

| To: | Emily Stahl | Company: | City of Guelph |
|----------|------------------------------|-----------|----------------|
| From: | Sam Ziemann | Our File: | 75-41-151088 |
| Cc: | Wayne Galliher, Bill Gauley | Date: | 15 June 2016 |
| Subject: | Community Engagement Summary | | |

The contents of this memorandum are intended only for the recipient. Any other use and/or reproduction without prior consent of C3 Water Inc. is strictly prohibited.

.....

CITY OF GUELPH

COMMUNITY ENGAGEMENT SUMMARY

C3 WATER INC.

15 June 2016

Alternate formats are available as per the Accessibility for Ontarians with Disabilities Act by contacting Water Services at 519-822-1260 extension 5627.



| VERSION | DATE | DESCRIPTION OF REVISIONS | REVISED BY | REVIEWED BY |
|---------|---------------|------------------------------------|-----------------|--------------------|
| 1 | 8 April 2016 | Draft Community Engagement Summary | Kelsey Shaw | Bill Gauley |
| | | | Andrea Williams | |
| 2 | 25 April 2016 | Draft Community Engagement Summary | Kelsey Shaw | Bill Gauley |
| | | | Andrea Williams | |
| 3 | 15 June 2016 | Final Community Engagement Summary | Andrea Williams | Bill Gauley |



Table of Contents

| 1.0 | Inti | roduction | .1 |
|-----|------|--|----|
| 2.0 | Cor | mmunity Liaison Committee Meetings | .2 |
| 2.1 | C | Community Liaison Committee Meeting #1 | .3 |
| 2.2 | C | Community Liaison Committee Meeting #2 | .4 |
| 2.3 | C | Community Liaison Committee Meeting #3 | .7 |
| 2.4 | C | Community Liaison Committee Meeting #4 | .9 |
| 2.5 | C | Community Liaison Committee Meeting #51 | .2 |
| 3.0 | Put | blic Consultation | .5 |
| 3.1 | C | Open House #1 1 | .5 |
| 3.2 | C | Dpen House #2 1 | .7 |
| 3.3 | C | Open House 3 1 | .9 |
| 3 | .3.1 | eMERGE Survey Results | 20 |
| 3 | .3.2 | Healthy Landscapes Survey Results2 | 21 |
| 3 | .3.3 | Royal Flush Toilet Rebate Program Survey Results 2 | 22 |
| 4.0 | Sur | nmary of Public Consultation events 2 | 24 |

List of Tables

| Table 1. Stakeholder Participation | 2 |
|--|----|
| Table 2. Community Liaison Committee #1 Question and Answer Summary | 3 |
| Table 3. Community Liaison Committee #2 Question and Answer Summary | 5 |
| Table 4: Community Liaison Committee #3 Question and Answer Summary | 7 |
| Table 5: Community Liaison Committee #4 Question and Answer Summary | 10 |
| Table 6: Community Liaison Committee #5 Question and Answer Summary | 12 |
| Table 6: Sticker Engagement | 16 |
| Table 7: Open House #2 Events | 18 |
| Table 8: Evaluation Criteria Survey Results for Jazz Festival and Vegfest Events | 18 |
| Table 9: Evaluation Criteria Total Scores, Community Engagement Results | 19 |

| Appendix A – Evaluation of Conservation Rate Structures |
|---|
| Appendix B – Public Engagement Materials |
| Appendix C – Mind Mixer Reports |





1.0 INTRODUCTION

In collaboration with the City of Guelph's Community Engagement Team and in compliance to the City's Community Engagement Policy, the Project Team led the development of a community engagement plan. Engaging and maintaining contact with the public and stakeholders early and effectively was considered crucial to project success. These interactions help to facilitate final solutions that will meet the project goals and be supported by the public.

The key consultation mechanisms utilized by the Project Team included:

- Community Liaison Committee Formation and Consultation;
- Public Meetings (Open Houses, Special Events and Public Displays); and
- Online Engagement (Mind Mixer and Social Media).

Community engagement occurred frequently and throughout all phases of the project to be able to gather feedback at each phase. Other activities undertaken included a residential market research study and a number of interviews conducted with key business informants. Reports for both research studies are available on the City's website <u>www.guelph/wesu.ca</u>.



