

Moira River, Napanee Region
and Prince Edward Region Watersheds.
RR # 2, 2061 Old Highway # 2,
Belleville, Ontario, K8N 4Z2.
www.quinteconservation.ca. 613-968-3434

Legend

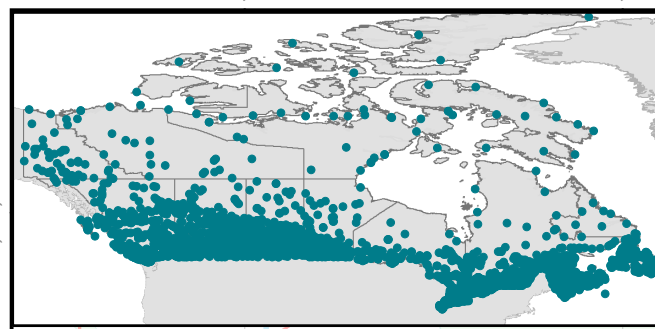
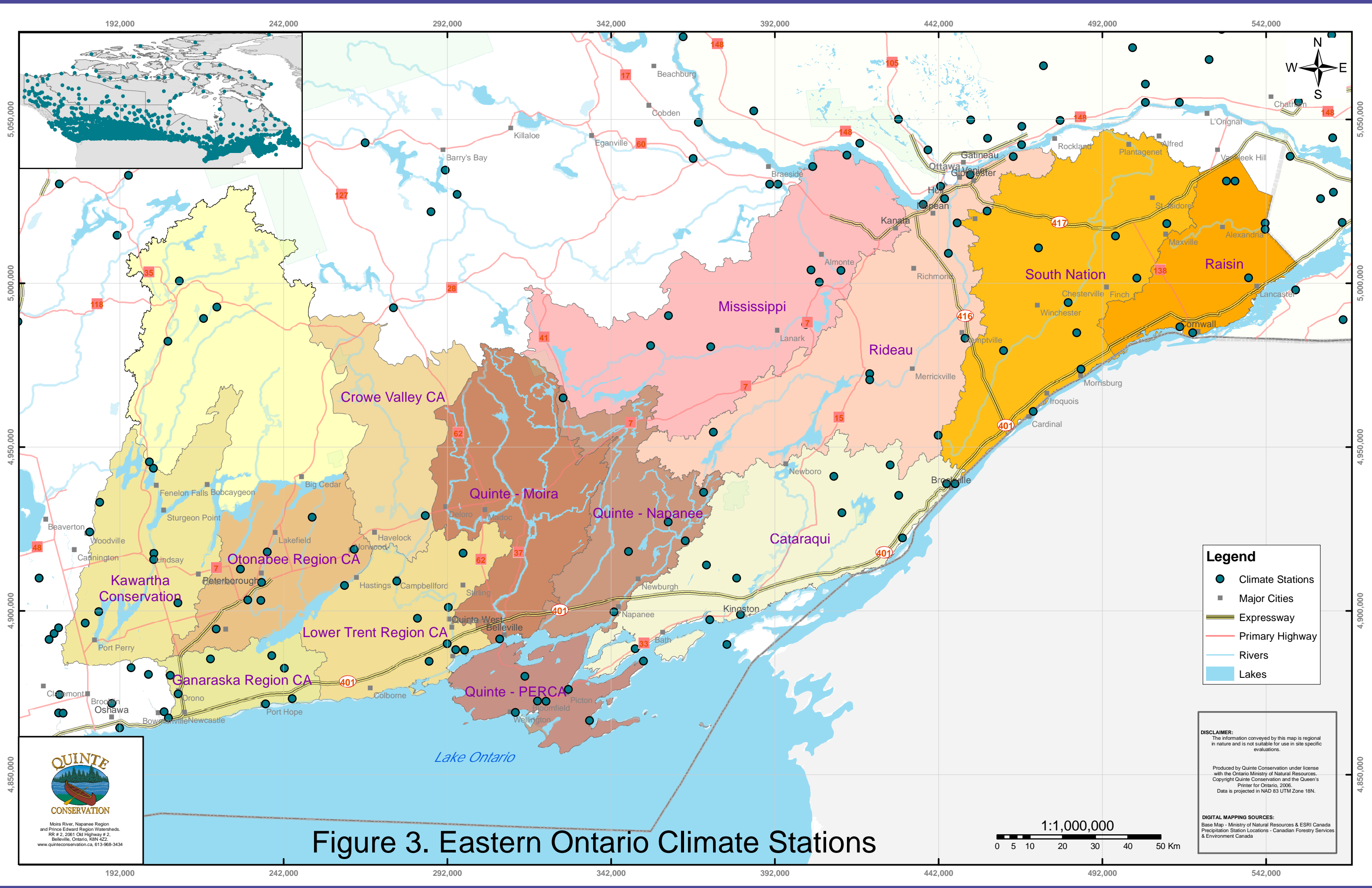
- Highway 401
- Rivers
- Populated Areas
- County Boundaries
- Highways
- Lakes
- Quinte Region Watersheds
- Township Boundaries

**Figure 1. Study Area Extents
and Watershed Divisions**

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DIGITAL MAPPING SOURCES:
Base Map - Ontario Ministry of Natural Resources
Index Map - ESRI



Legend

- Climate Stations
- Major Cities
- Expressway
- Primary Highway
- Rivers
- Lakes

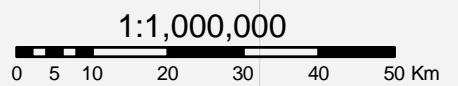
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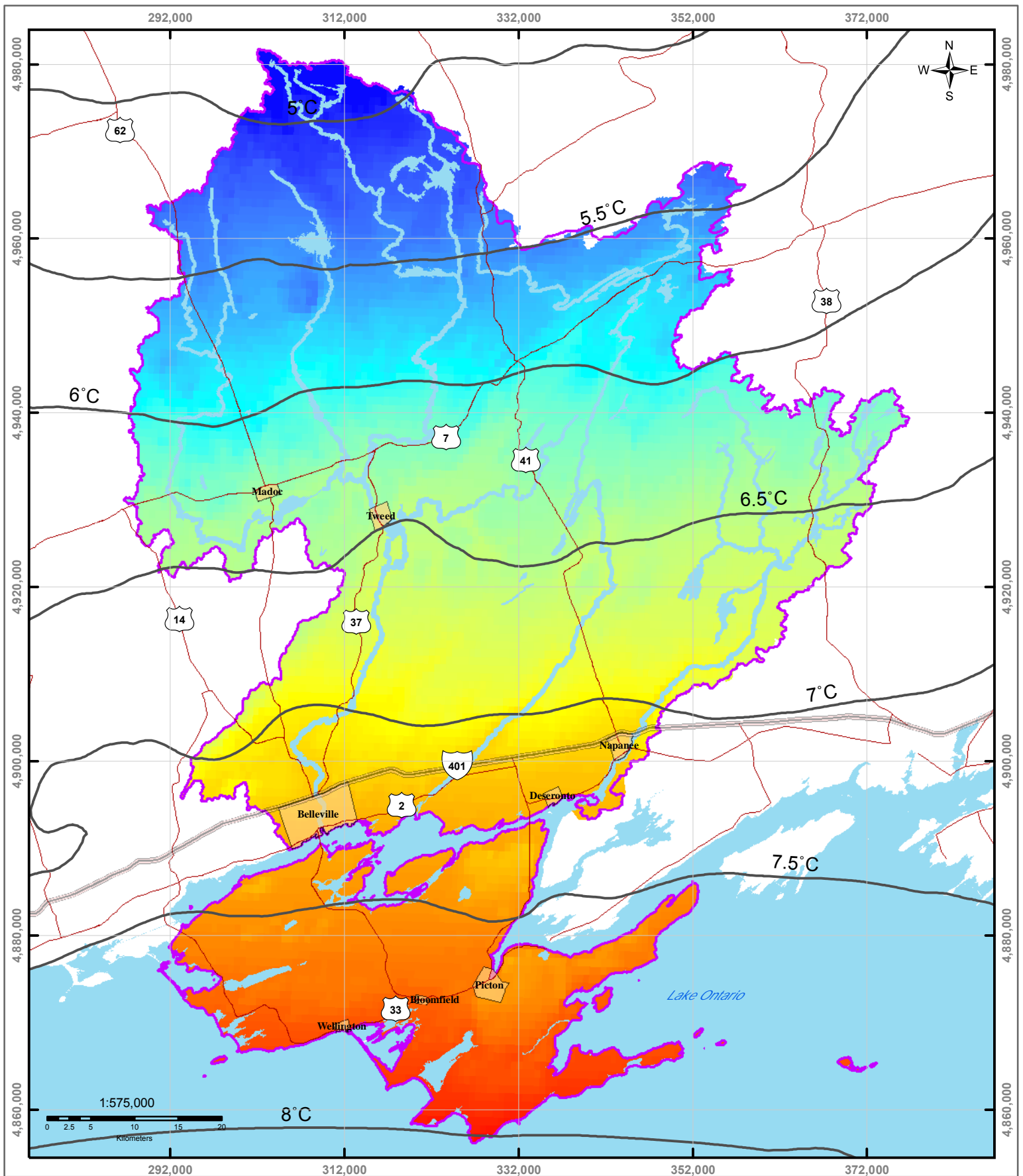
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DIGITAL MAPPING SOURCES:
 Base Map - Ministry of Natural Resources & ESRI Canada
 Precipitation Station Locations - Canadian Forestry Services & Environment Canada

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Figure 3. Eastern Ontario Climate Stations



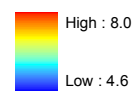


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Legend

- Highway 401 — Rivers — Populated Areas — Isolines (°C)
- Highways — Lakes — Quinte Region

