

# Groundwater Vulnerability Assessment – Trent Conservation Coalition Source Protection Region

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**AECOM**

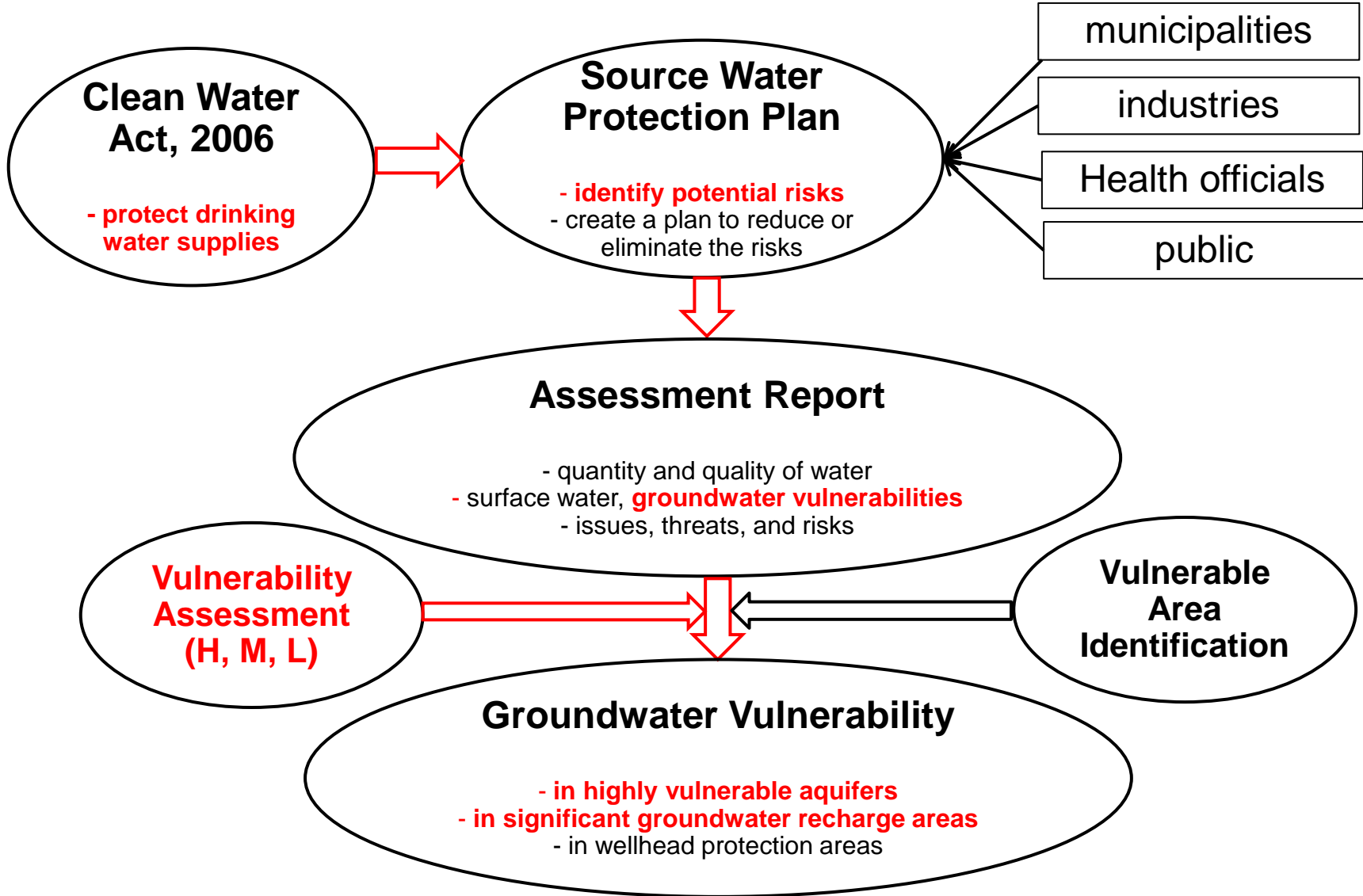
# Outline

- Project Background
- Scoring Groundwater Vulnerability
- Mapping Groundwater Vulnerability
- Recommendations

# Project Background

- Policies and Guidelines
- Study Area
- Assessing Methods

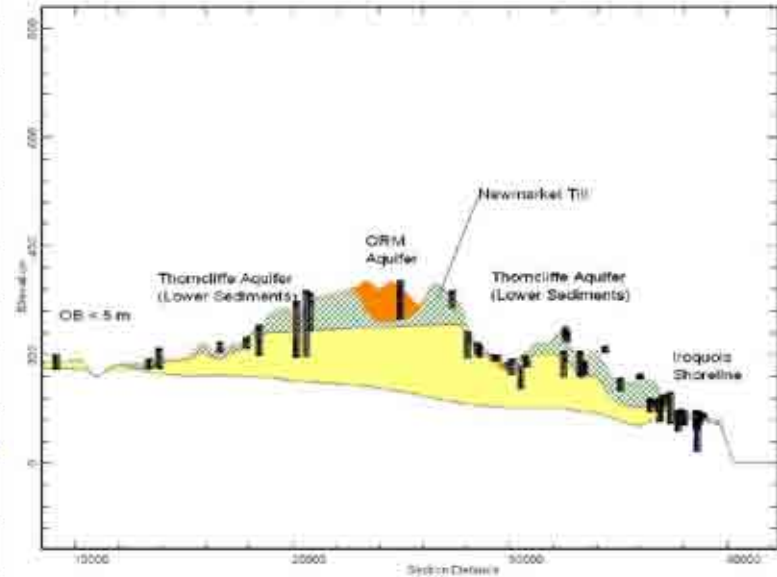
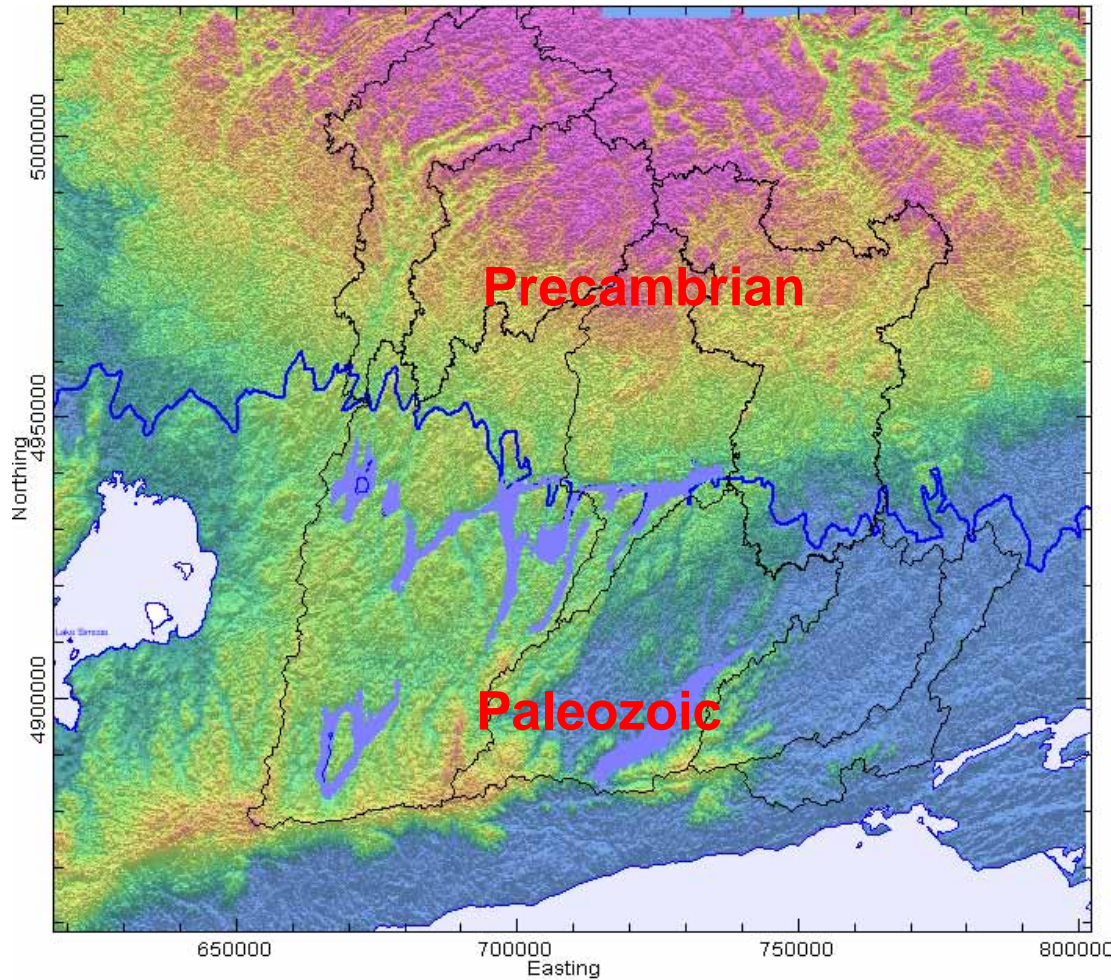
# Policies and Guidelines



