

Managing our Most Strategic Natural Resource: *Groundwater Reservoirs of the Region of Waterloo*

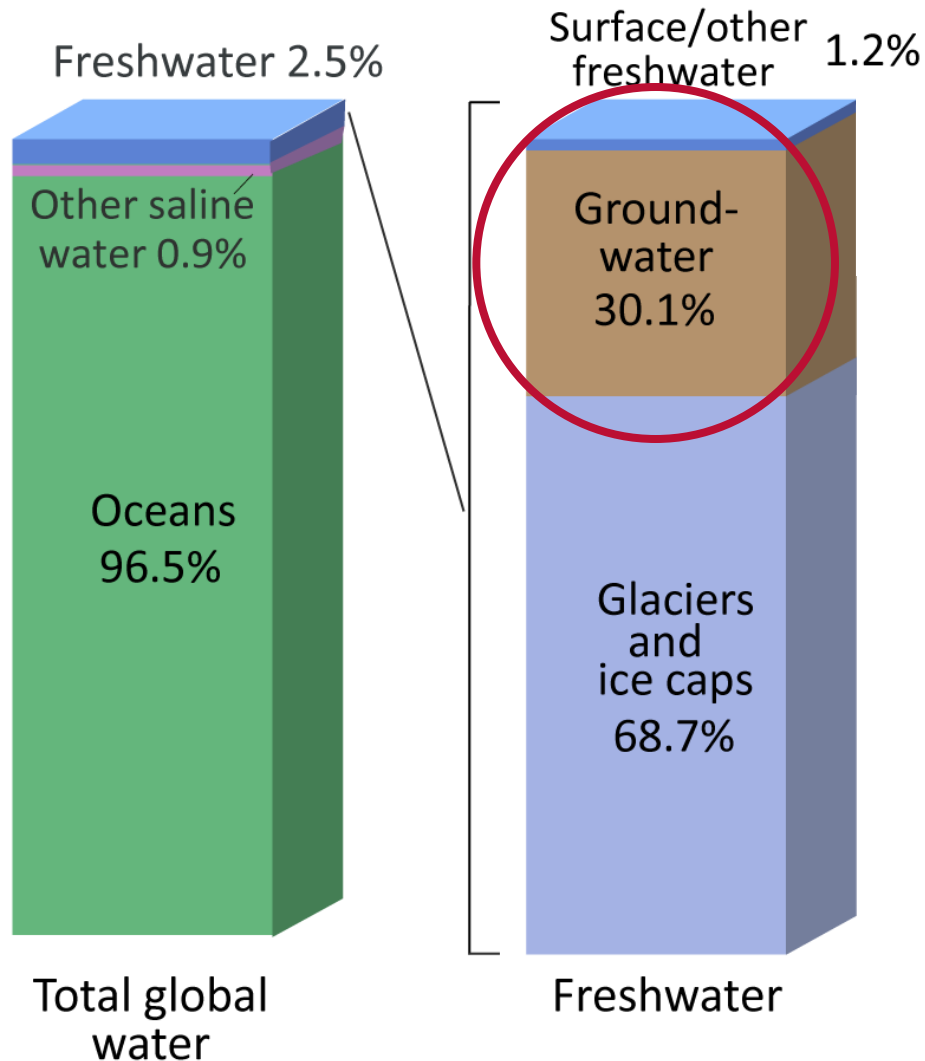
UW: Research Talks
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Groundwater as a Global Resource



~95% of liquid freshwater on Earth is groundwater

- *50% of drinking water supply globally*
- *43% of all water used for irrigation*

In Canada:

- *23% in Alberta, 40% in Ontario and 100% in PEI and Yukon*
- **80% in Regional Municipality of Waterloo**

Waterloo Moraine (?)



