News for the residents of the Grand River watershed

Watershed Report

The GRAND

GRAND RIVER CONSERVATION AUTHORITY
2006 Watershed Report

Distribution 200,000 copies

Going to the source to protect our water

Proposed Clean Water Act will help communities protect water

It's easy to get people to agree that the quality of our drinking water must be protected.

But that doesn't mean it's equally easy to develop a plan to do that.

That's because the job of providing drinking water is, itself, a complex process. And it's particularly challenging in an area such as the Grand River watershed because of its size, population, location and variety of drinking water sources.

Throughout the watershed, people are accustomed to turning on a tap and having a virtually unlimited supply of clean, safe drinking water flow into their homes, schools, hospitals, stores and factories.

In the past, they probably did it without giving a second thought about where it came from and how it got from the source to their taps.

The Walkerton tragedy, however, changed that. In 2000, seven people died and thousands became ill when E.coli bacteria entered the municipal water system and made its way to taps throughout the community.

Since then, the people of Ontario have looked to their leaders, at all levels of government, to take the steps necessary to protect drinking water and prevent another tragedy.

The road map they're following was laid out by Justice Dennis O'Connor in his two part report of the Walkerton Inquiry.

He examined the entire water supply and treatment process, and issued 93 recommendations on ways to do it better.

Multiple barriers

O'Connor envisioned a system in which there would be multiple layers of protection for the water system.

Each layer of protection would be a barrier to contaminants, stopping them from getting into drinking water. Having multiple layers, he wrote, would "guard against the failure of any one barrier."

He said the five barriers are:

- adequate treatment
- secure distribution system
- monitoring and warning systems
- well-thought-out responses to adverse conditions
- source protection

"Although each barrier offers protection, no single barrier is perfect," wrote O'Connor.

In 2002 the Ontario government passed two laws (The Safe Drinking Water Act and the Sustainable Water and Sewage Systems Act) which set in place new rules for the treatment, testing and distribution of water.

However, these new laws did not deal with one of O'Connor's recommendations – that plans be developed in each watershed in Ontario to protect drinking water sources.

O'Connor understood the complexity of the task. He recognized that the job had to be done by the people and the municipalities of each watershed. Protecting water sources could have an impact on the

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Red dye in the river

Red dye floats down the Grand River in the shadow of the Freeport Bridge in Kitchener. The dye was put into the river to test how long it takes to reach the Region of Waterloo water intake. The information will be used to help develop a source water protection plan. Similar studies have been done for Guelph and Brantford.

Along the Grand

Digging deep
About 82 per cent of the water used in our watershed comes from wells
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In the zone
Wellhead and intake protection zones identify the areas of greatest concern for water quality
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Greener Grand
Supporters of the Grand River Conservation Foundation are helping to plant thousands of trees.
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THE GRAND RIVER
A Canadian Heritage River

The GRCA

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Maps by Lara Vujanic of the GRCA

A Message FROM THE CHAIRMAN AND THE CAO

In the history of the conservation movement in Ontario, there have been several important moments – watershed moments, we might call them – that led to a significant change in our direction.

The first came in the 1930s when the people of the Grand River watershed decided that they had to deal with the growing problems of flooding, drought and water pollution. Their solution, adopted by the municipalities of the watershed, was to create the Grand River Conservation Commission to tackle these important issues.

This approach of managing resources on a watershed basis through a partnership of municipalities was adopted on a wider basis with the passage of the Conservation Authorities Act in 1946.

The second moment came in 1954 following the death and devastation caused by Hurricane Hazel. This led to new controls on development in the floodplains along rivers and streams to reduce property damage and loss of life from future storms.

The third moment was in 2000 in Walkerton. In the wake of that event it became clear that we needed to do more in Ontario to safeguard our drinking water supplies.

All three watershed moments were the product of tragedy and loss. All three resulted in a firm resolve to take the actions necessary to build a better future.

In the wake of Walkerton, the Province of Ontario has introduced several pieces of legislation to ensure that our municipal water treatment and distribution systems are well-built and well-run. That ensures that the water that comes out of our tap is clean and safe.

The next step, however, is to take action to protect the quality of our water sources – the lakes, rivers and aquifers that supply our raw water.

That's the purpose of the proposed Clean Water Act which is expected to become law this fall.

The act calls for municipalities and their residents across Ontario to develop source water protection plans in each watershed.

In the Grand River watershed, we have our work cut out for us. We may have the most complex water supply system in Ontario.

There are about 925,000 residents in the Grand River watershed, and more than two-thirds of them get their water from municipal systems.

There are 41 municipal water systems drawing from a wide variety of sources – 190 wells, four river intakes and two Great Lakes intakes. Some communities, such as Brantford and Ohsweken, have only one water source. Others, such as the Region of Waterloo and Guelph, draw water from dozens of sources.

The very complexity of the system is why it is so important that the development of a source protection plan be open and transparent. It is also why it will be vital that the residents of the watershed be informed and involved in the process.

Solid science and research will be the foundation of the source protection plan for the Grand River watershed.

But the strength of the plan will come from the effort invested in it by the people of the watershed and their municipalities.

Peter Krause
Chairman

Paul Emerson
Chief Administrative Officer

WHO SPEAKS FOR YOU?

The municipality where you live appoints one or more representatives to the (GRCA) board to oversee the budget and activities of the Conservation Authority. They speak on your behalf at the GRCA.

