

Water Forum 2005

Water

A Fine Balance: Managing...

and

GROWTH!



GEOSCAPE – GRAND RIVER

Designed to provide information to the
citizens of the Grand River Basin

Alan V. Morgan, Department of Earth Sciences, University of Waterloo

Geoscape Grand River

Geoscape Grand River is part of a national initiative to explain “geo-phenomena” in terms that can be understood by students and the public.

Five posters for the Grand River Basin have been created to cover some necessary topics.

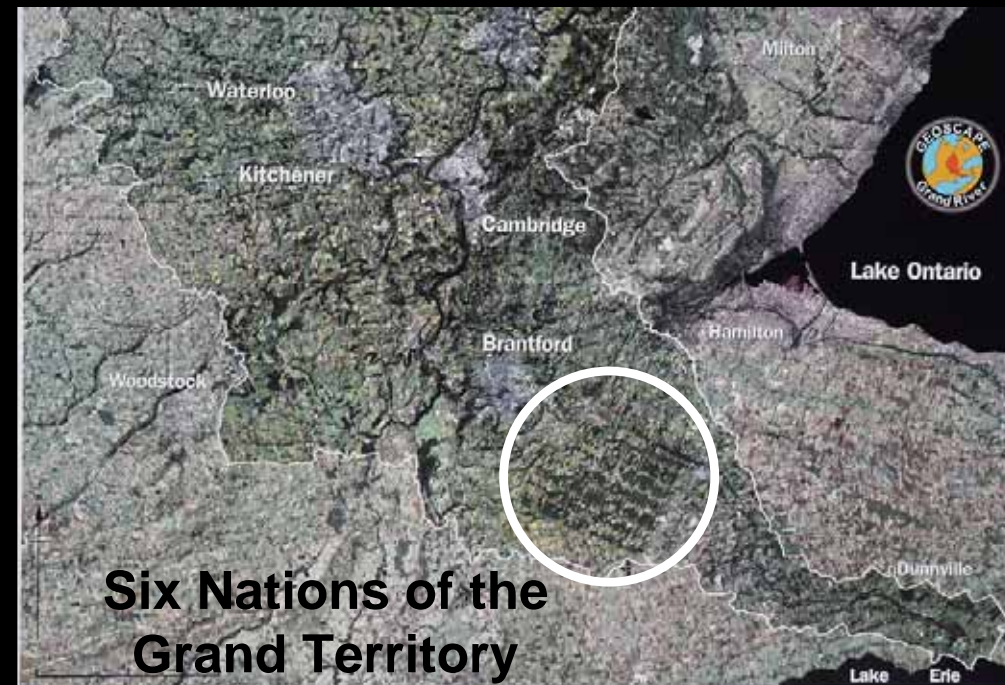


The first poster commences with a view
of the Grand River from space

Poster 1: Satellite View



Niagara Escarpment



Grand River

GUELPH

WATERLOO

**ICE MOVEMENT
DIRECTION**

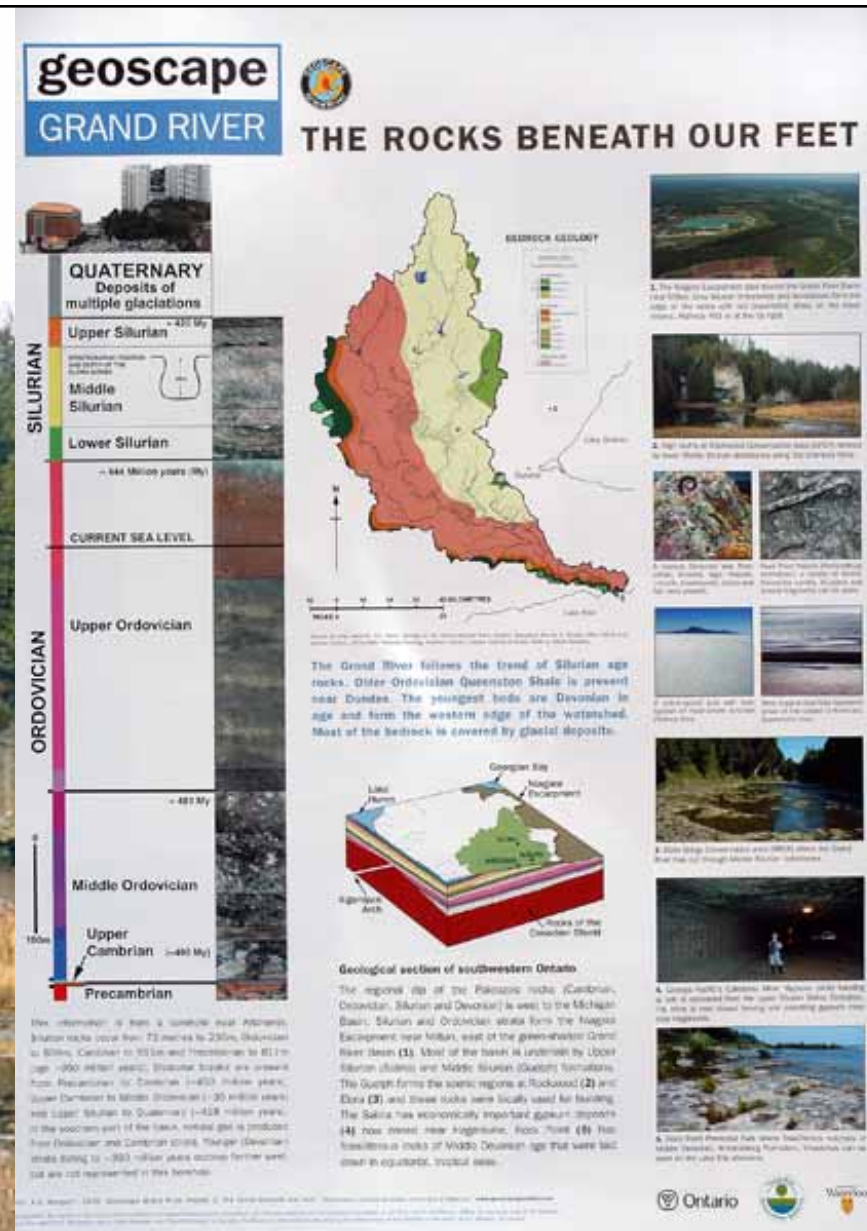
My School
is here

KITCHENER

Speed River

CAMBRIDGE





Poster 2 deals with the bedrock geology of the Grand basin. It shows the distribution of the bedrock units; some of the interesting geological features (Elora, Rockwood, Rock Point) and comments on the “rocks beneath our feet”.

Poster 3

Heritage of the Ice Age

Baden Hills



Kitchener-Waterloo region about 15,000 years ago.



Aerial view of the Grand River valley showing a mix of green forest and brown, eroded soil.



Close-up of a riverbank showing distinct horizontal layers of sedimentary rock.



Two small photographs: one showing a close-up of a rock surface with a small pool of water, and another showing a close-up of a rock surface with a small pool of water.



Aerial view of the Grand River valley showing a mix of green forest and brown, eroded soil.



