SOURCE WATER PROTECTION

City of Guelph Municipal Drinking Water Systems

Open Houses – May 26 and June 3, 2010

DRINKING WATER SOURCE PROTECTION
ACT FOR CLEAN WATER

LAKE ERIE SOURCE PROTECTION REGION

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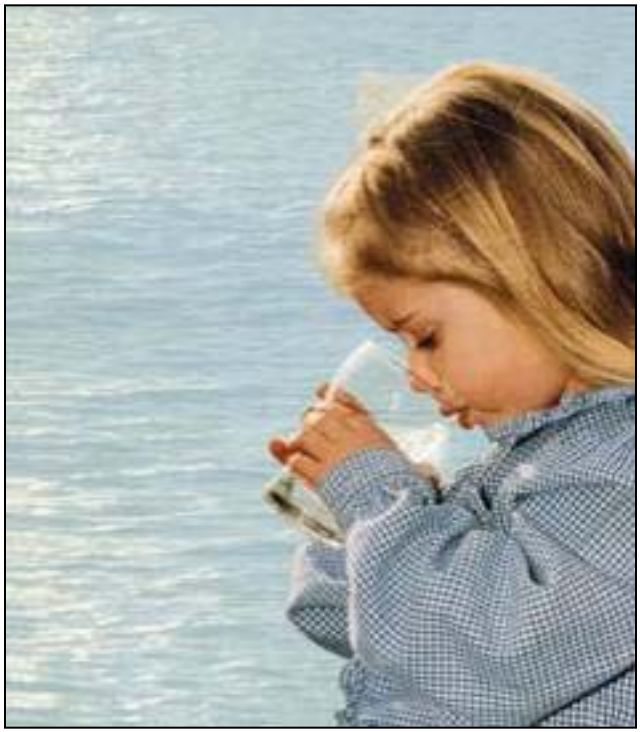
Making a Difference

Protecting our water

- We need safe, abundant drinking water supplies to survive and prosper
- Walkerton water crisis showed us the importance of protecting water supplies
- Walkerton inquiry recommended a ‘source water protection program’



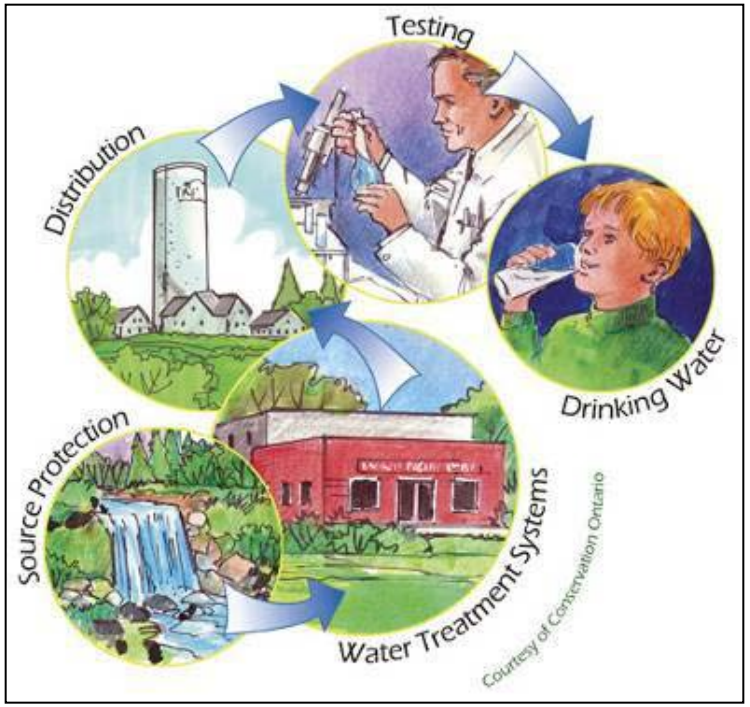
The Clean Water Act

- **Passed in 2006 to implement recommendations on source protection in the Walkerton Report**

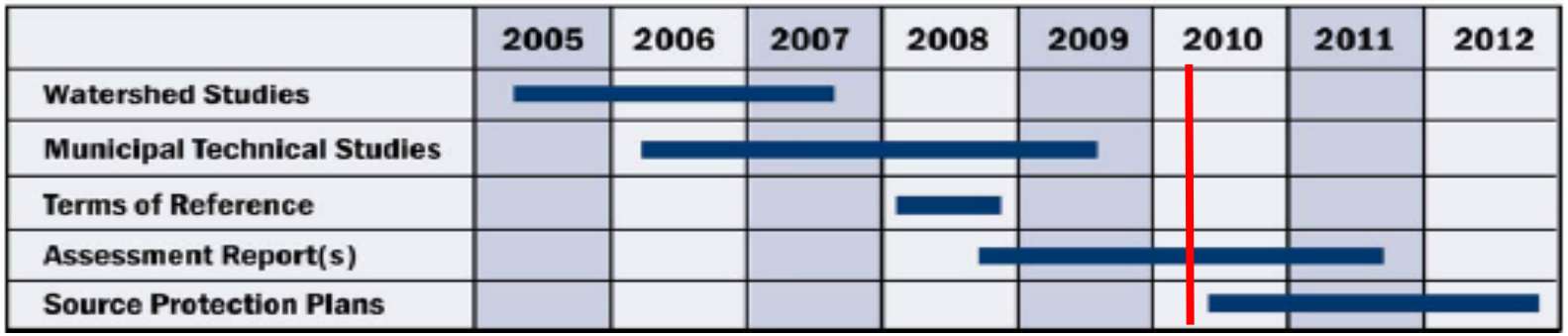
- **Source Protection Plans will be**
  - science-based
  - done on a watershed basis
  - joint effort of municipalities and people of a watershed
  - facilitated by conservation authorities

Source Protection Plans

- **Protect current and future drinking water sources from contamination and depletion**
- **One of five layers in a 'multi-barrier' approach:**
  - source water protection
  - adequate treatment
  - secure distribution system
  - good monitoring and warning systems
  - well thought-out responses to problems



Source Protection and the CWA



- **Characterization Reports:** Complete
- **Terms of Reference:** Complete
- **Technical studies:** Complete
- **Assessment Reports:** in progress – 2010
- **Source Protection Plans:** complete by 2012

Who does what?