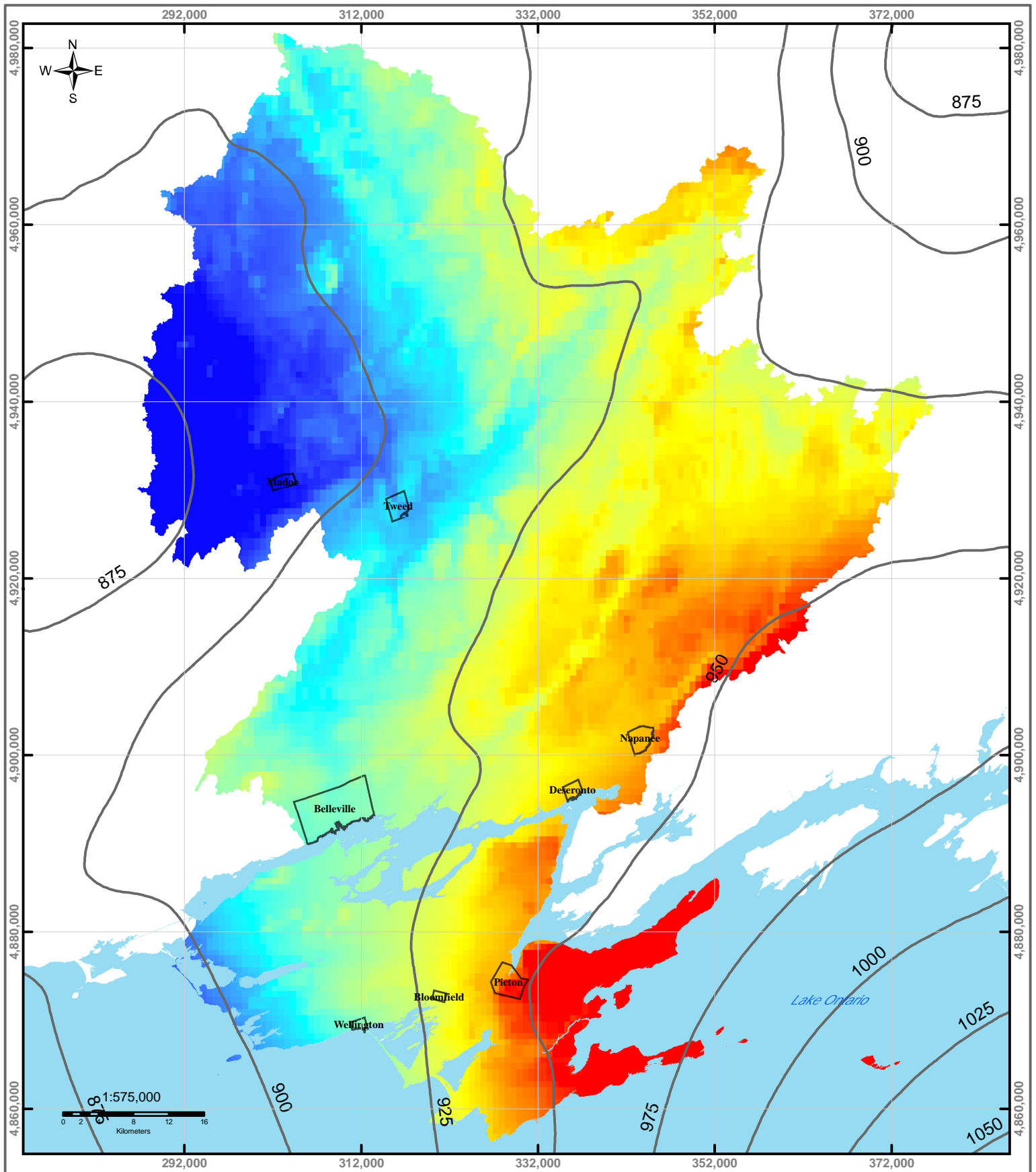
Temperature (°C)



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DIGITAL MAPPING SOURCES:
 Base Map - Ontario Ministry of Natural Resources
 Mean Annual Temperature - Canadian Forestry Services

Figure 4. Mean Annual Temperature



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Legend

— Precipitation Isolines (Interval 25mm)

Precipitation (mm)

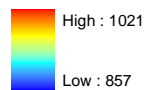


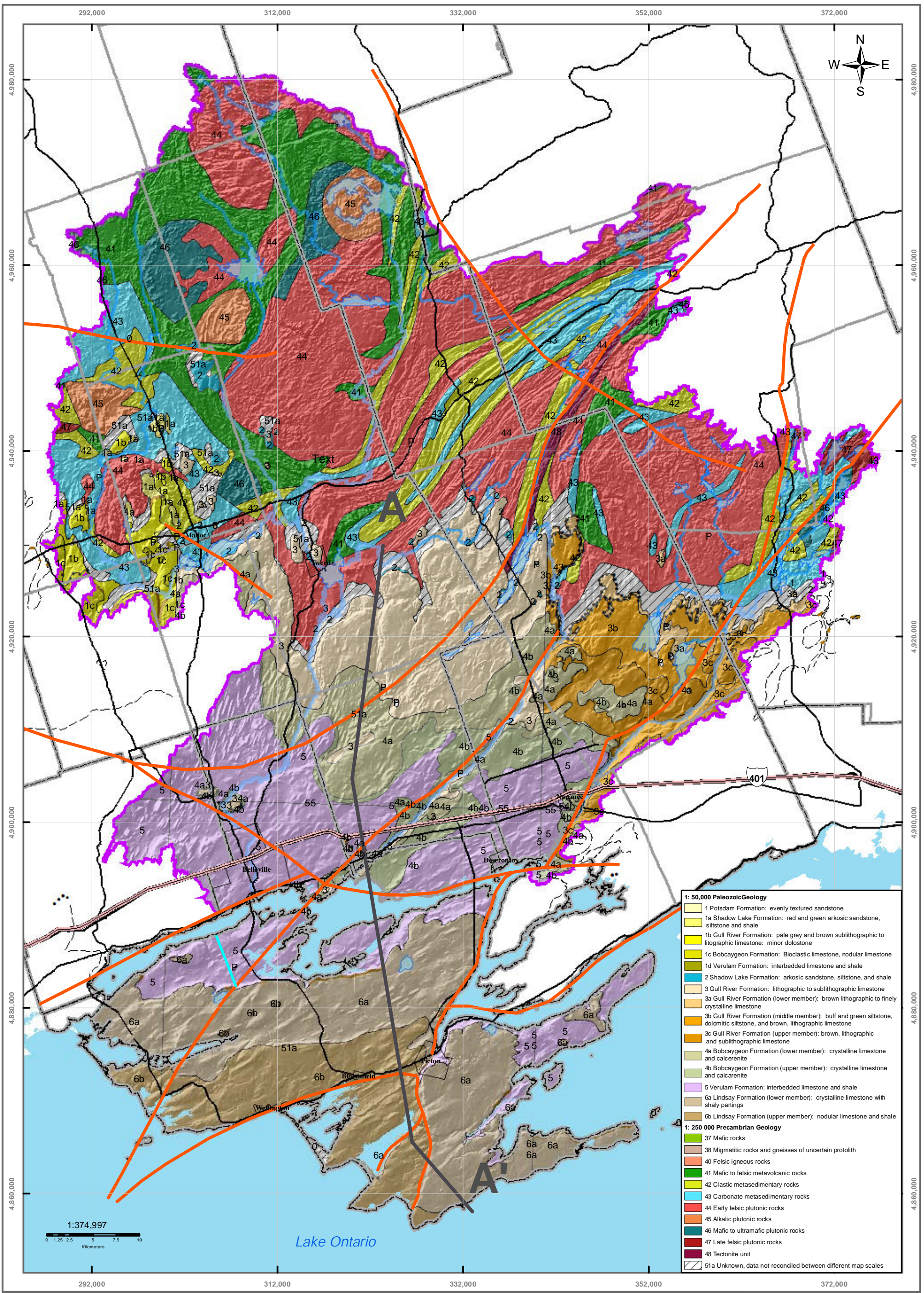
Figure 5. Mean Annual Precipitation

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DIGITAL MAPPING SOURCES:

Base Map - Ontario Ministry of Natural Resources
Index Map - ESRI Canada
Mean Annual Precipitation - Canadian Forestry Services



- 1: 50,000 Paleozoic Geology**
- 1 Potsdam Formation: evenly textured sandstone
 - 1a Shadow Lake Formation: red and green arkosic sandstone, siltstone and shale
 - 1b Gull River Formation: pale grey and brown sublitographic to litographic limestone: minor dolostone
 - 1c Bobcaygeon Formation: Bioclastic limestone, nodular limestone
 - 1d Verulam Formation: interbedded limestone and shale
 - 2 Shadow Lake Formation: arkosic sandstone, siltstone, and shale
 - 3 Gull River Formation: lithographic to sublitographic limestone
 - 3a Gull River Formation (lower member): brown lithographic to finely crystalline limestone
 - 3b Gull River Formation (middle member): buff and green siltstone, dolomitic siltstone, and brown, lithographic limestone
 - 3c Gull River Formation (upper member): brown, lithographic and sublitographic limestone
 - 4a Bobcaygeon Formation (lower member): crystalline limestone and calcarenite
 - 4b Bobcaygeon Formation (upper member): crystalline limestone and calcarenite
 - 5 Verulam Formation: interbedded limestone and shale
 - 6a Lindsay Formation (lower member): crystalline limestone with shaly partings
 - 6b Lindsay Formation (upper member): nodular limestone and shale
- 1: 250 000 Precambrian Geology**
- 37 Mafic rocks
 - 38 Migmatitic rocks and gneisses of uncertain protolith
 - 40 Felsic igneous rocks
 - 41 Mafic to felsic metavolcanic rocks
 - 42 Clastic metasedimentary rocks
 - 43 Carbonate metasedimentary rocks
 - 44 Early felsic plutonic rocks
 - 45 Alkalic plutonic rocks
 - 46 Mafic to ultramafic plutonic rocks
 - 47 Late felsic plutonic rocks
 - 48 Tectonite unit
 - 51a Unknown, data not reconciled between different map scales

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- Legend**
- Approximate_Faults
 - Interpreted_Faults
 - Lakes
 - QC Region
 - - - Geological Boundary - position approximate
 - Highway 401
 - County Boundaries
 - Geological Boundary - position interpreted
 - Highways
 - Township Boundaries
 - Geological Boundary - observed
 - Rivers
 - Populated Areas

Figure 7. Bedrock Geology

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DIGITAL MAPPING SOURCES:
Base Map - Ministry of Natural Resources
Bedrock Geology - Ministry of Natural Resources & Ontario Geological Survey