Aerial view of the Grand River valley showing a mix of green forest and brown, eroded soil.



A diagram showing a cross-section of a river valley with arrows indicating the flow of water and sediment.



A map of the Grand River watershed showing different geological features and land use. The map is color-coded: green for forest, yellow for agriculture, and brown for eroded soil. A scale bar indicates distances up to 20 kilometers.

Geological diversity of the Grand River Basin. The watershed can be divided into three main areas. In the north and west, light and dark green illustrate the old glacial till of the north. In the central Grand basin, the light green, orange and yellow areas show the till, moraine and outwash plains. In the south and east, the yellow and gold-toned areas illustrate the sand and gravel plains that make up much of the west-point of Grand that was formerly submerged beneath pre-glacial Lake Winnebago. Keweenaw, Manitowish and Sturgeon are shown and these indicate ice movement from the south of the Grand River Basin.



A photograph of a riverbank showing a mix of green forest and brown, eroded soil.



A photograph of a riverbank showing a mix of green forest and brown, eroded soil.



A photograph of a riverbank showing a mix of green forest and brown, eroded soil.



A photograph of a riverbank showing a mix of green forest and brown, eroded soil.



A photograph of a riverbank showing a mix of green forest and brown, eroded soil.



A diagram showing a cross-section of a river valley with arrows indicating the flow of water and sediment.