- **Province:**
  - provides legislation, regulations and rules
  - pays 100% of cost of plan development
  - approves milestone documents and Source Protection Plan
- **Source Protection Committee (SPC):**
  - directs the development of Source Protection Plans
- **Conservation Authorities:**
  - provide support and technical expertise
  - reports on progress in implementing the plan
- **Municipalities:**
  - involved in technical studies, consultation, plan development
  - implement and enforce Source Protection Plans
- **Stakeholders:**
  - provide input through reps on SPC and in public consultation

The Assessment Report

- **Describes watershed characteristics**
- **Identifies:**
  - ***vulnerable areas*** related to drinking water supplies
  - ***potential threats*** to water quality and quantity
- **Ranks activities as potential threats:**
  - ***low***, ***moderate*** or ***significant***
- **Based on:**
  - existing reports and studies
  - new, peer-reviewed technical studies

Risk-based Approach

Vulnerable areas
(Based on lay-of-the-land)

- **Wellhead protection areas**
- Surface water intake areas
- Vulnerable aquifers
- Recharge areas

X

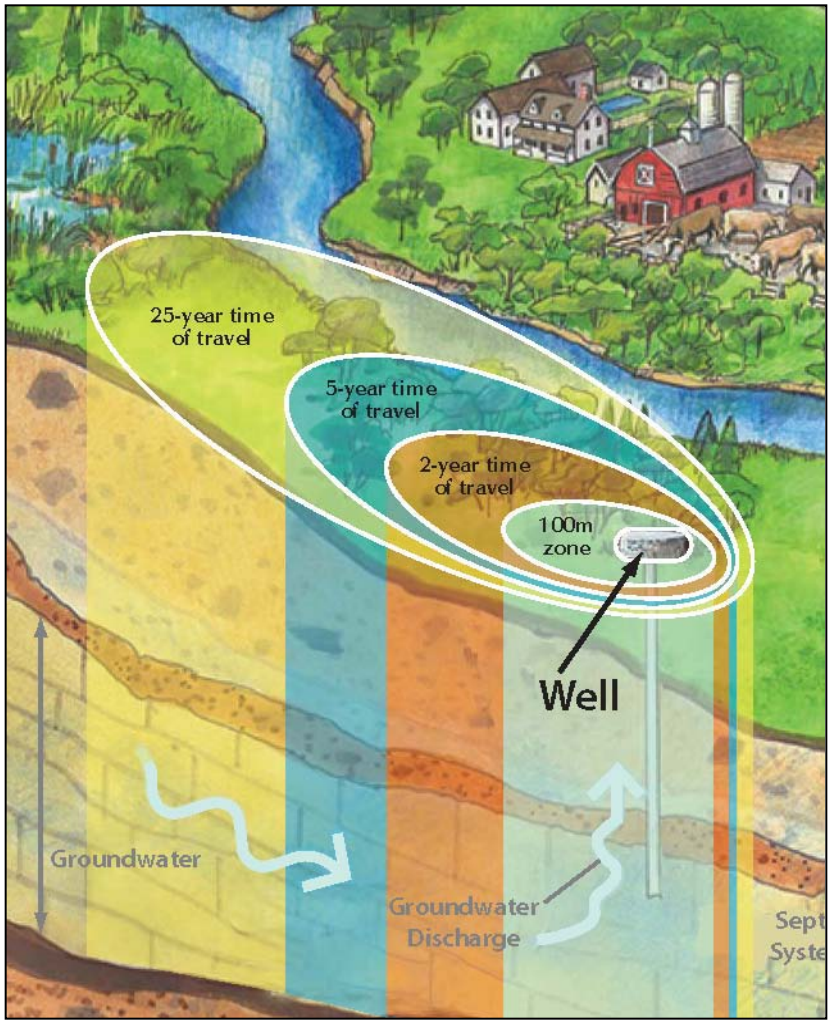
Threats
(Based on activity)

- Chemical use
- Handling practices
- Waste disposal

‘Significant threats’

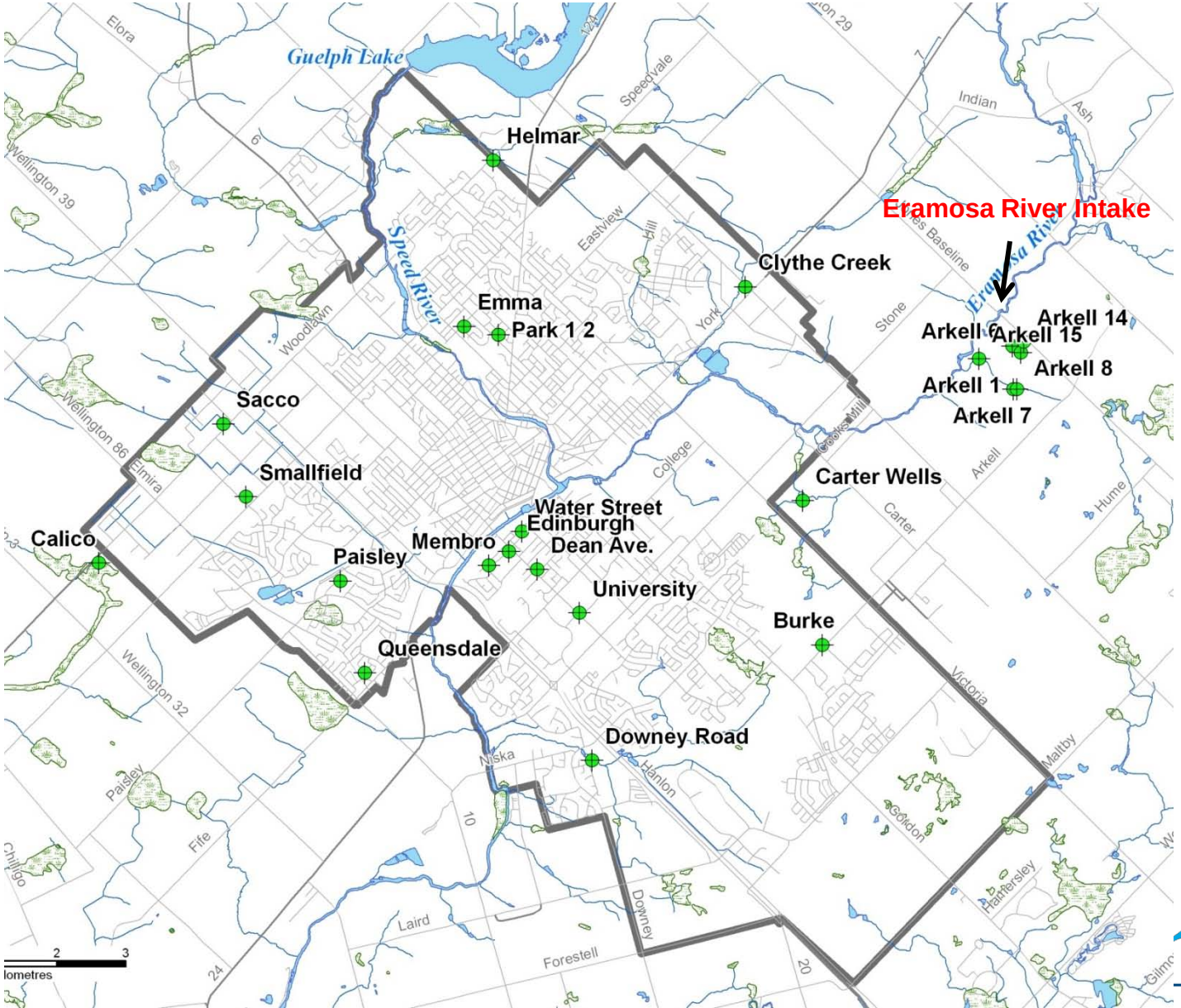
High vulnerability **X** **High** threat =
High risk of contamination