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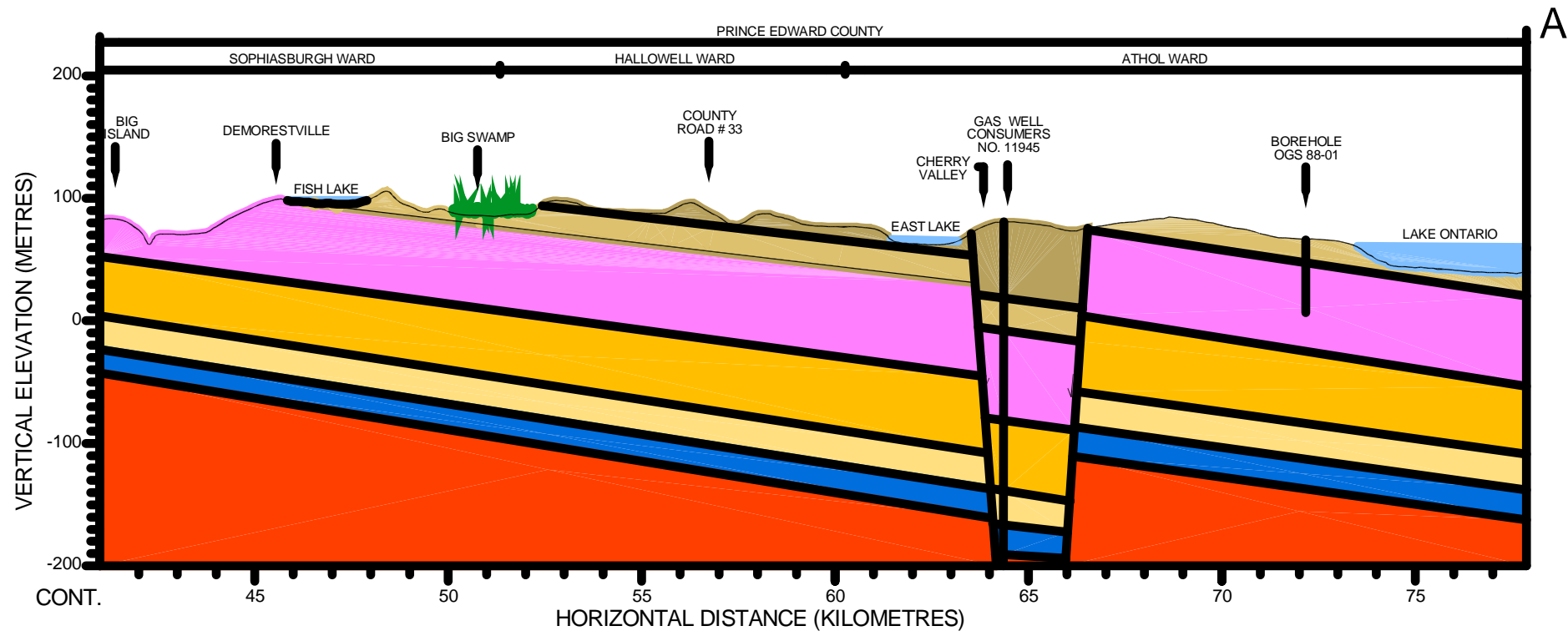
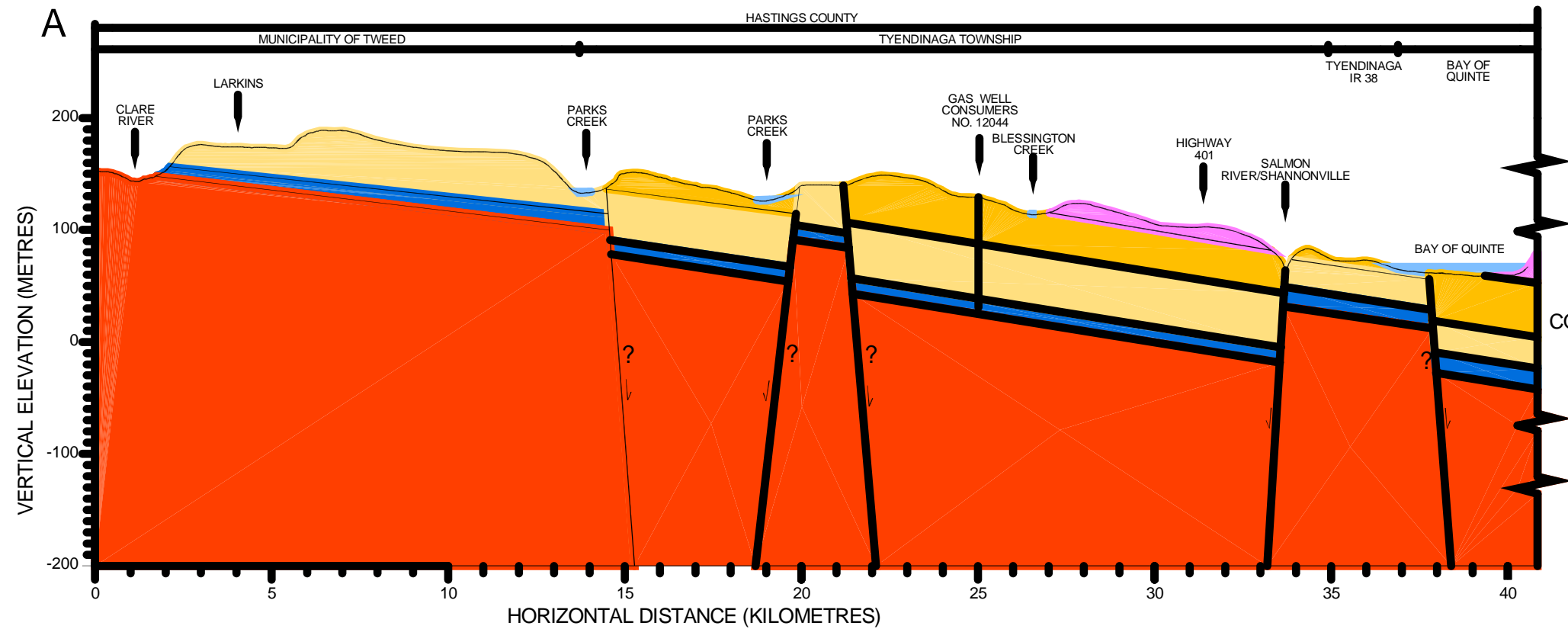
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DATA SOURCES:
QUINTE REGIONAL GROUNDWATER STUDY 2004
DILLON CONSULTING

**Figure 8. Bedrock Geology
Cross Section**

NOTE:

- 1) SEE BEDROCK GEOLOGY MAP FOR SECTION LOCATIONS.
- 2) SECTION A-A' ADAPTED FROM BELANGER, 2001
- 3) VERTICAL ELEVATION IN METRES ABOVE SEA LEVEL.
- 4) BOREHOLE GEOLOGY TAKEN FROM WILLIAMS, 1991 AND M.O.E. WATER WELL INFORMATION SYSTEM.
- 5) VERTICAL EXAGGERATION IS 25X.



LEGEND

? FAULT UNCERTAIN ↓ DIRECTION OF DISPLACEMENT

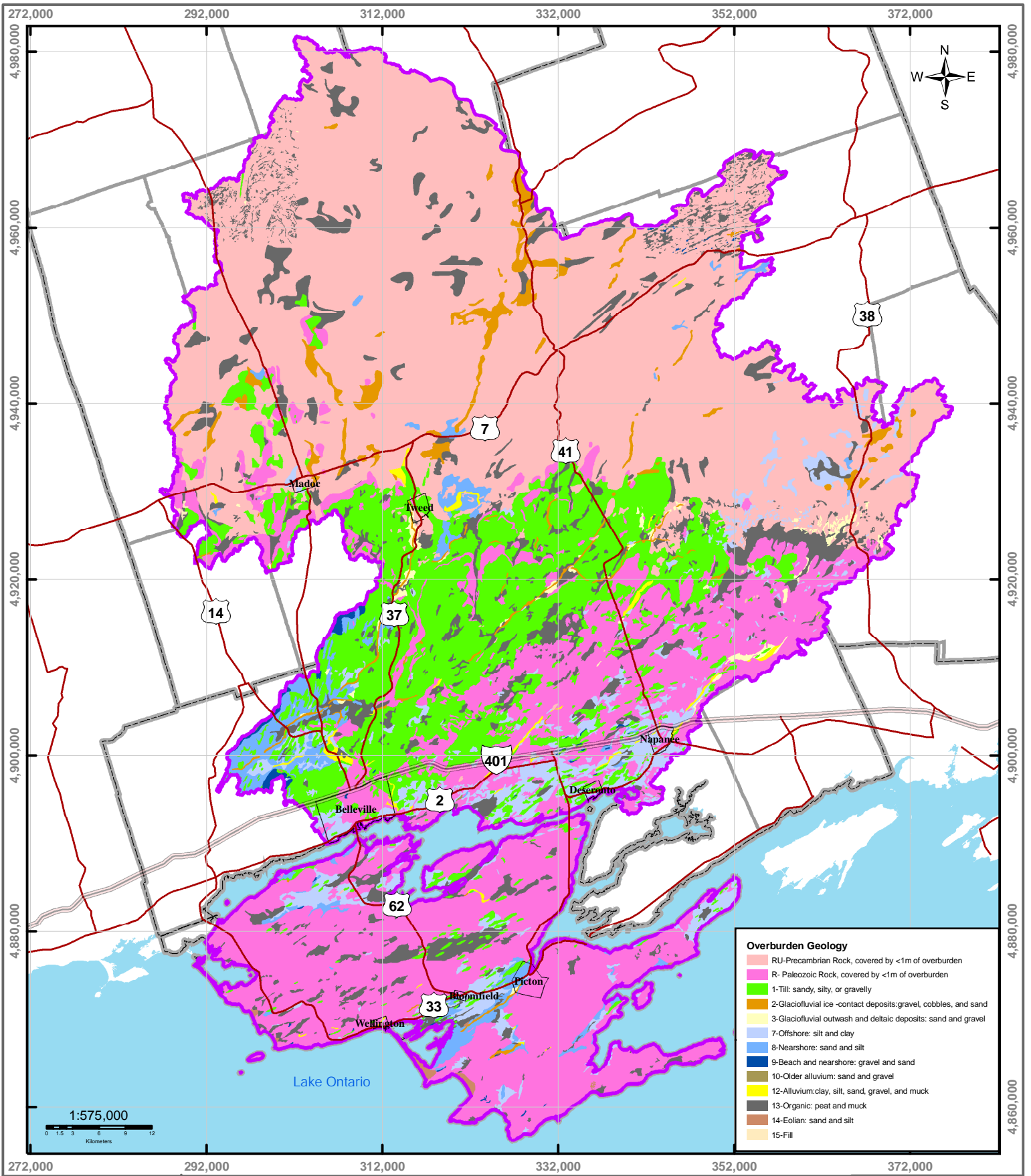
FORMATIONS

- LINDSAY (upper-limestone and shale)
- GULL RIVER (limestone)
- LINDSAY (lower - limestone)
- SHADOW LAKE (dolostone and sandstone)
- VERULAM (limestone and shale)
- BOBCAYGEON (limestone)
- PRECAMBRIAN Shield (igneous & metamorphic rocks)

