One of the Watershed Protection Program in 1990 initially, under this program development activity within 75 m of a protected watercourse was regulated.

With the introduction of the second phase of the Watershed Protection Program, standards are now placed on activities within the entire watershed, in addition to the 75-metre setback zone. This includes the watercourses themselves. In this manner, the Department of Environment can more effectively ensure quality drinking water for the 21 communities that receive their drinking water from surface watersheds.

⁵Climate Change and Freshwater Resources

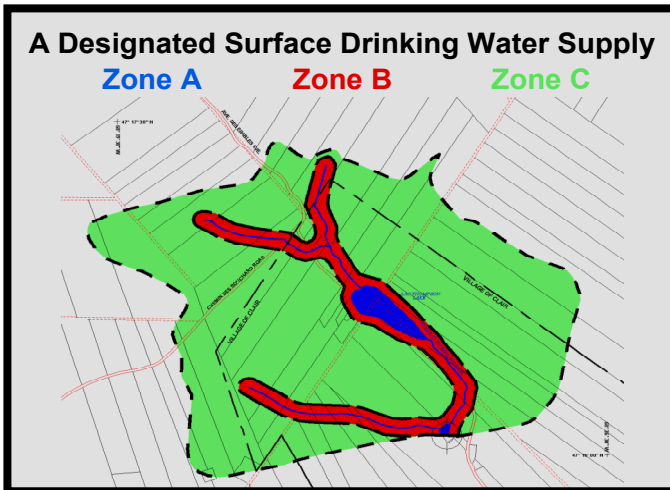
What is a protected area within a watershed?

In New Brunswick each of the provincially designated Municipal drinking water supply sources have designated protected zones defined under the **Watershed Protected Area Designation Order – Clean Water Act**.

The activities that are regulated within these protected designated watershed areas are:

- Agriculture
- Aquaculture
- Forestry
- Mining
- Residential Development
- Recreation
- Road Construction
- Commercial and Industrial Development

Designated Setback Zones and Restricted Activities



Source: Watershed Protection Program, Department of the Environment

ZONE A (Watercourse) is defined as any watercourse, including lakes, streams, ponds, rivers or brooks designated as protected, within the watershed area.

ZONE A — Restricted Activities

- Recreational water use activities for waterfront owners/ occupants only; swimming at public beaches only
- Motorized boating prohibited

ZONE B, also called the 75-metre setback zone, is an area within a horizontal distance of **75 metres from the bank of watercourses**. This area also encases the riparian zone.

ZONE B — Restricted Activities

- No *new* residential development
- Size restrictions on renovations/additions to *existing* dwellings
- Agriculture: *No new* agriculture operations; existing activities permitted with restrictions
- Mining: Mineral exploration only
- Forestry: No clear-cutting; selection harvest silviculture, pesticide application permitted with restrictions
- Shoreline protection permitted with Watercourse & Wetland Alteration (WAWA) permit

ZONE C is defined as the remaining area within the watershed, **outside the 75-metre setback but within the watershed boundary**. This is also sometimes referred to as the balance of the watershed area.

ZONE C — Restricted Activities

- Residential development is permitted
- No effluent discharge from mining or aquaculture permitted within watershed
- Forestry: Maximum clearcut size of 25 hectares and further buffer and adjacency delay requirements
- Agriculture: **No new** agriculture operations; restrictions on land clearing, manure storage and spreading; soil conservation practices incorporated in the Order
- **No new** landfills, asphalt plants, bulk storage of fuels/PCBs, septic treatment plants or lagoons, commercial, industrial or institutional development

For more information visit :

Watershed Protected Area Designation Order

<http://www.gnb.ca/0009/0371/0004/0001-e.asp>

Riparian zones

One way that we can all protect the health and wellbeing of our watershed is by safeguarding the riparian zones around watercourses.

Riparian zones are the land and vegetation adjacent to or near the banks of watercourses (stream, river, lake, etc.) and are critical for maintaining water quality in our watersheds. These zones are important natural biofilters, protecting aquatic environments from excessive sedimentation, polluted surface runoff and erosion. They supply shelter and food for many aquatic animals and shade that is an important part of stream temperature regulation.



A preserved riparian strip on a river. Source: Wikipedia

Native vegetation that occurs along waterfronts provides an attractive landscape with many important benefits, and helps preserve plants and animals that make an area unique. By selecting native plants, you help to create a more natural condition on your property — a practice that benefits you as well as the health of our water resources.

Research shows riparian zones are instrumental in water quality improvement for both surface runoff and water flowing into streams through subsurface or groundwater flow. Particularly the attenuation of nitrates from fertilizer in this buffer zone is important.

Riparian zones can play a role in lowering nitrate contamination in surface runoff from fertilized fields and lawns. Without an intact and healthy riparian zone, runoff containing these substances would damage ecosystems, water quality and potentially human health.

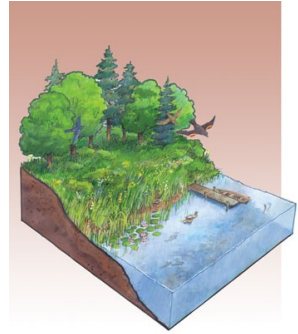
Here are some common concerns of property owners about using trees, shrubs, and warm-season grasses to protect shorelines and stream banks.