Legacy of the last ice!

This heritage gave us the Waterloo Moraine, pristine groundwater, and aggregate resources for development.



The question of GROWTH!

Planned: Vista Hills and associated developments, Westside Waterloo.



Just 27 months of “development” in Westside Waterloo!



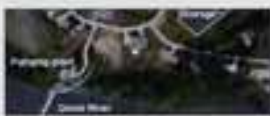
WATERSCAPE: WATER IN THE GRAND RIVER BASIN



The Grand Hotel is being bought by the same family that owns the hotel near Dublin in the 1980s, property which is thought to have been the Queen's last foreign travel before she died in 1992. The hotel was built in 1902 and is one of the most important buildings in the city.



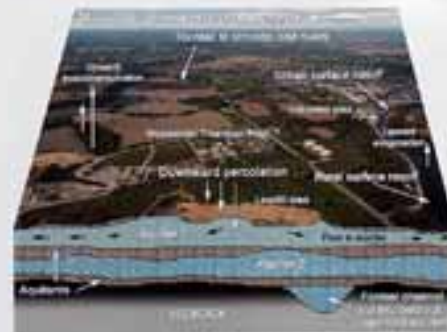
order. In this context, it is important to note that the time that a firm spends on customer acquisition is not necessarily related to the time that it spends on the firm's core business.

[illegible]

With the limited space on Williams' 1987-88 tour schedule, Roberts knew a road tour would mean a short season, and he is happy.



Main municipal pumping wells, irrigation wells and commercial/industrial water wells in the basin. Ruled valleys form significant aquifers and are part of the pre-glacial drainage of the Strand that flowed eastward to Lake Ontario through the Dundas Valley. Groundwater underlies the valley and the surrounding area.



The Water Cycle in the Permian Basin, Midland area is made not originally concerned from *evaporation*. Precipitation falls as rain (surface) and some (partial). Water runs off, or seeps through (infiltration) depending on the permeability of the rock composition from which it is derived. It is percolated by pores. Water that percolates into the ground flows through aquifers where it is percolated or seeps in local water bodies. The water moves by way down the Gular River to Lake Erie and eventually to the sea, and the cycle starts again.



Image Arts, in the United States is dependent on artists' salaries because K&A's 40% margin is not the majority part of its revenues. Large shows such as the ones I describe are in reality just a buffer when you're at the lowest of the market. Some artists of prominence lose. Large ones are not the focus. They provide just a little extra needed when the system itself is not up to par. Making sure that you can sell more is critical.

[illegible]

that the process of water pollution is the predominantly caused by private trading activities. Thus, whereas a cap will allow the market to allocate pollution rights among only "the best" of all firms, a tax will allow