# Trent Conservation Coalition Source Protection Region



# Study Area



TARGET: Shallow Aquifer

# Selection of the Assessment Methods

- Technical Rules: Assessment Report
  - Part IV.1, Rule 37 (ISI, AVI, SAAT, SWAT, and alternative)
- Previous groundwater vulnerability mapping within the TCC SPR
- Methodologies applied by the neighbouring SPRs or CAs
- Availability of models / data
- Palaeozoic area – ISI screened by depth, AVI
- Precambrian area – adapted ISI

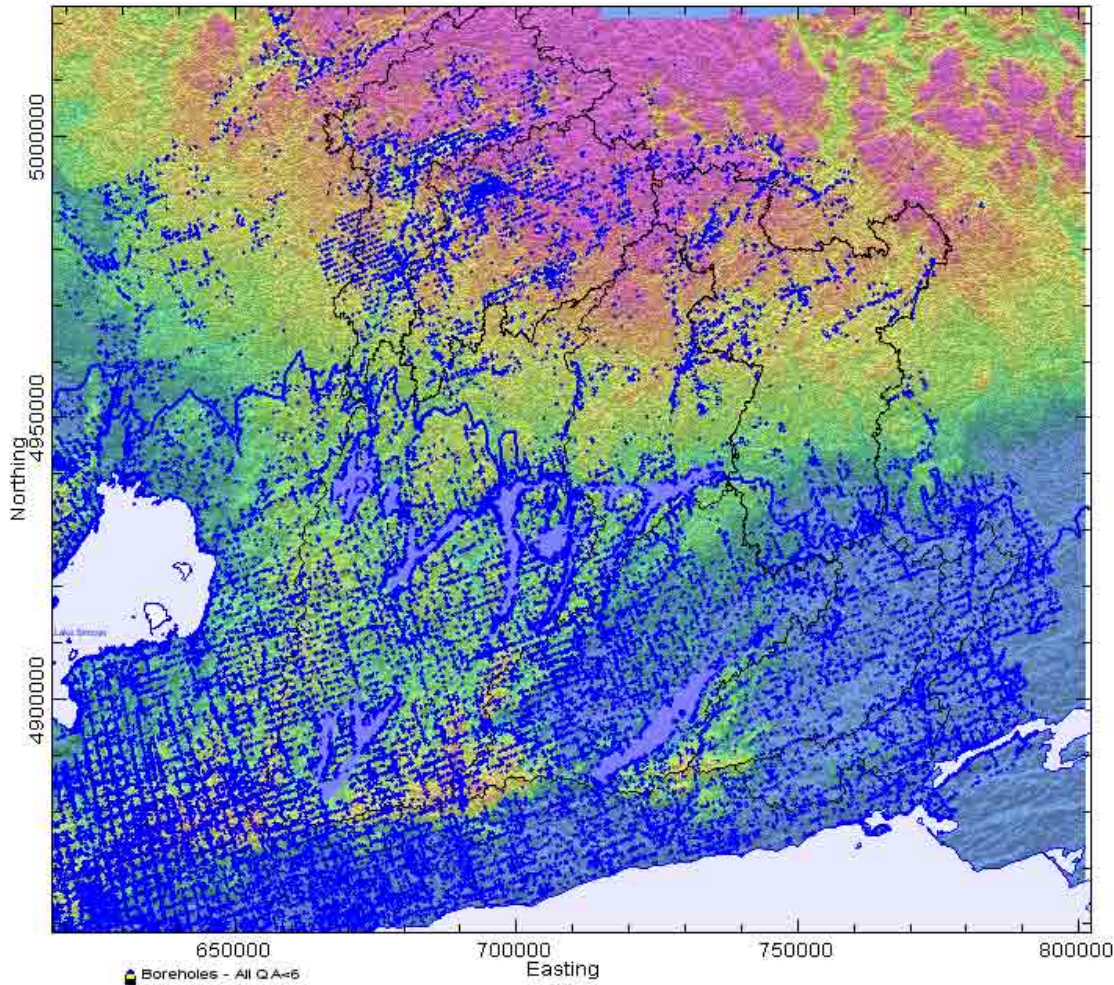
# Groundwater Vulnerability Scores

- Data Sources
- Paleozoic Study Area ISI
- Paleozoic Study Area AVI
- Precambrian Study Area ISI

# Data Sources

- YPDT-CAMC database
  - MOE water well records with GSC modification
  - Regional surfaces
- Additional data
  - OGS database and surfaces
  - OGS Surficial geology mapping (GIS)