Concern	Concern Addressed
It will block my view of the water.	Many native trees, shrubs, and grasses are fairly low-growing. With a well-designed landscaping plan, you'll be able to enhance scenic views and increase your privacy.
I like keeping my lawn looking neat and trimmed.	Some people are concerned that riparian vegetation will look unkempt. Sure, it's a switch from the manicured lawn; however, native trees, shrubs, and grasses at the shoreline or stream bank can be a low-maintenance landscaping alternative that is aesthetically pleasing in a very "natural" way.
All that weedy growth will attract rats and snakes.	Actually, native shrubs and trees are much more likely to attract beneficial wildlife, including butterflies and songbirds. The secret is to think about the types of wildlife you'd like to attract, and then choose native plants that provide food and/or shelter for those species.
It is difficult to find native trees and shrubs at my local garden center.	Watershed Organizations can be a good source of information to point you to varieties that will thrive in your location—and give you information on where you might obtain them.
A bunch of plants won't make much of a difference. If I'm really going to try to stop erosion, riprap will work better and last longer.	Without a doubt, there are certain locations experiencing severe erosion which require rock riprap. For maximum benefits, establish a vegetative riparian zone in addition to hard armoring by planting native plants above the rock riprap.

Benefits of riparian zones

⁶Maintaining or developing a healthy riparian zone can:

- Increase your property value
- Reduce property loss from excessive erosion
- Protect water quality
- Enhance wildlife habitat
- Contribute to the natural beauty of the land
- Dissipate noise from roads and nearby properties
- Reduce maintenance time and related costs
- Provide privacy
- Screen unsightly views



Source: Department of Fisheries & Oceans Canada

Checking the health of well water

The most significant risks to people's health from drinking water come from microscopic organisms such as disease-causing bacteria, protozoa and viruses. The guidelines that relate to these microorganisms are stringent because the associated health effects can be quite severe. They can also affect health over the long-term.

Chemical and radiological substances may also be found in some drinking water supplies but these are generally only a concern if they are present above guideline levels and you are exposed to them over a period of years. New science is showing that exposure to some chemical contaminants above guideline levels may be a concern in the short-term as well.

⁶ Benefits of Riparian Zones

Checking well water continued...

Thousands of New Brunswick families, living in smaller towns and rural areas, rely on individual wells for drinking water. These wells, in turn, depend on natural groundwater reserves or "aquifers". The quality of the water they produce is always influenced by naturally occurring minerals beneath the ground surface. As well, a variety of substances and other aspects of our modern lifestyle can affect the quality of well water.

The Department of Environment recommends that well owners have their water tested for bacteria twice a year (spring thaw and late fall) and a general chemistry test (inorganic) once every two years. The standard tests required under the "Potable Water Regulation" analyze the water for both inorganic and bacteriological substances.

"Inorganic" testing examines a variety of components such as: hardness, alkalinity, calcium, chloride, copper, fluoride, iron, potassium, magnesium, manganese, sodium, nitrite, lead, sulphate, antimony, arsenic, boron and zinc.

"Bacteriological" testing looks for the presence of total coliform and fecal coliform, which are substances typically associated with decaying natural organic matter or discharges from sewage disposal systems.

The basic well water test costs approximately \$132.00 + HST (2009 price) and is payable to the Minister of Finance at the time of picking up

your water sampling bottles and instructions. The bacteriological test is \$35.00 + HST. The Department of Health has a contract with Service New Brunswick to supply water sampling kits to landowners. The Department of Health does not supply sample kits. Well owners must obtain kits from Service New Brunswick. All micro water testing is now done through Service New Brunswick.



Source: University of Wisconsin-

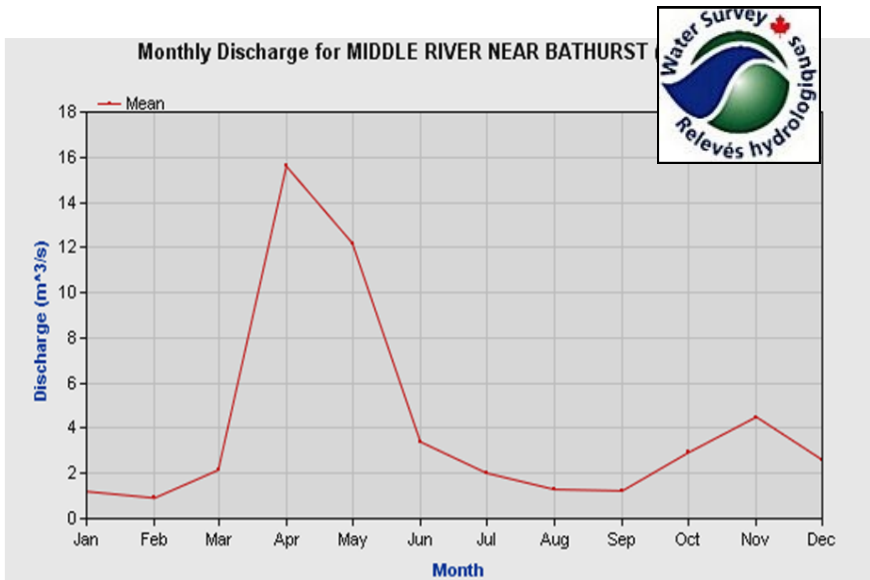
Monthly water discharge of the Middle River from 1981 to 2007

Environment Canada's Water Survey of Canada monitors the water flow on the Middle River above the drinking water reservoirs. The graph (left) shows the average quantity of water flowing through the station on Middle River from 1981 to 2007.

Average discharge is measured in cubic meters. One cubic meter is the same as 1000 Liters or 500 two-liter plastic pop bottles. Water discharge is on average highest from March to mid-May, and lowest in August and when the river freezes over in January.