Townships of Amaranth, East Garafraxa, East Luther Grand Valley, Melancthon, Southgate: Paul Chantree

Townships of Wellington North and Mapleton: Pat Salter

Township of Centre Wellington: Jean Innes

Town of Erin, Townships of Guelph-Eramosa and Puslinch: Vacant

City of Guelph: David Birtwistle, Dan Moziar

Regional Municipality of Waterloo: (Cambridge, Kitchener, Waterloo, North Dumfries, Wellesley, Wilmot and Woolwich) – Jane Brewer, Jean Haalboom, Ross Kelterborn, Peter Krause (GRCA chair), Joe Martens, Claudette Millar, Jane Mitchell, Ralph Shantz, Bill Strauss, Lynne Woolstencroft

Town of North Perth, Township of Perth East: George Wicke

Regional Municipality of Halton: (Halton Hills and Milton) – Barry Lee

City of Hamilton: Jeanette Jamieson

County of Oxford: (including Townships of Blandford-Blenheim, East Zorra-Tavistock, Norwich) – Alan Dale (GRCA 1st vice-chair)

City of Brantford: Robert Hillier, Vic Prendergast (GRCA 2nd vice-chair)

County of Brant: Brian Coleman, Gord Moore

County of Norfolk and County of Haldimand: Craig Ashbaugh, Lorne Boyko

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Source water

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way land would be used and the type of activities that could take place in source water areas, in both urban and rural settings.

The people and municipalities of the watershed would have to develop the plan because they would have the best ideas about how to do it, and they would have to implement it.

The Ontario government responded to O'Connor's recommendations by introducing the Clean Water Act in December 2005.

It has received second reading in the legislature and was recently the subject of a week of public hearings. It is expected to be passed in the fall.

The Clean Water Act would set in motion a public process to develop source water protection plans throughout Ontario.

The development of the plans would be overseen by Source Protection Committees, which would be made up of representatives of municipalities, agricultural groups, businesses, land developers, First Nations, health officials and others.

Communities, in conjunction with the Source Protection Committee, would take a look at their drinking water sources and identify potential threats to both water quality and water quantity. Communities would have to plan measures to safeguard their water supplies and then carry them out.

The plans would be developed on a watershed basis because water doesn't stop flowing at municipal boundaries. What happens upstream affects downstream users and what happens on the surface affects groundwater.

Public input sought

It's envisioned that it could take up to five years to develop a plan once the Clean Water Act is passed.

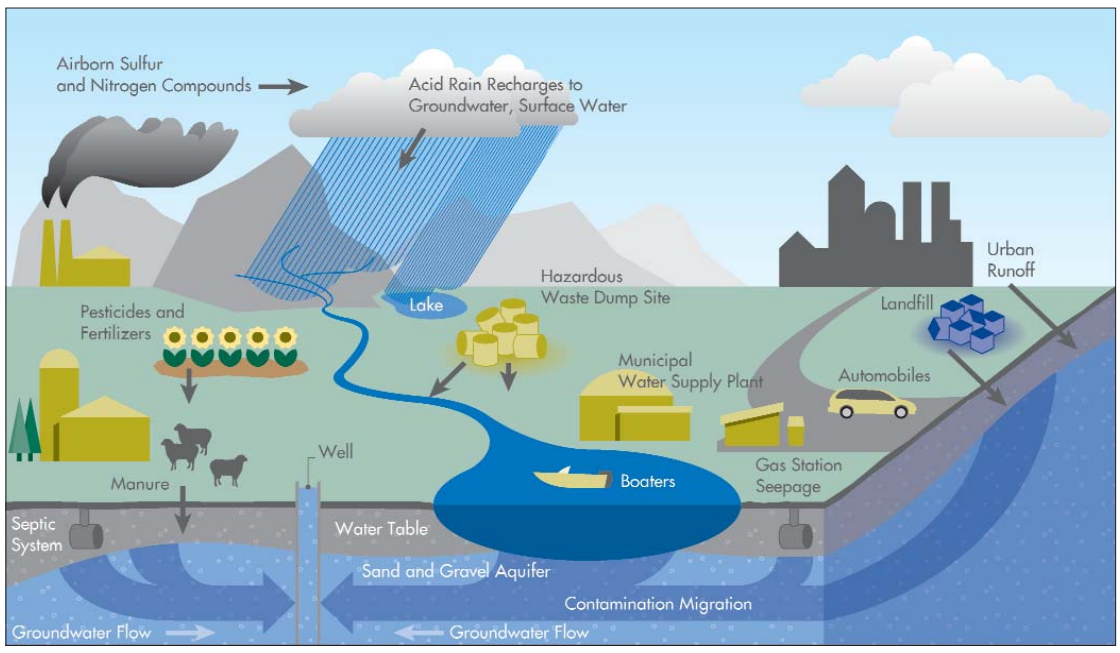
Throughout the process, the public will be kept informed and given opportunities to be involved and to comment on the elements of the plan, particularly if their lands are affected. Appeal mechanisms would be available to affected property owners.

The Source Protection Plan would be based on scientific research and information, so it is both sound and fair.

Much of the scientific research to support Source Protection Planning has already been done by conservation authorities and municipalities.

Where there are gaps in knowledge, the Ontario government has promised to pay the cost of research.

In November 2005, the province announced it would support $65 million worth of study and research on source protection issues by conservation authorities and municipalities.



Source: Pollution Probe – The Source Protection Primer

A formula for measuring risks

Before a Source Protection Plan can be developed, it's important to identify the location and types of existing issues and potential threats to water quality and supply.

In a watershed as large and varied as the Grand River, it can be a big task to assess which issues and risks need to be addressed first.

By conducting a risk assessment, it is possible to zero in on the most significant threats and deal with them.

Two questions need to be answered to narrow the scope of the investigation.

- How vulnerable to contamination is the land around the water source?
- How big is the threat?

Vulnerability

Some parts of the landscape are more vulnerable to contamination than others. In some areas, it is easier for pollutants to make their way into municipal water supplies.

Four types of areas will receive particular attention:

- wellhead areas – the land around municipal water wells
- intake areas – the land upstream of municipal water intakes on rivers and lakes
- areas susceptible to contamination – vulnerable aquifers where porous soils or a high water table allow pollutants on the surface to enter the groundwater system fairly quickly
- recharge areas – the parts of the watershed where water on the surface enters the groundwater system to recharge aquifers.

Threats

There are many potential threats from human activities, such as:

- waste disposal
- chemical use
- handling methods for waste and chemicals.

Doing the math

To zero in on the most significant risks, it's a matter of doing a little arithmetic.