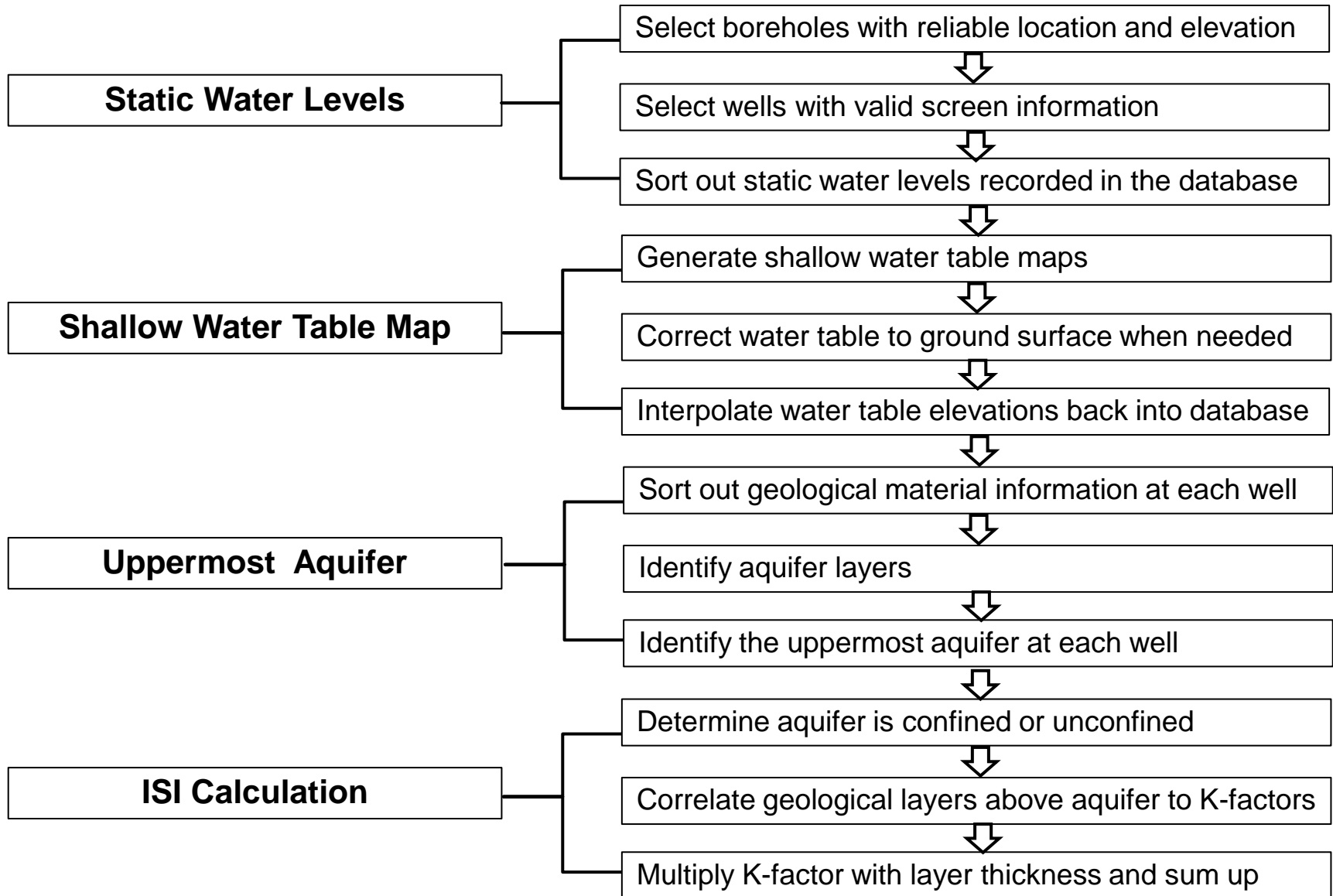
# Well Record Coverage



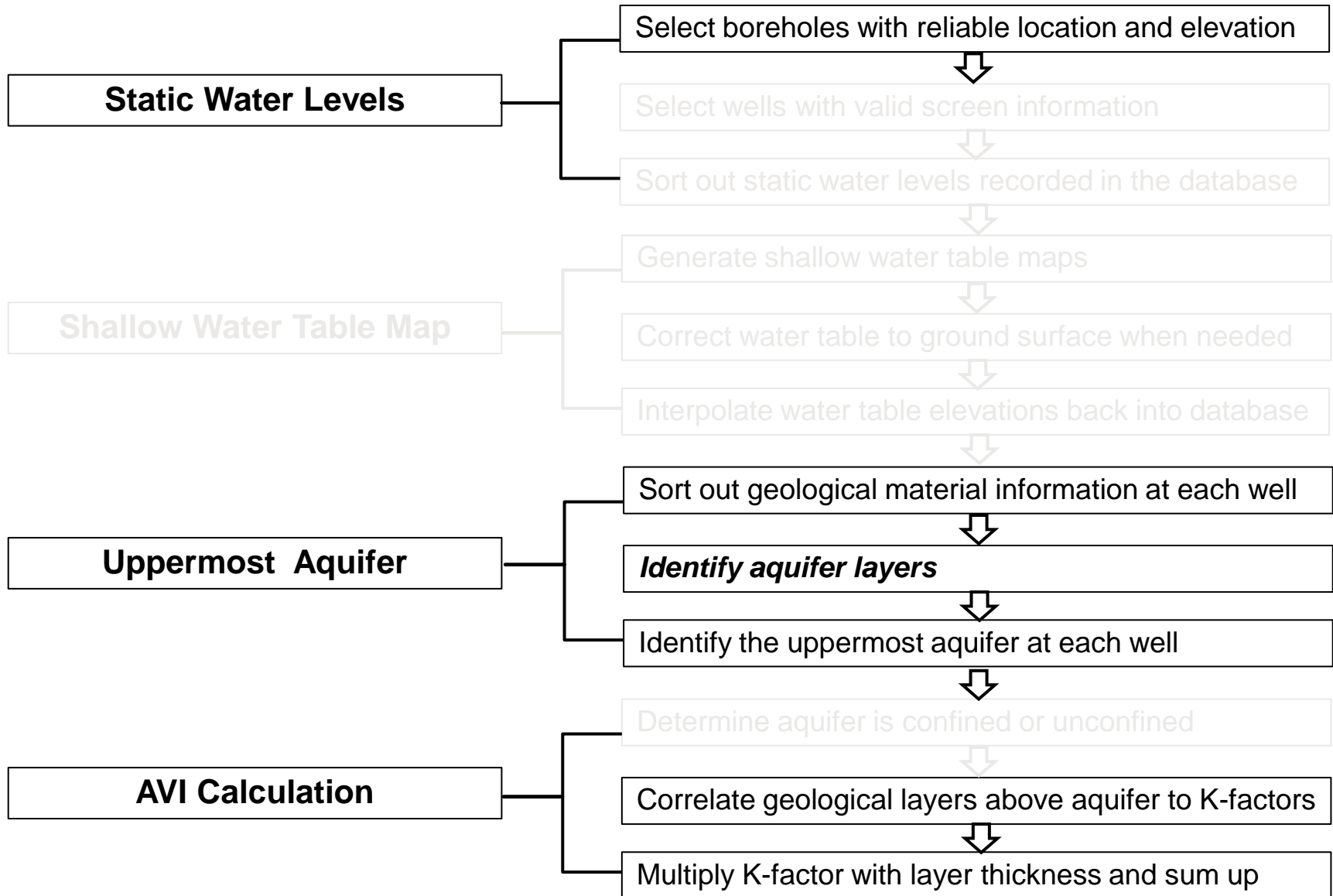
Paleozoic > 40,000 wells

Precambrian < 5,000

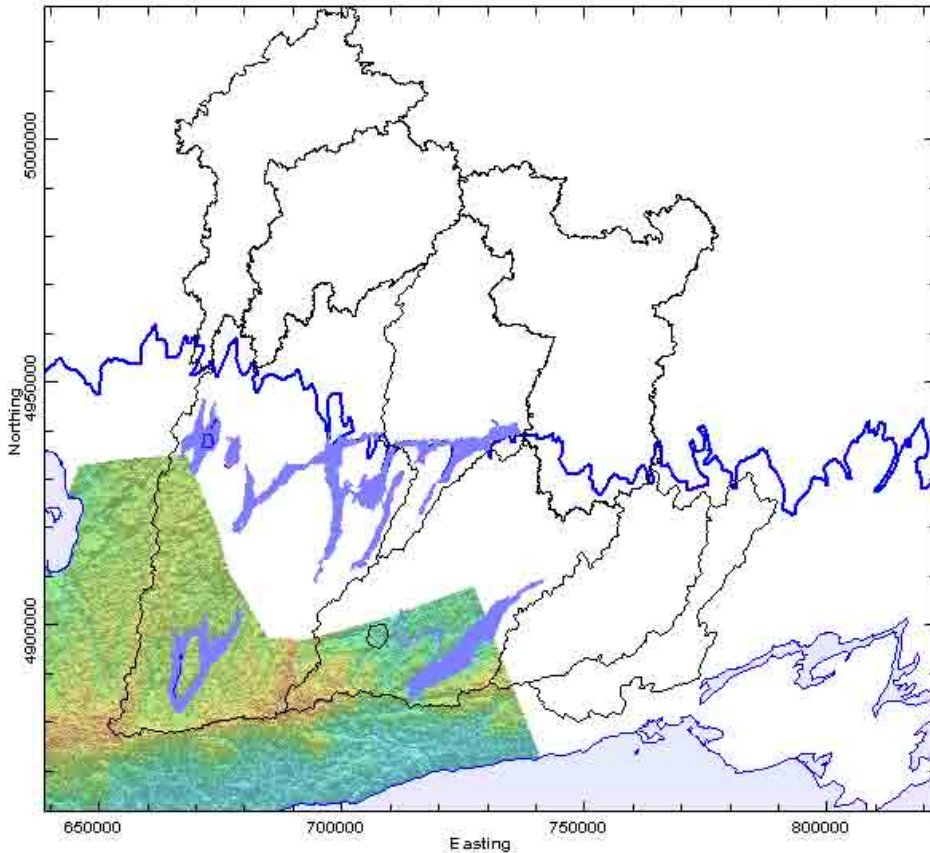
# Paleozoic Area ISI



# Paleozoic Area AVI



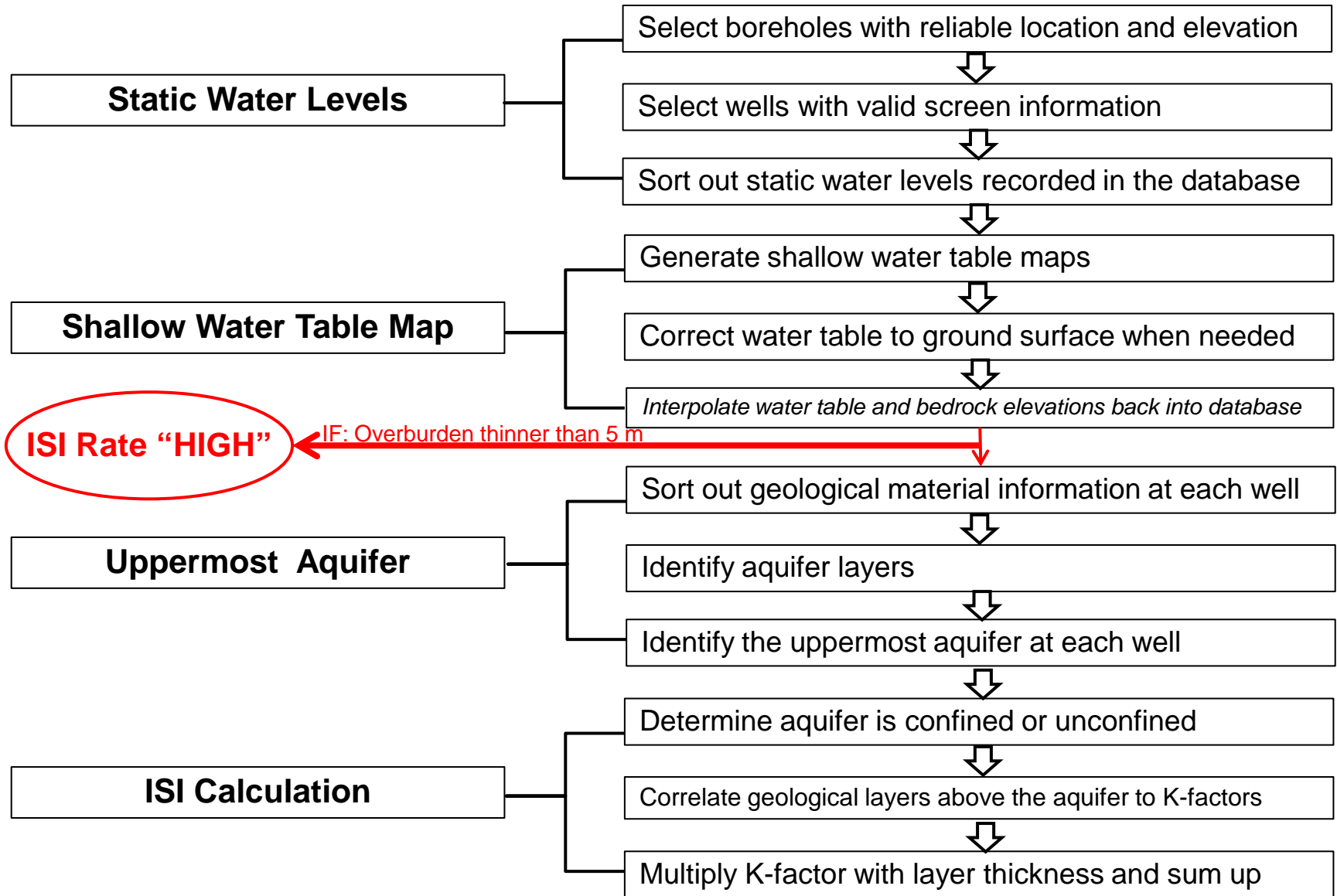
# AVI by Hydrostratigraphic Layer



- YPDT / CAMC model  
does not cover most of the  
TCC SPC



# Precambrian Area ISI



# Groundwater Vulnerability Maps

- Map Interpolation
- Map Modification
- Transport Pathways

# Map Interpolation

- Based on groundwater vulnerability scores
- Variance analysis of the data
  - shows the distribution of the semi-variance by the distance between two points. The weight given to each of the closest data point that was going to be utilized for krigging of the data was selected by means of this analysis.
  - alternatively, default linear variogram where data points closer to the node were given a higher weight for interpolation, independently of the variance distribution.
- Data interpolation – krigging
- Vulnerable rate classification – High, Medium, Low

