GRAND RIVER WATERSHED
Water Management Plan

Grand River Watershed Water Management Plan

Water Demand Management: Meeting Water Needs in the Grand River Watershed

Prepared by: James Etienne
in consultation with the Grand River Water Demand Management Working Group
for the Grand River Water Management Plan 2012 Update

September 2014

Suggested Citation

Water Demand Management; Meeting Water Needs in the Grand River Watershed. Grand River Water Management Plan. Prepared by James Etienne, GRCA in consultation with the Grand River Water Demand Management Working Group. Grand River Conservation Authority, Cambridge, ON. 2014.

Acknowledgements

This document would not have been possible without the collaborative efforts of a diverse team of water use sector representatives, consultants, municipal, ministry and agency staff as well as staff at the GRCA who worked on the many facets of the Water Management Plan. Thanks to all of you for helping to bring this project together.

- Municipal Water Demand Management Working Group
- Grand River Low Water Response Team
- Kirk Stinchcombe – Econnics
- Carol Maas & Sarah Wolfe – Bridgewater Research
- David Dilks and Ariana Cancelli – LURA Consulting
- Lorrie Minshall, Sandra Cooke, Dwight Boyd, Amanda Wong, Stephanie Shifflett, Katherine Balpataky and Lara Fox – GRCA
- Hajnal Kovacs and the Whitemans Creek Drought Contingency Pilot Project Steering Committee

Definitions and Abbreviations

Grand River Water Management Plan Update (WMP) – a collaborative effort by the GRCA and their watershed partners to prepare and update to the 1982 Grand River Basin Water Management Study.

Water Demand Management (WDM)

Permit to Take Water (PTTW)

Water Management Plan Steering Committee (WMPSC)

Ontario Low Water Response Program (OLWR) – provincial program to respond to low water conditions in the Province of Ontario. The program is intended to ensure provincial preparedness, to assist in coordination and to support local response in the event of a drought.

Water Demand Management Working Group (Working Group) – a watershed based group of municipal, provincial and federal water managers who represent partners to the water management plan in the Grand River watershed and have direct water management responsibilities in the watershed.

Low Water Response Team (Response Team) – a watershed based group of local water users, who coordinate local activities under the OLWR program to help to mitigate low water conditions at Levels 1 and 2, and prepares recommendations for actions to the Province when conditions in the watershed reach Level 3. Representation in the group includes representatives from municipalities, provincial agencies, local water use sectors, First Nations and special interest groups.

Table of Contents

Appendices

Appendix A: Water Demand Management Discussion Paper, September 2011

Appendix B: Discussion Paper - Considerations for "Securing" Current and Planned Source of Municipal Supply, June 2013

Appendix C:: Water Supply and Demand Management Workshop, September 15, 2011 Outcomes Report

Appendix D Grand River Low Water ResponseTeam Meeting Agenda/Minutes, June 10, 2011

Appendix E WDM Objective Development Process, March 2, 2012

Appendix F Water Sustainability Planning Resources List

Appendix G Municipal Solutions and Knowledge Transfer Workshop, June 5th 2012 Outcomes Report

Appendix H Municipal Water Demand Management Primers

Appendix I Municipal Demand Management Questionaires

Appendix J: Whitemans Creek Drought Contingency Plan, January 2014

List of Figures

List of Tables

Preface

Goal # 3 in the Grand River Watershed 2014 Water Management Plan Update Project Charter is “Secure water supplies”. Fundamental deliverables are:

- An assessment of the extent to which future municipal water supply needs are identified, sourced and secured.
- An assembled set of community water demand management objectives/strategies
- Identification of areas with potential for conflict along with plans for how management strategies will be developed
- Together, a water supply/demand management strategy that we agree represents a road map for sustainable water use.

In order to prepare these deliverables, it was necessary to assess the availability of water supplies throughout the watershed relative to estimated and calculated water use and to identify demand management best practices that ensure the security and sustainability of water resources.

Executive Summary

The Demand Management Working Group set out in 2011 to identify unique municipal demand management objectives for the Grand River Water Management Plan Update based upon the GRWMP Steering Committee's identification in May 2010 that water demand management objectives are difficult to do on watershed scale. Each municipality's water supplies are very different, and the financial implications on the municipalities could be immense. It was agreed by the Steering Committee that demand management objectives could be an assembled set of strategies, with each municipality determining their own strategy. In addition, water demand management best practices were sought in consultation with the Grand River Low Water Response Team which represents the diversity of water use throughout the watershed.

The Water Management Plan highlighted a need to manage the quantity of water in the watershed. Population growth places greater pressure on demand for water. Climate change adds a level of uncertainty to water supply plans. For the Water Management Plan, a proactive, innovative approach to water demand management was undertaken with the objective of determining water demand management objectives for the various high water-use sectors. Municipal use is the largest demand (61% of all water takings) for water in the watershed, followed by dewatering (6%), agricultural irrigation (6%), aggregate washing (4.5%) and livestock watering (4.4%). Consequently, much effort was placed on determining water demand management objectives for municipal supplies. Demand management is a proactive, innovative approach to reduce water use and consumption, avoid unnecessary capital expenses (e.g., wastewater treatment plant upgrades, Great Lakes pipeline, etc.) and reduce potential conflicts between competing human and ecological needs.

The objectives of this project were met. A Water Demand Management working group came together that comprised seven agencies and 10 members to discuss water demand, conservation and other innovative approaches for managing water supply. Several multi-stakeholder workshops were held and a number of reports were drafted to synthesize the information from the variety of water use sectors (e.g. municipal supply forecasts, agricultural uses for irrigation and livestock watering, aggregate use, and ecosystem environmental flow requirements). As a result of this consultative process, a series of Municipal Water Demand Management Primers were developed as a mechanism to share information and lessons learned for the Municipal sector. In addition to highlighting innovative approaches to reducing municipal water demand, the Primers highlighted the financial, social, political and operational barriers to reducing water demand. The Primers have been posted to the web for use within and outside the Grand River watershed. In addition, companion reports were also written for environmental flow requirements for the regulated river reaches and the reliability of reservoir operations.

Water demand management for all high water use sectors and for water users in areas of conflict or constraint is needed to ensure water supplies over the long term. The Water Management Plan provided the mechanism to start a wider discussion on water demand management across water use sectors. Action starts when the discussion starts and water demand management objectives for leading municipalities are already being incorporated into long term planning however, challenges remain for the smaller municipalities. Smaller municipalities find it challenging to undertake long term water supply planning. Resources, both financial and human, are limited in smaller municipalities and much of the effort to ensure long-term supplies tends to be pushed to the development industry. This can create much uncertainty in the long term supplies for some areas of the watershed. Resources are needed to assist smaller municipalities in long-term water supply planning, especially in those areas that are targeted in the Places to Grow for the Greater Golden Horseshoe (2012). It is hoped that the process of

assessing the long term sustainability of all municipal water supplies has given smaller municipalities the tools to assess long term capacity and set demand management targets where necessary.

Still, other challenges exist. Non-municipal water users are not as formally organized as municipalities, so much effort is needed to discuss the issue with a wide variety of users (i.e. farmers, aggregate operators, golf course managers, etc). Capacity is needed to keep the discussion going for the non-municipal water use sectors, especially in areas of potential water use conflict or constraint.

Work was done to assess future agricultural and aggregate mining water needs. Forecasting for these sectors is less conclusive, but it is expected that livestock water needs will not conflict with other sectors due to the low demand from other water use sectors in the livestock intensive subwatersheds. There exists the potential for water use conflicts to increase between crop irrigation and aggregate mining as both sectors intensify water use in Brant County. However, efforts to proactively establish a drought contingency plan for the Grand River watershed are identifying local action plans, particularly in Brant County that will improve the long term sustainability for a variety of water use sectors, including the establishment of alternative water sources that reduce agricultural irrigation takings from ecologically sensitive streams like Whitemans Creek. It is expected that the Drought Contingency Pilot Project for the Whitemans Creek subwatershed will generate demand management recommendations that can be transferred to subwatersheds with similar high water use issues.

1. Introduction

Water quantity issues are growing in the Grand River watershed. Increasing population pressures anticipated in part due to the Provincial Places to Grow and Greenbelt legislations will continue to drive demand pressures in municipal centres. Climate change has also introduced a degree of uncertainty in the reliance on current water supplies. Municipalities are currently undergoing assessments of risks to their drinking water supplies through Source Protection Planning. Some may need to expand their infrastructure to minimize this risk. The recently introduced Water Opportunities and Conservation Act could also drive the need for municipalities to demonstrate efforts to develop strategies for water conservation and efficiency through mandatory compliance requirements (*Wong, 2011*).

In addition to significant municipal water demand issues, there exists the potential for water use conflicts in the rural portions of the watershed from a variety of intensive non-municipal uses. Agriculture, aggregate mining and rural domestic use also have the potential to conflict with urban and ecological water needs. As a result, a dialogue was needed with a wide variety of water users to confirm existing needs and the trends for future use to ensure the sustainability of water sources throughout the watershed.

In 2010 the Grand River Conservation Authority commenced an update of water management goals and objectives set out in the 1982 Grand River Basin Water Management Study. As stewards of the watershed, the GRCA requires a longer-term plan to ensure a sustainable water supply for communities and ecosystems, reduce potential flood damages and improve water quality to maintain river health and reduce the Grand's impact on Lake Erie. Goal # 3 in the Grand River Watershed 2014 Water Management Plan Update Project Charter is “Secure water supplies”. Deliverables were established to achieve this goal. In order to prepare these deliverables, it was necessary to assess the availability of water supplies throughout the watershed relative to estimated and calculated water use and identify the demand management best practices that ensure the security and sustainability of water resources.

GRWMP Goal #3: Secure Water Supply Objectives*

- An assessment of the extent to which future municipal water supply needs are identified, sourced and secured.
- An assembled set of community water demand management objectives/strategies
- Identification of areas with potential for conflict along with plans for how management strategies will be developed
- Together, a water supply/demand management strategy that we agree represents a road map for sustainable water use.

* Adapted from the *Grand River Water Management Plan Update Project Charter.*

The WMP Steering Committee made it clear to the GRCA that the individual municipalities were responsible for setting municipal demand management objectives and establishing their own water conservation strategies. It was agreed that the GRCA’s role in Demand Management was to develop a process for confirming objectives and consolidating municipal targets into the Water Management Plan.

This page was intentionally left blank

2. Grand River Watershed

The Grand River is a managed river system where reservoir operations, water supply, and wastewater management were designed as an integrated system on a watershed basis (***Figure 1***). Multi-purpose reservoirs capture runoff from snow melt and heavy rains and release stored water to maintain flow in the central and lower river system to support water supply, wastewater assimilation and aquatic ecosystems (*GRWMP 2013*). Groundwater discharges further augment surface flow and support cold water streams in the central part of the watershed. The lower watershed is influenced by activities upstream with the ultimate outlet of the river to Lake Erie at Port Maitland. The majority of the watershed's water supply needs are satisfied by groundwater sources and river system takings, while less than 4% of water supply is sourced from the Great Lakes (*Wong, 2011*).

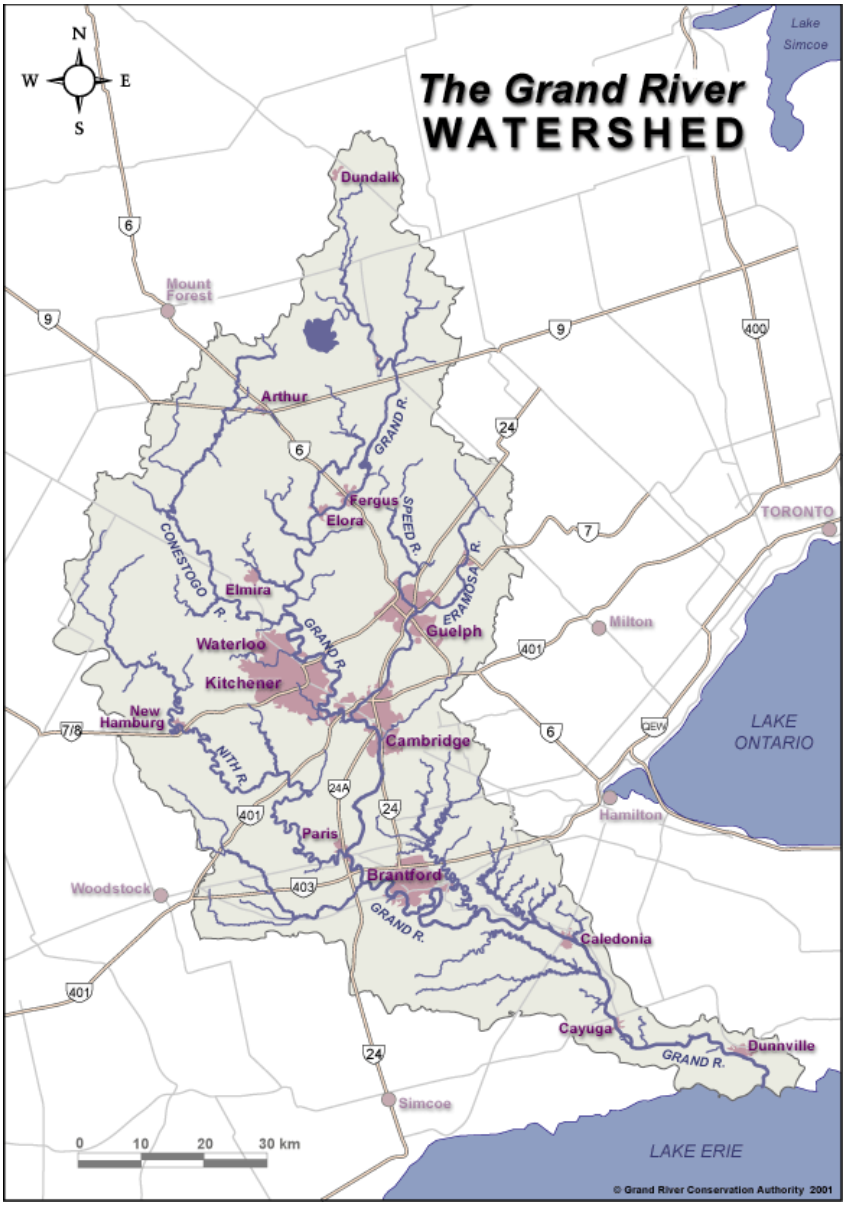


Figure 1. Map of the Grand River Watershed

Grand River Water Use Inventory

In December 2010, staff reported to the Water Management Plan Steering Committee (WMPSC) on the status of available water quantities in the watershed. The 2011 Water Use Inventory Report compiled information on four main categories: municipal water supply systems, rural domestic water demand, agricultural water uses and permitted water takings (greater than 50,000L/day). The PTTW database provides the information for the permitted water takings and includes approximately 700 permits with over 1200 sources in the Grand River watershed in 2008 (***Figure 2***). The Grand River watershed relies heavily on groundwater sources, which comprise over 70% of the volume of water demand. The total assessment of all water takings for the Grand River watershed amounts to 152 million cubic metres per year.

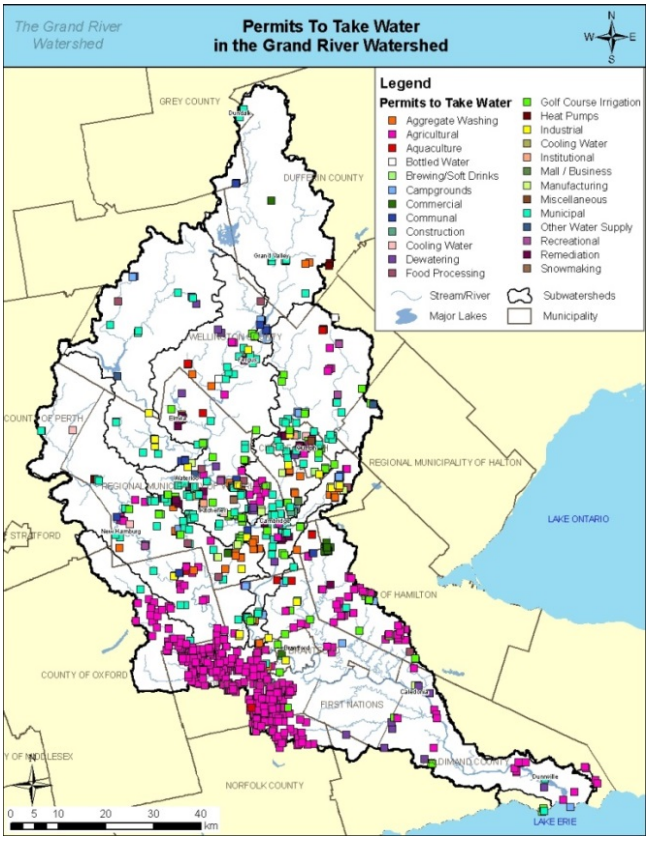


Figure 2. Map of Permits to Take Water in the Grand River Watershed

2.1. Water Demands

Municipal water demand in the watershed accounts for over 60% of the total annual volume of water used (***Figure 3***). The top 10 non-municipal water uses were identified through the assessment of all water takings, using actual takings where available and estimates based on water use sector research (*Wong, 2011*).

1. Dewatering
2. Agricultural – Irrigation
3. Aggregate washing
4. Agricultural – Livestock watering
5. Rural Domestic Water Supply
6. Aquaculture
7. Remediation
8. Communal Water Supply
9. Unspecified Industrial Uses
10. Golf Course Irrigation

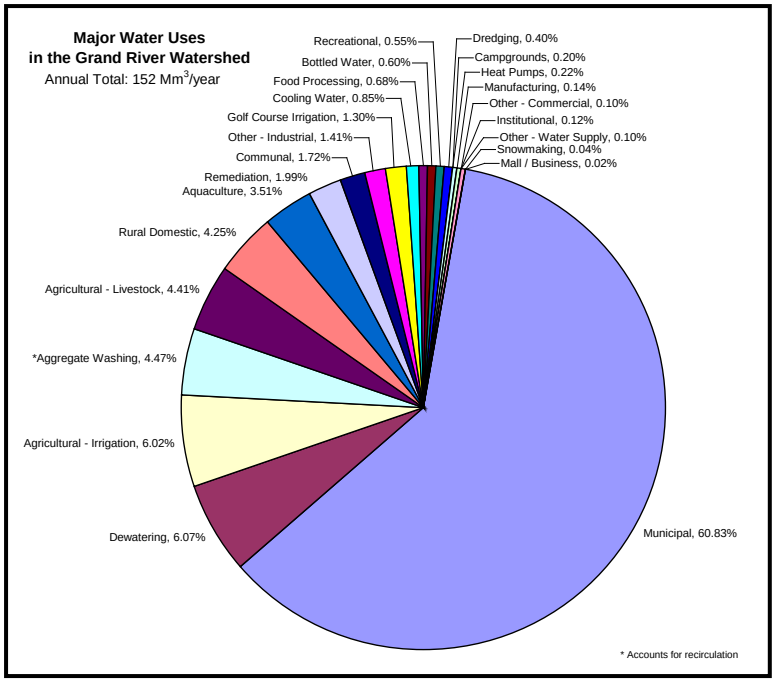


Figure 3. Water Use Summary

2.2. Water Budgets

Water Budget modelling activities have been conducted in the Grand River Watershed for more than 20 years. The Tier 2 Water Budget and Water Quantity Stress Assessment reports were completed in 2009 for the Drinking Water Source Protection Program; built on a greater body of work that had been completed in the Grand River Watershed to increase the understanding of water pathways in the watershed. The Integrated Water Budget Report (AquaResource, 2009a) was completed using a set of water budget tools (groundwater flow and hydrologic numerical models) to provide a physical means of quantifying flows through the system for determining available water resources in the Grand River watershed.

Significant efforts were undertaken to better quantify and characterize the consumptive water demand. The water demand characterization gathered relevant information contained within Ministry of the Environment and Climate Change (MOECC) PTTW paper files, verified municipal water use information, gathered actual industrial and commercial pumping data, refined agricultural demand estimates based on discussions with the farming community and validated actual use information through calibration of the surface water model.

The Tier 2 Water Quantity Stress Assessment (AquaResource, 2009b) was prepared as a structured means of evaluating the degree of potential water quantity stress throughout an area by comparing the volume of water demand to that which is practically available for use. The results of streamflow and groundwater flow modelling and water demand estimates from the Integrated Water Budget were incorporated to determine the potential stress to surface and groundwater source areas (***Figure 4***).

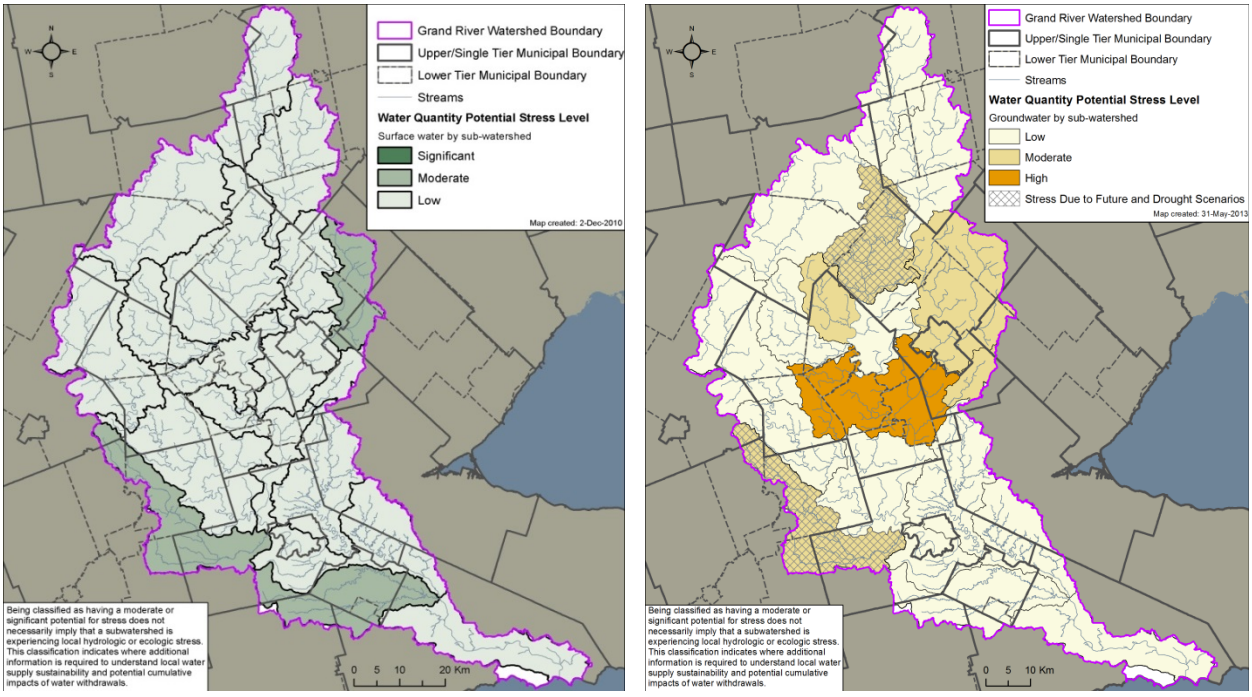


Figure 4. Surface Water and Groundwater Quantity Potential Stress Areas

In keeping with Provincial Clean Water Act legislation, municipal drinking water systems located within potentially stressed subwatersheds are required to undertake Tier 3 Water Quantity Risk Assessment studies to confirm the sustainability of their sources under existing and future water demands (***Table 1***).

Surface Subwatershed	Municipal Surface Water Supplies
Eramosa Above Guelph Subwatershed	City of Guelph (Eramosa / Arkell Intake)
McKenzie Creek Subwatershed	None
Whiteman's Creek Subwatershed	None
Groundwater Assessment Area	**Municipal Groundwater Supplies**
Canagagigue Creek Assessment Area	Region of Waterloo (West Montrose, Conestogo, Elmira)
Central Grand Assessment Area	Region of Waterloo (Integrated Urban System, New Dundee)
Mill Creek Assessment Area	None
Upper Speed River Assessment Area	City of Guelph, Guelph-Eramosa Township (Rockwood, Hamilton Drive)
Irvine River Assessment Area (Future Conditions Only)	Town of Centre Wellington (Fergus-Elora)
Whiteman's Creek Assessment Area (Drought Conditions Only)	Oxford County (Bright), Brant County (Paris Bethel Well)

Table.1 - Summary of Municipal Water Supplies within Potentially Stressed Subwatersheds

One method of mitigating the potential water quantity risk is to employ pro-active demand management strategies that stretch the ability of existing water supplies to serve even larger demand populations or improve the peak demand resiliency of existing sources, reducing the need to expand infrastructure or find new sources. The water "soft path" approach, shown in *Figure 5* (Maas & Porter-Bopp, 2011), can be taken to manage municipal and non-municipal water demands and lessen the potential for subwatershed stress.

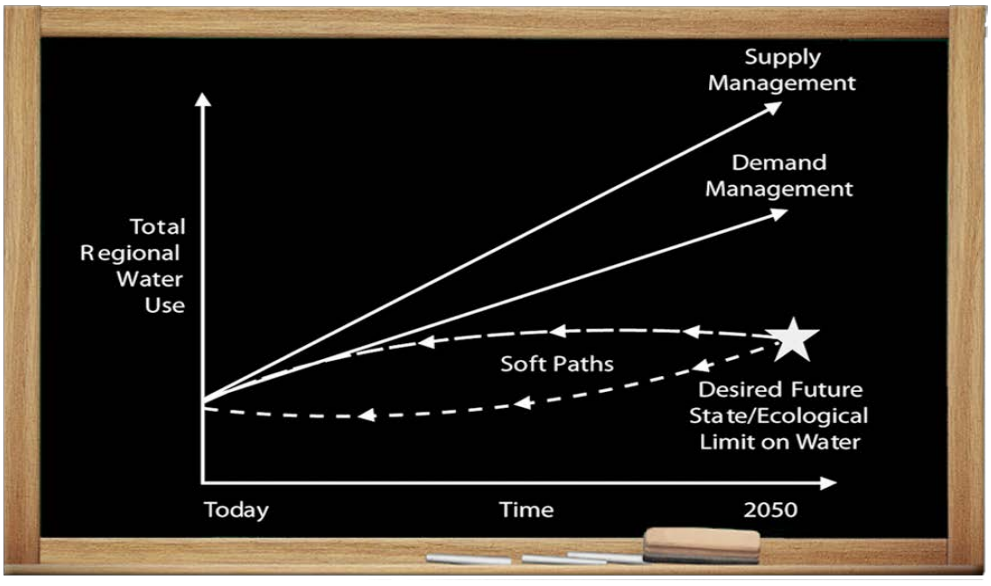


Figure 5. Water Soft Path Conceptual Graph

2.3. Identifying Municipal Water Needs

A Municipal Water Supply and Demand Management Working Group (Working Group) was struck in Spring 2011 to review existing municipal water supply plans and demand management activities and identify the need for future studies or work to ensure the future quantity of municipal water supplies. The Working Group were specifically asked in a discussion paper (*Appendix* A:) to consider the potential barriers to securing and maintaining a sustainable long term municipal water supply.

At the first meeting of the Working Group on April 18th, 2011, the municipalities identified concerns with their ability to obtain and hold onto long term water supply capacity in their PTTWs from the MOECC. The concern evolved from the MOECC's move towards more frequent renewals of the PTTWs giving the impression that a focus on short term use might result in "claw backs" of long term permitted capacity. The municipalities were also concerned that operations and maintenance contingencies are not being built into the consideration of permitted average day and maximum pumping rates. This led to the development of a discussion paper on security of supply (***Appendix B***:). The paper recognizes the importance of long term water supply planning and concludes that the security of municipal water supplies can be enhanced by a cooperative and supportive working relationship between the MOECC and municipalities in planning, establishing and maintaining municipal water supplies. This need is supported by mutual provincial and municipal interest in strategic planning for municipal services, security for municipal water supplies and efficiency in infrastructure (*GRWMP, 2013a*).

On September 15, 2011 the GRCA sponsored a Water Supply and Demand Management Workshop to consider the barriers and challenges to water demand management, by identifying promising municipal strategies and solutions. The themes for presentation and discussion included technology and operations for delivering municipal water along with economics, community involvement, regulations and implementation challenges associated with water demand management. LURA Consulting facilitated the workshop and captured the proceedings in an Outcomes Report *(Appendix C)*.

2.4. Identifying Non-Municipal Water Needs

In the late 1990s, the Province of Ontario experienced extended periods of low rainfall and high temperatures resulting in some of the lowest surface water levels and driest soils recorded since the 1960s. A review of these conditions in 1999 led to the development of the Ontario Low Water Response (OLWR) Plan, intended to ensure preparedness and assist in co-ordination to support local response in the event of a drought (*MNR, 2010*). Since then, the GRCA and its water use stakeholders have provided leadership in the development of locally active Low Water Response programs. The GRCA has been called upon on numerous occasions by the Ministry of Natural Resources and Forestry to conduct pilot studies, host stakeholder meetings and to make presentations at annual training workshops.

The Grand River Low Water Response Team (Response Team) represent the diversity of municipal and non-municipal water uses across the watershed and is active throughout the high water demand season to provide input, advice and a response to low water events. The GRCA conducts an annual Start-Up meeting with the Response Team to prepare them for the coming season and address the logistics of keeping the Response Team informed. The Response Team was provided with an overview of the WMP goals and objectives and the representatives from the non-municipal water use sector were invited to report on trends in their sectors at the Response Team Start-Up Meeting on June 10, 2011 (***Appendix D***). Although the focus of the Response Team is reactive, it is recognized that strategies are needed in the non-municipal water use sectors to protect the quantity of their water sources and minimize the need for drastic response activity during frequently recurring low water conditions.

3. Municipal Objective Assembly Process

The Demand Management Working Group set out in 2011 to identify unique municipal demand management objectives for the Grand River Water Management Plan Update based upon the WMPSC's identification in May 2010 that water demand management objectives are difficult to do on a watershed scale. Each municipality's water supplies are very different, and the financial implications on the municipalities could be immense. It was agreed by the Steering Committee that demand management objectives could be an assembled set of strategies, with each municipality determining their own strategy.

3.1. Municipal WDM Toolkit Development

In response to the findings of the September 2011 workshop, the GRCA developed a Terms of Reference and requested consultant proposals for the development of a tool kit to assist municipalities in the preparation of demand management objectives for integration in the Water Management Plan. It is important to recognize that all municipalities do not have the same resources and/or needs for their demand management strategies. The working group recommended that the toolkit allow the municipal strategies to align with the three generations of water conservation (supply management, demand management and "Soft Path" in ***Figure 5*** discussed at the September workshop.

Bridgewater Research was selected to prepare a Municipal WDM Framework. Bridgewater Research, a partnership of Carol Maas from The POLIS Project on Ecological Governance and Sarah Wolfe from the University of Waterloo`s Environmental Science Department, were instrumental in the development of a Water Soft Path Pilot Project for the Towns of Fergus and Elora in 2010.

On the basis of this direction, the working group held several meetings and workshops to address the barriers, challenges and solutions for municipal demand management. The result of these sessions was the establishment of a process for the development of a toolkit for setting demand management objectives (***Figure 6***), the details of which are found in ***Appendix E***.

Figure 6. Municipal Water Demand Management Objective Assembly Process

Bridgewater Research consulted with the Working Group to establish priority topics with the municipalities for a June 2012 workshop. Bridgewater Research developed a number of supporting resources to help the municipalities prepare for this workshop, including a Water Sustainability Planning Resources List (***Appendix F***). The June 5, 2012 Municipal Solutions and Knowledge Transfer Workshop, again facilitated by LURA Consulting, helped municipal water managers explore solutions, proven strategies, and new approaches to implementing WDM in a peer learning setting. The goal was to give Bridgewater Research a clear understanding of the local suite of initiatives that would be suitable for the development of a WDM Toolkit to help preserve municipal water resources in the Grand River watershed. LURA Consulting also captured the June 5th workshop proceedings in an Outcomes Report (***Appendix G***).

The WMP Steering Committee made it clear to the GRCA that the individual municipalities were responsible for setting municipal demand management objectives and establishing their own water conservation strategies. It was agreed that the GRCA's role in Demand Management was to develop a process for confirming objectives and consolidating municipal targets into the Water Management Plan. The GRCA worked, with the help of Bridgewater Research and LURA Consulting, to take what was learned in this process to develop a toolkit for water managers. The toolkit, now available on the GRCA website, includes an up to date electronic resource sheet referencing the latest in water sustainability best practice from across North America and a series of WDM primers (***below***) based on local experiences shared at the Toolkit Development Workshop to tailor best practices to municipal water utilities of all sizes that did not have established water conservation strategies.

Municipal WDM Primer Series

The Primer series was designed with Water Management Plan branding that addresses the nine subjects, identified by municipal water managers, which cover demand management topics:

- Long-Term Supply Planning,
- Community outreach,
- Water metering,
- Outside water use by-laws,
- Rebates & capacity buy-backs,
- Water loss control (leak detection, breaks, flushing),
- Conservation pricing and
- New technologies.

The primers were designed to give Decision making advice on applicable practices and present the material using breakout box dialogue, local municipal case studies and internet resource list references. The toolkit also includes a matrix (***Table 2***) that helps water managers identify which best practices might be most appropriate to their situations based on water savings potential, revenue risk, ease of use and program cost.

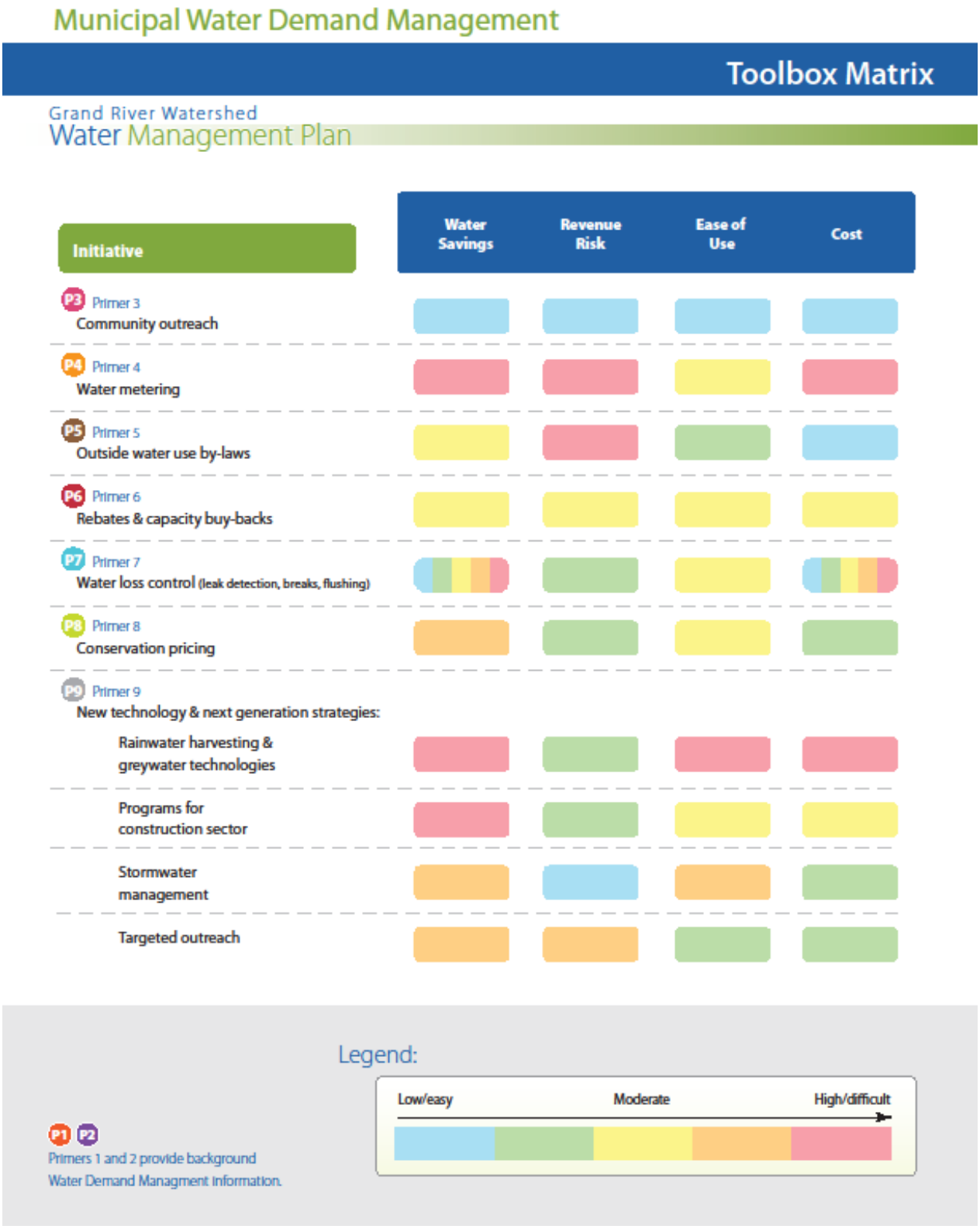


Table 2. Municipal Water Demand Management Toolbox Matrix

3.2. Municipal Long Term Supply Needs

The goal of this process was to obtain municipal water demand management objectives from all water utilities for assembly in the WMP which will help them set future objectives for local approval and implementation of their own water efficiency programs. This has literally been a moving target to water managers for some time. In the 1970's per capita water standards for infrastructure design used 100 imperial gallons/person/day (450 l/person/day) as the domestic target. More recently the bar has been dropping rapidly, especially with the introduction of low flow toilets in the mid-1990s. While most Grand River watershed municipalities have experienced significant drops in indoor domestic water demands, creating potentially serious revenue shortfalls for some utilities, decreasing per capita water use has yielded some surplus capacity in supply and distribution infrastructure. At the same time, household landscaping and recreational water use expectations have started to run up against the challenge of a changing climate.

In this process, the next step in identifying the need for demand management was an understanding of existing municipal demand, water supply capacity and projections for future need. Municipal water supply operators in the Grand River watershed were asked to update data from the GRCA's May 2011, *"Status Report on Municipal Long Term Water Supply Strategies"* (*Shifflett, 2011*). The 2011 status report relied on municipal population and water system data from 2006 and 2009 respectively. The 2012 update provided an opportunity to check water use against the most recent 2011 census population data to get a better per capita water use estimate. Water Use Surveys were circulated to the water managers requesting confirmation/correction of the summary information collected using a base year of 2011 and providing a preliminary assessment of the future water supply needs for the municipal system (***Appendix I***).

A summary of the preliminary assessment of the 41 municipal water supply systems in the Grand River watershed can be found in ***Table 3***. Two of the systems, St. Agatha and West Montrose, are being decommissioned in favour of connection to larger municipal systems. Of the remaining 39, 33 do not appear to have future limitations in their capacity. ***Table 3*** notes that five small rural systems (Waldemar, Marsville, Hamilton Drive, Mt. Pleasant and Airport) with higher than average peak day to average day ratios will still have sufficient supplies, but it is assumed that Low Water Response programs will continue to provide guidance for managing long term peak demands.

Of the six systems assessed with limitations, Rockwood is expecting growth that could trigger water supply expansion by 2031. However, it is assumed that Low Water Response programs will continue to provide guidance for managing peak demands and potentially defer the need for expansion. The County of Oxford has identified that the water supply system in Bright is no longer capable of producing the permitted maximum water capacity for the village. The County has begun exploration for an additional source and the GRCA has commenced the Whitemans Creek Tier 3 Water Quantity Risk Assessment which will help quantify the long term sustainability of the Bright supply. The four remaining systems (Fergus-Elora, Guelph, and the Integrated Urban System and Baden/New Hamburg in the Region of Waterloo) already have draft or approved documents which identify demand management objectives to maintain the long term capacity of their water supplies.

The Region of Waterloo's Water Efficiency Master Plan (2015-2025), due to be approved in 2014, concludes that conservation measures, economic changes and intensification in the Region have reduced the long term demand forecast allowing them to defer the Great Lakes Pipeline alternative from 2035 (from the Region's 2007 Water Supply Master Plan) to beyond 2050. ***Figure 7*** shows that the Region of Waterloo is proposing to achieve a per capita water efficiency target of 168 l/person/day by 2025 and lists recommended programs to achieve this goal (*Lura Consulting & Econics, 2014*).

Municipality	Water System	Long Term Water Supply Needs			Notes (Sufficient Supply assumes OLWR participation and industry accepted efforts to reduce water loss)
		Avg. Day	Peak Day	WDM Objective	
Southgate	Dundalk	OK	OK	Status Quo	Sufficient Supply
Amaranth	Waldemar	OK	OK	Status Quo	Sufficient Supply (with high peak demands)
East Garafraxa	Marsville	OK	OK	Status Quo	Sufficient Supply (with high peak demands)
Grand Valley	Grand Valley	OK	OK	Status Quo	Sufficient Supply
Centre Wellington	Fergus-Elora	OK	X	Reduce 14% by 2028, 38% by 2040	Water Supply Master Plan in progress. Soft Path Report identified staged water demand management objectives.
Mapleton	Drayton	OK	OK	Status Quo	Sufficient Supply
	Moorefield	OK	OK	Status Quo	Sufficient Supply
North Wellington	Arthur	OK	OK	Status Quo	Sufficient Supply (no expansion needed)
Guelph-Eramosa	Rockwood	OK	X	Strengthen WDM program	Expansion required by 2031 to satisfy peak day needs could be deferred with WDM.
	Hamilton Dr.	OK	OK	Status Quo	Sufficient Supply (with high peak demands)
Perth East	Milverton	OK	OK	Status Quo	Sufficient Supply
Region of Waterloo	Integrated Urban System	X	X	Region proposing 168 l/person/day by 2025 in the 2015-2025 Water Efficiency Master Plan.	The Region's WSMP Update (due to be approved in 2014) concludes that conservation measures, economic changes and intensification in the Region have reduced the overall demand forecast allowing them to defer the Great Lakes Pipeline alternative to beyond 2050.
	Baden/ New Hamburg	X	X		
	Ayr	OK	OK		
	Wellesley	OK	OK		
	St. Clements	OK	OK		
	10 Non-Growth Rural Systems	OK	OK	Status Quo	Sufficient Supply (some with high peak demands)
Guelph	Guelph	X	X	Target residential per capita use of 167 l/person/ day by 2019	The 2014 WSMP Update recommends an enhanced water conservation that will reduce demand an additional 9,150 m^3/day by 2038, effectively deferring implementation of 14 water supply capacity expansion projects to satisfy long term needs.
Hamilton	Lynden	OK	OK	Status Quo	Sufficient Supply
County of Oxford	Bright	OK	X	Review well capacity	Studies commenced to assess the sustainability of the Bright water supply.
	Plattsville	OK	OK	Status Quo	Sufficient Supply
	Drumbo	OK	OK	Status Quo	Sufficient Supply
County of Brant	Paris	OK	OK	Status Quo	Sufficient Supply
	St. George	OK	OK	Status Quo	Sufficient Supply
	Mt. Pleasant	OK	OK	Status Quo	Sufficient Supply (with high peak demands)
	Airport	OK	OK	Status Quo	Sufficient Supply (with high peak demands)
Brantford	Brantford	OK	OK	Status Quo	Sufficient Supply
Haldimand County	Caledonia/ Cayuga	OK	OK	Status Quo	Sufficient Supply (currently connected by pipeline to Hamilton)
	Dunnville	OK	OK	Status Quo	Sufficient Supply
Note: OK implies water system can meet 2041 demand, X implies existing system capacity may not be able to meet average and/or peak day demand.					

Table 3. Summary of long term municipal water demand management (WDM) objectives

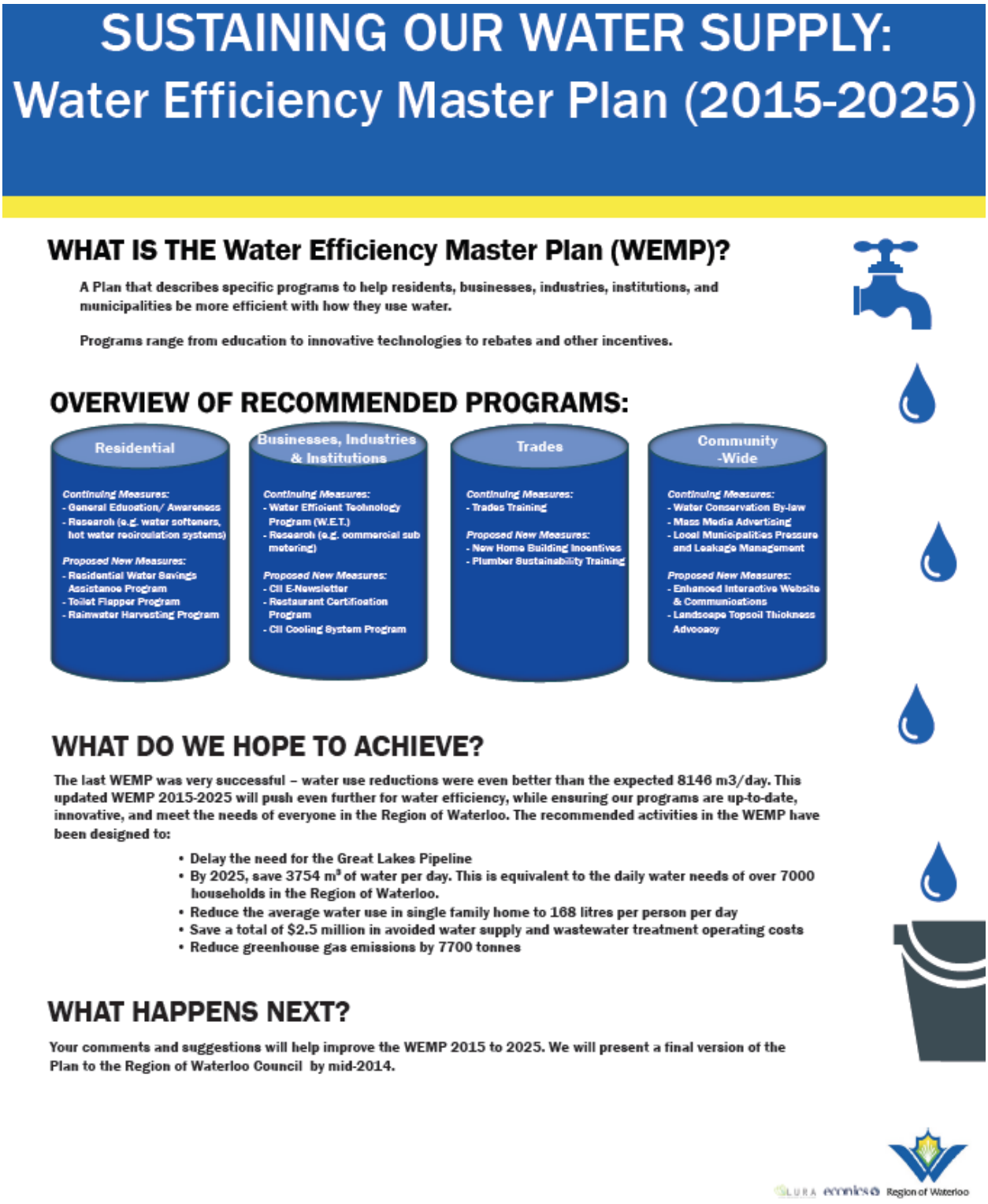


Figure 7. Region of Waterloo Water Efficiency Master Plan

In May 2014, the City of Guelph approved an update to the 2007 council–approved Water Supply Master Plan. The purpose of the 2013 Guelph Water Supply Master Plan Update was to define where and how Guelph would continue to access a safe and sustainable supply of water—for residential,

industrial, commercial and institutional use—over the next 25 years. The 2013 WSMP Update recommends an enhanced water conservation strategy that will reduce demand an additional 9,150 m^3/day by 2038, effectively deferring implementation of 14 water supply capacity expansion projects over the next 25 years while still satisfying long term needs (*AECOM, 2014*). Approval of this WSMP approach assumes the implementation of demand management strategies currently targeting per capita domestic consumption of 167 l/person/day by 2019 (*Resource Management Strategies Inc., 2009*)

Figure 8 presents the recommendations from the 2011 Soft Path Strategy for Fergus-Elora that identifies the residential target of 169 l/person/day by 2028 in Fergus-Elora. This assumes that no actions at the municipal level would be required provided the expected changes to the Ontario Building Code were put into force in 2011. A further target of 72 l/person/day by 2040 is considerably more aggressive, requiring efficient technology, significant use of non-potable sources for toilet flushing and laundry and/or behavioural changes (*Maas & Porter-Bopp, 2011*).

Even though other municipal demand targets are not specifically identified, per capita use is expected to continue to drop in all watershed communities experiencing new residential development. The City of Brantford reported in 2012 that they were approaching the 200 l/person/day threshold. In the estimation of Carol Maas (POLIS), every new single family home being built (with 6 litre low flush toilets and front load washers) can easily achieve around 200 l/person/day and toilet fixtures are still getting more efficient. The next generation of indoor and outdoor demand management in the coming decade will likely move new units into the range from 130-160 l/person/day, particularly as developments intensify vertically. Realistically, even greater water efficiency strategies will emerge over the next 25 years that will cut that target in half. As a result it is expected that average domestic municipal domestic water use across the whole watershed will drop below 175 l/person/day over the next 10-15 years.

[1]21st Century toilets are able to reduce water use to zero by using a non-potable source (e.g. rainwater or greywater) for flushing or through use of composting toilets.

Figure 8. Residential Sector Indoor Water Use Chart

This page was intentionally left blank

4. Non-Municipal Demand Management Objectives

Although the focus of the Grand River Low Water Response Team is reactive, it is recognized that strategies are needed in the non-municipal water use sectors to protect the quantity of their water sources and minimize the need for drastic response activity during frequently recurring low water conditions. This approach to low water response is integrated in the Drought Contingency Plan (GRWMP, 2014) prepared for the GRCA's Water Management Plan, and will continue to be promoted at the provincial level (GRWMP, 2014). Non-municipal PTTW stakeholders include crop irrigators, aggregate producers, water bottlers and golf course operators. The Low Water Response Team also represents the needs of First Nations water supplies, livestock owners, domestic rural water use as well as the ecological needs of river systems.

The following sections on non-municipal demand management objectives are drawn primarily from the GRWMP Drought Contingency Plan (GRWMP, 2104)

4.1. Agricultural WDM

Agricultural water use falls into two categories: irrigation and livestock watering. Agricultural irrigation is considered an important use of water from an economic perspective, while livestock watering is an essential use of water for humane reasons.

4.1.1. Livestock Watering

Livestock watering is the fifth largest water user in the watershed (***Figure 3***) with an estimated 4 to 6% of total water used (*Wong, 2011*). Livestock watering estimates include: the amount of water directly consumed by livestock, cooling water, animal washing and some equipment washing, but does not include barn clean out. Water consumption by livestock is expected to increase in the future (up to 8% of total water use) because of an increase in animals and greater demand for cooling water with hotter summers (*GRWMP, 2013b*). However, areas with high livestock watering demands are mostly located within subwatersheds not prone to water use conflict.