When there are two things – an area that is highly vulnerable and a high threat – there is a high risk of contamination.

For example, an industry using a highly toxic chemical in close proximity to a municipal well would be considered a high risk.

On the other hand, a farmer practicing best management practices in handling fertilizer far from a river intake would be considered a low risk.

A tool kit for protecting water

A Source Protection Plan would include a broad range of tools to protect water quality and water supplies.

There are many places in the Grand River watershed where these tools are already in use.

- Municipal land use bylaws and official plans are being used by some municipalities to protect the area around municipal wells, such as the Region of Waterloo and Oxford County
- Investments in improved sewage treatment to protect water quality in the Grand River are being planned by several municipalities
- Water conservation bylaws to help protect water supplies are in place
- Stormwater management programs are being used in areas of new development to protect water quality
- Pesticide and chemical control regulations protect water quality
- Various farm programs, including Environmental Farm Plans and the Rural Water Quality Program promote ways to keep water clean on the farm.
- The province's Spills Response Program helps municipalities that draw water from the Grand River to protect their supplies
- One element of the proposed Clean Water Act would cover situations where a site-specific risk management plan may be needed for a new or existing activity that could pose a threat to a municipal well or a river intake.

In some cases, these can be dealt with through zoning bylaws and site plans.

In addition, under suggested amendments to the proposed Act, a risk management official appointed by the municipality could work with the property owner to negotiate a risk management plan.

Risk management officials would have the appropriate training and qualifications to develop plans.

Property owners would have a right to appeal a risk management plan within 60 days.

Digging deep for water

Grand River watershed communities are big users of groundwater

It's a fact that is often quoted: Canada's lakes and rivers contain about 20 per cent of the world's fresh water.

Not as well known is that, by some estimates, for every litre of fresh water on the surface of the earth, there's another 480 locked up in the ground.

Groundwater is a significant source of water in Ontario.Close to 29 per cent of Ontario residents – about three million people — rely on groundwater for their domestic water supply, whether they get it from a private well or a municipal water system.

In the Grand River watershed, the reliance on groundwater is dramatically higher.

Groundwater accounts for about 82 per cent of the water supply. Groundwater is the primary source of water for 37 municipal water systems, which have about 190 wells tapping groundwater sources, supplying water to our homes, businesses and factories.

Largest user

Waterloo Region, which includes the cities of Kitchener, Waterloo and Cambridge, is the most populous municipality in Canada to use groundwater as the principle source of water for its 425,000 people. It has about 125 wells.

Municipal water systems serving tens of thousands of people in the City of Guelph (23 wells) and towns and villages such as Grand Valley, Arthur, Fergus, Elora and Paris also look underground for their water supplies with anywhere from one to six wells.

And, of course, rural families, farms and businesses have no choice but to use groundwater. All told, there are more than 28,000 private wells in the Grand River watershed, although not all of them may be in use.

The dependence on groundwater sets the Grand River watershed apart from other parts of Ontario which mainly get their water from the Great Lakes system.

The people of the Grand River watershed started drilling wells for their communal water supplies in the 1800s.

Geography had a lot to do with it. At that time, the Grand and its tributaries were subject to drought and low flow conditions and, increasingly, quality issues. Lake Erie and Lake Ontario were too far away.

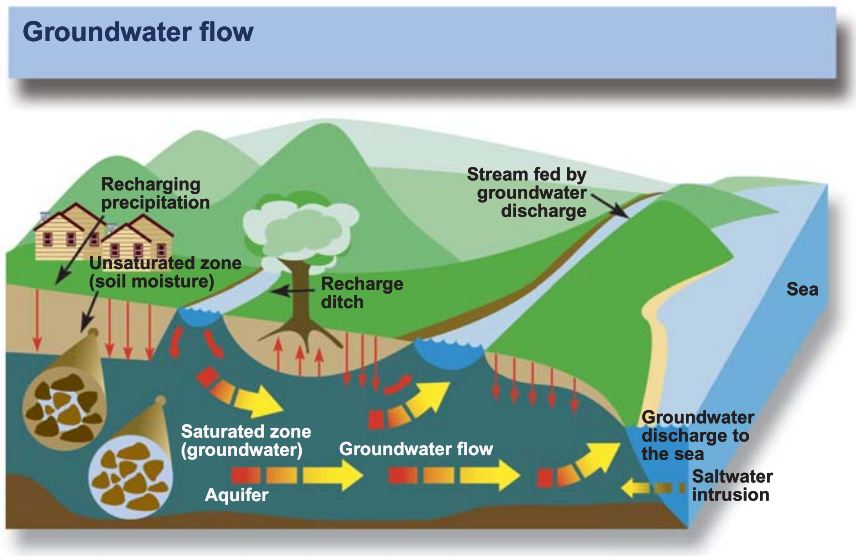
As the cities of the central Grand started to grow in the early 20th century, they had no place to go but down for their water.

Fortunately, the watershed has several rich sources of high quality water that the growing cities could tap.

They're called aquifers. Water exists almost everywhere underground. It fills the spaces between grains and sand and gravel, and it finds its way into fractures and spaces in rock.

An aquifer is an area of rock or loose sediment which can produce useful quantities of water when tapped by a well.

Water from the surface can take anywhere from weeks to centuries to seep through the ground to the aquifer in a process called recharge. Along the way, many impurities are filtered out or break down with the result that, in most cases, the water in the aquifer is cool and clean, requiring only a modest level of treatment when it is pumped up to the surface.



Source: Environment Canada's Freshwater website (www.ec.gc.ca/water) Reproduced with the permission of the Department, 2006

Ancient bedrock is a rich source of water

Underneath the surface material across the watershed are layers and layers of ancient bedrock – some of it 350 million years old.

Generally, the bedrock formations occur in long, parallel bands of varying widths, running from the northwest to the southeast. There is a slight tilt – about two degrees – in the bedrock layers, which means the eastern parts of each layer are a little higher than the western parts.

