



Lake Ontario Integrated Shoreline Strategy: HYDROGEOLOGY

**Technical Workshop
January 26th, 2012**

Background Review: Findings

- Geology
- Water Takings
- Groundwater Chemistry
- Groundwater Levels
- Groundwater Discharge

Background Review: Geology

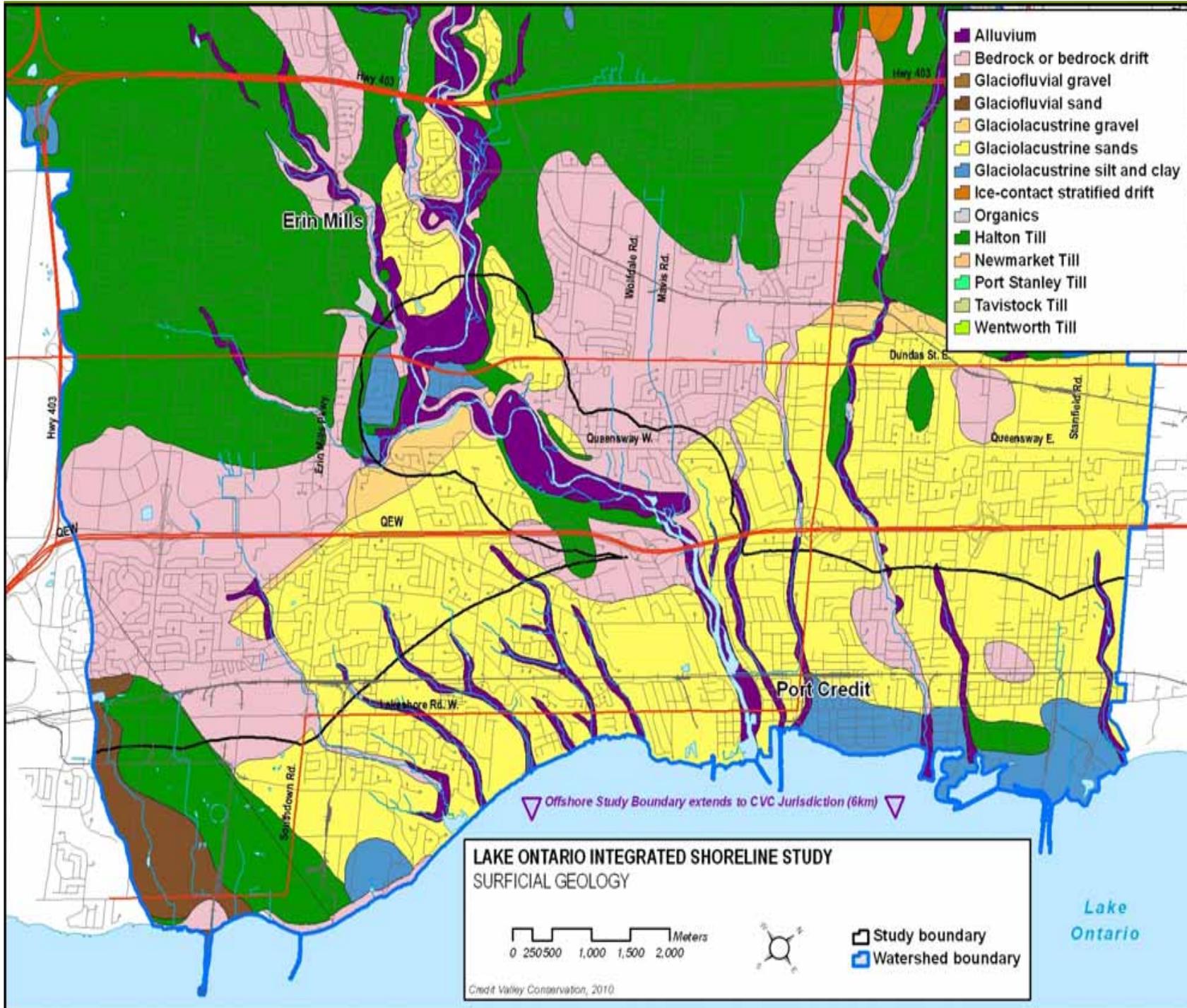
Three main geological units in the Study Area:

–Halton Till (unconsolidated overburden, low permeability);

–Iroquois Sand (unconsolidated overburden, higher permeability); and

–Georgian Bay Shale (bedrock, low permeability except for upper weathered zone).