2.0 COMMUNITY LIAISON COMMITTEE MEETINGS

It was recommended that a Water Efficiency Strategy Update Community Liaison Committee be established with a broad representation from stakeholders and representation of the City's current Water Conservation and Efficiency Public Advisory Committee to provide support and advice to the Project Team. The Community Liaison Committee was comprised of, but not be limited to, representatives from the community (business, industry, developers, etc.), and agencies such as the Grand River Conservation Authority, members of the general public and local environmental interest groups.

The mandate of the Community Liaison Committee was to provide feedback to the Project Team on key issues, including:

- Objectives and scope of the Strategy Update;
- Issues and opportunities;
- Alternative solutions;
- Evaluation method and criteria; and
- Preferred alternatives and go-forward strategy.

During the update of the Water Efficiency Strategy, Community Liaison Committee meetings were held in an effort to provide a forum for community input and guidance to the Project Team. This committee was established at the outset of the Project to help the City understand and consider community aspirations and concerns as they relate to current water supply demands, water efficiency progress and direction for future water efficiency programming.

In total, five meetings were held in Meeting Room C at Guelph City Hall (1 Carden St, Guelph, ON N1H 3A1), with each meeting lasting approximately 150 minutes. Twenty key stakeholders, including members of the City's existing Water Conservation and Efficiency Public Advisory Committee, plus members of the Project Team and City employees attended. Participants were drawn from a variety of stakeholder groups to represent a balance of interests that reflect the range of perspectives in the community. Table 1 lists the make-up of the Committee.

Table 1. Stakeholder Participation

| Stakeholder Group | Stakeholder Category | Number of Members |
|------------------------------------|--------------------------|----------------------|
| Cargill | Business / Industry | 2 |
| ABS Friction | | |
| University of Guelph | Academia | 2 |
| Reid's Heritage Homes | | 2 |
| Guelph and District Home Builders' | Home Builder / Developer | |
| Association | | |
| Wellington Water Watchers | Environmental Interest | 3 |



| Stakeholder Group | Stakeholder Category | Number of Members |
|--|-----------------------------------|----------------------|
| Council of Canadians | | |
| eMERGE Guelph | | |
| Grand River Conservation Authority | Conservation Authority | 1 |
| Guelph Chamber of Commerce | Guelph Chamber of Commerce | 1 |
| Wellington County- Housing Services | Social Assisted / Rental Housing | 1 |
| Water Conservation and Efficiency Public | Public at Large/ Residential Rate | 8 |
| Advisory Committee | Payers | |

The following information is available on the City of Guelph's website under "Plans and Strategies", "Water Efficiency Strategy" and "Engagement" (<u>http://guelph.ca/plans-and-strategies/water-efficiency-strategy/</u>):

- Community Liaison Committee Terms of Reference;
- Discussion Guides;
- Meeting Minutes; and
- Presentations.

2.1 Community Liaison Committee Meeting #1

This meeting was held on June 2, 2015 from 7:00 pm until 9:00 pm. The meeting was an introduction to the process of Water Efficiency Strategy Update Project including presentations on the current Water Conservation Program and Water Efficiency Strategy Update Process Overview.

Members of the Community Liaison Committee were divided into three groups to brainstorm ideas for the Water Efficiency Strategy Update. Table 2 summarizes the questions and responses provided by the Community Liaison Committee in addition to the actions taken to implement feedback into the report.

Table 2. Community Liaison Committee #1 Question and Answer Summary

| Question | Summary of Responses | Action Taken |
|--------------------|---|---|
| | Update the incentive program: Focus | Increased Water Capacity Buyback Incentive |
| | on sectors with highest gains | in order to increase participation. Included |
| | (Industrial/Commercial/Institutional) | Multi-residential Audit and Multi-residential |
| | | Sub-metering Programs. |
| What should be the | Financial versus recognition incentives | Increased Water Capacity Buyback Incentive. |
| what should be the | Address high user information | Continued Home Visit/Audits, recommended |
| Water Efficiency | | to pilot Automated Meter Reading Program |
| Stratogy Undato? | Better quantify 25 percent overuse | Recommended pilot Automated Meter |
| Strategy Opuale! | | Reading Program, included Watr App to |
| | | promote awareness of water use. |
| | Innovation and creativity | Recommended multiple research programs. |
| | Behavioural marketing | Continued Public Education and included |
| | | Watr App. |