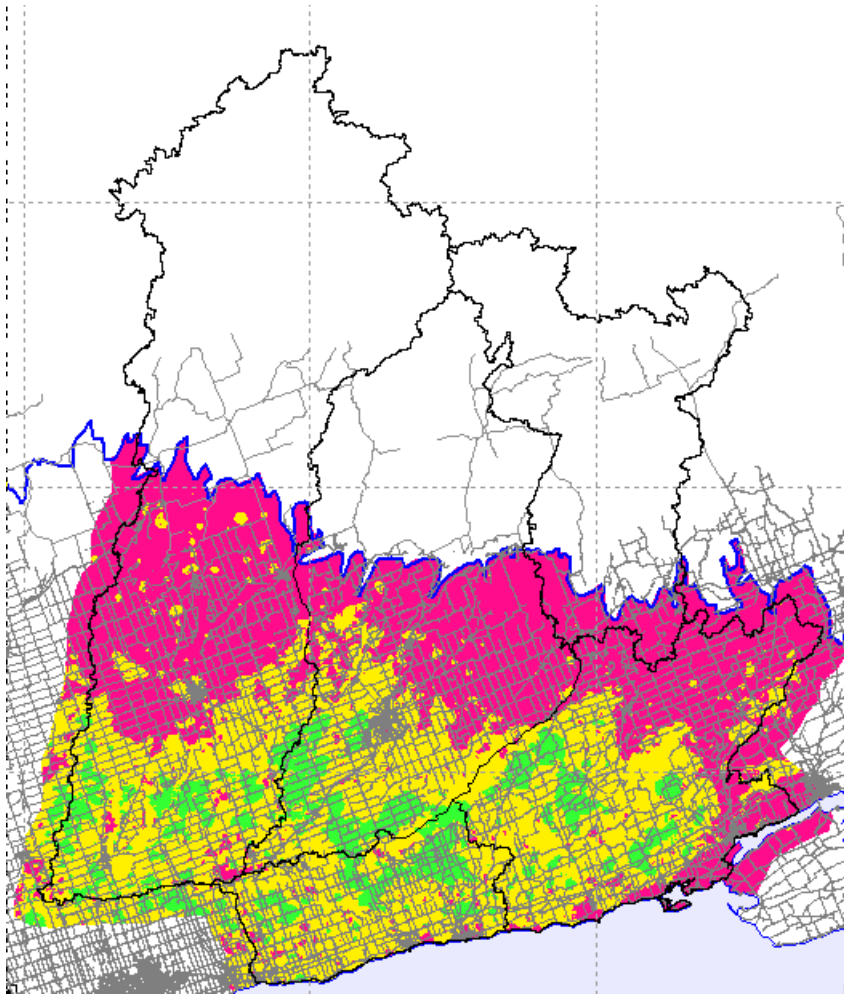
# Map Modification

- Based on the original generated maps
- Precambrian area
  - additional data (overburden thickness) from OGS included, however, not many (187 wells)
  - manual adjustment based on professional judgement
- Paleozoic and Precambrian areas
  - discrete areas smaller than 0.01 km<sup>2</sup> excluded

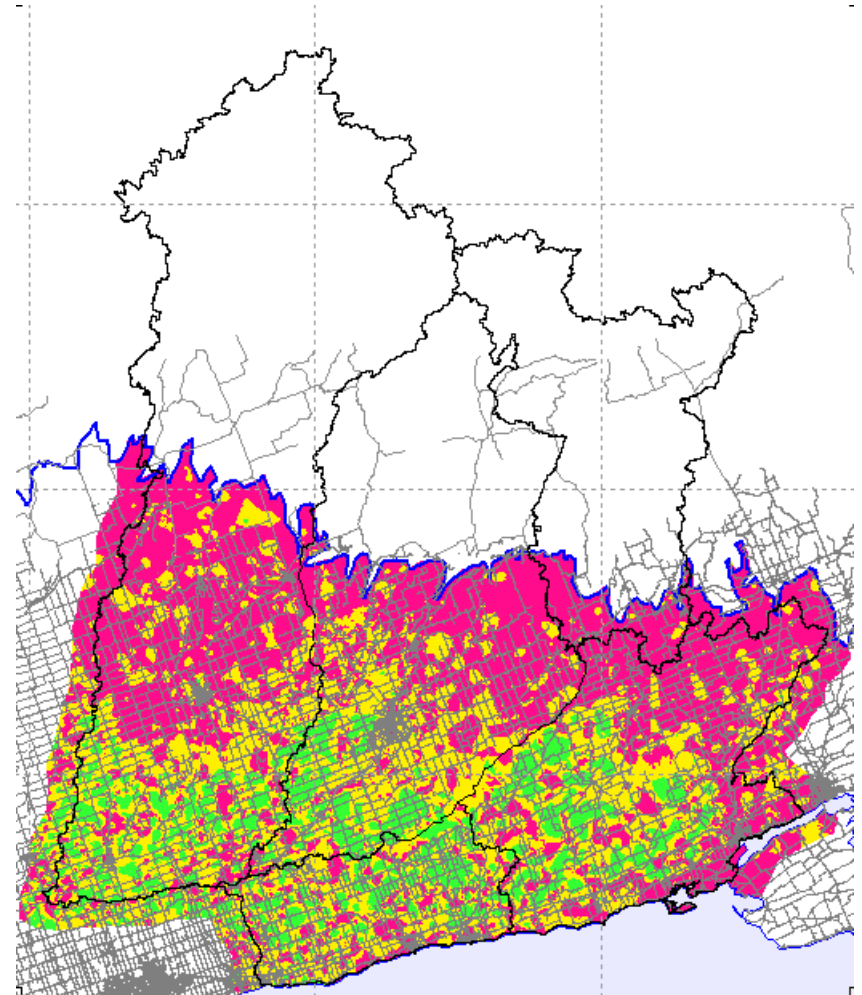
# Rate Increase at Transport Pathways

- Based on the modified maps
- In accordance with Technical Rules, Part IV (39 – 41)
- Wells older than 10 years
  - More risk due to likely poor construction of the wells
  - buffer zone of 30 m radius
- Pits and quarries
  - act as conduit for the movement of contaminant from surface to aquifers