To get daily updates of water flow on the Middle River, visit the Water Survey of Canada real-time data portal and scroll to "Middle River near Bathurst":

<http://scitech.pyr.ec.gc.ca/waterweb/formnav.asp?lang=0>



Above: The 'mean' (or average) monthly discharge from the Middle River from 1981-2007. Data and graph provided by Environment Canada's Water Survey of Canada—2009. www.wsc.ec.gc.ca

Be prepared!

Interruptions in water supply can happen without warning due to dryer than normal summer seasons, breaks in the water treatment equipment, during major storms and or emergency events. Each adult requires 2.1 to 2.8 litres of drinking water per day and each child between the ages of 9 and 13 requires 1.6 to 1.8 litres of drinking water per day plus a supply of water for food preparation and sanitization.

Public Health Agency of Canada recommends 2 litres of drinking water per person per day on hand for emergencies.⁷ In 1998, Canadians, on average, used 343 litres of water per person per day.⁸ Please ensure that you have on hand at all times a minimum of two weeks and preferably a three month supply of professionally bottled and sealed drinking water for your household.⁹

For more information visit the Water Emergency Preparedness documents at the following websites:

Public Health Agency of Canada:

<http://www.phac-aspc.gc.ca/index-eng.php>

Public Safety Canada Emergency Preparedness Plan:

<http://www.publicsafety.gc.ca/prg/em/prprdns-eng.aspx>

New Brunswick Emergency Operations Branch: <http://www.gnb.ca/cnb/emo-omu/index-e.asp>

Stewardship opportunities

We all have the opportunity and a vital role to play in the stewardship and protection of our watershed. If you see or know of areas in the watershed which are in need of restoration, have been damaged or see activities taking place which may impact our water quality please help by reporting such issues to the:

Regional Services and Enforcement Branch (Bathurst):
(506) 547-2092

⁷ Public Health Agency of Canada

⁸ Natural Resources Canada

⁹ Water Emergency Preparedness: Federal Emergency Management Organization (FEMA)

Stewardship continued...

You can also take action by contacting your local watershed group and volunteering to participate in programs, projects and local initiatives to help raise awareness about watershed protection.

Bathurst Sustainable Development is a local non profit environmental organization and one of the many areas of our work is working on awareness and protecting the health of the Middle River and Carter's Brook watershed area.

We work together with the other conservation and special interest groups, government departments and the City on raising awareness about how citizens can assist in protecting our watershed. To be part of the Middle River and Carter's Brook watershed stewardship initiative and partnership or for more information you can reach us at:

Bathurst Sustainable Development- Climate Change Action Center
237 Main Street, Bathurst or visit us at our Environmental Resource Center at the City Farmer's Market on Saturday mornings.

Phone: (506) 548-2106 or (506) 548-8470 Action Center
Email: rosewood@nbnet.nb.ca

Conclusion

The watershed where you live is a dynamic and unique place. It is a complex web of natural resources - soil, water, air, plants and animals. Yet, everyday activities can impact these resources, ultimately impacting our well-being, economic livelihood and our future. Understanding your watershed is the first step in protecting the water and other natural resources.

To fully understand your watershed you'll also need to understand how it's used by the people who live, work and play there. These are the stakeholders who need to be involved in the planning and implementing process.¹⁰

Everything that is done in a watershed affects the watershed's system.

¹⁰ Watershed Information Network, *Getting to Know Your Local Watershed, A Guide for Watershed Partnerships*

Important phone numbers & contacts

City of Bathurst After-hours Emergency- 506-548-0463

Environmental Emergencies- Reporting oil spills, pesticides, dumping, chemical spills, illegal fishing and other environmental emergencies-
Call: 911 or 1-800-565-1633

Household Hazardous Waste

Nepisiguit-Chaleur Solid Waste Commission
1300, route 360, Allardville,
New Brunswick, E8L 1H5
Phone: 506- 725- 2402
Info@EnviroChaleur.ca
www.EnviroChaleur.ca

NB Department of Environment, Regional Services and Enforcement Branch

159 Main St., Suite 202,
Bathurst, N. B. E2A 1A6
Office: (506) 547-2092
Service New Brunswick
161 Main Streets, Bathurst,
New Brunswick, E2A 1A6
(506) 547-2077;
snb@snb.ca

Department of Health

165 St. Andrew Street
Bathurst, New Brunswick,
E2A 1C1, Canada
(506) 549-5550;
dh-ms@dh-ms.ca



Regulations

The following is a sample of legislation and policy that either regulate water quality in watersheds or that proposed developments may need to contact to obtain authorization or relevant permits when considering conducting activities near a watercourse. This list is not intended to be inclusive.

Clean Water Act – Depending on the location, activity or development along coastal shorelines, rivers, streams, lakes and brooks you may be required to submit your plan to the NB Department of Environment for review. No watercourse or wetland may be disturbed without a Watercourse and Wetland Alteration Permit. <http://www.gnb.ca/0062/acts/acts-e.asp>

Water Well Regulation - Clean Water Act (90-79); <http://www.gnb.ca/0062/regs/c-6-1reg.htm>

Potable Water Regulation - Clean Water Act (93-203); <http://www.gnb.ca/0062/regs/c-6-1reg.htm>

Watercourse and Wetland Alteration Regulation - Clean Water Act (N.B. Reg. 90-80); <http://www.gnb.ca/0062/regs/c-6-1reg.htm>

Watershed Protected Area Designation Order - Clean Water Act (2001-83); <http://www.gnb.ca/0062/regs/c-6-1reg.htm>