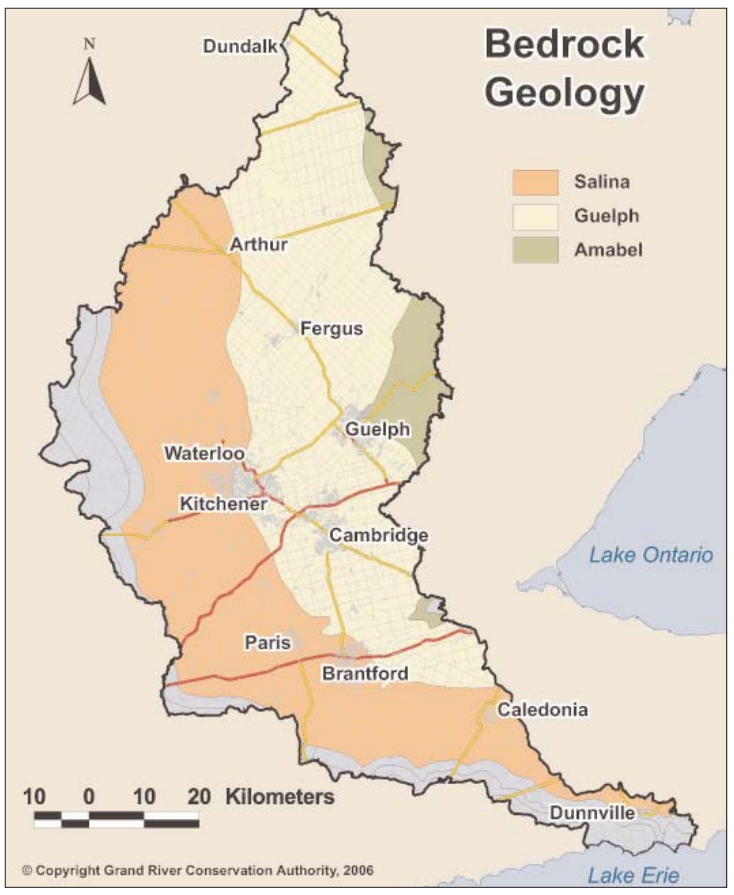
Three bedrock formations have proven particularly good sources of water: The Guelph and Amabel Formations in the east and the Salina Formation in the west.

The water in these aquifers may be hundreds, or even thousands of years old. As a result, the water has picked up materials from the surrounding bedrock.

Water from wells tapping these bedrock aquifers has been tested for materials such as sodium, iron, chloride, sulphate, hardness and dissolved solids. These things can affect taste and odour of the water supply, although in many cases the problems can be dealt with during the water treatment process on the surface.

In fact, the water in the Amabel formation is of such high quality that it is also the location of several water bottling industries.

The City of Guelph gets almost all of its water from bedrock aquifers, as do many of the towns of Wellington and Dufferin counties. The Region of Waterloo has bedrock wells in the Cambridge area.



Studies take a look at groundwater quality

Pure water – H_20 – exists in laboratories, not in the real world.

In the real world, water takes on the characteristics of its surroundings. If it flows across the surface, it will pick up organic material from rotting leaves or soil.

If it is trapped in an aquifer, it will take on chemicals from the surrounding rock, such as sulphur or iron.

And, of course, human activities can have an effect on the quality of groundwater. Chemicals used in factories, manure and fertilizers used on farms, organic material from septic tanks, salt applied to roads – these can all show up in groundwater.

Since 1998 the Ontario government and municipalities in the Grand River watershed have been conducting groundwater studies, to determine the quantity and quality of groundwater supplies.

The studies identified the characteristics of the aquifers, defined protection zones for the areas around municipal wells, catalogued potential threats to groundwater quality and analysed water use.

"Groundwater Studies in Ontario: Mapping a Hidden Treasure" was published by the Ontario government as an overview of the studies.

"Virtually anything spilled or placed on the ground can potentially leach into groundwater," says the report. "Compounds that are persistent, don't readily degrade, are soluble in groundwater, or are toxic in very small doses pose the greatest threat to groundwater quality and subsequently to human health," it said.

In the Grand River watershed, municipalities tap into deep aquifers that are largely protected from contamination because of the types of soils between the surface and the aquifer.

Municipalities routinely test water that comes out of their wells, both before and after it is treated to ensure that dangerous materials are removed, or are below maximum allowable limits set by the Ontario government.

In some cases, municipal wells have been taken out of the system while the contaminants are dealt with. Wells that can't be repaired may be removed from the system.

The report, Mapping a Hidden Treasure, lists six varieties of contaminants that have shown up in groundwater studies across Ontario. They have also been detected in some wells in the Grand River watershed.

Bacteria and viruses

These can come from human and animal waste from sewage sludge, septic tanks and manure. The best known bacteria, E.coli, is found in both human and animal waste and can sometimes make its way into a well from these three sources. Most die off and are decomposed in about 100 to 250 days. They are unlikely to survive long enough to show up in groundwater from bedrock aquifers or deep wells in overburden aquifers. Municipal water treatment systems are designed to kill bacteria in groundwater, so they pose no threat in a properly operated municipal water system.

Nitrates

Nitrates are a form of nitrogen and are found in human and animal waste, as well as many commercial fertilizers. They are highly soluble, stable and capable of migrating considerable distances if they are leached into a groundwater source.

The Ontario Drinking Water Standards say that nitrate levels should be no higher than 10 milligrams per litre

In the Grand watershed, studies have found high nitrate levels in some wells in Guelph, Brant County and Oxford County.

Chloride

The most common source of chloride is road salt, which is highly soluble and can readily build up in an aquifer.

Chloride has been detected in wells in Guelph and the Region of Waterloo, but at levels well below federal guidelines. Blending water from these wells with other water will reduce the chloride content even further. Municipalities have implemented procedures for winter road salting to reduce the amount of salt remaining in the environment.

Petroleum products

These products can be harmful in drinking water at only a few parts per billion. While petroleum products seldom travel more than several hundred metres from their source, they can persist in the environment for years. Gasoline storage tanks, especially from the 1950s and 1960s, are one source.

