



GUELPH-GUELPH/ERAMOSA WATER QUANTITY POLICY DEVELOPMENT STUDY

Risk Management Measures Evaluation Process and Water Quantity Discussion Paper

Community Liaison Group
June 26, 2018

COMMUNITY LIAISON GROUP

Meeting Purpose

- Provide context and information about the **technical studies** that help guide the development of source protection water quantity policies
 - a) Overview of the results of the Tier 3 Technical Study
 - b) Provide the results of the Risk Management Measures Evaluation Process (RMMEP)
 - c) Present the Threat Management Strategy (TMS)
- Provide an update on the current state of the **policy development process**
 - a) Overview of the water quantity policy development process
 - b) Present the Water Quantity Discussion Paper

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Agenda

7:00 p.m.	Welcome, Agenda Review and Introductions
7:10 p.m.	Review of Previous Meeting Outcomes
7:20 p.m.	Overview of the Threats Management Strategy <ul style="list-style-type: none">• Questions of clarification
8:05 p.m.	Overview of the Discussion Paper <ul style="list-style-type: none">• Questions of clarification• Feedback on promising policy tools
8:50 p.m.	Next Steps and Closing Remarks
9:00 p.m.	Adjourn

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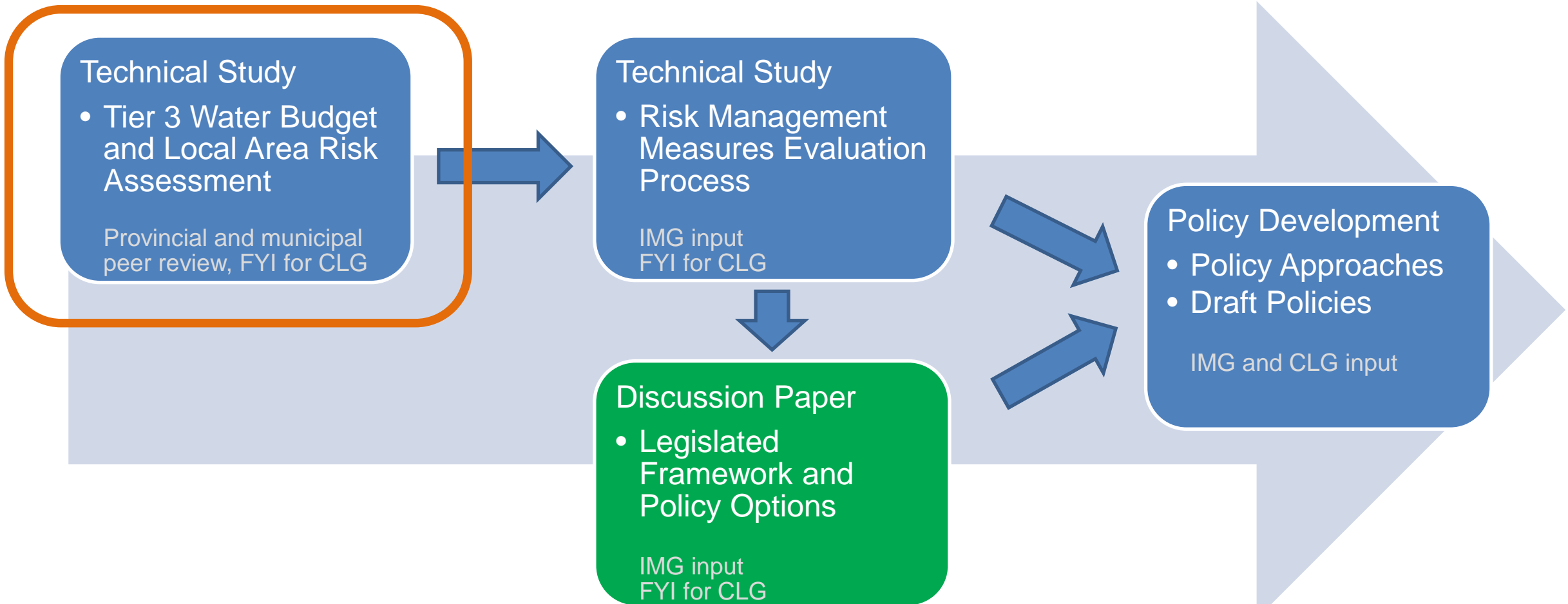
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GUELPH-GUELPH/ERAMOSIA TIER 3 WATER BUDGET AND RISK ASSESSMENT