Livestock watering is considered an essential use of water in the watershed, but livestock watering does not require a water taking permit. As a result, it is difficult to determine where water is taken from. Traditionally, it has been assumed that 50% of water was from surface water and 50% from groundwater. However, observations from those working with the agriculture community, estimate that most livestock operations now use wells for the main source of water and only a small number of pastured animals use surface water during the summer period. Since livestock require a consistent water supply and herds are increasing in size most farms have replaced older dug wells with drilled wells to ensure a stable water supply. The switch to drilled wells is also in response to recent droughts when some dug wells could not keep up with demand.

With much of the livestock water sourced from deep drilled groundwater wells, livestock water is not vulnerable to short term drought. Longer droughts, which affect the deeper groundwater system, and cases where livestock are using surface water or in groundwater poor areas do require contingency planning. For the limited number of livestock operations using vulnerable sources it is recommended that alternative sources are found or water storage facilities are built for bulk water deliveries.

4.1.2. Irrigation

The drought contingency plan for irrigation presented in this document is based on a project commenced in 2013 in the Whitemans Creek watershed. The 2013 project report '*The Whitemans Creek Subwatershed Drought Contingency Project'* (***Appendix J***:) was funded through the Water Resources Adaptation and Management Initiative. The project focused on a collaborative approach to water management in the Whitemans Creek watershed by giving irrigators the tools they needed to manage their water use and plan for drought conditions. A drought contingency specialist worked with individual irrigators with a focus on improved irrigation efficiency and establishment of alternative water sources to taking irrigation water directly from the creek.

Agricultural irrigation is estimated in ***Figure 3*** to be the third largest water user in the watershed (*Wong, 2011*). Although irrigation occurs throughout the watershed, the majority of permits are concentrated in the Norfolk Sand Plain region (***Figure 2***) with some pockets of high use in other areas where sandy soils are prevalent. Specific subwatersheds with high agricultural irrigation include: Whitemans Creek, McKenzie Creek, Mt. Pleasant Creek and the lower Nith River. There is the potential for high water use conflict in these areas between irrigators, other high use permits like aggregate washing and with ecosystem needs. Water sources for irrigation include watercourses, dugouts, sand points and wells.

Although not unique to irrigation, the conflict between water needed for human livelihood and water for ecosystems is especially prominent in the Norfolk Sand Plain region where a healthy cold water fishery exists within an area with heavy demand for irrigation water. With the high potential for economic hardship with a loss of irrigation water, the agricultural community is under a lot of stress resulting in the potential for negative social and economic consequences during a drought. Long term water management planning is needed in this region to alleviate this issue. One goal to date has been to move irrigation to water sources that are less likely to interfere with ecosystem water needs, such as dugout ponds instead of watercourses. Additional work on drought and water management planning for this region is ongoing.

Agricultural irrigators in the Grand River watershed are generally very responsible with their water use during irrigation events not just because it is costly to irrigate, but because they understand the value of water to their farm operation. In order to maximize revenue, farmers need to produce high quality and high yielding crops with the least amount of inputs. During drought, decision making becomes more serious as the fate of the crop, and the irrigator's income, is often at stake. Many farms in the watershed are independent operations and the loss of crops result in severe economic hardship.

Drought contingency planning for irrigation, as stated in the Whitemans Creek project, consists of four steps: 1) ensure irrigation system is appropriate and working accurately, 2) use Best Management Practices year round, 3) secure a permitted and reliable water source before a drought, and 4) plan options if the regular water source is vulnerable to drought or may create interference with an essential water use during a drought (*Kovacs, 2014*) (***Appendix J***:). ***Table 4*** lists recommended actions for irrigators prior to a drought, while ***Table 5*** gives recommended actions during a drought. It is important to recognize that solutions to drought for heavily irrigated areas will most likely come from long term watershed planning at the community level, rather than individual contingency plans (*Kovacs, 2014*).

The GRCA is commencing a Tier 3 Water Quantity Risk Assessment in the summer of 2014 to refine the understanding of long term water use sustainability in the Whitemans Creek subwatershed. Any of the findings and recommendations for best practices to reduce surface water demands from the creek should be applicable to subwatershed with similar water use issues.

Suggested Actions	Examples/Explanation
- choose irrigation system based on crop type - switch to highest efficiency irrigation system for crop type	- plastic mulch and drip for produce - overhead for larger crops - pivots for potatoes
- routinely have irrigation systems assessed to improve efficiency	- assessments can highlight the areas that need to be adjusted to maximize efficiency
- use a moisture meter - use evapotranspiration values	- used to determine the right time to irrigate to ensure healthy crops - can prevent over and under irrigating
- increase organic content in soil - match crops to soil types	- increases soil water holding capabilities - reduce amount of irrigation needed
- assess vulnerability of water sources	- Is there sufficient stream flow to maintain flow during taking? - How often does the source fail? - How close is a groundwater source to a stream or wetland? - How close is a groundwater source to a domestic or livestock well? - How much of the total stream flow is being taken for irrigation?
- develop less vulnerable water sources	- dugouts away from streams and wetlands - deep or drilled wells
- plan alternatives if using vulnerable water sources	- assess neighbouring dugouts and wells - ensure permission and permits for alternative sources are obtained - assess equipment needs to access alternative sources - build storage for bulk water deliveries

Table 4. Recommendations for actions prior to a drought for agricultural irrigation*

Suggested Actions	Examples
- prevent wastage of water	- refrain from over irrigating - prevent irrigation of non-crop areas - inspect pipes for leakage - shift irrigation to the cooler part of the day - refrain from irrigating when it's windy
- maximize efficiency of irrigation system	- have an irrigation system assessment done - use moisture meter and/or evapotranspiration values to calculate amount of water needed - tune up system
- lessen impact of water takings	- switch to less vulnerable water sources - reduce pumping rate from all surface water sources - stop taking from smaller watercourses
- focus irrigation on highest return crops (prolonged or severe drought)	- review crops and conditions - consider stopping irrigation on crops with expected low rate of return - consider not investing in extra plantings - consider switching irrigation to multi-season crops when water is limited

Table 5. Recommendations for actions during a drought for agricultural irrigation*

** Adapted from The Whitemans Creek Subwatershed Drought Contingency Project. For more information refer to* ***Appendix J:****.*

4.2. Industrial and Commercial WDM

Most of the Industrial and Commercial (IC) sector within the watershed is supplied by municipal water systems, but there are a few categories of large water users that are predominantly self-supplied (***Figure 3***). Aggregate washing is estimated to be the fourth largest water user in the watershed, accounting for approximately 5% of total water use in the watershed. Golf course irrigation is estimated to be the eleventh largest water user and accounts for less than 2% of water use. Both of these industries are dependent on water and are active during the summer low flow season. Other IC water users outside of municipal supplies and with more than 0.5% of the total estimated water use in the watershed include: miscellaneous industrial (1.4%), cooling water (0.9%), food processing (0.7%) and bottled water (0.6%) (*Wong, 2011*).

Drought planning for self-supplied industries is the responsibility of the permit holder. These industries are part of the local economy and represent an important economic water use, therefore a drought plan is needed to maintain operations when practical during drought conditions in order to minimize economic loss.

Water dependent industries are vulnerable to drought. For IC operations in the watershed there are some actions that can be taken to prepare for drought. Water sources can be evaluated for susceptibility to drought or to restrictions that may be enacted during a drought situation. Equipment and processes can be reviewed for water efficiencies and reuse. Additional options may include connecting to a municipal supply if available, building onsite storage or finding new sources that are less susceptible to drought. It is recommended that self-supplied IC operations undertake drought contingency planning that includes economic implications of reduced operations during a significant drought. More details for the largest two IC water users are given below.

4.2.1. Aggregate Washing

There are a number of small and large aggregate washing operations in the Grand River watershed. Aggregate washing facilities use a recirculating system where used wash water is discharged to a settling pond where fines settle out and then recirculated back into a wash pond for reuse. Consumptive water use is minimized with some water lost to the final product and water lost through evaporation and infiltration from the ponds. The source of the wash pond water is from groundwater seeping into the pond if below the water table, as well as outside sources such as wells and rivers from which water is pumped into the pond. The water demand thus primarily comes from the need to fill the washing ponds and also to top it up when the ponds get too low (*GRWMP, 2012*).

Most aggregate sites in the watershed have not had any issues with water availability in the past, especially for sites with below water table extraction. More vulnerable sites are ones with mostly above water table extraction, sites with perched aquifers and sites that rely on river intakes to top up wash ponds. These sites run the risk of water sources being unavailable or restrictions on takings in times of drought.

With water readily available in the past, there has been little contingency built into older aggregate operations. New sites are planning some additional water storage on the site or lining above water table ponds to reduce losses to infiltration. In water limited sites additional deep wells are often sited and permitted to provide extra water when needed.

A number of recommendations for the aggregate industry are given in ***Table 6***. All aggregate sites need to develop their own plans for operations during droughts and should include some contingency within

operating and business plans. Companies with multiple sites may also investigate shifting operations to different sites based on water availability. This will require prior planning to ensure aggregate is sourced correctly.

Timing	Suggested Actions
Prior to Drought	build additional onsite storage
	line above water table ponds
	maintain maximum water levels when water is available
	divert site drainage to settling ponds
	develop alternative sources on water limited sites
	stockpile product when practical
	include drought contingency in business and site plans
During a Drought	use water from storage
	limit topping up of ponds
	schedule operations to allow pond levels to recover
	inspect equipment for leaks and wastage
	stop other consumptive uses
	refrain from filling new ponds
	use stockpiled product
	enact drought contingency plan

Table 6. Recommendations for drought contingency for the aggregate industry (GRWMP, 2014)

4.2.2. Golf Courses

Concerns have been raised regarding water consumption by the Ontario golf industry for many years, however, the industry has never responded to the environmental concerns and criticisms with actual water taking data to support their claims of environmental sustainability. Recent research used daily water withdrawal data, self-reported by 129 golf courses, to the Ministry of Environment and Climate Change (MOECC), from 2007 to 2012, to estimate current water use. This study examined biophysical golf course characteristics that influence water use, estimated annual water use by golf courses in Ontario, identified potential water use reductions through best management practices and explored how climate change may influence future golf course water use in Ontario (Peister, 2014).

Water use at golf courses varies throughout the Grand River watershed depending on course conditions and irrigation management. Changing trends in turf health, pest control, irrigation technology and public perception on course conditions has helped to lower water use on golf courses in recent years. Water sources include groundwater wells, groundwater fed ponds, direct surface water takings and ponds filled by surface runoff. Many of the courses have onsite storage reservoirs that are filled when water is plentiful and then used for irrigation during dry periods. Development of onsite storage and secondary sources increased following dry conditions in 1998/99.

During a drought, golf courses may face restrictions on water use and/or some water sources may be unavailable for use. Dugout ponds may be low because of low groundwater levels and high evaporation. Surface water sources usually have restrictions built into the PTTW to limit takings during dry conditions, especially for smaller streams. Onsite storage ponds may also be low with high evaporation and water use.

Drought and a reduction in watering can lead to poor turf that is more susceptible to pest infestation and can lead to high damage rates and the need for turf replacement. There is also conflicting public perception on brown courses with some players expecting it during dry periods and some expecting lush green turf regardless of a lack of precipitation. This can lead to economic losses with fewer players using the course and higher competition between courses with different irrigation practices.

The results of the provincial golf course irrigation water use analysis revealed that irrigation increased by 58% during a season that was 1.2°C warmer and 29% dryer than normal. This finding indicates that under anticipated climate change by the 2050s, water use on golf courses in southern Ontario could increase by 151% current levels. However, the analysis for potential water savings for golf courses revealed that water use reductions of 35% are possible if golf courses adopt similar maintenance and irrigation practices to more efficient golf courses (Peister, 2014).

Many golf courses have some contingency built into their overall irrigation system. As mentioned before, onsite storage reservoirs are present at many courses; these can be topped up during wet periods and then used during dry conditions. They can also be used to hold water from other sources that may have pumping restrictions such as surface water takings that should be pumped at a slower rate during dry conditions and deep groundwater wells. Golf courses also can use deeper groundwater where available. Healthy turf prior to a dry spell can go a long way to ensuring it can come back after drought conditions. Selective irrigation, greens and tees more often than fairways, is a common practice that goes a long way to minimizing water use. Courses can also step up public education about course conditions during dry periods and ways that players can help keep the turf healthy and conditions good during a drought.

Table 7 summarizes the drought contingency recommendations for the golf course industry.

Timing	Action
Prior to Drought	build onsite storage into course design
	line above water table ponds
	maintain max water levels when water is available
	divert site drainage to storage ponds
	develop alternative water sources
	invest in irrigation systems including moisture meters
	maintain healthy turf
	include drought contingency in business and site plans
During a Drought	use water from storage
	reduce irrigation to key features (e.g. greens and tees)
	use deeper groundwater sources
	reduce pumping rate for surface water sources
	inspect equipment for leaks and wastage
	time irrigation to reduce loss to evaporation or wind
	step up public education about golf course and drought

Table 7. Recommendations for drought contingency for the golf course industry (GRWMP, 2014)

4.3. Rural Domestic and Communal WDM

Rural domestic water use is estimated to be the sixth largest water use in the Grand River watershed with approximately 4.25% of the total water use (***Figure 3***), while communal water systems are the ninth largest water user with 1.7% (*Wong, 2011*). Water supply is almost entirely from groundwater (private and communal wells) and is considered an essential use of water to support human health. Availability of water during dry periods will be dependent on the nature of the drought and the condition of each individual well. Shallow or dug wells are often more susceptible to drought conditions than deep, drilled wells. Unconfined aquifers are more susceptible than confined overburden or bedrock aquifers. Many older wells are susceptible to drought and have been replaced recently because of insufficient water.

It is up to the private well owner to plan for drought contingency. In many cases, a reduction in non-essential water use can help if water levels are low during a drought. Problem wells can be replaced, but this can be quit costly. Maintenance of private wells and pumping systems can help to keep the supply running. Another option for home owners in areas with limited groundwater resources is to install a cistern to be used during droughts. These units are filled by bulk licensed water haulers usually from municipal systems. Proper maintenance of cisterns is important if the water is to be used for drinking water.

In cases where a private domestic well owner believes there is interference from other nearby wells they can contact the Ministry of the Environment and Climate Change.

4.4. Non-Municipal WDM Summary

Although the focus of low water response is reactive, it is recognized that long term strategies are needed in the non-municipal water use sectors to protect the quantity of their water sources and minimize the need for drastic response activity during frequently recurring low water conditions.

The GRCA staff have worked with OMAFRA staff to consider trends in agriculture along with climate situations that may influence future demands for livestock watering and crop irrigation. While it is likely that specific existing agricultural water uses and individual permit holders may require more supplies, it is not foreseeable that there will be a trend towards the creation of new demands in areas of the watershed that are not already high use areas. One of the limiting factors includes the amount of Class I & II farmland in the watershed available for potential irrigation. In the northern half of the watershed, where increases in livestock numbers are possible, the existing subwatersheds are not currently subject to high water use and are deemed capable of accommodating increased demands (*GRWMP, 2013b*).

An exceptional area of potential stress has long been identified in the Norfolk Sand Plain (Whitemans Creek area) that will require further study to address the potential for conflicts between water users. It is anticipated that additional surface and groundwater studies (including modeling in the Whitemans Creek Tier 3 Water Quantity Risk Assessment) will help identify feasible options for dealing with the current water use issues as well as to assess future municipal and farm use scenarios and the impacts of climate change on future water use.

Another significant non-municipal use applies to dewatering and washing of aggregate. GRCA staff have recently met with representatives from the aggregate industry (OSSGA) to quantify trends in aggregate demand in the watershed and to discuss their plans around best practices to manage water use (*GRWMP, 2012*).

With respect to rural domestic and communal water use, growth will continue in the rural townships, increasing the number of private water well takings. However, it is anticipated that the existing stock of rural residential units will see a decline in per-capita water use due to the natural replacement of water fixtures and appliances with more efficient devices, and that new homes will be built to much higher water efficiency standards. As a result, the gross increase in domestic water demand is considered to be negligible.

Several other uses also exist in the top 10. Discussions with some of these sectors (i.e. golf courses) indicate that best practices for water efficiency are being developed and implemented. Overall these smaller water use sectors are expected to have a negligible effect on total overall water demand but their effect on the reliability of regulated flows in the Grand and Speed Rivers will continue to be investigated.

5. Conclusions

The 2014 Grand River Water Management Plan Update had identified the need to provide long term management of the quantity of water in the watershed. Population growth places greater pressure on demand for water while climate change adds a level of uncertainty to water supply plans. As part of the Plan, a proactive, innovative approach to water demand management was undertaken with the objective of determining water demand management objectives for the various high water-use sectors.

The Demand Management Working Group set out to identify unique municipal demand management objectives for the Water Management Plan Update based upon the GRWMP Steering Committee's identification that water demand management objectives are difficult to do on watershed scale. In addition, water demand management best practices were sought in consultation with the Grand River Low Water Response Team which represents the diversity of water use throughout the watershed.

5.1. Municipal Water Demand Management

The Municipal Water Demand Management (WDM) component of the GRCA's Water Management Plan was designed to provide local benefits that could be transferred to a variety of municipal settings. Kirk Stinchcombe of Econnics in Victoria B.C., provided the notion of a "next generation" in water conservation best practice to help develop a demand management process and toolkit for water managers. The toolkit, now available on the GRCA website, includes an up to date electronic resource sheet referencing the latest in water sustainability best practice from across North America and a series of WDM primers based on local experiences shared at the Toolkit Development Workshop to tailor best practices to municipal water utilities of all sizes that did not have established water conservation strategies.

The primers were designed to give Decision making advice on applicable practices and present the material using breakout box dialogue, local municipal case studies and internet resource list references. The toolkit also includes a matrix that helps water managers identify which best practices might be most appropriate to their situations based on water savings potential, revenue risk, ease of use and program cost. An assessment of all municipal water supplies was carried out to confirm that water utilities have sufficient resources to meet long term needs and the tools to manage existing demands and defer premature system expansions.

As a result of the GRCA's work on WDM, the GRCA along with the Region of Waterloo, the City of Waterloo and the City of Guelph were sponsored by the Great Lakes Protection Fund to participate in a pilot for Improving Water Management in the Great Lakes Basin. This team, along with municipal representatives from southern Michigan, will identify and test the environmental and financial rationales for municipalities to pursue water conservation and green infrastructure practices, and test how this information, when combined with effective knowledge transfer techniques, can drive innovation in water management throughout the Great Lakes region. The team will approach this work from the viewpoint that water conservation, to be effective in the Great Lakes region, must include municipal supply, stormwater and wastewater, and engage a different set of stakeholders than traditional water conservation strategies. The team will transfer the tools created in the pilots to communities throughout the Great Lakes basin.

5.2. The Whitemans Creek Subwatershed Drought Contingency Project

The Whitemans Creek Subwatershed Drought Contingency Pilot Project (a Water Resource Adaptation and Management Initiative sponsored by Farm & Food Care Ontario) is a proactive approach to a reoccurring issue of low water in the Whitemans Creek subwatershed, a highly productive agricultural area. The first phase of the project took place in 2013 and every surface water Permit To Take Water (PTTW) holder was contacted. The goal of the project was to increase drought preparedness as well as increasing communication with the Conservation Authorities, Ministries and local groups, increasing education and outreach, and increasing understanding for both water users and regulators of how water is used in the Whitemans Creek subwatershed. The project was part of seventeen pilots conducted in 2013 to share innovative agricultural water use best practices across Ontario. The findings of the pilots were presented to over 100 delegates at a symposium in Guelph on March 6, 2014.

The result of the knowledge gained from the irrigators was used in forming a plan to help drought preparedness for all farmers, a plan which reflects years of farming expertise. Four steps have been highlighted as key components to a drought contingency plan: 1) making sure an irrigation system is in place and working accurately, 2) using Best Management Practices (BMPs) year round, 3) securing a reliable water source with a Permit To Take Water, and 4) writing down what options exist if the regular water supply is not able to provide the watering needs.

The 2013 Water Resource Adaptation and Management Initiative was successful enough to generate an extension of funding in 2014. The Whitemans pilot was reprised and used to raise even more awareness of the need for pro-active drought planning. With a total of nine farmers involved with pond retrofit projects as well as the several others who participated in moisture measurement data collection throughout the project confirm the importance of proactive thinking and planning with the agricultural community, especially in the case of drought planning.

5.3. Grand River Low Water Response

The GRCA and its water use stakeholders have provided provincial leadership in the development of active Low Water Response programs for over a decade. The GRCA has been called upon on numerous occasions by the Ministry of Natural Resources and Forestry to conduct pilot studies, host stakeholder meetings and to make presentations at annual training workshops. This approach to low water response is integrated in the Drought Contingency Plan prepared for the GRCA's Water Management, and will continue to be promoted at the provincial level. The Drought Contingency Plan provides guidance to a wide variety of water users across the Grand River Watershed to ensure that the water resources we use and manage will be available for future generations.

5.4. Lessons Learned

The direction of the WMP Steering Committee with respect to water demand management clearly recognized the diversity of municipal and non-municipal water users. The development of this plan would not be possible without the input of water users from across the watershed. It is critical to consult with various water users to understand their perspective on the availability of water resources and how to approach the subject of water demand management.

The majority of the municipal WDM learning points were translated into the Primer series. But even the development of "how to" documentation is not sufficient. One of the big things to emphasise from a small municipal system perspective is the appropriate timing of demand management activity. Small systems do not have adequate revenue streams to promote water conservation for conservation

sake. However, it is good to get the system managers to think long term and reiterate that demand management at the right time can save a lot of time and money when their system is getting close to capacity. At this point water saved through conservation efforts is a lot cheaper per cubic meter than new supply.

With respect to agricultural irrigation, waste is not an issue for farmers because they cannot afford the gas to run the pumps for no reason. The important thing to get across is watering at the right time is critical to achieving the best return on crops and it was found that some farmers actually wait too long before they turn on the watering systems, therefore they may be underutilizing their water supplies. The Whitemans pilot has also highlighted the use of alternate irrigation systems (like drip lines) to get the right amount of water to the plant at the right time. Too much water can cause leaching of nutrients below the root zone, creating a water quality issue. Finally, a reactive penalizing of permit holders to get them to stop irrigating during times of drought will not work if a farmer's livelihood is at risk.

Finally, the majority of non-municipal permit holders need to develop contingency plans for their water supplies to ensure that temporary water quantity restrictions do not cause inconvenient and/or costly water shortfalls. It is safe to say that a back-up plan is far less costly in the long run that a shortage.

References

AECOM. 2014. City of Guelph Water Supply Master Plan Update Draft Final Report

AquaResources Inc. 2009a. Integrated Water Budget for the Grand River Watershed. Produced for the Grand River Conservation Authority under Source Protection Planning.

AquaResources Inc. 2009b. Water Quantity Risk Assessment for the Grand River Watershed. Produced for the Grand River Conservation Authority under Source Protection Planning.

Grand River Water Management Plan (GRWMP). 2011. Water Demand Management Discussion Paper, Prepared by A. Wong, GRCA.

Grand River Water Management Plan (GRWMP). 2012. Water Use for Aggregate Washing in the Grand River Watershed (Internal Technical Memo) DRAFT. Prepared by A. Wong, GRCA.

Grand River Water Management plan (GRWMP). 2013a. Environmental Flow Requirements in the Grand River Watershed. Report from the E-flows working group.

Grand River Water Management Plan (GRWMP). 2013b. Livestock Water Use and Future Water Needs. Prepared by A. Wong, GRCA.

Grand River Water Management Plan (GRWMP). 2013c. Discussion Paper - Considerations for "Securing" Current and Planned Source of Municipal Supply. Prepared by L. Minshall, GRCA.

Grand River Water Management Plan (GRWMP). 2014. Drought Contingency Plan Grand River Watershed. Prepared by S. Shifflett, GRCA in consultation with the Grand River Low Water Response Team.

Kovacs, H. 2014. The Whitemans Creek Subwatershed Drought Contingency Project. Prepared with funding under the Water Resource Adaptation and Management Initiative (WRAMI).

Lura Consulting and Econics. 2014. Region of Waterloo Water Efficiency Master Plan (2015-2025) public consultation display boards.

Maas, C., and S. Porter-Bopp. 2011. A Soft Path Strategy for Fergus-Elora, Ontario. Victoria: POLIS Project on Ecological Governance, University of Victoria.

Ministry of Natural Resources (MNR). 2010. Ontario Low Water Response. Prepared by the Ministry of Natural Resources for the Province of Ontario. March 2010 update.

Peister, C. 2014. Water Use on Ontario Golf Courses. A thesis presented to the University of Waterloo.

Resource Management Strategies Inc. 2009. City of Guelph Water Conservation and Efficiency Strategy Update

Shifflett, S. 2011. Status Report on Municipal Long Term Water Supply Strategies

Wong, A. 2011. Water Use Inventory Report for the Grand River Watershed. Prepared for the Grand River Water Management Plan Update, February 2011

This page was intentionally left blank

Appendix A: Water Demand Management Discussion Paper, September 2011

Water Demand Management in the Grand River Watershed Barriers and Solutions to Implementation

Why Should Municipalities Consider Water Demand Management?

Water quantity issues are growing in the Grand River watershed. Increasing population pressures anticipated in part due to the Provincial Places to Grow and Greenbelt legislations will continue to drive demand pressures in municipal centres. Climate change has also introduced a degree of uncertainty in the reliance on current water supplies.

Already, the Grand River watershed has close to a million residents living mostly within the 5% of area devoted to urban centers (Figure 5). Eighty-five percent of the watershed residents rely on a municipality to supply their drinking water. Municipal water demand is therefore the highest use in the watershed, accounting for 60% of all water takings. This is ten times greater than the next highest water using sector.

Municipalities are currently undergoing assessments of risks to their drinking water supplies through Source Protection Planning. Many may need to expand their infrastructure to minimize this risk. The recently introduced Water Opportunities and Conservation Act will also drive the need for municipalities to demonstrate efforts to develop strategies for water conservation and efficiency through mandatory compliance requirements.

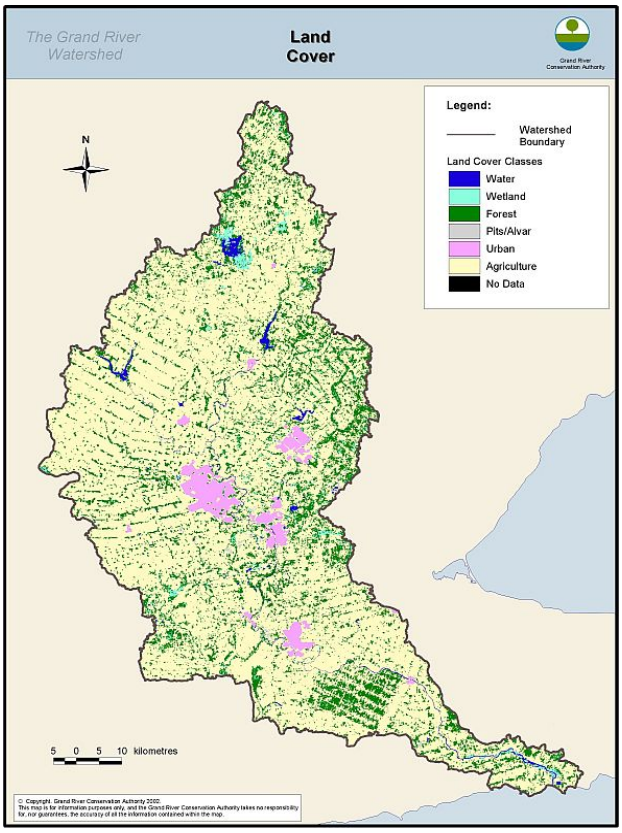


Figure 5. Land cover in the Grand River watershed. At 6800 km^2 in size, it is the largest watershed in southern Ontario.

A longer-term approach is needed to assess the ability for municipalities to plan for the future and provide adequate water for consumer needs. A proactive approach is therefore preferred to put in place measures that encourage efficiency and conservation when it is best timed with capital spending processes.

Collaboration is Imperative

With these issues in mind, the GRCA is hosting a one day workshop of watershed municipalities, practitioners, senior managers and demand management experts, on *Thursday, September 15, 2011*, to enable a discussion of the water demand management options available to municipalities involved with supplying municipal drinking water to their communities. This workshop will provide an opportunity for any and all those involved with municipal water delivery to discuss the challenges and barriers to demand management looking to the future, with an eye to solutions. It is also an opportunity to share

the many success stories found both within and outside the watershed to determine why, when and how certain demand management objectives can be met using the various tools available.

The workshop is sponsored by the partners of the Grand River Water Management Plan: representatives of the GRCA, municipalities, provincial and federal ministries and First Nations who agreed that water demand management is an important goal for the health of the watershed and prosperity of communities. Encouraging an adaptable water demand management strategy for municipalities is an essential priority, recognizing that a one-size-fits-all approach is not appropriate.

Why attend this workshop?

The workshop is intended to be geared towards those affiliated with providing municipal water from operations to decision makers, including (but not limited to) the plant operators, supervisors, councilors, compliance officers and consultants. Each of these roles will provide a different outlook to addressing water demand management. Workshop results will facilitate the development of municipal demand strategies that will feed directly into the Grand River Water Management Plan.

Professionals working in the area of water supply or related projects will want to be involved to:

- consider how current municipal water supplies (Figure 6) will meet future needs and understand options for updating master plans
- inform commitments made by the partners to the Grand River Water Management Plan process
- make informed decisions in light of new legislations, policies and emerging science
- network and collaborate with other municipalities and learn from their challenges and successes
- demonstrate public responsibility to your consumers in addressing current and emerging environmental issues
- better understand alternative solutions to infrastructure expansions
- manage costs of delivery of water to consumers by deferring upgrades
- be on the leading edge of water conservation
- stay current with new technologies

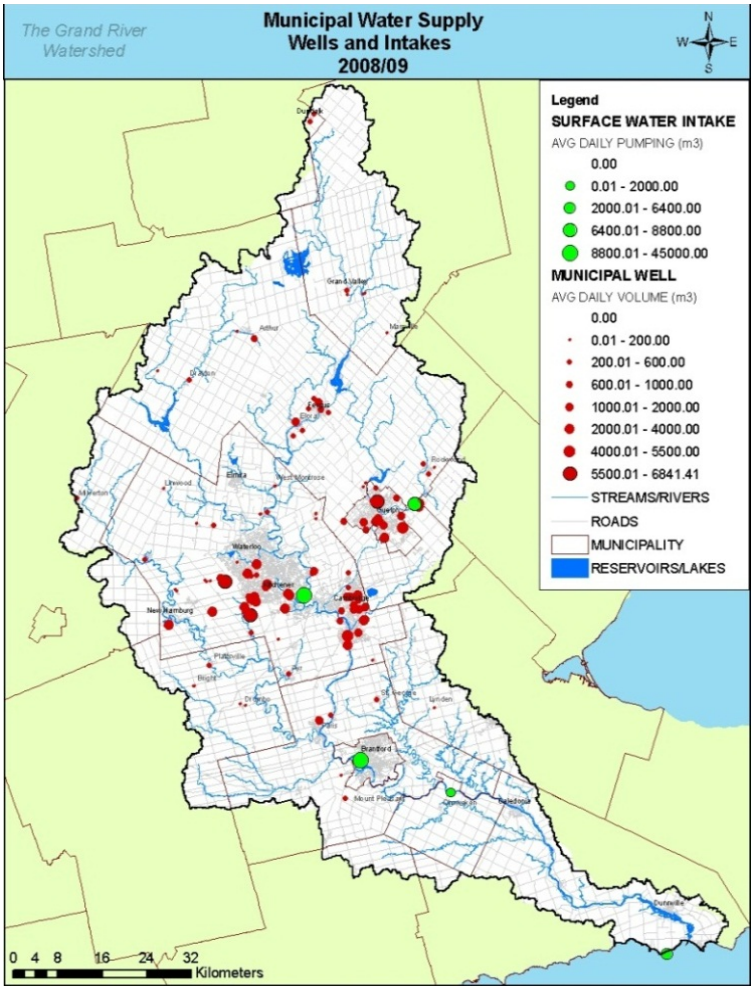


Figure 6. Municipal wells and intakes

Themes of the workshop

Water demand management (WDM) for municipalities focuses on the conservation of water used, through the improvement of efficiency measures or a change in water use behaviours. Water demand management goals are structured to defer the need to look for costly new potable water supply sources to meet the future demands of consumers.

The main workshop goal is **address the barriers and challenges to water demand management, by identifying promising municipal strategies and solutions.** The following topics are subsets of the theme to be addressed in the workshop:

- **Technology and Operations** of Delivering Municipal water
- **Economics** of WDM
- **Community involvement** WDM
- **Regulations** associated with WDM**,** and
- **Implementation** Challenges Associated with WDM

These five streams of discussion will guide the day, starting with identifying the barriers and challenges, followed with discussions of lessons learned from past failures, and finally with pinpointing promising strategies and solutions that could be employed by watershed municipalities. As smaller municipalities face different challenges than larger municipalities, these scale differences will also be addressed. The following questions will help focus the day's discussion:

Are there promising technological or operational solutions that need to be considered?

Technological and operational aspects of water treatment and delivery are constantly improving. Increased system automation allows for more consistent approaches to water delivery, while other technology can help with leak detection in underground pipes. What technical or operational aspects of water systems need to be considered for cost-effective WDM? Some examples may include best management practices (BMPs), greywater re-use, rainwater harvesting and leakage detection.

What are the promising economic tools or strategies that should be considered by municipalities?

Getting municipal decision makers on board for water demand management requires a demonstration that benefits will offset the expected losses in revenue. For the

Successes in Water Demand Management in the Grand River Watershed

Several successful projects have already been initiated in the Grand River watershed, including:

1. The City of Guelph has achieved 20% reduction in water demand through their management options (outdoor water use, conservation messages and toilet rebate programs for example), despite a population increase of 19% over the period between 1999 and 2010.
2. Waterloo Region has implemented successful programs for residents as well as industries. The industrial sector had been targeted in the Water Efficient Technology (WET) Program for water use reductions through infrastructure change with incentives of up to $0.40/L of annual water savings.
   a. The first WET participant, Brick Brewery, underwent a water conservation project with total savings of about 60,000 m^3 of water per year or approximately $150,000 annually.
   b. Co-benefits to industrial water conservation programs include lower energy bills to move or heat water, reduced sewer surcharges and improved water quality.
3. The Township of Centre Wellington has identified a Soft Path Approach for Water in conjunction with their Municipal Servicing Water Master Plan. This planning approach looks to design policies of efficiency and conservation for immediate implementation. The Soft Path goal is reduce or eliminate the need to look for new sources of water in the 20-50 year planning horizon. This approach will be considered alongside other alternatives during the Township's Master Plan Class EA public process.
4. Across the watershed, water use peaks in the summer months due in part to seasonal outdoor water use, such as lawn watering and car washing. Hence, many watershed municipalities have initiated outdoor water use by-laws; a good first step to water demand management. Most by-laws allow for watering or washing only on alternate days, based on street address. A few, more restrictive by-laws, only allow outdoor watering once a week, such as the Region of Waterloo and Guelph-Eramosa Township.

consumer, incentives should be designed in such a way that they actually encourage conservation or offset the costs of improving efficient use. For example, rebates may not be enough to convince industrial water users to alter their processes, but returns on investment that start paying dividends in less than two years can drive process changes. Rebates or incentive programs, cost-benefit analysis and elimination of bulk water discounts are amongst the examples of tools that water providers may draw upon.

What promising community engagement strategies should be considered?

Motivating the community to use water wisely requires an approach that triggers changes in water use behaviour. Demonstrating economic self-interest, the importance of community conservation goals, or providing better information about personal water use can all serve as tools for marketing sustainable behaviour. Incentive programs to encourage water use efficiency may be appropriate, but should be carefully examined in order to ensure cumulative results are adequate in terms of water, energy and cost savings. Other considerations would be on the marketing and advertising side, with social equity and social capital as topics. This discussion will consider of all types of users including residents, industries, commercial and institutional operations.

How does regulation affect municipal water demand management? What can municipalities do?

Increasingly, regulations and policies being developed by the federal and provincial governments are geared towards mandating or encouraging efficiency and conservation in municipal water demand and supply. The introduction of the Water Opportunities and Conservation Act and the existing Source Water Protection legislation are two examples. The Water Opportunities Act will make leak detection mandatory, but how will this affect each municipality? Other regulations associated with WDM include the national and provincial Building Code standards, municipal by-laws and Permits to Take Water. Certificates of Approval require the consideration of peaking factors and maximum allowable takings. The current and future implications of regulations affecting demand management objectives will be discussed.

What are the barriers to the implementation of WDM programs? What can be done to set the stage for successful implementation?

Implementation of the water demand management measures may be the greatest challenge after all the planning is complete. Awareness is a large factor in the success of the programs. What are the needs to be considered in implementing successful programs and measures that will work towards water demand management?

Current Municipal Water Use in the Grand River Watershed

It is useful to examine the current state of municipal water use when evaluating the options for demand management.

The total volume of municipal water demand in the Grand River watershed is 102.4M m^3/year (2008-09), with sources coming from deep and shallow groundwater, the Grand River and the Great Lakes (see Figure 7).

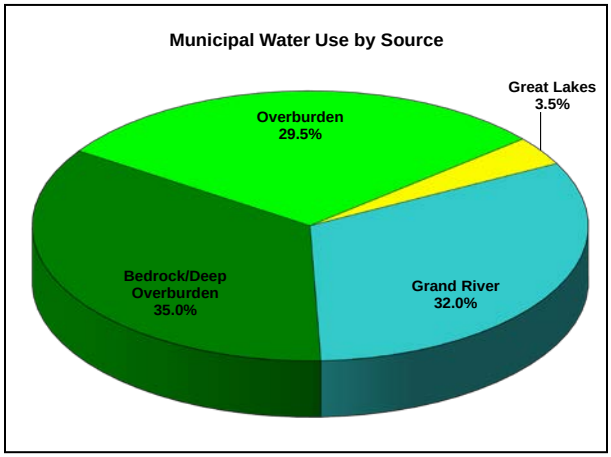


Figure 7. Municipal water use by source

Municipal water use includes connections to residential, industrial, commercial, institutional (ICI) ventures and other operations relying on the municipality for their water supply.

Many municipal systems have capabilities in detailing residential uses separately from what is utilized by the ICI sectors (Figure 8). Often municipal tracking systems will also record 'revenue water', or the water they have sold to consumers, and 'total water supplied', which is revenue water plus any water lost to leakages, meter errors and maintenance uses. The difference can be called 'unaccounted' water uses and shows more accurate water usages of the system.

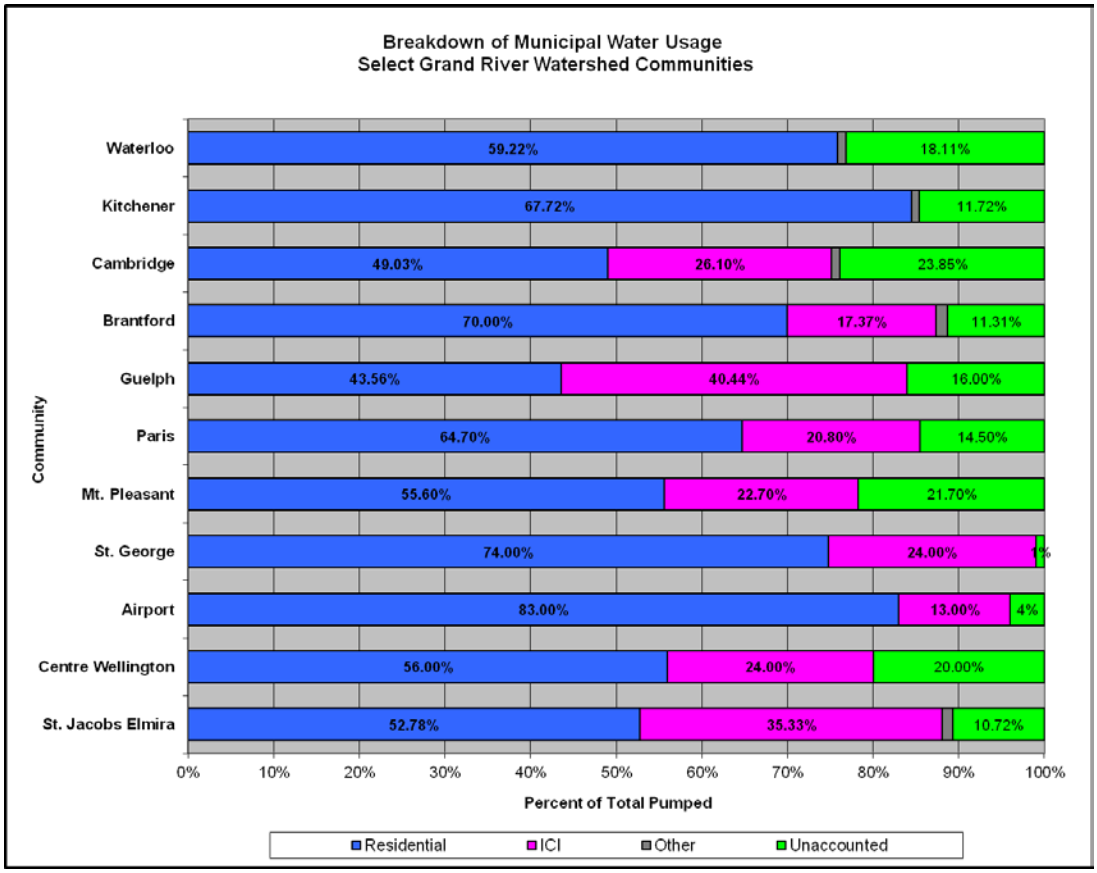


Figure 8. Breakdown of municipal water uses in select municipal systems

A very beneficial first step towards water demand management for municipalities could be to reduce the amount of non-revenue and unaccounted water, reducing their overall costs and usage of the

resource. A benchmarking approach also allows municipal water managers to target potential areas of concern.

A breakdown of the residential water demand allows for a better estimate of per capita demands. Residential per capita water use is utilized to compare across municipalities as ICI sectors can vary widely from community to community (Figure 9). Many gains can be made often in the residential sector and therefore be a main target of water demand management strategies.

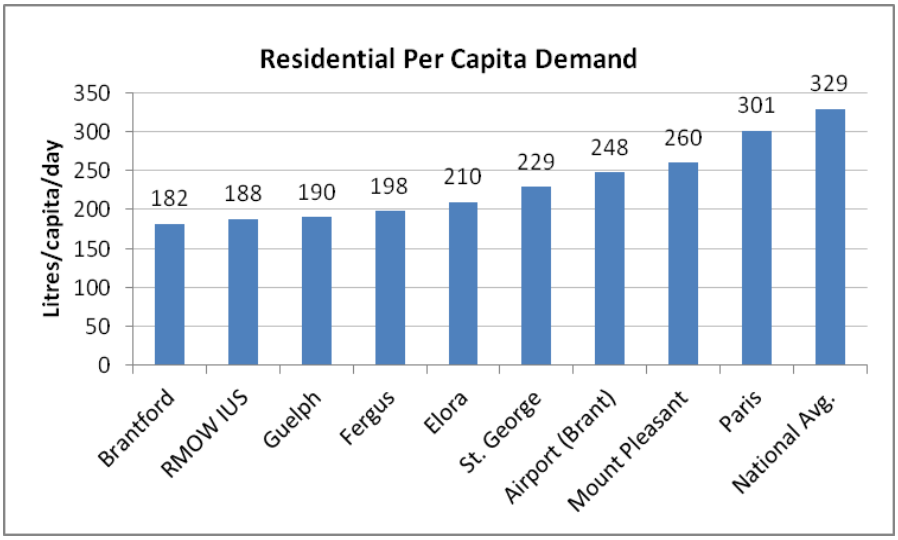


Figure 9. Residential per capita rates for selected watershed communities

How will my participation in the WDM Workshop be recorded?

The purpose of this workshop is to initiate discussions amongst experts and practitioner from a diverse range of perspectives in an open, inclusive and supportive environment.

During the session, note-takers will be recording the discussion's key messages. Comments or ideas of particular interest can be posted onto the GRCA's Twitter account. The workshop proceedings will be developed into a technical document that captures the ideas, without attribution. The WDM workshop participants will be receiving a draft copy of the workshop proceedings as they become available, to be given an opportunity to provide feedback to the organizers prior to general circulation.

A general description of some of the ideas coming out of the workshop will be shared the following day with the delegation at the Grand River Watershed Water Forum. Participants of the WDM workshop are encouraged to attend the Water Forum as well.

The proceedings will be provided to and shared with the Water Management Plan's Steering Committee, Project Team and Demand Management Working Group. It will inform the development of targets and best management options that are practical and feasible, as defined by municipal partners for their own operations and to assist in the identification of barriers that could potentially block the successful implementation of a WDM strategy.

Appendix B: Discussion Paper - Considerations for "Securing" current and planned sources of municipal water supply June, 2013

Contents

Context

Goal # 3 in the Water Management Plan (WMP) Project Charter is "Secure water supplies". Fundamental deliverables are:

- an assessment of the extent to which future municipal water supply needs are identified, sourced and secured;
- an assembled set of community water demand management objectives/strategies;
- identification of areas with potential for conflict, along with plans for how management strategies will be developed; and
- together, a water supply/demand management strategy that we agree represents a road map for sustainable water use.

In September 2011, staff reported to the WMP Project Team and Steering Committee on the status of municipal water supply planning, that is, whether future municipal water supply needs have been identified, sourced and secured. The Steering Committee concluded that the term "secured" needed to be defined.

Two Municipal Water Supply and Demand Management Working Group meetings were held on April 18th, 2011 and March 2, 2012. During the meetings, municipalities identified concerns with their ability to obtain and maintain long-term water supply capacity in their Permits to Take Water (PTTW) and to protect future sources identified in their long term Water Supply Master Plans (WSMP) from contamination and depletion.

The Water Managers' Working Group met on April 24, 2012 to discuss these questions. Carl Slater, the Ministry of the Environment (MOE) Technical Support Manager - West Central Region - was able to clarify several questions and offer solutions. While further discussion is warranted, the municipal staff seemed to be satisfied that the process, as discussed, could significantly reduce the uncertainties around the security of municipal water supplies from a regulatory perspective.

Defining "Secured"

"Secured" means reasonable certainty (i.e. reduced uncertainty) that the current and future sources of municipal water supplies will be available when they are needed. "Available" refers to both physical and regulatory availability.

"Secured" from a physical perspective means that the source will still be viable (i.e. available, sustainable, feasible, of suitable quality) at the time it is needed.

"Secured" from a regulatory perspective means that the municipality will be able to obtain and keep provincial approval to use the water.

Background

Mutual Provincial and Municipal Interest in Securing Municipal Drinking Water Supplies

Strategic planning for municipal services involves mutual provincial and municipal interests. Such interests include ensuring that municipalities have secure water supplies to support provincial growth initiatives. Through the Places to Grow Act (among other things), the Government of Ontario has expressed its interest in, and intent to, manage growth and development in a way that supports economic prosperity, protects the environment and helps communities achieve a high quality of life. As well, the Provincial Policy Statement (PPS) and the Growth Plan for the Greater Golden Horseshoe promote strategic planning for municipal infrastructure, including water supplies. Most industry and commerce in the Grand River watershed is located in municipally serviced areas, and the PPS and Growth Plan call for future development to occur in these areas. However, economic growth and prosperity in municipalities can only occur if the municipality has a secure water supply to support the growth. Typically, if a municipality cannot provide the additional water supply to support new growth, the growth rate is slowed or curtailed until the new supply is available.

Mutual provincial and municipal interest in efficiency in infrastructure is also dependent on a secure water supply. Given the provincial and municipal interest in maximizing the value of public investment, the municipality must locate its water supply sources close-by. Large regional water supply systems (e.g. Great Lakes pipeline) have very high capital, operational and maintenance costs, and may only be feasible once other local options have been fully utilized.

Municipal Planning for Growth and Water Services

The Municipal Planning Cycle

The typical municipal water services planning cycle generally includes the following steps:

A municipal Official Plan update designates lands uses and provides for development type and location over a 20 year planning horizon (with proposed five year updates). The Official Plan provides the basis for projecting municipal water supply needs over the 20 year planning horizon. In the context of a continuum, and following the PPS, the Official Plan provides land use-related considerations for source protection, water quantity protection and water demand management.

A Municipal WSMP is used to identify the long-term water supply needs associated with the Official Plan, and sets out how water supply needs will be met for the planning horizon. The WSMP typically applies for a 25-50 year planning horizon, with proposed five year updates. The WSMP follows the framework of the Municipal Class Environmental Assessment process. The process includes: an evaluation of the need for additional water supply; a public consultation program; an assessment of a reasonable range of alternatives; consideration of effects on the environment and of the alternatives; and a systematic evaluation of preferred alternatives. The WSMP can also set out the projected water demand management assumptions or objectives.

A Water Efficiency Master Plan establishes the extent to which water conservation/efficiency will be used to meet the water demand management assumptions, or the objectives set out in the WSMP.

A Water Reserve Capacity Report, prepared annually, documents actual water use, water production capacity, development planning and remaining capacity. Municipalities commit future lots based on a capacity that has been determined to be present (as set out in the PPS). For a secure water supply, it is important that the existing permitted capacity is maintained to ensure that the allocated municipal reserve capacity is not undermined.

Long Term Water Supply Planning (25-50 year planning horizon)

The municipal water services planning cycle generally has a 25 to 50-year planning horizon to ensure that the 20-year water services planning, associated with the municipal Official Plan is not locking the municipality into short-sighted decisions. It allows time for planning, financing and implementing complex or costly new infrastructure initiatives that may require 20+ years to bring on-line. The 25 to 50-year planning horizon:

- provides background for need and justification (for the Environmental Assessment process);
- includes an assessment of potential alternatives, optional concepts, cost comparisons, basic feasibility assessments (including capacity), and sustainability considerations;
- addresses provincial interests as defined by the PPS, including suitability, capacity, sustainability, and potential environmental impact;
- identifies, with appropriate consultation, a project or a range of projects as the next steps to satisfy the need; and
- provides sufficient investigation of preferred alternatives to expect that, all things remaining equal, the basic concepts for new water supply are available in principle and will continue to be available.

A 25 to 50-year planning horizon provides assurances that there are viable long-term alternatives. This is particularly important for land-locked communities relying on local groundwater supplies to enable planning for future alternatives that involve changes to the nature of the supply source.

Short Term Water Supply Planning (20-25 year planning horizon)

A 20-year planning horizon provides for immediate water supply needs associated with the Official Plan, including those required under the Places to Grow Act and the Growth Plan for the Greater Golden Horseshoe. Supply needs are achieved by conducting individual water supply projects, which typically include an environmental study report with design concepts and the feasibility assessment to complete an Environmental Assessment.

The process should provide sufficient certainty to expect no big surprises in the approvals process.

For a secure water supply, there is a need to be able to move directly from the water supply needs identified in the Official Plan, through the Environmental Assessment and approvals process and on to implementation of the WSMP before the identified water supply is needed. The anticipated timeline to accommodate the municipal water supply planning cycle, and the provincial approvals process under the current situation for growth areas in the Grand River watershed, is 8-15 years.