SECTION A - A' FEBRUARY, 2004

BEDROCK GEOLOGICAL CROSS SECTION PROJECT NO.: 03-1813

QUINTE REGIONAL GROUNDWATER STUDY



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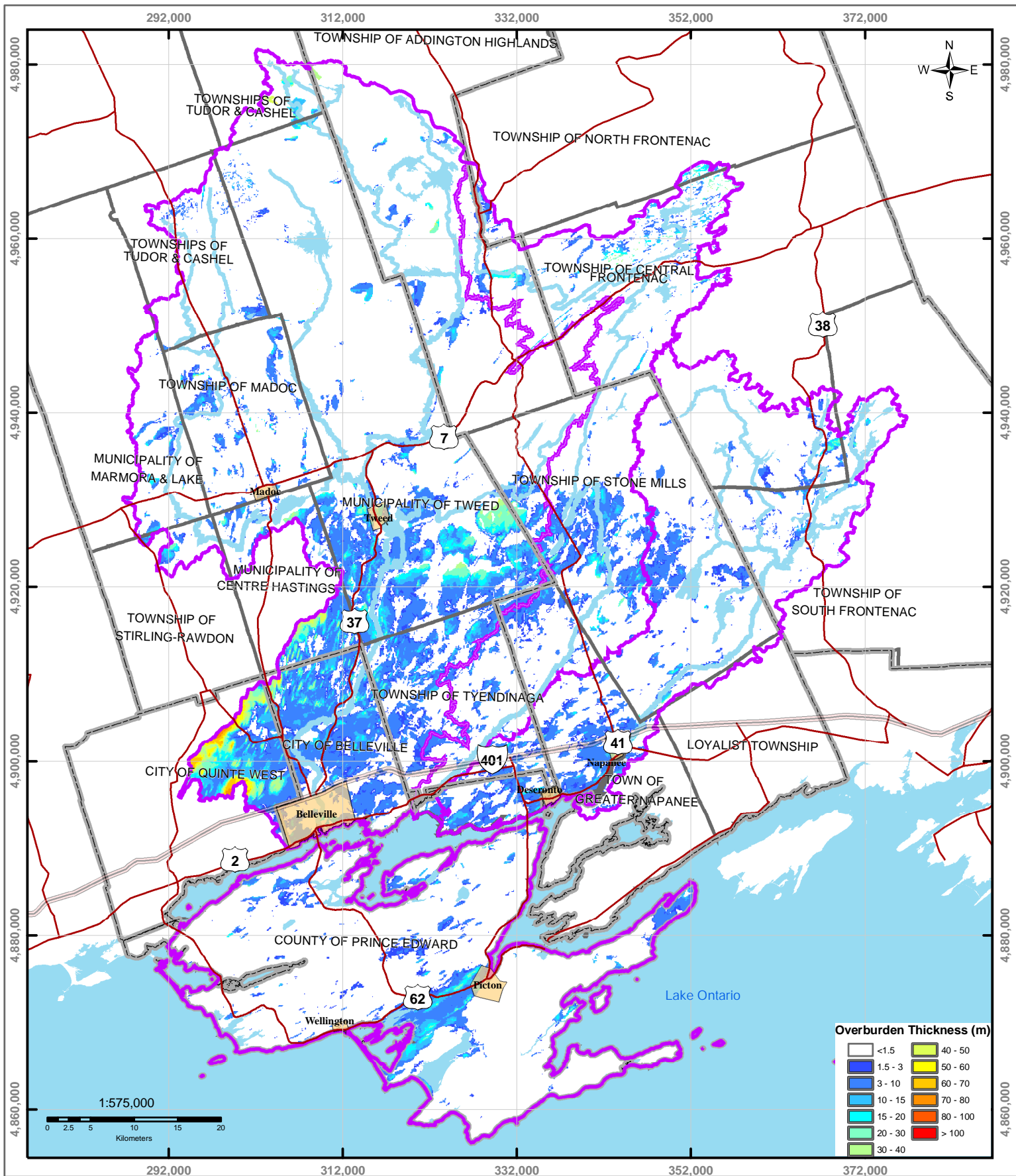
- Legend**
- Highway 401
 - Rivers
 - Populated Areas
 - County Boundaries
 - Highways
 - Lakes
 - Quinte Region
 - Township Boundaries

Figure 9. Overburden Geology

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DIGITAL MAPPING SOURCES:
Base Map - Ontario Ministry of Natural Resources
Overburden Geology - Dillon Consulting



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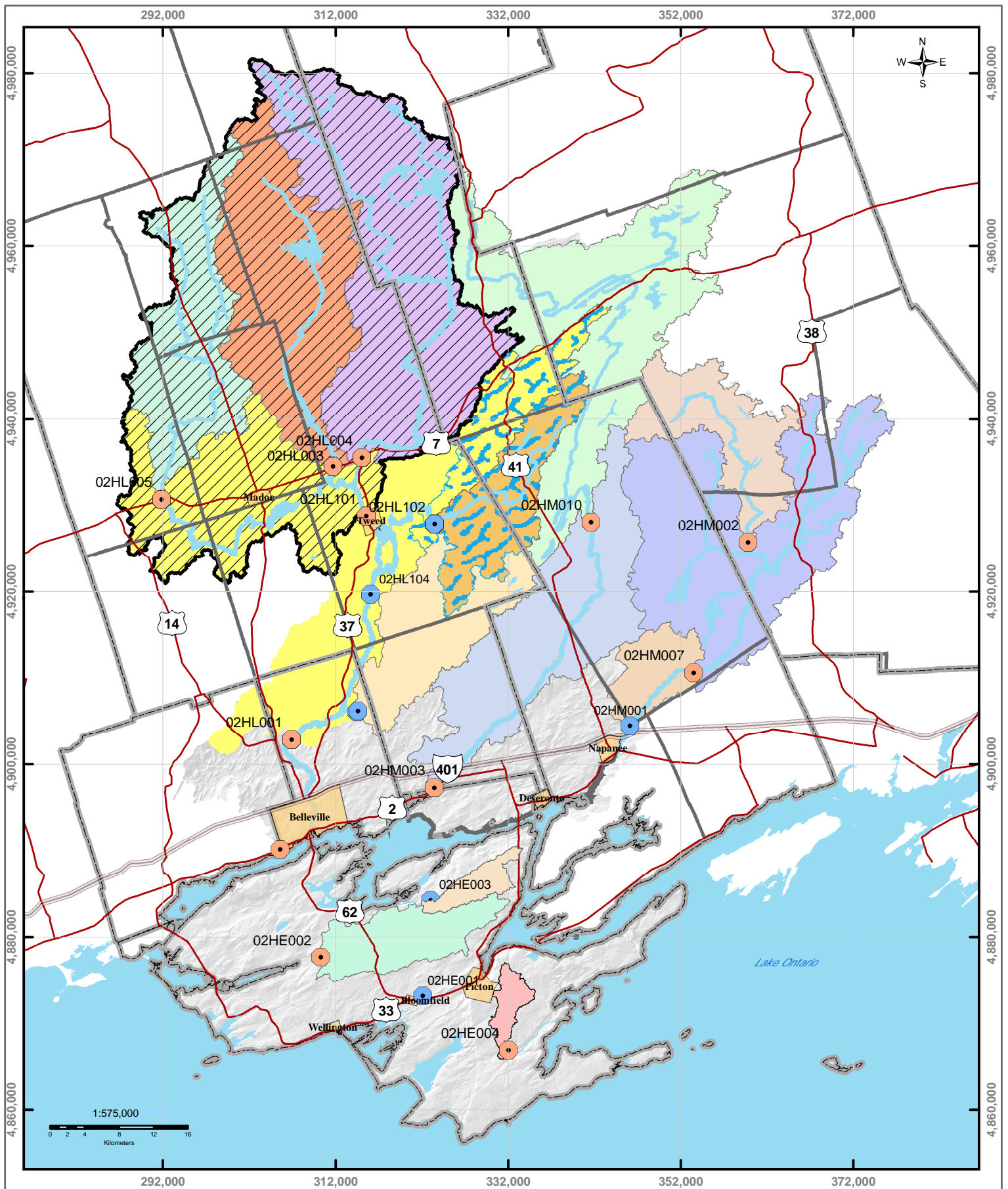
Legend

- Highway 401
- Rivers
- Populated Areas
- County Boundaries
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- Lakes
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Figure 10. Overburden Thickness

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Base Map - Ontario Ministry of Natural Resources
Overburden Thickness - Dillon Consulting



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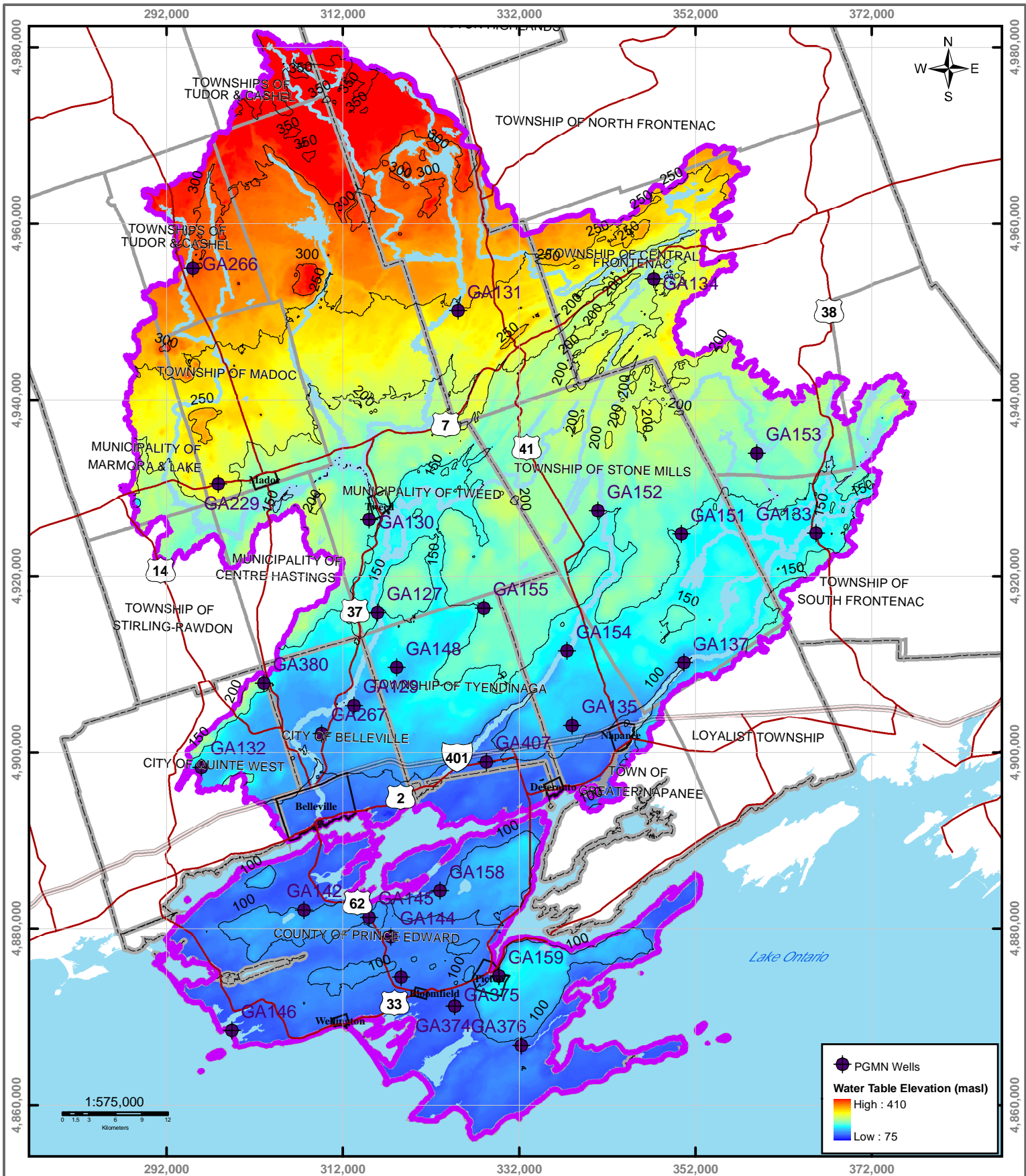
- Inactive Gauges
- Active Stream Gauges
- Milford catchment
- Consequon catchment
- Depot catchment
- Camden catchment
- Demoretsville
- Tweed catchment
- Tamworth catchment
- Skootamatta catchment
- Clare catchment
- Clare catchment2
- Deloro catchment
- Napanee catchment
- Shannonville catchment
- Black catchment
- Parks catchment
- Parks catchment2
- Foxboro catchment