# Paleozoic Study Area ISI (Modified and Transport Pathways Rate Increased)

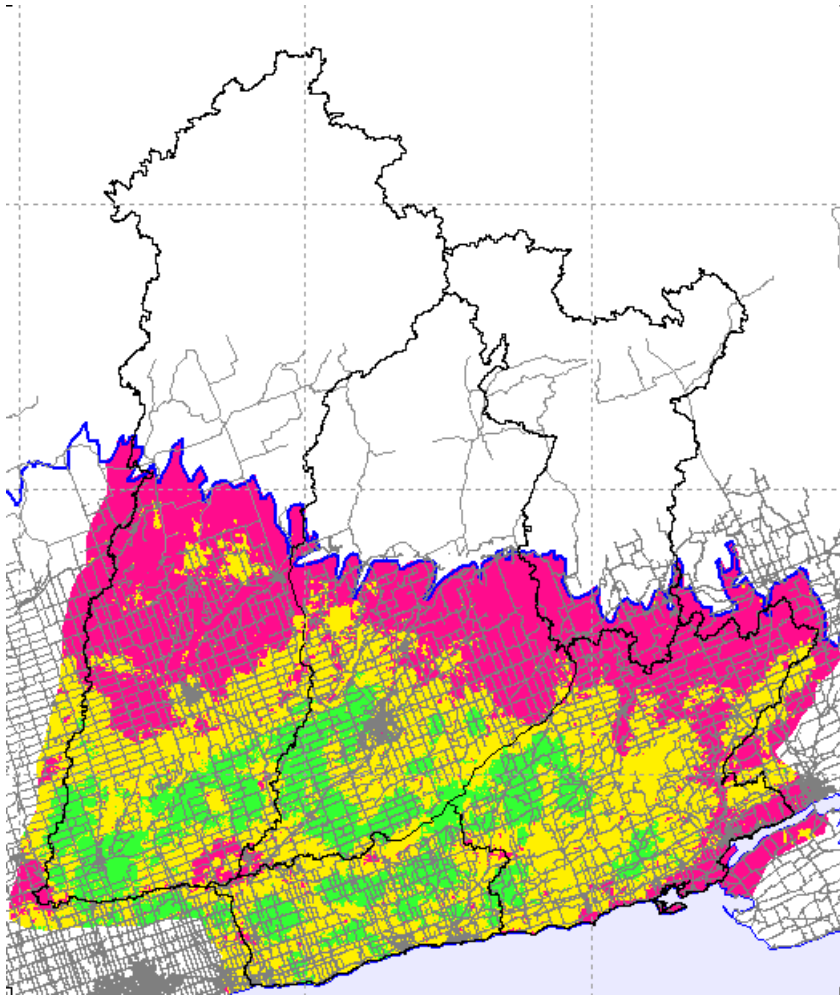


- Variance analysis

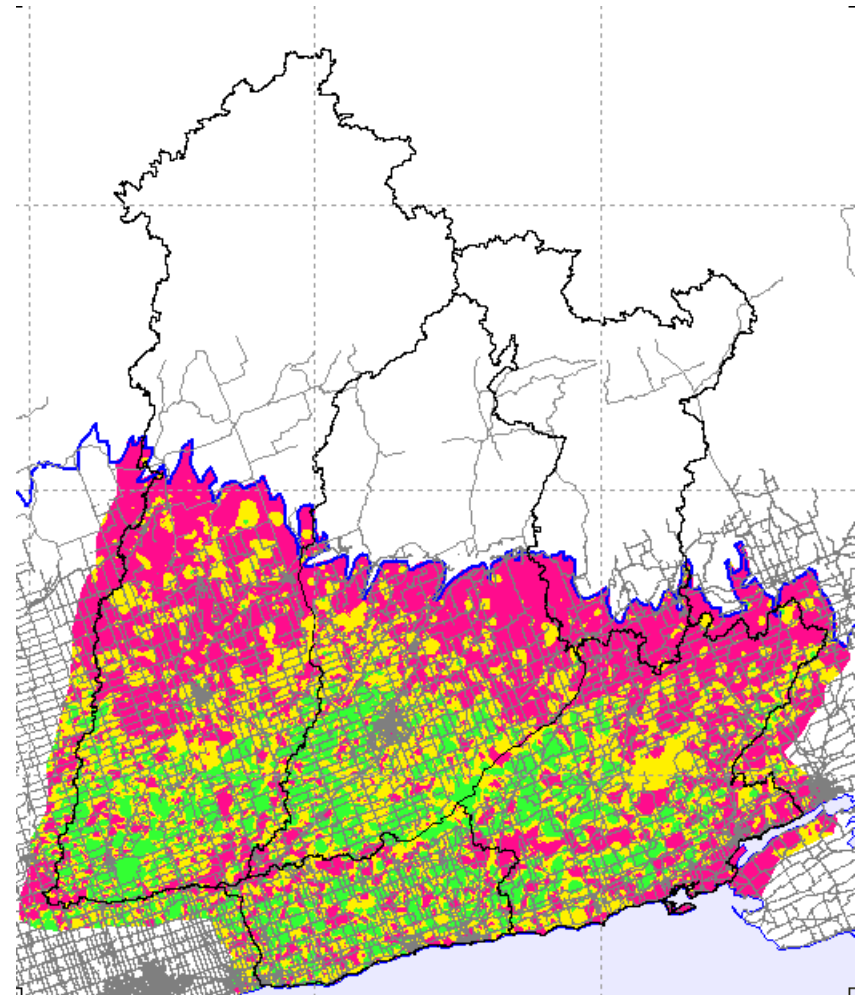


- Default linear

# Paleozoic Study Area AVI (Modified and Rate Increased)

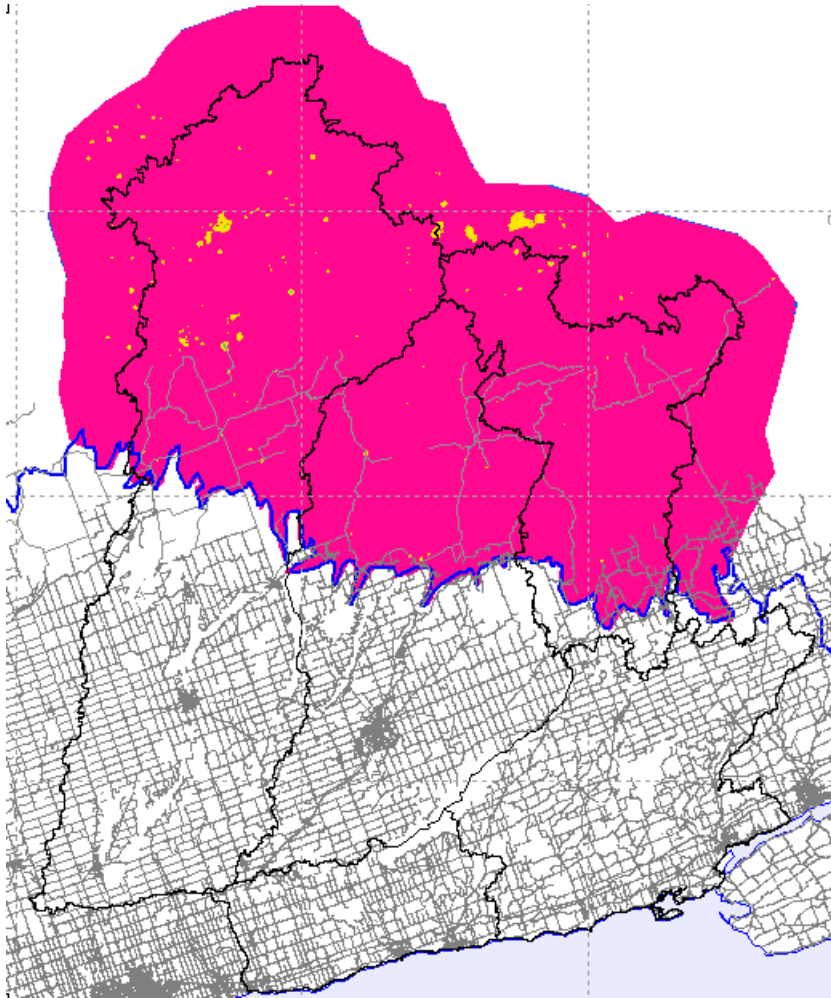


- Variance analysis