Chlorinated solvents

Chemicals such as paint removers, dry cleaning fluids and metal degreasers are highly toxic, very persistent and highly mobile in groundwater. Heavier than water, they tend to pool at the bottom of an aquifer and can be very difficult to detect or remove.

Chemicals in this category have been found in municipal wells in Kitchener and Guelph. The wells have been taken out of the system while new safeguard mechanisms are put in place. Solvents have also been found in the groundwater in Cambridge, although it has not affected any municipal wells. In Brantford, presence of a solvent in the groundwater system caused the city to notify residents that they should not use water from any old private wells in one part of the city.

Pesticides

Many pesticides are biodegradable, although they can be toxic at low concentrations. Some of their breakdown products are also dangerous.

Municipalities tap into glacial moraines

When the glaciers retreated from this part of Ontario about 10,000 years ago, they left behind great piles of sand, gravel, rock and other loose sediment. These materials are called "overburden."

As the glaciers retreated from the Grand River watershed, they left behind large piles of overburden that are known as moraines.

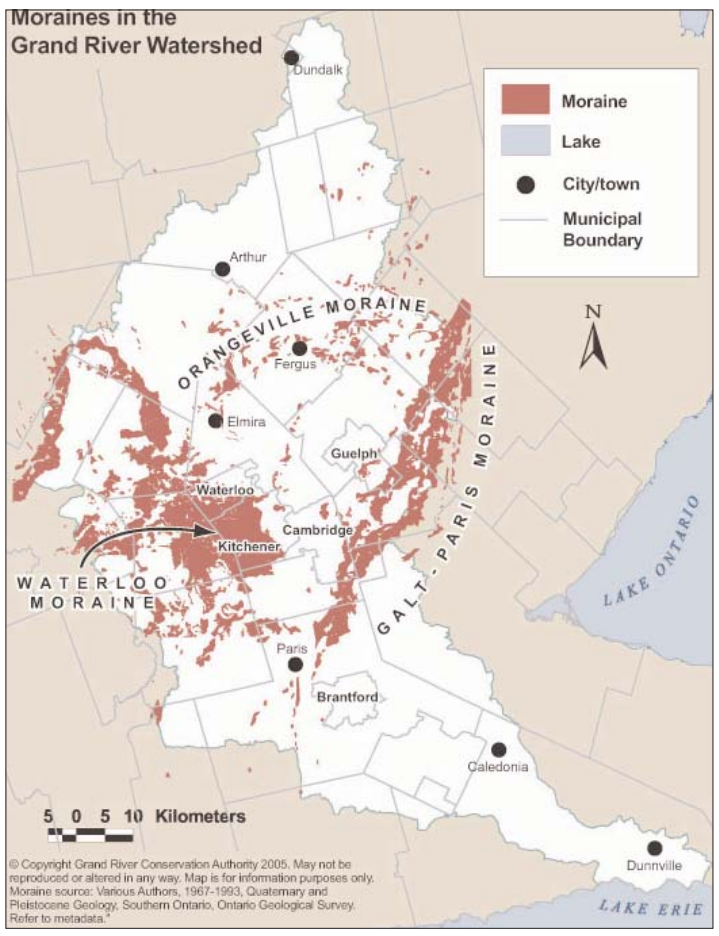
The Grand River watershed is home to three major moraine complexes: the Orangeville Moraine in Dufferin and Wellington counties, the Waterloo Moraine in the western part of Waterloo Region, and the Galt-Paris Moraine in southern Wellington, eastern Waterloo and central Brant.

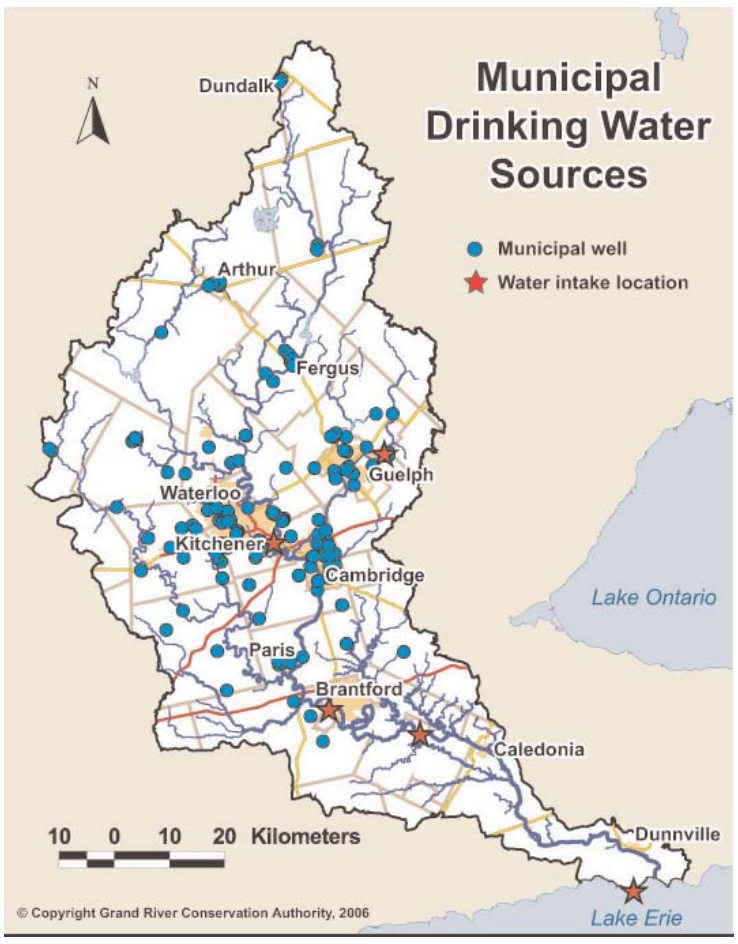
Water flows easily through the coarse material within the moraines. As the water moves through the sand and gravel it is naturally filtered.