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DIGITAL MAPPING SOURCES:
Base Map - Ontario Ministry of Natural Resources
Digital Elevation Model - Ministry of Natural Resources
Subcatchments - Derived using ArcHydro

Figure 12. Flow Monitoring Stations and Catchments



 PGMN Wells
Water Table Elevation (masl)

 High : 410
 Low : 75









- Legend*
-  Highway 401
 -  Rivers
 -  Populated Areas
 -  County Boundaries
 -  Highways
 -  Lakes
 -  Quinte Region
 -  Township Boundaries

Figure 13. Water Table Elevation

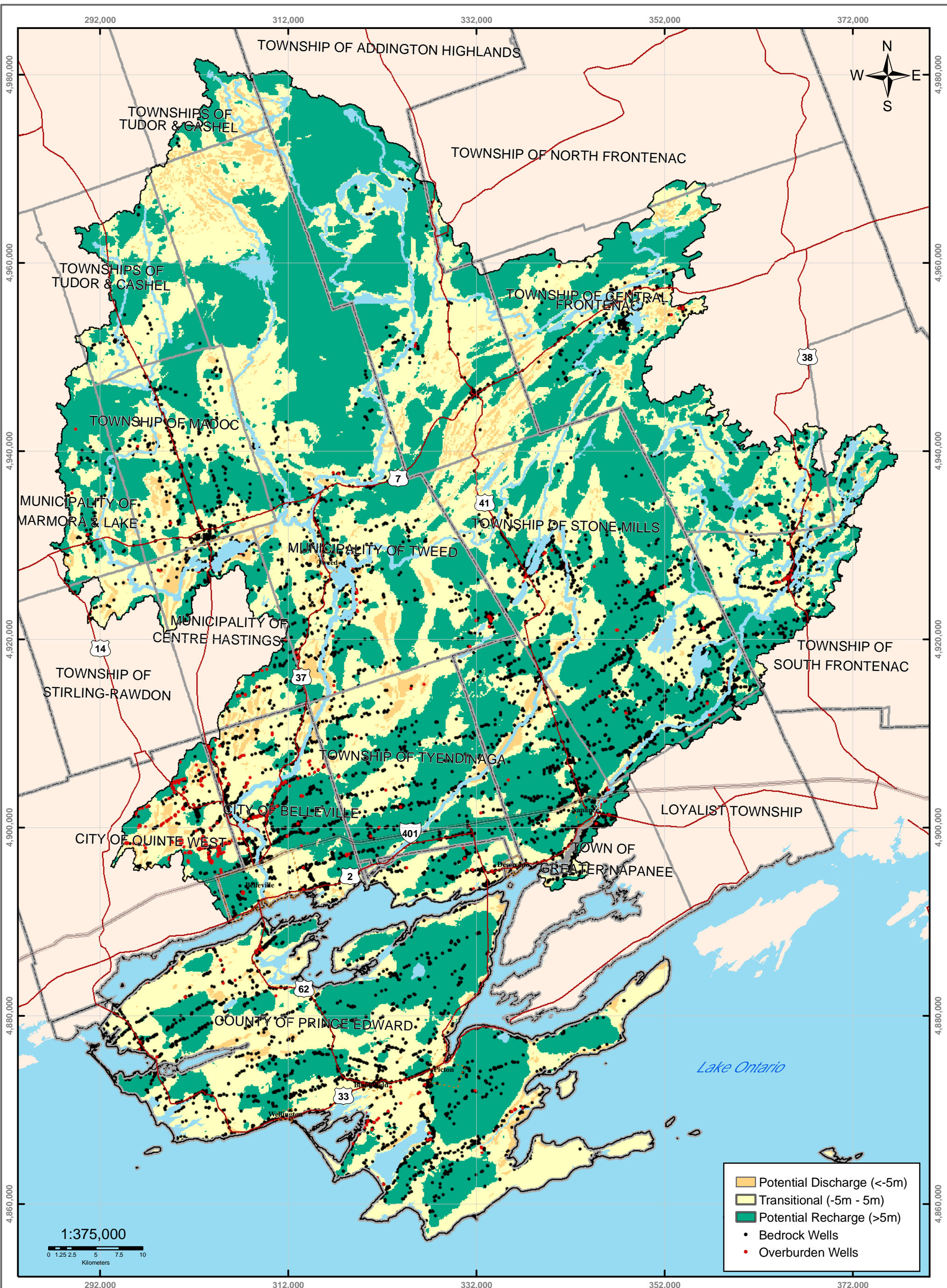
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DIGITAL MAPPING SOURCES:
 Base Map - Ontario Ministry of Natural Resources
 Water Table Elevation - Dillon Consulting



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	Potential Discharge (<math><-5\text{m}</math>)
	Transitional ($-5\text{m} - 5\text{m}$)
	Potential Recharge (>5m)
	Bedrock Wells
	Overburden Wells



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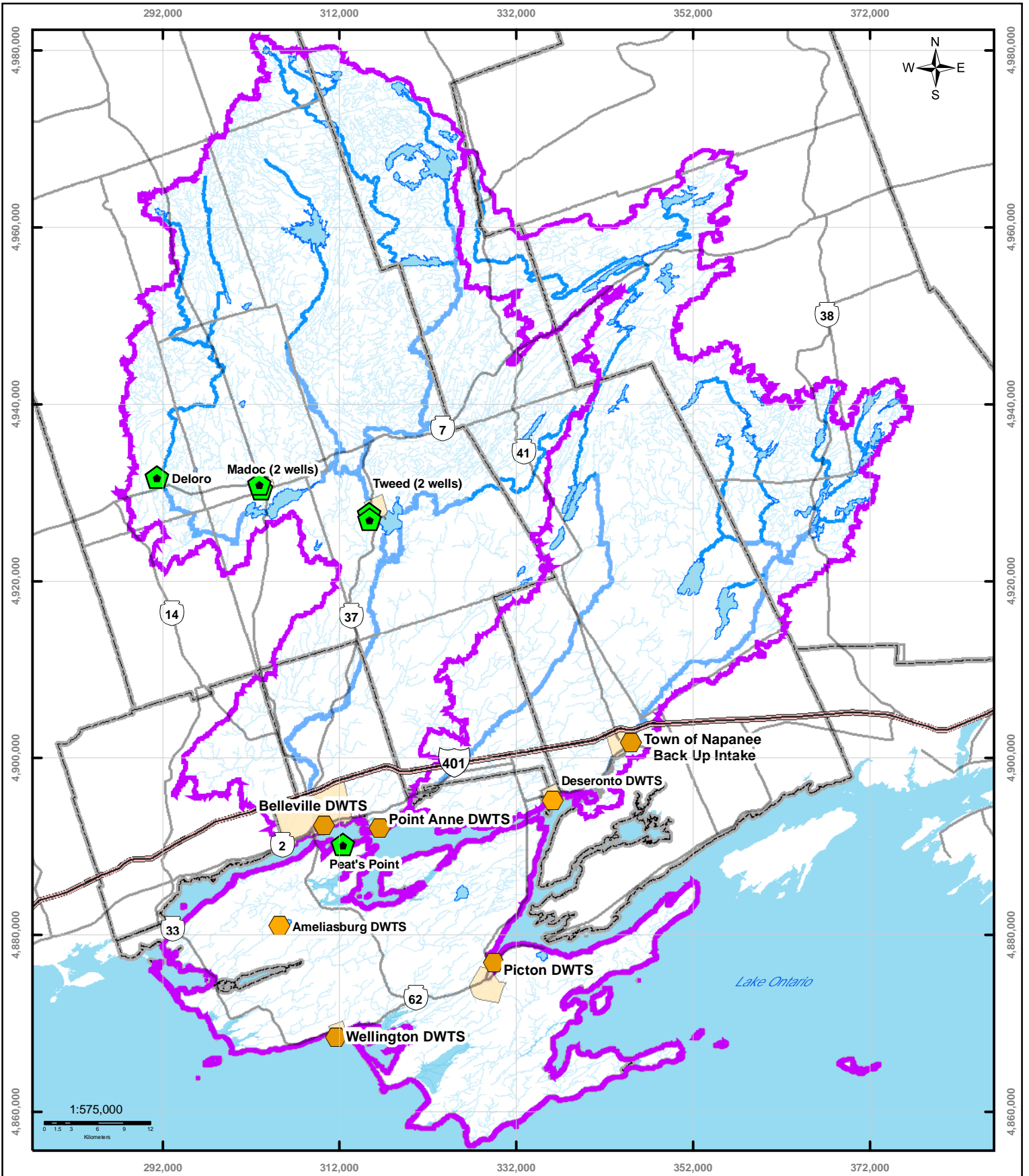
- | | | | | | | | |
|--|-------------|--|--------|--|-----------------|--|---------------------|
| | Highway 401 | | Rivers | | Populated Areas | | County Boundaries |
| | Highways | | Lakes | | Quinte Region | | Township Boundaries |

Figure 14. Groundwater Recharge

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DIGITAL MAPPING SOURCES:
 Base Map - Ontario Ministry of Natural Resources
 Discharge/Recharge Areas - Dillon Consulting
 Well Locations - MOE /Dillon Consulting



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Legend

- Municipal Wells
- Surface Water Intakes
- Highway 401
- Highways
- Rivers
- Lakes
- County Boundaries
- Township Boundaries
- Populated Areas
- Quinte Watersheds