| Question | Summary of Responses | Action Taken |
|--------------------|--|---|
| | Conservative pricing | Considered conservation water rate pricing. |
| | Non-revenue water | Continued Water Loss Management Program. |
| | Landscaping: Native plant cover will | Continued Healthy Landscapes, |
| | reduce water usage | recommended Water Efficient Landscape |
| | | Incentive. |
| | Sustainability | Water Reuse and Demand Research. |
| | Education | Continued Public Educational Programs. |
| | Celebrating and identifying value of water | Continued Public Educational Programs. |
| | Hire consultant | Planned for next update in 2021. |
| | Shut customers' water off for one day | Continued Public Educational Programs. |
| | each quarter to highlight importance | |
| | of the City's water supply | |
| | Invite everyone to the river's edge to | Continued Public Educational Programs. |
| | connect with the rivers: swimming, | |
| | fishing, etc. | |
| | Public Education and Challenges | Included in list of alternatives. |
| | Group utility bills together to see | Considered. |
| | entire savings – not only water | |
| If you only had | Collect stories from those that were | Continued Public Educational Programs. |
| three (3) years to | without water due to frozen pipes | |
| implement a plan, | Composting toilets/waterless urinals | Included in list of alternatives. |
| what would you | Give every resident a rain barrel | Considered not viable. |
| do? | Partnerships: Industry connects with | Recommended research programs. |
| | University of Guelph research | |
| | Incentives | Continued Water Capacity Buyback, Royal |
| | | Flush and Blue Built Home Programs. |
| | Pipe replacement/repair | Continued Water Loss Management Program. |
| | Waterless floor drains | Included in list of alternatives. |
| | Rally support from Province | Considered out of scope. |
| | Raise Rates significantly: Tiered-rate | Considered conservation rate structures. |
| | program | |
| | Water audits | Continued Home Audits. |
| | Retrofit more assertively | Updated Royal Flush Program. |

2.2 Community Liaison Committee Meeting #2

This meeting was held on September 29, 2015 from 7:00 pm until 9:30 pm. The Project Team introduced and updated the committee on the Project Progress and Community Feedback from the first Open House in



addition to briefly reviewing the Technical Memos, updated demand profiles, and preliminary Industrial/Commercial/Institutional survey results.

Questions periods were incorporated throughout the presentation. The following are the questions and responses.

Table 3. Community Liaison Committee #2 Question and Answer Summary

| Question | Summary of Responses | Action Taken |
|--|--|----------------------|
| | Reach a broader public | Went to various City |
| | demographic; shopping malls, | venues (City Hall |
| What further apgagement appartunities | community centres, public libraries, | and the West End |
| should the City be employing to solicit | grocery stores, sporting events (e.g., | Rec Centre) and the |
| should the City be employing to solicit | Guelph Storm hockey game). | H2O Go Festival. |
| program and policy ideas through our project | Additional social media | Engaged the public |
| in your opinion? | | through MindMixer, |
| | | Facebook and |
| | | Twitter. |
| | Leverage community groups. | Future |
| | | consideration. |
| | Inflow and infiltration reduction | Water Efficient |
| | potential; collect and reuse water. | Landscape |
| What program resources and policies would | | Incentives Program. |
| have the most impact for conserving water in | Building code standards; | Considered and |
| the City of Guelph in your opinion? | Compare per capita use | included analysis of |
| | versus incentive programs. | water use versus |
| | Compare house water use | age of home. |
| | by construction age. | |
| | Inflow and Infiltration. | Future |
| | | Consideration. |
| Do you have any ideas for future technical | Building code standards. | Future |
| memo topics? | | Consideration. |
| | Cost-benefit analysis of public | Future |
| | education. | Consideration. |
| | Community members/companies | Recommended |
| Would you support investing in water | that participate in programs say | programs that had |
| conservation if the per unit value of | "Spend more money", however the | an overall cost |
| programming equaled the costs to establish | silent majority are concerned about | benefit when using |
| new water supply and treatment | tax dollars and don't want to spend | a \$4.68 cost of |
| infrastructure? | money to support growth, i.e., the | supply. |
| | existing population shouldn't be | |
| | paying for future residents. Some | |



| Question | Summary of Responses | Action Taken |
|----------|---------------------------------------|---------------------|
| | residents will do things because they | |
| | think it's the 'right' thing to do | |
| | environmentally, not based solely on | |
| | financial savings (like homes that | |
| | install solar panels). | |
| | Water conservation programming is | Recommended |
| | a known cost – as opposed to trying | programs that will |
| | to find new sources of water where | help delay the need |
| | you are likely to have cost overruns | to increase water |
| | and unknown expenditures. | supply in the City. |