“A Coastal Areas Protection Policy for New Brunswick”; 2003, NB Department of Environment, <http://www.gnb.ca/0009/0010-e.asp>

Quarriable Substances Act – The Department of Natural Resources’ Minerals Division must issue a Quarry Permit authorizing any excavation of materials 300 metres above or 300 metres below the ordinary high water mark. An application is required. <http://www.gnb.ca/0062/regs/q-1-1reg.htm>

Fish & Wildlife Act; Endangered Species Act; Wetlands Policy – All applications may be forwarded to DNR’s Fish & Wildlife Branch for their review to ensure they do not conflict with these Acts or Policies, <http://laws.justice.gc.ca/en/F-14/index.html>

Clean Environment Act – Depending on the nature of the work and/or the location, the NB Department of Environment may review and approve activities under certain regulations (e.g., Water Quality Regulation, Environmental Impact Regulation). <http://www.gnb.ca/0062/acts/acts-e.asp>

Fisheries Act – The Habitat Management Division of Fisheries and Oceans Canada must approve any activity that may alter, disrupt or destroy fish habitat. <http://laws.justice.gc.ca/en/F-14/index.html>

Indoor water use calculation worksheet

Use this worksheet to help you calculate your average daily indoor household use. The best and most accurate way to measure your indoor water use is to read your meter for each of the following activities when you are using the water – be sure to only measure one activity at a time.

Activity	Our household	Average
<u>Showers</u>		
Regular flow head (7 gal/minute)	_____	49 gallons
Low-flow head (3 gal/minute)	_____	21 gallons
Ultra-low flow (1.75 gal/minute)	_____	12 gallons
<u>Baths</u>		
Full tub	_____	38 gallons
<u>Toilets – per flush</u>		
Older Standard size	_____	7 gallons
Conserving models	_____	3.5 gallons
Ultra-low flow	_____	1.6 gallons
<u>Brushing Teeth</u>		
Faucet running – 3 minutes*	_____	9 gallons
Fill drinking cup	_____	8 ounces
*Faucet output may vary.		
<u>Shaving</u>		
Faucet running – 10 minutes	_____	30 gallons
Fill basin	_____	1 gallon
<u>Automatic Dishwasher</u>		
Full Cycle	_____	12 gallons
Short cycle – water miser	_____	8 gallons

Continued on next page....

Indoor water use calculation sheet (contd...)

Washing Dishes by Hand

Water running – 15 minutes _____ 45 gallons

Fill sink _____ 3 gallons

Clothes Washer – per load

Full water level _____ 43 gallons

Short water level – water miser _____ 34 gallons

High-efficiency washer
(varies by machine) _____ 18 gallons

Leaking/Dripping Faucets

At 60 drops/min per day _____ 7 gallons

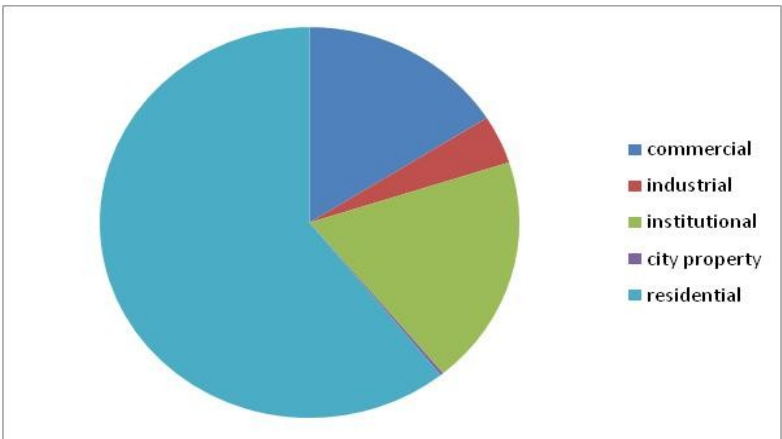
Leaking Toilets per day _____ 60 gallons

Our total daily indoor water use _____

We commit to reducing our household water consumption by

_____ gallons per day.

Source: *Padredam Municipal Water District*



Residential water use in Bathurst makes up 60% of the total water drawn from the Middle River watershed. Use the calculation sheet above to learn where you can help to conserve water!

Easy steps to prevent watershed pollution

- Do not use pesticides or chemical fertilizers. Find some alternative ways to control pests inside and outside your home, and enrich your soil without toxic chemical pesticides.
- Take unwanted pesticides to the Nepisiguit-Chaleur Solid Waste Commission (506) 725-2402.
- Do not park or wash any vehicle any closer to a river edge than is necessary. Oil from asphalt or a leaking oil tank might get washed into the river.
- Do not store garbage or manure close to a river.
- Do not dump debris from construction or road work into the river.
- Clean up trash outside your home. Pick up leaves and yard clippings and recycle as green waste. If you see litter, pick it up and put it in a trash can.
- If you change your own oil, recycle the waste oil at the curb or take it to a Household Hazardous Waste Collection Event.
- Never pour oil or other automobile fluids into a storm drain or onto the ground.
- Wash your car on an unpaved area or better yet, take it to a commercial car wash.
- Pick up your pet droppings and dispose of them in the trash or in your toilet.
- Use kitty litter or other absorbent materials (not your hose) to clean up spills and leaks on paved surfaces. Remember to clean up and properly dispose of the used absorbent.
- Rinse latex paint brushes, pans and rollers in the sink. Filter and reuse oil-based paint thinner or brush cleaners. Take leftover latex and oil-based paints and solvents to a hazardous waste collection event. Never pour paint or solvents into a storm drain, sink or onto the ground.
- Control erosion around your property to prevent dirt and debris being carried into the storm drain. Divert rainspouts and garden hoses away from paved surfaces to prevent water from carrying pollutants directly into storm drains. Provide landscaping next to sidewalks and driveways to collect runoff from paved surfaces.