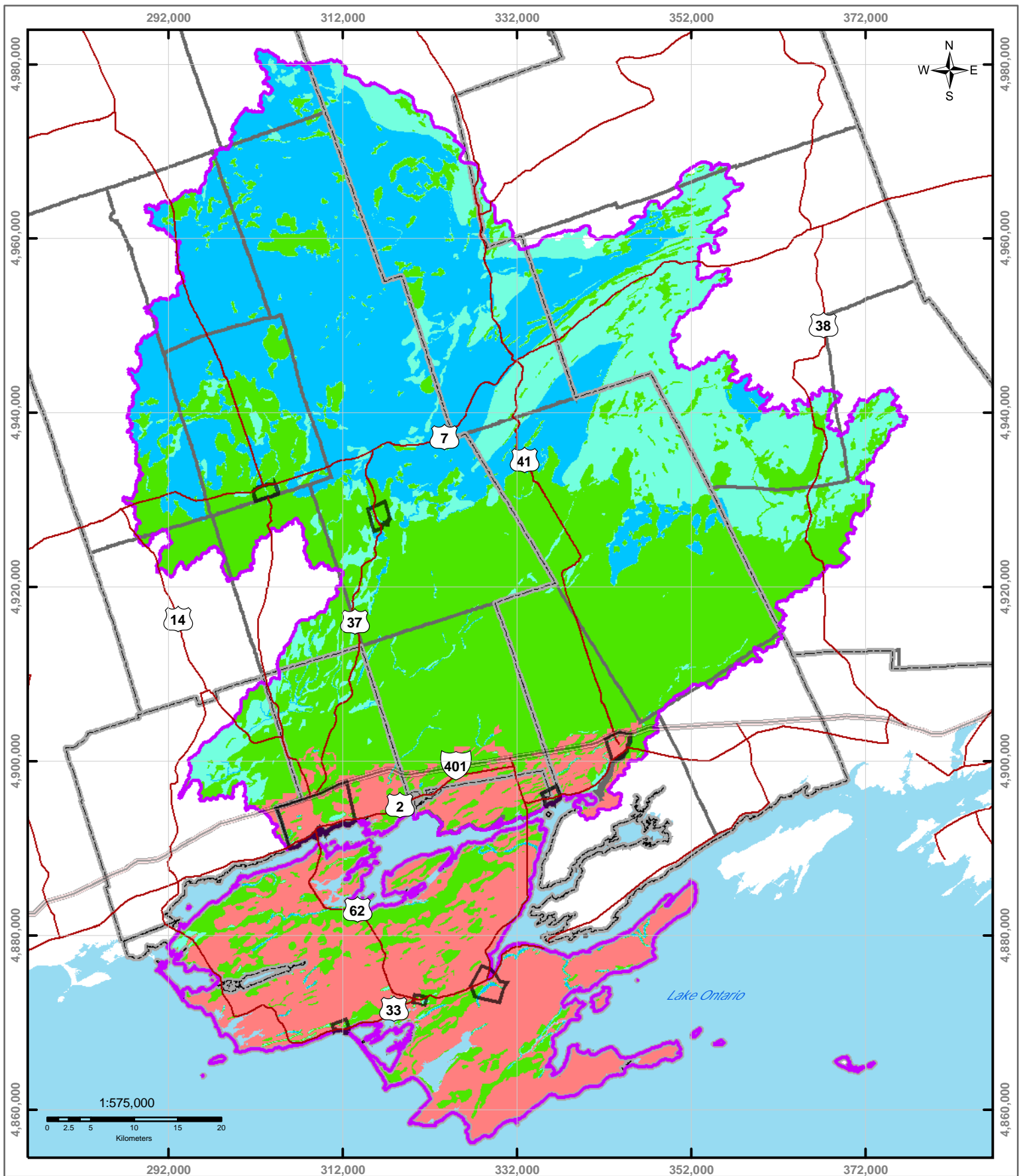
Figure 16. Municipal Groundwater Wells and Surface Water Intakes

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DIGITAL MAPPING SOURCES:
Digital Mapping Sources:
Base Map - Ontario Ministry of Natural Resources
Surface Water Intakes - Ontario Ministry of the Environment
Municipal Wells - Dillon Consulting

* Surface Water Intake Locations include both groundwater and non-retained data



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Legend

- Highway 401
- Highways
- Populated Areas
- Quinte Region
- County Boundaries
- Township Boundaries

Annual Actual

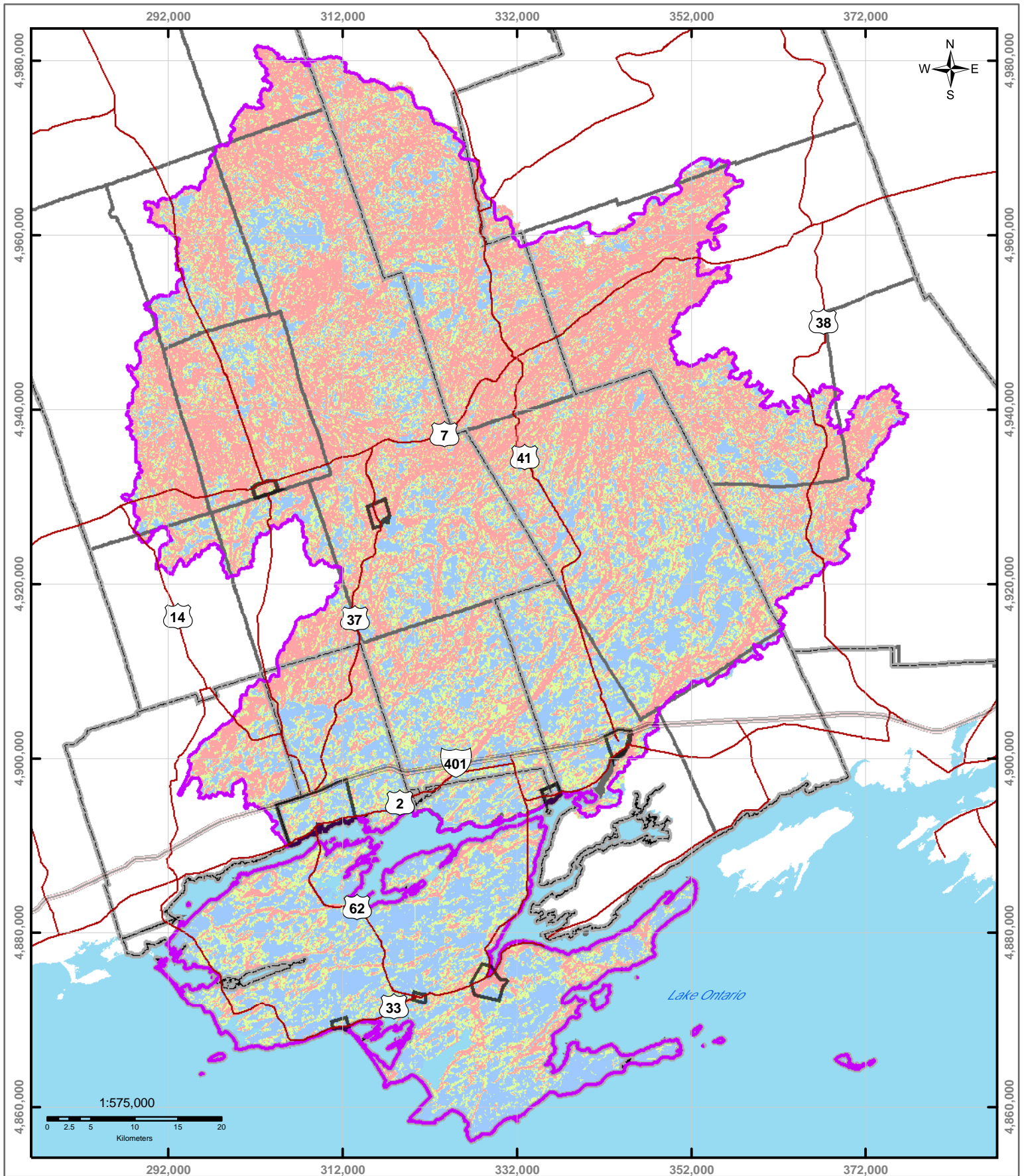
- 450 - 500
- 500 - 550
- 550 - 600
- 600 - 650

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DIGITAL MAPPING SOURCES:
Base Map - Ontario Ministry of Natural Resources

Figure 22. Actual Annual Evapotranspiration



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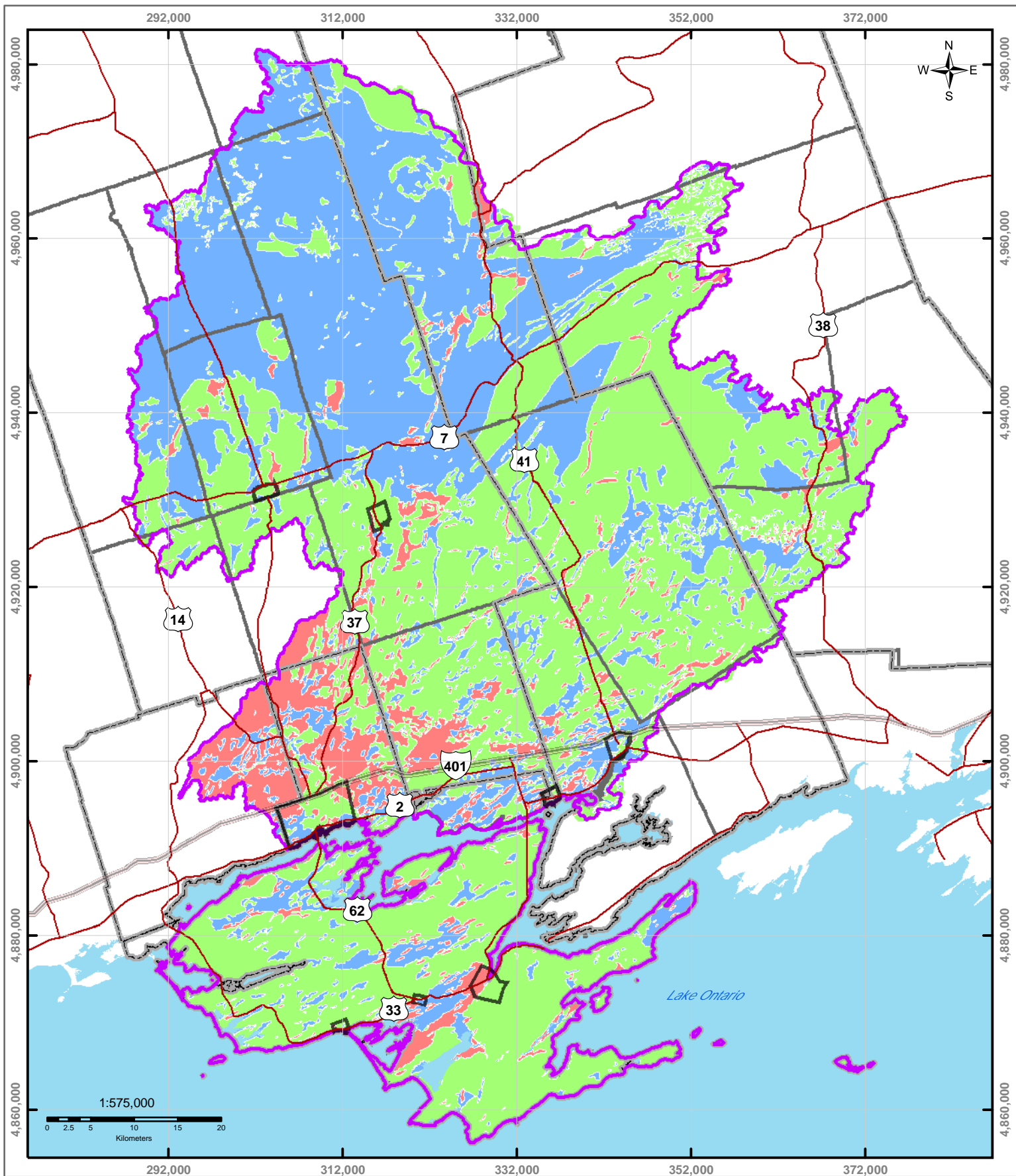
- | | | |
|-----------------|---------------------|------------------------------------|
| Highway 401 | Quinte Region | Slope Type
Flat Land (0 - 1.5%) |
| Highways | County Boundaries | Rolling Land (1.5 - 3%) |
| Populated Areas | Township Boundaries | Hilly Land (>3%) |