Unique Geologic Landscape

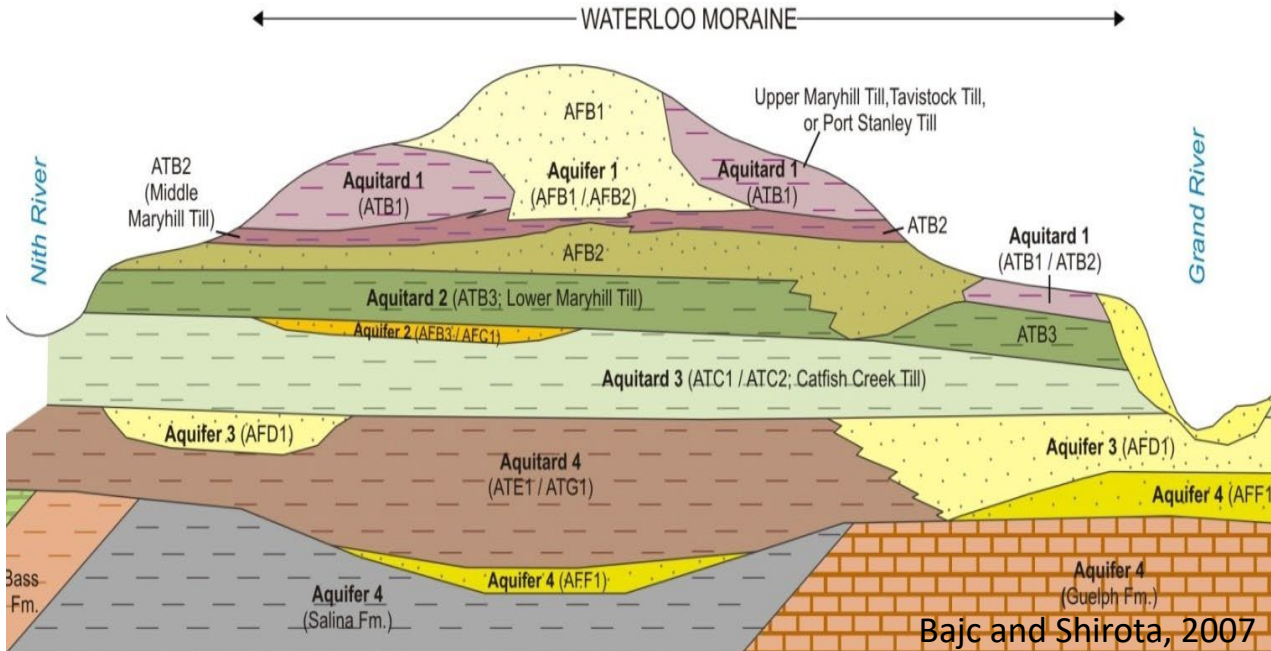
- Rolling, hummocky topography
- Natural, agricultural and urbanizing land use
- ~400Km² underlying the central area of RMOW



Dynamic Hydrologic Environment

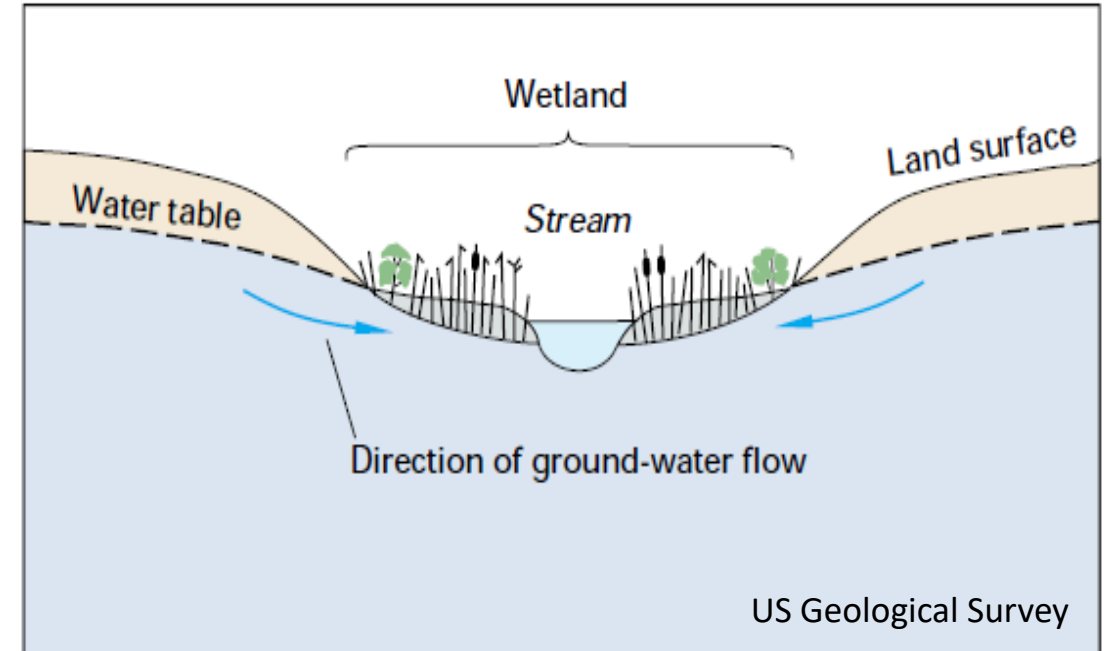
- Perennial rivers and streams
- Ponds and wetlands
- Rich aquatic ecology