Outdoor water conservation

- As a *general rule*, your lawn and garden will only need about 2 to 3 centimetres (1 inch) of water per week. Often enough rain falls to naturally supply this amount.
- If you must water your lawn the best time to water is in the early morning – after the dew has dried – or the evening. Watering at these times cuts down on losses to evaporation.
- When it comes to watering plants and flower beds, *drip irrigation* is the most effective method. With drip irrigation, porous tubes deliver small quantities of water directly to the root zone.
- *Water from the sky is free, so make use of it.* Cisterns are perfect for catching rain-water from the roof for use on your lawn or garden. Channel downspouts into rain barrels, buckets, or holding tanks, to collect water for later use.
- Cut your grass high to provide shade for the roots. Set the mower blades between 5 and 8 centimetres; and leave the grass cuttings on the lawn as mulch. The mulch slows the evaporation of water from the soil and acts as a fertilizer for the grass.
- An 8 to 15 centimetres layer of loose, organic mulch on the soil surface around plants and trees retains moisture and moderates soil temperature.
- *If your lawn fades in the summer, don't panic.* Grass becomes naturally dormant during hot, dry periods. It will revive quickly after a good rainfall or when the weather becomes cooler.
- If you own a pool, be sure to use a *pool cover* when it's not in use. This will cut down on evaporative losses and will keep it cleaner and warmer. Check equipment such as filtration systems and water inlets on a regular basis for signs of leaks.
- Using a running hose to wash your car can waste about 400 litres of water. Using a bucket with a sponge plus a *trigger nozzle* on the hose will save you about 300 of those litres. And, *never clean the driveway or sidewalk with the hose.* Use a rake and broom and save about 200 litres of water every time you sweep.

Install a rain barrel under your downspout and use the rain water for outdoor water needs!



Water conservation for business, industry, & institutions

- Encourage installation of equipment with automatic shut-off taps, High-Efficiency equipment, etc.:
- Use automatic shut-off taps in kitchens, lunch rooms and wash-rooms
- Install dual flush toilets
- Install low flow showerheads if there are showers at work
- Energy Star Low Water use washing machines
- Only serve glasses of water to restaurant patrons if they request it.
- Use drip hoses to water flower beds and plants.
- For industries, a water audit is indicated to locate leaks.

Harvesting rain water

Many municipalities and homeowners are facing shortages of fresh water for drinking water. As the impacts of an ever warming world continue to be felt, impacts from climate change on our fresh water resources will require that we “think outside the box” and look for alternative sources of both non potable and potable water supplies both for human needs and for agricultural use.

Rain Water harvesting and the use of both above ground and below ground rain water collectors and cisterns, is an ancient water system and was the first type of municipal water collection and supply used in the world.

Archaeological evidence supports the capture of rain water as far back as 4000 years ago and cisterns built as early as 2000 BC are still standing in Israel and Jordan. Ancient underground cisterns are still being discovered today that contain pure fresh water that has not been exposed to light or air pollutants for thousands of years.

Today, rainwater harvesting is popular in many parts of the world and is quickly becoming a necessity due to reductions in global fresh water resources.

A rainwater harvesting system functions in many ways, but mainly to catch rainwater from the roof and gutters, transport it through the downspouts and piping, remove debris and clean and store it for its intended use.

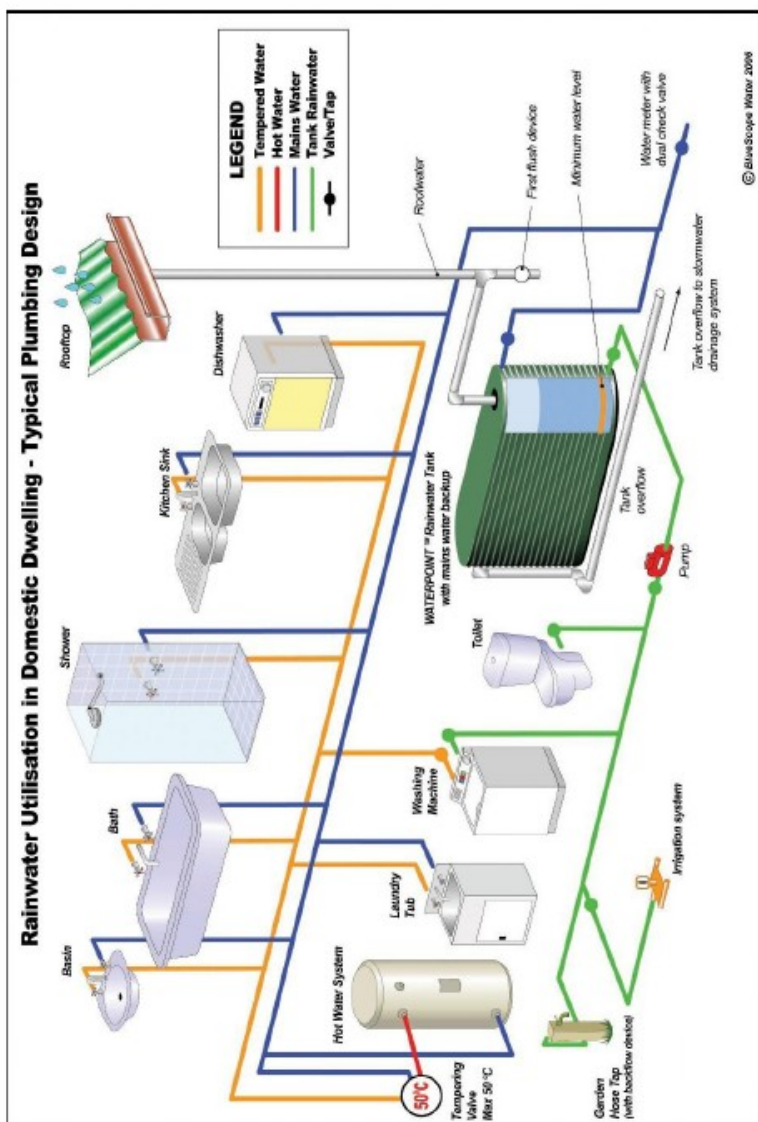
A rainwater collection and storage system can be as simple as capturing rain in a barrel for gardening or complex enough to require the expertise of an architect, engineer, rainwater specialist and filtration and water treatment specialist.