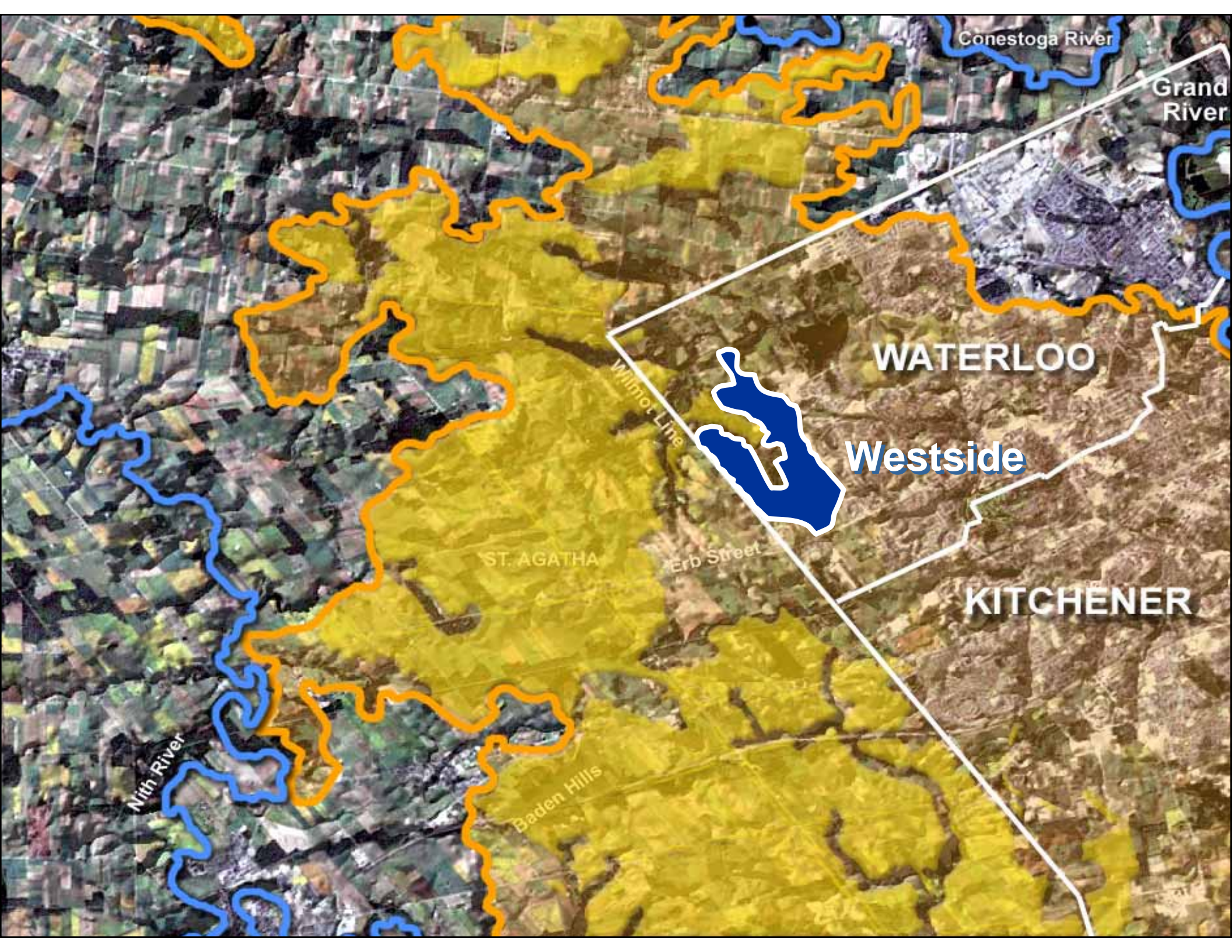


Research indicates that children with more than one sibling are exposed to fewer and more negative sibling relationships than to those with only one sibling. In fact, the more siblings a child has, the more negative the relationships tend to be. This may be due to the fact that children with more siblings have more competition for parental attention and resources. As a result, they may experience more conflict and less positive interaction with their siblings.

Poster 3

As population expands from 800,000 to over one million in the next two decades the citizens of the Grand River Basin are becoming increasingly dependent on water supplies from shrinking groundwater resources and from the Grand River itself.