Waterloo Moraine (?)



Unique Geologic Landscape

- Glacial deposits (30m-100m thick)
- Interlayered sand and gravel beds (aquifers) and fine-grained till units (aquitards)



Dynamic Hydrologic Environment

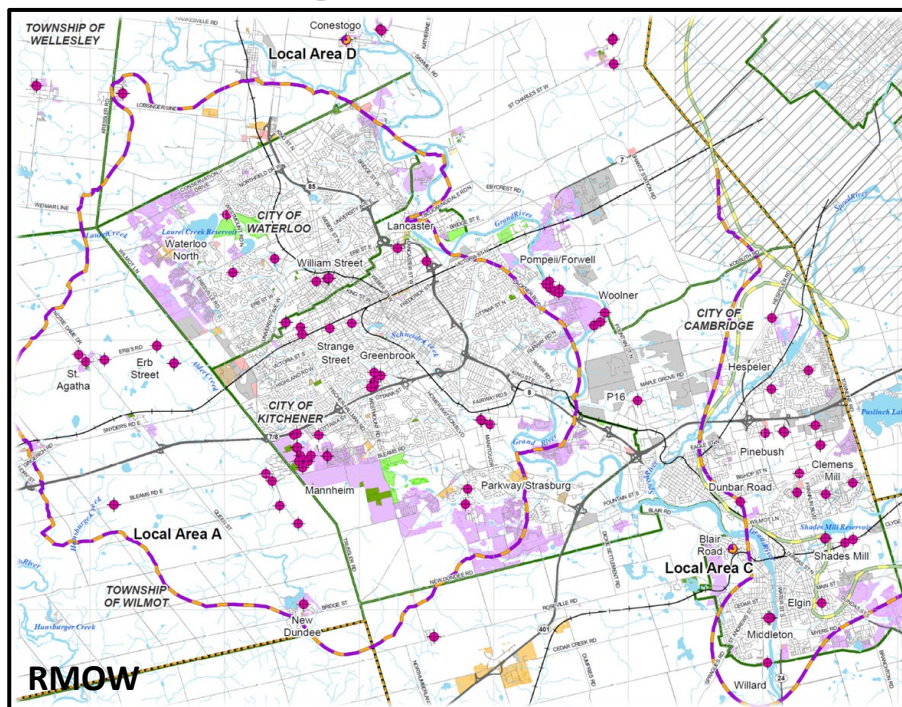
- Groundwater discharge sustains streams and wetlands
- Groundwater dependent ecosystems