There is a significant untapped potential to generate additional water supplies through rainwater harvesting, particularly in urban and suburban areas. Governments could consider expanding their role in promoting rainwater harvesting by:

Directing new government facilities with 10,000 square feet or greater in roof area (and smaller facilities, when feasible) to incorporate rain water collection into the building design. Harvested rainwater at these locations may be used for restroom facilities, landscape watering and cleaning.

Developing incentive programs and or funding to encourage the incorporation of rainwater harvesting systems into the design and construction of new and existing residential, commercial, and industrial facilities.

Example: Residential Rain Water Collection System



An example of a dual plumbing system used in Australia.

Source: Texas Water Development Board : <http://www.twdb.state.tx.us/iwt/rainwater.asp>

References and Resources

1. Santa Clara Valley Urban runoff Pollution prevention program; <http://www.mywatershedwatch.org/>

2 and 3. New-Brunswick Department of Environment; <http://www.gnb.ca/0009/0373/0001/0002-e.asp>

4. Watershed Information Network, Getting to Know Your Local Watershed a Guide for Watershed Partnerships; <http://www2.ctic.purdue.edu/KYW/brochures/GetToKnow.html#FIRST>

5. Climate Change and Freshwater Resources, Noah D. Hall, Bret B. Stuntz, and Robert H. Abrams, <http://works.bepress.com/cgi/viewcontent.cgi?article=1005&context=noahhall>

6. Benefits of Riparian Zones, <http://www.tva.gov/river/landandshore/stabilization/benefits.htm>

7. Health Canada; <http://www.hc-sc.gc.ca/ewh-semt/water-eau/drink-potab/guide/index-eng.php>

8. Public Health Agency of Canada; <http://www.phac-aspc.gc.ca/influenza/fam-pl-ckl-eng.php>

9. Natural Resources Canada; <http://atlas.nrcan.gc.ca/site/english/maps/freshwater/consumption/domestic/1>

10. Water Emergency Preparedness: Federal Emergency Management Organization (FEMA); http://www.fema.gov/areyouready/assemble_disaster_supplies_kit.shtm

11. Watershed Information Network, Getting to Know Your Local Watershed a Guide for Watershed Partnerships; <http://www2.ctic.purdue.edu/KYW/brochures/GetToKnow.html#FIRST>

12. Environment Canada; http://www.ec.gc.ca/Water/en/info/pubs/nttw/e_nttwi.htm

13. Managing Nonpoint Pollution: An Action Plan for Puget Sound Watersheds, Puget Sound Water Quality Authority Tel: 206-464-**7320**

Other resources:

1. NB Brunswick Environment Industry Association; <http://www.nbeia.nb.ca/pdf/WEI%20pubeng.pdf>

2. Wisconsin Water Resources Clip Art Collection; <http://clean-water.uwex.edu/pubs/clipart/index.htm>

3. Texas Water Development Board : <http://www.twdb.state.tx.us/iwt/rainwater.asp>

Water Conservation Tips: In the Kitchen

- Take foods out of the freezer early to allow plenty of time to thaw. Thawing frozen goods under a running tap wastes water.
- When boiling vegetables, use only enough water to cover the food. Steaming uses even less water while conserving more nutrients.
- Keep a bottle of drinking water in the refrigerator. That way, you don't have to let your tap run to get cold water when you want a drink.
- Fill the dishwasher before you turn it on. It can use from 30 to 45 litres per cycle. Washing by hand uses about the same, *each time you wash*, so use the dishwasher once a day and save.
- Turn your taps off tightly but gently so they don't drip. And repair any leaks in and around your taps and faucets without delay.

In the Bathroom

- You can save 10 to 20 litres of water each time you shave by filling the basin, instead of letting the water run continuously.
- Turn off the tap while brushing your teeth, and use short bursts of water for rinsing.
- A quick shower uses less hot water than a bath in a full tub. If you prefer the bath, don't overfill the tub; 1/2 full should be enough.
- If you're taking a bath, put in the plug and turn on the hot water. Let it run until the water gets hot before adjusting the temperature with cold water.
- Flush the toilet only when necessary. *Never use it as a wastebasket for tissue etc.*, and never flush paints, solvents or other chemicals down the toilet.

Let us know what you think...

1. Did you find this booklet useful? (circle one)
Yes No
2. Are you using any of the tips and suggestions mentioned in this booklet? (circle one)
Yes No
3. What new actions have you taken to help in the stewardship of your watershed?

4. Suggestions? Comments? Questions?

Returning this feedback form will help us to better serve our community.

