



**Assessment of Water Monitoring Networks
for Climate Change**

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Climate Change Initiatives at GW-SW Unit, EMRB, MOE

•The Canada-Ontario Agreement (COA) Project:

Assessment of the Groundwater and Stream Water Quality Monitoring Networks for Climate Change Detection and Adaptation. In partnership with Conservation Ontario.

•CCME Water Agenda Development Committee:

Working with MOE Strategic Policy Branch on the Water Monitoring and Climate Change Adaptation Subgroup; Setting Strategic Directions for Water (Three Year Water Action Plan)

•Lake Simcoe Climate Change Adaptation Strategy:

Working with the Sport Fish and Biomonitoring Unit to develop the water vulnerability assessment for Lake Simcoe and 18 subwatersheds.

•Ontario Low Water Response:

Working with MNR Surface Water Monitoring Centre to develop a groundwater indicator.

COA Project

Assess the **PGMN** and **PWQMN** for their effectiveness to provide relevant data for climate change *detection* and *adaptation*.

A partnership project with Conservation Ontario.

Technical Working Team: MOE, CO, OMAFRA, MNR

A multi-phase, multi-year project.

Phase 1 and 2 completed

Phase 3 in progress

Reports available at <http://www.conservation-ontario.on.ca>

Phase 1: Monitoring CC Impacts on Water

- Set up Advisory Committee
- Review of the literature on effects of climate change on **quantity and quality** of groundwater and surface water;
- Identification of monitoring parameters and indicators.

Phase 2: Assessment of PGMN and PWQMN

BASIC APPROACH

DETECTION AND ADAPTATION



PRIORITIZATION: IDENTIFY "CRITICAL" OR "SENSITIVE" OR "REPRESENTATIVE" OR "APPROPRIATE" WATERSHEDS.