Vulnerable areas: Wells

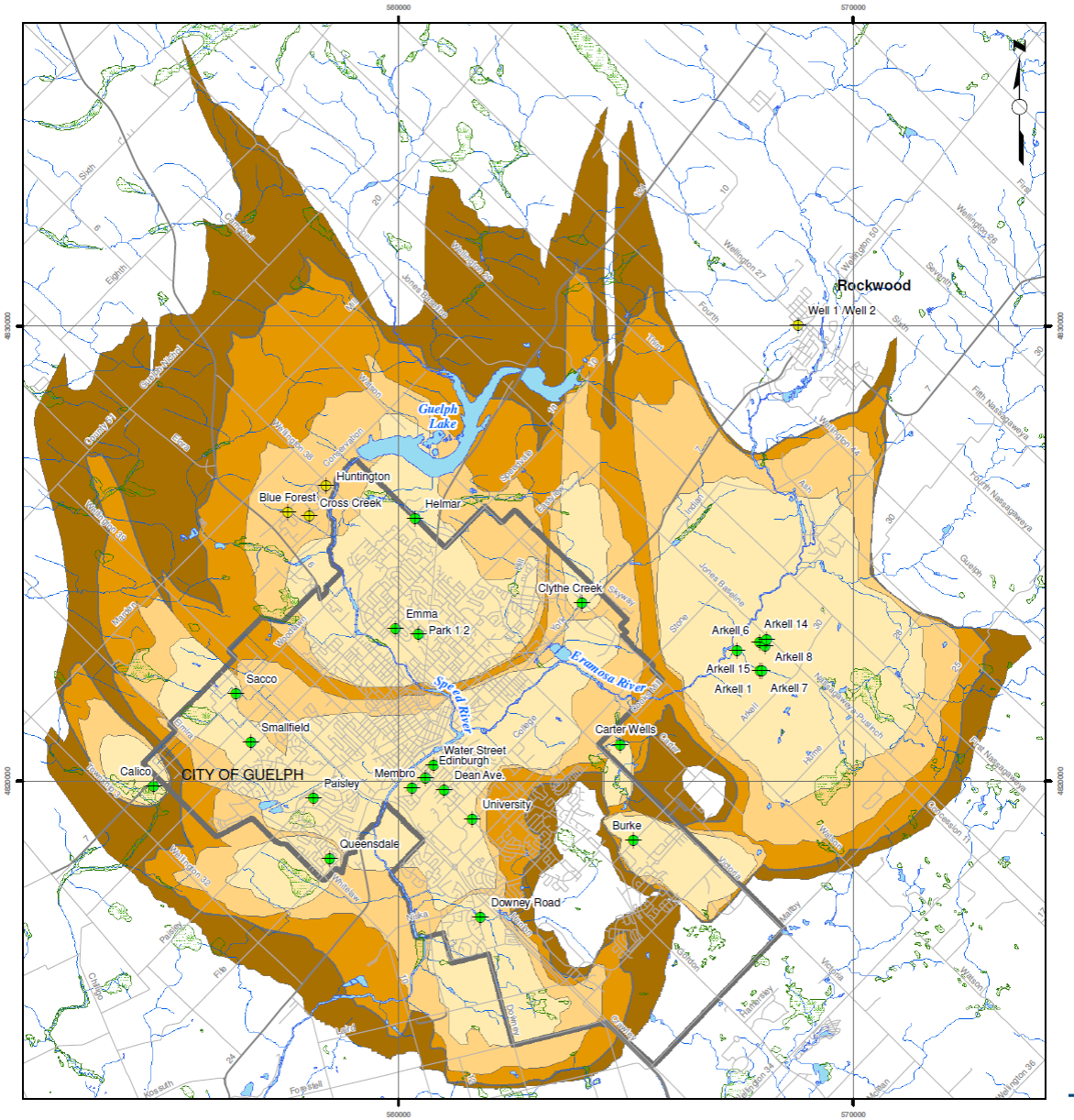


- **Wellhead Protection Areas (WHPA)**
- **Movement of water from surface to well**
  - horizontal (time of travel)
  - vertical (vulnerability)
- **Lines mark 'time of travel'**
  - 100-metres, 2 years, 5-years, 25-years
- **Vulnerability rated on a <u>10-point scale</u>**
  - high vulnerability = 8 or 10