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DIGITAL MAPPING SOURCES:
Base Map - Ontario Ministry of Natural Resources Index Map - ESRI Canada
Slope - Derived from Ontario Ministry of Natural Resources 10m Digital Elevation Model

Figure 23. Land Slope Classes



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Legend

- Highway 401
- Highways
- Populated Areas
- Quinte Region
- County Boundaries
- Township Boundaries

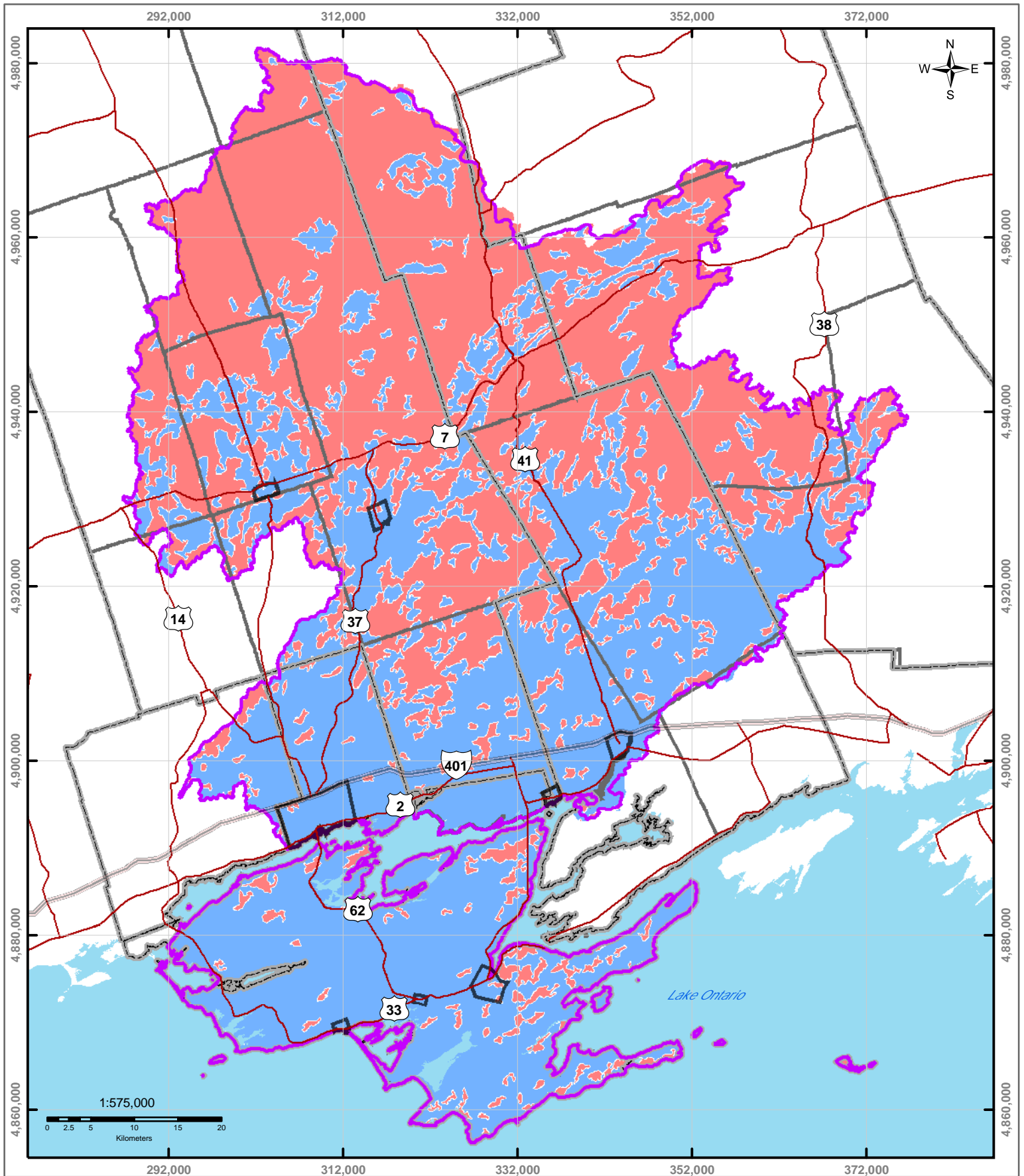
- Soil Permeability**
- Low (0.1)
 - Medium (0.2)
 - High (0.4)

Figure 24. Soil Permeability Classes

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DIGITAL MAPPING SOURCES:
Base Map - Ontario Ministry of Natural Resources
Soil Permeability Classes Derived from Surficial Geology - Ontario Ministry of Natural Resources & Ontario Geological Survey



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Legend

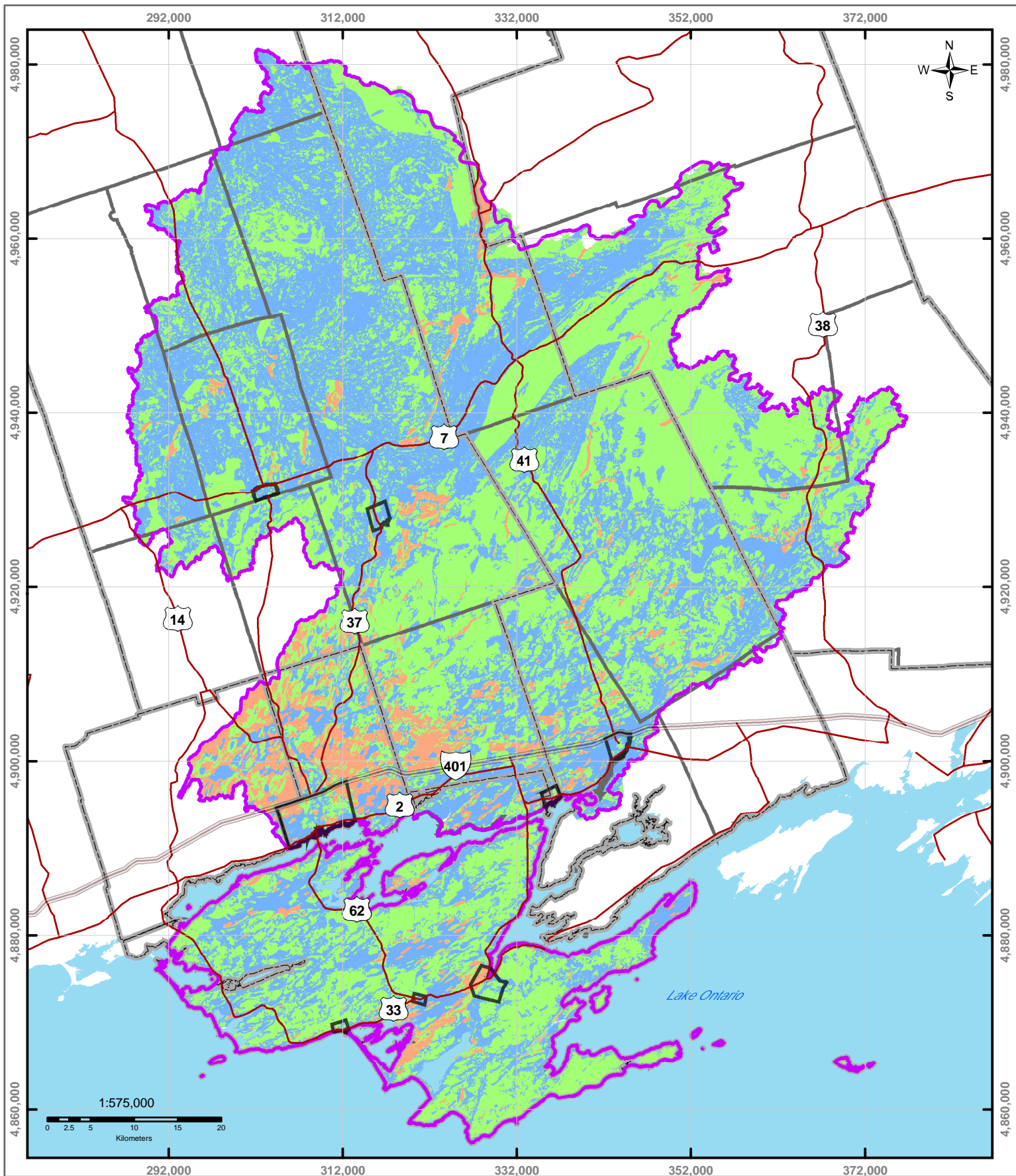
- | | | |
|-----------------|---------------------|-------------------------|
| Highway 401 | Quinte Region | Land Cover
Low (0.1) |
| Highways | County Boundaries | High(0.2) |
| Populated Areas | Township Boundaries | |

Figure 25. Land Cover Classes

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DIGITAL MAPPING SOURCES:
Base Map - Ontario Ministry of Natural Resources
Land Cover - Derived from Ontario Ministry of Natural Resources PLC 28 Classes



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- Highway 401
- Highways
- Populated Areas
- Quinte Region
- County Boundaries
- Township Boundaries