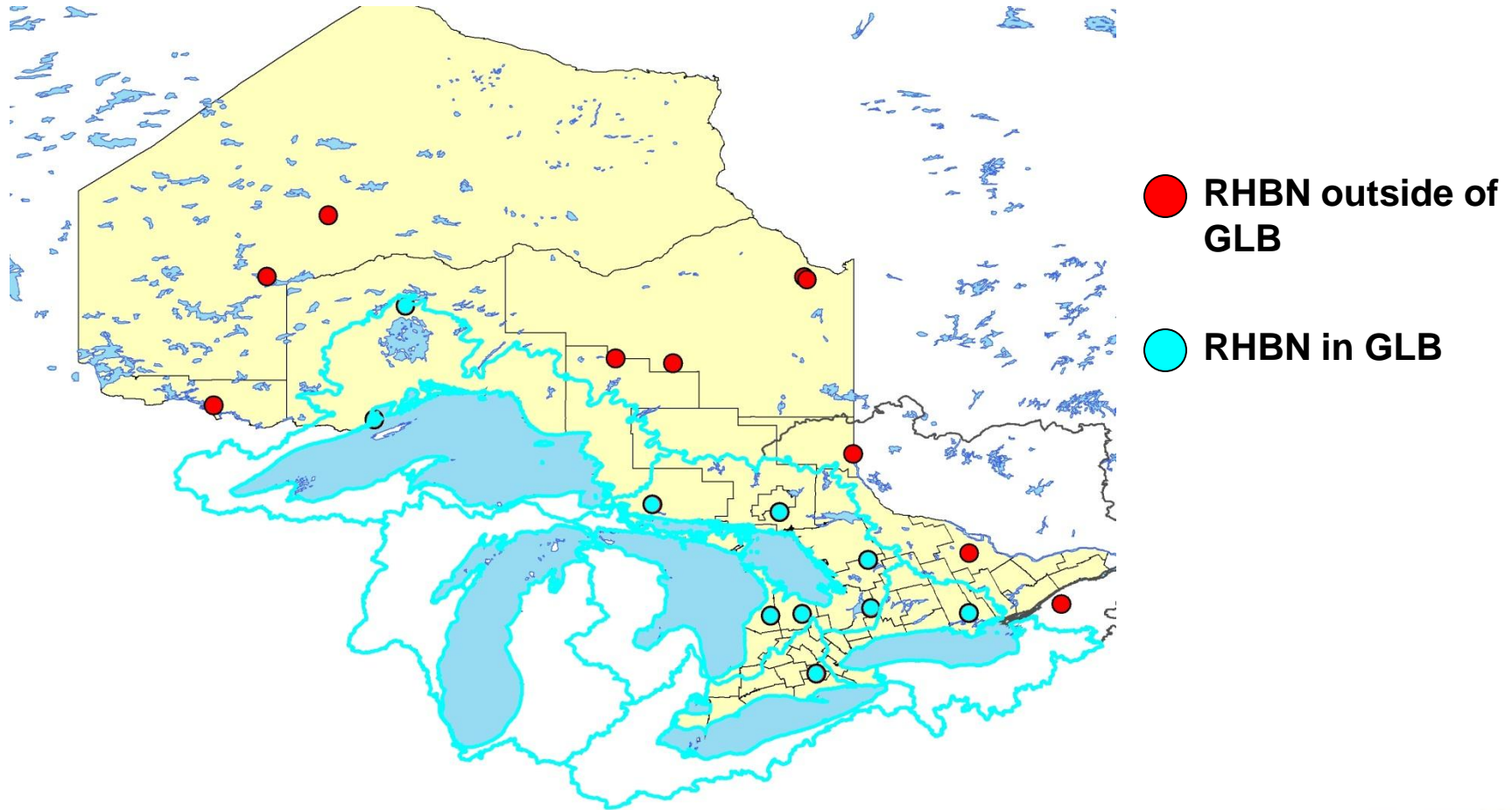
NETWORK EVALUATION: IDENTIFY MONITORING NEEDS AND ENHANCEMENTS

Detection and Water Monitoring

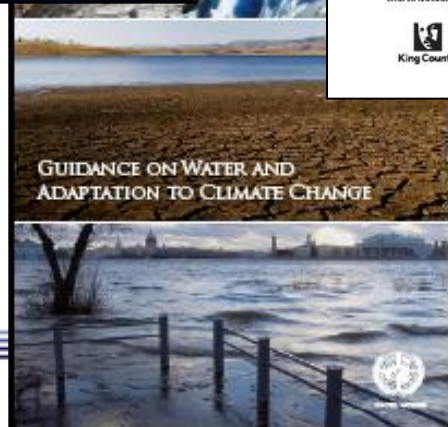
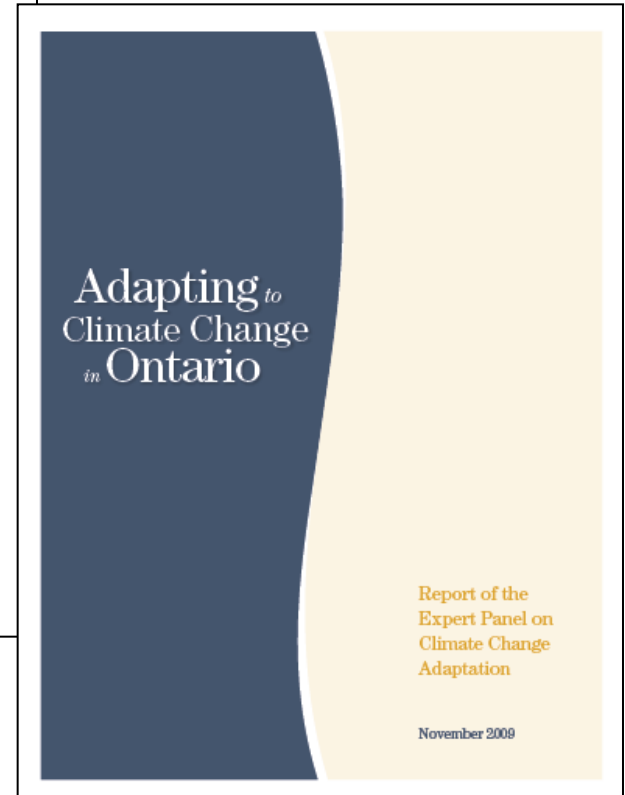