Guelph Drinking Water Wells



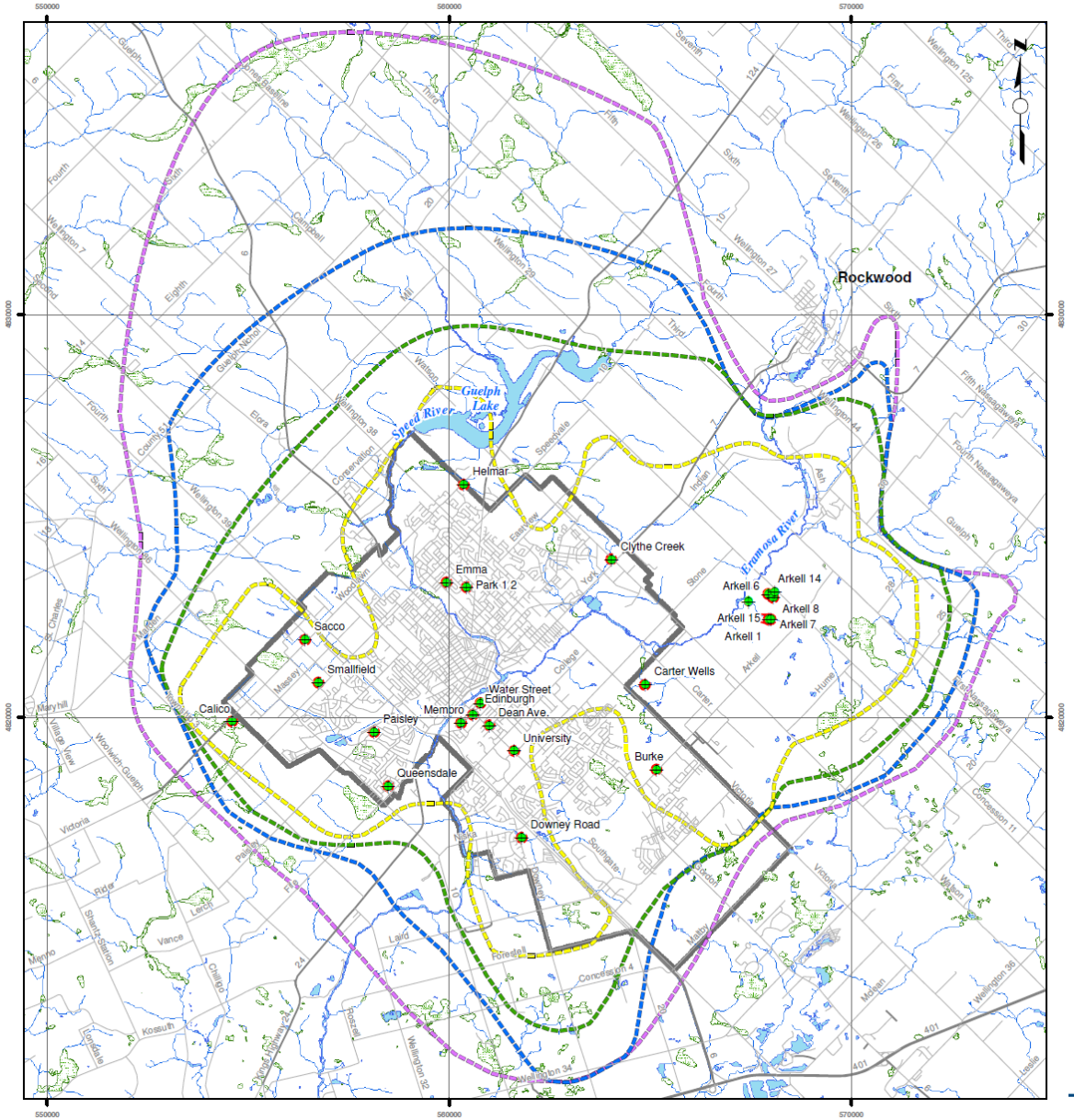
City of Guelph Capture Zones (2010)



Capture Zones

- 2 year
- 5 year
- 10 year
- 25 year

Wellhead Protection Areas (2010)



WHPAs delineated from capture zones. Simplified to reflect uncertainty.

WHPAs

- 100m (WHPA-A)
- 2yr (WHPA-B)
- 5yr (WHPA-C)
- 10yr (WHPA-C1)
- 25yr (WHPA-D)

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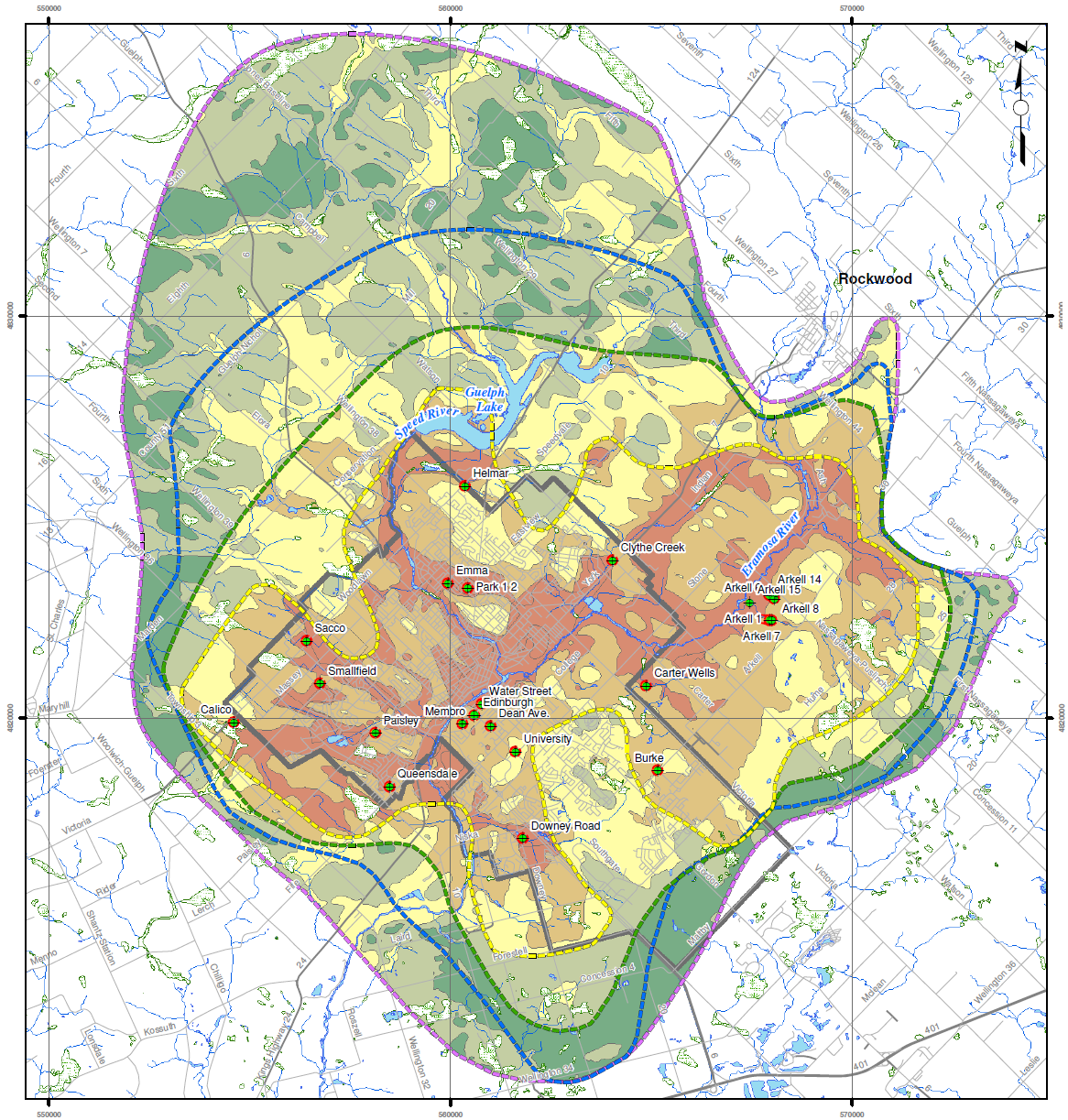
Guelph GW Vulnerability Scores