The generalized timeline is as follows (Waterloo Region's example):

- Exploratory drilling and report writing – 2-3 years.
- Environmental Assessment – 3-5 years - RFP, tendering, field program, hydrogeological assessment, public consultation, ESR writing: 3-4 years; 5 years if new GUDI assessment protocols require increased testing periods, ESR review.
- Approvals - PTTW - 1-2 year - Detailed review of hydrogeologic report, meetings/discussion, parallel pre-design.
- Detailed design, construction and commissioning - 2-4 years depending on piping distances, staff availability, scheduling and budget.

However, a protracted public consultation process, extended testing periods, or Part II order requests in the Environmental Assessment process can significantly delay final approvals. The 8-15 year timeline to

implement water supply plans increases uncertainty in the security of supply. The timeline can be reduced by:

a) streamlining the Environmental Assessment process to 2-3 years maximum, by more directly involving MOE staff in the process and reducing the time required for decisions on Part II order requests, and

b) streamlining the PTTW process to 6 months by using the Environmental Assessment documentation as the basis for the permit.

In this regard, the municipality can streamline the process by incorporating field investigations required for the PTTW process (e.g. sustainability) into the Environmental Assessment process. The MOE advises that the process can be streamlined, provided that the PTTW is being applied within a reasonable length of time following the completion of the Environmental Assessment process (i.e. all of the technical information and conditions are still valid).
The Environmental Assessment assumptions on need and justification, capacity and sustainability need to be carried through to the PTTW approval process. The MOE advises that they rely on the municipality to provide this information at the time of the application; master plans or Environmental Assessment reports that contain this information should accompany new PTTW applications.

Provincial Interests, Policies and Approvals

There are a number of provincial interests, policies and approvals that influence the water supply planning process, including the following:

Places to Grow Act – The Ontario government's initiative to manage growth and development in Ontario in a way that supports economic prosperity, protects the environment and helps communities achieve a high quality of life. The designated Greater Golden Horseshoe planning area west of the GTA includes most of the Grand River watershed. In particular, the planning area west of the GTA in the Grand River watershed includes Dufferin County, Wellington County and the City of Guelph, Waterloo Region, Brant County and the City of Brantford and Haldimand County. The cities of Guelph, Kitchener, Waterloo, Cambridge and Brantford are noted as urban growth centres.

As part of the Preamble: *The Government of Ontario recognizes that an integrated and co-ordinated approach to making decisions about growth across all levels of government will contribute to maximizing the value of public investments.*

Provincial Planning Policy Statement (PPS) – The statement of the Ontario government's policies on land use planning. It provides direction for the entire province on matters of provincial interest related to land use planning and development, and promotes the provincial "policy-led" planning system.

With respect to infrastructure and public service facilities for sewage and water, the PPS says

> 1.6.1 Infrastructure and public service facilities shall be provided in a coordinated, efficient and cost-effective manner to accommodate projected needs. Planning for infrastructure and public service facilities shall be integrated with planning for growth so that these are available to meet current and projected needs.

1.6.2 The use of existing infrastructure and public service facilities should be optimized wherever feasible, before consideration is given to developing new infrastructure and public service facilities.

1.6.4 Planning for sewage and water services shall:

a) direct and accommodate expected growth in a manner that promotes efficient use of existing municipal sewage services and municipal water services;

b) ensure that these systems are provided in a manner that 1) can be sustained by the water resources upon which such services rely; 2) is financially viable and complies with all regulatory requirements; and 3) protects human health and the natural environment;

c) promote water conservation and water use efficiency; and

d) integrate servicing and land use considerations at all stages of the planning process; and allow lot creation only if there is confirmation of sufficient reserve municipal sewage system capacity and water system capacity.

Growth Plan for the Greater Golden Horseshoe, 2006 – informs decision-making regarding growth management in the GGH. It is a 25-year plan that aims to:

- revitalize downtowns to become vibrant and convenient centres;
- create complete communities that offer more options for living, working, learning, shopping and playing;
- provide housing options to meet the needs of people at any age;
- curb sprawl and protect farmland and green spaces; and
- reduce traffic gridlock by improving access to a greater range of transportation options.

Environmental Assessment – provides for the protection, conservation and wise management of the environment in Ontario. The Environmental Assessment process:

- includes the Municipal Class Environmental Assessment process, which governs an approved class environmental assessment process with respect to a class of undertakings (such as municipal water supply projects); and
- establishes the need and justification, consideration and evaluation of options, an opportunity for stakeholder and public consultation, and open and transparent decision-making.

An Environmental Assessment is typically completed “just in time”, because Environmental Assessment approvals have a 10-year life after which an update/addendum is required.

Permit to Take Water (PTTW) – provides for the conservation, protection and management of Ontario’s waters and for their efficient and sustainable use, in order to promote Ontario’s long-term environmental, social and economic well-being.

Under the *Ontario Water Resources Act* (Section 34), a PTTW is required, with a few exceptions, for the taking of water in excess of 50,000 L/day. The PTTW process requires submission of an application, which includes a summary of adjacent land uses, nearby surface water features, private wells and a hydrogeologic and/or hydrologic assessment of potential impacts from pumping. Conditions within the permits are established to protect the quality and quantity of the natural environment, foster efficient use and conservation of waters, and ensure the fair sharing and sustainable use of Ontario's water.

Water is assumed to be for the "common good" of the public in Ontario and is therefore not subject to "ownership". The MOE has a policy or philosophy of "fair sharing" and "first come-first served" for all water users in the PTTW process. Municipalities do not have a priority position with respect to new water supply.

PTTW have an expiry date which usually requires renewal on a 5 or 10-year cycle. Approved permits are posted on the Environmental Registry, with the exception of permits for municipal wells, as they have undertaken public consultation through the Environmental Assessment process.

Permit applications (with a few exceptions) are also circulated to the municipality and the conservation authority for comment. This provides the municipality with an opportunity to bring their interests related to existing and planned water supplies to the MOE's attention and to request that appropriate studies (impact on planned municipal takings, sustainability of taking) be required.

Decisions to restrict a non-municipal PTTW to protect a future municipal water source must be defensible before the Environmental Review Tribunal. The MOE is able to recognize and give status to planned municipal water supply sources in their PTTW decisions when the municipality holds a PTTW for its planned supply, and also when a preferred option has been approved by Council through an Environmental Assessment process.

Clean Water Act – Promulgated in 2007, the *Clean Water Act, 2006* enables the development of watershed-based Source Protection Plans (SPP) to protect the quality and quantity of municipal drinking water supplies. Development of a SPP includes preparation of an Assessment Report, which maps vulnerable areas around wells and intakes and calculates the risk of specific threats to those supplies. For water quality, wellhead and intake protection zones are delineated and scored, and a list of 19 prescribed drinking water threats are assessed. Significant threats to municipal drinking water sources that are identified through this process, whether existing or potential, must be addressed through policies in the SPP.

The Proposed Grand River SPP has been submitted by the Grand River Conservation Authority to the Minister of the Environment. This Proposed Plan addresses significant water quality threats, and water quantity threats in the Townships of Amaranth and East Garafraxa. Studies to identify significant water quantity threats in other municipalities (if any) are not yet completed, and will be incorporated into a future Plan update. Approval of the SPP is expected by late-2014, and it is anticipated that the document will be updated on an approximate five-year cycle.

The SPP improves security for both existing and future municipal water supplies. From a water quality perspective, this is accomplished by requiring action be taken to reduce the risk of contamination from existing and future activities that pose a significant threat to municipal drinking water sources. New tools provided by the *Clean Water Act, 2006* (e.g. prohibition of future threat activities; Risk Management Plans for both existing and future threat activities) enhance the ability of municipalities and provincial agencies to deal with significant drinking water threats. Specifically, Risk Management

Plans can be followed up on to ensure that protective measures are maintained. In addition, efforts undertaken through the source protection planning program have significantly increased technical understanding ofthe relative vulnerability of municipal drinking water sources to contamination and activities that pose a risk to the quality of municipal drinking water supplies.

For water quantity, a tiered water budget and risk assessment process is undertaken to determine whether any significant threats to quantity occur. The tiered process includes Tier 1 and 2 Water Quantity Stress Assessments (WQSA) which assess, on a sub-watershed scale, the degree to which water is used in relation to the amount of water available. If the water use is moderate or high, a Tier 3 or local area Water Quantity Risk Assessment (WQRA) is undertaken. The Tier 3 WQRA confirms if municipal water supplies are able to meet future demands, including demand in drought conditions and as might be affected by climate change. Pumping rates used for the water budget assessment are based on current water takings; future water demands deal only with future municipal needs, and are based on water supply needs identified in approved Environmental Assessments and PTTW.

In the Grand River watershed, the Tier 2 WQSA identified a number of municipal systems that require a Tier 3 assessment, including the City of Guelph, the Region of Waterloo Integrated Urban System, Guelph-Eramosa Township, Centre Wellington and several smaller systems in Waterloo Region. Tier 3 WQRA studies are underway for Guelph and the Region of Waterloo Integrated Urban System. The Grand River SPP will be updated to include policies to deal with significant water quantity threats (if any) when the Tier 3 WQRA studies have been completed.

From a water quantity perspective, the SPP improves security for both existing and future municipal water supplies. This is accomplished by requiring action be taken to reduce the risk of depletion from existing and future activities related to water taking or reduced aquifer recharge, that pose a significant threat to municipal drinking water sources. For the most part, the policies to reduce the risk of depletion of municipal drinking water supplies would affect PTTW decisions by the MOE.

Challenges and opportunities for “securing” existing and planned municipal water supply sources

As a result of discussions with municipal and MOE representatives, the following are considerations for “securing” existing municipal water supply sources:

Characteristics of a regulatory environment that supports security (reduces uncertainty) in municipal water supply services

The following are listed as characteristics of a regulatory environment that would provide support to municipalities in securing water supply, and thereby reducing the uncertainties in their future supply sources:

- provides support throughout the continuum of municipal water supply planning;
- considers the provincial drivers for growth (i.e. Places to Grow) and assists the municipality in its plan to secure water supply for growth;
- fosters good communication and collaboration to transfer knowledge and maintain trust among provincial and municipal staff;

- allows for basic need and justification, feasibility, capacity, and sustainability to be established at the earliest possible stage (earlier than the Environmental Assessment process) and maintained though the continuum of the water supply planning;
- considers the realities of planning for, operating and maintaining a safe, reliable water supply system (basis for land development approvals, prudent redundancy, contingency);
- minimizes uncertainty associated with permit renewals for existing supply sources; and
- considers the municipal WSMP and the continued viability of planned sources in decisions on other (private) PTTW and discharge Environmental Compliance Approvals applications.

Available tools

Source Protection under the Clean Water Act, 2006

Source protection planning under the *Clean Water Act, 2006* provides an opportunity to protect the quality of existing and planned municipal drinking water sources ('planned' meaning there is an approved Environmental Assessment in place) and the quantity of existing and future municipal drinking water sources ('future' meaning as required to support the approved Official Plan). Quantity protection is applied in moderate and high use sub-watersheds (i.e. areas requiring a Tier 3 Water Quantity Risk Assessment).

Once an Environmental Assessment is complete for a planned municipal water supply source, (i.e. a preferred option is approved by municipal Council or the MOE, where a Part II order has been requested) the well/intake is defined as a "planned source" under the *Clean Water Act, 2006.* This means that it must be included in the Assessment Report and the SPP, allowing for the protection of water quantity and quality through SPP policies.

Permit to Take Water Regulation under the Ontario Water Resources Act

As part of the PTTW review process, the MOE circulates PTTW applications (with a few exceptions) to the municipality and the conservation authority. This provides the municipality with an opportunity to bring their interests related to existing and planned water supplies to the MOE's attention, and to request that appropriate studies (e.g. impact on planned municipal takings, sustainability of taking) be required.

Land Use Planning under the Planning Act

As per the Artemesia Water Case Decision, water taking is a land use decision, allowing municipal Official Plan policies and zoning by-laws to restrict water taking in identified areas (for example, for the protection of future water supply sources identified in the long term WSMP). Where a municipality makes such a policy, the MOE Director will not approve water taking where it is restricted by the municipal Official Plan policies.

Maintaining permitted capacity

The MOE has confirmed that, where municipalities have a PTTW for current sources (that are not conditional on further monitoring or adaptive management plans), the municipality can consider the source "secure" from a regulatory perspective for the purposes of this WMP.

Short duration of permits (frequency of renewal)

From a municipal perspective, a 10-year renewal period on a PTTW is a workable timeframe, although a longer time period would be preferred. A 5-year, or shorter PTTW, creates considerable uncertainty and is inconsistent with the municipal planning cycle.

The MOE has confirmed that, for municipal PTTW, a permit with a 2 or 5-year expiry is only issued when there is uncertainty about the sustainability of the taking and further monitoring is required. Otherwise, a 10-year permit could be expected.
The MOE is working to simplify the permit and permit renewal process, for example, by permitting wellfields, rather than individual wells in a wellfield.

Uncertainty that the planned water supply source will be available when it is needed

Municipalities can significantly reduce uncertainty about the security of their water supply by moving through the Environmental Assessment and PTTW process early, such that their planned supplies can be considered in PTTW decisions and defended, if necessary, at the Environmental Review Tribunal.
The MOE is able to issue PTTW for planned municipal takings, with expiry set for a date (e.g. 10 years) after the takings are brought on-line. This will secure the municipal sources within the PTTW process, but will only be helpful in securing planned municipal water supply sources if the Environmental Assessment and the PTTW processes are completed early.

It is current practice that new wells assess their impact on existing wells through pumping tests. Alternative means are needed to evaluate impacts on planned wells (i.e. wells in place, but not currently pumping). The MOE could require new private wells to test their impact on planned municipal wells in the vicinity, using the municipal pump test results carried out during municipal Environmental Assessment and PTTW application processes. This step could help reduce the uncertainty related to the impact of new private wells on planned municipal sources. As part of its comments on a circulated PTTW application, a municipality can request, through the MOE's request for studies from the proponent, that an examination of the impact of the proposed taking on the planned municipal well(s) be conducted.
Should there be conflict between private uses and planned municipal uses, the MOE could permit private use of the water in the interim period, on the condition that the planned municipal use will have priority at the time it is needed.

The length of time required to develop water supply

For a secure water supply, there is a need to be able to move directly from the water supply needs identified in the Official Plan, through the Environmental Assessment and approvals process and on to implementation of the WSMP before the identified water supply is needed.
The 8-15 year timeline to implement WSMPs increases uncertainty in the security of supply. The timeline can be reduced by:

a) streamlining the Environmental Assessment process to 2-3 years maximum, by more directly involving MOE staff in the process and by reducing the time required for decisions on Part II order requests, and

b) streamlining the PTTW process to 6 months by using the Environmental Assessment documentation as the basis for the permit.

In this regard, the municipality can streamline the process by incorporating field investigations required for the PTTW process (e.g. sustainability) into the Environmental Assessment process. The Assessment assumptions on need and justification, capacity and sustainability need to be carried through to the PTTW approval process; the municipality should include this information with the PTTW application.

Possible complications related to the source protection program under the *Clean Water Act*, 2006

It is unclear how the Tier 2 WQSA will be used in the PTTW process, and this has created uncertainty that municipalities can establish new water supply sources. The MOE notes that the current restrictions on water supply development in high water use areas are limited to specific water takings and do not affect municipal supplies. The concern is that municipalities will need to meet an even higher standard for approval of water supply expansions in high water use areas, and this might make development of these supplies unachievable; the MOE assures that there need not be concern in this regard.

The process for including a new supply source in the SPP would include delineating Wellhead Protection Areas, ranking threats, and creating policies to protect the supply. For quantity, a reassessment of the Tier 2 WQSA and/or Tier 3 WQRA would be needed to "confirm" the sustainability of supply as part of the source protection planning process. The concern is that the timeline for bringing new supplies on-line may be considerably delayed by this process. From a provincial perspective, MOE staff cannot think of a reason why the SPP updating process would intersect with the municipal water supply planning and approvals process. The municipality may choose to undertake the technical assessment work as part of other investigative processes, but this would apparently be their choice. Therefore, the MOE assures that this process need not increase uncertainty related to the security of existing or planned municipal water supplies.

Ability to secure future municipal water supply sources beyond the 25-year planning horizon

A Long-Term Municipal WSMP has no provincial status unless conducted as an individual Environmental Assessment. The MOE's participation in regular Water Managers' Working Group meetings (watershed municipal water services staff and MOE staff), where long term plans are shared, will keep MOE staff aware of the municipal plans and allow them to provide provincial support and assistance in securing municipal water supplies.

Given the length of time required to transcend from growth plan to water supply, the province may want to consider whether the planning horizon for its interest in water supply planning should be extended beyond the current 20-25 years. The province's 20-25 year limit is meant to restrain capital investment in infrastructure. Its interest in water supply planning and source protection could be extended where plans are sufficiently developed.

Conclusions and Recommendations

1) Regulatory tools are generally in place for municipalities to work together with the MOE to secure municipal water supplies. For the most part, the municipalities' uncertainties about the security of their existing and planned water supplies relate to communication and information sharing.

2) The security of municipal water supplies can be enhanced by a cooperative and supportive working relationship between the MOE and municipalities in planning, establishing and maintaining municipal water supplies. This need is supported by mutual provincial and municipal interest in strategic planning for municipal services, security for municipal water supplies and efficiency in infrastructure.

   To enhance cooperative and supportive working relationships, it is recommended that:

   a) the MOE foster a culture of working together with municipalities to solve problems; and

b) the Grand River Water Managers' Working Group continue to meet regularly and share long term plans to foster good communications and collaboration, transfer knowledge, and keep MOE staff aware of municipal plans.

3) MOE has confirmed that, where municipalities have PTTW for current sources (that are not conditional on further monitoring or adaptive management plans), the municipality can consider the source "secure" from a regulatory perspective for the purposes of this WMP.

4) The standard 10-year expiry for PTTW is reasonable and consistent with the municipal water supply planning cycle.

   It is recommended that:

   a) the MOE continue with the 10-year permit expiry and explore options for longer term or other expiry dates, and

   b) the MOE simplify and streamline the application and review process for renewal of existing permits (i.e. everything the same);

5) The process for providing additional supplies to meet forecasted future needs can approach or exceed the planning horizon for growth. For efficiency and cost control, the Environmental Assessment and PTTW processes should be streamlined. It is recommended that:

   a) the MOE and municipal staff pre-consult on information requirements;

   b) the MOE participate more fully through the Environmental Assessment process to assist with questions and requirements as the process proceeds; and

   c) the MOE reduce the time required for decisions on Part II order requests.

6) To enhance the security of planned water supplies to meet future municipal needs, it is recommended that:

   a) municipalities consider initiating the Environmental Assessment and PTTW processes as early as practical in their planning cycle, in order to reduce uncertainty about the security of their planned water supply sources;

   b) the MOE put processes in place to grant permits under the PTTW process for planned municipal water takings ahead of the taking being brought online (the MOE advises that this may require changes in the application and review templates used in the PTTW program);

   c) for new private water takings near planned municipal wells, the MOE put processes in place to provide for studies of the impact on the planned municipal well as if it were an existing municipal well (municipalities have confirmed that they will share the information required to facilitate this process);

   d) for large, new private water takings in areas near existing or planned municipal supply wells, municipalities make use of the PTTW application circulation process to request that appropriate studies (impact on planned municipal takings, sustainability of taking) be required; and

   e) municipalities consider Official Plan policies restricting new water taking in designated areas as required to secure planned sources of supply required to meet their projected future needs.

7) The implementation of the Grand River SPP, likely to come into effect in 2014, provides an opportunity to protect the quality of existing and planned municipal drinking water sources, and also the quantity of existing and planned municipal drinking water sources in moderate and high use sub-watersheds (i.e. where Tier 3 Water Quantity Risk Assessments have been carried out).

   It is recommended that, between 2020 and 2025, the Water Managers' Working Group jointly evaluate the quality and quantity protection provided by the implementation of the Grand River SPP and whether additional action is required to fill gaps or address implementation issues.
8) The Long Term Municipal WSMPs (beyond the planning horizon of the current Official Plan) are not currently considered in the decision-making for PTTW applications in the area. There are outstanding municipal concerns for securing sources identified in municipal WSMPs to meet the needs beyond the 20-25 year planning horizon of the municipal Official Plan.

Appendix C: Water Supply and Demand Management Workshop, September 15, 2011 Outcomes Report

LURA
LISTEN · UNDERSTAND · RELATE · ADVANCE

Contact Information:

Workshop Hosts – Grand River Conservation Authority

James B. Etienne, P.Eng.
Senior Water Resources Engineer
Grand River Conservation Authority
400 Clyde Road, Cambridge, ON N1R 5W6
519-621-2763 ext. 2298 | jetienne@grandriver.ca

Workshop Facilitation – Lura Consulting

David Dilks
President
LURA Consulting
515 Consumers Road Suite 201 | Toronto, ON M2J 4Z2
416.536.1729 | 416.536.3453 | ddilks@lura.ca

Table of Contents

1. Backdrop for the Workshop

Water quantity issues in the Grand River watershed are growing. Currently, the watershed has close to a million residents living within the 5% of area devoted to urban centres. Increased population pressures are expected to continue, driving water demand pressures in municipal centres. Climate change has also introduced a degree of uncertainty about the reliance on current water supplies.

Municipalities account for approximately 60% of all water takings in the Grand River watershed – ten times greater than the next highest water using sector – underscoring the need for a long-term approach to planning for the future of providing water to municipal users.

Water demand management (WDM) for municipalities focuses on the conservation of water, through the improvement of efficiency measures or a change in water use behaviours. The goals of water demand management seek to defer the need to look for new potable water supply sources to meet the future demands of consumers.

The Water Supply and Demand Management Workshop was organized by the Grand River Conservation Authority (GRCA) in order to bring together individuals and organizations involved with municipal operations and decision making to discuss the barriers, challenges and solutions to water demand management.

The workshop included keynote presentations, panel discussions and interactive feedback sessions. Participants were asked to identify and discuss the barriers and challenges to municipal WDM, as well as the promising strategies and solutions that could be deployed by watershed municipalities in the future. The workshop agenda is included in Appendix A and the list of workshop participants is contained in Appendix B. The workshop discussion paper, which was distributed to participants in advance of the workshop, is included in Appendix C.

The results of the workshop are to be a key source of information for the development of Water Quantity portion of the Grand River Water Management Plan, as well as to help municipalities develop their own municipal demand strategies. A WDM tool-kit for municipalities will be developed by the GRCA based on the workshop results.

2. Workshop Highlights

The following points offer a summary of the key messages and themes emerging from the workshop, including the keynote presentations, panel discussions and feedback sessions. A more detailed summary of the workshop proceedings is included in Section 5.

- Collaboration is critical to implementing effective WDM strategies. Collaboration between smaller municipalities can help them to share costs, staff resources, as well as promote the successes and lessons learned. Collaboration within the municipality can help to raise awareness about the need for WDM, gain political support and find efficiencies and commonalities across departments. Smaller municipalities can also look to larger municipalities for support.
- Water conservation efforts should be targeted at specific audiences – municipalities should use existing data sources to better understand the market and then target their communication and outreach efforts accordingly.
- Rebates for water efficient technologies in the home have reached a saturation point in some municipalities, meaning there will be diminishing returns for these programs in the future. More work is still needed to improve water conservation outdoors and with the ICI sectors.
- Innovative approaches to education and engagement are needed – Community-Based Social Marketing provides valuable tools and approaches for raising awareness and changing behaviour. Other suggestions for education include: finding champions, attending local events to engage community members (rather than hosting meetings), and using local media. A clear and consistent message is needed in communication campaigns.
- Increasing trust among the public is critical. Municipalities need to be transparent and engage citizens in the process of decision making about water pricing. The goal should be to help the public to understand water rates and the increases.
- Water demand management has considerable political dimensions. Municipalities need support from council and other senior decision makers to affect change. There needs to be a process for engaging council and gaining political buy-in for water demand management solutions.
- The challenges and solutions for WDM vary between municipalities. Small municipalities for instance, have issues especially in relation to economies of scale, staffing and resource availability.
- WDM should be integrated in the planning for new developments and subdivisions. The subdivision scale provides many opportunities for improving water conservation.
- Municipalities can require that WDM is incorporated in new development through the bidding process, thereby downloading the responsibility to the developers.
- There is a strong connection between water and energy and significant cost savings to both could be had, especially by the ICI sector. Municipalities should help decision makers, businesses and households make the connection between water and energy use.

- Rainwater harvesting is an important and promising technology for WDM. More work is needed to bring these technologies to market and make them affordable for the average person.
- Improvements to the Building Code would have a significant effect on WDM efforts and take some of the burden off municipalities.
- There are extensive Provincial regulations related to water conservation in Ontario. These provide some opportunities for, as well as restrict municipalities in what they are able to accomplish.
- Water is essential to individual and public health and prosperity. Promoting the true value of water may encourage users to use less; however, experience has shown that increasing the price of water does not necessarily result in reduced demand.
- Municipalities should explore better use of water bills as information tools, to encourage residential water conservation and educate users about their usage. Additions to the bill content, such as usage comparisons and clearer information on pricing would be effective.
- Financial modelling and full cost accounting are promising opportunities for WDM. Financial analysis can be used to quantify cost and revenue impacts of declining demand and set rates to assure full cost recovery. Sharing of best management practices for financing water at the municipal level would be valuable.
- More consideration should be given to the involvement of builders or developers, who can implement water demand reduction technologies in their product offerings. These technologies can range from the low/cost, low effect, to higher effect systems such as grey-water and rain water harvesting systems. Municipalities could work more closely and strategically with builders and developers in order to create significant reductions in water supply demand for residential homes.[1]

[1] This issue was not discussed in detail at the WDM workshop; however research and commentary on the subject were provided to GRCA after the workshop. The Water Supply and Demand Management Working Group considers this to be a promising opportunity to address funding barriers and therefore has been included in this report. A summary of a workshop on the subject is included in Appendix D.

3. Workshop Introduction Opening Remarks

James Etienne, *Grand River Conservation Authority*, welcomed participants to the workshop. He stated that the workshop would be an opportunity for participants to provide their feedback to assist the GRCA and its municipal partners in developing the long-term water demand management strategy. The input received would also provide the basis for development of a tool-kit for municipalities to prepare local WDM strategies.

James explained that the main goal of the workshop, as stated in the discussion paper, was to address the barriers and challenges to water demand management and identifying promising municipal strategies and solutions. The workshop was structured around 5 themes: *Technology & Operations, Economics, Community involvement, and Regulations and Implementation.*

James noted that the workshop would focus on the municipal side of WDM, as municipalities are responsible for the day to day provision of water and account for 60% of all water takings in the Grand River watershed. Participants were encouraged to look 25-50 years in the future, think about the capacity limitations and what municipalities can do to ensure the availability of water in the future.

David Dilks, *Lura Consulting,* reviewed the agenda and the format of the workshop. He led a round of introductions of all the participants in the room. Participants included representatives from a range of sectors and geographic areas within the Grand River watershed and beyond, including conservation authorities, small and large municipalities, the Province, consultants, engineers, academia and legal organizations. Dave stated that after the workshop, a report would be prepared by Lura based on the workshop discussions and distributed to participants for review and comment.

4. Presentations and Panel Discussion Summary

The participants were given a number of presentations throughout the day to help them appreciate the themes of the workshop. Copies of these presentations are included in Appendix E.

Morning Keynote - Kirk Stinchcombe - *"The Next Generation"*

Kirk Stinchcombe is the founding director of Econnics – a company specializing in innovative water conservation and sustainability solutions for water utilities, the private sector and government. He is also an internationally known water expert and speaker. His presentation, entitled "The Next Generation", focused on where we are now in terms of water conservation planning (what he considers the third generation) and its implications for WDM. He reviewed the history of water conservation planning, arguing that the old rules no longer apply. He suggested that if we don't respond to the need for change in the way we think about and plan for water conservation, our water supply is at great risk. Kirk demonstrated that the WDM management today is more complex and not easily amenable to standardization. It is financially riskier, as well as on an operations level. To get it right, it will require organizational change and more strategic thinking from water experts and suppliers.
The following is a summary of the key points of Kirk's presentation:

- The first generation of water conservation focused on educating people about the need to conserve water and introduced the first round of water restrictions. This was important but was not sufficient to change behaviour.
- The second generation was driven by data and technology – in the home including low flow showerheads and limiting outdoor use, and ICI sectors. This period saw the rise of the conservation professional and an increasing sophistication in the industry. Rebate schemes were very popular at this time and were successful; however, now rebate schemes have reached a point of saturation and there are diminishing returns.
- Programs targeted at outdoor water conservation today remains complicated, partly because there is significant segmentation within the market. The public is also confused and sceptical about the changes they would need to make in their outdoor water use habits.
- We have now entered the third, or 'next generation' of water conservation. The promising tools of this generation include:
    - **pressure and leakage management** – controlling pressure, detecting and managing leakage in existing water supply infrastructure;
    - **Community-Based Social Marketing** – designing programs based on what the community is willing to accept, using empirical tools;
    - **narrowcasting** – target marketing; using available data to target communications to specific user groups (i.e. gardeners) and behaviours;
    - **mass customization** – give customers specialized items for the same price as a mass-produced item;
    - **source substitution** – using alternative water sources at the household and the neighbourhood level;
    - **conservation-oriented pricing** – pricing of water to affect decision making.
- The next generation of water conservation needs to include boutique approaches, targeted programs, sophisticated program design and be driven by the market.

Panel Discussion – *"Breaking down the Barriers"*
Wayne Galliher (Moderator) introduced the 3 panellists and provided an overview of their work and accomplishments. Following this introduction, each panellist gave a short presentation.

Theresa McClenaghan (Canadian Environmental Law Association)
Theresa presented an overview of the emerging laws and regulations in Ontario that have requirements which relate to water demand and are relevant to municipalities. She gave an overview of how these would affect municipal decision making and planning within the context of WDM. The legislation provides some opportunities, as well as will determine what municipalities have the power to do or what they are restricted to do. These things can be integrated – we just need to be cognisant of how they play a role and how they interface with plans. Innovation will be rewarded by necessity, to reach targets, new tools are needed. Relevant legislation and regulations include:

- *Permit to Take Water* – conditions from MOE – based on science and need, and may draw attention from the public. These conditions may be more prescriptive in the future.
- *Sector specific regulations* – yet to be developed but may be important for WDM.
- *Safe Drinking Water Act* – ability to require financial plans for drinking water systems.
- *The Water Opportunities and Water Conservation Act* – includes a regulation-making authority to require municipal water sustainability plans.
- *Land-use planning* – The Provincial Policy Statement (PPS) requires that municipalities have reasonable long-term understanding of where their water supply is coming from.
- *Great Lakes-St. Lawrence River Basin Sustainable Water Resources Agreement* – may be relevant for large infrastructure projects that take water from the Great Lakes.
- *Ontario Building Code* – there are potential changes to the water conservation provisions in the Building Code.
- *Clean Water Act* – Policies addressing water quantity threats in the Source Protection Plan (SPP) may have an effect on municipalities.

Steven Renzetti (Professor, Brock University)

Steven Renzetti presented some of his current research on WDM, specifically in relation to pricing and drivers and barriers to behaviour change. The following is a summary of his presentation:

- Heterogeneity in water preferences, decisions and behaviour makes water conservation planning complicated.
- Cellular telephone companies offer an interesting model for water pricing – they interact with customers and tailor their rates to narrowly-defined user groups.
- There is a lack of trust with water provided via water utility companies – people filter it or used bottled water. Messages about water conservation don't get received as a result.
- Decisions to retrofit are also complex.
- Water pricing is complex. Just because prices increase, does not mean demand will go down.
- One of the main drivers of retrofits is a general concern about environment. This suggests that we may need to influence perception about the environment in general to affect water conservation behaviour.
- There is a need to do more research to predict impacts of policies.

Bruce Taylor (President of Enviro-Stewards Inc.)

Bruce Taylor is an internationally recognized expert and conference speaker in the field of water and waste reduction, reuse and recycling. His presentation focused on his recent work in water conservation planning and engineering. The following is a summary of his presentation.

- Recently, Taylor's company worked in Sudan where much of the water is contaminated. His company installed a filtration system and bottling facility. The goal was to make the operation environmentally and economically sustainable.
- Reducing water consumption can result in increased effluent contaminant concentrations. The mass of effluent contaminants may remain the same, but the resulting higher concentrations can exceed municipal bylaw effluent discharge limits.
- A solution to water demand management is to combine water conservation with pollution prevention and/or energy efficiency. This leads to lower water costs, as well as savings associated with ingredients and energy in the effluent stream.
- It is important for governments to look at mass-based as well as conservation limits.
- We need to promote awareness of the connection between water use and other externalities, and help people to see the cost saving benefits of conserving water. Once an assessment has been done, there is a strong likelihood and motivation to implement.

Morning Panel Discussion

The responses from the question and answer sessions can be found in Appendix F

Afternoon Keynote - Mike Fortin - "Death Spiral? The Economics of Demand Management"

Mike Fortin gave a presentation on the economics of WDM, arguing that there are 2 main things that municipalities can do fairly easily to help them avoid the death spiral: 1) estimate impacts on demand and (2) evaluate and mitigate any financial burdens. The following is summary of the presentation:

- Increasing the price of water usually results in a fairly minimal change in demand.
- What we are seeing is that demand is now shifting – this shift in demand curve can be the result of water conservation programs.
- The driver in trends at the municipal level is plumbing codes.
- The decision to use less water in the ICI sector is more connected to price, compared to residential.
- How to quantify rate impacts: 1) Custom characteristics 2) Price awareness – people don't know how much they are paying and they don't know how much water they are using and 3) Revenue recovery targets – municipalities are not businesses, they can't make a profit.
- There are 2 approaches to financial analyses for water conservation – 1) evaluate water conservation program elements and 2) how to mitigate demand.
- Financial model can include – customer counts, demand levels by customer class, capital plans, scheduling, cost, other drivers of financial performance, uncertainty and risk.
- Financial model outputs include – capital reserves, residential pricing, etc.
- Comparing unit costs (i.e. Is the cost of savings less than the cost of capacity expansions?) can be misleading and confusing.

- You want people to know that when you make changes (i.e. toilet retrofit) the overall cost of the system will be lower.
- Two key strategies include:
    - use financial analysis to quantify cost and revenue impacts of declining demand and set rates to assure full cost recovery
    - frame the discussion of proposed rate increases properly.
- We need to anticipate decline in demand and plan for it.
- Use our understanding and knowledge of demand to:
    - estimate (and model)
    - evaluate
    - mitigate (adverse revenue impacts to avoid death spirals).

Question and Answer Discussion

The responses from the question and answer sessions can be found in Appendix F.

5. Summary of Workshop Session Participant Feedback

The following is a summary of the comments received from participants during the breakout sessions for the 3 topic areas: technology & operations, socio-economics and regulation and implementation. The breakout groups were asked to focus on barriers and opportunities for each topic. This summary is organized using themes that emerged from the discussions and separates those barriers and promising strategies that are relevant to small municipalities.

Technology and Operations

BARRIERS

The Cost of Making Improvements

- Innovative technological solutions are not cost effective for the average person (e.g. rainwater systems).
- Greater upfront costs for new technology discourage municipalities from purchasing.
- There is an overall lack of resources available to municipalities to invest in new technology and infrastructure upgrades.
- If municipalities increase the price of water to offset the cost of new technology, there is a risk that water demand will decrease. As a result, revenue drops, the municipality is faced with a budget shortfall and must raise prices again (i.e. 'the death spiral').
- The current purchasing system in most municipalities gives contracts to the lowest bidder, not the best solutions.
- Municipalities must consider capital cost vs. the cost of delivery.

Resistance to Change and Staff Resources

- Decision makers tend to follow the status quo, rather than being innovative.
- Some municipalities lack the time or expertise to address WDM.
- When water experts leave an organization, they take their specialized knowledge with them.

Problems with WDM Technology

- Leak detection is most often introduced after the construction process.
- Green technology can be unappealing (i.e. aesthetics).
- Water softeners are inefficient – they waste water and energy.
- Rainwater harvest technology has an impact on the volume of water stored through rain water recharge (i.e. indoor domestic use of rainwater will take away from the recharge portion of the water balance).
- Introducing alternate domestic water sources (i.e. grey water and rainwater harvesting) increases the potential for cross-connections with treated municipal water supplies.

Complexity of WDM Systems

- Municipalities require different solutions – there is no one-size-fits-all solution.
- There is a tendency to look at water in a silo and not acknowledge the connections with other systems (i.e. the potential cost savings on energy from water demand management).
- Peaking factors – there are complex issues with scale and demographics (residential vs. large plants).

- District area metering in larger communities with interconnected distribution is complex.

Challenges for Small Municipalities

- Economies of scale – especially challenging for small municipalities with few users.
- There is a fear of losing industrial users if WDM is asked of them because jobs and tax revenue are scarce.
- Water conservation planning in small municipalities is still in the first and second generation – small municipalities haven't saturated the market with rebates and because the limited time and capacity to even consider WDM.

PROMISING STRATEGIES

♦ Information Sharing and Collaboration

- Sharing of equipment between neighbouring municipalities can reduce costs.
- A centralized organization/mechanism for sharing information, as well as connecting municipalities to suppliers and researchers, would be beneficial – this could be done by GRCA or newly created watershed groups.
- Share expertise and staff among municipalities (i.e. one WDM expert shared between neighbouring municipalities).
- Collaboration across municipal departments – building officials, water staff, health department, etc. (note: health departments are often missing on the multi-disciplinary team).
- Find ways to share success stories to help municipal decision makers see that others are doing it.
- Provide education opportunities for inspectors/plumbers – mentorship, training, certification.
- Municipal/academic/industrial should work together to bench test rainwater harvesting and greywater systems to improve cost, performance and reliability.

♦ Integration and Scale

- Integrate new water conservation technology at the planning and development stage.
- Engage the energy sector.
- Plan and build land-uses that can be integrated (e.g. cooling water can be recycled to a nearby use such as heating a hotel).
- Implement new technology on the subdivision/community scale as well as the site specific scale.

♦ Forecasting and Reporting

- Develop more strategic asset management programs.
- Conduct operational demand forecasts.
- Full cost accounting (i.e. reporting and tracking infrastructure, operational and administrative costs).
- Better use of information systems to capture information about water usage – time of use, type of use, etc.

- **Technological Solutions**
  - Concentrate on improved water pressure management – especially during the design and development of new buildings – before they are built.
  - Find energy savings through forecast demand (tank/reservoir level management).
  - Promoting the WaterSense rating system for water efficient products.
  - Improve rainwater harvesting technology – look to other stormwater technologies for increasing recharge.
  - Promote nature-scaping for outdoor water conservation.
  - Improve use of smart metering – send the information back to electricity facility.
  - Integrate technology into the distribution of water.
  - Use a separate system for grey water.
  - Promote pilots for rainwater harvesting on a low cost level.
  - Look at retrofitting existing systems as well as new builds.

- **Smart Marketing**
  - Target technology to specific user groups – i.e. promote existing technology among high end users.
  - Send promotions/rebates to high water users (multi-unit buildings).
  - Create “water wise” promotion stickers like EnerGuide program.

- **Examining and Assessing the ICI Sector**
  - Collaborate with groups that do assessments of ICI to incorporate efficient water strategies for new development. Offer reduced water rate to industry with conservation plan.
  - Examine concentrations and loadings more closely – to find sources for water conservation.

- **Promising Strategies for Small Municipalities**
  - Collaboration – either with larger adjacent municipalities or other small municipalities within the watershed/county.
  - Planning prior to regulation (i.e. wastewater optimization).
  - Incorporate WDM technology in municipal operations strategies.
  - Encourage strategic thinking by the economic department.

Socio-Economics

BARRIERS

- **Misperceptions and Lack of Political Will**
  - Water users are unaware of the true cost and value of municipal water services.
  - Politicians are unlikely to support increased water costs because they are not supported by the public.
  - Perception of abundance and difficulty thinking long-term.
  - Varying mandates across different levels of government create confusion for the regulator and public.
  - The relatively low cost of water does not encourage conservation.

- **Billing**
  - Current format for water billing does not allow residents to understand how their use compares to others or how their behaviour affects their usage/water cost.

- **Cost Structure**
  - Debentures within a municipal budget are limited to capital (not operating).
  - Charging a flat rate for water deters conservation.
  - Accounting complexity – short-term or long-term planning and budgeting for improvement is difficult.
  - The reserve – investment in infrastructure for the future generations is paid for largely by current population.
  - There is a disconnect between those who use the water system and those who pays for it.
  - Federal and provincial infrastructure funding acts as a disincentive to incorporate true cost into bill.
  - Fair implementation of block charges can end up driving away business.
  - There is currently no BMP for municipal water economics.

- **Challenges for Small Municipalities**
  - Fixed base cost of delivering water (i.e. infrastructure, salaries, and maintenance) is especially problematic for small municipalities.
  - Limited personnel capacity to market/advertise, especially the more strategic type of advertising and social marketing.

PROMISING STRATEGIES

♦ Improvements to Billing and Pricing

- Include comparisons on bills to let households know how much water they use using meaningful measurements (i.e. compare to average community consumption or between billing periods).
- Compare household usage on the water bill by including a per person use.
- Show savings from conservation in terms of the current rate on the water bill.
- Separate billing for water and other utilities.
- Water budgeting – give households a water budget – based on previous consumption.
- Improve pricing structure and rates to promote conservation.
- Find ways to be open and transparent with users about the reasons for water rate increases (i.e. what exactly is the extra money going to and how is the municipality trying to keep costs down).

♦ Financial Modeling and Planning

- Develop best management practices for financing water at the municipal level.
- Develop water budgets to determine how much water is being used by industry, residents, etc.
- Use full-cost accounting/financial planning – to report and track infrastructure, operational and administrative costs.
- Use rate reforms to mitigate variations over time.
- Isolate capital reserves for water.

♦ Audience Specific Approaches

- Obtain greater baseline data to identify opportunities for targeting specific user groups.
- Target businesses – i.e. garden centers, plumbing, the development industry.
- Focus conservation efforts on ICI sector – considering that residential low hanging fruit are already completed.

♦ Enhanced Education and Awareness Building

- Create community norms around water conservation (i.e. socially unacceptable to have green lawns).
- Find champions for water conservation.
- Use demonstration projects to promote opportunities for WDM.
- Help the public and municipal decision makers to see the connection between water and energy – and the cost saving potential.
- Consistently promote the message about the intrinsic value of water.
- Survey and conduct research on public perceptions and what is driving behaviour – ask the public what they are willing to pay for.
- Utilize Community-Based Social Marketing concepts, tools and approaches.
- Use slick, traditional advertising, in addition to more innovative approaches and social marketing.
- Build trust in community through transparency; involve them in the process of defining the goals of WDM.

- **Promising Strategies for Small Municipalities**
  - Focus on governance – share resources amongst small municipalities to increase economies of scale and share costs.
  - Request expansion of the small municipality fund to include WDM (i.e. Canada – Ontario Municipal Rural Infrastructure Fund Agreement).
  - Implementation of the rest of the water taking charges program – transfer to WDM (equalization payments).
  - Ensure that operators understand water systems – use them to help communicate the water conservation message.
  - Use low-cost/free local media (i.e. Channel 20, local paper)

Regulation and Implementation

BARRIERS

- **Conflicting Regulation**
  - Approvals become bottlenecked due to extensive regulation.
  - Timing of legislation and regulation.
  - Dilution to meet chloride residual targets set by Provincial regulation results in wasted water.
  - Some of the regulations for water are conflicting, creating confusion and lack of clarity.

- **Political Challenges**
  - Uncertainty in political future regarding legislation makes it difficult to plan and incorporate regulation changes.
  - The 20-25 year horizon that municipalities typically use for planning, may not be sufficient for WDM.
  - Lack of political certainty between election terms.
  - Regulations are not being updated to respond to and keep pace with new technologies (i.e. Building Code).
  - There is a lack of resources available to municipalities to improve infrastructure and planning for water.
  - Enforcement regarding watering restrictions is poor.

Impediments to Implementation

- Tendency to use simple solutions for complex problems.
- Permit to Take Water claw-backs due to reduced demand is a fear in many municipalities.
- Regulations regarding health concerns or non-compliance discourage early adopters (i.e. limits in how grey water/rainwater used).
- It is a challenge to partner and collaborate with other municipalities.
- There is a lack of staff resources and capacity.

Challenges for Small Municipalities

- The administration time needed to meet all compliance regulations (reporting, audits, inspections, etc) means there is not time or resources available to do more useful/practical things like WDM, upgrades.
- Lack of political will and awareness about WDM from council.
- Politicians are more concerned about 'standard of care'; being in compliance.
- Growing the ICI sector and bringing in development is a higher priority than WDM.

PROMISING STRATEGIES

Alignment of Water-Related Legislation and Regulation

- Conduct a systematic analysis of barriers to relieve bottleneck and disincentives.
- Integration of acts and regulations to reduce conflicts, time and costs, rather than requiring a new plan or amendments for each.
- Allowing the approval processes for certain technologies to be fast tracked.
- Phase in complex new requirement of immediate/early implementation of accepted BMPs or technologies.

Enforcement of By-laws

- Implement a by-law that allows residents to water their lawns only one day a week.

Upgrading the Building Code

- Develop higher standards for water related policies in the Building Code.
- Give municipalities the ability to phase in or require immediate changes for straight forward technology.
- Conduct more frequent reviews of the Building Code and water related issues.
- Allow municipalities to modify local building codes and by-laws (could be done on a larger basis i.e. watershed wide).

Regulatory Opportunities

- Take advantage of the Water Opportunities Act – and the opportunity to do sustainability plans with environmental and financial benefits considered.
- Funding opportunities from senior levels of government.

Other Ideas

- Improved metering – efficient meters pay for their replacement

- Assist the municipality in justifying Permit to Take Water limits rather than penalizing for reduced demand.
- Public Advisory committees – promote planning and implementation of water conservation
- Conduct a systematic evaluation of barriers to relieve bottlenecks in the regulation.
- Create more voluntary requirements for municipalities.
- Make conservation part of compliance with the Water Resources Act.

Promising Strategies for Small Municipalities

- Provide capacity support by a larger group like GRCA or County to share work; the ability to outsource WDM work.
- Share resources and staff capacity from several small municipalities to do compliance, share operators.
- Streamline the process of the compliance reporting.
- Change requirements of regulations (i.e. Building Code) to require efficient technology – to help streamline the process and take burden off municipalities.

6. Workshop Feedback Survey

Participants were given an opportunity to provide other feedback on the workshop as well as comment on the barriers and promising strategies for WDM using a feedback survey. The feedback from the participant evaluations has been incorporated into the report. In addition, the list below shows the level of participant satisfaction with the workshop and highlights key points of the survey results. A blank copy of the survey is included in Appendix G.
Average level of satisfaction with components of the workshop: (1 – Good, 5 – Poor)

- Speakers - 1.4
- Content - 1.6
- Agenda – 1.6

Responses to key questions:

- *Did we achieve the workshop goal?* (To identify promising strategies and solutions that will enable Grand River watershed municipalities to address the barriers and challenges of WDM) - **17 / 17 agreed.**
- *Is collaboration imperative for WDM in Grand River?* - **15 / 15 agreed.**
- *Would you be interested in working with others like the GRCA to achieve WDM?* - **11 / 14 answered YES; 3/14 wanted more information.**

Promising strategies for municipalities:

- *Technology* - Rain harvesting; smart metering.
- *Operations* - Mentoring programs for staff; finding ways to fund more staff; capacity building initiatives; leak protection; optimizing water levels in water towers; pressure reduction.
- *Social* - Community awareness; building trust in community for utility; marketing rather than education; education by sector; engagement methods.
- *Economics* - User pay system; more funding; use better deferral projections; change rate structure.
- *Regulation* - Water sustainability plans; political will; Water Opportunities Act; rationalise WDM regulations across the board; building code revisions/updates.

Other comments on the workshop:

- “Collaboration between municipalities in this watershed can help all of us move forward – tap expertise within and share.”
- “The next step is development of on the ground action plan.”
- “MOE should incorporate the findings of this workshop in their regulations. “
- “There is still a lot of help and education needed for small systems to implement and encourage WDM.”

Appendix D: Low Water Response Meeting Agenda/Minutes, June 10, 2011

Grand River Low Water Response Meeting Agenda
Grand River Conservation Authority Head Office
Chestnut Room
June 10, 2011 0:30am-12:00pm

1. **Welcome** — **James**
2. **Introduction of Committee Members** — **All**
3. **Review Committee Terms of Reference** — **Amanda**
    a. Confirm Membership — All
4. **Annual Elections of Chair and Secretary** — **All**
    a. Discussion of Roles and Responsibilities — Amanda
5. **Overview of 2010 Activities** — **James**
6. **Current Watershed Conditions, Summer Outlook** — **Stephanie**
7. **Communications** — **Amanda**
    a. Schedule for 2011 WRT Meetings
8. **Grand River Water Management Plan Presentation** — **Amanda**
9. **Trends reports from Water Sector Reps** — **Amanda**
    a. Water Bottler Rep
    b. Aggregate Rep
    c. Golf Courses Rep
    d. Agriculture Reps
    e. Others?
10. **Other Business** — **All**
    a. Low Water Response Provincial Training (via WebEX)
    June 22 and 23 (half days in the morning) for the first session
    July 12 for the second compressed session (basic OLWR training presentations)

For those teleconferencing:
Phone Number: **1- 866-295-8360** Passcode: **1881062#**

Grand River Low Water Response Team 2011 Start-Up Meeting Minutes

Grand River Conservation Authority Head Office
June 10, 2011 10:30am-12:30pm

1. Welcome

Amanda began the meeting by welcoming everyone at 10:39am who were either in person or via teleconference. Amanda explained that while we were still in very wet watershed conditions this meeting was also to gather people to also discuss the Water Management Plan and to share trends in the non-municipal water sectors.

2. Attendance

Amanda asked everyone in the room to introduce themselves and their affiliation around the room. In attendance were:
In person: Amanda Wong, James Etienne, Stephanie Shifflett, Dave Schultz (GRCA), Don DeMarco (water bottlers rep, Nestle Waters Canada), David DeCorso (golf course rep, Victoria Park GC), Jessica Davidson (aggregates alternate rep, Holcim), Matt Wilson (OMAFRA), Ken Cornalisse (MNRF), Jack Imhof (Trout Unlimited Canada)
Teleconferencing: Larry Davis (agricultural rep, Brant OFA), Dale Murray (Centre Wellington), Wayne Galliher, Laura Beintema, Becky Swainson (City of Guelph), Todd Gregg (Oxford)

3. Review of Committee Terms of Reference

The TofR were circulated with the agenda prior to the meeting. Amanda highlighted and read over the introduction of a new paragraph called 'Long Term Management'(LTM) for inclusion in the existing TofR document. Amanda stated that while none of the other paragraphs had changed from the TofR, it may be worthwhile to consider long term management and read the paragraph as found in the OLWRP Draft 2009 document from the Province. Everyone was in agreement that the concept of long term management should be included. L. Davis suggested that the word 'supporting' or 'promoting' long term management was more the mandate of the WRT than the actual management responsibilities. J. Imhof stated that some wording needed some definitions, to ensure that the WRT is aware of the implications of such terminology. Amanda agreed that the term 'ecological health' is controversial and needs some better understanding from the group, especially when managing for water supply and demand.
Action Item: A. Wong to add the word 'promoting' into the paragraph as discussed. A. Wong will give better wording and definitions to the paragraph. The WRT will send feedback and it will be discussed at a subsequent meeting.