General Comments about Updated Demand Profiles:

- Production has been flat-lining since 2010 but it was thought that leak detection efforts would have resulted in much lower demand. It was noted that frozen lines causing pipe bursts have increased yearly production.
- Reuse storm water.
- Water rates are low, cost of water is minimal, just pennies per day, hard to make the case for residents to conserve with retrofitting.
- What are the incentives for homebuilders? The Blue Built Home Program was described and how simple efficiency measures are difficult to incentivize builders under applicable law.
 - Incentivize builders through policies.
 - 2012 building code includes water efficiency measures. It was explained that some new houses were using more water than those built 30 years ago. Blue Built Home households have demonstrated water demands which are 20 percent better than "to building code" homes. It was confirmed that many homes built 30 years ago have been retrofitted, and this may be cause for less water use than new builds.
 - Can Guelph set its own bylaws for homebuilders? There were examples of incentives for builders but higher standards may be hard to require/enforce by individual municipalities under law.
- Education may be an option when demand plateauing occurs, however, it is difficult to put a value on educating the public. It was explained that several studies have found that the savings related to educational programming is negligible. For example, baby boomers are generally very educated, yet tend to be poor environmental conservationists.
- It was noted that about 55 percent water consumption is residential and 45 percent is from the Industrial, Commercial, and Institutional sector. The highest water consuming business sectors identified in the 2009 Water Efficiency Strategy included automotive manufacturing, food and beverage, and educational institutions.



General Comments about Preliminary Industrial/Commercial/Institutional Survey Results:

- One Community Liaison Committee member conducts energy audits and agrees that a 2-year or less return on investment is needed for Industrial/Commercial/Institutional payback before the client will consider implementing a measure/program.
- It was explained that not all water supplied is returned as wastewater. For example, water is lost to the atmosphere during evaporative cooling. In other cases, poor quality wastewater is not accepted by Guelph's water treatment plant and has to be shipped to another community to be treated. Community Liaison Committee member confirmed that the University of Guelph uses lots of water for evaporative cooling and would like to see a wastewater credit from the City stating that wastewater credits are available in other municipalities.

Following a presentation, committee members were presented with handouts of the draft evaluation criteria and asked which criteria was most important to them and why. The top rated criteria are found below, with complete responses summarized on the City of Guelph website in CLC documents located there.

What is your input on the draft evaluation criteria regarding refinement and weighting? (Of the criteria evaluated, the following had six or more Community Liaison Committee members rating its level of importance as a five, the highest level of importance)

- Source water protection "Aquifer should not be risked/compromised to satisfy demand", "Must be sustainable".
- Focuses resources on the problem "Best bang for buck".
- Growing efficiently "Good long-term investment, easier than retrofits".
- Technology must be applicable and provide cost-effective water savings "No point in pursuing a measure/program if it is not technically feasible".
- Compliance "City by-laws can be reconsidered/revised", "Amend existing regulations".

2.3 Community Liaison Committee Meeting #3

This meeting was held on January 26, 2016 from 7:00 pm until 9:30 pm. The Project Team provided participants with a review of the Workplan, Water Rates Feasibility Assessment and a Short List of Program Alternatives. The following are questions/comments from the Community Liaison Committee members and responses by the Project Team and City Staff in addition to actions taken.