The moraines are rich sources of water. The Region of Waterloo has many wells tapping into the Waterloo and Galt-Paris moraines. Communities in Brant County, such as St. George and Paris, get much of their water from wells in the Galt-Paris moraine.

Another type of overburden aquifer is found in the Norfolk Sand Plain, which occupies the western part of Brant County and the eastern part of Oxford County.

The sand plain is actually an ancient river delta, made of material washed down the Grand River valley by melting glaciers. This aquifer is a rich source of water for many farms and homes in this part of the watershed.





Recharge and discharge: tracking water as it moves through ground

Water never stops moving. Rain or water from melting snow will infiltrate into the ground, filling the spaces between grains of sand and gravel, or filling fractures in bedrock.

As the water moves through the ground, it sometimes comes across a valley or a depression. The water may seep out of the ground, even bubble up, providing fresh water to feed wetlands, streams and rivers.

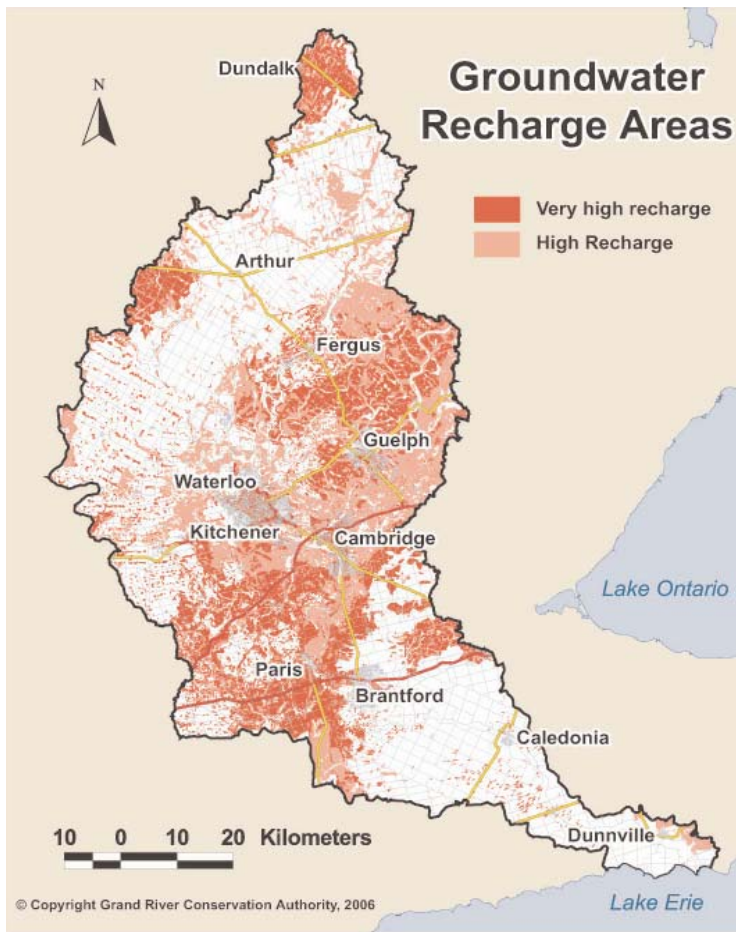
This process, called discharge, is important to the quantity and quality of the water flowing in the Grand River.

Many streams and rivers flowing through moraine areas are largely made up of groundwater discharge. The water tends to be cool, clear and clean which makes these watercourses rich aquatic environments.

These streams can continue to flow even through the driest weather, because they are being fed by water that fell from the sky years, or even centuries ago.

Identifying the places where groundwater can enter the ground easily and replenish aquifers is an important part of the process of developing a source protection plan.

Protecting vulnerable aquifers helps reduce the chances that pollutants will get into the groundwater system. It's also important to ensure that water can still get into the ground in recharge areas to ensure that enough water continues to replenish the aquifers.



This map shows the recharge areas in the Grand River watershed. The combination of the red and pink areas amounts to just 30 per cent of the land area of the watershed, but it accounts for 80 per cent of the recharge.

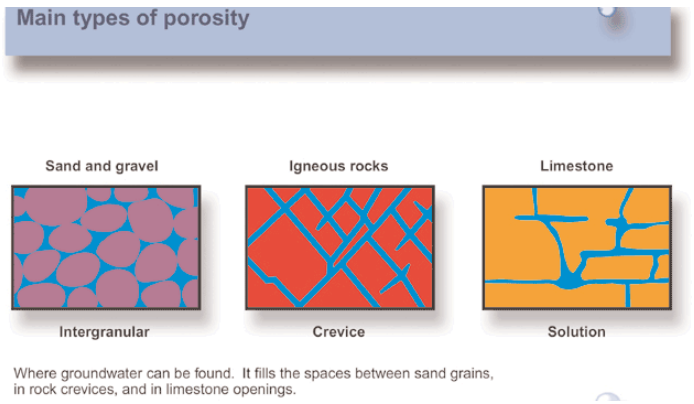
A vulnerable aquifer is one where there is a relatively fast path from the surface to an aquifer. These occur in regions of coarse or sandy soils or where there is a high water table.

Examples can be found in the gravel terraces through Waterloo and Wellington, the Flamborough bedrock plain and the Norfolk sand plain.

The work is continuing to refine the definition of a highly vulnerable aquiferRecharge areas are similar in that they are often areas of hummocky topography and coarse or sandy soils.

They are areas where a relatively high volume of water makes its way from the surface to the aquifer. It is important to protect this recharge capacity because it has an effect on both the quality and the quantity of water.

These recharge areas are also important to surface water quality because they feed the aquifers that then feed the streams and rivers.



Source: Environment Canada's Freshwater website (www.ec.gc.ca/water)
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Surface water important to several communities

Residents of seven communities across the Grand River watershed look to rivers and lakes for some or all of their drinking water.

Region of Waterloo – Mannheim Water Treatment Plant (Kitchener) – This plant provides about 20 per cent of the treated water supplies used in the Region of Waterloo. The intake is in the Grand River near Hidden Valley Road. The water is pumped 10 km to the Mannheim plant where it is treated and pumped to homes.