3a. Confirm Membership

The membership list (Schedule 1), was also circulated prior to the meeting to confirm membership on the WRT this year. There were a few changes and additions of alternate representatives that have offered to stand for the 2011 year. Adjustments will be made to the Schedule 1 for 2011 to reflect these changes.

4. Annual Elections of Chair and Secretary

James requested that someone in the meeting offer to take over as Chair for the annual elections. Don DeMarco offered to stand in as Chair for the elections and made a call for nominations for the position of Chair of the WRT 2011. James nominated himself and there were no other nominations from the floor. D. DeMarco called for a vote of hands and James was elected Chair. D. DeMarco then called for

nominations for Secretary of the WRT 2011. Stephanie Shifflett nominated Amanda Wong, who accepted the nomination. No further nominations were made and a vote of hands was called. Amanda was elected as Secretary for the 2011 year. D. DeMarco returned the role of Chair back to James for the remainder of the meeting.

5. Overview of 2010 Activities

James gave a brief overview of the 2010 activities. The conditions in 2010 were fairly wet and little was needed of the WRT. There was just one declaration made last year; a Level 1 in the upper Nith River subwatershed. James recalled that there were some discussions about the accuracy of calling a Level 1, since the threshold was an average value as opposed to a median value and it may have not been necessary. The Level was dropped after a few weeks and no further action was taken.
D. Decorso recalled last year that we met very early in the year as hot dry conditions were seen in April. He was glad that while conditions were favourable to call a Level 1, the WRT opted not to take such action since it would not be in the public's interest. He thought we made the right call in holding off and not giving the public the wrong impression of the WRT.

6. Current Watershed Conditions, Summer Outlook

Stephanie presented with PowerPoint and a handout, the current watershed conditions and summer outlook. All gauges are well above the average summer low flow, reservoirs are above or right at the rule curve and precipitation across the watershed has been well over the long term average since the start of 2011. Groundwater levels in the more susceptible monitoring wells are also in good shape. Environment Canada 3-month predictions show hotter and drier weather than the long term average for this area.

7. Communications: Schedule for 2011 WRT Meetings

Amanda stated that the WRT meetings generally are via teleconference on an 'as-needed' basis. She asked the team whether the same time as last year would work this year. The time to put on hold in case of the need to call a WRT meeting would be Wednesday's at 1:30pm. Amanda clarified that Stephanie will be monitoring the conditions and if the flows are dropping and becoming a concern, she will prepare a watershed conditions report. Those reports generally will get sent out on Monday and the Secretary (Amanda) will request a meeting for Wednesday afternoon. If conditions change, an updated conditions report will be presented and the WRT can make a consensus decision on taking action. All members were fine with the teleconference schedule.

8. Grand River Water Management Plan Presentation

Amanda stated that part of the reason to meet today was to introduce the Team to the WMP which is happening currently in the Grand River watershed. The hope was that for non-municipal sectors, the WRT would be able to give advice on future trends in water use. James presented the canned presentation "A Plan for the Grand" for the WRT members.

9. Trend Reports from Water Sector Reps

Matt Wilson (OMAFRA): Agricultural water sector. Matt gave an overview of what he and Rebecca Shortt had discussed regarding irrigation and cropping patterns in the watershed. While there are no trends that can be predicted for cropping, he did state that the tobacco crop is again larger than last year and irrigation is steadily increasing. Irrigation equipment that is being used is moving towards more efficient models. He thinks farmers generally under-irrigate their crops so better management may increase water use for the agricultural sector. This will translate into more frequent irrigation events but less volume per event.

Don DeMarco (Nestle): water bottling. Don discussed Nestle Waters Canada's sources of water and some of the operations located in the vicinity (Erin and Aberfoyle). The distribution of these plants are throughout Ontario. They use approximately 60% of their permitted maximum. The future of water bottling demand is driven by consumers and weather. Hot summers sell more water bottles than wet years. James asked whether there is reserve storage of bottled water in case of higher demand. Don confirmed that there is warehouse storage which also can act as a way to conserve water during low periods. Don anticipates between 0 and 6% growth in the future.

Jessica Davidson (Holcim): aggregate industry. Jessica gave an overview of the different plant operations in this watershed. Primarily, they are all sand and gravel plants and not quarries. Amanda asked for clarification and Jessica stated that sand and gravel operations do not dewater the pit, but remove and wash the aggregate, whereas quarries dewater to blast unconsolidated rock. Sometimes the sand or gravel does not need to be washed but if it is, there is a closed loop system. They are introducing a new program called Sustainable Environmentally Responsible Aggregate (SERA) which they hope others in the industry will adopt.

There were other questions about operations of the Holcim operations and the industry itself. Jessica stated that the industry is fairly saturated with pits so the likelihood of more pits in the future is minimal. K. Cornalisse stated that a report is published on aggregate resources every year.

There were also discussions about water usage on site, and losses due to evapotranspiration. It is estimated that on a hot day, approximately 2cfs/acre is lost to evapotranspiration from open pit ponds.

David Decorso (Victoria East GC): golf courses. Dave gave a very thorough list of actions that golf courses have done to improve water efficiency over the past years and where the industry is heading. (Please see Appendix A). In summary, public education on water efficiency is improving (brow n turf ok, offline storage), technology is improving the timing and need for irrigation and it is likely that the golf course sector is saturated an there is not much room for growth in terms of new courses in this area.

Other Comments: James asked Larry Davis about the current year outlook for agricultural crops. Larry stated that many farmers delayed planting because the ground was too wet, but most crops are now in the ground. This may mean that the first part of July will be a desperate time for water to grow crops as fast as possible to make up the time. This is especially true for broccoli which often has 3 crops per year. Irrigation is likely to occur this year much later into the Fall than normal.

10. Other Business

Amanda reminded the members that the provincial training for OLWRP was taking place via web seminar (WEBEX) on the mornings of June 22 and 23rd. All GR-WRT members are welcome to join in the connection at GRCA Head Office to attend the seminars. An agenda and details will be provided as they are available. If unable to attend, the material covered will be distributed by Amanda to the WRT afterwards.

The meeting was adjourned at 12:30pm.

Appendix D-A: June 2011 Trends in Golf Course Irrigation

Here are some of the trends that I have noticed in the last few years.

Public Education – Drier soils provide fast and firm playing conditions. This is not a bad thing. Golf courses in Europe especially links style courses in Scotland (The home of golf) emphasize playability and not so much lush green conditions. Golfers in North America are slowly realizing that it is OK to see brown turf especially during drought conditions.

Education of Golf Course Management and Golf Course Superintendents – We now realize that over watering turf grass promotes unhealthy conditions and diseases. Water deep and infrequent to promote deep roots and healthy turf. Water only where and when necessary for example do not water the whole green if only the back corner is what is drying out. Golf course managers understand the importance and cost of wasting water and maintain their irrigation systems for maximum efficiency. When they see a leak they fix it.

Water Supply – Golf courses have been increasing their storage capacity for the past number of years. The GRCA was very instrumental in encouraging many local golf courses to have adequate off line storage capacity. This will enable the golf course to reduce water taking directly from a vulnerable water source during low flows and or drought conditions. This extra storage capacity will also allow the golf course to reduce pumping during MOE water restrictions without compromising turf grass quality.

Irrigation System Technology – The improvements in technology are astonishing. There have been major improvements in all aspects of an irrigation system. Some of the improvements are:

Sprinkler heads are designed for maximum uniformity and even distribution rates.

Pump stations are designed for maximum efficiency saving water and power.

Computer Control Systems – Irrigation control software has many features to conserve water and power. Some of the features include:

Built in weather stations to adjust for the evapo- transpiration rate of turf grass. (The computer will water according to how much water the plant has lost in a day).

A feature called rain watch will adjust and or turn off an irrigation program if it rains during the night.

A feature called cycle and soak with will delay an irrigation cycle on a sloped area to prevent run off.

Irrigation programs now have the ability to control every single head at different times because the days of watering everything for 10 minutes are over.

Not every golf course is the same and the water requirements for each golf course are different depending on many environmental factors including elevation, tree cover, terrain, soil types etc. Most golf courses have not had to water much this year maybe just a few times and this would be for small areas of the golf course prone to drying out such as greens and tees.

Not every golf course have these elaborate systems previously mentioned, however I think most golf courses understand the importance of water conservation and manage their properties as best they can with the resources available to them.

David DeCorso, Victoria Park Golf Club

Appendix E: DM Objective Development Process, March 2, 2012

Process of WDM Objective Development (12 Month)
(for Working Group discussion March 2, 2012)

GRCA Barriers & Opportunities Workshop (Completed September 15, 2011)

- Key Opportunities (at the local level) Identified by Workshop Participants:
  - Improved Forecasting and Reporting
  - Financial Modeling and Planning
  - Improvements to Billing and Pricing
  - Enhanced Education and Awareness Building
  - Range of Technological Solutions (pressure management, WaterSense, etc.)
  - Information Sharing, Collaboration and Capacity Support
  - Integrate New Technology at the Planning Stage and subdivision scale
  - Smart (targeted) Marketing / Audience Specific Approaches
  - ICI Sector
  - Encourage Strategic Thinking in Economic Development Department

Process Review Meetings of Working Group, Project Team and Steering Committee (March 2012)

- Overview of Proposed 12 Month Process
- ***OUTCOME: Identification of any required adjustments to process***

Preparatory 2 hour Working Group Meeting for Workshop (mid-April 2012)

- What are WDM Objectives?
- How do municipalities arrive at WDM Objectives?
- How are WDM objectives incorporated into supply planning?
- What will municipalities need to produce at the end of this process?
- Given each municipality will be at a different point along this trajectory, what are the major hurdles to moving forward at each point in the trajectory?
- Which of these barriers and/or specific WDM opportunities are priorities to discuss during the Toolkit Development Workshop?
- ***OUTCOME: Priority Topics for Workshop***

Bridgewater Toolkit Development - Preliminary Resources (April-May 2012)

- References describing process of Developing WDM Objectives
- Relevant Case Studies
- References for priority topics identified in Workshop
- Option: Alliance for Water Efficiency Tracking Tool Workshop

1 Day Working Group Toolkit Development Workshop / Peer Meeting (June 2012)

- Discussion and brainstorming ideas on priority topics
- Provision of information on solutions from other jurisdictions and/or experts
- ***OUTCOME 1: Knowledge gained on priority topics***
- ***OUTCOME 2: Solutions of Interest IDENTIFIED for Toolkit***

Bridgewater Toolkit Completed and Distributed to Municipalities (July 2012)

- Discussion and brainstorming ideas

Municipalities Define WDM Objectives (Aug-Dec 2012)

- Option: Assist municipalities with networking and/or WDM Objectives documentation
- ***OUTCOME 1: Municipalities provide WDM Objectives to GRCA***
- ***OUTCOME 2: Municipal WDM Objectives assembled by GRCA***

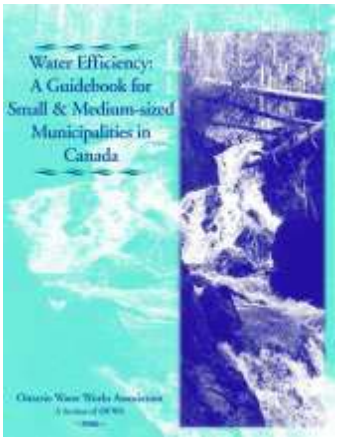
Process and Toolkit Shared with Broader Stakeholders (2013-14)

Appendix F: Water Sustainability Planning Resources List

Water Demand Management Planning Resources

Water Efficiency: A Guidebook for Small and Medium-sized Municipalities in Canada.

(2006) Ontario Water Works Association
Available for order at: **http://www.owwa.com/hm/inside.php?sid=35&id=765**



The Guidebook is organized into the following sections:
- Introduction
- Evaluate your system
- Review utility efficiency measures
- Consider potential water savings
- Design your water efficiency program
- Implement your program

The Guidebook contains easy-to-use fill in the blank worksheets in each of the above sections to assist the water efficiency planner develop a program.

Water Conservation Planning Guide for British Columbia's Communities. (2010)

POLIS
Project
Available online at: http://poliswaterproject.org/publication/243

This seven step "how to" guidebook for British Columbian communities enhances local government capacity to develop and implement effective water conservation plans by summarizing core research on water-wise tools and practices in an easy to use step-by-step guidebook. The guidebook helps municipal water staff and active citizens get started on water conservation planning, and communities who are looking to strengthen existing water conservation plans. This publication is a collaboration between the POLIS Water Sustainability Project and Ministry of Community and Rural Development.

Water Efficiency Measures

Water Efficiency Best Management Practices Manual (2005) Ontario Water Works Association
Available for order at: http://www.owwa.com/hm/inside.php?sid=35&id=765

Best management practices are provided in a number of areas as follows:
- Meters for All Users
- Full Cost Pricing
- Public Information and Education Programs
- School Programs
- Compile a Water Use Database
- Water Loss Management
- Developing a Water Efficiency Program/Plan
- Implementing a Utility/Municipal Water Efficiency Program
- Industrial/Commercial/Institutional Water Efficiency
- Indoor Residential Water Conservation
- Landscape Water Efficiency Program.
- Reducing the Flow in the Wastewater System

Outdoor Water Use Reduction Manual (2008) Ontario Water Works Association
Available online at:
http://www.owwa.com/img/content_images/Image/Outdoor%20Water%20Use%20Manual.pdf

Key topic areas covered through this publication include:
- Peak Summer Demand Measurement and Benchmarking
- Consumer Based Social Marketing and Public Education approaches for Peak Demand Reduction
- Peak Demand Water Use Reduction through By-law Control and Enforcement
- Rebates and Incentives for Encouraging Efficient Outdoor Water Use
- Real Water Rate Pricing and Increased Water Consumption Costing Structures Resources for Planning the Right Program

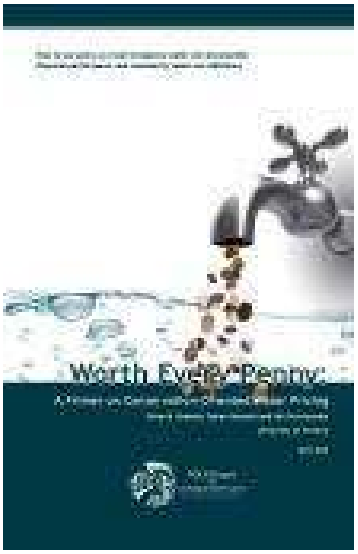
Alliance for Water Efficiency's Resource Library
http://www.allianceforwaterefficiency.org/resource-library/default.aspx

Reputable information on the following topics (and more):
- Residential Water Use and Appliances
- Landscape Irrigation and Outdoor Use
- Commercial, Institutional and Industrial Water Users
- Water Loss Control
- Water Rates and Rate Structures

Pricing and Revenue Loss

WORTH EVERY PENNY: A PRIMER ON CONSERVATION-ORIENTED WATER PRICING (2010)

POLIS Project
http://poliswaterproject.org/publication/344



Worth Every Penny: A Primer on Conservation-Oriented Water Pricing provides an overview of conservation-oriented water pricing for decision makers, water utilities and service providers in Canada. It explains how water pricing works, what the benefits are, and how water utilities can implement conservation-oriented water pricing structures as a key tool in the water manager's toolkit. As well, it offers advice on how to address implementation challenges, including how to avoid penalizing low-income families and how to maintain revenue stability for water utilities.

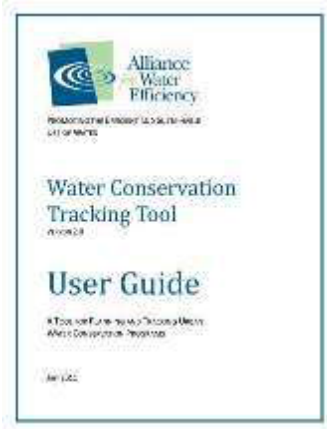
Water Pricing Primer for the Great Lakes Region (2010) Alliance for Water Efficiency
http://www.allianceforwaterefficiency.org/AWE-GLPF-value-water-project.aspx

This primer provides an introduction to key principles and concepts of ratemaking,
including:

- How Price Matters
- Rate Design
- Efficiency-oriented Rates
- Conservation and Revenues
- Implementing a Change in Rates
- Communication is Key

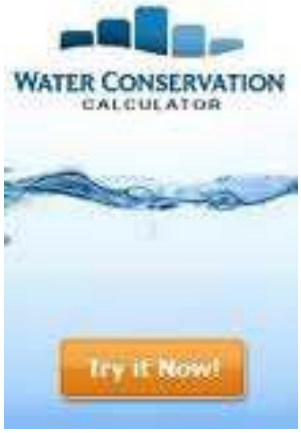
Analytical Tools

Water Conservation Tracking Tool. Alliance for Water Efficiency
http://www.allianceforwaterefficiency.org/Tracking-Tool.aspx



What the Tracking Tool Is
The Tool is an Excel-based model that can evaluate the water savings, costs, and benefits of conservation programs for a specific water utility, using either English or Metric units. Using information entered into the Tool from the utility's system, it provides a standardized methodology for water savings and benefit-cost accounting, and includes a library of pre-defined conservation activities from which users can build conservation programs.

Water Conservation Calculator. BC Ministry of Community & Rural Development
http://waterconservationcalculator.ca/



The Water Conservation Calculator (WCC) is a free, web-based decision-support tool used to illustrate how specific water conservation measures can yield both fiscal and physical water savings for communities.

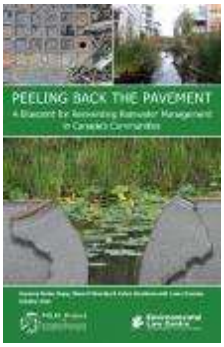
Stormwater Management

Comprehensive Stormwater Management Master Plan Guidelines:
Guidelines for the Development and Implementation of Comprehensive Stormwater Management Master Plans in the Lake Simcoe Watershed
http://www.lsrca.on.ca/pdf/reports/swm_master_plan_guidelines.pdf

The Lake Simcoe Protection Plan (LSPP) sets out specific requirements for the management of stormwater in existing and planned settlement areas, through the preparation of comprehensive Stormwater Management Master Plans. This document provides direction to municipalities on how to prepare and implement Stormwater
Management Master Plans including:

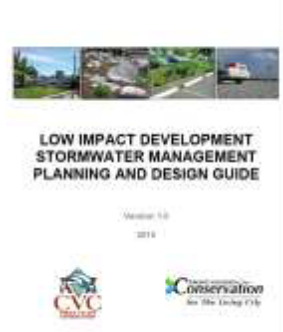
- Evaluate the Cumulative Environmental Impact of Stormwater from Existing and Planned Development
- Determine the Effectiveness of Existing Stormwater Management Systems
- Identify and Evaluate Stormwater Improvement and Retrofit Opportunities

PEELING BACK THE PAVEMENT: A BLUEPRINT FOR REINVENTING RAINWATER MANAGEMENT IN CANADA'S COMMUNITIES (2011) POLIS Project
Available online at: http://poliswaterproject.org/publication/426



The handbook outlines the problems with conventional stormwater management and examines solutions for moving toward sustainability. It provides a comprehensive blueprint that outlines the crucial steps necessary to change the way communities manage and, importantly, govern stormwater. The blueprint describes detailed actions that local and senior levels of government can take to move from the current system of stormwater management to one focused on rainwater as a resource. A main focus is addressing the fragmented responsibility for fresh water across and within jurisdictions—one of the greatest challenges to reinventing rainwater management.

LOW IMPACT DEVELOPMENT STORMWATER MANAGEMENT PLANNING AND DESIGN GUIDE
(2010) Toronto and Region Conservation Authority & Credit Valley Conservation Authority
Available online at: http://www.sustainabletechnologies.ca/Portals/_Rainbow/Documents/LID SWM Guide - v1.0_2010_1_no appendices.pdf



The Low Impact Development (LID) Stormwater Management Guide is a joint initiative of
the Toronto and Region and Credit Valley Conservation Authorities that has been developed in consultation with representatives from the Ministry of the Environment,
Fisheries and Oceans Canada, GTA municipalities and the development industry.

Ontario Water Efficiency Programs of Interest

Excerpted from the OWWA Water Efficiency Website:

City of Guelph
www.guelph.ca/waterconservation

City of Hamilton
www.hamilton.ca/water

Region of Peel
www.watersmartpeel.ca

City of Toronto
www.toronto.ca/watereff

Region of York
www.waterfortomorrow.ca
www.openwater.ca

Region of Waterloo
http://www.regionofwaterloo.ca/en/abouttheenvironment/water.asp

Networks, Committees & Partnerships:

OWWA Water Efficiency Committee

Ontario Water Works Association
www.owwa.com/hm/inside.php?sid=35&id=765

Committee Chair: Lisa Botticella, City of Toronto, lbottic@toronto.ca

CWWA Water Efficiency Committee

Canadian Water and Wastewater Association
www.cwwa.ca/net_conservation_e.asp

Committee Chair: Kevin Reilly, Capital Regional District, kreilly@crd.bc.ca

The National Water Efficiency Committee's interests and activities relate to municipal water use and demand, and include (but are not limited to):

- Fostering innovation in water efficiency research and technology improvement related to water using fixtures, devices, appliances and practices and processes
- Promoting programs, policy and legislation to ensure the efficient and sustainable use of water resources in the municipal water supply services.
- System operating efficiency such as System Leak Detection

Canadian Municipal Water Efficiency Network (CMWEN)

Chair: Kathy McAlpine-Simms, Halton Region, kathy.mcalpine-sims@halton.ca

Alliance for Water Efficiency

hwww.allianceforwaterefficiency.org/awe-membership-page.aspx

Join the growing group of stakeholders working to improve water efficiency and conservation in North America. We welcome municipalities, water utilities, resource planning agencies, non-profit organizations, academic representatives, business and industry leaders, plumbing and appliance manufacturers, irrigation consultants, distributors, product manufacturers, and individual citizens unaffiliated with a utility, company, or organization…in short, anyone interested in working to improve water efficiency in the United States and Canada.

Benefits of Membership:

- Access to the AWE Water Conservation Tracking Tool
- Access to an extensive North American network of water efficiency professionals for advice and guidance, by phone or e-mail
- Access to the latest research and case studies on water conservation programs through a comprehensive clearinghouse web site
- Notices of upcoming water efficiency events worldwide

WaterSense Promotional Partners
www.epa.gov/watersense/partners/why_join.html

WaterSense is now recognized and adopted in Canada.
Joining WaterSense is free and easy! WaterSense partnership connects you to a network of utilities, local governments, manufacturers, retail and distributors, builders, and other organizations working to promote the WaterSense label and water efficiency. You will gain exclusive access to outreach and marketing resources to help you promote WaterSense and water efficiency. **Download free collateral and media materials, including public service announcements, factsheets, brochures, press releases, letters to the editor, and bill stuffers with the water-efficiency message for utility customers.**

Appendix G: Municipal Solutions and Knowledge Transfer Workshop, June 5th 2012 Outcomes Report

Moving Forward on Water Supply and Demand Management Planning

WORKSHOP OUTCOMES REPORT (FINAL DRAFT)

Introduction

On June 5th, 2012, the *Grand River Conservation Authority* hosted a full-day workshop with municipal partners and water management consultants focusing on long-term water demand management. This workshop was a follow-up to a September 2011 workshop where barriers and challenges to long-term water demand management were identified. This second workshop moved beyond barriers to explore solutions, proven strategies, and new approaches to implementing water demand management initiatives that will help preserve the quantity of municipal water resources in the Grand River watershed.

A key feature of the June 5th workshop was knowledge and experience transfer across all watershed municipalities, small and large. For each of six theme areas, workshop participants heard from municipal representatives and/or water demand management practitioners about their experience with the topic, and were engaged in an interactive discussion on opportunities and potential solutions with respect to that theme. The six theme areas addressed at the workshop included:

1. Long-Term Supply and Water Demand Management Planning;
2. Getting Started on Water Meter Installations;
3. Energy Management and Peak Reductions;
4. Sustainable Funding for Stormwater Resources;
5. Rainwater Harvesting; and
6. Revenue Loss and Rate Setting.

This Workshop Outcomes Report provides a brief summary of the challenges, solutions, and success stories identified throughout the workshop presentations and discussions. A list of workshop participants can be found in Appendix A.

Topic Presentations and Interactive Discussions

Long-Term Supply and WDM Planning and Programming

James Etienne, Senior Water Resources Engineer at the Grand River Conservation Authority, spoke about the challenges and benefits of long term water demand management planning. Nancy Kodousek from the Region of Waterloo described the Region's experience with developing and implementing their Water Supply Master Plan.

GRCA

James highlighted the following barriers and opportunities of long-term water supply and demand management planning:

Barriers	Opportunities
• Municipalities have limited resources for planning. • Revenue loss from decreasing water use is a threat to sustainable funding of plans (especially for smaller municipalities).	→ Optimizing planning – to address: o Existing sources reaching capacity o Cost of identifying new sources o Peak demands exceeding capacity o Pressures on the watershed (e.g. growth, climate change) → Preparation for pending conservation planning requirements by the Ministry of Environment as part of regulations associated with the Conservation Opportunity Act and/or as a condition of approval for new permits.

Region of Waterloo

In 2007, the Region created the Water Supply Master Plan, which will be updated in 2012. Some of the associated outcomes of water supply and demand management planning have been:

- Water consumption has been decreasing while population is increasing. Some of the decreasing water demand is likely from manufacturing industries leaving the area, manufacturing being more efficient, increased awareness, efficient household appliances, and leak detection.
- The Region has been able to adjust water use and revenue projections for population growth *with* water efficiency.
- Revenue is below their projections (loss of $20 million due to decreased demands).
- However they have been able to look at capital programs and moved out their need for new water supply infrastructure ($100 million in capital work) for another 10 years due to decreases in water demand.

The Region is still grappling with sustainable funding and how to get user rates to be sustainable (operation budget is increasing even as demand decreases). Next steps include monitoring trends in

demands, monitoring new regulations, maintaining existing infrastructure and optimizing supply/distribution, energy use, and chemical use.

Discussion

Challenges and solutions raised during the discussion following the presentations included:

Challenge/Concern	Way Challenge Was Addressed
• Political challenge of going to Council with less revenue but arguing for the need for more water conservation.	• ***Waterloo Region*** – presented a business case and forecasting to Council. They were able to show the ability to push back the need for new capital infrastructure by 10 years due to decreasing water demand. This eased impact of the first five years of the water rate.

Getting Started on Water Meter Installations

Dale Murray (Triton Engineering), speaking about Dundalk (pop. ~1200), and Rick Chilton, Township of Centre Wellington (pop ~23,000) shared the experiences that these municipalities have had with water meter installations.

Dundalk – Township of Southgate

With a small population and hydrogeological studies showing a supply out to 50 years, water supply is not currently considered a challenge in Dundalk. However, Council was interested in a user-pay rate structure for water and associated benefits to the community, and saw metering as key to determining an equitable rate structure. The municipality faced a key challenge in funding the cost to install the water meters, as well as revenue loss from a sustained 30% decrease in domestic water consumption as a result of meter installations. Despite these challenges, the municipality ultimately feels that the benefits have outweighed the costs.

Challenge	Way Challenge Was Addressed
• Funding cost of water meter installation (~800 customers).	→ **Grants:** Dundalk obtained a grant from the Building Canada Fund (BCF), joint federal/provincial funding. Dale noted that without this funding Dundalk would not have pursued the water metering project. *(This funding is no longer available.)*

Challenge	Way Challenge Was Addressed
• The unanticipated 30% decrease in water consumption meant a significant decrease in revenues. • 1 individual looks after both the water and wastewater systems in Dundalk; this means increased operating costs due to meter reading and billing.	→ **Cost Recovery:** Dundalk conducted a sewer and water rate study to try to recover costs. → **Increased Rates & Public Education:** The municipality significantly increased their user rates. While there was some backlash, the municipality had a proactive public engagement process to help the public understand the rate structures, forecasting, and need to pay for true costs of water. This was noted as being well-worth the effort.

Township of Centre Wellington

The Township installed meters in 2003 for residential and ICI, without the support of funding. With installation of the meters, demand and revenue decreased by 15%. Despite this loss in revenue, the municipality sees several key benefits of water meters, including:

- The ability to monitor water use and monthly water losses;
- The ability to compare the municipality with a national average;
- Availability of information for better long-term planning; and
- The ability to direct funds to targeted needs (e.g. water leakage repairs) with the information collected.

Discussion

Challenges and solutions raised during the discussion following the presentations included:

Challenge/Concern	Way Challenge Was Addressed / Opportunities
• Backlash from consumers about paying flat rate portion when they are out of the country for months of the year.	→ ***Woodstock*** – uses a $50 shut off and $50 turn on fee for customers away from residence for long periods of time (e.g. to Florida). → Framing the charge differently (e.g. fire protection) can also change consumers' perspective on flat rate costs

Challenge/Concern	Way Challenge Was Addressed / Opportunities
• Small municipalities do not have the funding, staff and resources for water installation; they do not have the economy of scale to absorb costs and revenue loss. • The need for water demand management is recognized in small municipalities – but the biggest barrier is that costs are prohibitive to make the change.	→ ***Oxford*** – has clustered several township-sized systems into one shared financial system (have 15 flat rate systems ranging from 17 to 1500 consumers). It took 5 years to negotiate this system. For the systems to be financially stable, they kept urban systems separate. → ***Centre Wellington*** – charges a monthly base rate to cover the cost of maintenance, programming, and meter replacement. → *Additional challenge*: while there can be staff interest for clustering, there may not be political interest (e.g. between big and small municipalities).
• Some small municipalities have ample supply and no projected growth – this makes it difficult to create a financial business case for demand management.	→ There needs to be a financial driver – it can be more cost effective to do acoustic leak detection than to put meters in. → In small systems, however, it is easy to see leaks because usage is consistent or consumers call.
• There can be a culture of high water usage among residents because of excess supply (e.g. Waldemer, 400L/person/day; vs. Mansfield 250 L/person/day with metering)	

Energy Management and Peak Reduction

Alex Davidson, County of Brant and Wayne Galliher, from the City of Guelph, shared the experiences of their two municipalities with respect to efforts at reducing energy use associated with municipal water services, and reducing demand at peak water use.

County of Brant

Alex Davidson noted that while returns may seem minimal for energy management in small municipalities, operating cost reductions of 2 to 3% are still significant. The County of Brant looked at reducing overall energy costs associated with water operations, as well as allocating energy consumption to off-peak energy demand users.

Challenge	Way Challenge Was Addressed / Opportunities
• Reducing peak water use (as a strategy to save energy and money)	→ **Open dialogue:** County had one-on-one conversations with their largest water user – the Paris abattoir – to have the night shift fill the tank at 5 am instead of at 7 am during peak water demand times. → Need to change operating philosophies – to get pumps to come on where they are facing minimal pressure (with soft starts or variable frequency drive); use of gravity fed distribution systems; and elevated storage which would allow pumps to shut off.
• Residents do not want an elevated tank in their backyard.	→ Later in the workshop, it was mentioned that when the St. George Street (Kitchener) water tower was to be torn down, the community lobbied to keep it. It had become a community landmark.

City of Guelph

Wayne Galliher stated that with Guelph's Community Energy Initiative, energy use has declined by 15%. Strategies they have used include increasing water demand management activities to decrease energy use and decreasing energy investment. One example given was the 2011 Leak Detection Program, which cost $46,000 to implement, but avoided $85,000 per year of costs. A second approach that Guelph is using is Service Energy Optimization. A key focus of this program is real-time monitoring – providing operators with the information they need to facilitate energy use reductions (energy bills typically go directly to finance and bypass operators). Guelph received $900K from province to showcase their Water Innovation Project.

Discussion

Challenges and solutions raised during the discussion following the presentations included:

Challenge/Concern	Way Challenge Was Addressed / Opportunities
• Promoting energy demand management tools when the municipality's priority is water supply.	→ ***Waterloo Region*** – has a Supply and Distribution Optimization Master Plan. Looks at each pressure zone and explores how they can supply water better in that zone with pressure sensors (changing pressures, structures). Noted that we need to start getting people to shift their thinking towards system use and storage – e.g. looking at closed zones, set up storage and pumping off-peak for storage.

Challenge/Concern	Way Challenge Was Addressed / Opportunities
• How to capitalize instead of lose from strong PSI differences between zones, requiring energy to pump water between them.	→ There is an opportunity for generating hydro (e.g. with a water turbine) with the PSI differences – to use the energy currently being dropped to lower pressures.
• Resistance at the operational level to changes (e.g. operators on call 24 hours, but not present at night for off-peak pumping if something goes wrong). • Resistance from fire department to keep levels at overflow in case of fire risks.	→ Bring people around the table for dialogue and discussion. Retraining and attitude change. → ***Brant*** – have SCADA system which means can program time to start pumps. Operators are seeing the opportunities of this new technology in terms of reduced energy use and other efficiencies.
• Lack of funding for initiatives.	→ There may be funding incentives from province when regulation comes in. → ***Brant*** – FCM funding: received an interest free loan for treatment of Manganese in water. Ontario Small Waterworks Assistance Program (OSWAP): replaced all pumps with variable frequency pumps. → ***Guelph*** – Hydro utilities have Tier 3 programs for capital retrofits and decreasing demand. Guelph has in their Demand Management Plant opportunities for co-funding with local hydro providers for things such as toilet retrofits.

Sustainable Funding for Stormwater Resources

Denise McGoldrick, City of Waterloo, and Nick Gollan, City of Kitchener, spoke about a new program they are operating for recovering costs of stormwater management – the use of a fee-based model for stormwater.

City of Kitchener and City of Waterloo

Stormwater management faces many challenges, including population growth, aging infrastructure, change in storm events, and lack of funding (the City of Waterloo is funded to clean out retention ponds once every 170 years). Traditionally stormwater management is funded through a tax levy, but this is not linked to the amount of stormwater contributed. A fee-based model is based on the amount of run-off generated, with a credit to reward environmental stewardship. Kitchener and Waterloo implemented this Stormwater Utility model, with a key focus on fairness and equity. It took 6 years for the dual-city fee-based stormwater management model to be approved by Council. The yearly cost for an average house is $120, and for an industry taking up a city block (mostly paved) it is $23,000.

Challenges	Way Challenge Was Addressed
• The concept of linking user pay charges to the amount of stormwater runoff facilitated on your property is a new concept in Canada. • There is a general lack of understanding about stormwater management needs. • Perception that it is an additional tax or that people are being charged for natural events. • Pushback from tax-exempt properties (e.g. school boards).	→ A public engagement strategy with clear communication tools and messages. They received $1 million in funding for public education and outreach from 1) Showcasing Water Innovations; 2) Green Communities Canada and 3) City of Waterloo. → Credit reward system for rainwater capture. → Plan to have a home visit program like a home energy audit to go through possible solutions with owner. Landscape architects, planners, and engineers are on a panel to advise on programming.

Discussion

Challenges and solutions raised during the discussion following the presentations included:

Challenge/Concern	Way Challenge Was Addressed + Opportunities
• A residential credit program is not enough to subsidize the upgrades; the payback period is too long. • Achieving sustainable funding for something that is already underfunded.	→ ***Waterloo*** - The credit reward system has a 45% maximum. The idea was to create an incentive for individuals already wanting to upgrade, and to achieve fairness and equity.
• Stormwater management benefits are intangible.	→ ***REEP Green Solutions*** – promotes other benefits to landowners (e.g. reducing urban heat islands), and focuses on low management actions (e.g. rain gardens, infiltration gardens). Their workshops and information sessions are in high demand.
• I&I will redirect stormwater into sanitary sewer, increasing costs for wastewater system.	→ ***Waterloo*** – there is no quick fix. They are currently working on a pilot project and looking at options and projects for industry.
• Cross connection issues associated with greywater reuse.	→ Local building authorities are softening on requirements for backflow prevention; next round of Ontario Building Code changes may extend to laundry and also reduce requirements for backflow prevention.

Rainwater Harvesting

Steve Gombos, from the Region of Waterloo spoke about the Region's experience with rainwater harvesting and their next steps. Tim Neeb, from Neeb Engineering, described current large scale rainwater harvesting technology.

Region of Waterloo

The Region of Waterloo has been steadily working at peak demand reduction through a lawn watering by-law (only once a week) and rain barrels. Their rain barrel program was so successful it was extended from a 5 year program to a 10 year program, and rain barrels have become a symbol of water conservation in Waterloo similar to blue boxes for recycling. Waterloo spent $15,000 on advertising and sell the barrels at cost. The rain barrel program ends this year, and the region is looking at what to do next. Their concern is that a 200L rain barrel does not save much water, but larger systems have many challenges, including: high cost, more maintenance, limited supplies, and lack of local knowledge. Also noted is that there is no revenue associated with stormwater that goes into the sewer.

NEEB Engineering

LEED studies indicate that rainwater harvesting can supply up to 60% of home water use. Tim described current technology for a large all-season rainwater harvesting system – currently in use at the Guelph Campus Co-op and Valley Park School in Toronto – and a new system that can be manufactured locally. They have 12 signed purchase orders for the new system.

Discussion

Challenges and solutions raised during the discussion following the presentations included:

Challenge/Concern	Way Challenge Was Addressed + Opportunities
• Rainwater used indoors for toilet flushing and laundry conserves municipal potable water, but must still be treated at the wastewater treatment plant incurring costs to the municipality. Because wastewater leaving a home or business is typically not metered (meters are located on the potable water side), the municipality does not capture the necessary revenue for wastewater treatment.	→ ***Neeb Engineering*** – meters were installed on all systems. → ***Waterloo*** – meters can be installed on water and wastewater sides to measure loss.
• The cost of a larger system is high (even cisterns). • The public does not see the necessity and are not willing to	→ ***Australia*** – because of drought issues, the public wanted rainwater. Large scale rainwater harvesting provided municipalities with a different revenue

Challenge/Concern	Way Challenge Was Addressed + Opportunities
pay.	stream, which was combined with wastewater and then sold at a premium. → There is an opportunity for the Region to target industrial/commercial properties with rainwater harvesting methods that are eligible for rebates from municipal stormwater utilities.
• Redirecting rainwater can result in increased nutrient/effluent contaminant concentrations – the mass of nutrients/contaminants stay the same, but the amount of water in which they dissolve would be less.	

Revenue Loss and Rate Setting

Joe Miedema, from Dufferin Water Services, and Deb Goudreau, from the County of Oxford, described two experiences with water rate setting to compensate revenue lost due to water demand management activities.

County of Dufferin

By 1993, the village of Grand Valley was metered. They received $16 million in funding to build a new treatment plant for 1600 people. In Mansfield there was a 30% decrease in water demand and use after metering. With their rate structure – on a flat rate in 2007 – they ran out of water, and needed a system to recover their revenue losses. They are currently looking at a tiered rate structure. Joe put out the question if there are any municipalities that are tiered based on *property assessment* – for fair billing of large properties watering their lawns versus small single-homes occupied by retired elderly residents – or by *season*. The concern is that fixed rates do not encourage conservation.

County of Oxford

The County of Oxford has four water systems in the Grand River watershed, one with growth capability. The County currently uses a humpback rate structure after a rate study in 2005/06 to overhaul their system. While they wanted to go to one rate, there was no political support. So they decided upon a rate that would have no impact on high volume users. In retrospect, the County feels the rate structure is likely too complex for the public to understand – they needed to put calculators on the website to help residents determine rate – and a 3-tier structure is likely simpler. Deb suggested that doing meter installations and a rate study at the same time is not advisable – they should be kept separate so as not to confuse the public.

Discussion

Challenges and solutions raised during the discussion following the presentations included:

Challenge/Concern	Way Challenge Was Addressed / Opportunities
• Establishing a rate system that is fair but that recovers revenues.	• ***Oxford*** – humpback rate structure. Base rate for 0 to 15 m^3/month, 20% above rate for 16 to 45 m^3/month, 40% above for 46 to 850 m^3/month, and back to 20% above for 851 + m^3/month. • ***Guelph*** – doing a study right now with Econnics and Brock University on rate models. • ***Waterloo*** – currently looking at fixed versus variable rates***.***
• Addressing high usage of water for lawn care on large properties.	• Many U.S. municipalities use a water budget (e.g. Los Angeles) and charge a different rate for outdoor versus indoor use. • ***Dundalk*** – has smart water meters (AMI) similar to smart energy meters, but do not have the capacity to bill using time of use. • ***Oxford*** – has a flat rate plus charge for people with on-line sprinklers. Residents must get a permit every year to run on-line sprinkler system. Amount is in rates by-law.
• Need for public education about water use. • Need for education that water and wastewater are two separately funded systems with their own infrastructure needs.	• ***Oxford*** – unable to use bills as an education tool because billing is done by 3 different service providers and have limited capability to adjust on the bill. Do use bill stuffers, but these are likely ineffective. • ***Small municipalities*** – there is a large opportunity in small systems, as that is where residents are engaged. There is more community involvement, community leaders to rally people, etc.

Next Steps and Tools to Support WATER SUPPLY AND DEMAND MANAGEMENT Planning

The input received at this workshop will provide the basis for the development of a series of primers outlining tools and solutions for municipalities in preparing local water demand management strategies. The Grand River Conservation Authority will continue to work with municipalities to support them in their water demand management planning and activities in the Grand River watershed.

Developing demand management objectives for watershed municipalities is a key deliverable of the Grand River Watershed Water Management Plan as set out in the Project Charter. The Water Management Plan will assemble a set of community objectives for demand management as part of the work to secure water supplies across the watershed. Demand management strategies undertaken by each municipality will be consolidated into the Grand River Watershed Water Management Plan.

APPENDIX G-A: JUNE 5th PARTICIPANTS AND THEIR AREAS OF EXPERTISE IN WDM

	Organization	Area of WDM Expertise
Balpataky, Katherine	GRCA	• Water communications and engagement
Button, Donna	Guelph-Eramosa	• Data management/water loss tracking
Chilton, Rick	Centre Wellington	• Smaller community operations in practice
Davidson, Alex	Brant County	• Water operations
Davy, Nancy	GRCA	•
Dilks, David	LURA	• Community-based social marketing • Communications
Etienne, James	GRCA	• Infrastructure, planning, master planning • Development of outside water use programs
Galliher, Wayne	City of Guelph	• Water efficiency master planning and program development • Business case for water conservation programs
Gollan, Nick	City of Kitchener	• Implementation of utility fee and development of associated policy
Gombos, Steve	RMOW	• Planning and program development • Best practices identification – water conservation, efficiency, water program management
Goudreau, Deborah	Oxford County	• Demand management programs
Heyming, Louise	GRCA	•
Kerr, Jim	Centre Wellington	• Water supply systems and distribution – ground and surface water
Knuckle, Leanne	City of Brantford	• Water conservation programs
Kodousek, Nancy	RMOW	• Master planning for water distribution systems, water efficiency, water supply systems, projections
Lamberts, Julie-Anne	City of Guelph	• Here to learn
Maas, Carol	Bridgewater Research (POLIS)	• Water conservation and soft path policy • Quantification of water energy nexus
Marshall, Andrew	REEP	• Substitution of potable water with stormwater • Living through severe water restrictions/drought
McGolderick, Denise	City of Waterloo	•
McKeown, Karen	City of Guelph	• Education and outreach
McMillan, Karen	Centre Wellington	• Data management (pumping consumption, loss)
Miedema, Joe	Dufferin Water Services	• Water and waste water systems, system operations • Treatment and distribution
Minshall, Lorrie	GRCA	• Importance of overall WDM planning
Murray, Dale	Triton Eng. (Southgate)	• Assisting smaller municipalities in initiating water meter programs
Neeb, Tim	Neeb Eng.	• Rainwater and greywater harvesting systems • Water efficient fixtures
Shifflett, Stephanie	GRCA	•
Veale, Barb	GRCA	• Policy development and public engagement
Wolfe, Sarah	University of Waterloo	• Water policy innovation
Wong, Amanda	GRCA	• Water use data collection and reporting
Yates, Heather	City of Guelph	• Water conservation and efficiency • Stewardship and outreach
Znajda, Sandra	LURA Consulting	• Applied research and communication

Appendix H: Municipal Water Demand Management Primers

Municipal Water Demand Management

PRIMER 1 Securing Your Municipal Water Supply – For the Long-Term

P1

Grand River Watershed
Water Management Plan

What is long-term supply and Water Demand Management (WDM) planning?

Our water supply outlook in the Grand River watershed is changing. In some municipalities, populations are growing, peak demands are exceeding supply, existing water sources are reaching capacity and new sources are costly to identify and develop. In others, water uses and customer needs continue to evolve and diversify. Climate change adds a level of uncertainty to water supply plans for all municipalities in the watershed.

Long-term supply and water demand management planning is a way that each municipality can contribute to reducing pressures on the Grand River watershed while ensuring the long-term security of their municipal water supplies. It enables municipalities to adopt complementary policies, programs and technologies that improve water efficiency and change water use behaviour.

Ultimately, long-term planning means thinking past what needs to be done in the next five years to what needs to be done in the next 25 years and beyond.

Preparing for upcoming Provincial regulations

Planning now will help municipalities meet provincial water regulations that are coming down the pipe.

Mandatory requirements are soon to be released under the 2010 Ontario *Water Opportunities Act* that will require municipalities to engage in long-term water conservation planning and implementation. The *Water Opportunities Act* and regulations will be an opportunity for municipalities to improve their water use efficiency and operations, while supporting a sustainable water supply.

How will long-term planning benefit your Municipality?

Engaging in long-term planning for water has many potential benefits beyond ensuring long-term water supplies, including:

- Lower operating costs;
- Less stress on the system during peak demand times;
- Increased reliability and longevity of water supplies;
- Deferment of capital expenditure and supply schemes;
- Improved public perception of water utilities;
- Better understanding of full costs from water source to tap;
- Identification of potential triggers for water demand management (e.g. new capital works); and
- Opportunities to align WDM initiatives with other long-term municipal plans and systems (e.g. wastewater and stormwater) for better revenue forecasting and improved efficiencies.

How does your Municipality fare in water consumption and conservation?

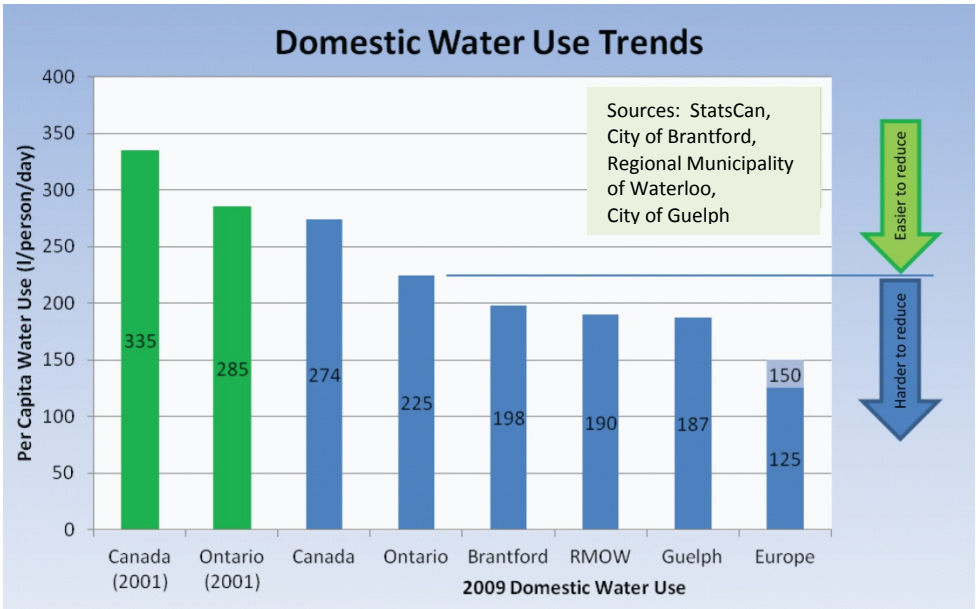
A key goal of water demand management initiatives is to decrease per capita consumption of water to achieve the benefits mentioned above.

In general, per capita water use has been declining in Canada, with many larger municipalities ahead of the trend. While this decline is positive, there is much more that can be done to catch up to European trends of 125 litres per person per day consumption.

The good news is that reducing per capita consumption to 225 litres per person per day (the 2009 Ontario

average) requires less effort than dropping below 225. Many municipalities are therefore in a position where lower-effort WDM initiatives – such as outdoor water use by-laws or leak detection – can provide big returns in water efficiency. Larger municipalities, in turn, can continue aggressive practices to get even closer to European consumption levels.

the Grand who have grappled with – and overcome – similar challenges.



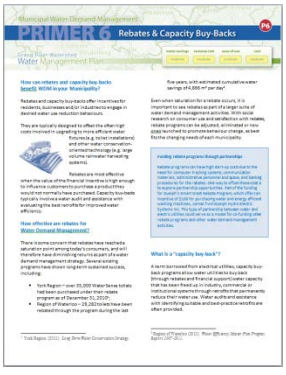
Reducing per capita consumption to 225 litres per person per day requires less effort than dropping below 225. Lower effort WDM initiatives can provide big returns.

Improving the Bottom Line: Water Demand Management = Energy Savings

In Ontario, energy required for pumping, treating and heating water and generating steam represents 40 per cent of Ontario's natural gas use and 12 per cent of electricity use*. Reducing the amount of water that needs to be pumped and heated in municipalities therefore has an added benefit: reduced energy costs. Many water demand management initiatives outlined in this Primer series effectively do "double-duty" – improving water efficiency while simultaneously contributing to energy savings. Recognizing the linkages between water and energy systems and use can add up to savings in both.

* *Ontario's Water Energy Nexus.* (2010). POLIS Research Report 10-01.

The WDM Primer Series



There can be many challenges in implementing water supply and demand management initiatives, despite the financial, social and environmental benefits they can bring.

This WDM Primer Series aims to help both small and large municipalities in the Grand River watershed overcome these challenges and choose appropriate WDM initiatives that will be the best fit and most effective in each community.

The Series includes details on specific WDM tools, innovative ideas and approaches, success stories and words of advice from municipal water managers across

WDM Primer Series: topics covered

The WDM Primer Series can be read in sequence or as stand-alone topics depending on the needs of your municipality.

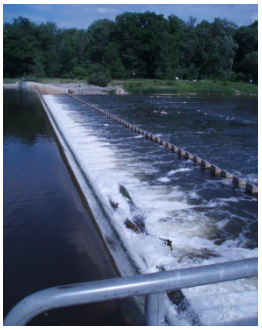
1. Securing Your Municipal Water Supply – For the Long Term
2. Easing the Flow – Getting Past WDM Barriers
3. Community Outreach
4. Water Metering
5. Outside Water Use By-Laws
6. Rebates and Capacity Buy-Backs
7. Water Loss Control
8. Conservation Pricing
9. New Technology and Next Generation WDM Strategies

Pushing Back Capital Projects: The Regional Municipality of Waterloo's Water Supply Master Plan

Population (2011): 507,906
Density: 370.4 people/km^2
Water Supply: 75 per cent groundwater;
25 per cent surface water

The Regional Municipality of Waterloo has had a long history with water supply planning. The Region completed a Long Term Water Strategy in 1991, mapping out water supply options to 2041.