POLICY DEVELOPMENT

Guelph-Guelph/Eramosa Water Quantity Policy Development Study



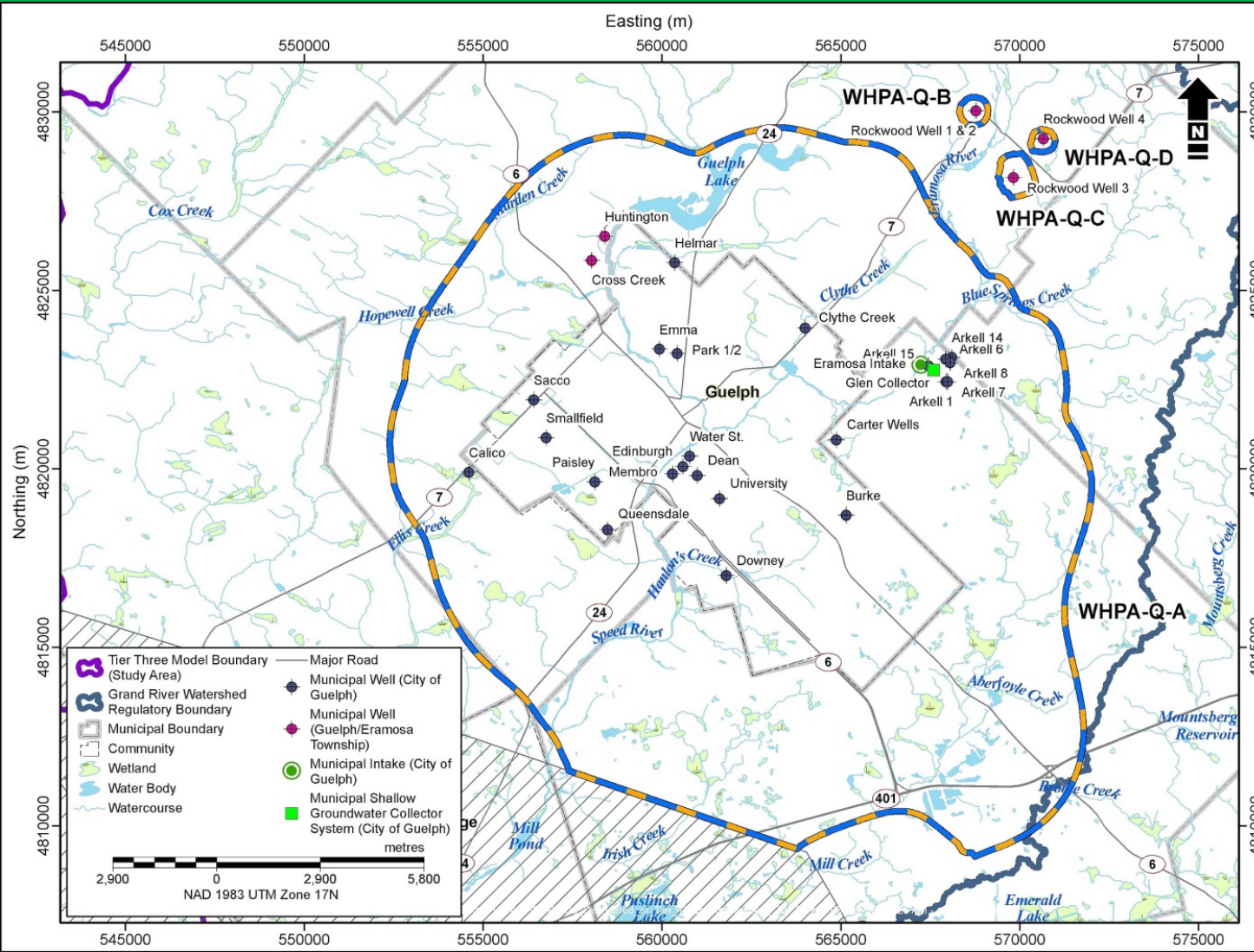
GGET TIER 3 STUDY

Wellhead Protection Area Quantity (WHPA-Q)

- Comprehensive water budget study from 2008 to 2017
- Included characterization, groundwater-surface water modeling and risk assessment
- Initiated in 2008 as a pilot before guidance and technical rules finalized
- Focused on the municipal water supplies for the City of Guelph (2008-2014) and the Township of Guelph-Eramosa (in Rockwood and Hamilton Drive) (2014-2017)
- Accepted by SPC in April, 2017

GGET TIER 3 STUDY

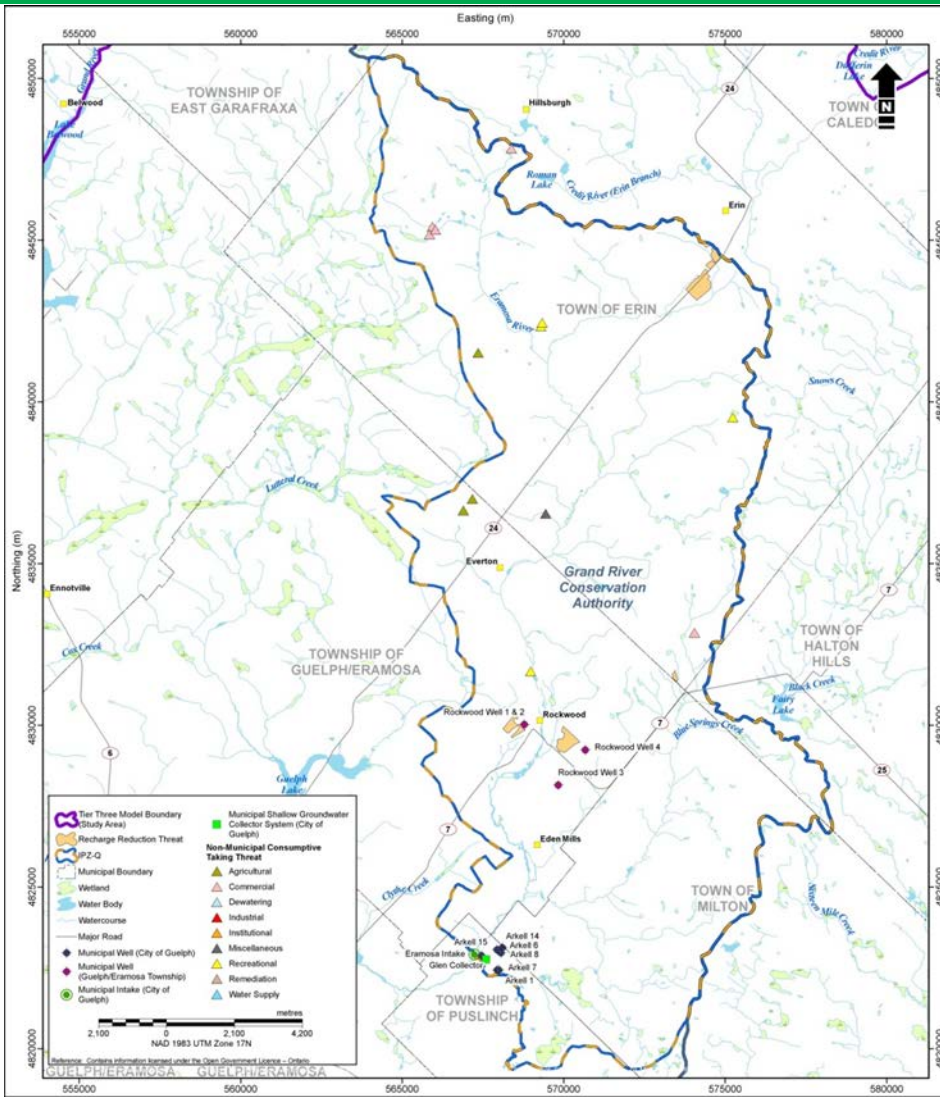
Wellhead Protection Area Quantity (WHPA-Q)



- Defined four WHPA-Qs within study area
- Considered current and future water takings under future land use and drought conditions
- GGET WHPA-Q - **Significant Risk Level**
- GET WHPA-Q around Rockwood Wells – **Low Risk Level**

GGET TIER 3 STUDY

Intake Protection Zone Quantity (IPZ-Q)



- IPZ-Q = area upstream of the surface water intake on the Eramosa River
- Assigned **Significant** risk level, adopted from WHPA-Q because of interconnection through Arkell System
- Significant risk levels for GGET WHPA-Q and IPZ-Q a result of model prediction that municipal wells (Queensdale, Arkell 1) may not be able to continue pumping in the future (2031) under future land use and drought conditions