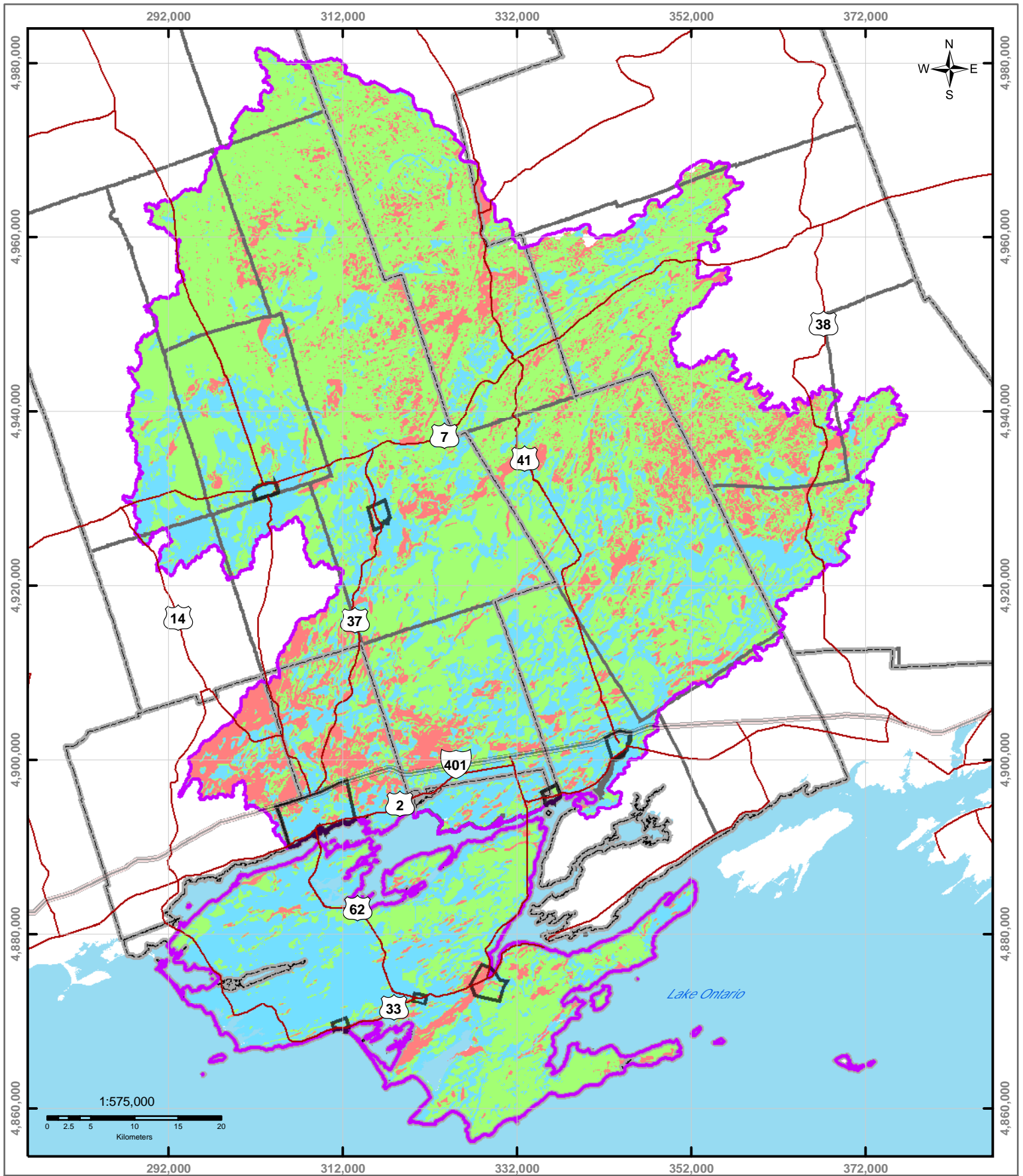
Groundwater Recharge Coefficient

- Low (0.275 - 0.445)
- Medium (0.445 - 0.600)
- High (0.600 - 0.775)

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DIGITAL MAPPING SOURCES:
 Base Map - Ontario Ministry of Natural Resources

Figure 26. Groundwater Recharge Coefficient



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Legend

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- Quinte Region
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- Township Boundaries

Annual Infiltration (mm)

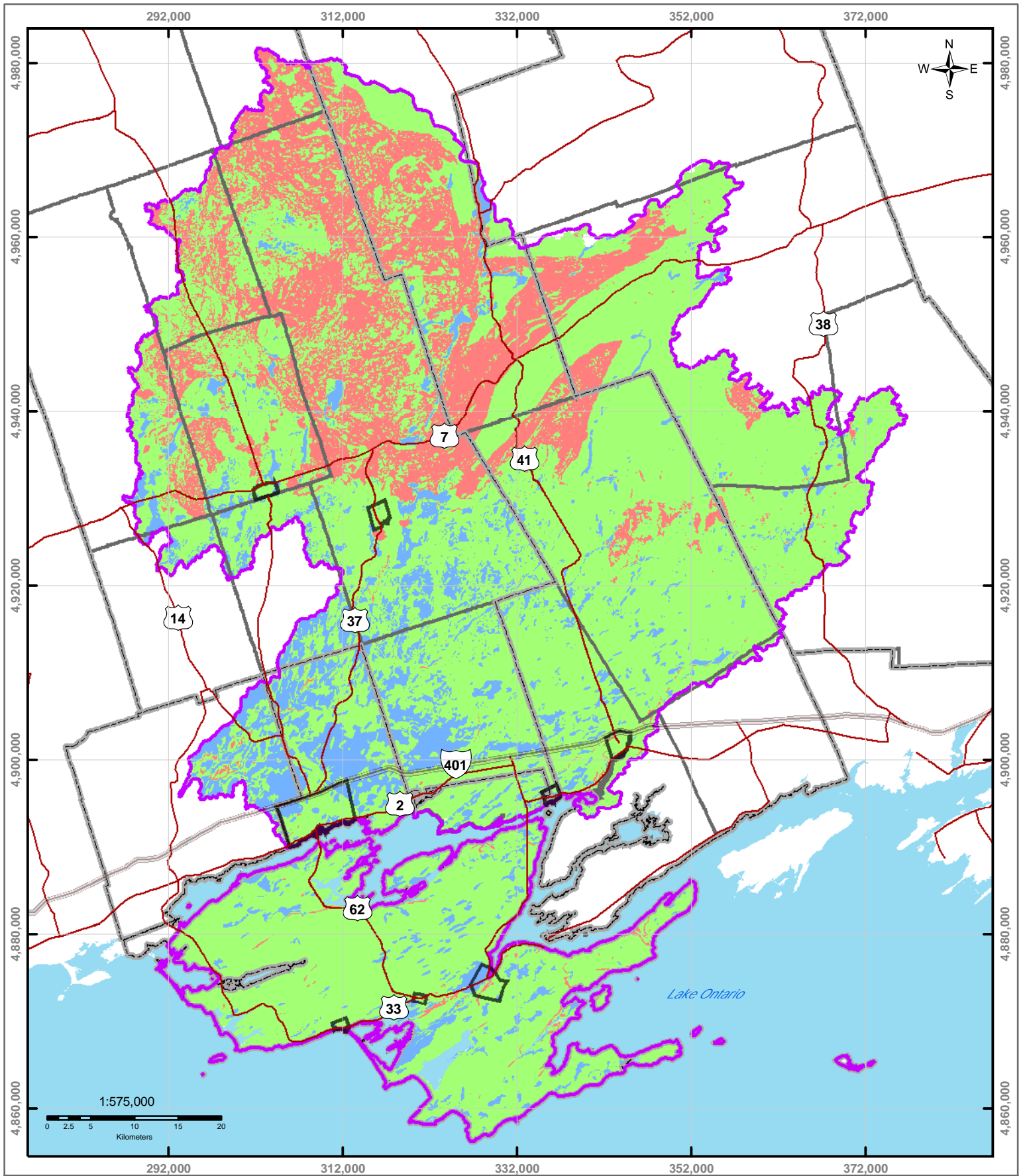
- 50 - 150
- 150 - 200
- 200 - 400

Figure 27. Spatial Distribution of Average Annual Groundwater Recharge

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Legend

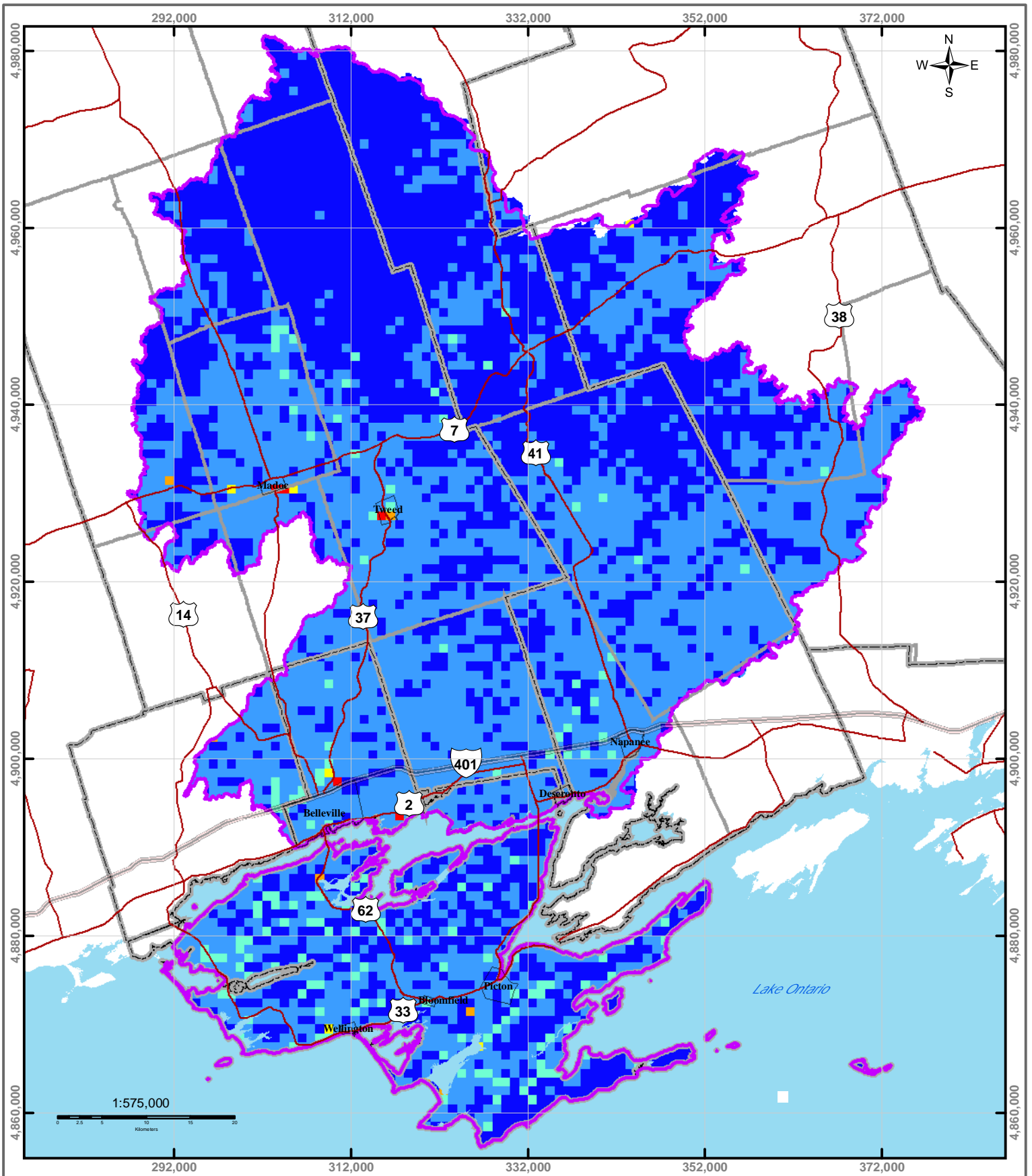
- | | | |
|-----------------|---------------------|-----------------------------------|
| Highway 401 | Quinte Region | Annual Surface Runoff (mm) |
| Highways | County Boundaries | 50 - 150 |
| Populated Areas | Township Boundaries | 150 - 250 |
| | | 250 - 350 |

Figure 28. Spatial Distribution of Average Annual Direct Runoff

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DIGITAL MAPPING SOURCES:
Base Map - Ontario Ministry of Natural Resources



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Legend

- | | | | | | |
|-----------------|---------------------|------------------------------|----------|-------------|--|
| Highway 401 | Quinte Region | Ground Water Use (mm) | | | |
| Highways | County Boundaries | 0 | 3- 50 | 100 - 500 | |
| Populated Areas | Township Boundaries | 0 - 3 | 50 - 100 | 500 - 5,000 | |

Figure 29. Spatial Distribution of Annual Groundwater Usage

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