The Region's approach was documented in the 2000 Water Supply Master Plan (WSMP), which was updated in 2007 and is currently being reviewed again in 2012. The Plan includes measures such as water reduction targets under the Water Efficiency Master Plan, continuation of once-a-week lawn watering restrictions, and phased-in capital investment for increasing water supplies.



Mannheim intake, Grand River

The Region of Waterloo has shown that the implementation of their water demand management strategies has contributed to a decrease in water consumption even while their population is increasing. The major impact of the implemented WDM strategies, however, has been deferring the need for new water supply infrastructure – a $100 million capital work project – for another 10 years due to decreased demand.

Nancy Kodousek, Director of Water Services at the Region of Waterloo, noted that the successful development of the plan can be attributed to a commitment to a transparent, inclusive and environmentally-sensitive process that was supported by both the public and the Ministry of Environment.

With the challenge of changing population projections during the development of the plan, Kodousek advises to "always be aware of your context, water demand, and population, and keep doing a check to see if the Master Plan still meets the needs of the community."

While long-term planning can be challenging for small municipalities with fewer resources, Kodousek notes that it is possible, helped by defining specific focus areas (e.g. population, regulation and demand usage was the focus for the Region in 2007) and seeking outside support.

Resources:

- Water Efficiency: A Guidebook for Small and Medium-sized Municipalities in Canada. (2006). OWWA
- Water Conservation Planning Guide for British Columbia's Communities. (2010) POLIS Project: http://poliswaterproject.org/publication/243
- Water Efficiency Best Management Practices Manual (2005) Ontario Water Works Association.
- Water Conservation Tracking Tool. Alliance for Water Efficiency: http://www.allianceforwaterefficiency.org/Tracking-Tool.aspx
- Water Conservation Calculator. BC Ministry of Community & Rural Development: http://waterconservationcalculator.ca/

The Water Demand Management Primer series was developed in partnership with the following municipalities and partners:

Townships of Amaranth and East Garafraxa, Brant County, City of Brantford, Bridgewater Research, Township of Centre Wellington, Dufferin Water Services, City of Guelph, Town of Grand Valley, Grand River Conservation Authority, Guelph-Eramosa Township, City of Kitchener, LURA Consulting Ltd., Township of Mapleton, Neeb Engineering Inc., Oxford County, POLIS, REEP Green Solutions, Township of Southgate, Region of Waterloo, City of Waterloo and Wellington County.

This project was undertaken with the financial support of the Government of Canada through the Federal Department of the Environment. This project has received finding support from the Government of Ontario. Such support does not indicate endorsement by the Government of Ontario of the contents of this material.

Getting past WDM barriers

Water demand management activities can provide economic, environmental and social benefits. But that knowledge alone is not always enough to lead to implementation of WDM initiatives in a municipality.

Barriers – both real and perceived – can obstruct municipalities from committing to and engaging in water conservation initiatives. These can include:

- Financial barriers – limited resources for capital costs or revenue insecurity if water demand decreases;
- Social barriers – public perception of "limitless" water supply, lack of public understanding of where their drinking water comes from and what is involved in getting it to their tap;
- Political barriers – lack of political support or a lack of perceived need for water conservation (due to low population growth or ample water supplies); and
- Operational barriers – limited personnel, resistance to change, and lack of connectivity between multiple systems.

Finding ways to overcome these barriers and realize the benefits of WDM will be different for each municipality and some barriers will be easier to overcome than others. This primer highlights how ingenuity and careful planning can help address three key barriers.

Sustainable program funding and reducing the risk of revenue loss

The "catch 22" of water demand management is that achieving success (i.e. reducing water demand) has the potential to reduce revenue without careful planning and forecasting.

This reduced revenue can affect operating budgets and the impacts may be especially acute in small water systems. Opportunities to reduce the risk of revenue loss and maintain sustainable funding for WDM could include:

Reducing risk of revenue loss:

- Aligning water demand management planning with water supply planning, including time horizons, to ensure most accurate water demand estimates
- Including all factors that influence water consumption in demand estimates for revenue projects, such as market change in fixtures, efficiency requirements in the building codes and loss or gain of industrial users

Sustainable funding for WDM:

- Obtaining government/industry grants for capital infrastructure (e.g. metering) or innovative WDM approaches elements (e.g. rainwater harvesting)
- Exploring partnerships and co-funding opportunities – e.g. with electricity utilities (see **Primers #6, #9**)
- Phasing in water rates and surcharges that recover operating costs and the costs of WDM programs (see **Primer #8**)
- Including conservation efforts in capital budgets
- Implementing municipal-wide development charges at time of issuing building permits

Funding opportunities

- The *Federation of Canadian Municipalities Green Municipal Fund* provides low-interest loans and grants for capital water projects with the potential to reduce per capita consumption by 20 per cent.
- The *Ontario Small Waterworks Assistance Program (OSWAP-3)* provides funding for improving water conservation and efficiency in small municipalities serving 5,000 or fewer customers.
- Additional provincial funding may be upcoming under the *Water Opportunities Act*, similar to the $30 million over three years provided for Showcasing Water Innovation, which provided funds for municipal water sustainability planning and public education and awareness about water conservation.

Working around small economies of scale

Small municipalities face particular challenges in engaging in water demand management activities, even when support for and recognition of the need for water demand management is present:

- There are few resources to absorb the large capital costs required of many WDM strategies;
- A sudden decrease in water consumption – from installing water meters, for example – can cause a significant impact on budgets from the loss of revenue;
- Operating costs can increase significantly, as there may be only one staff overseeing multiple systems;
- Ample supply and no projected population growth makes it difficult to make a financial business case for water demand management; and
- There may be a culture of high water use among residents because of ample water supplies.

Creative rate solutions

Phasing in water rates and surcharges is one way to recover operating costs and the costs of WDM programs.

The **City of Woodstock** in Oxford County (*population 37,700*) has taken this a step further to also address customer disatisfaction with paying their flat rate water bill when they are out of the country for extended periods of the year. The measure taken? Instigation of a $50 shut-off and $50 turn-on fee.

Opportunities to address barriers faced by small municipalities implementing water demand management initiatives could include:

- Focusing on strategies that *can* be done cost-effectively in small systems (e.g. leak detection, community outreach);
- Collaborating with other small municipalities to share equipment, staff and expertise;
- "Clustering" or grouping several systems together under a shared system;
- Collaborating across municipal departments to improve efficiencies and increase political support; and
- Exploring opportunities to work with larger municipalities.

Building capacity and support for WDM

A key challenge in getting started with water demand management activities is addressing the lack of political will and/or public support to implement the chosen activities. In addition to the potential solutions discussed above – specifically exploring collaboration and partnership opportunities – ways to address this challenge could include:

- Starting small and building momentum – as Council sees the benefits and growing support for water demand management initiatives, capacity will grow and municipalities can set more aggressive targets;
- Building a good business case and forecasting data which can be presented to Council;

- Communicating the value of water services to the public and community groups (see **Primer #3**);
- Joining a Water Efficiency Network (such as the OWWA or the Alliance for Water Efficiency) to glean ideas for overcoming political barriers from other practitioners; and
- Hiring dedicated personnel

Resources:

- Ontario Small Waterworks Assistance Program: http://www.moi.gov.on.ca/en/infrastructure/sectors/oswap.asp
- Federation of Canadian Municipalities Green Municipalities Fund: http://www.fcm.ca/home/programs/green-municipal-fund/resources/water-resources.htm

Small municipality customer service

To help reduce peak water demand use in **Brant County**, water utility staff sat down to have a one-on-one conversation with their largest water user – an abattoir.

Together, they were able to work out a plan where the abattoir night staff fills the water tank before dawn, instead of first thing in the morning when water demand is at its highest. This has both reduced the pressures on peak water demand, and reduced energy costs associated with water operations in the County.

Garnering political support: public opinion polling

Since 2008, **the City of Guelph** has engaged in social research for its water conservation program. This research, typically in form of telephone surveys or focus groups, has allowed Guelph to obtain feedback from its customers about their programs and to assess level of knowledge about particular water issues, level of acceptance of rates and other program modifications and changes in desired behaviours.

Wayne Galliher, Water Conservation Project Manager at the City of Guelph, notes that this research reinforces water conservation initiatives and provides the necessary support for Council to help make decisions about approving programs and providing funding.

The Water Demand Management Primer series was developed in partnership with the following municipalities and partners:

Townships of Amaranth and East Garafraxa, Brant County, City of Brantford, Bridgewater Research, Township of Centre Wellington, Dufferin Water Services, City of Guelph, Town of Grand Valley, Grand River Conservation Authority, Guelph-Eramosa Township, City of Kitchener, LURA Consulting Ltd., Township of Mapleton, Neeb Engineering Inc., Oxford County, POLIS, REEP Green Solutions, Township of Southgate, Region of Waterloo, City of Waterloo and Wellington County.

This project was undertaken with the financial support of the Government of Canada through the Federal Department of the Environment. This project has received finding support from the Government of Ontario. Such support does not indicate endorsement by the Government of Ontario of the contents of this material.

Municipal Water Demand Management

PRIMER 3 Community Outreach

P3

Grand River Watershed
Water Management Plan

water savings	revenue risk	ease of use	cost
low	low	easy	low

How can Community Outreach benefit WDM in your Municipality?

Community outreach is a fundamental first step for increasing awareness and gaining public support for water demand management. Community outreach also plays a fundamental role in enhancing the planning and implementation success for most WDM initiatives. In other words, community outreach is a cross-cutting and ongoing WDM initiative. Some of the benefits of effective community outreach campaigns for WDM include:

- Reaching water conservation targets: Encouraging water-related behaviour change in customers – including increased uptake of municipal incentive programs – which can contribute to meeting the water conservation targets set by a municipality;
- Increased awareness: Fostering a public audience that is well-informed about municipal WDM initiatives, water resources, and the importance of water conservation;
- Improved trust and support: Building public support and trust in municipal water providers and initiatives (e.g. rate changes), a result of a well-informed public and increased transparency;
- Public feedback: Understanding customer preferences and other feedback that can be used to improve the design and delivery of WDM initiatives.

What is Community Outreach?

Community outreach for WDM can run from the basic to the innovative. Targeting communications to your desired audience or particular water use can increase effectiveness, as can continually seeking out innovative approaches to attract your audience's attention.

Three types of community outreach activities are described below, with more in the "Idea Centre" box on the following page.

1. Awareness Campaigns – a typical awareness raising campaign uses local media (e.g. newspapers, newsletters, mail-outs, flyers), events, and other creative approaches (e.g. social media, web-based tactics) to communicate clear information to the broader public. The goal of the campaign could be to increase awareness about specific municipal WDM initiatives (e.g. watering bans, increased water rates or rebate programs) or general water-consciousness-raising information. General information could include helping resident and ICI water users better understand:

- The life cycle of water supply resources (from source to tap);
- The importance and need for water demand management (financial, social, environmental etc.);
- Linkages with other systems (e.g. energy, wastewater, stormwater); and
- The true costs of water – the infrastructure, operation and treatment costs involved in providing clean potable water to consumers.

2. Narrowcasting Campaigns – communities are typically made up groups or sectors of people and industries that differ in:

- the way they use water resources;
- the barriers that they perceive to reducing their water use; and
- where they access their information.

Denver Water, 2012

Narrowcasting involves identifying these specific user groups and behaviours and targeting your communication and outreach programs directly to those groups instead of to a broader audience. For example, campaigns targeting gardeners can be adapted to their knowledge of plants and the outdoors, and can be communicated through garden centres and other areas gardeners typically frequent. Other examples of influential groups of individuals in WDM include plumbers, builders, realtors, irrigation professionals and commercial operations.

3. Community-Based Social Marketing (CBSM) Campaigns – CBSM operates under the principle that "knowing" the right thing to do does not always equal "doing" the right thing. It goes beyond basic information transfer and uses a set of tools to overcome identified barriers and change behaviour.

   Barriers are identified through social research to understand why a target audience does what they do, what their perceptions are towards water use and water rates and specific drivers of behaviour. Some CBSM tools include:

- Prompts – reminders for customers to engage in water conservation behaviour;
- Norms – change perceptions that the desired behaviour is the "right thing to do";
- Communications – vivid communications with clear messages;
- Commitments – having residents commit to making the desired behaviour change;
- One-on-one contact – proven more effective at behaviour change than prompts alone.

Small Town Advantage

Small municipalities have a key advantage in terms of education and outreach about water conservation. Residents tend to be more engaged and involved in small communities where "everyone knows their neighbour."

Small municipalities can take advantage of this by working with community leaders to pass along the water conservation message and lead by example.

Idea Centre: Community Outreach Activities

- Feature local conservation champions in the local media
- Take your water conservation message to local community events
- Showcase techno tion projects
- Use water bills an tools where possible (e.g. to show use between billing periods, average per person use or water budgets)
- Become a WaterSense member to access complimentary marketing material and logos to raise awareness of WaterSense certified fixtures
- Create a Water Public Advisory Committee to gain public input and feedback on water demand management planning, new initiatives and other areas of interest
- Engage schools in poster contests on the theme of water conservation
- Engage the public through social media (Facebook, Twitter, etc.)

Denver Water, 2012

Getting Started with Education & Engagement Campaigns

- Identify objectives for your campaign (e.g. raise awareness; communicate specific messages; etc.)
- Identify the group(s) that you would like to engage ("target audience")
- Pinpoint the key message(s) that you would like to communicate, or behaviours that you would like to influence and change
- Take stock of the resources available for your campaign
- Think about partnership opportunities – with NGOs, other municipalities, universities, etc.
- Use past community engagement campaigns in your municipality or others for inspiration and ideas
- Identify the best ways to reach your target audience: TV? Radio? Professional associations? Social media? Face-to-face?
- Map out a community outreach plan – identifying your target audience, goals and objectives, key messages, communication activities, and evaluation mechanism.

"Use Only What You Need" water conservation campaign. Denver Water, 2006

Case Study

Guelph's "Don't be a Water Hog" Campaign

Population (2011): 121,688
Density: 1,395.4/km^2
Number of Meters/Services (2011): 40,032
Water Supply: Groundwater

In the mid 2000's, Guelph faced a key barrier to reducing residential water use – the widespread accepted practice of extensive watering to maintain green and healthy lawns.

This outdoor water use was making it hard for Guelph to meet water demands. In response, Guelph launched the Outdoor Water Use Program (OWUP), a program with three levels of water use restrictions, accompanied by the "Don't be a Water Hog" campaign.

This early campaign included vivid communication messages to capture the audience's attention and prompts such as roadside signs to remind residents to reduce their water use. Soon neighbours were coaching neighbours about reducing outdoor water use and a transition away from the original norm was observed.

The communication plan won the Canadian Public Relations Society's Don Rennie Award in 2005, an award recognizing the development of strategic programs to address public relations challenges.

Today Guelph's OWUP program still focuses on effective communication strategies and annual social research to encourage more water conscious behaviour (see **Primer #5**). A recent public survey indicated 90 per cent awareness of the program.

Wayne Galliher, City of Guelph

Wayne Galliher, Water Conservation Project Manager at Guelph, advises that the key to the success of any community outreach campaign is "keeping communications convenient, accessible and visible, and having the courage to go out there and be seen."

Resources:

- Community-Based Social Marketing: www.cbsm.com
- Community outreach campaigns in Denver, Colorado: http://www.denverwater.org/Conservation/UseOnlyWhatYouNeed/CampaignOverview/ and http://parkhowell.com/tag/denver-water

The Water Demand Management Primer series was developed in partnership with the following municipalities and partners:

Townships of Amaranth and East Garafraxa, Brant County, City of Brantford, Bridgewater Research, Township of Centre Wellington, Dufferin Water Services, City of Guelph, Town of Grand Valley, Grand River Conservation Authority, Guelph-Eramosa Township, City of Kitchener, LURA Consulting Ltd., Township of Mapleton, Neeb Engineering Inc., Oxford County, POLIS, REEP Green Solutions, Township of Southgate, Region of Waterloo, City of Waterloo and Wellington County.

This project was undertaken with the financial support of the Government of Canada through the Federal Department of the Environment. This project has received finding support from the Government of Ontario. Such support does not indicate endorsement by the Government of Ontario of the contents of this material.

Municipal Water Demand Management

PRIMER 4 Water Metering

P4

Grand River Watershed
Water Management Plan

water savings	revenue risk	ease of use	cost
high	high	moderate	high

How can water meters benefit WDM in your Municipality?

Water meters are often considered the first step in water demand management and are key to helping both the municipality and users understand how much water is being used and where.

Metering also sets the stage for adopting a more equitable user-pay structure that is representative of the true costs for water services. Flat rate water fees – the only option in a non-metered system – are often associated with the perception of "unlimited supply", and could therefore actually deter water conservation. In contrast, charging customers by volume increases their awareness of the link between the amount of water they use and the amount they pay, which typically leads to reduced water use.

More than Just a Water Conservation Tool

Beyond the obvious benefits of decreasing demand, water meters can help a municipality:

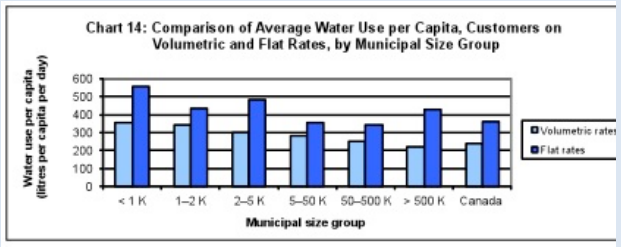
- Track progress in municipal water conservation monthly, seasonally and/or annually;
- Identify high water users and areas of water loss, often "low-hanging fruit" solutions where scarce monetary resources can be directed;
- Estimate water use by sector and employ "narrowcasting" techniques (see **Primer #3**);
- Showcase your progress by comparing numbers with other similarly-sized communities or a national average;
- Provide essential management information to system operators in both water and other utilities (e.g. energy) for improved efficiencies; and
- Use the collected data for better long-term WDM planning through forecasting future water use.

What Gets Measured Gets Managed

While there are many factors influencing water consumption behaviour in a community, flat versus volumetric rates play a large role.

Environment Canada's *2011 Municipal Water Pricing Report: 2009 Statistics* found that households on a flat rate system use 52% more water (361 litres per person per day) than households paying per volume of water used (238 liters per person per day).

Determining a water rate that works best for your municipality's context, resource needs, and customers can be a complex task. **Primer #8** – Conservation Pricing – provides some ideas and examples of water rates used by municipalities across the Grand River watershed and beyond.



***2011 Municipal Water Pricing Report: 2009 Statistics,* Environment Canada**

How can your Municipality get started?

Installing water meters requires a large capital investment and public support. Once installed, the effect on water demand may be substantial – so substantial that the municipality faces reduced revenue.

These challenges are felt especially by small municipalities that have fewer resources and personnel.

Municipalities across the Grand River watershed have used creative strategies to overcome these obstacles. These are outlined in the following chart:

Challenge	Creative solution
Large Capital Investment	• Applying for provincial and federal grants • Partnering with neighbouring communities to share costs
Lack of Public Understanding and Support for Water Meters	• Fostering an informed public with regular communications explaining rate increases (see Primer #3) • Framing the need for changes in terms the target audience can relate to • Being proactive with public engagement • Illustrating the absolute impact of rate increases in relatable terms for consumers – e.g. "a 10% rate increase is equivalent to only X cups of coffee over the year"
Revenue Loss	• Conducting sewer and water rates study to recover costs • Adjusting water rates, coupled with education campaign • Clustering financial systems • Using a monthly base rate to cover standard expenses

Despite the challenges of reduced revenue, the Township has experienced major benefits from the detailed water use data collected from each of 6,000 metered customers.

Funding Opportunities for Installing Water Meters

The *Federation of Canadian Municipalities Green Municipal Fund* provides low-interest loans and grants for capital water projects with the potential to reduce per capita consumption by 20 per cent.

The *Ontario Small Waterworks Assistance Program (OSWAP-3)* provides funding for water meter installation for small municipalities serving 5,000 or fewer customers. Further provincial funding opportunities may be forthcoming, associated with regulations soon to be released under the 2010 Ontario *Water Opportunities Act.*

Case Study

(Primer #3)

Metering in Small Systems: Township of Centre Wellington

Population (2011): 26,693
Density: 65.5 people/km^2
Number of Meters/Services: ~6000
Water Supply: Groundwater

In 2003, the Township of Centre Wellington installed water meters for residential and ICI customers, initiating their water/wastewater user-pay system.

They saw a 15% drop in revenue in the first year, primarily from residential customers. To keep revenue stable, the Township has both a base rate and volumetric rate. The monthly base rate (which does not change with volume consumed) covers the cost of maintenance, programming and meter replacement, ranging from $9.05 for meters that are 3/4" or less to $297.49 for 10" meters (2012 rates). The volumetric rate covers the costs of delivering water and programs.

This data – and the advantage of being a small system – has allowed the Township to identify leaks and large water users, helping to target limited resources for follow-up.

Karen McMillan, Environmental Support Coordinator, commented, "I use data from my spreadsheet two or three times a day! I often know before someone at home knows that they have a water leak".

Karen MacMillan, Township of Centre Wellington

With the water use data, McMillan has been able to help notify homeowners of small indoor leaks, as well as track non-compliance to the Township's outdoor water use by-law through large jumps in water use. In both cases, a follow-up call, visit or information reminder can be provided to that user.

The Township has also been able to monitor system leakage by comparing amount of water pumped to that consumed and infiltrated as wastewater. The calculated 20 to 25 per cent monthly loss highlights a key area where the Township can focus on improving water efficiencies.

Resources:

- Alliance for Water Efficiency's Resource Library: http://www.allianceforwaterefficiency.org/resource-library/default.aspx
- Building Canada Fund – Communities Component: http://www.infrastructure.gc.ca/prog/bcf-fcc-eng.html#cc-vc
- Federation of Canadian Municipalities (FCM) Green Municipal Fund: http://www.fcm.ca/home/programs/green-municipal-fund/what-we-fund/projects/water-funding.htm
- Ontario Small Waterworks Assistance Program:
- http://www.moi.gov.on.ca/en/infrastructure/sectors/oswap.asp

The Water Demand Management Primer series was developed in partnership with the following municipalities and partners:

Townships of Amaranth and East Garafraxa, Brant County, City of Brantford, Bridgewater Research, Township of Centre Wellington, Dufferin Water Services, City of Guelph, Town of Grand Valley, Grand River Conservation Authority, Guelph-Eramosa Township, City of Kitchener, LURA Consulting Ltd., Township of Mapleton, Neeb Engineering Inc., Oxford County, POLIS, REEP Green Solutions, Township of Southgate, Region of Waterloo, City of Waterloo and Wellington County.

This project was undertaken with the financial support of the Government of Canada through the Federal Department of the Environment. This project has received finding support from the Government of Ontario. Such support does not indicate endorsement by the Government of Ontario of the contents of this material.

Municipal Water Demand Management

PRIMER 5 Outside Water Use By-Laws

P5

Grand River Watershed Water Management Plan

water savings	revenue risk	ease of use	cost
moderate	high	easy to moderate	low

How can an outdoor water use by-law benefit WDM in your Municipality?

An outdoor water use by-law aims to reduce high peak demands on water supply systems, the prospect of having to implement outdoor water use bans and overall pressures on the water supply by restricting outdoor water use by day and/or time. In the Grand River watershed, restrictions are typically enacted in the summer when peak demand is at its highest due to increased lawn and garden watering during periods of hotter temperatures.

What are the components of a water use by-law?

Looking at municipal outdoor water use by-laws across the Grand River watershed, typical components include:

1. ***Water Use Restrictions*** – such as permitting water use on even/odd days depending on residential address, during particular times of the day, or, for improved effectiveness, restricting outdoor water use to one day per week (by address, on waste pick up days, etc.).
2. ***Education and Outreach*** – widespread communication and outreach about schedules/restrictions, why the by-law is being implemented, what changes individuals and businesses need to make to their outdoor water use habits, and how this will benefit individuals and their municipality
3. ***Enforcement*** – typically patrols and fines.

Idea Centre: creative community outreach ideas

- Water supply condition updates
- Student educators engage in conversation about outside water use reduction with property owners in specific neighbourhoods
- "Mock tickets"/information cards to non-compliers
- Community-based social marketing tools (see **Primer #3**)

Offenders face lower water pressure: Oxford County's by-law

In Oxford County, 250 million litres of water were used in 2011 on lawns and gardens. The External Water Use By-Law was implemented as part of the County's plan to reduce this water use.

Offenders of the by-law are subject to lowered water pressure, which is only restored after payment of a fine and a 24 hour waiting period. The by-law also requires residents or businesses using automatic sprinklers to purchase a permit – providing the utility with additional revenue and tracking of sprinkler system use.

http://www.oxfordcounty.ca/ServicesforYou/WaterWastewater/Ratesandbylaws.aspx

What is involved in planning and implementing an outdoor water use by-law?

Steps that your municipality can take when designing and implementing a by-law include:

- Building a foundation of support for the by-law through partnerships and community leaders;
- Collecting data and public opinion to support your case for how a by-law can influence water conservation behaviour;
- Talking to and learning from other municipalities with a successful water conservation by-law;
- Identifying your target audience and the best ways to reach them;
- Designing clear and consistent communication messages;
- Keeping the by-law text short, easy to understand and to the point;
- Launching a public education and engagement campaign before enacting the by-law;
- Continuing to communicate with and engage the public once the by-law is in place.

Case Study

Region of Waterloo's Water Conservation By-Law

Population (2011): 507,906
Density: 370.4/km^2
Number of Meters/Services (2011): 40,032
Water Supply: 75% groundwater, 25% surface water

From October to May, the Region of Waterloo's 2005 Water Conservation By-Law permits outdoor water use (such as washing cars or watering trees or shrubbery) on odd/even days during designated hours. From May 31st to September 30th, residents, businesses and institutions are permitted to irrigate lawns one day per week during designated hours. Customers with automatic sprinklers are required to adjust the timed settings accordingly. Fines for non-compliance range from $150 to $5000.

Since implementing the by-law in 2005, the Region reports an 8 to 12 per cent reduction in peak demand compared to other years with similar weather. A 2009 survey of residents showed that 87 per cent were aware of the by-law, with 80 per cent following it strictly and 11 per cent following it "most of the time". Overall, the Region has been able to stabilize peak demand each month, reduce the need for surplus capacity to serve peak demand times, and has more water available for emergencies and maintenance.

A key challenge in first implementing the by-law was public concern around the restrictions; it took two to three years before the public became used to the by-law and accepted it. Key to overcoming this challenge was a strong public information campaign that emphasized the need for the by-law – stressing that if peak demand went over a certain level the Region would not necessarily have the water to meet everyone's needs, and the need to have reserve water for fires and emergencies. Other municipalities may face the challenge of reduced revenue during the summer months if outdoor water use decreases. A conservative rate structure is important to address this revenue challenge (see **Primer #8**).

Steve Gombos, Water Efficiency Manager at the Region of Waterloo, noted the following as key factors in the success of the by-law:

- Drawing from existing by-law examples in other municipalities;
- Setting a maximum demand objective and communicating the need to keep below that level each day;
- Social research (surveys and focus groups) to measure public opinion;
- Visible support from local politicians;
- Support from the media through editorials;
- Continual public education and communication about the need for the by-law, water wasting, brown lawns being dormant, and changing public opinion on the by-law;
- Patrolling summer students to witness and document violations and issue warnings; and
- Provincial "Set Fine" approval allowing by-law officers to write tickets on the spot.

Gombos has the following words of advice for other municipalities: "*Enforce the by-law, advertise it every year, and be proactive not reactive*".

Resources:

- *Outdoor Water Use Reduction Manual* (2008) Ontario Water Works Association: http://www.owwa.com/img/content_images/Image/Outdoor%20Water%20Use%20Manual.pdf
- Region of Waterloo Water Conservation By-Law: http://www.regionofwaterloo.ca/en/aboutTheEnvironment/Conservation2.asp#waterbylaw
- Guelph's Outdoor Water Use Program (OWUP): http://guelph.ca/living.cfm?smocid=1792
- Landscape Ontario Irrigation Sector Group education programs: http://www.ontarioirrigation.ca/

Case Study

Guelph's Outside Water Use Program (OWUP)

Population (2011): 121,688
Density: 1,395.4/km^2
Number of Meters/Services (2011): 40,032
Water Supply: Groundwater

Guelph's Outside Water Use Program (OWUP) was developed in 2002 to help conserve Guelph's groundwater supply and protect against the impacts of drought in the summer. Targeted at residential customers, it consists of three levels, each of which increasingly restricts outdoor water use:

Level 0 (Blue) – careful use;
Level 1 (Yellow) – reduce outside use (alternate day watering for lawn); and
Level 2 (Red) – reduce and stop non-essential use (e.g. no lawn watering).

Communication and improving the community's water literacy has been a key part of the program. A weekly Water Conditions Report provides clear-cut parameters as to why specific OWUP levels are in effect, outlining current precipitation levels, river flow and water storage. Since OWUP's inception, public opinion polls have shown that more than 90 per cent of residents recognize and follow the levels in place, and the City has reduced average summer daily water use by over 8.6 million litres.

The OWUP program has not been without challenges. The first was overcoming a strong social norm regarding the need for excessive watering to maintain lawn health. The use of community-based social marketing (see **Primer #3**) played a key role in addressing this challenge. The public's perception of fairness and equity of the by-law across all user groups has been another challenge; for example, whether businesses that are high water users should be allowed to continue their use when others face restrictions. Guelph continues to explore the question of equity across all user groups. Third, the program and its communications have struggled to keep up with growth in the city and addressing new development areas where common communication vehicles for such information may not yet be in place.

Wayne Galliher, City of Guelph

Wayne Galliher, Water Conservation Project Manager at Guelph, provides the following words of advice for other municipalities embarking on a water conservation by-law:

- Use clear, visible and accessible communications – these tools can start out simple and will increase in sophistication over the life of the program;
- Carry out frequent social research – to understand levels of public knowledge and acceptance;
- Draw on what is out there – tools associated with Ontario's Low-Water Response Plan and other municipalities can be adapted to each municipality's specific context; and
- Seize opportunities through program delivery to leverage other plans and processes that are already highly visible in the community to gain focus for your initiative.

The Water Demand Management Primer series was developed in partnership with the following municipalities and partners:

Townships of Amaranth and East Garafraxa, Brant County, City of Brantford, Bridgewater Research, Township of Centre Wellington, Dufferin Water Services, City of Guelph, Town of Grand Valley, Grand River Conservation Authority, Guelph-Eramosa Township, City of Kitchener, LURA Consulting Ltd., Township of Mapleton, Neeb Engineering Inc., Oxford County, POLIS, REEP Green Solutions, Township of Southgate, Region of Waterloo, City of Waterloo and Wellington County.

This project was undertaken with the financial support of the Government of Canada through the Federal Department of the Environment. This project has received finding support from the Government of Ontario. Such support does not indicate endorsement by the Government of Ontario of the contents of this material.

Municipal Water Demand Management

PRIMER 6 Rebates & Capacity Buy-Backs

P6

Grand River Watershed
Water Management Plan

water savings	revenue risk	ease of use	cost
moderate	moderate	moderate	moderate

How can rebates and capacity buy-backs benefit WDM in your Municipality?

Rebates and capacity buy-backs offer incentives for residents, businesses and/or industries to engage in desired water use reduction behaviours.

They are typically designed to offset the often high costs involved in upgrading to more efficient water fixtures (e.g. toilet installations) and other water conservation-oriented technology (e.g. large volume rainwater harvesting systems).

Rebates are most effective when the value of the financial incentive is high enough to influence customers to purchase a product they would not normally have purchased. Capacity buy-backs typically involve a water audit and assistance with evaluating the best retrofits for improved water efficiency.

How effective are rebates for Water Demand Management?

There is some concern that rebates have reached a saturation point among today's consumers, and will therefore have diminishing returns as part of a water demand management strategy. Several existing programs have shown long-term sustained success, including:

- York Region – over 35,000 Water Sense toilets had been purchased under their rebate program as of December 31, 2010[2];
- Region of Waterloo – 29,282 toilets have been rebated through the program during the last five years, with estimated cumulative water savings of 4,866 m^3 per day[3].

Even when saturation for a rebate occurs, it is important to see rebates as part of a larger suite of water demand management activities. With social research on consumer use and satisfaction with rebates, rebate programs can be adjusted, eliminated or new ones launched to promote behaviour change, as best fits the changing needs of each municipality.

Funding rebate programs through partnerships

Rebate programs can have high start-up costs due to the need for computer tracking systems, communication materials, administrative personnel and space, and banking procedures for the rebates. One way to offset these costs is to explore partnership opportunities. Part of the funding for Guelph's Smart Wash Rebate Program, which offers an incentive of $100 for purchasing water and energy efficient washing machines, comes from Guelph Hydro Electric Systems Inc. This type of partnership between water and electric utilities could serve as a model for co-funding other rebate programs and other water demand management activities.

What is a "capacity buy-back"?

A term borrowed from electrical utilities, capacity buy-back programs allow water utilities to buy back (through rebates and financial support) water capacity that has been freed up in industry, commercial or institutional systems through retrofits that permanently reduce their water use. Water audits and assistance with identifying suitable and best-practice retrofits are often provided.

[2] York Region. (2011). *Long Term Water Conservation Strategy.*

[3] Region of Waterloo (2012). *Water Efficiency Master Plan Progress Report 2007-2011.*

Guelph's ICI Capacity Buyback Program provides financial assistance for conducting water audits and capital retrofits.

As the first institution accepted under the program, the University of Guelph conducted a water audit on 17 buildings in 2007. The total cost of the chosen retrofits was $353,000 and the University was given a one-time incentive from the Capacity Buyback Program of $93,570. The annual water savings for Guelph were 113, 844 m^3/year, with a net annual operating savings of $182,150 per year. The payback on the investment was 1.28 years.

In York Region, water audits to identify water-saving opportunities are provided free of charge to industry, businesses and institutions. Regional staff provide a comprehensive report on activities and strategies that can be taken to improve water efficiencies based on the results of the audit. Approved applicants are eligible for a one-time financial incentive of $0.30 per litre of water saved per average day, or 50 per cent of the total capital cost of the retrofit up to a maximum of $50,000 once the capital retrofits have been implemented.

Case Study

Building on the Royal Flush: Water Conservation Rebates in Guelph

Population (2011): 121,688
Density: 1,395.4/km^2
Number of Meters/Services (2011): 40,032
Water Supply: Groundwater

Guelph's first rebate program focusing on water conservation began with the Royal Flush Toilet Program in 2003 (currently a $75 rebate for WaterSense-approved models). The city's rebate offers have grown to include:

- $100 for replacing top-loading washing machines with front-loading ENERGY STAR® models;
- $60 for installing a waterless floor drain
- trap device in a home;
- $30 or $70 for replacing furnace-mounted humidifiers with a new approved model;
- Up to $2,460 one-time rebate for choosing a Blue Built Home;
- $1000 for installing an approved greywater reuse system; and
- $2000 for installing an approved rainwater harvesting system.

Wayne Galliher, Water Conservation Program Manager at the City of Guelph, says the following practices have worked well in achieving success in Guelph's rebate programs:

Wayne Galliher, City of Guelph

- Instant toilet rebate events at local retailers;
- Point of sale based marketing material; and
- Increasing knowledge among local contractors, who can then serve as ambassadors for the program with the public and endorse the products to their clientele.

Galliher's closing words of advice are "be out there and be visible" and "partnerships – with local retailers and contractors – are key.

Porcelain Mountains: Integrating Rebates and Waste Management Streams

Wayne Galliher, Water Conservation Program Manager at the City of Guelph, reminds us that in implementing rebates it is important to look at the program in a broader context and how it affects other systems.

When widespread retrofits are effective, the next question that is raised is what is happening to all of that waste? Effort needs to be put into understanding how a rebate program – and resulting retrofits – will affect waste streams (e.g. porcelain toilets), and how those increases can be addressed.

Case Study

Long-Standing Rebate Program: Region of Waterloo's Toilet Replacement

Population (2011): 507,906
Density: 370.4 people/km^2
Water Supply: 75 per cent groundwater, 25 per cent surface water

The Region of Waterloo has the longest standing toilet rebate program – launched in 1994 – in the Grand River watershed. Since then, the program has provided 73,778 rebates to residential and business property owners, and there are still more 13 litre toilets in circulation that the program is targeting.

Steve Gombos, Region of Waterloo

Steve Gombos, Water Efficiency Manager at the Region of Waterloo, notes that the program has matured since the launch of the program, and attributes its success to three key factors:

1. Educating retailers and plumbers – specifically demonstrating that the toilet technology actually works, to the right level of customer satisfaction;
2. Building awareness through education and outreach each year, such as:
    - Plumbing education events;
    - Demonstrations of "the good, the bad, and the ugly" toilet technology;
    - Newsletters to the public;
    - Communications and advertising;
    - Engaging schools; and
3. Tracking awareness and public opinion – especially how individuals hear about the program.

He also stresses the importance of market research to ensure that the rebate program adds value to existing programs and is not made irrelevant if market trends indicate behaviour will be changed in that direction anyway without the rebate. Ultimately, Gombos advises to "keep the administrative cycle simple, but keep it honest. Start as a pilot – evaluate – and change if necessary or eliminate".

Resources:

- Guelph water conservation rebates and ICI Capacity Buy-Back programs: http://www.guelph.ca/living.cfm?itemid=78890&smocid=2338
- Region of Waterloo's toilet replacement program: http://www.regionofwaterloo.ca/en/aboutTheEnvironment/Conservation2.asp
- Alliance for Water Efficiency: http://www.allianceforwaterefficiency.org/resource-library/default.aspx#
- York Region's Capacity Buy-Back Program: http://www.waterfortomorrow.ca/en/atwork/industry.asp?_mid_=21370

The Water Demand Management Primer series was developed in partnership with the following municipalities and partners:

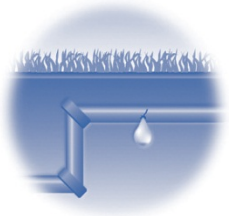
Townships of Amaranth and East Garafraxa, Brant County, City of Brantford, Bridgewater Research, Township of Centre Wellington, Dufferin Water Services, City of Guelph, Town of Grand Valley, Grand River Conservation Authority, Guelph-Eramosa Township, City of Kitchener, LURA Consulting Ltd., Township of Mapleton, Neeb Engineering Inc., Oxford County, POLIS, REEP Green Solutions, Township of Southgate, Region of Waterloo, City of Waterloo and Wellington County.

This project was undertaken with the financial support of the Government of Canada through the Federal Department of the Environment. This project has received finding support from the Government of Ontario. Such support does not indicate endorsement by the Government of Ontario of the contents of this material.

water savings	revenue risk	ease of use	cost
full range	low to moderate	moderate	full range

How can water loss control benefit WDM in your Municipality?

System water losses average 13 per cent across Canada, ranging from 7.5 per cent to 21 per cent[4].



This loss can arise from leaks at distribution lines, service connections and storage tanks or unauthorized water uses such as theft from hydrants and illegal connections. Further inefficiencies can arise from authorized but unmetered activities (e.g. flushing of mains and sewers, street cleaning and fire protection).

Fixing the leaks *before* they become major infrastructure problems and addressing unmetered inefficiencies can:

- Lower maintenance and operating costs;
- Increase revenue;
- Positively impact wastewater treatment capacity;
- Defer expensive capital projects for new water sources;
- Improve repair planning schedules;
- Lower risk of property damage by improving underground safety; and
- Increase public trust in the water utility.

Stopping the Leaks = Significant Savings

Halifax, Nova Scotia, has been a leader in reducing water lost to leaks in its amalgamated system.

Through methodically tracking flows and leaks, changing water pressures, and standardized water audits, the Halifax Water utility has reduced the amount of water the system requires from 168 million litres per day in 1999 to 130 million in 2011.

The annual savings have been $600,000, partly due to the need to pump less water and use fewer chemicals in water treatment[2].

[2] City Water Leaks Costing Millions of Dollars. CBC News. (Nov 23, 2011). Available at: http://www.cbc.ca/news/canada/story/2011/11/17/f-infrastructure-pipies-water-loss-reduction.html

Water Loss Control: A Cost-Effective "Big Bang for Your Buck" Water Efficiency Strategy

Reducing water loss can be a particularly effective strategy for some municipalities – in terms of water conservation, increased revenues, and cost savings.

A U.S. study on municipal water systems illustrated that "recapturing non-revenue water with an upfront investment is still a great business case with fast payback".[3]

Framing the cost of initiatives in terms of "cost of acre foot (AF) of water saved", water loss control initiatives in several U.S. case studies ranged from $318 to $658/AF of water saved – with an average avoided cost of $1030/AF. By comparison, a number of aggressive demand side conservation programs were costing in excess of $1000/AF of water saved after exhausting the cheapest initiatives.

A similar result can be seen here in the Grand River watershed; while Guelph's 2011 Leak Detection Program cost $46,000 to implement, it has avoided $85,000 *per year* of costs.

[3] Sturm, R. and J. Thornton. (2007). *Water loss control in North America: More cost effective than customer side conservation – why wouldn't you do it?!* p.1

[4] Environment Canada. (2011). *2011 Municipal Water Use Report:2009 Statistics.*

What can municipalities do to reduce water loss?

Leak reduction and management of "unaccounted for water" consists of a range of activities that vary in cost and other resource requirements. Some common approaches are shown in the figure below.

Measures to Reduce Municipal System Water Losses[4]

Water Audit	Comparison of water treated and pumped to amount used by consumers and calculation of authorized unmetered water use. (The AWWA provides free software for creating a Water Balance, including calculation of an Infrastructure Leakage Index (ILI), which may be a more reliable indicator of leakage).
Pressure management	Decreasing pressure in known leak areas to reduce water loss until pipes can be replaced.
Active Leak Detection	Sonic leak detection – detecting the vibrations emitted through pipes as water escapes from a leak – District Metered Areas (DMA) approach, or other leak detection approaches.
Corrosion Control	Such as cathodic protection of metallic pipes.
Water main replacement	Replacing aging and leaking infrastructure.

Working together across municipal departments

There is an opportunity for water leak detection to be co-ordinated with other municipal infrastructure and building projects, leading to improved efficiencies all around.

For example, street upgrading or resurfacing can be preceded by acoustic leak detection and repair. This can avoid excessive costs from having to excavate a newly re-paved road in order to fix water mains.

Detecting leaks through the District Metered Areas (DMA) approach

District Metered Areas (DMA) is an approach for identifying suspected leaks that involves dividing water distribution systems into large meter areas.

Flow into one area can be monitored and compared to a calculated number based on the households and businesses in that area. If the flow that is measured is greater than that calculated, the meter area is subdivided again and the process repeated – in this way the location of a leak can be narrowed down to a small enough area that sonic leak detection can be used.

Resources:

- Water Audit Methodology of the American Water Works Association (AWWA): http://www.allianceforwaterefficiency.org/Water_Audit_Process_Introduction.aspx http://www.awwa.org/Resources/WaterLossControl.cfm?ItemNumber=48511
- Water Loss Control in North America – More Cost Effective than Customer Side Conservation, 2007: http://www.allianceforwaterefficiency.org/WorkArea/linkit.aspx?LinkIdentifier=id&ItemID=2626

[4] Adapted from OWWA. (2006). *Water Efficiency: A Guidebook for Small and Medium-sized Municipalities in Canada.* Chapter 4: Operating and Maintenance Measures.

Municipal Water Demand Management

PRIMER 8 Conservation Pricing

P8

Grand River Watershed
Water Management Plan

water savings	revenue risk	ease of use	cost
moderate to high	low to moderate	moderate	low to moderate

What is conservation pricing?

Conservation pricing involves finding the best water rate structure for your water utility that reduces consumer demand, is fair and equitable for all users and recovers the costs of water service maintenance, delivery, and infrastructure replacement.

Can financial sustainability be maintained when charging by volume decreases demand?

Pay-per-use charges can be so successful that a water utility may see reduced revenues from the water system. Finding a water rate that supports water conservation, maintains public support and is financially sustainable for the water utility is a challenge that municipalities across the Grand River watershed continue to grapple with. Each utility will need to explore solutions that best meet their individual needs. This primer provides several examples from municipalities which have successfully implemented innovative rate structures.

What types of water rates exist?

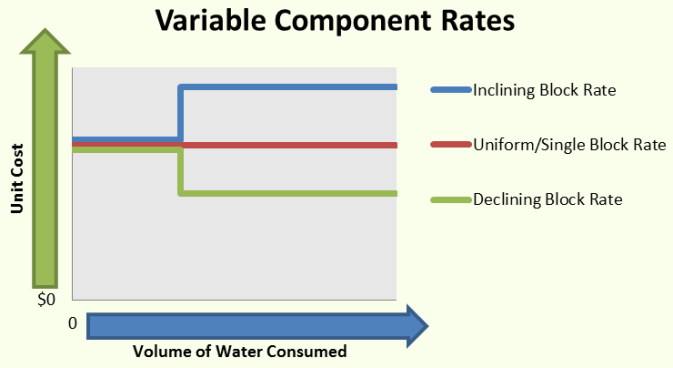
Municipalities across the Grand and beyond have adopted a wide variety of water rates to best match their specific context and circumstances.

Conservation-oriented pricing may include any of the components described below. The bottom line is to choose a rate system that reflects the true cost of providing water in your municipality.

- Fixed Component
  A base charge that is the same for all customers, regardless of volume consumed. This can be used to recover fixed costs.

- Surcharges
  Additional fees charged to specific customer groups for varying reasons (see text box).

- Variable Component
  Customers are charged by the volume of water consumed. Examples include use of the same rate for all volume levels (uniform rate) or different rates for different volume blocks:



Idea Centre: Innovative Rate Charge Alternatives[1]

- **Rolling Average Rate** – average rates across a set of years are used, with excess revenue from a given year due to low demand put into a reserve fund
- **Excess Use Rate** – rate applied to any use over a pre-determined volume
- **Seasonal Surcharge** – charging more for water during seasons with high water demand
- **Distance/Zonal Rates** – higher rates for customers at longer water distribution distances, to compensate for higher infrastructure and operational costs
- **Scarcity Rates** – rates applied to periods of especially low supply
- **Lifeline Block** – first block of water at low to no cost to ensure equity for low-income customers
- **Service on-off charges**
- **Different rates** for indoor water versus outdoor water use

[1] Adapted from: Brandes, O.W., S. Renzetti and K. Stinchcombe. (2010). *Worth Every Penny: A Primer on Conservation-Oriented Water Pricing.* Victoria, B.C.: POLIS Project. p. 19.

Factors to consider when implementing conservation pricing in your municipality

- What are your revenue needs? What are the full costs involved in your water service delivery now and into the future?
- Which sector (e.g. residential, commercial, industry, etc.) is the highest priority target for water demand management?
- What level of support is there in the community?
- How does the public perceive the current system used for water services payment? What is the perceived impact of a price change?
- What is the level of community awareness about the cost of water?
- How will the rate changes affect different user groups?
- Is the rate fair for all user groups?

Balancing revenue, demand, low supply and equity: Seattle Public Utilties

Seattle (population 1.5 million) sees a 35 to 45 per cent increase in water use in the summer months. This coincides with a time of low precipitation when water stored in mountain reserves supply the city's needs, in addition to watershed and ecological functions.

To manage demand, the utility has initiated the following measures for residential customers:

- **Seasonal surcharge** – customers pay an "off-peak usage rate" from September 16 to May 15, and "peak usage rates" during the summer months (mid May to mid September).
- **Three-tiered summer/peak water rates** – in 2012, customers paid rates arranged in inclining blocks by volume of water used (first tier up to ~28 m3; second tier 28 m3 to ~1019 m3; third tier over 1019 m3).
- **Drought surcharge** – used during years of excessive drought to discourage excessive water use.
- **Low income subsidies** – qualified low-income, elderly and disabled customers receive a 50 per cent discount on their water bill.

Case Study

County of Oxford's four-tiered "humpback" water rate structure

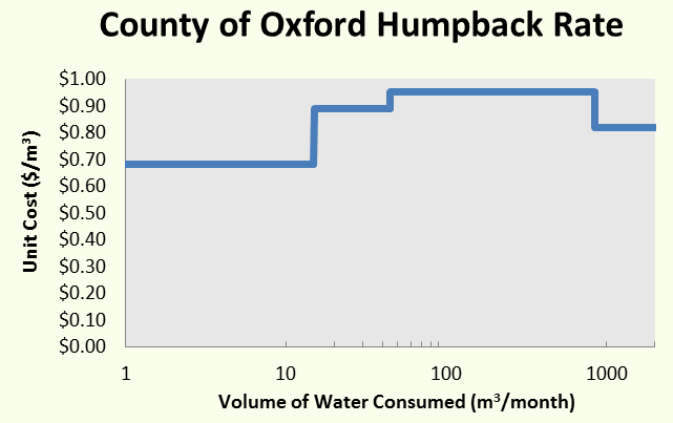
Population (2011): 105,719
Density: 51.8 people/km^2
Water Supply: groundwater

In 2005-2006, the County of Oxford conducted a rate study to overhaul their water rate system.

The County chose a "humpback" water rate structure, a model that encourages conservation while also promoting commercial and industrial development. It consists of a fixed base rate/service charge, plus a volumetric charge.

The rate for the first 0 to 15 m^3/month is the base block, the 2nd block is 30% above the base rate, the 3rd block is 40% above, and the 4th block is 20% above the base rate.

Water Consumption Volume	Rate ($/m^3)
0-15 m^3/month	0.68
16-45 m^3/month	0.89
46-850 m^3/month	0.95
851+ m^3/month	0.82



Deborah Goudreau, Manager of Water Services, County of Oxford shared several lessons learned from Oxford County's experience at a local workshop on water demand

Deborah Goudreau, County of Oxford

management.

Communicating the 4-tiered system to the public has been especially challenging, requiring the development of on-line calculators to help residents determine their specific rate.

She suggested a system with fewer tiers may achieve the same municipal objectives while providing fewer communication challenges. Also, conducting water rate studies during a different time period than installing meters would simplify community outreach activities and avoid potential customer confusion.

Resources:

- *Worth Every Penny: A Primer on Conservation-Oriented Water Pricing* (2010). Polis Project, University of Victoria: http://poliswaterproject.org/publication/344
- *Water Pricing Primer for the Great Lakes Region* (2010). Alliance for Water Efficiency: http://www.allianceforwaterefficiency.org/AWE-GLPF-value-water-project.aspx
- Seattle Public Utilities: http://www.seattle.gov/util/Services/Water/WaterRates/index.asp
- County of Oxford water rates: http://www.oxfordcounty.ca/ServicesforYou/WaterWastewater/Ratesandbylaws.aspx

The Water Demand Management Primer series was developed in partnership with the following municipalities and partners:

Townships of Amaranth and East Garafraxa, Brant County, City of Brantford, Bridgewater Research, Township of Centre Wellington, Dufferin Water Services, City of Guelph, Town of Grand Valley, Grand River Conservation Authority, Guelph-Eramosa Township, City of Kitchener, LURA Consulting Ltd., Township of Mapleton, Neeb Engineering Inc., Oxford County, POLIS, REEP Green Solutions, Township of Southgate, Region of Waterloo, City of Waterloo and Wellington County.