**Last year 80 – 90 % of
the flow of the Grand
through K-W was from
releases by the upstream
GRCA reservoirs!**



Conestoga River

Grand River

WATERLOO

Westside

KITCHENER

ST. AGATHA

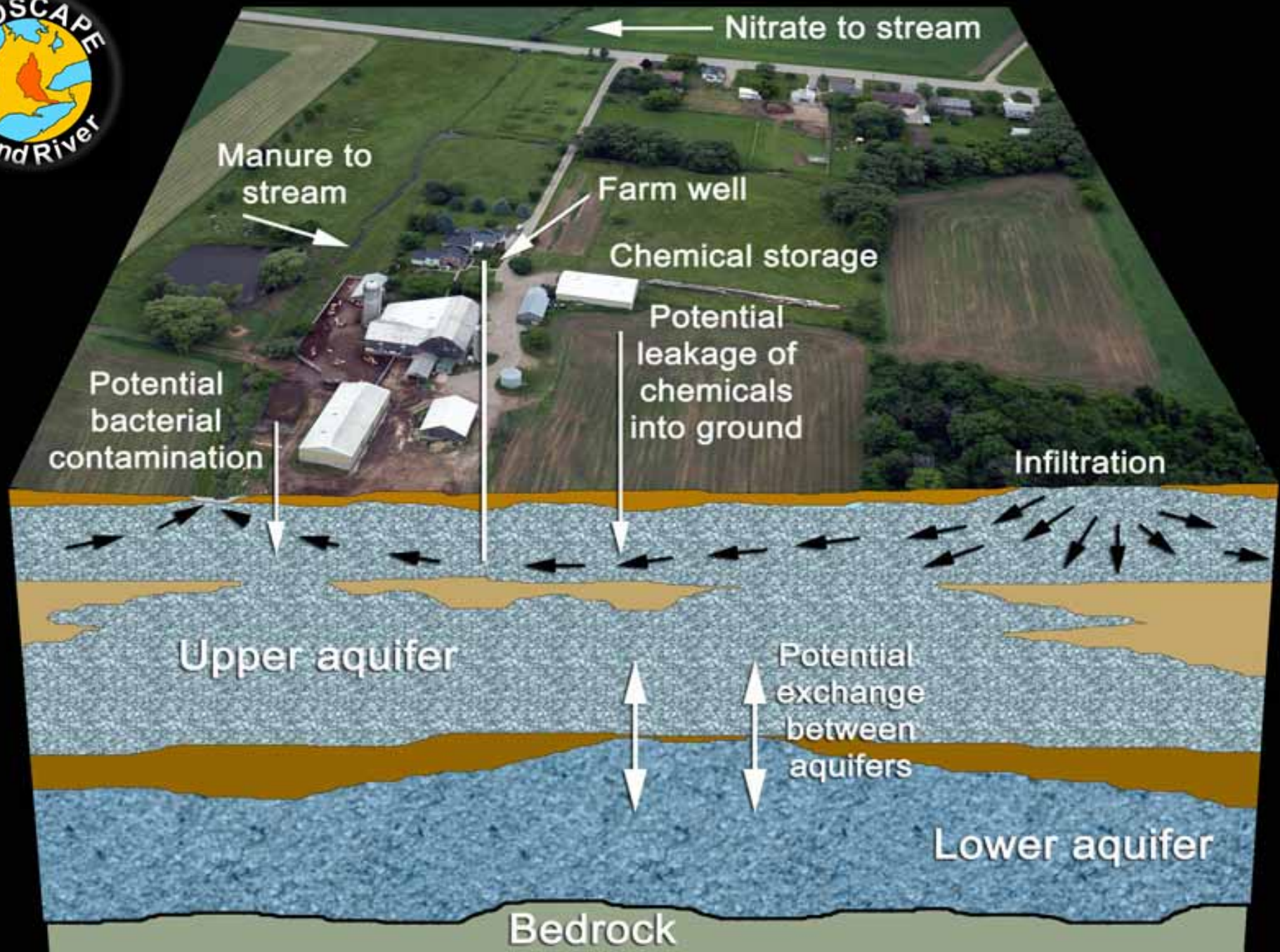
Wilket Line

Erb Street

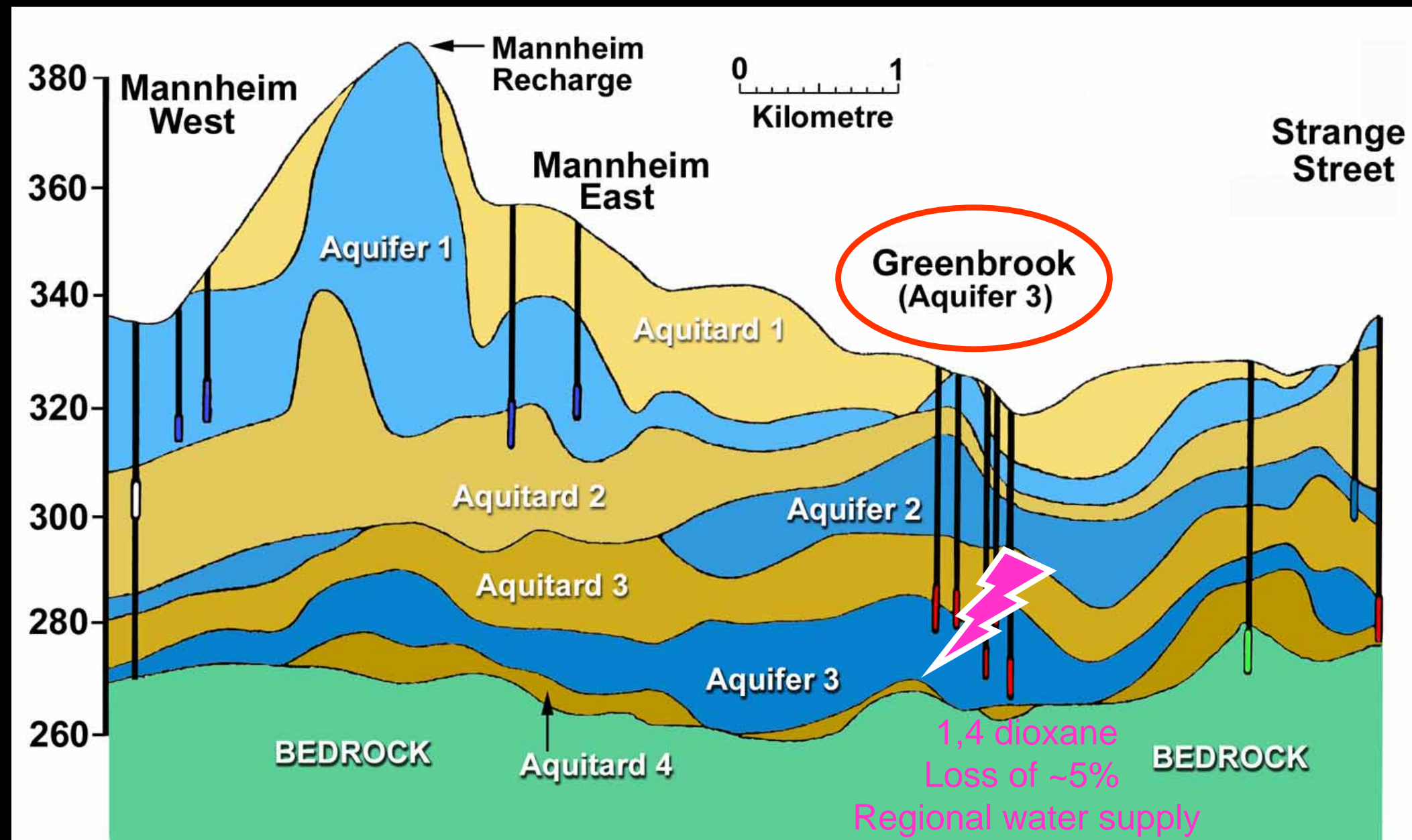
Baden Hills

Nith River

Geoscape Grand River Poster 4: Water!



The Waterloo Moraine consists of multiple “stacked” aquifers, some of which can be cross-contaminated if seriously polluted.



Using too much salt on pathways and roads also causes serious contamination of surface water and groundwater.





Household waste is often dumped in the back of a car or in a pile of debris. This is a common sight in many areas of the watershed. The waste is often dumped in the back of a car or in a pile of debris. This is a common sight in many areas of the watershed.



A photograph of a house with a large pile of waste in the front yard. This is a common sight in many areas of the watershed.



The Grand River watershed authority has a lot of recycling programs. This is a common sight in many areas of the watershed.



A photograph of a person recycling materials into a blue bin. This is a common sight in many areas of the watershed.



Municipal areas and boundaries in the Grand River Basin. Shows on this map are the townships of various landfills throughout the watershed. Many are closed with waste being concentrated at a few newer sanitary landfills. These are often associated with waste management recycling facilities.



A photograph of a large landfill site with a large pile of waste. This is a common sight in many areas of the watershed.



A photograph of a large pile of waste being dumped into a landfill. This is a common sight in many areas of the watershed.



A photograph of a large pile of waste being dumped into a landfill. This is a common sight in many areas of the watershed.



A photograph of a large pile of waste being dumped into a landfill. This is a common sight in many areas of the watershed.

Poster 5 Waste and Recycling

Growth creates more waste for disposal and in spite of the best engineering principles, more chances of accidental contamination of water supplies.

Dependence on dumping in the US (Toronto's current method) means more likelihood of "emergency" waste disposal in centres around the Toronto Metropolitan area.

Geoscape Grand River Poster 5: Waste





Geoscape Grand River – Yours to enjoy!

For more information on the Grand River Geoscape

Either contact

avmorgan@uwaterloo.ca

or go to

www.whatonearth.org

www.geoscapegrandriver.ca

Will be online soon