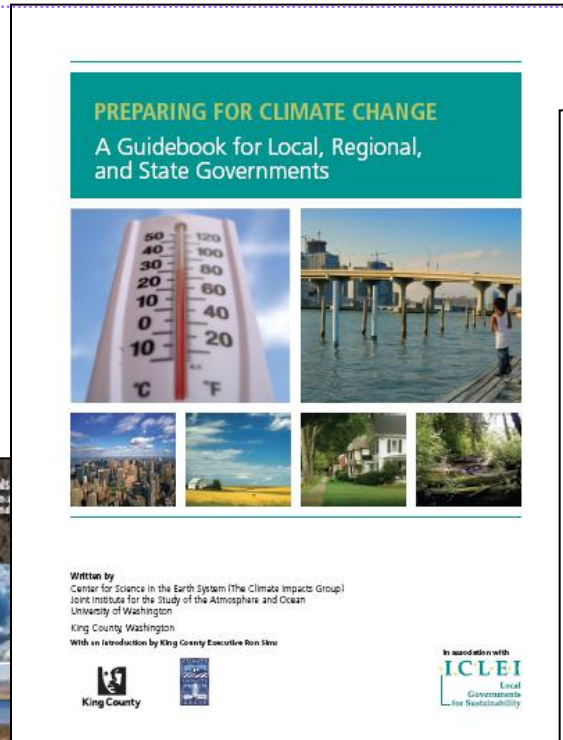
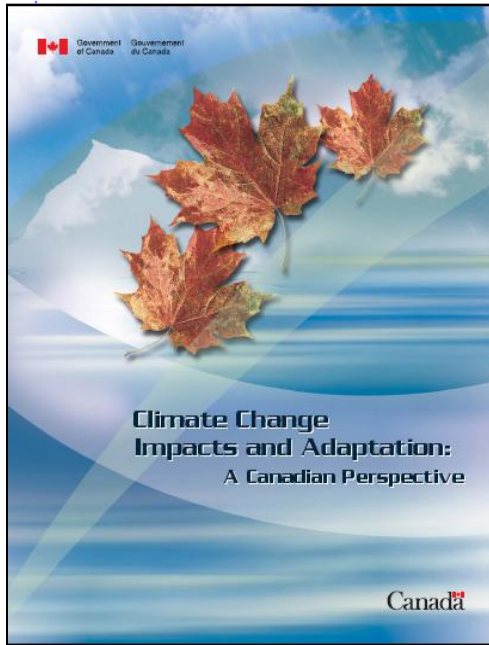
CCME Report, April, 2008: Assessment of Water Monitoring Networks For Detection of Climate Change in Canada – Summary Report on Scoping Study