City of Brantford – Holmedale Water Treatment Plant, Brantford – This plant provides all of the treated water used in Brantford. The Wilkes Dam on the Grand River backs up water which then flows down a canal to the water treatment plant.

Six Nations of the Grand River Territory – Ohsweken Water Treatment Plant, Ohsweken – The plant has an intake in the Grand River. The plant serves a population of about 2,000, primarily in the village of Ohsweken. A new plant is in the planning stages.

City of Guelph – Eramosa Recharge System – During high demand periods, water from the Eramosa River is used to recharge and enhance the flow of the municipal wells in the Arkell Spring collection system.

County of Haldimand – Dunnville Water Treatment Plant – Water enters an intake in Lake Erie and is pumped to the water treatment plant in Dunnville. The plant serves about 11,300 people.

County of Haldimand – Caledonia and Cayuga – These two communities with a total population of about 11,200 are supplied with water from the City of Hamilton Water Supply System. The Hamilton system has an intake in Lake Ontario.

Protection zones identify areas of greatest concern

Wellhead areas defined for groundwater

The concept of the "wellhead protection area" is a key one in source protection planning.

In the Grand River watershed, more than 82 per cent of our municipal water comes from about 190 wells bored into the ground to tap into water-rich areas called aquifers.

Beneath the ground's surface, water is constantly on the move. It filters down from the surface and then it moves horizontally through the aquifer.

Water will move faster through loose sand and gravel; it will move slower through the tiny fissures and cracks in bedrock. In some cases it might be weeks, in other cases years or even decades before water makes its way through the ground to a municipal well.

Unfortunately, if there are any contaminants in the groundwater, they too can make their way to the well.

Some contaminants become less of a threat over time. For example, bacteria and viruses from human and animal waste usually die off and decompose in about 100 to 250 days. Thus, they are the greatest threat when they enter the groundwater system relatively close to the well.

Some pollutants will break down in the ground. Others, such as petroleum products, are dangerous in small volumes, but tend not to move very quickly through the groundwater system. The threat level drops the further away the pollutants are from a well.

And others, including chlorinated solvents, such as degreasers used in the metal industry, are stable and move easily through the groundwater system. They can represent a significant threat across a wider area for a longer time.

In order to sort out the relative threat to groundwater in different regions, groundwater studies have been done throughout the province.

One key element of those studies has been to map out "time of travel zones" around municipal wells.

The zones represent the amount of time it takes water in the aquifer to reach the well.

Computer models and other tools are used to build a picture of the groundwater conditions around each well. After that, lines are drawn on a map to show the location of various time of travel zones around the wellhead.

Most of the studies have identified four zones.

The closest zone is a circle of 100 metres around the well. That's the area where the risk to the well is highest and the greatest care should be taken in the handling of all potential contaminants.

In the second ring – the two-year time-of-travel zone – bacteria and viruses from human and animal waste are a concern, as are hazardous chemicals

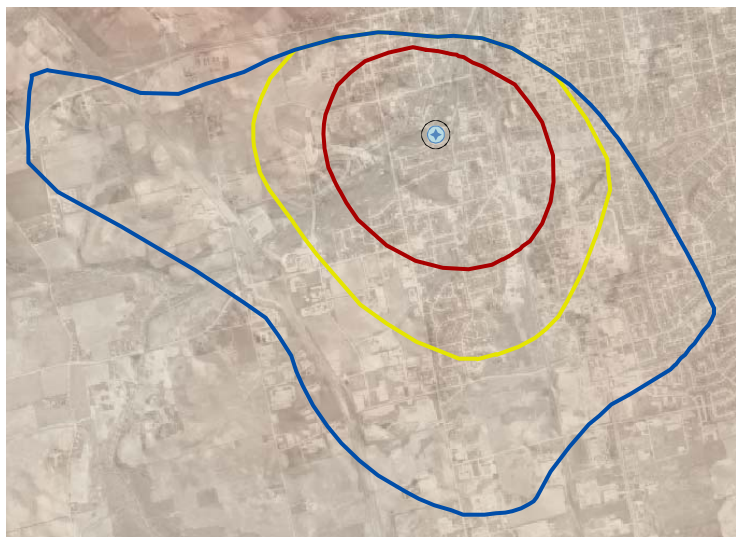
Biological contaminants are less of a concern in the third ring – the five-year time-of-travel – but chemical pollutants remain a concern.

The fourth ring – the 25-year zone – is the one where the most persistent and hazardous pollutants remain a concern.

Based on the results of their groundwater studies, many municipalities in the Grand River watershed have already developed rules about what kind of activities are allowed in each zone.

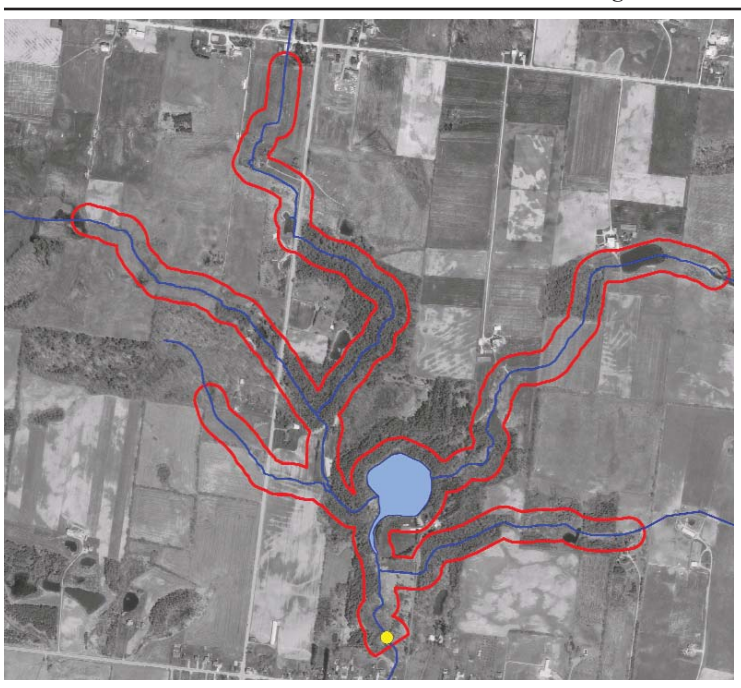
Thus, a chemical factory using dangerous solvents may not be allowed to operate on the property next to a municipal well. However, the same company may be allowed in a 25-year zone if it has good handling practices and a solid spill-response system so that even if there is an accident, none of the chemical will get into the groundwater system.