This project was undertaken with the financial support of the Government of Canada through the Federal Department of the Environment. This project has received finding support from the Government of Ontario. Such support does not indicate endorsement by the Government of Ontario of the contents of this material.

PRIMER 9 New Technology & Next Generation WDM Strategies

How can your utility reach the next level of WDM?

Municipalities that have effectively implemented WDM initiatives for years with positive results may be at a stage where they are looking for new and innovative ideas that can provide further water efficiencies and behaviour change.

Water conservation technology is a quickly evolving field that may fulfill these goals, if resources are available for the typically higher costs associated with new technology. Adopting a more integrated systems approach for water management is another option, if there is sufficient political and operational support and a champion to lead the cause.

This primer highlights examples of innovative and emerging WDM practices and technologies.

What are "next generation" WDM strategies?

Kirk Stinchcombe, founding director of Econnics, a company specializing in innovative water conservation solutions for water utilities, has grouped past and present water demand management strategies under "generations".

First generation strategies focus on education and outreach, second generation strategies are driven by data and technology and third generation strategies include many tools and approaches showcased in this primer series (leakage reduction, conservation-oriented pricing).

Included in this third or "next generation" of strategies are more targeted WDM programs and sophisticated technologies, such as:

Rainwater harvesting and greywater technologies

- Large volume, all-season rainwater harvesting systems for indoor (e.g. toilets, laundry) and outdoor use.

Programs for construction sector

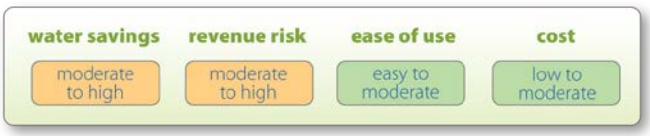
- Requirements for WDM initiatives in plans for new developments/sub-divisions.
- Green/blue building certification programs and financial incentive programs.
- Green approvals processes.

Stormwater management

- Pay-per-use fee for stormwater.
- Integrating stormwater management and water fees.
- Stormwater quality and quantity controls (rain gardens, infiltration gardens).

Targeted outreach (narrowcasting)

- Targeting WDM initiatives to specific groups (e.g. high water users or new building sector). See **Primer #3** – Community Outreach.



Integrating pay-per-service utilities:
Halifax, Nova Scotia

In 2007, Halifax Regional Municipality (*pop. 350,000)* merged its water, wastewater and stormwater utilities into a single entity, *Halifax Water* – the first regulated utility of its kind in Canada.

In 2012, Halifax Water charged its customers a water rate of **$0.509/**$m^3$ for all water consumed per month, and a wastewater and stormwater discharge rate of **$1.296/**$m^3$ for all water consumed.

This system allows the integrated management of the full urban water cycle while providing customers with both direct information about the costs of these utilities and a better understanding of the linkages between them.

What are the challenges associated with next generation WDM initiatives?

Key challenges involved with implementing these strategies include:

1. obtaining funding
2. adequate political and community support and
3. coordinating resources with other municipal departments

Some of these challenges may be easier to overcome than others. For example, costs can be offset by rebate programs, such as Guelph's $2000 rebate for large volume rainwater harvesting systems.

Moving forward with other next generation WDM initiatives requires relationship-building, communications, champions, and political leaders.

Primer #2 provides some ideas and examples for overcoming challenges.

Case Study

Water efficiency from the ground up: Guelph's Blue Built Home program

Population (2011): 121,688
Density: 1,395.4/km^2
Number of Meters/Services (2011): 40,032
Water Supply: Groundwater

Blue Built Homes is a certification program for new homes, administered by the City of Guelph with program support from Tarion-registered home builders.

It uses three water efficiency standards - bronze, silver and gold - based on the use of a third-party tested set of high quality home fixtures and appliances that save water.

Blue Built Homes can save up to $250 per year on water bills compared to conventional homes, with rebates provided directly to home owners. The program was endorsed by Guelph City Council in 2010, the first set of homes certified by September 2011 and in August 2012, 28 Blue Built Homes have been committed for construction.

The Blue Built Home program has faced challenges typical of a new certification with a new brand. Extensive stakeholder consultation went into the design of the program, along with research on the desired target audience and targeted communication methods.

The result has been a strong relationship with local home builders who support the program and actively promote it to their clients. The City of Guelph continues to explore opportunities for partnerships along with mechanisms to get the message out in new and innovative ways.

Wayne Galliher, Water Conservation Project Manager at the City of Guelph, notes that in trying to achieve active brand recognition for such a program you must "*make it look bigger than it is*". A sound piece of advice, as while the Blue Built Homes program is local to the Guelph

community, it has the look and feel of a broader program.

Case Study

Partnerships in stormwater management: Kitchener, Waterloo, and REEP Green Solutions

In 2011-12, the cities of Kitchener and Waterloo initiated a user-pay stormwater utility to better link funding for infrastructure and operations management with the amount of stormwater property owners contribute to their municipal stormwater system.

It took six years for the fee-based model to be approved by both city councils. One particular challenge the city-partnership faced getting the utility off the ground was a lack of public understanding about stormwater in general and with being charged for property runoff through stormwater fees.

REEP Green Solutions, an environmental non-profit organization in the Region of Waterloo, has played a large role in addressing these challenges by partnering with the cities as a service provider for stormwater education programs.

The RAIN program, with the key message of "*Slow it down. Soak it up. Keep it clean*", raises the profile of urban stormwater and water re-use through tours of demonstration sites and workshops on topics such as water cisterns, rain gardens, permeable paving, greywater systems and planting gardens with drought tolerant native plants.

Andrew Marshall, RAIN Program

Andrew Marshall, Manager of the RAIN Program at REEP, notes that the keys to success of this NGO-municipal partnership have included being open to learn from mistakes, being inclusive and collaborative, and being aware of each organization's limitations.

He noted that any NGO-municipal partnership faces challenges due to the different cultures at each organization in terms of timelines, processes and approvals. As final words of advice, Andrew stated "*ensure from day one that all players understand their roles, responsibilities, and limitations, and that these are adhered to throughout the project to avoid duplication.*"

Resources:

- Halifax Water rates and fees: http://www.halifax.ca/hrwc/RatesAndFees.html
- *Guidelines for the Development and Implementation of Comprehensive Stormwater Management Master Plans in the Lake Simcoe Watershed*: http://www.lsrca.on.ca/pdf/reports/swm_master_plan_guidelines.pdf
- *Peeling Back the Pavement: A Blueprint for Reinventing Rainwater Management In Canada's Communities*. (2011). POLIS Project: http://poliswaterproject.org/publication/426
- *Low Impact Development Stormwater Management Planning and Design Guide*. (2010). Toronto and Region Conservation Authority and Credit Valley Conservation Authority: http://www.sustainabletechnologies.ca/Portals/_Rainbow/Documents/LID SWM Guide - v1.0_2010_1_no appendices.pdf
- Econnics eco-efficiency specialists: www.econnics.com
- REEP Green Solutions RAIN Education Program: http://www.reepwaterlooregion.ca/prog_rain.php

  Blue Built Home Water Efficiency Standards and Rebate Program: www.bluebuilthome.ca

The Water Demand Management Primer series was developed in partnership with the following municipalities and partners:

Townships of Amaranth and East Garafraxa, Brant County, City of Brantford, Bridgewater Research, Township of Centre Wellington, Dufferin Water Services, City of Guelph, Town of Grand Valley, Grand River Conservation Authority, Guelph-Eramosa Township, City of Kitchener, LURA Consulting Ltd., Township of Mapleton, Neeb Engineering Inc., Oxford County, POLIS, REEP Green Solutions, Township of Southgate, Region of Waterloo, City of Waterloo and Wellington County.

This project was undertaken with the financial support of the Government of Canada through the Federal Department of the Environment. This project has received finding support from the Government of Ontario. Such support does not indicate endorsement by the Government of Ontario of the contents of this material.

Appendix I: Municipal Demand Management Questionaires

Grand River Watershed Water Management Plan:
Municipal Water Supply and Demand Management Reporting Sheet

No Capacity or Growth Issues to 2051
No Capacity or Growth Issues to 2031
No Capacity Issues to 2051

Water Use Confirmed	Yes			Yes			Yes		
Efficiency Programs Confirmed	Yes			No			Yes		
Water Use Objectives Confirmed	Yes	Status Quo		Yes	Status Quo		Yes	Status Quo	
Municipal System	Dundalk			Grand Valley			Arthur		
Long Term Water Supply Plan									
Plan	Plan Type	Good Until	Reference	Plan Type	Good Until	Reference	Plan Type	Good Until	Reference
Current sources (full report was not available for review)	Class EA	0	Triton 2005	Class EA	2011	R.J. Burnside 1991	Class EA	2025	B.M. Ross and Assoc. 2003
Municipal Water System Demand									
Parameter	Base Yr. 2011	Design Yr. 2031	Design Yr. 2051	Base Yr. 2011	Design Yr. 2031	Design Yr. 2051	Base Yr. 2011	Design Yr. 2031	Design Yr. 2051
Population	1768	2903	3549	1481	3652	5020	2421	2960	3472
Average Daily Demand (ML/d)	475	780	953	442	1090	1498	935	1143	1341
Peak Daily Demand (ML/d)	1127	1850	2262	856	2110	2900	1504	1839	2157
PDD:ADD Ratio	2.37			1.94			1.61		
Average Annual Water Use by Customer Category									
Residential (% or ML/d)	130.5								
ICI (% or ML/d)	20.99								
Non-Revenue (% or ML/d)	0.54								
System Capacity									
Basis (e.g. daily, hourly)									
Water Treatment (ML/d)	2820	2820	2820	4252	3337	3337	4225	6486	6486
Wastewater Treatment (ML/d)	1832	1832	1832						
Water Treatment Capacity Limited	NO	NO	NO	NO	NO	NO	NO	NO	NO
Do you face a long-term water supply shortfall or limitation in wastewater treatment capacity due to increasing population?		YES	YES		YES	YES		YES	YES
Is the long-term shortfall expected as a shortage in the source of supply or a shortfall in capacity of the system to treat and distribute water?	NO	YES		NO	YES		NO	YES	
Is your goal to secure a sustainable source of water supply or to defer capital costs for system expansion?	NO	YES		NO	YES		NO	YES	
What water efficiency programs are currently in place?									
Community Outreach		YES		NO	YES			YES	
Water metering		YES		NO	YES		NO		
Outside water use by-laws		YES		NO	YES			YES	
Rebates & capacity buy-backs	NO			NO	YES		NO		
Water loss control		YES		NO	YES			YES	
Conservation pricing	NO			NO	YES		NO		
Other new technologies	NO			NO	YES		NO		
In your plans, what reduction do you need to achieve?			By when?			By when?			By when?
Small (1-10% reduction)	NO			NO			NO		
Medium (10-20% reduction)	NO			NO			NO		
Large (>20% reduction)	NO			NO			NO		
Identify your preferred water demand management objectives to 2051.									
Community Outreach		YES			YES			YES	
Water metering		YES			YES		NO		
Outside water use by-laws		YES			YES			YES	
Rebates & capacity buy-backs	NO			NO			NO		
Water loss control		YES			YES			YES	
Conservation pricing	NO			NO			NO		
Other new technologies	NO			NO			NO		

Water Use Confirmed	Yes			Yes			Yes	Tier 3	
Efficiency Programs Confirmed	No			No			Yes		
Water Use Objectives Confirmed	Yes	Status Quo		Yes	Status Quo		No	Proposed	
Municipal System	Waldemar			Marsville			Fergus-Elora		
Long Term Water Supply Plan									
Plan	Plan Type	Good Until	Reference	Plan Type	Good Until	Reference	Plan Type	Good Until	Reference
Current sources	0	0	0	0	0	0	WSMP in progress	0	(POLIS Project
Municipal Water System Demand									
Parameter	Base Yr. 2011	Design Yr. 2031	Design Yr. 2051	Base Yr. 2011	Design Yr. 2031	Design Yr. 2051	Base Yr. 2011	Design Yr. 2031	Design Yr. 2051
Population	553	742	742	474	474	474	17533	32180	42596
Average Daily Demand (ML/d)	100	134	134	24	24	24	4927	9043	11970
Peak Daily Demand (ML/d)	404	541	541	69	69	69	8023	14726	19492
PDD:ADD Ratio	4.04			2.87			1.63		
Average Annual Water Use by Customer Category									
Residential (% or ML/d)									
ICI (% or ML/d)									
Non-Revenue (% or ML/d)									
System Capacity									
Basis (e.g. daily, hourly)									
Water Treatment (ML/d)	1080	1080	1080	182	182	182	13334	13334	13334
Wastewater Treatment (ML/d)									
Water Treatment Capacity Limited	NO	NO	NO	NO	NO	NO	NO	YES	YES
Do you face a long-term water supply shortfall or limitation in wastewater treatment capacity due to increasing population?		YES	YES		NO	NO		YES	YES
Is the long-term shortfall expected as a shortage in the source of supply or a shortfall in capacity of the system to treat and distribute water?	NO	YES		NO	YES		NO	YES	
Is your goal to secure a sustainable source of water supply or to defer capital costs for system expansion?	NO	YES		NO	YES		NO	YES	
What water efficiency programs are currently in place?									
Community Outreach	NO	YES		NO	YES			YES	
Water metering	NO	YES		NO	YES			YES	
Outside water use by-laws	NO	YES		NO	YES			YES	
Rebates & capacity buy-backs	NO	YES		NO	YES			YES	
Water loss control	NO	YES		NO	YES		NO		
Conservation pricing	NO	YES		NO	YES		NO		
Other new technologies	NO	YES		NO	YES		NO		
In your plans, what reduction do you need to achieve?			By when?			By when?			By when?
Small (1-10% reduction)	NO			NO			NO		
Medium (10-20% reduction)	NO			NO			14%	YES	2028
Large (>20% reduction)	NO			NO			24%	YES	2040
Identify your preferred water demand management objectives to 2051.									
Community Outreach		YES			YES			YES	
Water metering	NO			NO				YES	
Outside water use by-laws		YES			YES			YES	
Rebates & capacity buy-backs	NO			NO				YES	
Water loss control		YES			YES			YES	
Conservation pricing	NO			NO			NO		
Other new technologies	NO			NO				YES	

Water Use Confirmed	Yes	Tier 3		Yes	Tier 3		Yes	Tier 3	
Efficiency Programs Confirmed	Yes	Try to avoid expansion		Yes			Yes		
Water Use Objectives Confirmed	No	Draft		Yes	Status Quo		No	Proposed	
Municipal System	Rockwood			Hamilton Drive			Guelph (with Gazer/Mooney)2		
Long Term Water Supply Plan									
Plan	Plan Type	Good Until	Reference	Plan Type	Good Until	Reference	Plan Type	Good Until	Reference
Current sources	Class EA	2021	R.J. Burnside 2002	0	0	0	Water Conservation	2038	AECOM 2014
Municipal Water System Demand									
Parameter	Base Yr. 2011	Design Yr. 2031	Design Yr. 2051	Base Yr. 2011	Design Yr. 2031	Design Yr. 2051	Base Yr. 2011	Design Yr. 2031	Design Yr. 2051
Population	3869	5870	7670	1100	1100	1100	122362	175000	212200
Average Daily Demand (ML/d)	1420	2155	2816	234	234	234	45578	65185	79041
Peak Daily Demand (ML/d)	2243	3403	4446	1021	904	904	56949	81448	98762
PDD:ADD Ratio	1.58			4.35			1.25		
Average Annual Water Use by Customer Category									
Residential (% or ML/d)									
ICI (% or ML/d)									
Non-Revenue (% or ML/d)									
System Capacity									
Basis (e.g. daily, hourly)									
Water Treatment (ML/d)	5238	6238	4274	1728	1728	1728	83836	110000	140000
Wastewater Treatment (ML/d)	1323	1710	1710						
Water Treatment Capacity Limited	NO	NO	YES	NO	NO	NO	NO	NO	NO
Do you face a long-term water supply shortfall or limitation in wastewater treatment capacity due to increasing population?		YES	YES		NO	NO		YES	YES
Is the long-term shortfall expected as a shortage in the source of supply or a shortfall in capacity of the system to treat and distribute water?	NO	YES		NO	YES		NO	YES	
Is your goal to secure a sustainable source of water supply or to defer capital costs for system expansion?	NO	YES		NO	YES		NO	YES	
What water efficiency programs are currently in place?									
Community Outreach		YES			YES			YES	
Water metering		YES			YES			YES	
Outside water use by-laws		YES			YES			YES	
Rebates & capacity buy-backs		YES		NO				YES	
Water loss control	NO			NO				YES	
Conservation pricing	NO			NO			NO		
Other new technologies	NO			NO				YES	
In your plans, what reduction do you need to achieve?			By when?			By when?			By when?
Small (1-10% reduction)	NO			NO			NO		
Medium (10-20% reduction)	NO			NO			20%	YES	2025
Large (>20% reduction)	NO			NO			NO		
Identify your preferred water demand management objectives to 2051.									
Community Outreach		YES			YES			YES	
Water metering		YES			n/a			YES	
Outside water use by-laws		YES			YES			YES	
Rebates & capacity buy-backs		YES			YES			YES	
Water loss control		YES			YES			YES	
Conservation pricing	NO			NO			NO		
Other new technologies	NO			NO				YES	

Water Use Confirmed	No			No		
Efficiency Programs Confirmed	No			No		
Water Use Objectives Confirmed	No	Status Quo		No	Status Quo	
Municipal System	Drayton			Moorefield		
Long Term Water Supply Plan						
Plan	Plan Type	Good Until	Reference	Plan Type	Good Until	Reference
Current sources	0	0	0	Class EA	0	0
Municipal Water System Demand						
Parameter	Base Yr. 2011	Design Yr. 2031	Design Yr. 2051	Base Yr. 2011	Design Yr. 2031	Design Yr. 2051
Population	1880	2960	3960	479	1040	1496
Average Daily Demand (ML/d)	486	765	1023	61	133	192
Peak Daily Demand (ML/d)	889	1399	1872	170	369	530
PDD:ADD Ratio	1.83			2.77		
Average Annual Water Use by Customer Category						
Residential (% or ML/d)						
ICI (% or ML/d)						
Non-Revenue (% or ML/d)						
System Capacity						
Basis (e.g. daily, hourly)						
Water Treatment (ML/d)	3928	3928	3928	1554	1554	1554
Wastewater Treatment (ML/d)						
Water Treatment Capacity Limited	NO	NO	NO	NO	NO	NO
Do you face a long-term water supply shortfall or limitation in wastewater treatment capacity due to increasing population?		YES	YES		YES	YES
Is the long-term shortfall expected as a shortage in the source of supply or a shortfall in capacity of the system to treat and distribute water?	NO	YES		NO	YES	
Is your goal to secure a sustainable source of water supply or to defer capital costs for system expansion?	NO	YES		NO	YES	
What water efficiency programs are currently in place?						
Community Outreach	NO	YES		NO	YES	
Water metering	NO	YES		NO	YES	
Outside water use by-laws	NO	YES		NO	YES	
Rebates & capacity buy-backs	NO	YES		NO	YES	
Water loss control	NO	YES		NO	YES	
Conservation pricing	NO	YES		NO	YES	
Other new technologies	NO	YES		NO	YES	
In your plans, what reduction do you need to achieve?			By when?			By when?
Small (1-10% reduction)	NO			NO		
Medium (10-20% reduction)	NO			NO		
Large (>20% reduction)	NO			NO		
Identify your preferred water demand management objectives to 2051.						
Community Outreach		YES			YES	
Water metering		YES			YES	
Outside water use by-laws	NO			NO		
Rebates & capacity buy-backs	NO			NO		
Water loss control		YES			YES	
Conservation pricing	NO			NO		
Other new technologies	NO			NO		

Grand River Watershed Water Management Plan:
Municipal Water Supply and Demand Management Reporting Sheet

No Capacity or Growth Issues to 2051
No Capacity or Growth Issues to 2031
No Capacity Issues to 2051

Milverton

Parameter	Base Yr. 2011	Design Yr. 2031	Design Yr. 2051
Water Use Confirmed	Yes		
Efficiency Programs Confirmed	Yes		
Water Use Objectives Confirmed	Yes	Status Quo	
Municipal System	Milverton		
Long Term Water Supply Plan			
Plan	Plan Type	Good Until	Reference
Current Sources	Class EA	2020	Stantec 2002
Municipal Water System Demand			
Population	1824	2183	2493
Average Daily Demand (ML/d)	369	442	505
Peak Daily Demand (ML/d)	764	915	1045
PDD:ADD Ratio	2.07		
Average Annual Water Use by Customer Category			
Residential (% or ML/d)	70%		
ICI (% or ML/d)	25%		
Non-Revenue (% or ML/d)	5%		
System Capacity			
Basis (e.g. daily, hourly)	daily		
Water Treatment (ML/d)	2143	2143	2143
Wastewater Treatment (ML/d)	1,103		
Water Treatment Capacity Limited	NO	NO	NO
Do you face a long-term water supply shortfall or limitation in wastewater treatment capacity due to increasing population?		NO	NO
Is the long-term shortfall expected as a shortage in the source of supply or a shortfall in capacity of the system to treat and distribute water?	NO		
Is your goal to secure a sustainable source of water supply or to defer capital costs for system expansion?		YES	
What water efficiency programs are currently in place?			
Community Outreach		YES	
Water metering		YES	
Outside water use by-laws		YES	
Rebates & capacity buy-backs	NO		
Water loss control		YES	
Conservation pricing	NO		
Other new technologies	NO		
In your plans, what reduction do you need to achieve?			**By when?**
Small (1-10% reduction)	NO		
Medium (10-20% reduction)	NO		
Large (>20% reduction)	NO		
Identify your preferred water demand management objectives to 2051.			
Community Outreach		YES	
Water metering		YES	
Outside water use by-laws		YES	
Rebates & capacity buy-backs	NO		
Water loss control		YES	
Conservation pricing	NO		
Other new technologies	NO		

Lynden

Parameter	Base Yr. 2011	Design Yr. 2031	Design Yr. 2051
Water Use Confirmed	Yes		
Efficiency Programs Confirmed	No		
Water Use Objectives Confirmed	Yes	Status Quo	
Plan	Plan Type	Good Until	Reference
Current Sources	0	0	0
Municipal Water System Demand			
Population	380	531	552
Average Daily Demand (ML/d)	82	115	119
Peak Daily Demand (ML/d)	172	240	250
PDD:ADD Ratio	2.09		
Average Annual Water Use by Customer Category			
Residential (% or ML/d)			
ICI (% or ML/d)			
Non-Revenue (% or ML/d)			
System Capacity			
Basis (e.g. daily, hourly)			
Water Treatment (ML/d)	327	327	327
Wastewater Treatment (ML/d)			
Water Treatment Capacity Limited	NO	NO	NO
Do you face a long-term water supply shortfall or limitation in wastewater treatment capacity due to increasing population?		NO	NO
Is the long-term shortfall expected as a shortage in the source of supply or a shortfall in capacity of the system to treat and distribute water?	NO	YES	
Is your goal to secure a sustainable source of water supply or to defer capital costs for system expansion?	NO	YES	
What water efficiency programs are currently in place?			
Community Outreach	NO	YES	
Water metering	NO	YES	
Outside water use by-laws	NO	YES	
Rebates & capacity buy-backs	NO	YES	
Water loss control	NO	YES	
Conservation pricing	NO	YES	
Other new technologies	NO	YES	
In your plans, what reduction do you need to achieve?		**By when?**	
Small (1-10% reduction)	NO		
Medium (10-20% reduction)	NO		
Large (>20% reduction)	NO		
Identify your preferred water demand management objectives to 2051.			
Community Outreach		YES	
Water metering	NO		
Outside water use by-laws	NO		
Rebates & capacity buy-backs	NO		
Water loss control	NO		
Conservation pricing	NO		
Other new technologies	NO		

RMOW IUS1 2

Parameter	Base Yr. 2011	Design Yr. 2031	Design Yr. 2051
Water Use Confirmed	Yes	Tier 3	
Efficiency Programs Confirmed	Yes		
Water Use Objectives Confirmed	No	TBD	
Plan	Plan Type	Good Until	Reference
Current Sources	Updated Water Supply Master	2026	Update XCG 2007 RMOW Water
Municipal Water System Demand			
Population	495775	689540	822103
Average Daily Demand (ML/d)	141179	196356	234106
Peak Daily Demand (ML/d)	178974	270000	296777
PDD:ADD Ratio	1.27		
Average Annual Water Use by Customer Category			
Residential (% or ML/d)			
ICI (% or ML/d)			
Non-Revenue (% or ML/d)			
System Capacity			
Basis (e.g. daily, hourly)			
Water Treatment (ML/d)	250000	327000	432000
Wastewater Treatment (ML/d)			
Water Treatment Capacity Limited	NO	NO	NO
Do you face a long-term water supply shortfall or limitation in wastewater treatment capacity due to increasing population?		YES	YES
Is the long-term shortfall expected as a shortage in the source of supply or a shortfall in capacity of the system to treat and distribute water?	NO	YES	
Is your goal to secure a sustainable source of water supply or to defer capital costs for system expansion?	NO	YES	
What water efficiency programs are currently in place?			
Community Outreach		YES	
Water metering		YES	
Outside water use by-laws		YES	
Rebates & capacity buy-backs		YES	
Water loss control		YES	
Conservation pricing	NO		
Other new technologies		YES	
In your plans, what reduction do you need to achieve?		**By when?**	
Small (1-10% reduction)	NO		
Medium (10-20% reduction)		YES	
Large (>20% reduction)	NO		
Identify your preferred water demand management objectives to 2051.			
Community Outreach		YES	
Water metering		YES	
Outside water use by-laws		YES	
Rebates & capacity buy-backs		YES	
Water loss control		YES	
Conservation pricing	NO		
Other new technologies		YES	

Ayr

Parameter	Base Yr. 2011	Design Yr. 2031	Design Yr. 2051
Water Use Confirmed	Yes		
Efficiency Programs Confirmed	Yes		
Water Use Objectives Confirmed	No	TBD	
Long Term Water Supply Plan			
Plan	Plan Type	Good Until	Reference
Current Sources	WSMP/Class EA	2024	0
Municipal Water System Demand			
Population	4243	8728	11898
Average Daily Demand (ML/d)	1282	2637	3595
Peak Daily Demand (ML/d)	2215	4557	6212
PDD:ADD Ratio	1.73		
Average Annual Water Use by Customer Category			
Residential (% or ML/d)			
ICI (% or ML/d)			
Non-Revenue (% or ML/d)			
System Capacity			
Basis (e.g. daily, hourly)			
Water Treatment (ML/d)	5530	5530	5530
Wastewater Treatment (ML/d)			
Water Treatment Capacity Limited	NO	NO	YES
Do you face a long-term water supply shortfall or limitation in wastewater treatment capacity due to increasing population?		YES	YES
Is the long-term shortfall expected as a shortage in the source of supply or a shortfall in capacity of the system to treat and distribute water?	NO	YES	
Is your goal to secure a sustainable source of water supply or to defer capital costs for system expansion?	NO	YES	
What water efficiency programs are currently in place?			
Community Outreach		YES	
Water metering		YES	
Outside water use by-laws		YES	
Rebates & capacity buy-backs		YES	
Water loss control		YES	
Conservation pricing	NO		
Other new technologies		YES	
In your plans, what reduction do you need to achieve?		**By when?**	
Small (1-10% reduction)	NO		
Medium (10-20% reduction)		YES	
Large (>20% reduction)	NO		
Identify your preferred water demand management objectives to 2051.			
Community Outreach		YES	
Water metering		YES	
Outside water use by-laws		YES	
Rebates & capacity buy-backs		YES	
Water loss control		YES	
Conservation pricing	NO		
Other new technologies		YES	

Branchton

Parameter	Base Yr. 2011	Design Yr. 2031	Design Yr. 2051
Water Use Confirmed	Yes		
Efficiency Programs Confirmed	Yes		
Water Use Objectives Confirmed	Yes	Status Quo	
Plan	Plan Type	Good Until	Reference
Current Sources	0	0	0
Municipal Water System Demand			
Population	121	122	122
Average Daily Demand (ML/d)	34	34	34
Peak Daily Demand (ML/d)	108	109	109
PDD:ADD Ratio	3.19		
Average Annual Water Use by Customer Category			
Residential (% or ML/d)			
ICI (% or ML/d)			
Non-Revenue (% or ML/d)			
System Capacity			
Basis (e.g. daily, hourly)			
Water Treatment (ML/d)	130	130	130
Wastewater Treatment (ML/d)			
Water Treatment Capacity Limited	NO	NO	NO
Do you face a long-term water supply shortfall or limitation in wastewater treatment capacity due to increasing population?		NO	NO
Is the long-term shortfall expected as a shortage in the source of supply or a shortfall in capacity of the system to treat and distribute water?	NO	YES	
Is your goal to secure a sustainable source of water supply or to defer capital costs for system expansion?	NO	YES	
What water efficiency programs are currently in place?			
Community Outreach		YES	
Water metering		YES	
Outside water use by-laws		YES	
Rebates & capacity buy-backs		YES	
Water loss control		YES	
Conservation pricing	NO		
Other new technologies		YES	
In your plans, what reduction do you need to achieve?		**By when?**	
Small (1-10% reduction)	NO		
Medium (10-20% reduction)	NO		
Large (>20% reduction)	NO		
Identify your preferred water demand management objectives to 2051.			
Community Outreach		YES	
Water metering		YES	
Outside water use by-laws		YES	
Rebates & capacity buy-backs		YES	
Water loss control		YES	
Conservation pricing	NO		
Other new technologies		YES	

Roseville

Parameter	Base Yr. 2011	Design Yr. 2031	Design Yr. 2051
Water Use Confirmed	Yes		
Efficiency Programs Confirmed	Yes		
Water Use Objectives Confirmed	Yes	Status Quo	
Plan	Plan Type	Good Until	Reference
Current Sources	0	0	0
Municipal Water System Demand			
Population	290	301	301
Average Daily Demand (ML/d)	77	80	80
Peak Daily Demand (ML/d)	188	195	195
PDD:ADD Ratio	2.43		
Average Annual Water Use by Customer Category			
Residential (% or ML/d)			
ICI (% or ML/d)			
Non-Revenue (% or ML/d)			
System Capacity			
Basis (e.g. daily, hourly)			
Water Treatment (ML/d)	358	358	358
Wastewater Treatment (ML/d)			
Water Treatment Capacity Limited	NO	NO	NO
Do you face a long-term water supply shortfall or limitation in wastewater treatment capacity due to increasing population?		NO	NO
Is the long-term shortfall expected as a shortage in the source of supply or a shortfall in capacity of the system to treat and distribute water?	NO	YES	
Is your goal to secure a sustainable source of water supply or to defer capital costs for system expansion?	NO	YES	
What water efficiency programs are currently in place?			
Community Outreach		YES	
Water metering		YES	
Outside water use by-laws		YES	
Rebates & capacity buy-backs		YES	
Water loss control		YES	
Conservation pricing	NO		
Other new technologies		YES	
In your plans, what reduction do you need to achieve?		**By when?**	
Small (1-10% reduction)	NO		
Medium (10-20% reduction)	NO		
Large (>20% reduction)	NO		
Identify your preferred water demand management objectives to 2051.			
Community Outreach		YES	
Water metering		YES	
Outside water use by-laws		YES	
Rebates & capacity buy-backs		YES	
Water loss control		YES	
Conservation pricing	NO		
Other new technologies		YES	

Heidlberg

Parameter	Base Yr. 2011	Design Yr. 2031	Design Yr. 2051
Water Use Confirmed	Yes		
Efficiency Programs Confirmed	Yes		
Water Use Objectives Confirmed	Yes	Status Quo	
Plan	Plan Type	Good Until	Reference
Current Sources	0	0	0
Municipal Water System Demand			
Population	1009	1091	1892
Average Daily Demand (ML/d)	152	164	285
Peak Daily Demand (ML/d)	322	348	603
PDD:ADD Ratio	2.12		
Average Annual Water Use by Customer Category			
Residential (% or ML/d)			
ICI (% or ML/d)			
Non-Revenue (% or ML/d)			
System Capacity			
Basis (e.g. daily, hourly)			
Water Treatment (ML/d)	829	829	829
Wastewater Treatment (ML/d)			
Water Treatment Capacity Limited	NO	NO	NO
Do you face a long-term water supply shortfall or limitation in wastewater treatment capacity due to increasing population?		NO	YES
Is the long-term shortfall expected as a shortage in the source of supply or a shortfall in capacity of the system to treat and distribute water?	NO	YES	
Is your goal to secure a sustainable source of water supply or to defer capital costs for system expansion?	NO	YES	
What water efficiency programs are currently in place?			
Community Outreach		YES	
Water metering		YES	
Outside water use by-laws		YES	
Rebates & capacity buy-backs		YES	
Water loss control		YES	
Conservation pricing	NO		
Other new technologies		YES	
In your plans, what reduction do you need to achieve?		**By when?**	
Small (1-10% reduction)	NO		
Medium (10-20% reduction)	20%	YES	2051
Large (>20% reduction)	NO		
Identify your preferred water demand management objectives to 2051.			
Community Outreach		YES	
Water metering		YES	
Outside water use by-laws		YES	
Rebates & capacity buy-backs		YES	
Water loss control		YES	
Conservation pricing	NO		
Other new technologies		YES	

Linwood

Parameter	Base Yr. 2011	Design Yr. 2031	Design Yr. 2051
Water Use Confirmed	Yes		
Efficiency Programs Confirmed	Yes		
Water Use Objectives Confirmed	Yes	Status Quo	
Plan	Plan Type	Good Until	Reference
Current Sources	0	0	0
Municipal Water System Demand			
Population	848	819	831
Average Daily Demand (ML/d)	158	153	155
Peak Daily Demand (ML/d)	252	244	247
PDD:ADD Ratio	1.60		
Average Annual Water Use by Customer Category			
Residential (% or ML/d)			
ICI (% or ML/d)			
Non-Revenue (% or ML/d)			
System Capacity			
Basis (e.g. daily, hourly)			
Water Treatment (ML/d)	605	605	605
Wastewater Treatment (ML/d)			
Water Treatment Capacity Limited	NO	NO	NO
Do you face a long-term water supply shortfall or limitation in wastewater treatment capacity due to increasing population?		NO	NO
Is the long-term shortfall expected as a shortage in the source of supply or a shortfall in capacity of the system to treat and distribute water?	NO	YES	
Is your goal to secure a sustainable source of water supply or to defer capital costs for system expansion?	NO	YES	
What water efficiency programs are currently in place?			
Community Outreach		YES	
Water metering		YES	
Outside water use by-laws		YES	
Rebates & capacity buy-backs		YES	
Water loss control		YES	
Conservation pricing	NO		
Other new technologies		YES	
In your plans, what reduction do you need to achieve?		**By when?**	
Small (1-10% reduction)	NO		
Medium (10-20% reduction)	NO		
Large (>20% reduction)	NO		
Identify your preferred water demand management objectives to 2051.			
Community Outreach		YES	
Water metering		YES	
Outside water use by-laws		YES	
Rebates & capacity buy-backs		YES	
Water loss control		YES	
Conservation pricing	NO		
Other new technologies		YES	

St. Clements

Parameter	Base Yr. 2011	Design Yr. 2031	Design Yr. 2051
Water Use Confirmed	Yes		
Efficiency Programs Confirmed	Yes		
Water Use Objectives Confirmed	No	TBD	
Plan	Plan Type	Good Until	Reference
Current Sources	0	0	0
Municipal Water System Demand			
Population	1355	1421	1421
Average Daily Demand (ML/d)	258	270	270
Peak Daily Demand (ML/d)	466	489	489
PDD:ADD Ratio	1.81		
Average Annual Water Use by Customer Category			
Residential (% or ML/d)			
ICI (% or ML/d)			
Non-Revenue (% or ML/d)			
System Capacity			
Basis (e.g. daily, hourly)			
Water Treatment (ML/d)	1770	1770	1770
Wastewater Treatment (ML/d)			
Water Treatment Capacity Limited	NO	NO	NO
Do you face a long-term water supply shortfall or limitation in wastewater treatment capacity due to increasing population?		NO	NO
Is the long-term shortfall expected as a shortage in the source of supply or a shortfall in capacity of the system to treat and distribute water?	NO	YES	
Is your goal to secure a sustainable source of water supply or to defer capital costs for system expansion?	NO	YES	
What water efficiency programs are currently in place?			
Community Outreach		YES	
Water metering		YES	
Outside water use by-laws		YES	
Rebates & capacity buy-backs		YES	
Water loss control		YES	
Conservation pricing	NO		
Other new technologies		YES	
In your plans, what reduction do you need to achieve?		**By when?**	
Small (1-10% reduction)	NO		
Medium (10-20% reduction)	NO		
Large (>20% reduction)	NO		
Identify your preferred water demand management objectives to 2051.			
Community Outreach		YES	
Water metering		YES	
Outside water use by-laws		YES	
Rebates & capacity buy-backs		YES	
Water loss control		YES	
Conservation pricing	NO		
Other new technologies		YES	

Wellesley

Parameter	Base Yr. 2011	Design Yr. 2031	Design Yr. 2051
Water Use Confirmed	Yes		
Efficiency Programs Confirmed	Yes		
Water Use Objectives Confirmed	No	TBD	
Plan	Plan Type	Good Until	Reference
Current Sources	WSMP/Class EA	0	0
Municipal Water System Demand			
Population	2865	3081	5323
Average Daily Demand (ML/d)	590	635	1097
Peak Daily Demand (ML/d)	1003	1079	1864
PDD:ADD Ratio	1.70		
Average Annual Water Use by Customer Category			
Residential (% or ML/d)			
ICI (% or ML/d)			
Non-Revenue (% or ML/d)			
System Capacity			
Basis (e.g. daily, hourly)			
Water Treatment (ML/d)	3000	3000	3000
Wastewater Treatment (ML/d)			
Water Treatment Capacity Limited	NO	NO	NO
Do you face a long-term water supply shortfall or limitation in wastewater treatment capacity due to increasing population?		YES	YES
Is the long-term shortfall expected as a shortage in the source of supply or a shortfall in capacity of the system to treat and distribute water?	NO	YES	
Is your goal to secure a sustainable source of water supply or to defer capital costs for system expansion?	NO	YES	
What water efficiency programs are currently in place?			
Community Outreach		YES	
Water metering		YES	
Outside water use by-laws		YES	
Rebates & capacity buy-backs		YES	
Water loss control		YES	
Conservation pricing	NO		
Other new technologies		YES	
In your plans, what reduction do you need to achieve?		**By when?**	
Small (1-10% reduction)	NO		
Medium (10-20% reduction)	NO		
Large (>20% reduction)	NO		
Identify your preferred water demand management objectives to 2051.			
Community Outreach		YES	
Water metering		YES	
Outside water use by-laws		YES	
Rebates & capacity buy-backs		YES	
Water loss control		YES	
Conservation pricing	NO		
Other new technologies		YES	

New Dundee

Parameter	Base Yr. 2011	Design Yr. 2031	Design Yr. 2051
Water Use Confirmed	Yes	Tier 3	
Efficiency Programs Confirmed	Yes		
Water Use Objectives Confirmed	Yes	Status Quo	
Long Term Water Supply Plan			
Plan	Plan Type	Good Until	Reference
Current Sources	0	0	0
Municipal Water System Demand			
Population	1138	1170	1214
Average Daily Demand (ML/d)	221	228	236
Peak Daily Demand (ML/d)	432	444	460
PDD:ADD Ratio	1.95		
Average Annual Water Use by Customer Category			
Residential (% or ML/d)			
ICI (% or ML/d)			
Non-Revenue (% or ML/d)			
System Capacity			
Basis (e.g. daily, hourly)			
Water Treatment (ML/d)	983	983	983
Wastewater Treatment (ML/d)			
Water Treatment Capacity Limited	NO	NO	NO
Do you face a long-term water supply shortfall or limitation in wastewater treatment capacity due to increasing population?		NO	NO
Is the long-term shortfall expected as a shortage in the source of supply or a shortfall in capacity of the system to treat and distribute water?	NO	YES	
Is your goal to secure a sustainable source of water supply or to defer capital costs for system expansion?	NO	YES	
What water efficiency programs are currently in place?			
Community Outreach		YES	
Water metering		YES	
Outside water use by-laws		YES	
Rebates & capacity buy-backs		YES	
Water loss control		YES	
Conservation pricing	NO		
Other new technologies		YES	
In your plans, what reduction do you need to achieve?		**By when?**	
Small (1-10% reduction)	NO		
Medium (10-20% reduction)	NO		
Large (>20% reduction)	NO		
Identify your preferred water demand management objectives to 2051.			
Community Outreach		YES	
Water metering		YES	
Outside water use by-laws		YES	
Rebates & capacity buy-backs		YES	
Water loss control		YES	
Conservation pricing	NO		
Other new technologies		YES	

Grand River Watershed Water Management Plan:
Municipal Water Supply and Demand Management Reporting Sheet

No Capacity or Growth Issues to 2051
No Capacity or Growth Issues to 2031
No Capacity Issues to 2051

Municipal System	New Hamburg/Baden		
Water Use Confirmed	Yes		
Efficiency Programs Confirmed	Yes		
Water Use Objectives Confirmed	No	TBD	
Long Term Water Supply Plan			
Plan	Plan Type	Good Until	Reference
Increase storage, add backup to firm up capacity	Water and Wastewater	2041	AECOM 2011
Municipal Water System Demand			
Parameter	Base Yr. 2011	Design Yr. 2031	Design Yr. 2051
Population	11915	21569	29579
Average Daily Demand (ML/d)	2856	5170	7090
Peak Daily Demand (ML/d)	4381	7930	10875
PDD:ADD Ratio	1.53		
Average Annual Water Use by Customer Category			
Residential (% or ML/d)			
ICI (% or ML/d)			
Non-Revenue (% or ML/d)			
System Capacity			
Basis (e.g. daily, hourly)			
Water Treatment (ML/d)	12614	9676	9676
Wastewater Treatment (ML/d)			
Water Treatment Capacity Limited	NO	NO	YES
Do you face a long-term water supply shortfall or limitation in wastewater treatment capacity due to increasing population?		YES	YES
Is the long-term shortfall expected as a shortage in the source of supply or a shortfall in capacity of the system to treat and distribute water?	NO	YES	
Is your goal to secure a sustainable source of water supply or to defer capital costs for system expansion?	NO	YES	
What water efficiency programs are currently in place?			
Community Outreach		YES	
Water metering		YES	
Outside water use by-laws		YES	
Rebates & capacity buy-backs		YES	
Water loss control		YES	
Conservation pricing	NO		
Other new technologies		YES	
In your plans, what reduction do you need to achieve?			By when?
Small (1-10% reduction)	NO		
Medium (10-20% reduction)	15%	YES	2051
Large (>20% reduction)	NO		
Identify your preferred water demand management objectives to 2051.			
Community Outreach		YES	
Water metering		YES	
Outside water use by-laws		YES	
Rebates & capacity buy-backs		YES	
Water loss control		YES	
Conservation pricing	NO		
Other new technologies		YES	

Municipal System	St. Agatha		
Water Use Confirmed	Yes	Tier 3	
Efficiency Programs Confirmed	Yes		
Water Use Objectives Confirmed	No		
Plan	Plan Type	Good Until	Reference
	Decommissioned 2012	0	0
Municipal Water System Demand			
Parameter	Base Yr. 2011	Design Yr. 2031	Design Yr. 2051
Population	76	83	83
Average Daily Demand (ML/d)	27	29	29
Peak Daily Demand (ML/d)	85	92	92
PDD:ADD Ratio	3.13		
Average Annual Water Use by Customer Category			
Residential (% or ML/d)			
ICI (% or ML/d)			
Non-Revenue (% or ML/d)			
System Capacity			
Basis (e.g. daily, hourly)			
Water Treatment (ML/d)	518	518	518
Wastewater Treatment (ML/d)			
Water Treatment Capacity Limited	NO	NO	NO
Do you face a long-term water supply shortfall or limitation in wastewater treatment capacity due to increasing population?		NO	NO
Is the long-term shortfall expected as a shortage in the source of supply or a shortfall in capacity of the system to treat and distribute water?	NO	YES	
Is your goal to secure a sustainable source of water supply or to defer capital costs for system expansion?	NO	YES	
What water efficiency programs are currently in place?			
Community Outreach		YES	
Water metering		YES	
Outside water use by-laws		YES	
Rebates & capacity buy-backs		YES	
Water loss control		YES	
Conservation pricing	NO		
Other new technologies		YES	
In your plans, what reduction do you need to achieve?			By when?
Small (1-10% reduction)	NO		
Medium (10-20% reduction)	NO		
Large (>20% reduction)	NO		
Identify your preferred water demand management objectives to 2051.			
Community Outreach		YES	
Water metering	NO		
Outside water use by-laws	NO		
Rebates & capacity buy-backs	NO		
Water loss control	NO		
Conservation pricing	NO		
Other new technologies	NO		

Municipal System	Conestogo Plains		
Water Use Confirmed	Yes	Tier 3	
Efficiency Programs Confirmed	Yes		
Water Use Objectives Confirmed	Yes	Status Quo	
Plan	Plan Type	Good Until	Reference
	Initiate Class EA in 2013	0	CIMA (underway
Municipal Water System Demand			
Parameter	Base Yr. 2011	Design Yr. 2031	Design Yr. 2051
Population	373	663	663
Average Daily Demand (ML/d)	82	146	146
Peak Daily Demand (ML/d)	237	422	422
PDD:ADD Ratio	2.89		
Average Annual Water Use by Customer Category			
Residential (% or ML/d)			
ICI (% or ML/d)			
Non-Revenue (% or ML/d)			
System Capacity			
Basis (e.g. daily, hourly)			
Water Treatment (ML/d)	786	786	786
Wastewater Treatment (ML/d)			
Water Treatment Capacity Limited	NO	NO	NO
Do you face a long-term water supply shortfall or limitation in wastewater treatment capacity due to increasing population?		YES	YES
Is the long-term shortfall expected as a shortage in the source of supply or a shortfall in capacity of the system to treat and distribute water?	NO	YES	
Is your goal to secure a sustainable source of water supply or to defer capital costs for system expansion?	NO	YES	
What water efficiency programs are currently in place?			
Community Outreach		YES	
Water metering		YES	
Outside water use by-laws		YES	
Rebates & capacity buy-backs		YES	
Water loss control		YES	
Conservation pricing	NO		
Other new technologies		YES	
In your plans, what reduction do you need to achieve?			By when?
Small (1-10% reduction)	10%	YES	2031
Medium (10-20% reduction)	NO		
Large (>20% reduction)	NO		
Identify your preferred water demand management objectives to 2051.			
Community Outreach		YES	
Water metering		YES	
Outside water use by-laws		YES	
Rebates & capacity buy-backs		YES	
Water loss control		YES	
Conservation pricing	NO		
Other new technologies		YES	

Municipal System	Conestogo Golf		
Water Use Confirmed	Yes		
Efficiency Programs Confirmed	Yes		
Water Use Objectives Confirmed	Yes	Status Quo	
Plan	Plan Type	Good Until	Reference
	0	0	0
Municipal Water System Demand			
Parameter	Base Yr. 2011	Design Yr. 2031	Design Yr. 2051
Population	517	521	521
Average Daily Demand (ML/d)	152	153	153
Peak Daily Demand (ML/d)	480	484	484
PDD:ADD Ratio	3.16		
Average Annual Water Use by Customer Category			
Residential (% or ML/d)			
ICI (% or ML/d)			
Non-Revenue (% or ML/d)			
System Capacity			
Basis (e.g. daily, hourly)			
Water Treatment (ML/d)	601	601	601
Wastewater Treatment (ML/d)			
Water Treatment Capacity Limited	NO	NO	NO
Do you face a long-term water supply shortfall or limitation in wastewater treatment capacity due to increasing population?		YES	YES
Is the long-term shortfall expected as a shortage in the source of supply or a shortfall in capacity of the system to treat and distribute water?	NO	YES	
Is your goal to secure a sustainable source of water supply or to defer capital costs for system expansion?	NO	YES	
What water efficiency programs are currently in place?			
Community Outreach		YES	
Water metering		YES	
Outside water use by-laws		YES	
Rebates & capacity buy-backs		YES	
Water loss control		YES	
Conservation pricing	NO		
Other new technologies		YES	
In your plans, what reduction do you need to achieve?			By when?
Small (1-10% reduction)	10%	YES	2031
Medium (10-20% reduction)	NO	YES	
Large (>20% reduction)	NO	YES	
Identify your preferred water demand management objectives to 2051.			
Community Outreach		YES	
Water metering		YES	
Outside water use by-laws		YES	
Rebates & capacity buy-backs		YES	
Water loss control		YES	
Conservation pricing	NO		
Other new technologies		YES	

Municipal System	Maryhill		
Water Use Confirmed	Yes		
Efficiency Programs Confirmed	Yes		
Water Use Objectives Confirmed	Yes	Status Quo	
Plan	Plan Type	Good Until	Reference
	0	0	0
Municipal Water System Demand			
Parameter	Base Yr. 2011	Design Yr. 2031	Design Yr. 2051
Population	147	168	168
Average Daily Demand (ML/d)	34	38	38
Peak Daily Demand (ML/d)	122	139	139
PDD:ADD Ratio	3.62		
Average Annual Water Use by Customer Category			
Residential (% or ML/d)			
ICI (% or ML/d)			
Non-Revenue (% or ML/d)			
System Capacity			
Basis (e.g. daily, hourly)			
Water Treatment (ML/d)	157	157	157
Wastewater Treatment (ML/d)			
Water Treatment Capacity Limited	NO	NO	NO
Do you face a long-term water supply shortfall or limitation in wastewater treatment capacity due to increasing population?		NO	NO
Is the long-term shortfall expected as a shortage in the source of supply or a shortfall in capacity of the system to treat and distribute water?	NO	YES	
Is your goal to secure a sustainable source of water supply or to defer capital costs for system expansion?	NO	YES	
What water efficiency programs are currently in place?			
Community Outreach		YES	
Water metering		YES	
Outside water use by-laws		YES	
Rebates & capacity buy-backs		YES	
Water loss control		YES	
Conservation pricing	NO		
Other new technologies		YES	
In your plans, what reduction do you need to achieve?			By when?
Small (1-10% reduction)	10%	YES	2031
Medium (10-20% reduction)	NO	YES	
Large (>20% reduction)	NO	YES	
Identify your preferred water demand management objectives to 2051.			
Community Outreach		YES	
Water metering		YES	
Outside water use by-laws		YES	
Rebates & capacity buy-backs		YES	
Water loss control		YES	
Conservation pricing	NO		
Other new technologies		YES	