Mail to:

Bathurst Sustainable Development
Climate Change Action Center,
237 Main Street, Bathurst, NB, E2A 1C9

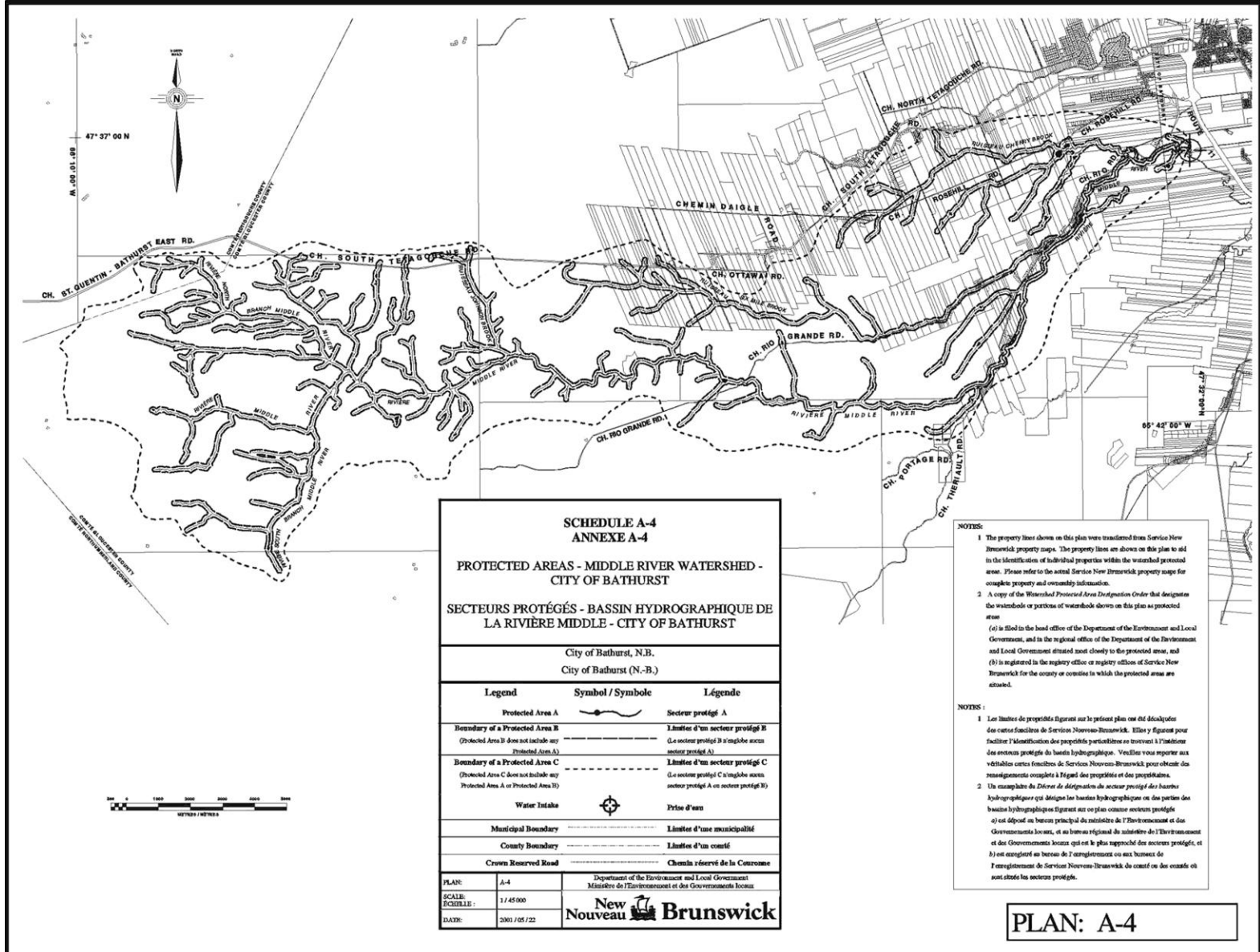
Tel: (506) 548-2106

E-mail: rosewood@nbnet.nb.ca

Visit Bathurst Sustainable Development Saturday mornings at the **Environmental Resource Center** at the Bathurst City Farmer's Market.
www.bathurstsustainabledevelopment.com