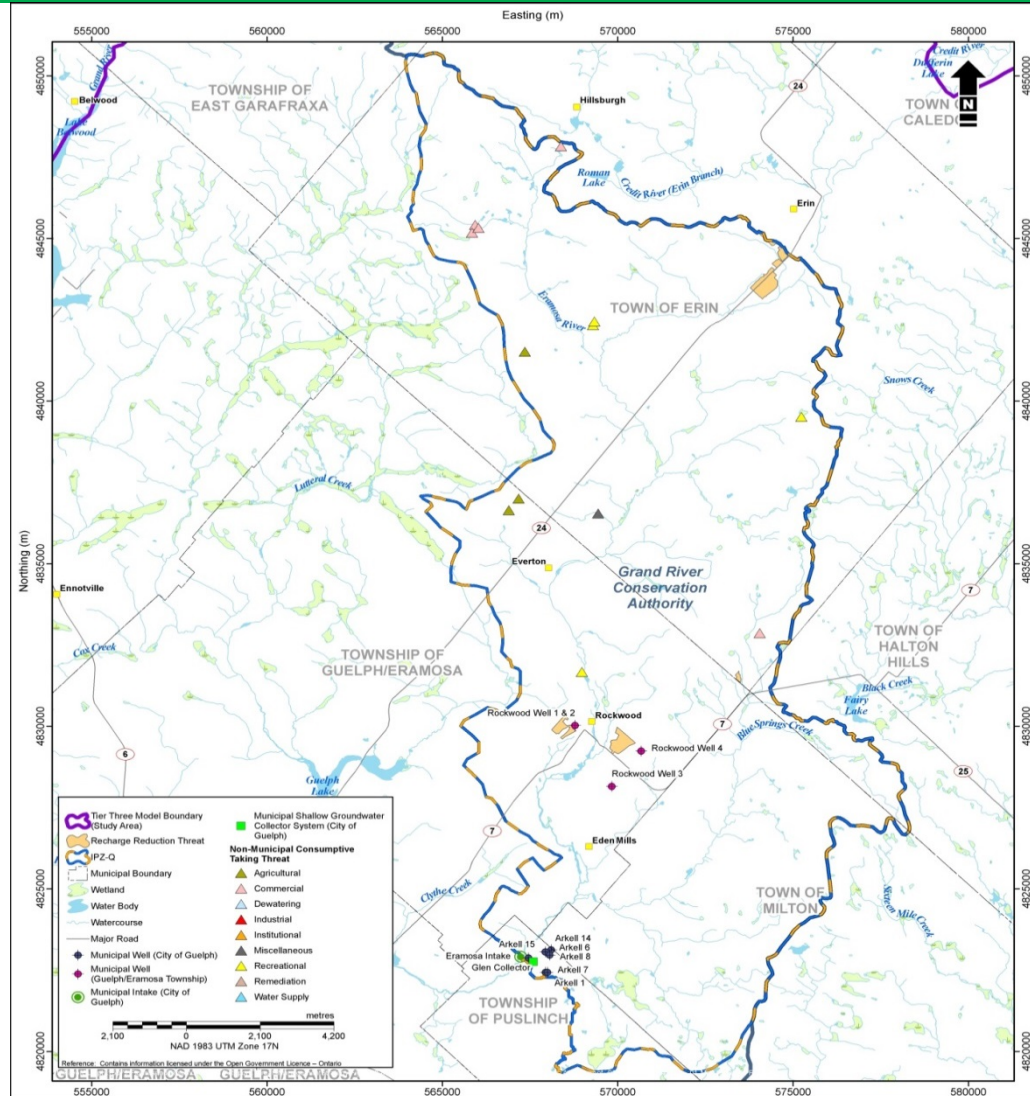
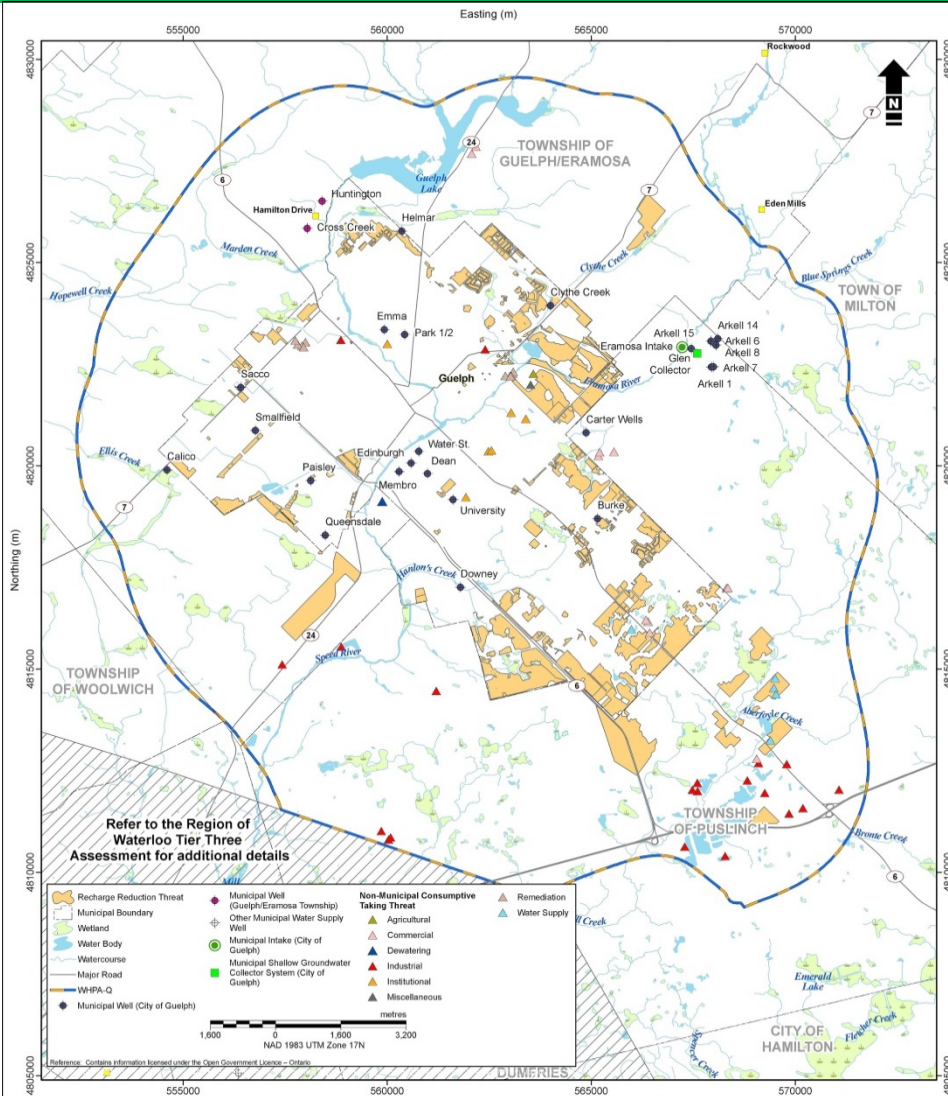
GGET TIER 3 STUDY

Water Quantity Threats

- Significant Risk Level requires identification of water quantity threats in GGET WHPA-Q and IPZ-Q
- Provincial Prescribed Threats:
 - #19 - Consumptive Water Takings (not returned to same aquifer)
 - #20 – Activities that reduce groundwater recharge
- Significant threat identification includes:
 - Existing and future water takings
 - Existing and future activities that reduce groundwater recharge (e.g., roads, parking lots, development)