WHPAs	Vulnerability Score
100m (WHPA-A)	2
2yr (WHPA-B)	4
5yr (WHPA-C)	6
10yr (WHPA-C1)	8
25yr (WHPA-D)	10

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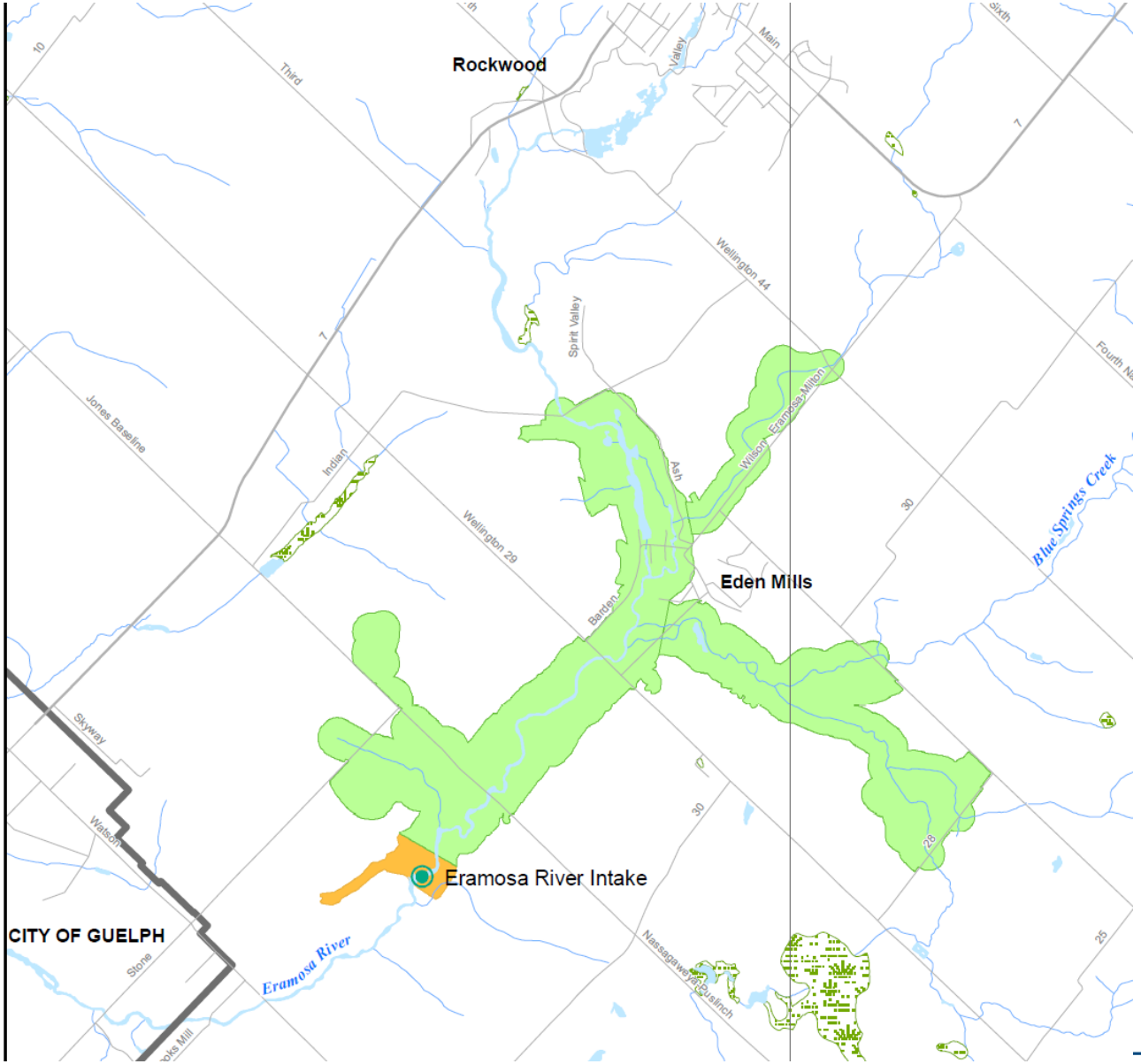
Surface Water Vulnerability

- **Intake Protection Zones**
  - IPZ-1 (200m)
  - IPZ-2 (6 hour time of travel)
  - IPZ-3 (Contributing Area)