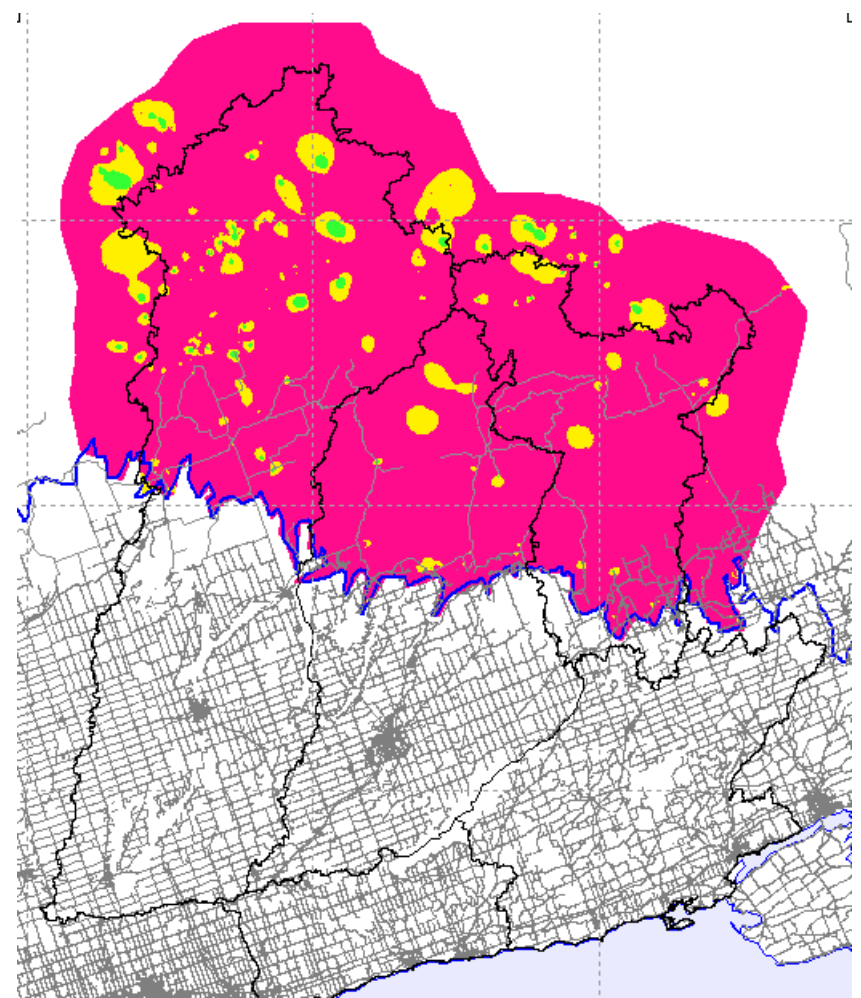


- Default linear

# Precambrian Study Area ISI (Modified and Rate Increased)



- Variance analysis

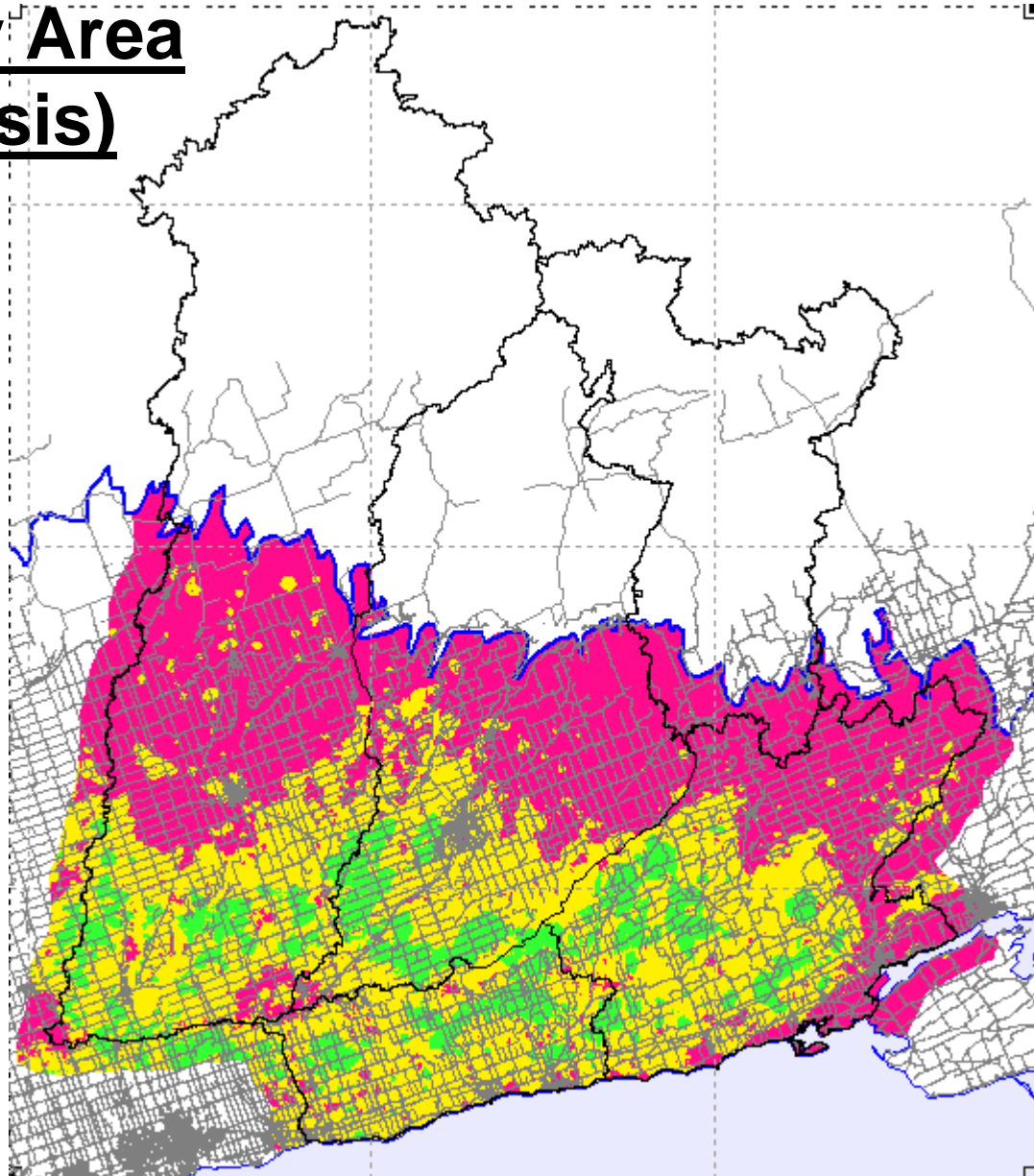


- Default linear

# Recommendations

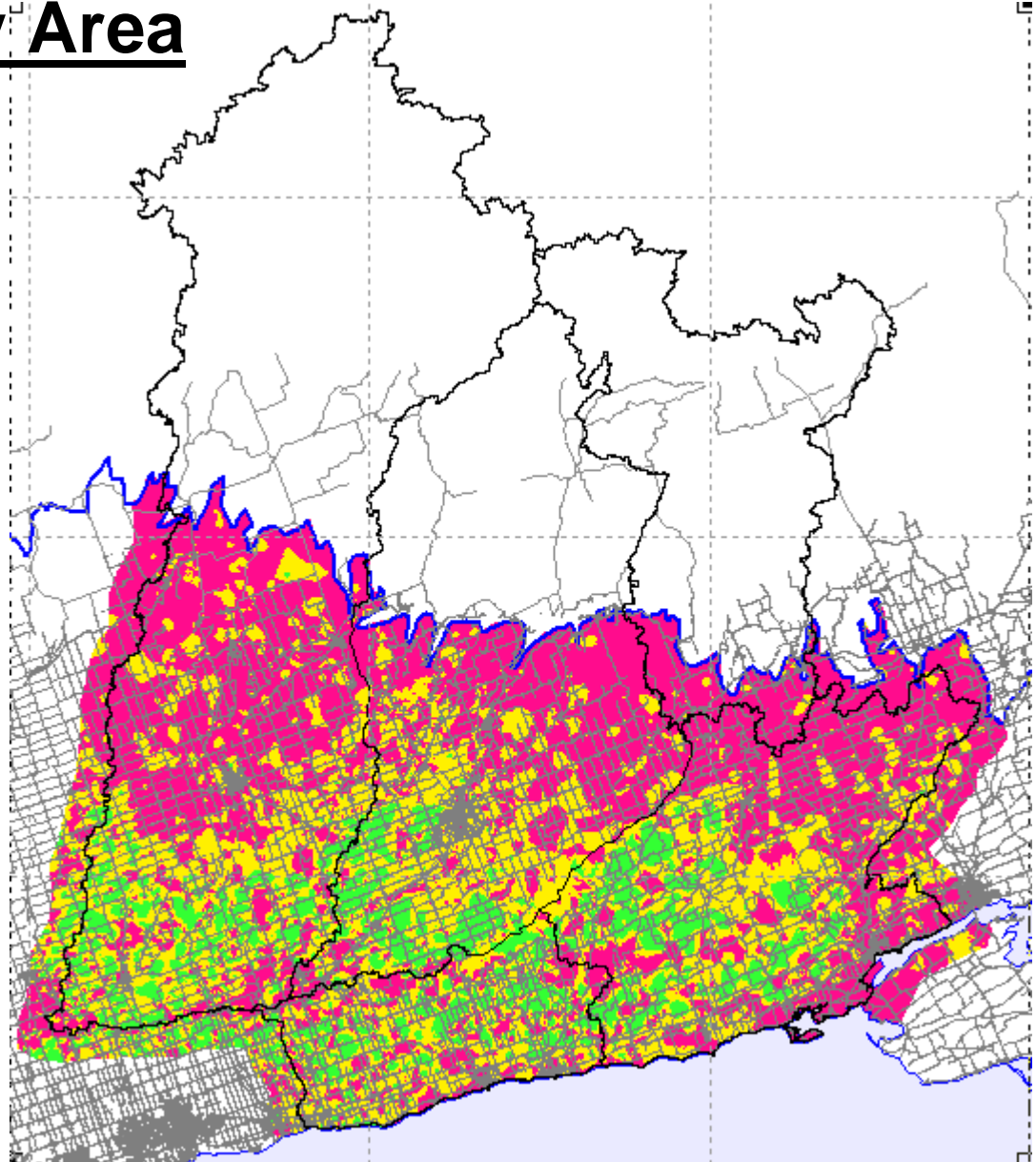