GGET TIER 3 STUDY

Significant Drinking Water Quantity Threats

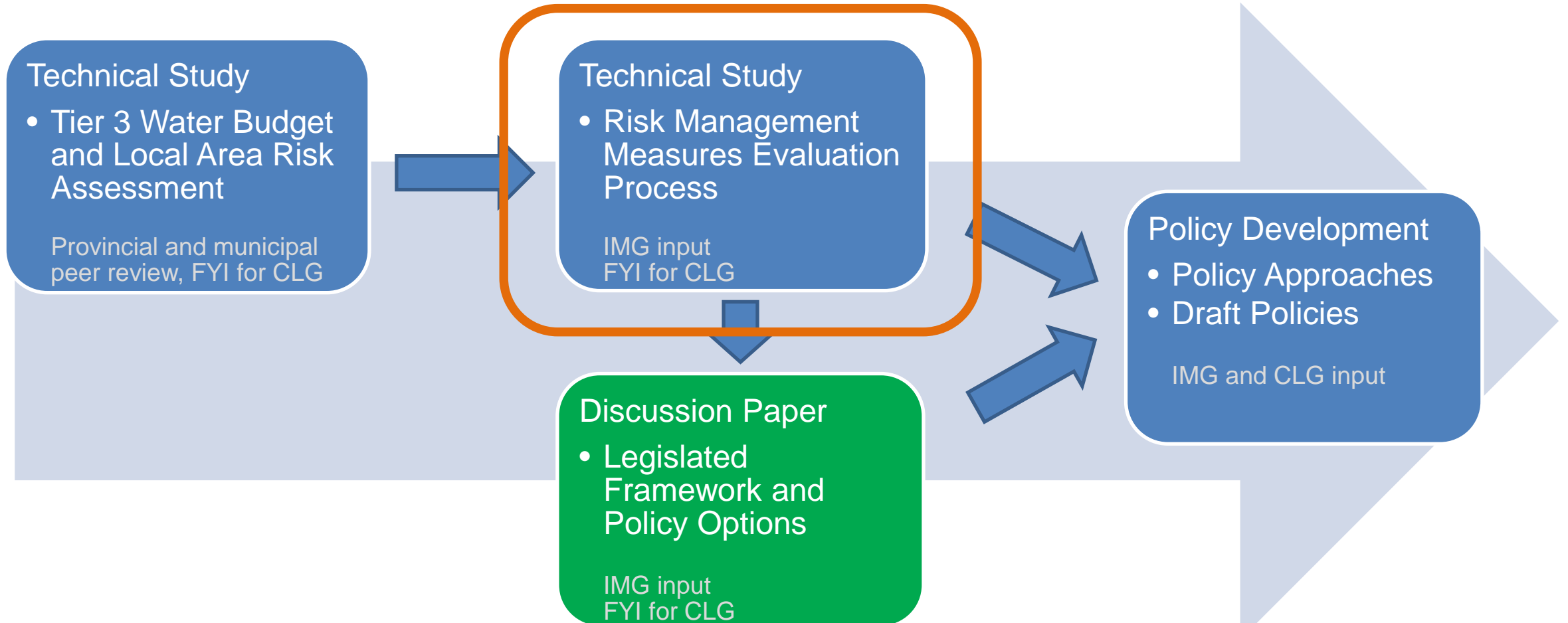




RISK MANAGEMENT MEASURES EVALUATION PROCESS AND THREATS MANAGEMENT STRATEGY

POLICY DEVELOPMENT

Guelph-Guelph/Eramosa Water Quantity Policy Development Study



RMMEP

Risk Management Measures Evaluation Process

Purpose:

- Identification and ranking of Significant threats (permitted and non-permitted consumptive water takings and recharge reduction)
- Selecting and evaluation of Risk Management Measures (RMM)
- Develop Threats Management Strategy (TMS)
- Uses Risk Management Measures Catalogue developed for Source Protection and following the “Guide – Water Quantity RMMEP” (TRCA, 2013)

RMMEP COMPONENTS

Overview

Greatest impact

- Impact of water quantity threats on water level in municipal wells and whether they can still be pumped under existing, future, and drought conditions
- Evaluated using Tier 3 model

Threats ranking

- Water quantity threats are ranked based on relative impact to water levels at a municipal well

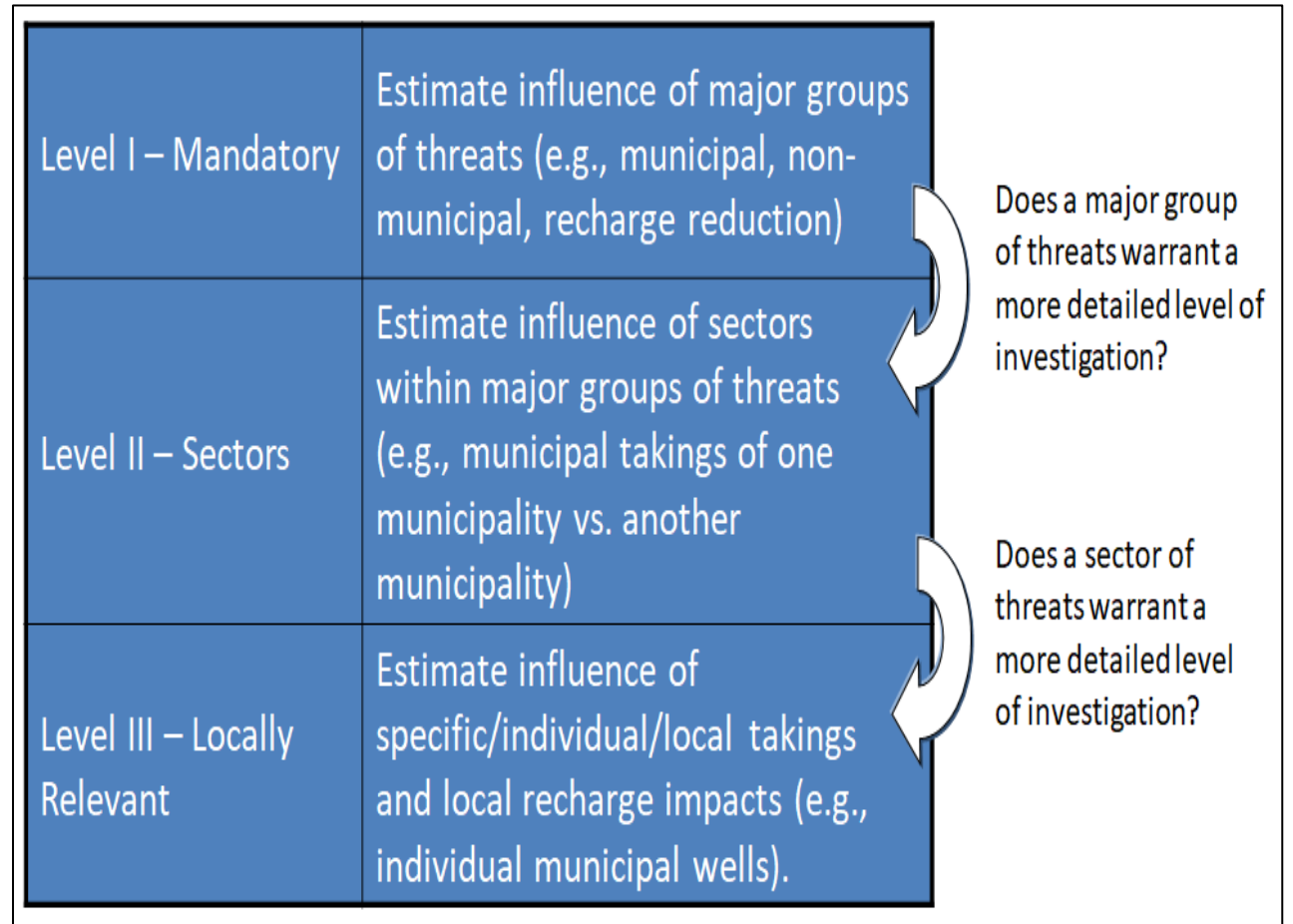
Best measures

- Threats ranking guides the selection of preliminary Risk Management Measures (RMMs)
- RMMs evaluated and recommended through scenarios using Tier 3 model