Groundwater as a Strategic Resource in RMOW



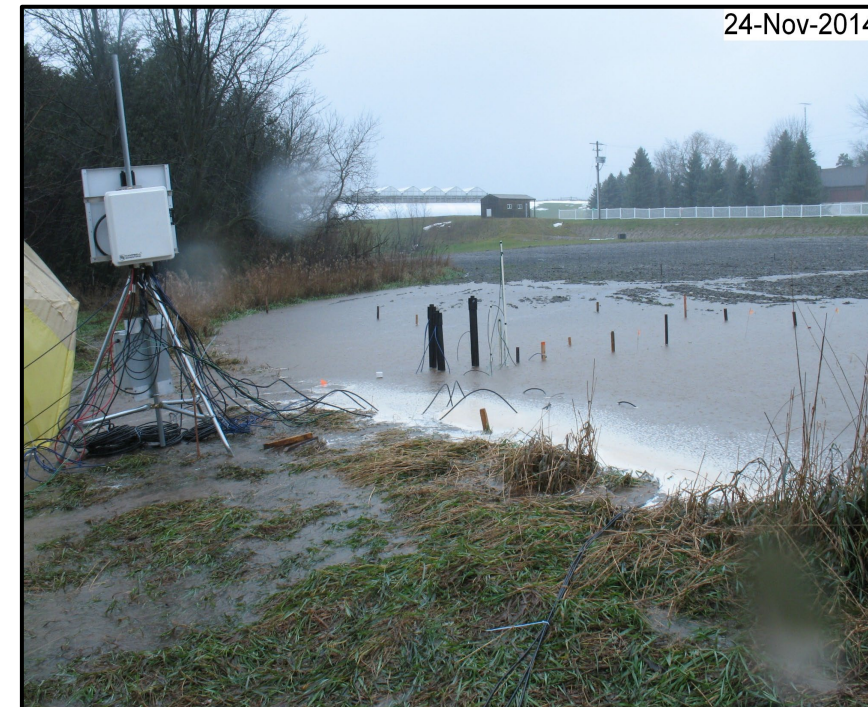
Groundwater Exploration

- Drilling commenced in ~1900
- Initial wells were flowing at surface



Current Well Network

- >100 wells currently in operation
- *Robust, inexpensive and renewable water source for over 125 years!*



Groundwater Recharge

- Recharge: source of replenishment
- Currently extracting ~30% of total annual recharge
 - *Subject of on-going research*

Managed Aquifer Recharge: A Global Initiative

Augmenting Natural Aquifer Recharge

- enhancing local infiltration
- artificially recharging water transferred from another location

e.g. Region of Waterloo

Aquifer Storage and Recovery System (ASR) (~1995)

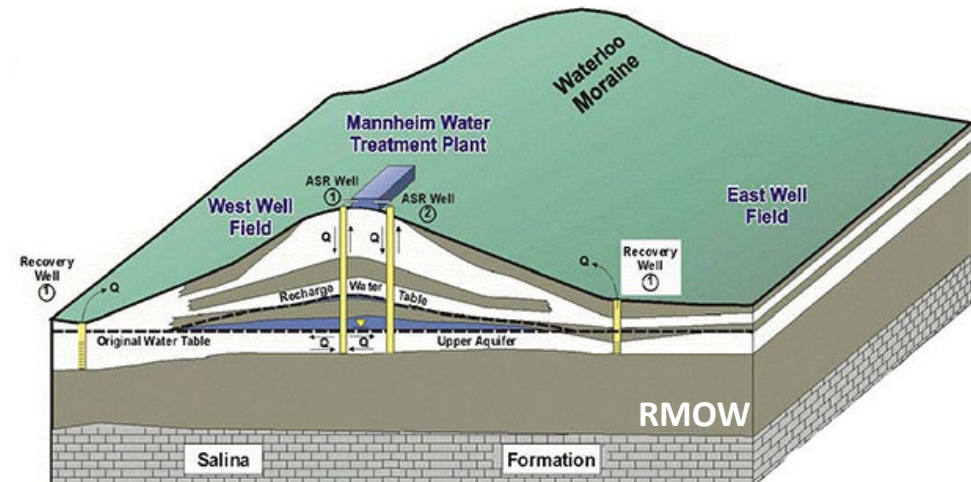
1. Water drawn from Grand River and pumped up to the Mannheim Water Treatment Plant
2. Water is treated and injected into a main production aquifer
3. Groundwater is extracted as required