Middle River Watershed



PLAN: A-4

Carter's Brook Watershed

**SCHEDULE A-3
ANNEXE A-3**

**PROTECTED AREAS - CARTERS BROOK WATERSHED - CITY
OF BATHURST**

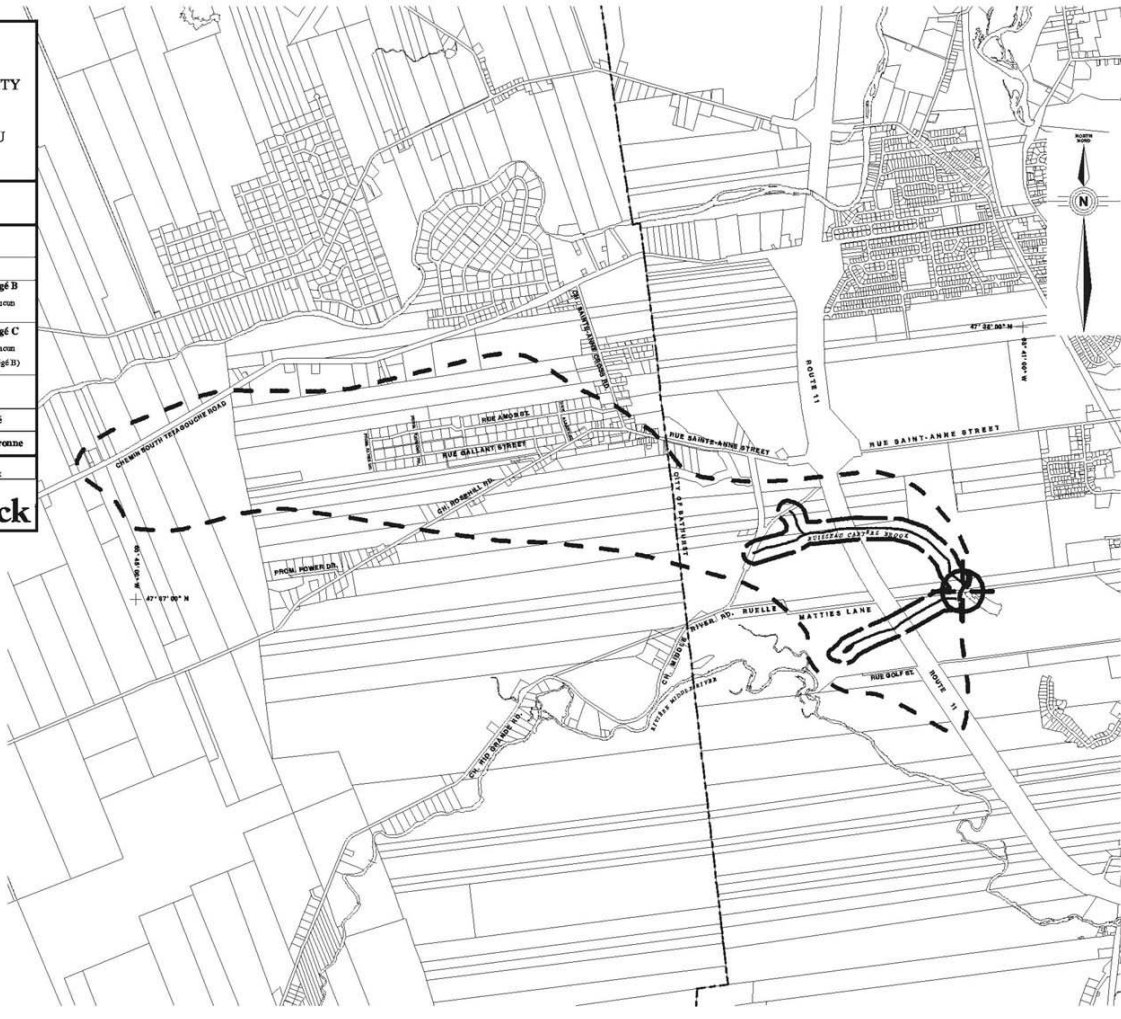
**SECTEURS PROTÉGÉS - BASSIN HYDROGRAPHIQUE DU
RUISSEAU CARTERS - CITY OF BATHURST**

City of Bathurst, N.B.
City of Bathurst (N.-B.)

Legend	Symbol / Symbole	Légende
Protected Area A		Secteur protégé A
Boundary of a Protected Area B (Protected Area B does not include any Protected Area A)		Limites d'un secteur protégé B (Le secteur protégé B n'inclut aucun secteur protégé A)
Boundary of a Protected Area C (Protected Area C does not include any Protected Area A or Protected Area B)		Limites d'un secteur protégé C (Le secteur protégé C n'inclut aucun secteur protégé A ou secteur protégé B)
Water Intake		Prise d'eau
Municipal Boundary		Limites d'une municipalité
Crown Reserved Road		Chemin réservé de la Couronne

PLAN:	A-3	Department of the Environment and Local Government Ministère de l'Environnement et des Gouvernements locaux
SCALE / ÉCHELLE:	1 / 13 000	
DATE:	2001 / 07 / 25	

New Brunswick
Nouveau Brunswick



NOTES:

- The property lines shown on this plan were transferred from Service New Brunswick property maps. The property lines are shown on this plan to aid in the identification of individual properties within the watershed protected areas. Please refer to the actual Service New Brunswick property maps for complete property and ownership information.
- A copy of the *Watershed Protected Area Designation Order* that designates the watersheds or portions of watersheds shown on this plan as protected areas
 - (a) is filed in the head office of the Department of the Environment and Local Government, and in the regional office of the Department of the Environment and Local Government situated most closely to the protected areas, and
 - (b) is registered in the registry office or registry offices of Service New Brunswick for the county or counties in which the protected areas are situated.

NOTES :

- Les limites de propriétés figurant sur le présent plan ont été décalquées des cartes foncières de Services Nouveau-Brunswick. Elles y figurent pour faciliter l'identification des propriétés particulières se trouvant à l'intérieur des secteurs protégés du bassin hydrographique. Veuillez vous reporter aux véritables cartes foncières de Services Nouveau-Brunswick pour obtenir des renseignements complets à l'égard des propriétés et des propriétaires.
- Un exemplaire du *Décret de désignation du secteur protégé des bassins hydrographiques* qui désigne les bassins hydrographiques ou des parties des bassins hydrographiques figurant sur ce plan comme secteurs protégés
 - a) est déposé au bureau principal du ministre de l'Environnement et des Gouvernements locaux, et au bureau régional du ministre de l'Environnement et des Gouvernements locaux qui est le plus rapproché des secteurs protégés, et
 - b) est enregistré au bureau de l'enregistrement ou aux bureaux de l'enregistrement de Services Nouveau-Brunswick du comté ou des comtés où sont situés les secteurs protégés.



Plan: A-3