RMMEP COMPONENTS

Threats Ranking

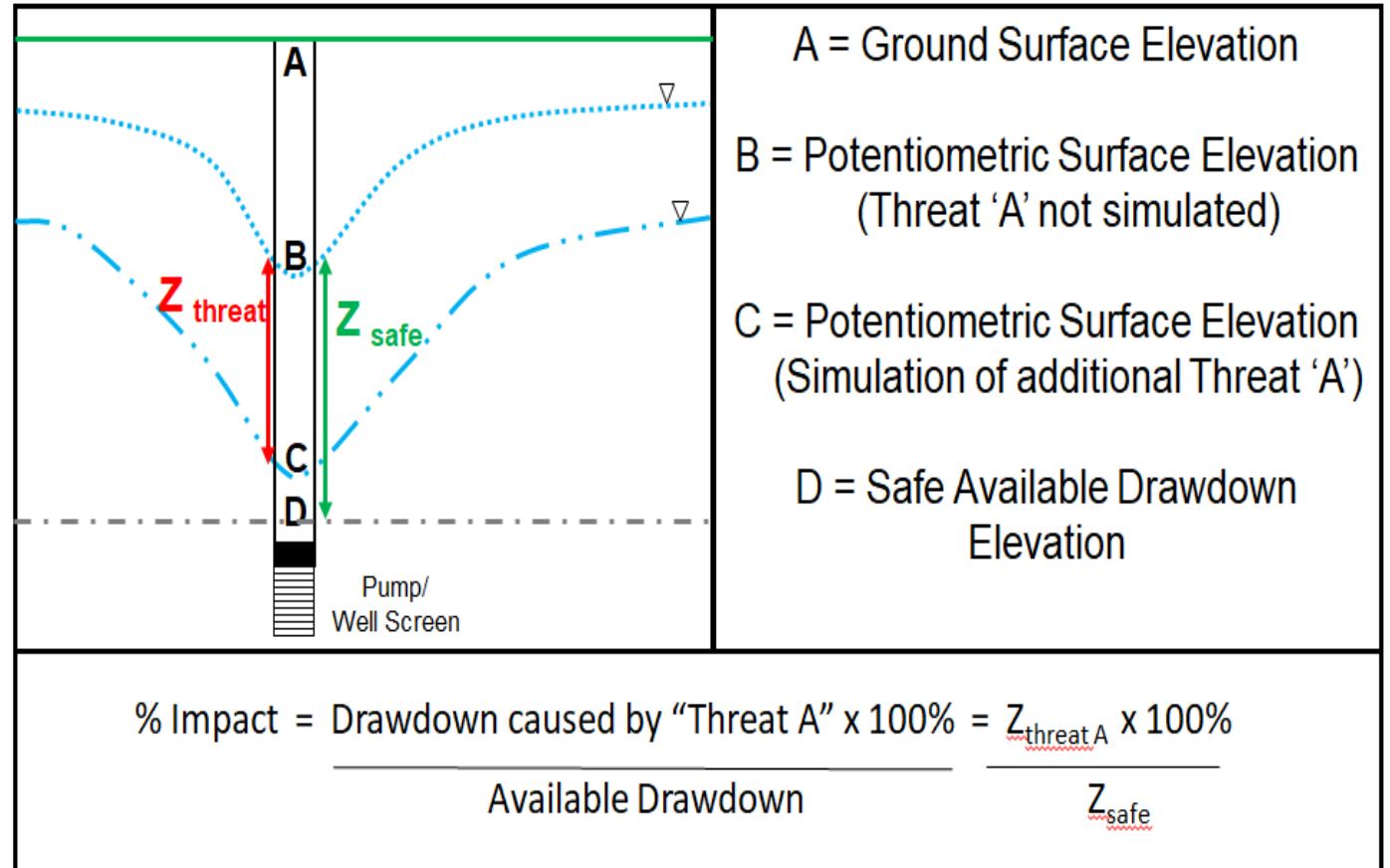
- Three stage approach to Threats Ranking
- Aims to identify Significant Threats with greatest impacts on municipal water supply:
 - Municipal vs non-municipal vs non-permitted vs recharge reduction
 - By sector
 - Local threats – individual wells or specific water takings
- Uses risk ranking to guide selection of RMM



THREATS RANKING

Methodology

- Quantifies the influence pumping wells have on drawdown at each municipal well
- Influence presented as %Impact
- Pumping wells are ranked in order of descending %Impact
- Expectation that municipal wells will have the greatest influence on themselves



THREATS RANKING

Municipal Results

- Results are a relative comparison of threats
- Threats ranked from highest to lowest
- Municipal wells threat to themselves
- Queensdale Well (#1 rank – 72% impact)
- Arkell System (#2 rank – 53%) (Note: individual wells would have lower rank/impact)
- #1 and #2 (Arkell 1 only) ranked takings triggered significant risk level

Water Quantity Threat	Greatest % Impact	Rank	Well under Greatest % Impact
Group or Individual Threat			
Queensdale Well	72%	1	Queensdale
Arkell System (Arkell 1, Arkell 6, Arkell 7, Arkell 8, Arkell 14, Arkell 15 wells & artificial recharge and collector system)	53%	2	Arkell 8
Clythe Creek Well	32%	4	Clythe Creek
Calico Well	24%	5	Calico
Sacco Well	22%	6	Sacco
Helmar Well	19%	7	Helmar
Smallfield Well	19%	8	Smallfield
Carter Wells	17%	9	Carter Wells
Water St. Well	17%	10	Water St.
Burke Well	15%	11	Burke
Membro Well	13%	12	Membro
Downey Well	12%	13	Downey
University Well	7%	16	University
Dean Well	4%	17	Dean
Paisley Well	2%	18	Paisley
Future Municipal Takings: Hamilton Drive (GET)	<1%	22	-