“....a monitoring strategy (for climate change detection) should focus on maintaining long-term stations in pristine areas not affected by land use changes and water use and establishing new stations in pristine areas not currently represented.”

Reference Hydrometric Basin Network in Ontario



Adaptation and Water Monitoring



Adaptation = Vulnerability Assessment

Review of adaptation guides:

Vulnerability assessment is a *fundamental* part of adaptation planning.

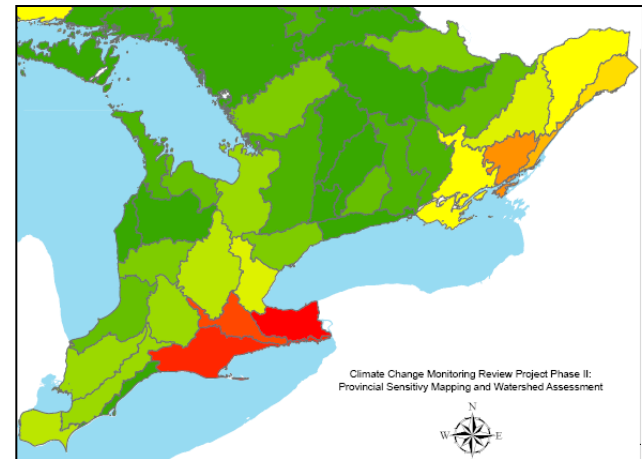
Vulnerability assessment (VA) = **exposure (E)**, **sensitivity (S)** and **adaptive capacity (A)**.