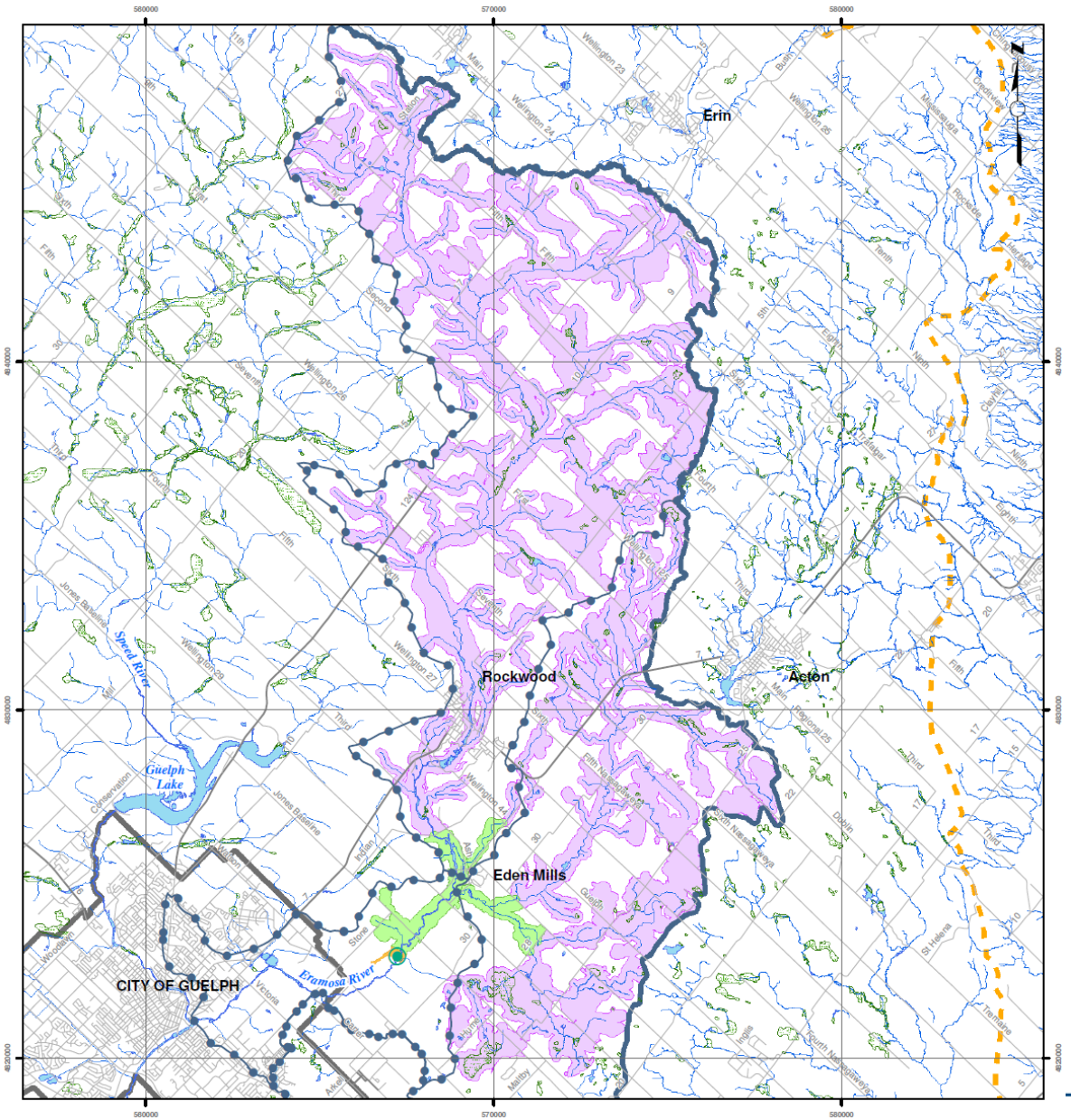
Guelph Eramosa Intake Protection Zones



2010

- Subwatershed Boundaries
- GRCA Watershed Boundary
- Intake Protection Zone 1
- Intake Protection Zone 2
- Intake Protection Zone 3

Guelph Eramosa Intake Protection Zones



2010

- Subwatershed Boundaries
- GRCA Watershed Boundary
- Intake Protection Zone 1
- Intake Protection Zone 2
- Intake Protection Zone 3

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Water Quality Issues Conclusions

- Issues associated with Nitrates (Carter Well), Trichloroethylene (TCE) (Membro, Smallfield, Sacco and Emma Wells), also concerns about chloride and sodium (numerous wells)
- Drinking water supply meets all applicable Drinking Water Quality Standards

Defining and measuring threats

- **Two categories of potential threats:**
  - chemicals
  - pathogens (e.g. bacteria, viruses in human or animal waste)
- **Chemical threats include use and storage of:**
  - solvents
  - pesticides
  - fertilizers
  - fuels (gasoline, heating oil)
- **Pathogen threats include:**
  - storage and spreading of manure
  - septic systems

Identifying potential threats

- **Not all potential threats are equal**

- **Potential threats given 'hazard rating' on a 10-point scale based on:**
  - the amount
  - how it is used or stored
  - how toxic it is
  - how the material behaves in the environment

Calculating level of risk

Vulnerable area

(Based on geology and lay-of-the-land)

- Wellhead areas
- Surface water intake areas
- Vulnerable aquifers
- Recharge areas

X

Threats

(Based on activity)

- Chemical use
- Handling practices
- Waste disposal

‘Significant threats’

High vulnerability **X** **High** threat =
High risk of contamination

Calculating level of risk

Vulnerable area X **Threats**

100-metre zone has a *vulnerability score* of **10**

Septic system has *hazard rating* of **10**

10 vulnerability ***X*** **10** hazard = **100**

- **Significant threat**: score of **80 - 100**
- **Moderate threat**: score of **60 - 79**
- **Low threat**: score of **41 - 59**

Establish the level of risk

- **Table of Drinking Water Threats**
  - 490-pages of tables cover all combinations of threats and vulnerability
  - available at *www.sourcewater.ca*

TABLE 1 – DRINKING WATER THREATS - CHEMICALS

DRINKING WATER THREATS:	Reference number	Under the following CIRCUMSTANCES:	Areas Within Vulnerable Area	Threat is Significant in Areas with a Vulnerability Score of:	Threat is Moderate in Areas with a Vulnerability Score of:	Threat is Low in Areas with a Vulnerability Score of:
Column 1	Column 2		Column 3	Column 4	Column 5	Column 6
The application of agricultural source material to land.	13	1. (a) The agricultural source material is applied to land located in a census consolidated subdivision that has a managed land percentage that is more than 80% and a livestock density that is sufficient to annually generate nutrients at a rate that is less than 0.5 nutrient units per acre; and (b) The total available nitrogen or phosphorus in all nutrients applied during the year to the land on which the material is applied exceeds the crop production requirements for crops on the land for that year by 15% or more.	IPZ-1, IPZ-2, IPZ-3, and WHPA-E	10	7 - 9	4.8 - 6.4
			WHPA-A, WHPA-B, WHPA-C, WHPA-C1, WHPA-D	10	8	6
		2. The application may result in the presence of Nitrogen in groundwater or surface water.	HVA			6
			SGRA			6
	14	1. (a) The agricultural source material is applied to land located in a census consolidated subdivision that has a managed land percentage that is more than 80% and a livestock density that is sufficient to annually generate nutrients at a rate that is less than 0.5 nutrient units per acre; and (b) The total available nitrogen or phosphorus in all nutrients applied during the year to the land on which the material is applied exceeds the crop production requirements for crops on the land for that year by 15% or more.	IPZ-1, IPZ-2, IPZ-3, and WHPA-E	10	7 - 9	4.8 - 6.4
			WHPA-A, WHPA-B, WHPA-C, WHPA-C1, WHPA-D			
		2. The application may result in the presence of Phosphorus (total) in groundwater or surface water.	HVA			
			SGRA			
	15	1. (a) The agricultural source material is applied to land located in a census consolidated subdivision that has a managed land percentage that is more than 80% and a livestock density that is sufficient to annually generate nutrients at a rate that is at least 0.5 nutrient units per acre but not more than 1.0 nutrient unit per acre; and (b) The total available nitrogen or phosphorus in all nutrients applied during the year to the land on which the material is applied exceeds the crop production requirements for crops on the land for that year by 15% or more.	IPZ-1, IPZ-2, IPZ-3, and WHPA-E	9 - 10	7 - 8.1	4.5 - 6.4
			WHPA-A, WHPA-B, WHPA-C, WHPA-C1, WHPA-D	10	8	6
		2. The application may result in the presence of Nitrogen in groundwater or surface water.	HVA			6
			SGRA			6
	16	1. (a) The agricultural source material is applied to land located in a census consolidated subdivision that has a managed land percentage that is more than 80% and a livestock density that is sufficient to annually generate nutrients at a rate that is at least 0.5 nutrient units per acre but not more than 1.0 nutrient unit per acre; and (b) The total available nitrogen or phosphorus in all nutrients applied during the year to the land on which the material is applied exceeds the crop production requirements for crops on the land for that year by 15% or more.	IPZ-1, IPZ-2, IPZ-3, and WHPA-E	9 - 10	7 - 8.1	4.5 - 6.4
			WHPA-A, WHPA-B, WHPA-C, WHPA-C1, WHPA-D			
		2. The application may result in the presence of Phosphorus (total) in groundwater or surface water.	HVA			
			SGRA			