THREATS RANKING

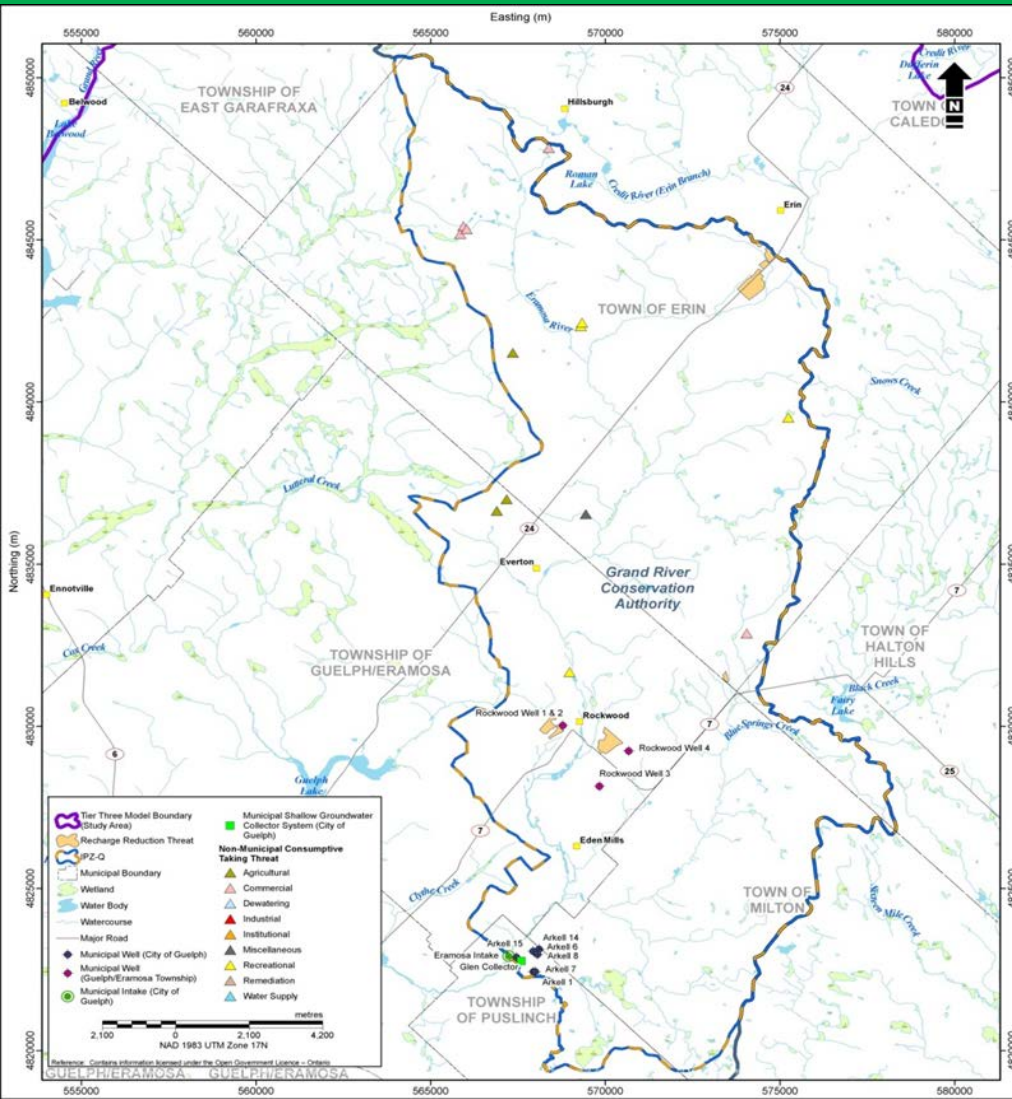
Non-Municipal Results

- Individually, majority of non-municipal water taking has little influence on water levels in municipal wells except for Dolime
- Notable findings:
 - a) Dolime Quarry – Rank #3 - 50% of drawdown at Membro
 - b) All other permitted takers exert 10% influence on the municipal wells including:
 - Gay Lea – Rank #19 – 2% drawdown at Emma
 - Nestle – Rank #20 – 1% drawdown at Burke
 - c) Combined influence of Recharge Reduction from land development – Rank #15 - 9%
 - d) Combined influence of all domestic wells - Rank #21 – 1%

Water Quantity Threat	Greatest % Impact	Rank	Well under Greatest % Impact
Group or Individual Threat			
a) 5080-8TAKK2 (Dolime - River Valley Developments)	50%	3	Membro
b) All other Permitted, Non-Municipal Takings Inside WHPA-Q except Dewatering, Commercial, and Industrial	10%	14	Emma
1245-AB8RMW (Gay Lea Foods)	2%	19	Emma
1381-95ATPY (Nestle Waters)	1%	20	Burke
5448-9FLM5E (Holody Electro Plating)	<1%	23	-
5736-8QSS7B (Flochem)	<1%	24	-
c) All Recharge Reduction Areas (due to future land use)	9%	15	Burke
d) All Non-Permitted Takings (WWIS-Domestic)	1%	21	Helmar

THREATS RANKING

IPZ-Q



- Threats ranking for IPZ-Q not done yet; will be undertaken as part of climate change assessment in 2018
- Water takings in the IPZ-Q are small compared to natural variability of flows in Eramosa River
- Threats impact on municipal wells expected to be limited by comparison

RISK MANAGEMENT MEASURES

RMM Catalogue (TRCA 2014)



- Examples include:
 - Increase of supply (i.e., addition of new wells)
 - Protection of groundwater recharge areas
 - Upgrades to municipal infrastructure (i.e., increasing connections throughout system) and system optimization
 - Residential – leakage reduction program/repair
 - Additional water storage facilities
 - Acquiring land to protect future supplies

RISK MANAGEMENT MEASURES

Evaluation Methodology

- RMM were evaluated using the Tier 3 Model
- Model scenarios were developed based on the results of the threats ranking to test RMM
- Approach to scenario development was iterative so that later scenarios could be developed base on the results of earlier ones
- Scenarios adjusted well pumping rates, well locations and other conditions to reduce Significant Risk Level:
 - Two scenarios to assess conservation measures using water use target from the WSMP
 - Four scenarios to test alternative municipal pumping configurations/optimizations
 - One scenario to test municipal pumping optimization plus no dewatering from Dolime Quarry
 - Three scenarios to assess new municipal test well locations

RISK MANAGEMENT MEASURES

Risk Management Measures Scenario Results

- The following RMM Scenarios are successful in reducing the risk to municipal wells:
 - Pumping optimization with demand reductions through conservation programs (Scenarios 5 and 6)
 - Pumping optimization with addition of new municipal wells (Scenarios 8, 9 and 10)
 - Pumping optimization with cessation of dewatering at Dolime Quarry (Scenario 7)
- However, these scenarios also predicted reductions in groundwater discharge to some cold water streams that need to be managed through source protection plan policies and further evaluated through water supply management

RISK MANAGEMENT MEASURES

Sensitivity Analysis Methodology

- WHPA-Q was delineated using average pumping rates.
- Tier 3 identified additional water is available within the WHPA-Q under current reported pumping rates
- However, the approved maximum permitted pumping rates are typically higher than average pumping rates.
- To better assess the capacity for increased non-municipal takings within the WHPA-Q, a sensitivity analysis was completed.
- Pumping rates from existing non-municipal water takings were increased in incremental steps from current rates to maximum permitted rates

RISK MANAGEMENT MEASURES

Sensitivity Analysis Results

- For average annual climate conditions, all municipal wells could meet future pumping rates.
- Under drought conditions, non-municipal non-dewatering takings at permitted maximum rates predict municipal wells cannot meet future planned demand
- The model suggests that permitted maximum rates need to be reviewed since the maximum rates are not sustainable
- The current non-municipal, non-dewatering permitted takings may be able to increase by approximately three times their current amount before impacts are predicted at municipal wells under drought conditions.
- This suggests that there may be capacity within WHPA-Q for increased takings
- Assumption is that future conservation targets at municipal wells (WSMPU rates) are achieved