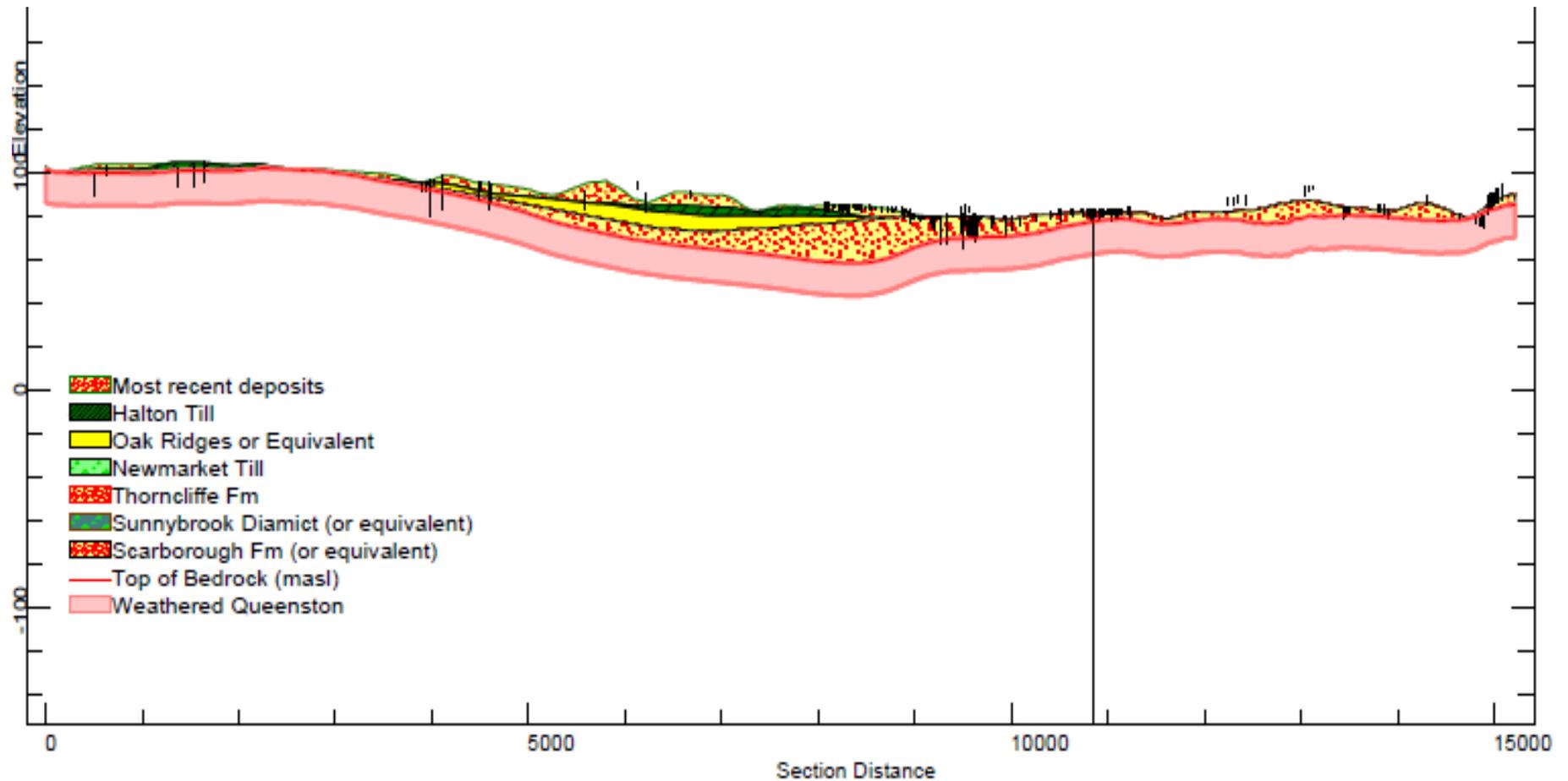
There is also likely widespread distribution of fill in the Study Area, particularly near the Lake.



Background Review: Buried Bedrock Valley

- Buried bedrock valleys are ancient valleys in the bedrock surface that were created by high energy erosion and then infilled by various overburden sediments.
- Elsewhere in the Credit River watershed municipal water supplies are often derived from buried bedrock valley aquifers.
- Interpretation of bedrock topography and overburden geology in the Study Area suggests there is a north-south trending buried bedrock valley in the western half of the Study Area, approximately following the course of the Credit River.

Background Review: Lakeshore Blvd Cross-Section



Background Review: Water Takings

- Only one known long-term groundwater taking in the vicinity of the Study Area: passive dewatering with discharge to upper Cooksville Creek.
- Multiple short-term groundwater takings for construction dewatering.
- Long-term surface water takings from Credit River for golf course irrigation and Lake Ontario-based takings for municipal drinking water systems.