Potential Threats Assessment

- **Activities - Major Components:**
  - Managed lands and agricultural-based threats
  - Impervious surfaces/road salting
  - Significant threat enumeration
  - Transmission of sewage

- **Conditions**
  - Sites containing contaminants from past activities
  - Evidence of off-site contamination

Potential Threats Assessment Conclusions

- No significant threats associated with managed lands based on initial work
- No significant threats associated with impervious surfaces/road salting based on initial work
- Potential significant threat enumeration – 1,670 activities on 1,041 locations – 33 for pathogens
- Potential areas for future threats identified
- Potential Conditions – 76 properties including 12 properties with chlorinated organic compounds

Preliminary Water Quality Threats

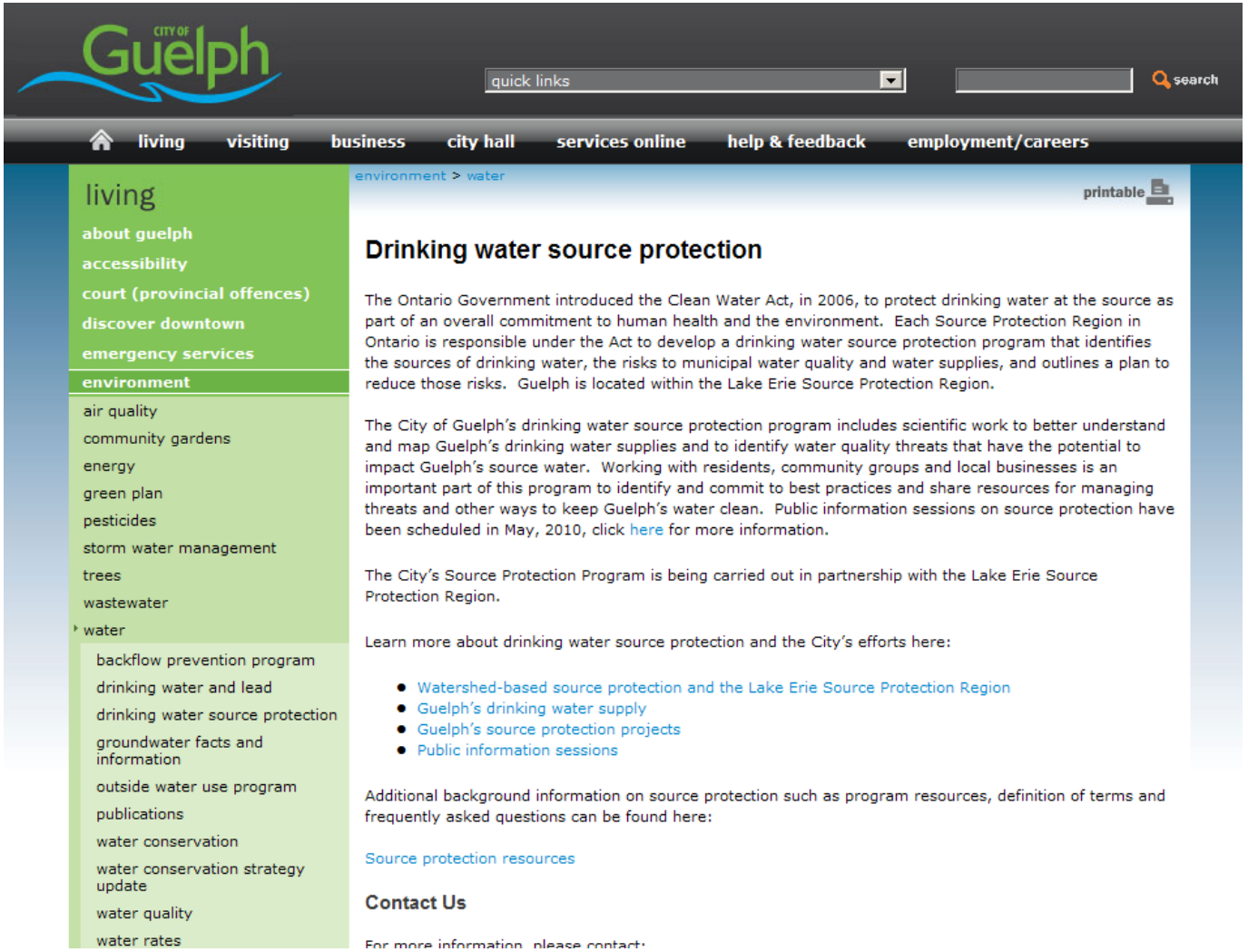
Table 9 - Type and Number of Significant Non-Agricultural Threats

Threat Type	WHPA-A	WHPA-B	WHPA-C	Total
The application of pesticide to land.		2		2
The establishment, operation or maintenance of a system that collects, stores, transmits, treats or disposes of sewage	3	71		74
The establishment, operation or maintenance of a waste disposal site within the meaning of Part V of the Environmental Protection Act.		42		42
The handling and storage of a dense non- aqueous phase liquid.	9	749	145	903
The handling and storage of an organic solvent.	7	235		242
The handling and storage of commercial fertilizer.		2		2
The storage of snow		1		1
The handling and storage of fuel.	8	357		365
The handling and storage of non-agricultural source material (NASM)	1	4		5
The handling and storage of pesticide.	1	31		32
The handling and storage of road salt.		2		2
TOTAL				**1,670**