$$VA = \frac{E * S}{A}$$

Prioritization: Current Sensitivity Assessment of Southern Ontario

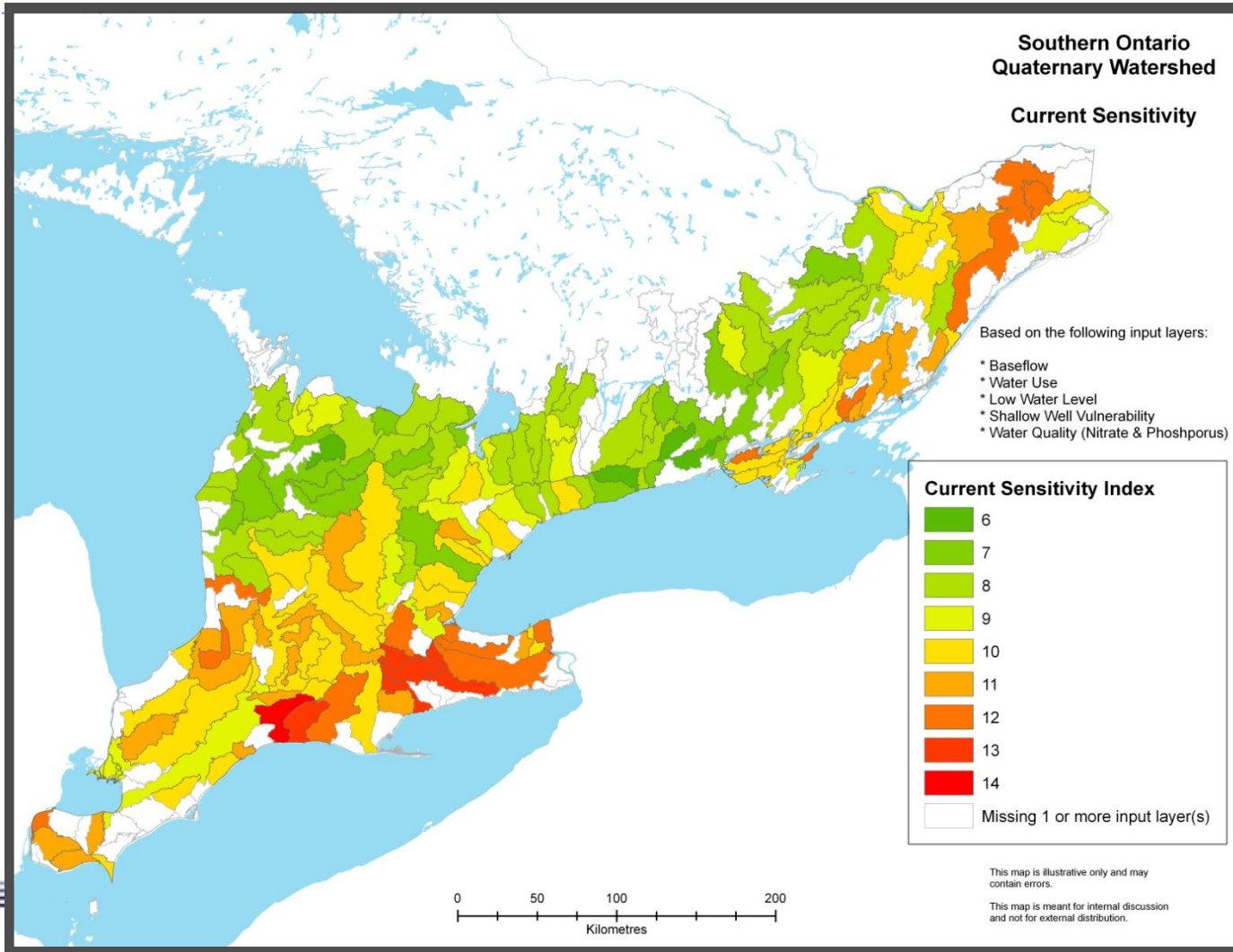
Using GIS, produce the following current sensitivity map overlays based on current data:

- Water Use / Demand
- Low Water Level
- Baseflow Index
- Stream Water Quality
- Shallow Well Vulnerability



Assign **simple** high-medium-low sensitivity ranges for the sensitivity factors and produce GIS map overlays.