THREATS MANAGEMENT STRATEGY

Purpose

- Provides the technical foundation for policy development
- Summarizes RMMEP and discusses recommended measures based on what was learned from the model scenarios
- Key elements:
 - Identification of Moderate and/or Significant threats
 - Identification of measures that are predicted to be most effective at meeting future municipal demands
 - Specific recommendations on how the measures could be implemented and tested further

THREATS MANAGEMENT STRATEGY

Recommended Risk Management Measures

Recommended RMM Category	Risk Management Measures Description
Well Optimization	This category includes re-allocating municipal pumping rates without violating critical low-water level thresholds in municipal wells.
Water Conservation and Efficiency	This category includes a series of specific RMMs designed to minimize residential, industrial, commercial, and institutional water demands. These RMMs aim to minimize total water demand, with a goal of keeping that water demand below the future rates evaluated in the Tier 3 Assessment.
Addition of New Water Supplies	This category includes the addition of new supplies (wells or intakes) or the addition of new alternate or backup water supplies. Cooperation across municipalities/agencies required.
Maintaining Pre-Development Aquifer Recharge Rates	This category includes RMMs such as Low Impact Development (downspout disconnection, pervious pavement), and stormwater retention ponds designed to maintain and increase recharge. Balance water quality and water quantity concerns.
Mitigating Impacts from Non-Municipal Consumptive Water Takings	This RMM includes the introduction of management or monitoring activities for current or future permitted consumptive water takings that have the potential to increase the risk to one or more municipal wells. Includes non-dewatering and dewatering (Dolime Quarry) water use.

THREATS MANAGEMENT STRATEGY

Other Recommendations – Model Maintenance

- Verification of Tier 3 Assumptions:
 - Hydrogeological characterization – collection and compilation of information to update the Tier 3 model
 - Groundwater and surface water monitoring data – collect data to update model and verify that the model is consistent with existing conditions
 - Municipal demands and future projections – update current and future water demand estimates
 - Non-municipal demands – update of permitted consumptive water demands using permit reviews and annual water taking records
 - Groundwater recharge estimates – update estimates when new information becomes available

RMMEP

Summary

- Tier 3 delineated Significant Drinking Water Threats within WHPA-Q and IPZ-Q
- RMMEP updated threats within WHPA-Q and ranked threats
- Majority of high ranked threats are municipal wells (Queensdale Well - #1, Arkell System - #2) and Dolime Quarry ranked #3
- RMM focused on municipal and non-municipal water takings, including consideration of:
 - Municipal well optimization,
 - Increased water conservation and efficiency,
 - Addition of new water supplies and
 - The mitigation of impacts from non-municipal water takings.
- Scenarios developed using the Tier 3 model to test RMM applicability

RMMEP

Conclusions

- Multiple scenarios could result in a decrease from Significant to Moderate Risk Level
- Recommended Risk Management Measures:
 - Municipal well optimization
 - Increased water conservation and efficiency
 - Addition of new water supplies
 - Mitigate the impacts from non-municipal water takings
 - Maintain or enhance recharge rates
- These five RMM are recommended for consideration in the development of water quantity policies
- Verification of the Tier 3 Model – update model with new data and information on a regular basis or as new, meaningful data becomes available

RMMEP

Conclusions

- Continued growth and new demands will add stress to groundwater and surface water resources
- Collective water resource management by municipalities, the conservation authority and the province is needed to ensure municipal drinking water is sustainable and other water uses (e.g., non-municipal takings, surface water flows, domestic users) have sufficient water to meet the respective needs
- Recommendation is to develop policies that incorporate water resource management strategies
- Strategies could include coordinated conservation programs, improved water monitoring and reporting, enhanced communication and regular coordination meetings, Tier 3 model management partnerships, and overall joint water management model

COMMUNITY LIAISON GROUP

RMMEP and Threats Management Strategy

Questions of clarification
about the RMMEP and
Threats Management
Strategy

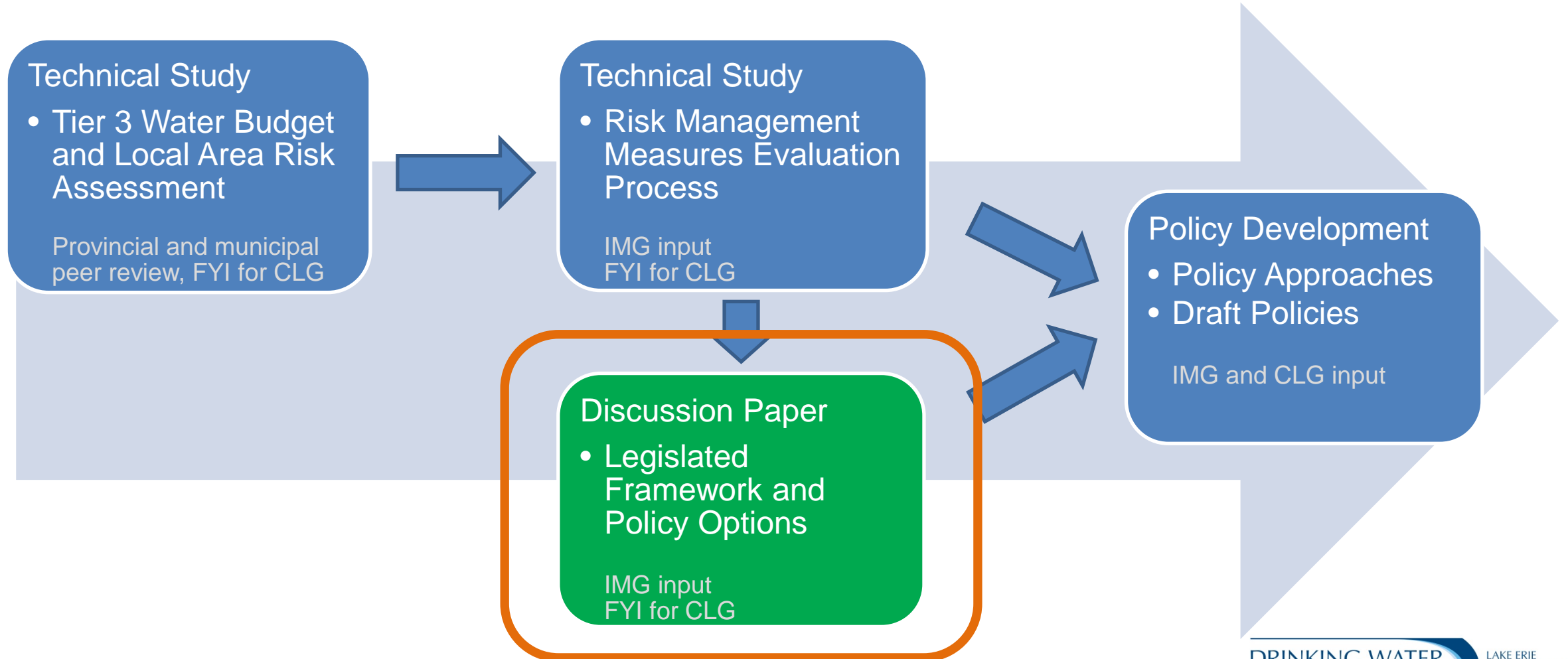




WATER QUANTITY POLICY DISCUSSION PAPER

POLICY DEVELOPMENT

Guelph-Guelph/Eramosa Water Quantity Policy Development Study



DISCUSSION PAPER

What is a discussion paper?