Similarly, farmers operating near a municipal well may have to adapt their handling practices for manure and chemical use nearer a wellhead.



Wellhead Protection Area

The rings surrounding the wellhead show the time it takes groundwater to reach a municipal well. The red ring is two years, the yellow ring is five years and the blue ring is 25 years.



Intake Protection Zone

In this example, the yellow dot represents the location of the water intake. The red lines show the area of the Intake Protection Zone.

Intake zones used for surface water

Protecting surface water sources from contamination, particularly those on rivers, requires the careful attention of municipal waterworks officials. One of their principle concerns is the threat of upstream spills. Whenever a spill occurs that may threaten the quality of the raw water in the river, the water plants shut down their intakes until the contaminant passes by.

But it takes time for a spill to be noticed and then for the word to be passed to the water plant operators and for the intake to be closed.

If the spill is far upstream, there may be several hours available to get the job done.

However, if the spill takes place close to the intake, there's a risk that the water plant operator may not have sufficient time to shut down the intake.

To guard against that possibility, source protection plans will require the development of "intake protection zones" for communities that use surface water.

Researchers look at the amount of time it would take material spilled in or near the river to float downstream to the water intake.

This is called the "time of travel." For the purposes of establishing an intake protection zone, the researchers examine a minimum time of travel of two hours, although it could be longer.

The researchers have to take into account river flows – in both high and low flow conditions – since this can have a significant effect on time of travel. They have to look at streams feeding into the river. They also have to know where municipal storm sewers or rural drains enter into the river.

The land surrounding the river, streams, sewers and drains become part of the intake protection zone.

Intake protection zones can also be established for intakes from the Great Lakes, such as the one used to serve Dunnville. In the case of a lake intake, a one-kilometre zone is established around the intake which, in some cases may include shore areas. In addition, a second zone is created that includes streams and rivers that can have an impact on the intake. As with a river intake, the size of this zone is determined in part by the amount of time it would take to close the intake.

The GRAND RIVER CONSERVATION FOUNDATION

Public support makes our watershed greener

More and more people are realizing the connection between trees and the health of the Grand River watershed – clearer air, cleaner water and a more beautiful viewscape.

Over the past century, the Grand River watershed has dramatically increased its level of forest cover, from a mere five per cent to about 19 per cent. This remarkable achievement couldn't happen without the commitment of the community.

Through the Grand River Conservation Foundation, donors support the reforesting of our landscape in many ways.

Our success is growing from the ground up, starting with the GRCA's Burford Tree Nursery, where 200,000 trees are grown each year.

A generous contribution from The Frank Cowan Foundation of Princeton has led to the installation of a drip irrigation system at the nursery, which ensures consistent watering and thus healthier trees. In turn these trees are planted by landowners, organizations and members of our community.

Bruce Graham, superintendent of the Burford Tree Nursery, with a rare sweet chestnut tree.

Million trees

The support of the Schreiter-Sandrock Funeral Home in Waterloo, the Beckett Glaves Family Funeral Centre in Brantford and Batesville Canada has led to the planting of almost one million trees in our watershed over the past 27 years – more than $126,000 in contributions that honour the families they serve.

Memorial groves at the Laurel Creek and Brant Conservation Areas honour the memories of departed loved ones and offer a place for quiet contemplation, while offering all of us the benefits that trees bring.

Donate to forest

For individuals and families, planting a tree is a wonderful way to commemorate the birth of a child, to mark an important holiday, to celebrate an anniversary, or to remember the life of a loved one. Through the Grand River Conservancy Forest, you can make a tax-creditable $30 contribution to cover the cost of planting a tree. For special occasions a certificate denoting your gift is available, and all donations in memoriam are recorded in a commemorative book, along with the name of the person you are remembering.

Through the GRCF, our community is making a real difference in our quality of life – and an investment for future generations. For more information about ways that you can support the greening of our watershed, please contact Sara Wilbur at (877) 29-GRAND or e-mail swilbur@grandriver.ca

Tree planting events, such as the Sunoco Earth Day, are among the many ways volunteers contribute to the greening of the Grand River watershed.

About the foundation

For more than 40 years, the Grand River Conservation Foundation has improved our quality of life by enriching the natural values of the Grand River watershed and encouraging people to enjoy, and to learn from, the great outdoors.

For more information:

- phone toll-free 1-877-29-GRAND
- e-mail *foundation@grandriver.ca*
- click on *www.grandriver.ca/foundation*

Foundation elects new leaders

Kerry Long of Kitchener is the new president of the Grand River Conservation Foundation. He was elected at the foundation's annual meeting in June.

Long, who has been a foundation board member since 2001, has lived in Kitchener for 28 years and is a financial consultant with the Scotia Private Client Group.

Long

He is a conservationist who enjoys hiking and canoeing, and is involved in many areas of local philanthropic work with groups ranging from the Kitchener Waterloo United Way, the Elora Festival Singers and the KW Community Foundation.

The new vice-president is David Hales of Waterloo, who recently retired as a vice-president of Manulife Financial.

Hales

Hales, who is originally from Guelph, has a strong, lifetime family connection with the GRCA and the Foundation through the Alf Hales Trail, which was named after his father.

A new member of the board is Crawford Reid of Brantford. Reid is a past president of TCG Materials, past chairman of the Canadian Automobile Association and an active philanthropist in the Brantford area.