Background Review: Cooksville and Sheridan Creek Studies

- Study included drilling and instrumentation of monitoring wells
- Groundwater level measurements at monitoring wells indicate that the water table is typically 2 to 5 metres below ground surface
- Identified some infrastructure contributions to creek baseflow
- Groundwater chemistry sampling from monitoring wells does not indicate impacts

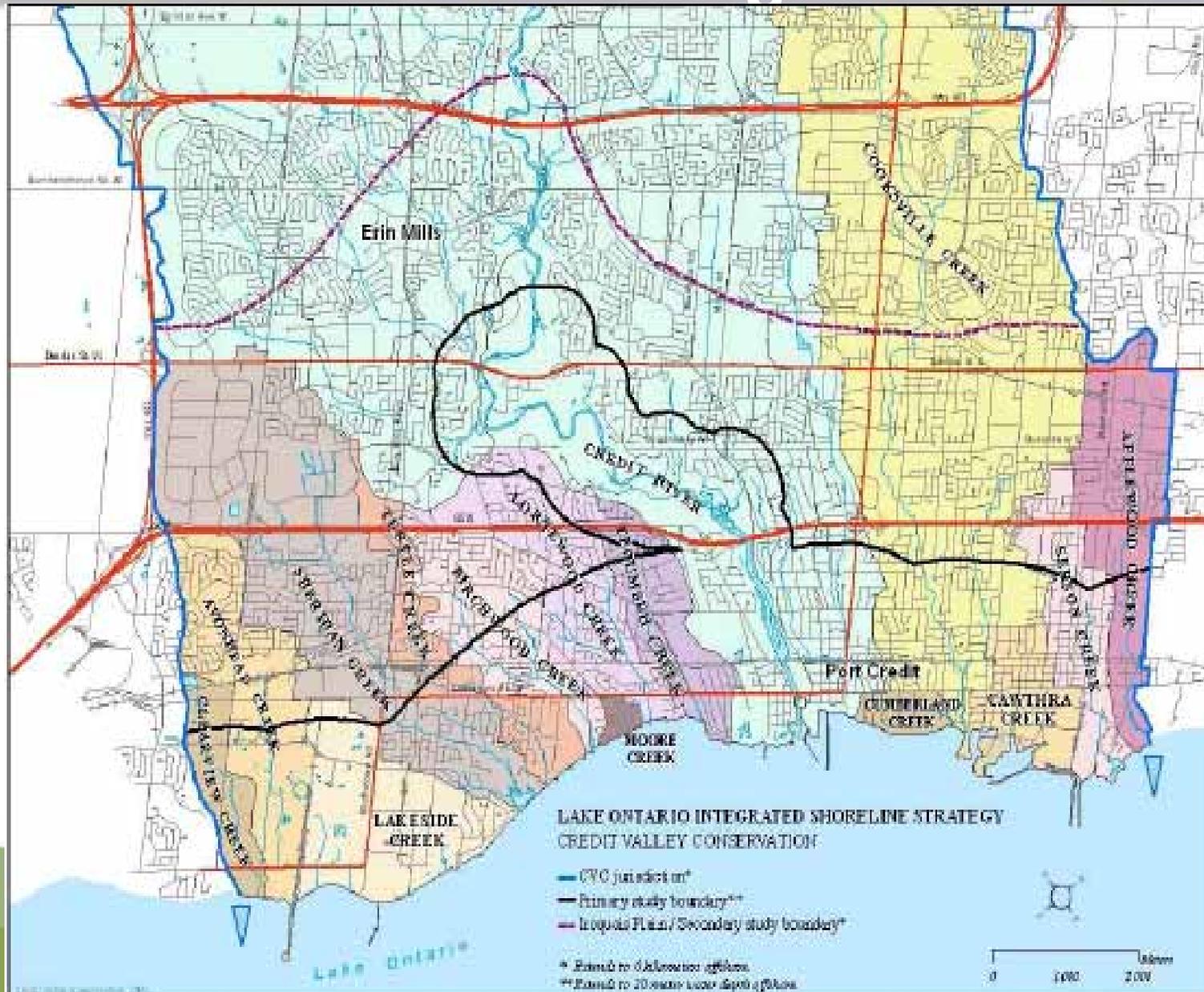
Knowledge Gaps: Groundwater Discharge

- Groundwater discharge to surface water features supports aquatic habitat, water quality, and temperature conditions.
- Creek flows during periods of prolonged dry weather are assumed to be primarily comprised of groundwater discharge.
- Spot baseflow measurements were completed in Cooksville and Sheridan Creeks in August 2008 and in the rest of the Study Area in July 2011.

Knowledge Gaps: Groundwater Discharge

- Spot baseflows in range of 1 litre/second: Clearview; Avonhead*; Turtle; Tecumseh; Cumberland; Serson.
- Spot baseflows in range of 10 L/s: Birchwood; Lornewood; Cawthra; Applewood.
- Spot baseflows in range of 100 L/s: Cooksville and Sheridan.

Knowledge Gaps: Groundwater Discharge



Knowledge Gaps: Groundwater Discharge

- Size of catchment appears to be most important factor.
- Surficial geology not as much of a factor as anticipated – appears to be similar discharge contributions from both shale and sand units.
- Groundwater levels and gradient are assumed to be significant.
- Sometimes difficult to identify “artificial” influences on baseflow.

Next Steps

- Integrate baseflow measurements and groundwater discharge interpretation with other disciplines.
- Where refinement of understanding of groundwater discharge is required, then follow up with additional flow measurements and creek surveys to identify other possible influences (e.g., sewer outfalls).

QUESTIONS?