Municipal System	Maryhill Heights		
Water Use Confirmed	Yes		
Efficiency Programs Confirmed	Yes		
Water Use Objectives Confirmed	Yes	Status Quo	
Plan	Plan Type	Good Until	Reference
	0	0	0
Municipal Water System Demand			
Parameter	Base Yr. 2011	Design Yr. 2031	Design Yr. 2051
Population	160	152	152
Average Daily Demand (ML/d)	72	68	68
Peak Daily Demand (ML/d)	125	119	119
PDD:ADD Ratio	1.75		
Average Annual Water Use by Customer Category			
Residential (% or ML/d)			
ICI (% or ML/d)			
Non-Revenue (% or ML/d)			
System Capacity			
Basis (e.g. daily, hourly)			
Water Treatment (ML/d)	820	820	820
Wastewater Treatment (ML/d)			
Water Treatment Capacity Limited	NO	NO	NO
Do you face a long-term water supply shortfall or limitation in wastewater treatment capacity due to increasing population?		YES	NO
Is the long-term shortfall expected as a shortage in the source of supply or a shortfall in capacity of the system to treat and distribute water?	NO	YES	
Is your goal to secure a sustainable source of water supply or to defer capital costs for system expansion?	NO	YES	
What water efficiency programs are currently in place?			
Community Outreach		YES	
Water metering		YES	
Outside water use by-laws		YES	
Rebates & capacity buy-backs		YES	
Water loss control		YES	
Conservation pricing	NO		
Other new technologies		YES	
In your plans, what reduction do you need to achieve?			By when?
Small (1-10% reduction)	10%	YES	2031
Medium (10-20% reduction)	NO	YES	
Large (>20% reduction)	NO	YES	
Identify your preferred water demand management objectives to 2051.			
Community Outreach		YES	
Water metering		YES	
Outside water use by-laws		YES	
Rebates & capacity buy-backs		YES	
Water loss control		YES	
Conservation pricing	NO		
Other new technologies		YES	

Municipal System	West Montrose		
Water Use Confirmed	Yes	Tier 3	
Efficiency Programs Confirmed	Yes		
Water Use Objectives Confirmed	Yes	Status Quo	
Plan	Plan Type	Good Until	Reference
	Class EA	0	AECOM 2013
Municipal Water System Demand			
Parameter	Base Yr. 2011	Design Yr. 2031	Design Yr. 2051
Population	245	285	285
Average Daily Demand (ML/d)	78	91	91
Peak Daily Demand (ML/d)	173	201	201
PDD:ADD Ratio	2.22		
Average Annual Water Use by Customer Category			
Residential (% or ML/d)			
ICI (% or ML/d)			
Non-Revenue (% or ML/d)			
System Capacity			
Basis (e.g. daily, hourly)			
Water Treatment (ML/d)	238	238	238
Wastewater Treatment (ML/d)			
Water Treatment Capacity Limited	NO	NO	NO
Do you face a long-term water supply shortfall or limitation in wastewater treatment capacity due to increasing population?		YES	YES
Is the long-term shortfall expected as a shortage in the source of supply or a shortfall in capacity of the system to treat and distribute water?	NO	YES	
Is your goal to secure a sustainable source of water supply or to defer capital costs for system expansion?	NO	YES	
What water efficiency programs are currently in place?			
Community Outreach		YES	
Water metering		YES	
Outside water use by-laws		YES	
Rebates & capacity buy-backs		YES	
Water loss control		YES	
Conservation pricing	NO		
Other new technologies		YES	
In your plans, what reduction do you need to achieve?			By when?
Small (1-10% reduction)	NO		
Medium (10-20% reduction)	NO		
Large (>20% reduction)	NO		
Identify your preferred water demand management objectives to 2051.			
Community Outreach		YES	
Water metering		YES	
Outside water use by-laws		YES	
Rebates & capacity buy-backs		YES	
Water loss control		YES	
Conservation pricing	NO		
Other new technologies		YES	

Municipal System	Foxboro Green		
Water Use Confirmed	Yes		
Efficiency Programs Confirmed	Yes		
Water Use Objectives Confirmed	Yes	Status Quo	
Plan	Plan Type	Good Until	Reference
	0	0	0
Municipal Water System Demand			
Parameter	Base Yr. 2011	Design Yr. 2031	Design Yr. 2051
Population	401	411	430
Average Daily Demand (ML/d)	99	101	106
Peak Daily Demand (ML/d)	160	164	172
PDD:ADD Ratio	1.62		
Average Annual Water Use by Customer Category			
Residential (% or ML/d)			
ICI (% or ML/d)			
Non-Revenue (% or ML/d)			
System Capacity			
Basis (e.g. daily, hourly)			
Water Treatment (ML/d)	527	527	527
Wastewater Treatment (ML/d)			
Water Treatment Capacity Limited	NO	NO	NO
Do you face a long-term water supply shortfall or limitation in wastewater treatment capacity due to increasing population?		NO	NO
Is the long-term shortfall expected as a shortage in the source of supply or a shortfall in capacity of the system to treat and distribute water?	NO	YES	
Is your goal to secure a sustainable source of water supply or to defer capital costs for system expansion?	NO	YES	
What water efficiency programs are currently in place?			
Community Outreach		YES	
Water metering		YES	
Outside water use by-laws		YES	
Rebates & capacity buy-backs		YES	
Water loss control		YES	
Conservation pricing	NO		
Other new technologies		YES	
In your plans, what reduction do you need to achieve?			By when?
Small (1-10% reduction)	NO		
Medium (10-20% reduction)	NO		
Large (>20% reduction)	NO		
Identify your preferred water demand management objectives to 2051.			
Community Outreach		YES	
Water metering		YES	
Outside water use by-laws		YES	
Rebates & capacity buy-backs		YES	
Water loss control		YES	
Conservation pricing	NO		
Other new technologies		YES	

Municipal System	Drumbo		
Water Use Confirmed	Yes		
Efficiency Programs Confirmed	Yes		
Water Use Objectives Confirmed	Yes	Status Quo	
Long Term Water Supply Plan			
Plan	Plan Type	Good Until	Reference
	Class EA	2021	CRA 2006
Municipal Water System Demand			
Parameter	Base Yr. 2011	Design Yr. 2031	Design Yr. 2051
Population	528	797	1000
Average Daily Demand (ML/d)	198	298	374
Peak Daily Demand (ML/d)	483	729	914
PDD:ADD Ratio	2.44		
Average Annual Water Use by Customer Category			
Residential (% or ML/d)			
ICI (% or ML/d)			
Non-Revenue (% or ML/d)			
System Capacity			
Basis (e.g. daily, hourly)			
Water Treatment (ML/d)	1329	1329	1057
Wastewater Treatment (ML/d)			
Water Treatment Capacity Limited	NO	NO	NO
Do you face a long-term water supply shortfall or limitation in wastewater treatment capacity due to increasing population?		YES	YES
Is the long-term shortfall expected as a shortage in the source of supply or a shortfall in capacity of the system to treat and distribute water?	NO	YES	
Is your goal to secure a sustainable source of water supply or to defer capital costs for system expansion?	NO	YES	
What water efficiency programs are currently in place?			
Community Outreach		YES	
Water metering		YES	
Outside water use by-laws		YES	
Rebates & capacity buy-backs		YES	
Water loss control		YES	
Conservation pricing		YES	
Other new technologies		YES	
In your plans, what reduction do you need to achieve?			By when?
Small (1-10% reduction)	NO		
Medium (10-20% reduction)	NO		
Large (>20% reduction)	NO		
Identify your preferred water demand management objectives to 2051.			
Community Outreach		YES	
Water metering		YES	
Outside water use by-laws		YES	
Rebates & capacity buy-backs		YES	
Water loss control		YES	
Conservation pricing		YES	
Other new technologies		YES	

Municipal System	Plattsville		
Water Use Confirmed	Yes		
Efficiency Programs Confirmed	Yes		
Water Use Objectives Confirmed	Yes	Status Quo	
Long Term Water Supply Plan			
Plan	Plan Type	Good Until	Reference
	Class EA	NA	Burnside 1999
Municipal Water System Demand			
Parameter	Base Yr. 2011	Design Yr. 2031	Design Yr. 2051
Population	1182	2175	2675
Average Daily Demand (ML/d)	483	889	1094
Peak Daily Demand (ML/d)	909	1673	2057
PDD:ADD Ratio	1.88		
Average Annual Water Use by Customer Category			
Residential (% or ML/d)			
ICI (% or ML/d)			
Non-Revenue (% or ML/d)			
System Capacity			
Basis (e.g. daily, hourly)			
Water Treatment (ML/d)	2290	2290	2290
Wastewater Treatment (ML/d)			
Water Treatment Capacity Limited	NO	NO	NO
Do you face a long-term water supply shortfall or limitation in wastewater treatment capacity due to increasing population?		YES	YES
Is the long-term shortfall expected as a shortage in the source of supply or a shortfall in capacity of the system to treat and distribute water?	NO	YES	
Is your goal to secure a sustainable source of water supply or to defer capital costs for system expansion?	NO	YES	
What water efficiency programs are currently in place?			
Community Outreach		YES	
Water metering		YES	
Outside water use by-laws		YES	
Rebates & capacity buy-backs		YES	
Water loss control		YES	
Conservation pricing		YES	
Other new technologies		YES	
In your plans, what reduction do you need to achieve?			By when?
Small (1-10% reduction)	NO		
Medium (10-20% reduction)	NO		
Large (>20% reduction)	NO		
Identify your preferred water demand management objectives to 2051.			
Community Outreach		YES	
Water metering		YES	
Outside water use by-laws		YES	
Rebates & capacity buy-backs		YES	
Water loss control		YES	
Conservation pricing		YES	
Other new technologies		YES	

Municipal System	Bright		
Water Use Confirmed	Yes	Tier 3	
Efficiency Programs Confirmed	Yes		
Water Use Objectives Confirmed	Yes	Status Quo	
Long Term Water Supply Plan			
Plan	Plan Type	Good Until	Reference
	0	0	0
Municipal Water System Demand			
Parameter	Base Yr. 2011	Design Yr. 2031	Design Yr. 2051
Population	409	512	512
Average Daily Demand (ML/d)	87	108	108
Peak Daily Demand (ML/d)	192	240	240
PDD:ADD Ratio	2.21		
Average Annual Water Use by Customer Category			
Residential (% or ML/d)			
ICI (% or ML/d)			
Non-Revenue (% or ML/d)			
System Capacity			
Basis (e.g. daily, hourly)			
Water Treatment (ML/d)	327	327	327
Wastewater Treatment (ML/d)			
Water Treatment Capacity Limited	NO	NO	NO
Do you face a long-term water supply shortfall or limitation in wastewater treatment capacity due to increasing population?		YES	YES
Is the long-term shortfall expected as a shortage in the source of supply or a shortfall in capacity of the system to treat and distribute water?	NO	YES	
Is your goal to secure a sustainable source of water supply or to defer capital costs for system expansion?	NO	YES	
What water efficiency programs are currently in place?			
Community Outreach		YES	
Water metering		YES	
Outside water use by-laws		YES	
Rebates & capacity buy-backs		YES	
Water loss control		YES	
Conservation pricing		YES	
Other new technologies		YES	
In your plans, what reduction do you need to achieve?			By when?
Small (1-10% reduction)	NO		
Medium (10-20% reduction)	NO		
Large (>20% reduction)	NO		
Identify your preferred water demand management objectives to 2051.			
Community Outreach		YES	
Water metering		YES	
Outside water use by-laws		YES	
Rebates & capacity buy-backs		YES	
Water loss control		YES	
Conservation pricing		YES	
Other new technologies		YES	

Grand River Watershed Water Management Plan:
Municipal Water Supply and Demand Management Reporting Sheet

No Capacity or Growth Issues to 2051
No Capacity or Growth Issues to 2031
No Capacity Issues to 2051

Water Use Confirmed	Yes			Yes	Tier 3 (Bethel)		Yes		
Efficiency Programs Confirmed	Yes			Yes			Yes		
Water Use Objectives Confirmed	Yes	Status Quo		No	Draft		Yes	Status Quo	
Municipal System	Brantford (including Cainsville)			Paris			St George		
Long Term Water Supply Plan							Long Term Water Supply Plan		
Plan	Plan Type	Good Until	Reference	Plan Type	Good Until	Reference	Plan Type	Good Until	Reference
Current source estimated demand of 130 ML/day in 50 yrs	Master Plans	2050	Personal Comm.	Master Servicing Plan	0	0	0	0	0
Municipal Water System Demand							Municipal Water System Demand		
Parameter	Base Yr. 2011	Design Yr. 2031	Design Yr. 2051	Base Yr. 2011	Design Yr. 2031	Design Yr. 2051	Base Yr. 2011	Design Yr. 2031	Design Yr. 2051
Population	95600	121070	145774	11763	20258	27465	3124	3327	3421
Average Daily Demand (ML/d)	34224	43342	52186	4998	8608	11671	927	987	1015
Peak Daily Demand (ML/d)	53338	67548	81331	6918	11913	16152	2185	2327	2393
PDD:ADD Ratio	1.56			1.38			2.36		
Average Annual Water Use by Customer Category	Average Annual Water Use by Customer Category			Average Annual Water Use by Customer Category			Average Annual Water Use by Customer Category		
Residential (% or ML/d)									
ICI (% or ML/d)									
Non-Revenue (% or ML/d)									
System Capacity	System Capacity			System Capacity			System Capacity		
Basis (e.g. daily, hourly)									
Water Treatment (ML/d)	100000	100000	100000	17400	21700	21700	7855	7855	7855
Wastewater Treatment (ML/d)									
Water Treatment Capacity Limited	NO	NO	NO	NO	NO	NO	NO	NO	NO
Do you face a long-term water supply shortfall or limitation in wastewater treatment capacity due to increasing population?	Do you face a long-term water supply shortfall or limitation in wastewater treatment capacity due to increasing population?			Do you face a long-term water supply shortfall or limitation in wastewater treatment capacity due to increasing population?			Do you face a long-term water supply shortfall or limitation in wastewater treatment capacity due to increasing population?		
		YES	YES		NO	NO		NO	NO
Is the long-term shortfall expected as a shortage in the source of supply or a shortfall in capacity of the system to treat and distribute water?	Is the long-term shortfall expected as a shortage in the source of supply or a shortfall in capacity of the system to treat and distribute water?			Is the long-term shortfall expected as a shortage in the source of supply or a shortfall in capacity of the system to treat and distribute water?			Is the long-term shortfall expected as a shortage in the source of supply or a shortfall in capacity of the system to treat and distribute water?		
	NO	YES		NO	YES		NO	YES	
Is your goal to secure a sustainable source of water supply or to defer capital costs for system expansion?	Is your goal to secure a sustainable source of water supply or to defer capital costs for system expansion?			Is your goal to secure a sustainable source of water supply or to defer capital costs for system expansion?			Is your goal to secure a sustainable source of water supply or to defer capital costs for system expansion?		
	NO	YES		NO	YES		NO	YES	
What water efficiency programs are currently in place?	What water efficiency programs are currently in place?			What water efficiency programs are currently in place?			What water efficiency programs are currently in place?		
Community Outreach		YES			YES			YES	
Water metering		YES			YES			YES	
Outside water use by-laws		YES			YES			YES	
Rebates & capacity buy-backs	NO			NO			NO		
Water loss control		YES			YES			YES	
Conservation pricing		YES		NO			NO		
Other new technologies	NO			NO			NO		
In your plans, what reduction do you need to achieve?	In your plans, what reduction do you need to achieve?		By when?	In your plans, what reduction do you need to achieve?		By when?	In your plans, what reduction do you need to achieve?		By when?
Small (1-10% reduction)	NO			NO	YES		NO		
Medium (10-20% reduction)	NO			NO	YES		NO		
Large (>20% reduction)	NO			NO	YES		NO		
Identify your preferred water demand management objectives to 2051.	Identify your preferred water demand management objectives to 2051.			Identify your preferred water demand management objectives to 2051.			Identify your preferred water demand management objectives to 2051.		
Community Outreach		YES			YES			YES	
Water metering		YES			YES			YES	
Outside water use by-laws		YES			YES			YES	
Rebates & capacity buy-backs	NO			NO			NO		
Water loss control		YES			YES			YES	
Conservation pricing		YES		NO			NO		
Other new technologies	NO			NO			NO		

Water Use Confirmed	Yes			Yes			Yes		
Efficiency Programs Confirmed	Yes			Yes			Yes		
Water Use Objectives Confirmed	No	Draft		Yes	Status Quo		Yes	Status Quo	
Municipal System	Mount Pleasant			Airport			Caledonia		
Long Term Water Supply Plan	Long Term Water Supply Plan								
Plan	Plan Type	Good Until	Reference	Plan Type	Good Until	Reference	Plan Type	Good Until	Reference
	0	0	0	0	0	0	Class EA	2016	Earth Tech 2006
Municipal Water System Demand	Municipal Water System Demand			Municipal Water System Demand			Municipal Water System Demand		
Parameter	Base Yr. 2011	Design Yr. 2031	Design Yr. 2051	Base Yr. 2011	Design Yr. 2031	Design Yr. 2051	Base Yr. 2011	Design Yr. 2031	Design Yr. 2051
Population	1152	1503	1784	500	597	595	9999	15459	19395
Average Daily Demand (ML/d)	693	904	1073	220	263	262	2729	4219	5293
Peak Daily Demand (ML/d)	1841	2402	2852	689	823	820	5358	8284	10393
PDD:ADD Ratio	2.66			3.13			1.96		
Average Annual Water Use by Customer Category	Average Annual Water Use by Customer Category			Average Annual Water Use by Customer Category			Average Annual Water Use by Customer Category		
Residential (% or ML/d)							70%		
ICI (% or ML/d)							12%		
Non-Revenue (% or ML/d)							18%		
System Capacity	System Capacity			System Capacity			System Capacity		
Basis (e.g. daily, hourly)									
Water Treatment (ML/d)	2274	2274	2274	2273	2273	2273	13000	13000	13000
Wastewater Treatment (ML/d)							7200		
Water Treatment Capacity Limited	NO	YES	YES	NO	NO	NO	NO	NO	NO
Do you face a long-term water supply shortfall or limitation in wastewater treatment capacity due to increasing population?	Do you face a long-term water supply shortfall or limitation in wastewater treatment capacity due to increasing population?			Do you face a long-term water supply shortfall or limitation in wastewater treatment capacity due to increasing population?			Do you face a long-term water supply shortfall or limitation in wastewater treatment capacity due to increasing population?		
		YES	YES		NO	NO		NO	NO
Is the long-term shortfall expected as a shortage in the source of supply or a shortfall in capacity of the system to treat and distribute water?	Is the long-term shortfall expected as a shortage in the source of supply or a shortfall in capacity of the system to treat and distribute water?			Is the long-term shortfall expected as a shortage in the source of supply or a shortfall in capacity of the system to treat and distribute water?			Is the long-term shortfall expected as a shortage in the source of supply or a shortfall in capacity of the system to treat and distribute water?		
	NO	YES		NO	YES		N/A	N/A	
Is your goal to secure a sustainable source of water supply or to defer capital costs for system expansion?	Is your goal to secure a sustainable source of water supply or to defer capital costs for system expansion?			Is your goal to secure a sustainable source of water supply or to defer capital costs for system expansion?			Is your goal to secure a sustainable source of water supply or to defer capital costs for system expansion?		
	NO	YES		NO	YES			YES	
What water efficiency programs are currently in place?	What water efficiency programs are currently in place?			What water efficiency programs are currently in place?			What water efficiency programs are currently in place?		
Community Outreach		YES			YES		NO		
Water metering		YES			YES			YES	
Outside water use by-laws		YES			YES			YES	
Rebates & capacity buy-backs	NO			NO			NO		
Water loss control		YES			YES			YES	
Conservation pricing	NO			NO			NO		
Other new technologies	NO			NO			NO		
In your plans, what reduction do you need to achieve?	In your plans, what reduction do you need to achieve?		By when?	In your plans, what reduction do you need to achieve?		By when?	In your plans, what reduction do you need to achieve?		
Small (1-10% reduction)	NO			NO			NO		
Medium (10-20% reduction)	NO			NO			NO		
Large (>20% reduction)		YES	2031 Peak Day	NO			NO		
Identify your preferred water demand management objectives to 2051.	Identify your preferred water demand management objectives to 2051.			Identify your preferred water demand management objectives to 2051.			Identify your preferred water demand management objectives to 2051.		
Community Outreach		YES			YES		NO		
Water metering		YES			YES			YES	
Outside water use by-laws		YES			YES			YES	
Rebates & capacity buy-backs	NO			NO			NO		
Water loss control		YES			YES			YES	
Conservation pricing	NO			NO			NO		
Other new technologies	NO			NO			NO		

Water Use Confirmed	Yes			Yes		
Efficiency Programs Confirmed	Yes			Yes		
Water Use Objectives Confirmed	Yes	Status Quo		Yes	Status Quo	
Municipal System	Cayuga			Dunnville		
Long Term Water Supply Plan						
Plan	Plan Type	Good Until	Reference	Plan Type	Good Until	Reference
	Class EA	2016	Earth Tech 2006	0	0	0
Municipal Water System Demand	Municipal Water System Demand			Municipal Water System Demand		
Parameter	Base Yr. 2011	Design Yr. 2031	Design Yr. 2051	Base Yr. 2011	Design Yr. 2031	Design Yr. 2051
Population	1622	2167	2495	5789	6211	6635
Average Daily Demand (ML/d)	632	844	972	2858	3066	3276
Peak Daily Demand (ML/d)	1164	1554	1790	8242	8843	9446
PDD:ADD Ratio	1.84			2.88		
Average Annual Water Use by Customer Category	Average Annual Water Use by Customer Category			Average Annual Water Use by Customer Category		
Residential (% or ML/d)	56%			53%		
ICI (% or ML/d)	18%			21%		
Non-Revenue (% or ML/d)	26%			26%		
System Capacity	System Capacity			System Capacity		
Basis (e.g. daily, hourly)						
Water Treatment (ML/d)	2333	2333	2333	14500	26000	26000
Wastewater Treatment (ML/d)	873	1215	1215	7728		
Water Treatment Capacity Limited	NO	NO	NO	NO	NO	NO
Do you face a long-term water supply shortfall or limitation in wastewater treatment capacity due to increasing population?	Do you face a long-term water supply shortfall or limitation in wastewater treatment capacity due to increasing population?			Do you face a long-term water supply shortfall or limitation in wastewater treatment capacity due to increasing population?		
		NO	NO		NO	NO
Is the long-term shortfall expected as a shortage in the source of supply or a shortfall in capacity of the system to treat and distribute water?	Is the long-term shortfall expected as a shortage in the source of supply or a shortfall in capacity of the system to treat and distribute water?			Is the long-term shortfall expected as a shortage in the source of supply or a shortfall in capacity of the system to treat and distribute water?		
	N/A	N/A		NO		
Is your goal to secure a sustainable source of water supply or to defer capital costs for system expansion?	Is your goal to secure a sustainable source of water supply or to defer capital costs for system expansion?			Is your goal to secure a sustainable source of water supply or to defer capital costs for system expansion?		
		YES			YES	
What water efficiency programs are currently in place?	What water efficiency programs are currently in place?			What water efficiency programs are currently in place?		
Community Outreach	NO			NO		
Water metering		YES			YES	
Outside water use by-laws		YES			YES	
Rebates & capacity buy-backs	NO			NO		
Water loss control		YES			YES	
Conservation pricing	NO			NO		
Other new technologies	NO			NO		
In your plans, what reduction do you need to achieve?	In your plans, what reduction do you need to achieve?		By when?	In your plans, what reduction do you need to achieve?		By when?
Small (1-10% reduction)	NO			NO		
Medium (10-20% reduction)	NO			NO		
Large (>20% reduction)	NO			NO		
Identify your preferred water demand management objectives to 2051.	Identify your preferred water demand management objectives to 2051.			Identify your preferred water demand management objectives to 2051.		
Community Outreach	NO			NO		
Water metering		YES			YES	
Outside water use by-laws		YES			YES	
Rebates & capacity buy-backs	NO			NO		
Water loss control		YES			YES	
Conservation pricing	NO			NO		
Other new technologies	NO			NO		

* This would trigger a specific rate review exercise

Appendix J: Whitemans Creek Drought Contingency Plan, January 2014

The Whitemans Creek Subwatershed Drought Contingency Project

Water Resource Adaptation and Management Initiative

Prepared by: Hajnal Kovacs, B.Sc., MES
January 2014

The Water Resource Adaptation and Management Initiative
Agriculture and Agri-Food Canada / Agriculture et Agroalimentaire Canada
Farm & Food Care Ontario
Ontario
Grant County Initiative of Agriculture
Grand River Conservation Authority

List of Figures

Introduction

The Whitemans Creek subwatershed in the Grand River watershed is an area with a rich variety of agricultural production. Low water conditions are a perennial issue in this subwatershed impacting both agriculture and the cold water trout fishery and wildlife that depend on Creek flows. In 2007 and 2012, the Creek fell to Ontario Low Water Response (OLWR) Level 3 conditions (less than 30% of average summer low flow and receiving less than 40% of long term average precipitation in a 30-60 day period). Through the Grand River Conservation Authority (GRCA) Low Water Response team, agencies and partners have been working with the irrigators for many years trying to help cope with low water issues. During the February 11th, 2013 Whitemans Creek Irrigators debriefing with the Brant County Federation of Agriculture (BCFA) at the Burford Fairgrounds, agencies discussed with local farmers the numerous irrigation Permits to Take Water (PTTW) from the Whitemans Creek area and how they affect Creek flows during times of drought. As a result of February's meeting, a working group was formed comprised of BCFA, GRCA, Ministry of Natural Resources, Ministry of Agriculture and Food, and Ministry of the Environment. The committee applied for funding under the Water Resource Adaptation and Management Initiative (WRAMI) at Farm and Food Care Ontario (FFCO). The Whitemans Creek Subwatershed Drought Contingency Pilot Project was one of 20 pilot projects in 2013 that received funding. The multi-agency steering committee hired Hajnal Kovacs to coordinate the project as the Drought Contingency Specialist, her findings are reported below.

Steering Committee

The group of individuals who designed this WRAMI project have different professions and backgrounds, with the common goal of helping irrigators in the Whitemans subwatershed be better prepared for drought. The committee consisted of: Larry Davis, Director, BCFA, Janet Licskai, Member Service Representative, Ontario Federation of Agriculture, James Etienne, Senior Water Resource Engineer, GRCA, Rebecca Shortt, Irrigation Engineer, Ontario Ministry of Agriculture and Food, and Ministry of Rural Affairs (OMAF/MRA), Ken Cornelisse, District Water Resources Coordinator, Ministry of Natural Resources (MNRF), Hal Schraeder, PTTW Program Specialist, MOECC, and John Warbick, Hydrogeologist, Ministry of the Environment (MOECC).

Acknowledgements

This project would not have had successful results if it was not for the receptive farmers of the Whitemans Creek subwatershed. We thank everyone who took time out of their farm operation to meet and talk with Hajnal Kovacs throughout the growing season. We want to thank Nathan Streef from Streef Produce for hosting the demonstration farm site during the twilight meeting in August. As well, John Kertez, John Sroka and Ken Van Torre who all volunteered to have their soil moisture monitored throughout the season. Many aspects of this project would be impossible without your support.

Summary

This pilot project was a proactive approach to a reoccurring issue of low water in the Whitemans Creek subwatershed, a highly productive agricultural area. The project took place over eight months and every surface water Permit To Take Water (PTTW) holder was contacted. The goal of the project was to increase drought preparedness as well as increasing communication with the Conservation Authorities, Ministries and local groups, increasing education and outreach, and increasing understanding for both water users and regulators of how water is used in the Whitemans Creek subwatershed.

Increased communication was achieved through regular site visits and continual contact by Hajnal Kovacs, Drought Contingency Specialist, as she collaborated with the farmers to build a drought contingency plan. Educational flyers and one-on-one sit down meetings with the farmers increased education regarding irrigation systems, calculating watering demands, introduction to soil moisture monitoring, PTTW applications/amendments and the process involved in pond creation/renovation. Two farmers participated in the irrigation system assessments that were offered by OMAF as part of this pilot project. These assessments gave the farmers an opportunity to see the ways in which their irrigation systems, both centre pivots on potato fields, could be modified to work more efficiently. Three farmers participated in soil moisture monitoring throughout the growing season. This resulted in tracking the soil moisture of six different fields: tobacco, seedling ginseng, two-year-old ginseng, overhead irrigated tomatoes, drip tape irrigated tomatoes, and drip tape irrigated peppers. These farmers got firsthand experience in witnessing the benefits of soil moisture monitoring and how useful it can be to them to make irrigation decisions. Farm and Food Care documented the monitoring on these fields with their video, "Water Conservation and Protection in an Ontario Watershed" on their YouTube channel at: http://www.youtube.com/watch?v=aR5j0NBvYh4. Five farmers showed interest in being involved with the advertised pond renovation that offered cost-sharing to either create a contingency source or modify an existing one to have a greater storage capacity. Four of the renovations were completed in the fall of 2013 and one of them is planned to commence in September 2014, due to timing limitations of in-water works for an online pond. During the pond renovations, Farm and Food care captured some of the work and the benefits of such renovation projects in a video called, "Pond renovation creates alternative irrigation source for Ontario farms" on their YouTube channel at: http://www.youtube.com/watch?v=9CoPtrpgnCk&list=PLxl8ycqu125fcq7iHjSuc2KV60lhXAru.

The result of the knowledge gained from these farmers was used in forming a plan to help drought preparedness for all farmers, a plan which reflects years of farming expertise. Four steps have been highlighted as key components to a drought contingency plan: 1) making sure an irrigation system is in place and working accurately, 2) using Best Management Practices (BMPs) year round, 3) securing a reliable water source with a Permit To Take Water, and 4) writing down what options exist if the regular water supply is not able to provide the watering needs. With a total of nine farmers involved with the project as well as the several others who were in touch with Hajnal throughout the project our findings indicate the importance of proactive thinking and planning with the agricultural community, especially in the case of drought planning.

Drought Contingency Planning

The irrigators in the Whitemans Creek subwatershed are very responsible with their water use during irrigation events not just because it is costly to irrigate but because they understand the value of water to their farm operation. Farmers are constantly under the stress of producing quality, high yielding crops with the least amount of inputs in order to maximize their revenue. Pressures are especially high during times of drought when decisions become more serious and the fate of the crop is at stake. This is why planning ahead for a drought is beneficial so that when a drought does come farmers can be prepared and bring their plan to action without having to make decisions in the middle of the season under stress. A plan should include good preparation and a contingency plan. Preparing for a drought consists of four steps: 1) making sure an irrigation system is in place and working accurately, 2) using Best Management Practices (BMPs) year round, 3) securing a reliable water source with a Permit To Take Water before a drought, and 4) writing down what options exist if the regular water supply is not able to provide the water needed (this is the contingency plan). During a drought you can review actions 1 and 2; are your systems working effectively and are BMPs being used? During a drought monitor the main supply water levels (and how they are decreasing/recovering). You may need to act on one of the Contingency Plan options. This might include requesting to use a neighbour's pond, reducing irrigation amount or even trucking in water. For a brief summary of the plan, please refer to "Summary of Plan" attached as Appendix 1.

1.0 Irrigation Systems

Constantly upgrading, and in some cases switching, irrigation systems are needed to increase an irrigation system's land cover, reduce its fuel consumption and maximize its water application. Some land owners invest in yearly tune ups that cost about $1,800 for a travelling gun while others invest in new computer boards for centre pivots (Figure 1) that cost around $50,000. While a drip tape system needs to be purchased yearly and in order to dispose of them farmers have to pay an additional fee. Whether a farmer can spend the money to upgrade their system or are simply doing their own tune ups, the ultimate goal is the same: increase efficiency while minimizing fuel and water loss.

Figure 1: Centre pivot irrigation system assessment on a potato farm in Brant County.

1.1 Irrigation System Assessments

Ever notice how some sections of a field are always dryer than others? The answer might be soil variability but it could also be uneven irrigation. Irrigation system assessments are one of the greatest opportunities for

irrigation efficiency and water savings because they can help improve the spread of water across the field. They can be conducted on overhead irrigation guns, centre pivots and even drip tape systems. In Ontario OMAF/MRA and AAFC are currently working with the California approach for irrigation system assessment since they are one of the first to standardize the approaches to measuring. For more detail on the methods, please refer to "Irrigation Assessments" attached as Appendix 2.

1.2 Benefits of Irrigation Assessments

During our advertising of irrigation assessments we found that farmers were surprised that such a service was offered to them especially for free. They saw the immediate benefit to getting their irrigation systems assessed as the results could point out which aspects of their system were not functioning properly. After running the assessment on two centre pivot systems we found out that the methods used were ineffective for those centre pivots. Both systems will be reassessed next season with an alternative method that is suitable for these pivots.

> Interested in getting an irrigation system assessed?
>
> Staff at OMAF conducts these assessments, for more information and to request an Irrigation System Assessment contact: *Rebecca Shortt* (519) 426-4920 or *Patrick Handyside* (226) 217-8001.

2.0 Best Management Practices (BMPs)

BMPs are practical and affordable approaches to conserving soil and water resources without sacrificing productivity. Timing irrigation events to occur in low wind conditions and preferable at night will minimize water loss and ensure that the amount of water applied will actually make it to the soil. The Ontario Ministry of Agriculture and Food has written books on the BMPs for 25 agricultural practices. The Irrigation Management BMPs for Crop Production outlines ways of making optimal use of water resources, they are summarized in "Irrigation Management BMPs" attached as Appendix 3 and can be seen on pg. 77-80 of BMPs of Irrigation Management for full details.

Planning For A Drought	During A Drought
• **Get a PTTW before a drought so that you are not scrambling to get one while the crops are wilting away.** • **Match crops to soil types so that they will need less irrigate, which is especially ideal when there is less water available.** • **Build soil organic matter throughout the years; pays off annually but especially during a drought year when any water received needs to be held in the soil for as long as possible.** • **Invest in and use a mobile soil moisture meter.**	• **When irrigation is needed, know exactly how much is needed by monitoring your soil moisture.** • **For produce like peppers and tomatoes, plant crop with plastic mulch to hold the soil moisture to the roots and prevent evaporation.** • **With plastic mulch use a drip system irrigation which requires less water per irrigation event. Irrigating a little bit all the time gives a pond the chance to recharge instead of draining all of it at once (like with an overhead gun for example).**

Irrigation shouldn't waste time, money, or water. Up-to-date information on scheduling strategies, the pros and cons of sprinkler, drip, and sub-irrigation systems, water-saving tips, and special applications are all available from BMP books. It even includes extensive crop-specific charts. Making sure a farm uses BMPs is the second step in drought planning, the third is establishing a secure water source.

> **Interested in getting a copy of your own BMPs books?**
>
> If you are an Ontario farmer, single copies of each title are available at no cost at your nearest Ontario Ministry of Agriculture and Food location. Books can also be order through an online order form from Service Ontario at http://www.gov.on.ca/OMAF/english/products/best.html

2.1 Soil Moisture Monitoring

Keeping an eye on soil moisture can help determine when irrigation is needed so that farmers do not irrigate too early or wait until the plants are already showing sign of water stress. When this happens, chances are the yield or quality has already been impacted. Soil moisture monitoring also helps remove questions of, "Should I irrigate today? Or can it wait a few more days?" Because the readings are accurate and field specific, monitoring the moisture day by day gives confidently planned irrigation events.

Figure 3: FieldScout TDR100 Soil Moisture Meter with 8" probes.

This Drought Contingency Pilot Project offered soil moisture monitoring to the surface water permit holders in the subwatershed and three farmers showed interest. Fortunately all of them had different types of crops: tobacco, peppers, tomatoes, seedling ginseng and two year old ginseng. Daily soil moisture monitoring over the months of August and September with a portable FieldScout TDR100 Soil Moisture Meter (Figure 3) took place at the same time each day. Results are described in more detail below in sections 2.1.1 through 2.1.3 and the monthly moisture graphs are in Appendix 4.

The FieldScout gives two reading measurement options: Volumetric Water Content (VWC) and Relative Water Content (RWC). The VWC is the ratio of:

$$\frac{\text{Volume of water for a Given volume of soil}}{\text{Total soil volume}} = \text{VWC \%}$$

It is expressed as a percentage and at saturation would equal the percent pore space of the soil. Using the VWC, you can determine a soil's field capacity and its permanent wilting point. The farms that were

monitored all had sandy loam soils meaning their field capacity would be 23% soil moisture and their permanent wilting point would be 11% (Figure 4).

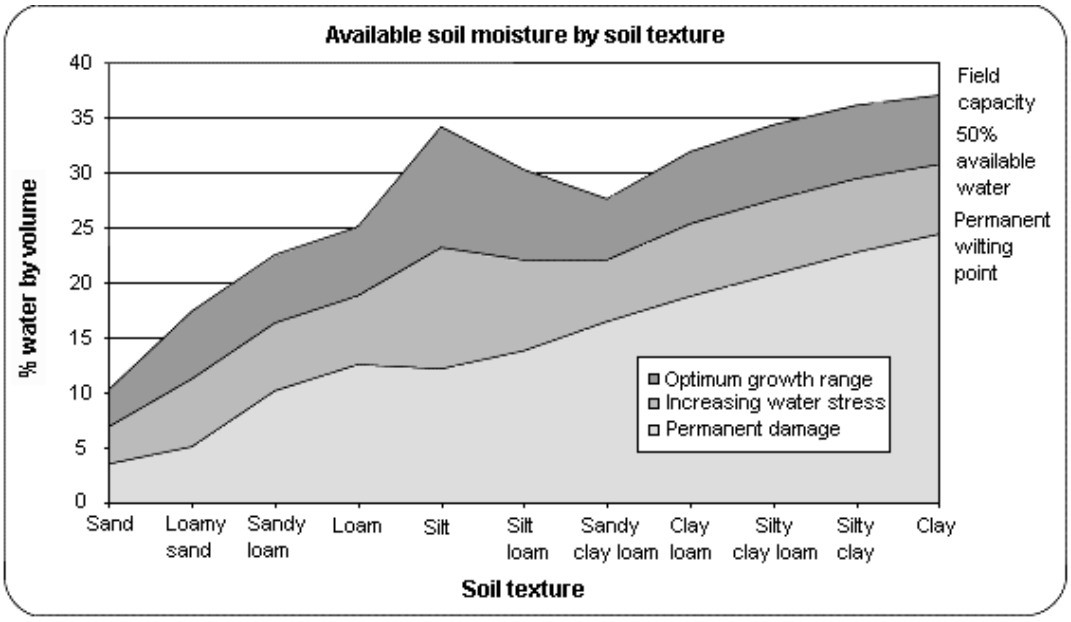


Figure 4: Available soil moisture by soil texture. Based on data from Ratliff, L.F., Ritchie, J.T., and Cassel, D.K. (1983). Soil Science Society of America Journal 47, 770(5).

RWC is index values calculated relative to the upper (wet) and lower (dry) VWC set points of a soil. If the RWC equals 100 the soil has reached the wet set point and it is at field capacity. By setting the field capacity (23% soil moisture) for the wet set point and the permanent wilting point (11% soil moisture) for the dry set point, the RWC reading became equivalent to the Plant Available Water (PAW) rather than just an index from wet to dry. The rule of thumb is to irrigate when a soil has reached 50% of the PAW. During the RWC measurement option, the meter not only displays the RWC (an index of the PAW) but it also shows the Water Deficit (WD) in inches necessary to raise the soil water content to the wet set point (field capacity). These two measurements go hand in hand: as WD increases PAW decreases.

The WD is displayed in inches, this is the same unit farmers use to set their irrigation amount so it seemed best to communicate WD with the farmers instead of PAW or VWC. Results were communicated with the farmers in conversation throughout the monitoring as well as in a final report. They easily understood and interpreted their soil moisture as a deficit of water from the field capacity rather than just telling them the soil moisture as a percentage. Irrigation events commonly apply 0.75” to 1.00” of water either on a weekly basis or whenever the farmer thinks the soil moisture is low enough that the field needs that much water again. If a 0.75” irrigation event was to take place when the WD was only 0.50”, more water would be applied than the field capacity and the extra water will go to waste. Not to mention extra running time for the irrigation systems and a waste of fuel. On the other hand, if a 0.75” irrigation event was to take place on a day when the WD was 1.00” then they would under-water and the next irrigation event would need to occur sooner so that the permanent wilting capacity is not reached. In most cases where the fields are under-watered and the soil moisture is not accurately monitored the field’s water deficit slowly adds up and the farmers are left playing catch up in

August and September. Just because it is common to apply 0.75" to 1.00" of water during irrigation does not mean that irrigating at a WD of 0.75" to 1.00" is the ideal time to start.

According to the water holding capacity of sandy loam soils, we determined that the "ideal irrigation start time" is at a WD of 0.65": approximately 50% of the water holding capacity and thus 50% of PAW. The "permanent wilting point" is at a WD of 1.3". The moisture monitoring results were graphed across times with reference lines at "ideal irrigation start time" and "permanent wilting point". When measurements were near the ideal irrigation start time it was recommended that farmers begin irrigation relatively soon. When readings approached the permanent wilting point it was recommended that farmers begin irrigation as soon as possible. If the fields often fall below the permanent wilting point the plants experience significant water stress and the crop's yield will be affected. See also the "Water Conservation and Protection in an Ontario Watershed" video on Farm and Food Care's YouTube channel at: http://www.youtube.com/watch?v=aR5j0NBvYh4

Planning for A Drought	During A Drought
Use a soil moisture meter throughout each season to get a feel for the readings and how their recommendations align with the current judgment for when and how much to irrigate. The results can be aligned with the usual schedule and once confident, all irrigation events can be planned with the meter. The graphs will show if irrigation is started too soon, too late, or if too much water or not enough is being used.	**While monitoring soil moisture there might be some worries about waiting too long before the next irrigation event, it is okay to let water deficit fall to about 1.0-1.1", or a soil moisture of about 13% (in sandy loam soils). Growth will be reduced but many plants are able to adapt to some water stress.**

2.1.1 John Kertez – Tobacco Fields

We monitored soil moisture on Mr. Kertez's tobacco fields (Figure 5). After the first week of August the soil moisture quickly dropped in these fields (Appendix 4 Graph 1 and 2). On average, the soil moisture was kept pretty well between the ideal irrigation start and permanent wilting point lines. In the future, irrigation should take place a bit more frequently to avoid seeing low moisture values like those on August 7th, 12th, 15th, and 19th. The idea is to irrigate before the field gets this close to the wilting point. Unfortunately, Mr. Kertez did not have time to start irrigating until the last week of August and the rebound in soil moisture on the 26th reflects this. Since the moisture was already so low he was left playing catch up for the rest of the season. The rain events on September 7th, 11th, and 21st combined with his irrigation kept the soil moisture levels at a much better level in September and relatively close to the ideal irrigation start level. This was great because the tobacco plants were experiencing water deficit for almost two weeks in August and would have started showing signs of stress. Even though there were two frost events mid-September and a dry start to the seasons, there was still enough moisture to meet crop yield goals.

Figure 5: Reading the soil moisture on a tobacco plant in Oxford County.

2.1.2 John Sroka – Pepper and Tomato Fields

We monitored soil moisture on Mr. Sroka's tomato (Figure 6) and pepper fields (Figure 7). After the first week of August the soil moisture quickly dropped in Mr. Sroka's tomato fields (Appendix 4 Graph 3). On average, after the 12th of August the soil moisture in the fields *with* plastic mulch was kept between the ideal irrigation start and permanent wilting points. However, the soil moisture in the fields *without* plastic mulch fell to the wilting point after August 6th and was never brought back to ideal moisture levels. Irrigating a bit earlier in August for the tomatoes in order to prevent that initial drop in soil moisture that occurred early in the season could have helped prevent the field from getting so close to the wilting point throughout August. This will eliminate the need to play catch up for the rest of the season.

Figure 6: Reading the soil moisture on tomatoes with plastic mulch (on left) and without (on right) in Brant County.

Figure 7: Reading soil moisture on peppers with plastic mulch in Brant County.

The soil moisture in the pepper fields with black plastic mulch (Appendix 4 Graph 4 and 5) is similar to the tomatoes with plastic mulch. The moisture in the pepper fields dropped in the first week of August and was maintained at about the same level throughout August with a few very dry readings on the 7th and 15th. However, in September the peppers were kept at optimal moisture levels; harvest was around the corner and sufficient water before harvesting peppers is critical. Compared to the month of August you can see how much higher the moisture readings were. It was exactly the kind of trend a drip-system should maintain for maximum yield. The peppers were harvested in late September, so the frequent irrigating and rain gave the very high soil moisture readings on days like August 18th and 25th when there was more moisture than the soil's water holding capacity. These are days where the pumps could have been turned off a few hours earlier, had the farmer been monitoring his own soil. Once the water holding capacity of the field is exceeded the water drains through and cannot be utilized by the crop.

2.1.3 Ken Van Torre – 1 & 2 year Ginseng

Figure 8: Monitoring soil moisture on one year old, or seedling, ginseng (on left) and two year old ginseng (on right) in Brant County.

We monitored soil moisture on Mr. Van Torre's one year old ginseng and two year old ginseng (Figure 8). Over the first week of August the soil moisture quickly dropped in both seedling and two year old ginseng fields. On average, the soil moisture in both fields was kept between the ideal irrigation start and permanent wilting points without the need for irrigation (Appendix 4 Graph 6 and 7). Seeing that ginseng does not like a lot of water, this season seemed to be just right for ginseng. This should show in the harvests of the 3 year old ginseng that took place this fall. Hopefully this will also give a nice rebound in the 2 year old ginseng that might have suffered from last year's dry year when it comes time to harvest that next fall. It was interesting to see that there was not much moisture difference between the seedling and 2 year old fields considering the difference in crop size in August. In September however, the rain events on the 7th, 11th and 21st busted the soil moisture above the wilting point. Interestingly, the 2 year old fields started showing lower soil moisture in September than the seedling ginseng. All around, it seems like the fields had a wet start but were at ideal conditions throughout the season.

2.1.4 Benefits of Soil Moisture Monitoring

During the process of monitoring soil moisture at various farms it was evident that even though farmers were using their best judgement to make irrigation decision, they often waited longer than needed to begin irrigating. If they follow the recommendations of soil moisture monitoring in the future and continuously apply the smaller amount of water the meter tells them then they would not be dancing around the wilting point of their crops throughout the season. Preventing soil moisture from getting there is a lot easier than trying to get it back up. Knowing the critical watering periods of crops helps determine when it is "critical" to apply the right amount of water. Crops that need lots of water prior to harvest, like peppers and tomatoes, were being over watered at harvest on the monitored site and the farmer could have been saving money and time irrigating if he kept track of the moisture as it approached field capacity.

> **Interested in monitoring soil moisture?**
>
> Find a provider who sells soil moisture probes and look for existing cost-share programs that might help cut the costs. For more information on monitoring your own soil moisture and to get help finding a provider contact *Rebecca Shortt* at OMAF (519) 426-4920. Or see fact sheet "Monitoring Soil Moisture to Improve Irrigation Decisions" www.omafra.gov.on.ca/english/engineer/facts/11-037.htm

2.2 Evapotranspiration (ET)

Figure 9: ET Gauge

Plants transpire more than 95% of the water they take up. Evapotranspiration (ET) is the amount of water that a crop transpires and the amount of water evaporated from the soil and plant surface. It can be measured by an ET gauge (Figure 9) and since the readings are influenced by climate they are different every day. Keeping track of and adding up ET values is another way to determine *when* and *how much* to irrigate. ET values equal the amount of water that needs to be given back to the field to maintain crop growth. For example, when the ET readings are around 0.65", begin setting up the next overhead irrigation gun event while a drip tape system should have already been started when ET equaled around 0.4". After irrigation, start adding up the ET values again until it reaches the starting value selected; 0.65" for overhead guns and 0.4" for drip tap. When using ET values posted online, take into account where and how far away the gauge is located to ensure the readings are valid for the farm location.

During this project, ET rates and daily temperature were tracked from August to the end of September, shown below in Figure 10 as weekly summed values. For example, in Figure 10 the week of Aug. 1 to 6th has an ET value of about 0.4". This means that if someone irrigated 0.4" on Aug. 7th they will return the exact amount of water to the field and crops lost the previous week. After the first two weeks of August, the ET values sum up to 0.9", so if they did not irrigate the 0.4" on the 7th, now they would need to irrigate 0.9" on the 14th.

Planning For A Drought	During A Drought
Just like soil moisture monitoring, practice using ET values to determine how current irrigation decisions line up with the ET recommendation.	**While monitoring ET, rather than starting irrigating when ET= 0.65" to 0.75" let water deficit fall to 1.0"-1.1" (in sandy loam soils).**

Interested in ET readings?

ET values are available at the Ontario potato grower's website, brought to you by the Ontario Potato Board and Weather INnovations website: http://www.onpoatoes.ca/cwd.cfm. To find another ET gauge in your local area that might not be posting readings online by contacting *Rebecca Shortt* at OMAF (519) 426-4920.

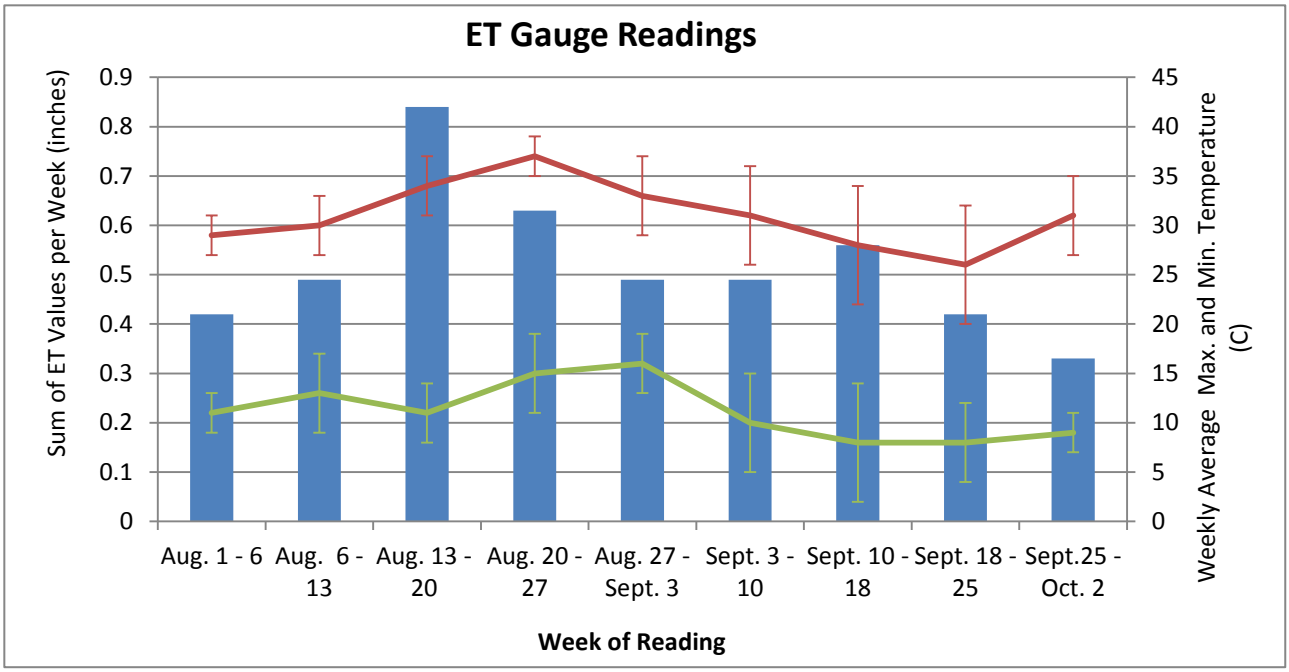


Figure 10: Sum of weekly ET values (in inches) throughout August and September. The weekly average maximum and minimum temperatures (C) at the GRCA's Burford Nursery are plotted as well, notice the temperature variability bars which show the range of temperature in each week.