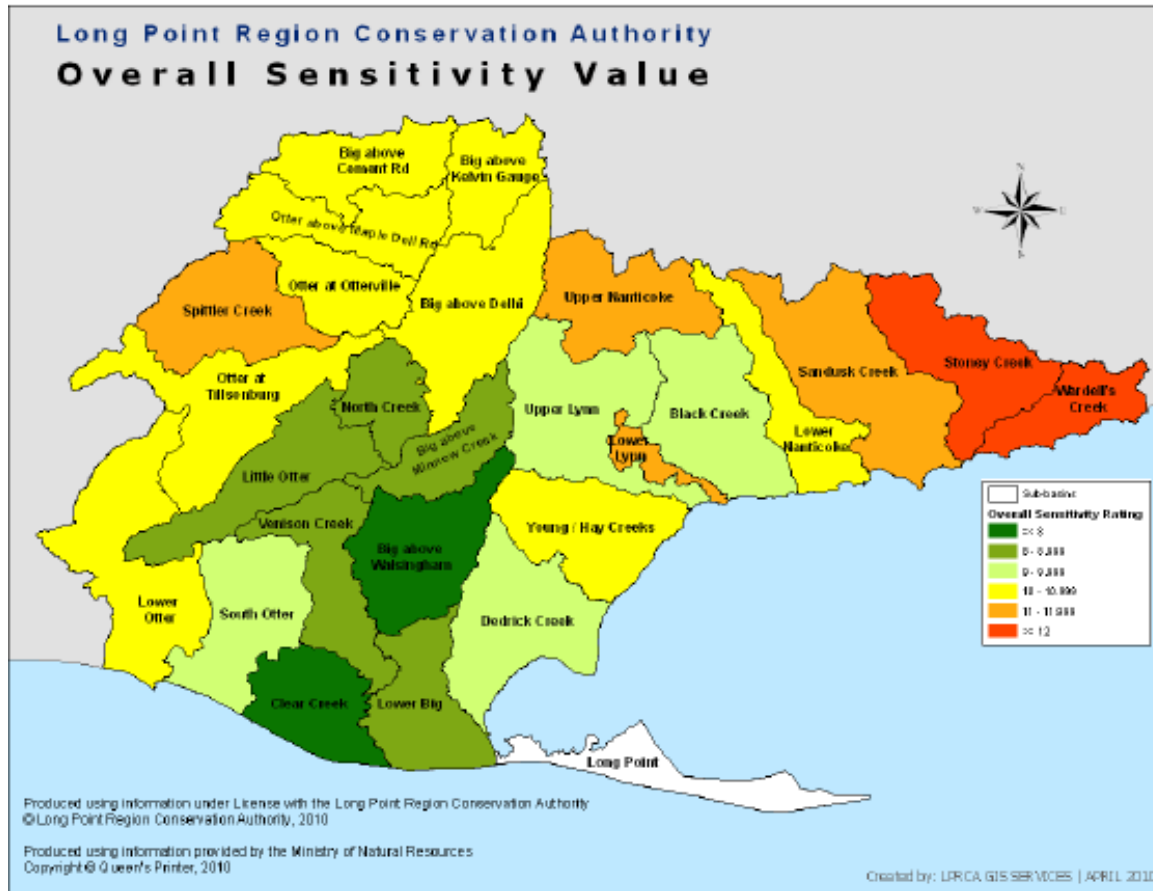
Current Sensitivity Assessment of Southern Ontario



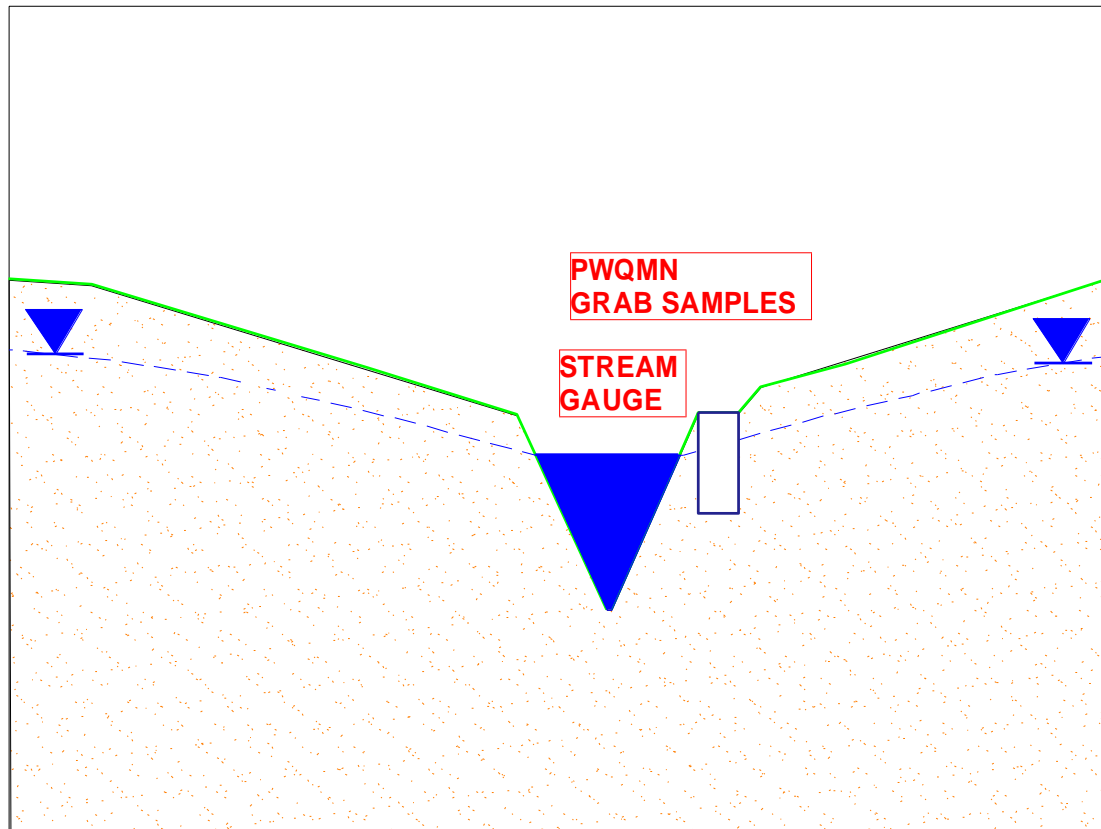
Evaluate networks in sensitive watersheds