# Paleozoic Study Area (Variance Analysis)

- A merged map – AVI in ORM area, and ISI in the rest areas

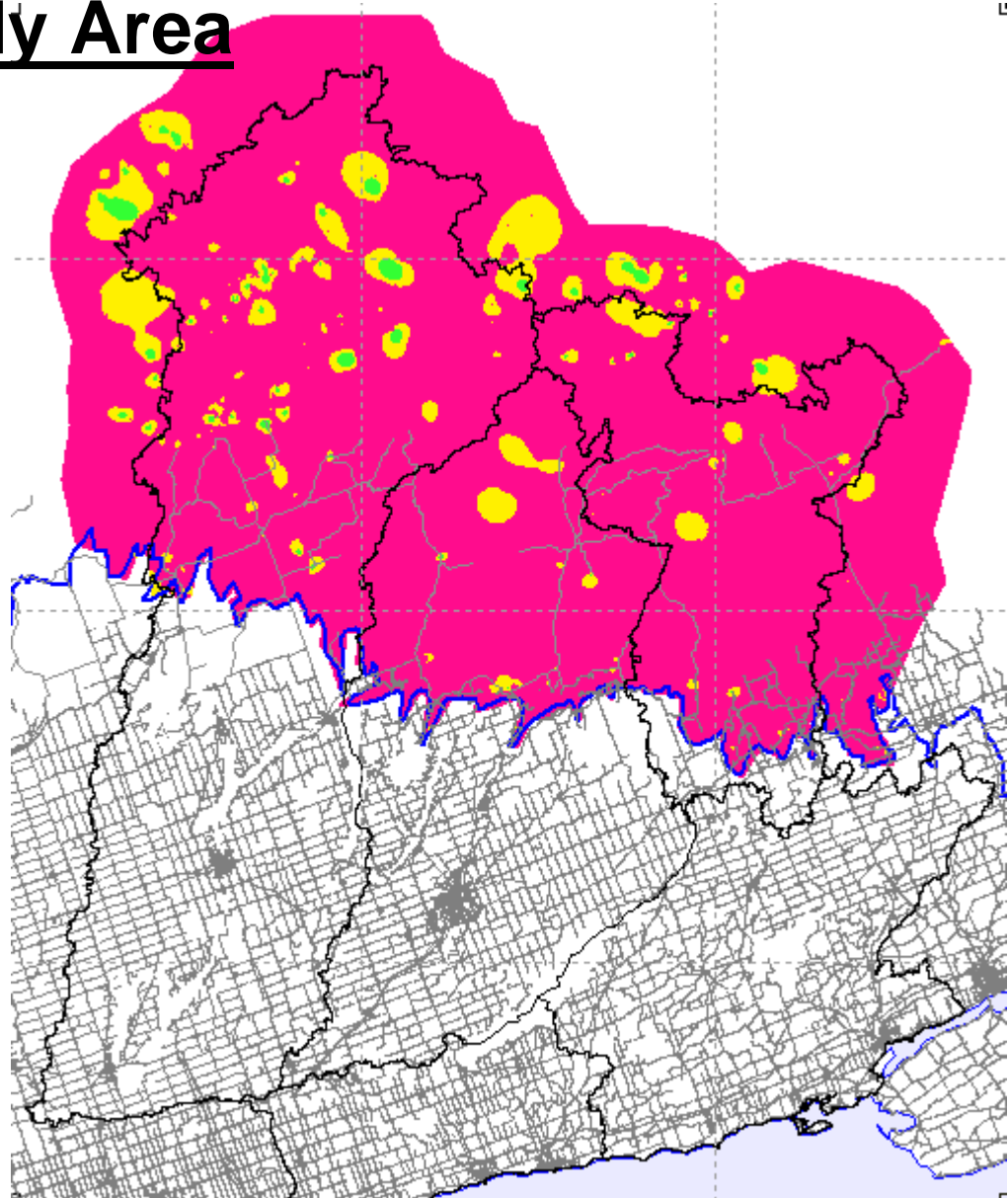


# Paleozoic Study Area (Default Linear)

- A merged map – AVI in ORM area, and ISI in the rest areas



# Precambrian Study Area (Default Linear)



# Thank You

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