3.0 Water Sources

Groundwater is the water that percolates through multiple layers of soil and makes its way in underground channels to an aquifer, which is a large body of water underground. Wells tap into these aquifers and act as major sources of water for municipal, agricultural and industrial uses. Groundwater also supplies many aquatic and wetlands systems with continual water in the form of natural springs. Groundwater is not as quickly affected by climatic events such as drought, but over a prolonged period of time, groundwater recharge of ponds and streams can slow. On the other hand, surface water sources are affected by drought more quickly since they are primarily influenced by rain and snow melt. Rivers, creeks and streams are all surface water sources and it is not hard to tell when their flows are dropping. These sources are fed by water that flows on the ground surface in a downward slope until it reached the body of water or watercourse. During a drought, temperatures are high and precipitation is scarce. Any rain that does fall is absorbed by the soil. This means all surface water sources will be under stress, imagine the irrigators who depend on surface water to irrigate their crops and how much stress they will be under as their livelihoods are at stake without enough water for their crops.

This is why it is important to establish a secure water source prior to a drought so that for those with a surface water source, from a creek let's say, are getting low flows, they can have a backup plan: a groundwater sourced pond. Wells or ground water fed ponds are called "offline" sources; taking from them doesn't decrease stream water levels with immediate impact such as with direct stream takings "online" sources. The best way to establish a secure offline water source is to locate or create a groundwater pond or well on a farm that could be used either as a primary source or as a contingency source. If a pond is not recharging very well, use a well or even a surface water source to fill the pond up *while the flows are high* in the spring. Many farm operations already depend on groundwater fed ponds as their primary water source simply because of their distance from a watercourse, even in these cases

it is still recommended to have an alternative backup pond as a contingency source. This way if the recharge time of the primary pond started to slow during the growing season, and they didn't want to draw from a well or surface water sources, they could off-set the waiting time by alternating irrigation from other ponds. For a summary of how to create a contingency groundwater source, see Appendix 5.

Farm operations that depend primarily on surface water sources are most at risk during times of drought. This is because of the reduced amount of rainfall and thus reduced amount of water in the creeks and tributaries. It may seem pointless to create a pond if there is a healthy creek flowing near the property but with reduced rainfall and increased temperatures during a drought, water levels will keep getting lower. When flows decline to a point where a Low Water Level is announced by the Water Response Team (administered by GRCA), water takings need to be reduced by 10%, 20% or even more than 20% to ensure continued flow in the stream. This applies to both ground and surface water takers. The tricky thing about surface water source is that MOE requires them to take no more than 10% of the flow at the permit's taking location at any given time of year. You can imagine how quick takings will equal 10% of the flow when the water levels are dropping. There will be a point where an irrigation pump requires 30% or even 50% of the water flowing and the farmer will have to find another source. The general terms and conditions imposed on a water taker by a Permit To Take Water (PTTW) require that when water taking occurs it must not stop of reduce stream flow to a rate that diminishes the availability of water for other users or to sustain the natural function of the stream. The MOE routinely inspects water takers and also responds to complaints reported by other users of the stream. When the MOE encounters unauthorized water taking or water taking that is not complying with the terms and conditions of a PTTW, it will immediately enforce measures to restore compliance with the PTTW and to protect the water supply for all other uses. If contingency source of a groundwater pond is established ahead of time, the only regulations they will need to follow is the appropriate percentage reduction in takings at the particular Low Water level Response.

Planning For a Drought	During A Drought
Whether a new pond can be dug or an existing pond can be renovated, take action to establish a groundwater source. Then apply for a PTTW or an amendment to your existing PTTW *before* a drought event.	**During a drought if there is no established contingency groundwater pond, contact neighbors if they have an existing unused irrigation pond with a PTTW. A holder of a PTTW can authorize another person to take water under the terms and conditions of the PTTW. The permit holder cannot however, 'lend' the permit to someone else to take water from another source for any purposes. If circumstance arise that might require you to take water under someone else's PTTW, it would be best to involve the MOE in those discussions. Cash crop growers, for example, may have an active PTTW for a pond on their farm in case future renters want to grow a water demanding crop.**

The future direction of alternative water sources for drought contingency planning includes the identification and establishment of community irrigation ponds. Draft documents have been made during this WRAMI pilot project for such a scenario where a land owner with an irrigation pond and PTTW can accept requests from his neighbouring irrigators to pump from his pond. These ponds would

have a short term agreement with the land owner, or the community pond "host", and the irrigator(s) who are granted permission by the host. Ways in which we can identify candidates for these ponds is by locating cash crops farms with permitted irrigation ponds using 2013 AgRI Ground Truth Observations map created by OMAF. Since cash crops do not require irrigation and they may be in rotation on a field with an irrigation pond, that pond could be used by neighbouring irrigators during the year(s) the cash crops are grown. Specifically during times when the water levels drop during a drought and negative effects are seen on farmers' primary water source. Appendix 6 has the draft "Community Pond Permission Request Procedure" which can apply to any drought sensitive areas.

3.1 Pond Renovations

The WRAMI project funded pond creation or renovation for surface water permit holders who wanted to create contingency sources or simply increase their water storage capacity. Two farmers showed interest in renovating existing old irrigation ponds to have an alternative source that can supplement their surface water source yearly, but especially during a drought when their surface water sources reaches low flows. Three additional farmers showed interest in increasing the storage capacity of their existing irrigation ponds so they could have more storage in case their recharge slowed during a drought. These five case studies are described below. See also the "Pond renovation creates alternative irrigation source for Ontario farms" video on Farm and Food Care's YouTube channel at: http://www.youtube.com/watch?v=9CoPtrpgnCk&list=PLxl8ycqu125fcq7iHjSuc2KV60lhXAru_.

3.1.1 Case Study 1: John Kertez

There was an old 1950's dugout pond on John Kertez's property and over time the springs naturally started clogging up with silt and the surrounding trees began to mature. Mr. Kertez had an active surface water PTTW from Horners Creek on his property and he wanted us to help him renovate the old pond so that he could partially divert his takings to an alternative source (shallow groundwater fed pond). The pond proposed for renovation was determined not to be in a wetland by Robert Messier at GRCA. This removed the need for any permitting that would have been required for this job since the pond was not a wetland and it is farther than 120m from any watercourse. The pond was cleaned to a maximum depth of 10ft with a 50ft extension on the North side (See Figure 11 through 14). The excavator and farmer were made aware of the importance of using the most environmentally friendly approach to the job to minimize the loss of trees around the pond. The excavator approached the site from the West side and trees were removed only from the North and West sides of the pond in order to access the pond and to create the 50ft extension. We were able to preserve the habitat on the East side of the pond and maintain a healthy tree cover. The removed fill and trees were placed in the shrubs West of the pond. The result was a cleaned, deepened and extended pond that Mr. Kertez is now adding to his existing PTTW so that he may irrigate from this pond in the following growing season.

Figure 11: John Kertez's pond before, Entire pond.

Figure 12: John Kertez's pond after, Entire pond, 50ft expansion of the North side (near the top of photo).

Figure 13: John Kertez's pond before, South side of pond.

Figure 14: John Kertez's pond after, South side of pond.

3.1.2 Case Study 2: Rob Wigand

Just like his neighbour Mr. Kertez, Rob Wigand had two old 1950's dugout ponds and over time the springs naturally started clogging up and the surrounding trees began to mature. Mr. Wigand had an active surface water PTTW from Horners Creek on his property and he wanted us to help him renovate the old ponds so that he could partially divert his takings to an alternative source (shallow groundwater fed pond). Both ponds were determined not to be a wetland by Robert Messier at GRCA. However both ponds still needed to get GRCA work permits as they fell into the GRCA regulatory areas. The excavator approached the first pond from the East and West sides and cleaned the whole pond area as well as the boarders so only shrubs were growing in with a few large trees (Figures 15 and 18). The second pond had a wall of mature trees all around it so in this case the excavator accessed the pond from the North and South sides to minimize tree removal while still cleaning the entire pond. Both ponds were cleaned out to a maximum of 10ft depth. Prior to beginning the work, the excavator removed the top soil from a large area beside the pond so that the fill from the pond could be spread in that area and then leveled back with the topsoil. This way Mr. Wigand lost no land and had two ponds cleaned and deepened for irrigation which he is now adding to his PTTW.

Figure 15: Rob Wigand's pond before from South Side.

Figure 16: Rob Wigand's pond after from South Side.

Figure 17: Rob Wigand's 2nd pond before from South Side.

Figure 18: Rob Wigand's 2nd pond after from South Side.

3.1.3 Case Study 3: Regina Rudy

This was an existing irrigation pond that Mrs. Rudy wanted to clean up and deepen. Although the pond backs onto a wetland, the Southwest extension of the pond was determined not to be a wetland by Robert Messier at GRCA while the North side of the pond remained as a wetland. The pond needed a GRCA work permit as it is partially in a wetland and therefore the GRCA regulatory area. The excavator accessed the pond from the South side and cleaned the South and West extending arm to a maximum of 10ft (See Figures 19 to 22). The majority of the North extension was left alone to prevent damages to the wetland North of the pond. We promoted to further protect the wetland habitat by placing logs in the North end and installing a wood duck nesting box as well. The fill was placed South of the pond and once it dewaters, Mrs. Rudy had the excavator move the soil around the farm.

Figure 19: Regina Rudy's pond, before on the West arm.

Figure 20: Regina Rudy's pond, after on the West arm.

Figure 21: Regina Rudy's pond, before East side.

Figure 22: Regina Rudy's pond, after East side.

3.1.4 Case Study 4: Phil DeMunck (Triple View Farms)

Triple View Farms already took the initiative to creating a contingency source aside from their existing source at Whitemans Creek. They dug the small pond four years ago and although it sustained their ginseng operation the land owner recognized that when he rents his land out in the future it would not have enough storage for water demanding crops. He preferred the renters have a secure water sources in the pond than having to resort to Whitemans Creek. This project needed a GRCA work permit because it partially fell into regulatory lines. The excavator approached the pond from the East side closest to the road. It was cleaned out to a total depth of 12ft and there was a 3m extension on either side of the pond (Figures 23 and 24). The spill was primarily gravel and went on the South side of the pond where it will be crushed and spread across the farm laneways by the land owner.

Figure 23: Triple View's pond before from the West.

Figure 24: Triple View's pond after from the West.

3.1.5 Case Study 5: John Vamos

Mr. Vamos has a large irrigation pond with two culverts acting as outlets. There was a GRCA work permit required for this project and that has been approved. However, this project was postponed to next season as it is connected to a cold-water system which means the work cannot begin until July 1st of 2014 and should be completed by Oct. 1st 2014. Robert Messier, an ecologist at GRCA, has identified trout spawning in the channel created by the pond's outlet that acts as a tributary to Rest Acres Creek, a tributary to Whitemans Creek. Robert says there is no mitigation plan that we can develop to get approval to begin the project this year. There are opportunities to extend the in-water works *later* into October next year if required (which it will be) so Robert will work with the Specialist to figure out how late we can work past October 1st of 2014. The work will begin with the installation of an AgriDrain control structure that will be installed in the West arm of this pond (Figure 25) with an inlet pipe from the centre of the pond and an outlet pipe leading 200 feet into the wetland North of the pond. Rather than having his current East culvert be the predominate outlet (Figure 26). The control structure will reduce the temperature of the water leaving, stop beavers from clogging the outlet, and control the exact level of the water in the pond. This will help prevent Mr. Vamos' pump houses from eroding into the banks, as well in times of pond clean up the water level can be lowered to reduce the difficulty of cleaning this large pond. The length and design of the outlet pipe will stop erosion issues that have been taking place from the water channel erosion with the current outlet design (Figure 27 and 28). The pond

will be cleaned to a depth of 12ft (Figure 29 and 30) and the spill will be used to fill in the East and West arms of the pond (Figures 25 and 26). The excavator will use the main farm lane, South of pond, and will work from the edges where there are no tree line buffers.

Figure 25: Mr. Vamos' pond before, West arm.

Figure 26: Mr. Vamos' pond before, East arm.

Figure 27: Mr. Vamos' pond outlet downstream of East arm.

Figure 28: Mr. Vamos' pond outlet downstream of East arm.

Figure 29: Mr. Vamos' pond before, West side of pond.

Figure 30: Mr. Vamos' pond before, East side of pond.

4.0 Recommendations

A lot of lessons were learned from the proactive approach taken for this project and the community involvement that resulted. Five of the major recommendations and guide lines are described below.

1. It is very important to outline and establish all goals of your project when working with a committee of multiple members with different interests. Advertise, send letters and make the target community aware of the project before meeting with individuals. As the project begins keep in touch with everyone interested whether they are involved in the project, just want occasional updates or have a few minutes to chat so that you can learn from their experiences. These conversations are priceless.

> It took *longer than expected to get the initial introduction letter out to the public and this delayed the start time for meetings with farmers, field work and setting up a demonstration site. If we would have sent out the letter in our first week we would have almost a month more of data. Perhaps the better solution would have been to hire the Specialist earlier.*

2. If workshops are planned, schedule them between December and April. After April there will always be a group of farms who are planting, irrigating, pruning, harvesting, combining or cultivating and they will not be free until about December. Advertise workshops through newspaper and bulletin boards but especially through personal letters to target your group of interest.

> *The field demonstration site during this project had a workshop at the end of August to show the benefits the soil moisture meters had on the crops. However, many irrigators could not attend because they were out irrigating their own fields or harvesting crops. Even if you are demonstrating equipment on a field that needs to have crops on, schedule the workshop either right after planting when the seedlings are just establishing or at the end of the season in late November.*

3. If the project involves cost-share initiatives, such as this one, create your funding criteria and distribute it to everyone applicable so all details, requirements and pricing is discussed as soon as possible. This will help prevent confusion and arguments later when the farmer says, "Well you never told me this before…"

> *One of the farmers was under the impression the pond renovation would be 100% paid for by the WRAMI project as "cost-share" was never officially discussed during the time the renovation was being planned. Once the excavator estimate was received, the farmer was informed of his share of the cost of the project. He was surprised he had to pay anything. Thankfully, the project still went head, but that confusion could have been avoided if cost-sharing was brought up earlier.*

4. If any equipment will be used, learn how to use them and work out the bugs *before* the growing season so that you do not waste any time trying to get them working when you should be collecting data.

> *One of the soil moisture meters used in the project was not setting up properly and the data logger would not log the data. There was trouble shooting throughout the season but no valid data was collected from that data logger. This was supposed to be the reference moisture to see how efficient the irrigator was on that site. Although occasional one time soil moisture readings were taking with another meter, there was no continual data as anticipated.*

5. If any renovation or construction related work is planned, figure out *all of the possible* permits, work timing-windows and other funding programs that exist *before* asking people whether they are interested in getting "x" renovation or project done.

> *Farmers were not aware that work permits were needed from the GRCA to renovate their existing irrigation ponds. These permits could have been received earlier if the farmers were aware of them. All works were still completed on time but there was a few weeks delay waiting for the permit approvals. However, one of the projects needed not only a work permit but it also had to be done in the cold-water timing window since the pond had two outlets to a tributary of Whitemans Creek. Had the project Specialist or farmer known about this timing-window earlier, they could have pushed to get the plans, estimates and work permits done faster so that the work would not have had to get bumped to the next timing window.*

6. This type of a program should be established as a sustainable long term program so that a proactive approach to drought planning can continue in all watersheds. It is essential to have someone coordinating the project and working with the individuals involved to build a trustworthy relationship with the agricultural community. Having a multi-agency steering committee gives ample amount of support and guidance for the coordinator and leaves a positive impression on the community.

> *The uptake from the irrigators in the Whitemans Creek subwatershed was excellent and irrigators were already asking about what next year will bring as they are interested in participating again. This type of feedback alone suggests the need to continue having an individual working in the field as much more progress and success was accomplished than otherwise. The farmers were happy to see things getting resolved quickly because the agencies were working together on one timeline so that progress could actually be made.*

7. Other funding sources such as those from the Ministry of Natural Resources and from Ducks Unlimited Canada (DUC) should be brought into the equation as many benefits arise from renovation projects that promote the goals of multiple funding sources.

> *DUC was especially interested in helping pond renovation where the land owner is interested in signing a conservation agreement and received a wood duck nesting box kit to promote water fowl habitat. Supplies, tools, instructional booklets, species identification books are just some of the things interested land owner would get, all for the low price of agreeing to take care of the box by cleaning it every winter.*

5.0 From the Farmers

During discussion on countless meetings with farmers in Brant and Oxford County, there were two interesting things brought to light where farmers would like to see change:

Problem 1: Irrigators are encouraged to use drip tape irrigation due to its frequent but low water application requirements. This means less immediate stress on their water source and better crop yield from frequent watering. When investing in drip tape, these irrigators also need to invest in plastic mulch to minimize soil moisture loss. Unfortunately both plastic mulch and drip tape need to be replaced annually to ensure a quality distribution of water and minimal moisture loss. Buying them to set up a new system yearly is one thing, but unfortunately these irrigators also have to pay to dispose of their plastic waste.

Solution: Establish a grant or funding program from the County or OMAF that would pay for farmers to dispose of their drip tape and plastic mulch. Irrigators understand the benefits of investing in a drip tape system but they do not agree with being penalized for its disposal.

Problem 2: Irrigators are expected to apply for a PTTW for *all water sources* from which they take more than 50,000L/day. They are to apply for amendments if they want to change anything about their permit and they need to apply for a renewal every "X" number of years. Unfortunately, these steps all require paper work and a lot of it, especially if your water source is a surface water source like a creek or river. Irrigators are becoming more informed about the PTTW requirements but not everyone understands the rules and processes involved. Doing research online is not a viable option for everyone.

Solution: Create and schedule PTTW workshops year round, preferably *three times* throughout winter: first week of December, last week of January and last week of February. These workshops need to be advertised in the newspaper, on local bulletin boards and online as the growing season wraps up so people can plan to attend one if not all of the workshops. The workshop must cover: when a PTTW is needed (ponds need permits too!), the three categories of PTTW, what forms you need, where you find the forms (especially for those people who don't use computers), how you apply/fill out those forms, when do you need to apply for amendment, how to renew your PTTW, and how and when to submit your PTTW annual water usage.

Problem 3: The Water Response Team mails letters to irrigators if a Low Water Levels is reached in their subwatershed. This is a way to communicate to irrigators that flows are low and we may be getting a dry spell so conservation actions need to be implemented. During Level 1 , irrigators are asked to voluntarily reduce their consumption by 10%, in Level 2 by 20%, and in Level 3 the Water Response Team may ask the province to impose mandatory restrictions on the PTTW holders. The ultimate goal of this Response team is to declare low water conditions for each part of the Grand River watershed. However, there is no contact between this team and irrigators when flows are normal or high, which is the case in wet years.

Solution: Farmers should get letters from the Response team when the water flows are normal, high, or are beginning to approach low instead of only getting news when the flows reach a Low Level. A monthly letter throughout the growing season for example would keep irrigators in the loop and (if a graph is included) show them how the water level has changed over the month. Some irrigators will not care either way and may not even read letters from the Response team. But others, would like to have good news mailed to them not just the bad news of, "you need to reduce taking water."

Conclusion

With the results of the field monitoring and the feedback from the irrigators who were involved, there is no doubt that this program would benefit the Whitemans Creek subwatershed year after year. The best part about this type of proactive community involvement based project is that it could be done in other sensitive irrigation areas too. The objectives of the committee can apply to any watershed that wants to help irrigators plan for times of low water. There is nothing but gained knowledge and increased water security to the agricultural community from our results. The findings were achieved in just months of working with the Whitemans Creek subwatershed community, imagine what can be done if this type of program continues or even became permanent.

Appendix J-1: Summary of Plan

Summary of a Drought Contingency Plan

1) Make sure your irrigation system is in place and working accurately,

- **I. Choose your irrigation system based on your crop type & get your irrigation system assessed annually.**
  - **a. Plastic mulch and drip for produce, overhead for larger crops, pivots for potatoes etc.**
  - **b. Irrigation system assessments can highlight the areas that need to be adjusted.**

2) Use Best Management Practices (BMPs) year round,

- **II. Build your soil organic matter throughout the years**
  - **a. Pays off annually but especially during a drought year when any water received can be held in the soil for a longer time.**
- **III. Invest in and use a mobile soil moisture meter**
  - **a. Use it as often as you can to see how the meter's recommendations align with your current judgment for *when* and *how* much to irrigate.**
- **IV. Use Evapotranspiration (ET) values**
  - **a. Determine how your current judgment lines up with the ET recommendation.**

3) Secure a reliable water source with a Permit To Take Water.

- **V. Establish a groundwater pond as a primary or contingency source**
  - **a. Either dig a pond or renovate and existing one and apply for a PTTW *before* a drought.**
  - **b. Assess how frequently you are affected by drought and how severe you're planning needs to be. For example, how many years in 10 does the supply get stressed?**
  - **c. Consider contacting your neighbours to see if they have irrigation ponds that you can use as an alternative source.**

Appendix J-2: Irrigation Assessments

Irrigation Assessments

The Assessment: Involves running the irrigation system for a minimum of 4 hours, during which time e technicians will measure the pressure, flow rate and depth of water applied in several sections of the field or zone (Figure 2).

The Results: Tell you the Distribution Uniformity (DU) (how much the water depth will vary across the field). If the DU does not meet the standard, then the raw data collected during the assessments can highlight which sections of your irrigation were under or over watered.

The Goal: To adjust the pressure, nozzles or whichever aspect of the system to get an even application to will ensure that the system will actually apply the set amount of water to the soil. Results will either leave you feeling assured that your system is working correctly or will highlight the areas in which your system needs to be adjusted.

Appendix J-3: Irrigation Management BMPs

Irrigation Management BMPs

1. **Get the required Permits to Take water (PTTW)**
    - **Apply for PTTW for *all* water sources *creek, well or pond.***
    - **Keep track of your daily usage and submit annually to MOE.**

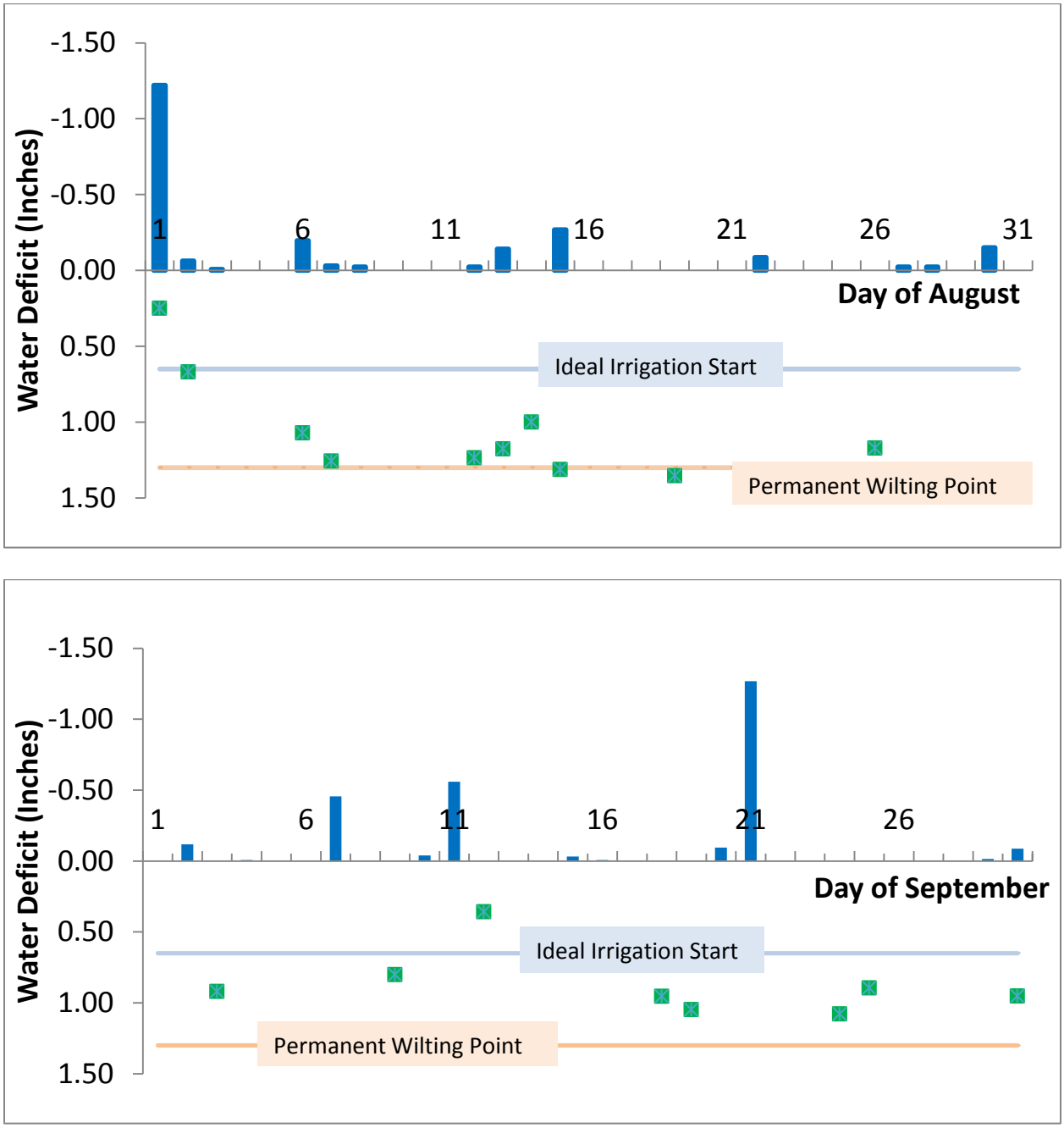
2. **Build healthy soils**
    - **Build soil organic matter: 0.5% increase in soil organic matter results in 12% increase in water-holing capacity of sandy loams.**
    - **Reduce tillage.**
    - **Use conservation tillage, keep residue on surface, encourages infiltration (See also BMPs for Soil Management).**

3. **Irrigate efficiently**
    - **Harvest and store water from watercourses during peak flows.**
    - **Apply the *right* amount of water- measure soil moisture.**
    - **Try to upgrade to drip irrigation next time if it suits your crop.**
    - **Schedule irrigation to take into account forecast information.**
    - **Irrigate at night and in low winds.**
    - **Maintain your irrigation equipment.**

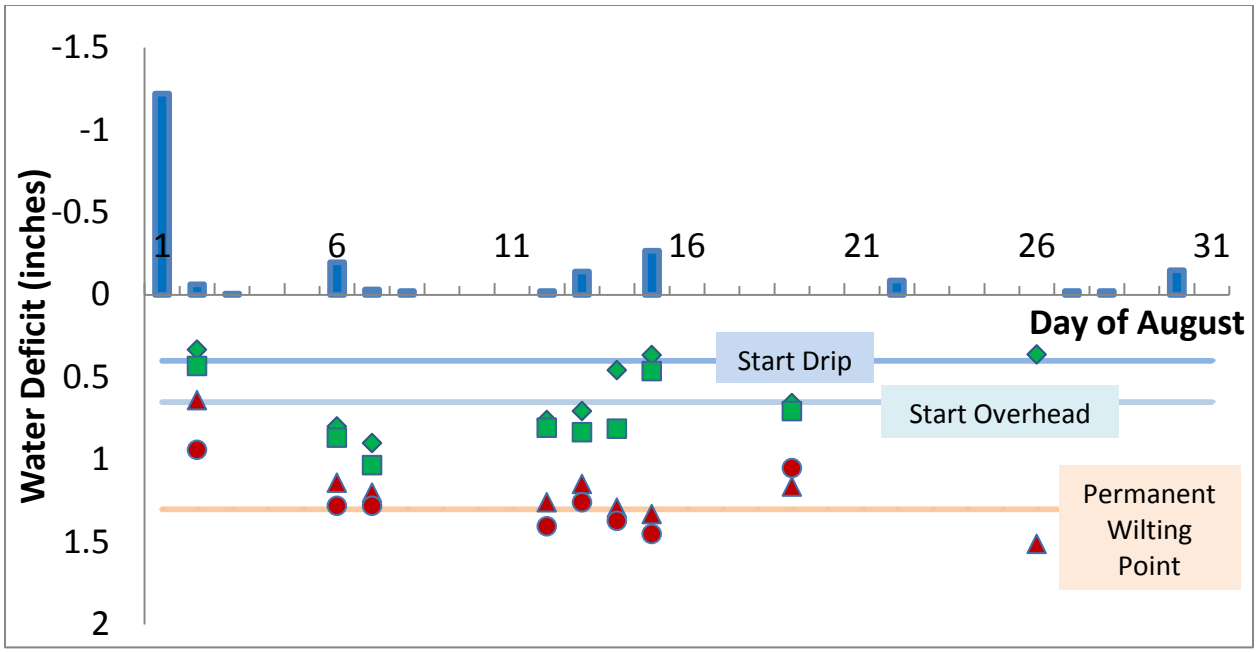
4. **Reduce water loss from crops and soil**
    - **Plant windbreaks to slow drying.**
    - **Use plastic or organic mulch.**
    - **Schedule short season crops for spring or fall.**

5. **When considering to irrigate, weigh the increased costs and potential benefits**
    - **Calculate the cost/benefit of an irrigation system for your operation.**

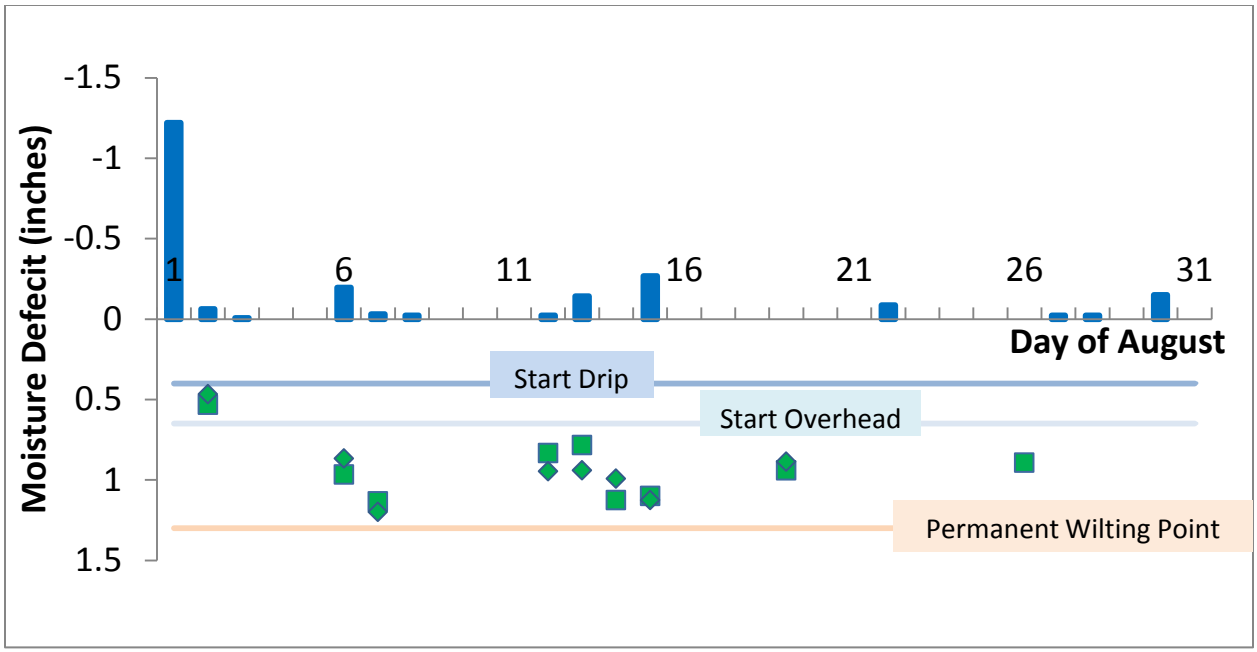
Appendix J-4: Soil Moisture Graphs

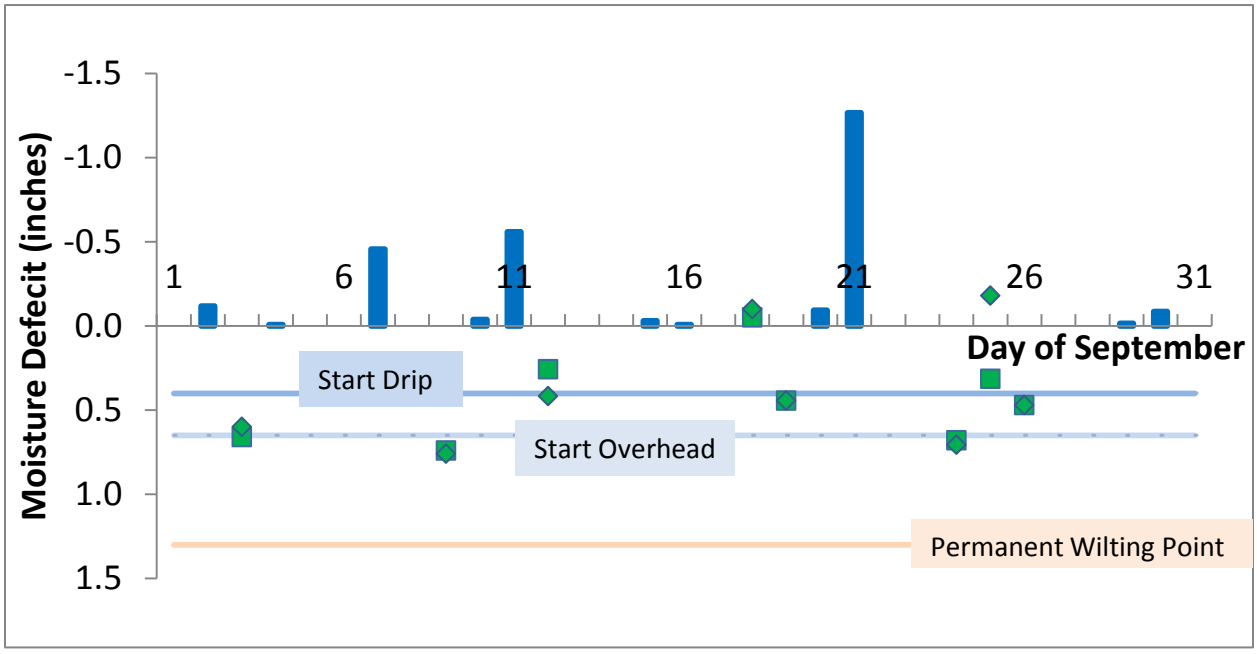


Graph 1 and 2: Soil moisture monitoring for Mr. Kertez's Tobacco in August and September. Points represent the average of measurements taken across all of the fields. The ideal irrigations start time, permanent wilting point, and amount of rainfall collected at the Burford Nursery Weather Station have been marked.

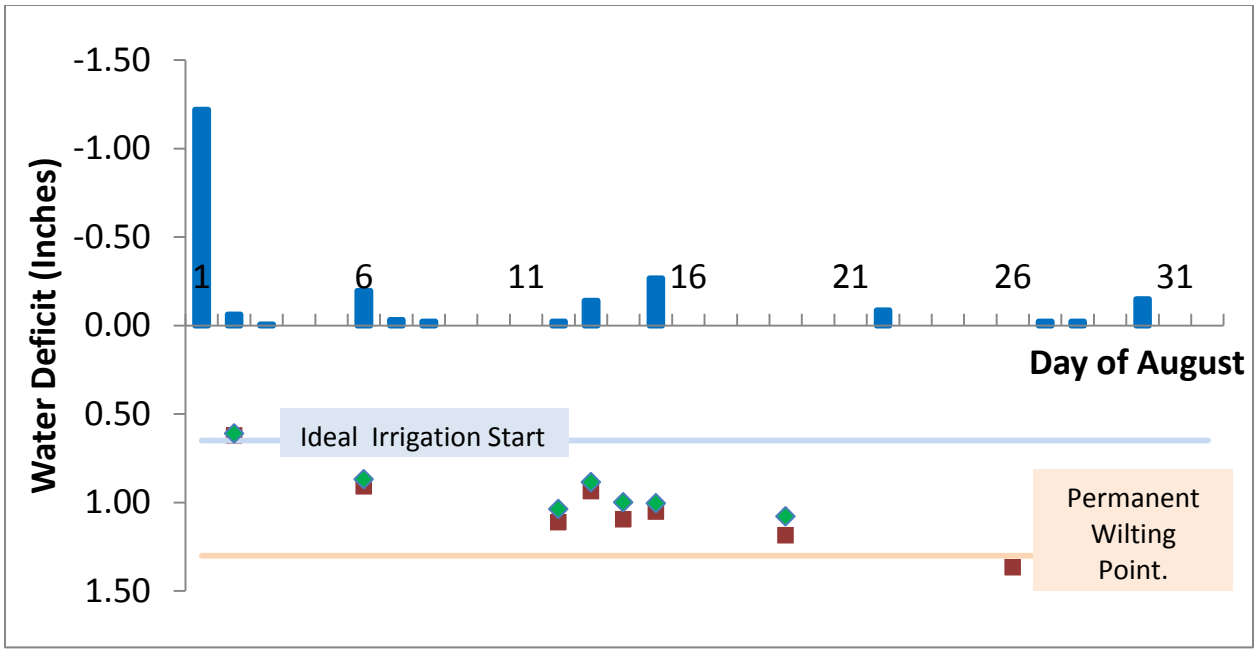


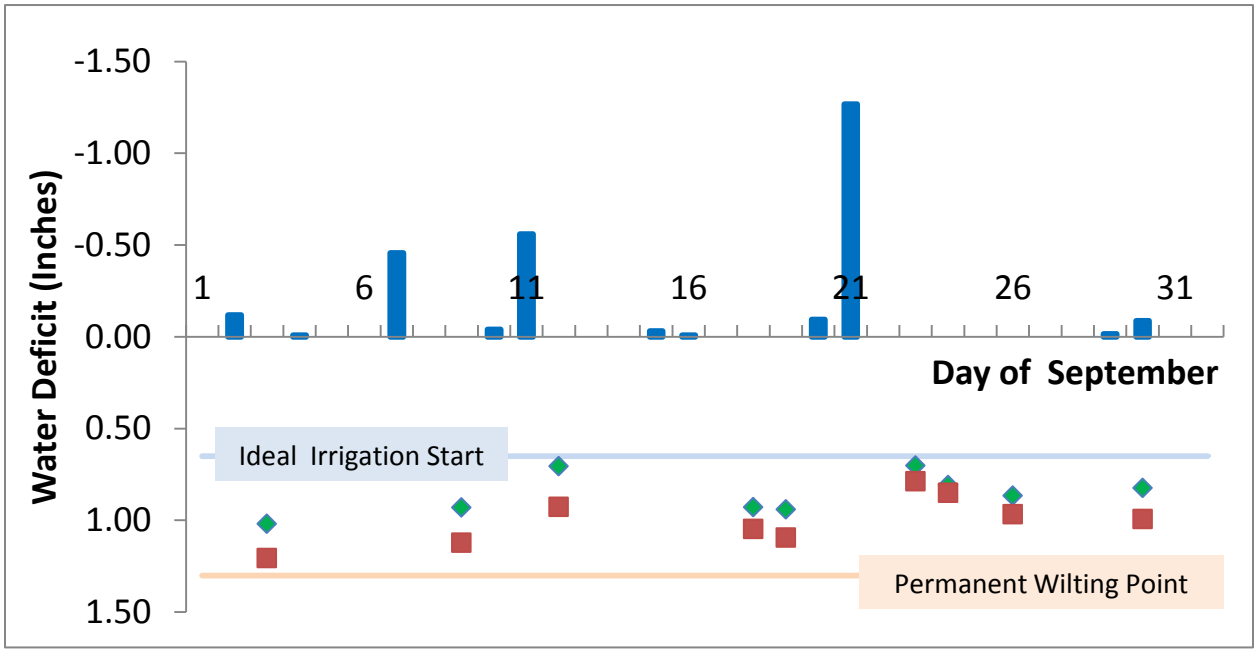
Graph 3: Soil moisture monitoring for Mr. Sroka tomatoes in August. Points represent the average of measurements taken across all of the fields at two different points: the beginning of the row and after the 1st sand knoll. All green points are for tomatoes with mulch and all red points are for tomatoes without mulch. The ideal irrigations start time, permanent wilting point, and amount of rainfall collected at the Burford Nursery Weather Station have been marked for the ease of comprehension.





Graph 4 and 5: Soil moisture monitoring Mr. Sroka's peppers in August and September. Both figures represent the average of measurements taken across all of the fields at two different points: the beginning of the row and after the 1st sand knoll. All green points are for peppers with plastic mulch. The ideal irrigations start time, permanent wilting point, and amount of rainfall collected at the Burford Nursery Weather Station have been marked for the ease of comprehension.





Graph 6 and 7: Soil moisture monitoring for Mr. Van Torre's ginseng in the months of August and September. Points represent the average of 3 measurements taken in 5 different rows that were 5 rows apart. The ideal irrigations start time, permanent wilting point, and amount of rainfall collected at the Burford Nursery Weather Station have been marked for the ease of comprehension.

Appendix J-5: Creating a Contingency Groundwater Source

Interested in creating a contingency groundwater source?

These are the steps you will take to renovate or create a new irrigation pond (not connected to a stream or creek):

Step 1: Plan

1) **Design your plan to create a pond or renovate an existing one. Try using online mapping tools if you can or contact a hydro-geologist or a contractor to help you design the perfect pond. To create a plan, you can go to http://www.grandriver.ca/, scroll down to "Online Services", click on "GRIN: Maps,…", then click on "Create a map" and you're on your way.**
2) **To determine what size of pond your irrigation system needs to cover "x" amount of acres, read through the Irrigation BMPs book or contact *Rebecca Shortt* at OMAF (519) 426-4920.**

Step 2: Permits

3) **Contact your local Conservation Authority (CA). Based on the project location, whether you are proposing a new pond or renovating an existing one they will tell you if the pond falls into a regulated area. If so, you need to apply for a work permit from your CA.**
   - **If you *do not* fall into a regulated area, then there are no other work permits required.**
   - **If you *do need* to get a work permit, the CA can send you the paper work. You need to fill out the one page application, attached your project plan, and pay the required permit fees.**
4) **Timing windows: your CA will tell if your pond is connected to a cold water system. If so, your project must be completed within the cold-water works timing window: Jul 1 – Oct 1.**
5) **If the pond project will involve tree removal, contact your county to see what tree bylaws exist.**

Step 3: Contractor

6) **Contact your local excavators to arrange site visits and get accurate estimates.**
   - **Do not assume the lowest hourly rate will be the cheapest; ask the contractor about their equipment's reach, years of experiences and get other people's reviews.**
7) **Once you chose an excavator, walk them through your plan and schedule your start date.**

Step 4: Permit to Take Water

8) **When the pond is finished, contact the MOE or go to their website: http://www.ene.gov.on.ca/ to get all of the forms needed to apply for a PTTW. On the website's home page, click on "Water" (left side of page), scroll down to "Water Taking", and click on "Permits to Take Water". All of the forms will be listed there. If you need extra help, call the MOE toll-free: 1-800-565-4923 and ask to speak to someone about Permits to Take Water.**

Appendix J-6: Draft Community Pond Permission Request Procedure

If someone is aware of the community pond and wants to use it during times of drought, they would initialize the process by sending the Requesting Permission letter (on page 1) to the owner.

Once the community pond owner (herein referred to as "host") receives the Requesting Permission letter, they would respond to with a Letter of Consent granting permission for the irrigator to use to pond under "x, y, and z" conditions. Potential conditions in which they will use the pond are listed but can be modified.

As the host receives Requesting Permission letters from irrigators, and responds to them with the Letter of Consent, he will reach a point where he has "enough" irrigators signed up for the next "x" years. The amount of irrigators that is "enough" for the pond will depend on the owner's preference and the size of the pond he has. The host then sends a Letter of consent for irrigators to use my community pond to the MOE and BCFA to notify them of the individuals that will be using his pond and PTTW in the next "x" years.

The host of the community pond will sign a Letter of Agreement to Host a Community Irrigation Pond with the BCFA for "x" duration, let's say 5 years. This agreement is for all hosts, whether they used grant money (ex. Brant County Rural Water Quality Program) to *create* a community pond or they just *turned their unused* ponds into community ponds. During the agreed upon duration time the host will receive letters Requesting Permission from the interested irrigators, send them back a Letter of Consent. The irrigator's letter Requesting Permission to use the pond will be kept by the host as an agreement for the terms, unless the host wants to modify the terms in which another document would be created

If someone is aware of the community pond and wants to use it during times of drought, they would initialize the process by sending this letter of request to the owner.

_____(*Name*)_____,
_____(*Address*)_____,
_____(*Postal Code*)_____,
____(*Phone Number*)____

_____(*Date*)_____

Subject: **Requesting Permission**

To (*Community pond land owner's name*):

I, ___(*Neighbouring irrigator's name*)___, a neighbouring farm at ___(*Neighbouring farm's address*)___ am writing to you to request permission to access the water taking location of the community pond on your property at ____(*Address of community pond*)___ in _____(*City*)_____, ON with UTM coordinates__(*Easting*)__, __(*Northing*)__ for the next __*(Insert Years)*__. I am asking for permission to access this water sources only in times of drought when the Grand River Conservation Authority has declared a Level 2 low water flow in the Whitemans Creek subwatershed or if a creek source has a low enough flow that taking the permitted 10% of the flow does not meet irrigation requirements of the individual. I propose to use the community pond until the Level 2 status drops back to a Level 1 or until the end of the growing season, whichever comes first. I acknowledge that you hold an active Permit to Take Water (PTTW), ___(*Permit Number*)___, at this location and I will follow the regulations set out by the Ministry of the Environment associated with that PTTW. I agree to these terms and will oblige by them to respect the community pond on your property. If you grant me permission please send me a letter of consent. Thank you.

If you have any further questions, you can contact me at ___(*Land owners Phone number*)___.

Sincerely,

___(*Neighbouring irrigator's First and Last name*)___

___(*Signature*)___

Once the owner receives the request letter, they would respond with letter granting permission for the irrigator to use to pond. The conditions in which they will use the pond are listed and can be modified.

_____(*Name*)_____,
_____(*Address*)_____,
_____(*Postal Code*)_____,
____(*Phone Number*)____

_____(*Date*)_____

Subject: **Letter of Consent**

To___(*Neighbouring irrigator's name*)__:

I am writing to let you know that I, ___(*Land owner's name*)___, the land owner at ____(*Address of water taking location*)___ in _____(*City*)_____, ON am granting you, _____(*Neighbouring irrigator's name*)_____, at _____(*Address*)_____ permission to access the community pond on my property at UTM coordinates__(*Easting*)__, __(*Northing*)__ for the next __*(Insert Years)*__ for which I hold an active Permit To Take Water, ____(*Permit Number*)____. You may have access to this water sources only in times of drought when the Grand River Conservation Authority has declared a Level 2 low water flow in the Whitemans Creek subwatershed or if a creek source has a low enough flow that taking the permitted 10% of the flow does not meet irrigation requirements of the individual. You may continue using the water source until the Level 2 status drops back to a Level 1 or until the end of the growing season, whichever comes first. If you disrespect my property or fail to follow these terms of use I will remove you from my approved list of irrigators and you will no longer be allowed to use the community pond. If you fail to cooperate I will call the police for trespassing without consent.

If you have any further questions, please contact me at ___(*Land owners Phone number*)___.

Sincerely,

___(*Land owner's First and Last name*)___

___(*Signature*)___

Once the host has “enough” irrigators signed up for the next “x” years. He sends this letter to the MOE and BCFA to notify them of the individuals that will be using his pond and PTTW in the next “x” years.

_____(*Name*)_____, _____(*Date*)_____
_____(*Address*)_____,
_____(*Postal Code*)_____,
____(*Phone Number*)____

Subject: **Letter of consent for irrigators to use my community pond**

To the Ministry of the Environment and the Brant County Federation of Agriculture:

I am writing to let you know that I, ___(*Land owner’s name*)___, the land owner at ____(*Address of water taking location*)___ in _____(*City*)_____, ON am granting permission for the following neighbouring irrigators to access my community pond for the next __*(Insert Years)__:*

_____(*Neighbouring irrigator’s name*)_____, at _____(*Address*)_____
_____(*Neighbouring irrigator’s name*)_____, at _____(*Address*)_____
_____(*Neighbouring irrigator’s name*)_____, at _____(*Address*)_____
_____(*Neighbouring irrigator’s name*)_____, at _____(*Address*)_____

to access the community pond on my property at UTM coordinates__(*Easting*)__, __(*Northing*)__ for which I hold an active Permit To Take Water, ____(*Permit Number*)____. The listed irrigators may have access to this water sources only in times of drought when the Grand River Conservation Authority has declared a Level 2 low water flow in the Whitemans Creek subwatershed or if a creek source has a low enough flow that taking the permitted 10% of the flow does not meet irrigation requirements of the individual. They may continue using the water source until the Level 2 status drops back to a Level 1 or until the end of the growing season, whichever comes first. If any of the irrigators disrespect my property or fail to follow these terms of use I will remove them from my approved list of irrigators and they will no longer be allowed to use the community pond. If they fail to cooperate I will call the police for trespassing without consent.

If you have any further questions, please contact me at ____(*Land owners Phone number*)___.

Sincerely,

____(*Land owner’s First and Last name*)___

____(*Signature*)____

The person who agrees to host a community pond will sign this agreement with the BCFA for "x" duration, let's say 5 years. The irrigator's letter requesting permission to use the pond will be kept by the host as an agreement for the terms, unless the host wants to modify the terms in which another document would be created.

Letter of Agreement to Host a Community Irrigation Pond

To the Ministry of the Environment and the Brant County Federation of Agriculture:

AGREEMENT: I the undersigned landowner, in recognition of the Brant County Federation of Agriculture investment in this pond renovation project (if applicable), agree to the following for a 5 year-period starting when the pond renovation is completed and the PTTW has been accepted and approved by the Ministry of the Environment.

1. To take reasonable measures to protect and maintain the irrigation pond from filling in by cleaning it when needed and trimming the shrubs and trees around it to prevent them from growing in and reducing water storage.

2. To allow the Brant County Federation of Agriculture staff and their agents to act as a liaison between interested irrigators and the Owner.

3. To grant permission to interested irrigators to have access to this water sources only in times of drought when the Grand River Conservation Authority has declared a Level 2 low water flow in the Whitemans Creek subwatershed or if a creek source has a low enough flow that taking the permitted 10% of the flow does not meet irrigation requirements of the individual.

4. To allow irrigators to continue using the water source until the Level 2 status drops back to a Level 1 or until the end of the growing season or whichever comes first.

5. If any of the irrigators disrespect the Owners property or fail to follow the terms of use (listed in the Letter of consent for irrigators to use the community pond) the Owner will remove them from the approved list of irrigators and they will no longer be allowed to use the community pond. If they fail to cooperate the police will be contacted for trespassing without consent.

6. In the event the Owner sells the property, all obligation of the Owner under this agreement will cease.

(Land owner's First and Last name)	*(BCFA Representative Agent)*
(Signature)	*(Signature)*
(Date)	*(Date)*