- Part of the process to update the Grand River plan to address water quantity threats in the vulnerable areas
- Aids policy makers by providing background information on:
 - Technical studies
 - Drinking water quantity threats
 - Existing legislation, policies and programs
 - Review of policy tools and approaches available
- Discusses promising policy tools that could be used to protect water quantity sources.

GGET DISCUSSION PAPER

Components

1. Introduction
2. GGET Tier 3 Water Budget and Local Area Risk Assessment Summary
3. Description of the Drinking Water Quantity Threats
4. Existing Legislation, Policies and Other Programs
5. Policy Toolbox
6. Policy Options
7. Policy Tool Review
8. Promising Policy Tools
9. Next Steps

EXISTING LEGISLATION

And Policies and Other Programs

- **Federal**

- e.g., Great Lakes Water Quality Agreement, Federal Water Policy, International Boundary Water Treaty Act and International River Improvement Act

- **Provincial**

- E.g., Ontario Water Resources Act, Clean Water Act, Planning Act, Places to Grow Act, Municipal Act, Building Code Act, Ontario Environmental Assessment Act, Ontario Low Water Response, Environmental Protection Act, Water Opportunities and Water Conservation Act

- **Municipal**

- City of Guelph: e.g., Water Efficiency Strategy Update 2016, Water Supply Master Plan Update 2014, Water and Wastewater Servicing Master Plan 2008, Stormwater Management Plan, Official Plan, Outside Water Use Program, Water Conservation Program, Incentive Programs
- Wellington County / Townships: e.g., County Official Plan, Puslinch Municipal Servicing Feasibility Study, Puslinch Groundwater Monitoring Network, Guelph/Eramosa Water Conservation

POLICY TOOLBOX

Clean Water Act, 2006

- Part IV Prohibition
- Part IV Risk Management Plans
- Part IV Restricted Land Uses
- Prescribed Instruments
- Land Use Planning
- Education, Outreach / Incentive Programs
- Stewardship Programs, Best Management Practices, Pilot Programs and Research
- Specify Actions

POLICY OPTIONS

Consumptive Water Takings

- Part IV prohibition of consumptive use
- Part IV risk management plan for consumptive use
- Prescribed Instrument – Province to review/amend Permit to Take Water (PTTW)
- Land Use Planning – managing new development through Official Plans and By-laws
- Education / Outreach – e.g., continue / expand water conservation
- Other – e.g., water conservation stewardship projects, promote pilot programs for water conservation at businesses, consideration of alternative water supplies (i.e., water reuse)
- Specify Action – e.g., Provincial support for Tier 3 model management, Tier 3 model use for PTTW, consider Tier 3 information in growth forecast, locating additional water supplies

POLICY OPTIONS

Recharge Reduction

- Part IV prohibition of development that reduces recharge
- Part IV risk management plans for developments to maintain recharge
- Prescribed Instruments – Province to review/amend Environmental Compliance Approvals (ECA) for storm water infiltration projects
- Land Use Planning – managing new developments through Official Plans and By-laws to maintain recharge
- Education / Outreach – e.g., continue / expand water recharge education initiatives
- Other – e.g., protection of recharge areas through stewardship, best management practices such as downspout disconnect
- Specify Action – e.g., develop water management plans to maximize recharge, develop joint water resource management system, optimize Low Impact Development guidelines

POLICY TOOL REVIEW

- Project Team, with input from Implementing Municipal Group (IMG) and Community Liaison Group (CLG), reviewed all policy tools available
- Review included identifying potential **strengths** and **opportunities** as well as potential **weaknesses** and **challenges**
- Summary Tables provided in SPC Report 18-06-03
- Detailed Tables provided in Appendix C of Discussion Paper
- Promising Policy Tools identify those that merit further discussion
- List does not preclude other tools from being used
- Tools may be used in combination

PROMISING POLICY TOOLS

Consumptive Water Takings

- Prescribed Instrument – Permit to Take Water (PTTW)
 - Review, amend and revoke existing, not issue new permit (e.g., where municipal services exist)
 - PTTW as prohibition tool only after all other feasible options insufficient in protecting sources
- Part IV prohibition and RMP
 - May be applicable in area around municipal well for activities exempted from PTTW
- Land Use Planning
 - As a tool to address water takings largely untested
 - Consumptive water use and availability could be considered in Growth Plan population and employment targets
 - Official Plan policies could specify restrictions or requirements for complete applications, direct new development to areas on full municipal services
 - Municipalities could incorporate long term water supply sustainability into water services decisions when approving growth and development

PROMISING POLICY TOOLS

Consumptive Water Use

- Specify Action
 - Develop / update municipal water management/conservation plans
 - Develop joint water resource management systems to provide collaboration and cooperation between province, source protection authority, and municipalities
 - Use of Tier 3 model to making informed decisions
 - Provincial funding on ongoing maintenance of Tier 3 models
 - Ensuring existing and future municipal water demands are met before allocating water to other users, i.e., shifting to “priority of use” concept

PROMISING POLICY TOOLS

Recharge Reduction

- Land Use Planning
 - Manage new developments to ensure activities do not reduce recharge, e.g., implementing best management practices (BMPs) to maintain predevelopment recharge.
- Prescribed Instruments
 - E.g., Environmental Compliance Approvals (ECAs) for storm water ponds to manage infiltration
- Education and Outreach / Incentives
 - Promotion of BMPs and low impact development (LID) in specific areas
 - Outreach programs could target specific sectors

POLICY FRAMEWORK

- Threats Management Strategy (TMS) and Policy Discussion Paper provide foundation for water quantity policy development
- Project Team will develop policy framework and list of policy approaches over summer
- Come back in fall with policy framework and policy approaches
- Topics that Project Team will consider include:
 - Manage water takings and recharge reduction
 - Water conservation
 - Information sharing and collaboration between government agencies
 - Tier 3 model management, including funding and monitoring

COMMUNITY LIAISON GROUP

Discussion Paper

Questions of clarification
about the Discussion Paper
and feedback on promising
policy tools



NEXT STEPS

- Lake Erie Region committed to collaborative process for policy development
 - Municipal and stakeholder engagement through Project Team, IMG, and CLG
- Policy framework and policy approaches to be drafted over the summer and presented to the CLG for feedback on September 6, 2018
- Policy framework and approaches to be brought to the Source Protection Committee on October 4, 2018
- Drafting of water quantity policy text expected to begin in the early fall