Conservation Authority	Number of Quaternary Watersheds
Ausable Bayfield	2
Catfish	1
Essex	1
Grand River	3
Hamilton	1
Kettle	1
Long Point	2
Niagara	3
Quinte	2
Cataraqui	1
South Nation	2

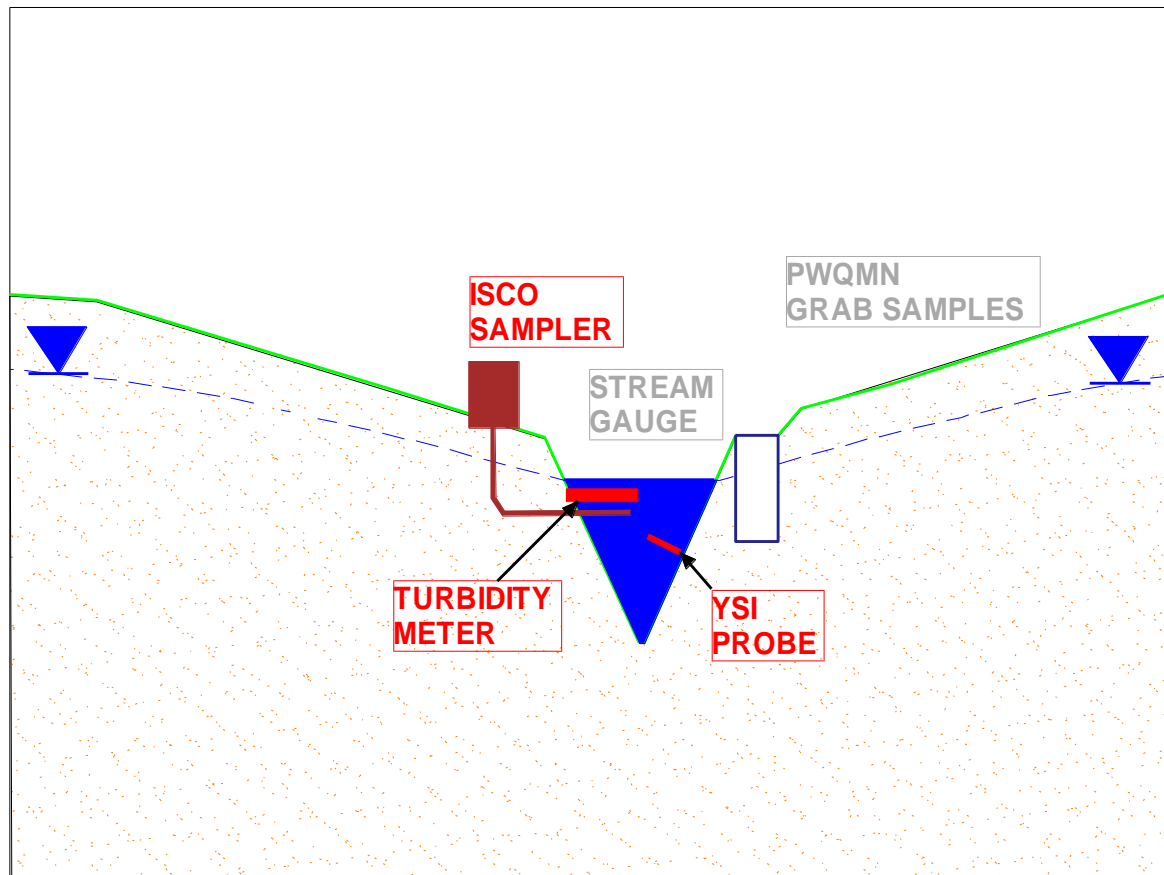
CA Evaluation Example: Long Point



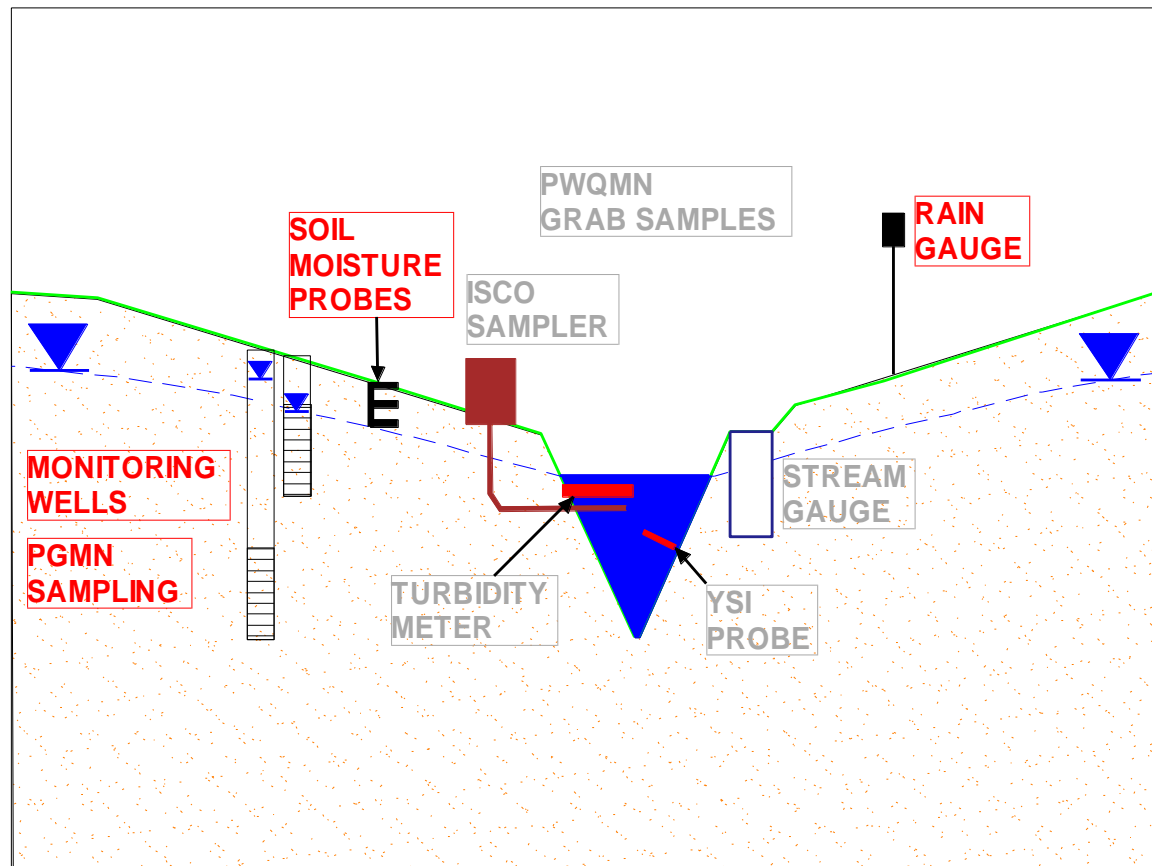
Phase 3: Integrated Monitoring for Climate Change