Recommendations

- **Preparation of a work plan to address identified key data gaps and high uncertainty work**
- **Potential Threats:**
  - Survey of significant urban threats to increase certainty in threat enumeration
  - Detailed roadside survey of agricultural properties for primarily potential pathogen threats
  - Address non-matches in the dataset by completing a GPS ground-truthing exercise
  - Assessment of Sanitary Sewer network

For More Information – guelph.ca/water



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Next steps – preparing Assessment Report

- GRCA staff present the Vulnerability and Threats reports to the SPC
- Public information meetings (late-May, early-June) –invitations and information mailed to property owners within the WHPA 5-year zone
- Open Houses for Guelph residents and ICI property owners and Townships/Milton
- Technical report info assembled into the Grand River Assessment Report (May-June)

ASSESSMENT REPORT TIMELINES

	GR Timeline
SPC reviews first draft AR	May 2010
SPC approves draft AR for posting	Jun 2010
Draft AR to municipalities & posted for 35 days	July 2010
Host public meetings	July
Closing date - public comment	Jul 2010
SPC considers comments	Aug 2010
SPC approves AR & submits to SPA	Sep 2010
SPA posts draft AR for 30 days	Sep 2010
Closing date for municipal/public comment	Oct 2010
SPA meeting to submit AR	Oct 2010
AR submitted to MOE	Oct 2010
MOE receives AR	Oct 2010

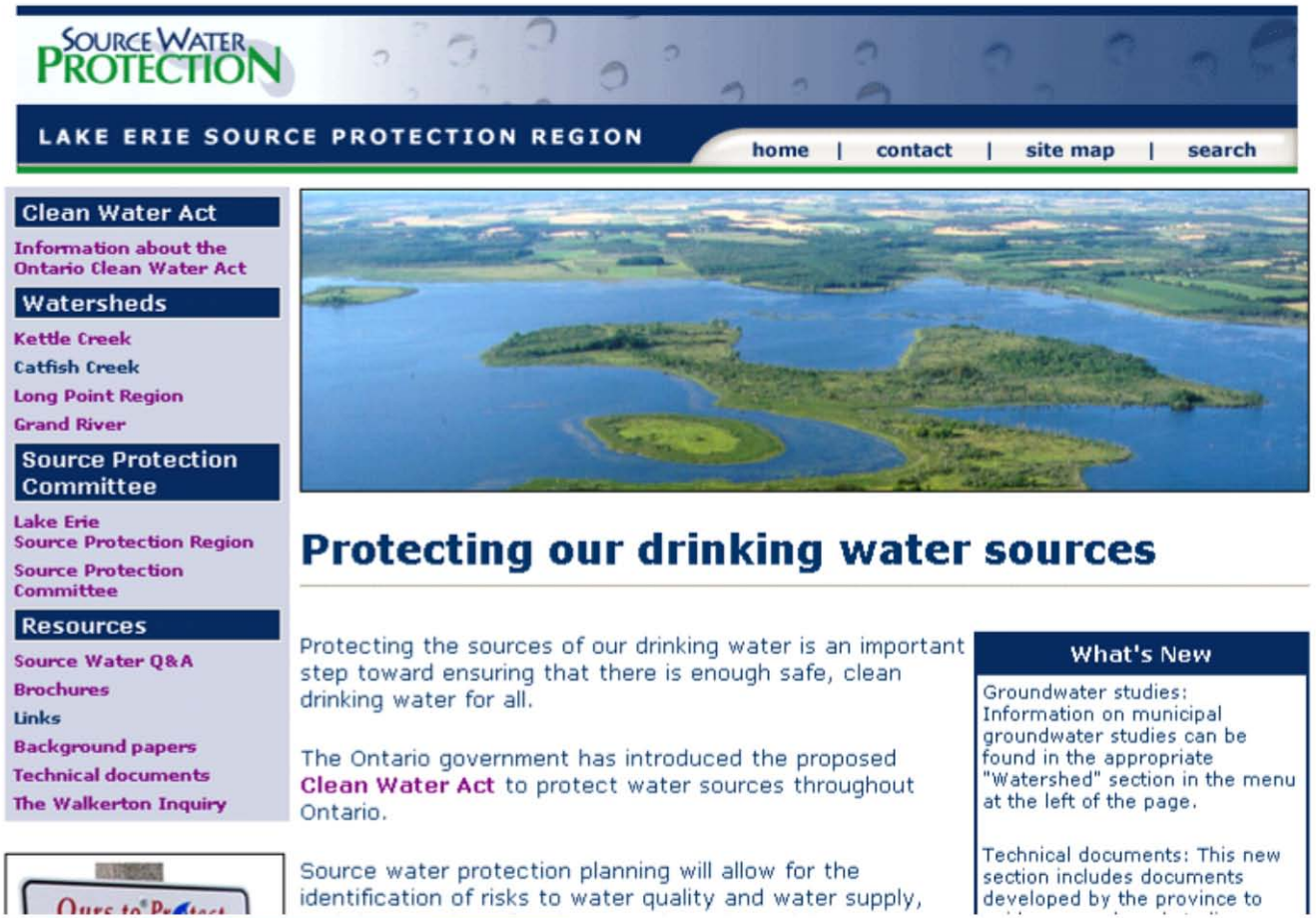
Drinking Water Stewardship Fund

- **Grants to landowners for early action**
  - decommissioning old wells– 80% topped up to 100% by the Rural Water Quality Program
  - upgrading existing wells – 80%
  - septic system upgrades – 80%
  - erosion control e.g. tree planting, buffers (% varies)
  - Business Pollution Prevention Reviews – 100%
- **Available in the 2-year zone around wells**
- **For more info:**
  - contact Grand River Conservation Authority
  - visit *www.sourcewater.ca*

Preparing the Source Protection Plan

- **Source Protection Plan must contain policies and programs to:**
  - manage *significant* threats so they are no longer significant
  - prevent new *significant* threats from being created
- **Various methods to accomplish these goals:**
  - land use controls (e.g. municipal zoning bylaws, official plans)
  - existing provincial instruments (e.g. Certificates of Approval)
  - negotiated "risk management" agreements with property owners
  - property owner incentives (e.g. stewardship program)
  - public education programs

www.sourcewater.ca



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Thank You!

Questions?