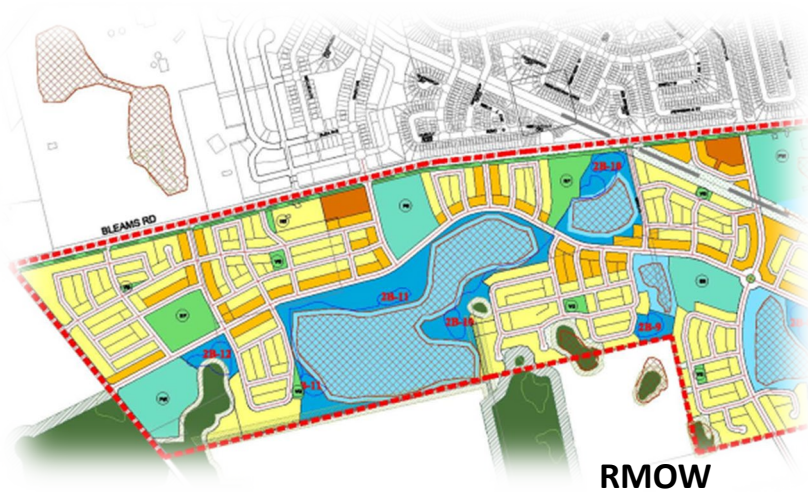
Intake at the Grand River



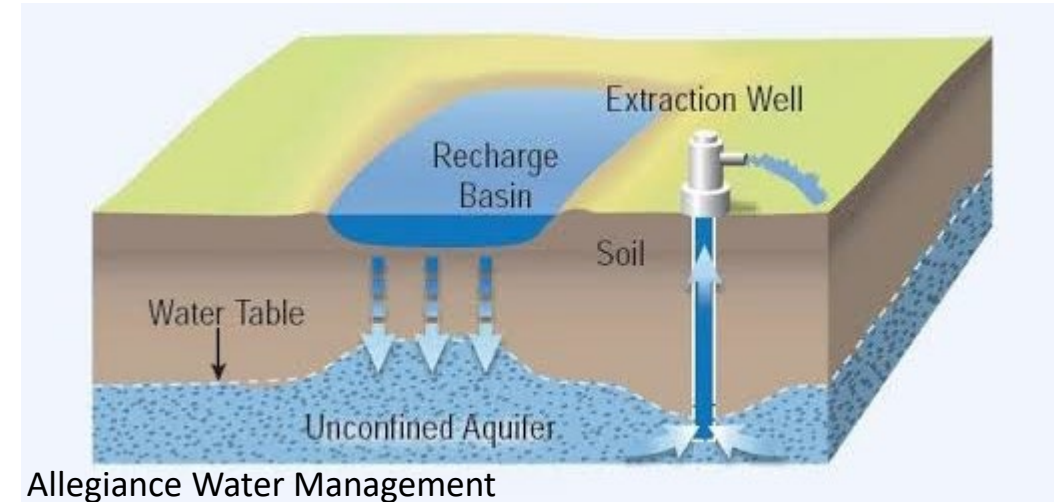
Mannheim Water Treatment Plant



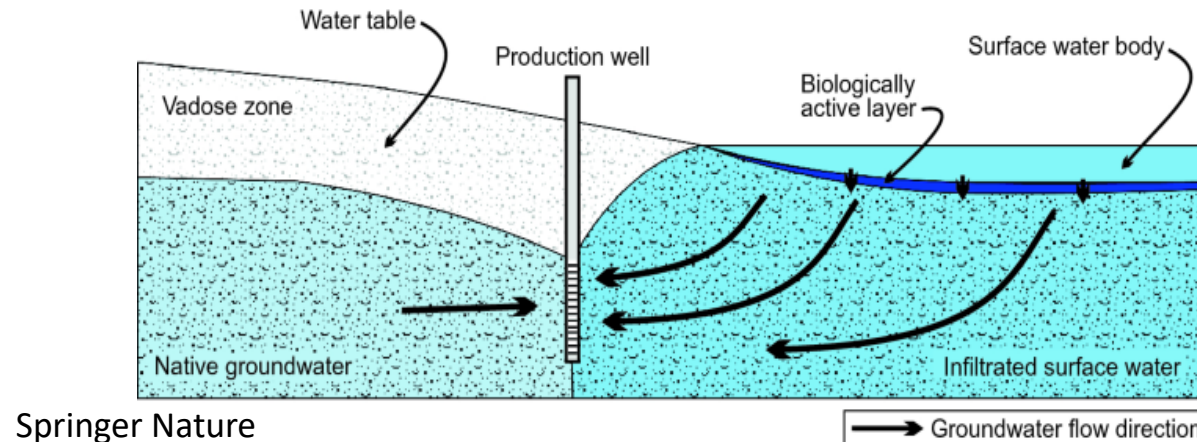
Alternative MAR Strategies: RMOW



Minimal Impact Urban Landscapes
(*Maintaining or enhancing natural recharge*)



Surface Water Recharge Basins



Riverbank Infiltration Systems

Springer Nature

UNIVERSITY OF **WATERLOO**