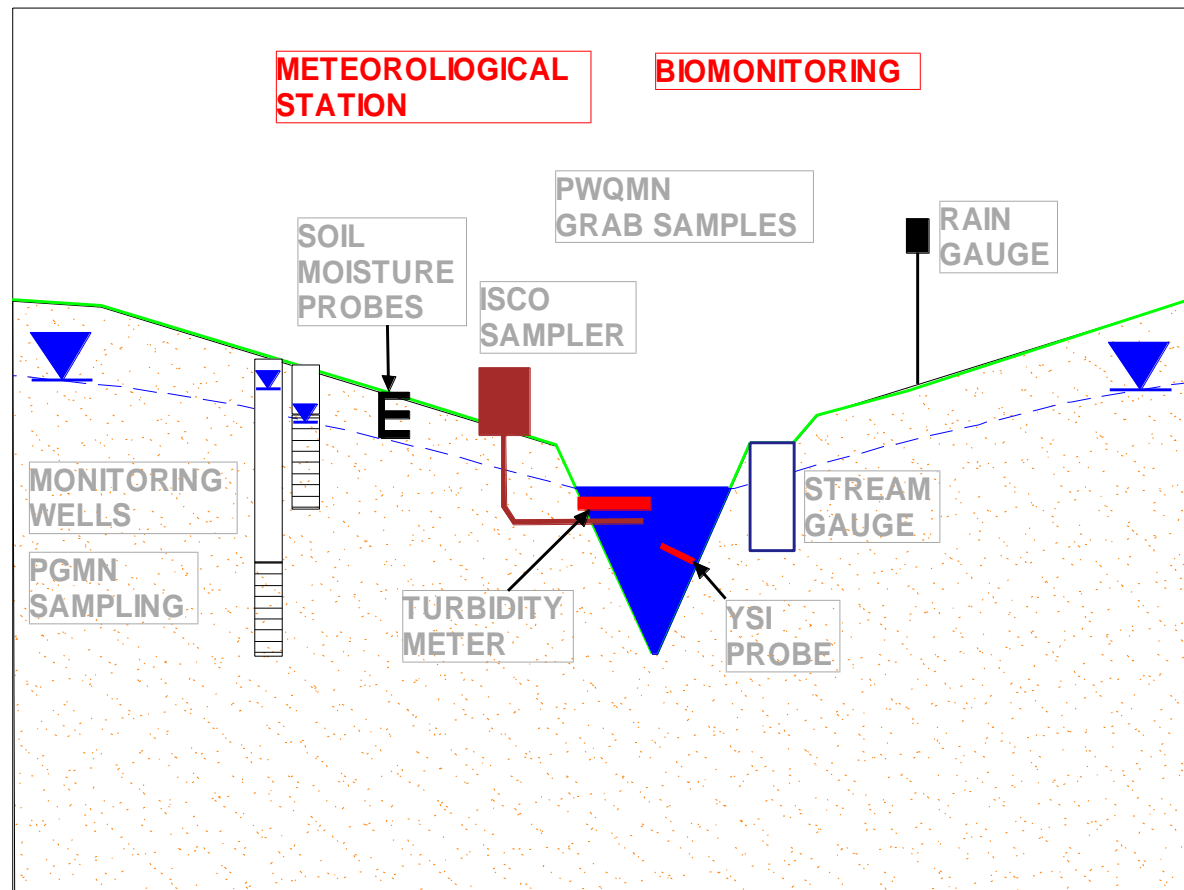
Phase 3: Integrated Monitoring for Climate Change



Phase 3: Integrated Monitoring for Climate Change



Phase 3: Integrated Monitoring for Climate Change



Conservation Authorities: Potential Integrated Monitoring Sites

ABCA

GRCA

NPCA

QUINTE

NICKEL DISTRICT

LAKEHEAD

CCME Water Action Plan

Goal 4. Climate change impacts are reduced through adaptive strategies

- **Guidance for the Evaluation of Water Monitoring Networks for Climate Change Adaptation, July 2011**
- **Tools for Watershed Based Vulnerability Assessment, October 2012**
- **Measures (Actions/Options) for Watershed Climate Change Adaptation, October 2013**

Ontario Low Water Response: Groundwater Indicator

- **Guidance document for well selection to be submitted by UTRCA.**
- **Finalize groundwater indicator method.**
- **Selection of PGMN wells (others?) for OLWR.**
- **Address data accessibility issue(s).**
- **Incorporation of groundwater indicator to OLWR**

SUMMARY

- **Water monitoring for climate change detection and adaptation.**
- **Integrated monitoring for water quantity and quality.**
- **Current work to provide guidance on water monitoring for climate change and climate change adaptation.**