Table 4: Community Liaison Committee #3 Question and Answer Summary

| Question | Summary of Responses | Action Taken |
|---|---|--|
| Do you have any feedback on the updated | Surprised that "cost-effective to the customer" is weighted so low. | Considered and included in business case. |
| | May be double counting where some criteria overlap. | Environmental benefit has multiple applications in the |





| Question | Summary of Responses | Action Taken |
|--|--|----------------------|
| | | criteria developed. |
| | Some flexibility should be included | Considered. |
| | in the final selection of measures by | |
| | noting special factors that might | |
| | apply only to certain measures. | |
| | The program alternatives should be | Included grouping of |
| | grouped by different sectors. It was | sectors as well as |
| | thought that the short-list appears | direct and indirect |
| | to be very residential focused. | water savings |
| | | grouping. |
| | There appears to be some overlap in | Measures were |
| | the list of measures. This will be | combined to reduce |
| | further considered in the feasibility | overlap. |
| | study. | |
| | There was support for including the | Separated as direct |
| | educational programs in the short- | and indirect water |
| | list, regardless of their scoring. | savings programs. |
| What observations or feedback do you have | It was noted that the building | Included long term |
| on the results of the preliminary evaluation | code/standard received a high score | recommendations |
| and short-list of program alternatives? What | on the short-list alternatives. The | to document topics |
| do you like? What concerns do you have? | Project team explained the strategy | to be considered in |
| | update will include long-term | following Updates. |
| | implementation recommendations | |
| | and the City can continually push for | |
| | changes to the building code. | |
| | Support was expressed for eMERGE | Continued program. |
| | home visits as it is a great source of | |
| | information for residents. It was | |
| | suggested this program be | |
| | expanded. | |
| | It was suggested a pilot composting | Health risks |
| | toilet program be explored. | associated with |
| | | disposal continued |
| | | to be a concern. |
| | It was suggested that revisions be | Some aspects |
| What advice do you have for the Project | made to the Blue Built Home | require building |
| Team on moving towards a revised short-list | Program to include aspects such as | code changes. |
| of program alternatives? | right-sized plumbing, insulating hot | |
| or program alconatives: | water lines, and permeable | |
| | driveways. | |



| Question | Summary of Responses | Action Taken |
|----------|--------------------------------------|----------------------|
| | Allow the City to show leadership by | Included multiple |
| | testing new ideas and approaches. | research programs. |
| | Consider that there is a learning | Included in the 5 to |
| | curve with "smart" systems for | 10 year timeframe |
| | contractors. A big educational | to allow for |
| | component will be required for | planning. |
| | those measures (e.g., irrigation | |
| | system audits). | |
| | Consider integration with storm | Inclusion of Water |
| | water rates and incentives. | Efficient |
| | | Landscaping |
| | | Incentives |
| | The public does not understand how | Personalized |
| | much water they are using; | messaging to be |
| | education and awareness is very | included in the Watr |
| | important. Combined Hydro and | App. |
| | Water bills are not informative. A | |
| | suggestion was made to include | |
| | water messaging on the front page | |
| | of bills as well as a simplified | |
| | explanation of water charges and | |
| | usage comparisons. | |
| | Explore additional behavioural | Inclusion of Watr |
| | changes that reduce impact on | App. |
| | water resources and infrastructure | |
| | such as reductions in wastewater | |
| | volumes. | |

Following the water rates presentation, it was concluded that utilizing water rates as a measure for water conservation will not be pursued at this time. Mike Fortin's report, Evaluation of Conservation Rate Structures is included in Appendix A for reference.

2.4 **Community Liaison Committee Meeting #4**

This meeting was held on March 22, 2016 from 7:00 pm until 9:30 pm. The meeting included presentation reviewing the Draft Water Demand Report and Draft Program Performance Report. The Draft Program Alternatives were presented, followed by a roundtable discussion to gather individual feedback on proposed program/measures recommended by the Project Team.



| Question | Summary of Responses | Action Taken |
|---|--|--|
| What feedback do you have on the list of proposed programs? | What do you like? In general the members were pleased with the proposed programs. Phasing in of automated metering infrastructure. Happy with the diversity of programs. Glad there are education and outreach programs even though water savings are not quantifiable. Happy to see Royal Flush available to all age of homes. | |
| | What concerns do you have? Are there any key gaps? Would like to review business cases to assess program/measure description and cost of implementation. Concerns regarding program development and execution | Review during Community Liaison Committee #5 |
| Should we revisit any programs that failed to make the grade or that are recommended to be removed? | Water Smart Business Program – would like to remove the clause that limits innovation – currently must have a payback greater than one year to qualify for rebate. Acts as a disincentive. The success of all projects, even those that have a relatively quick payback would provide positive awareness of the City of Guelph's leadership in water efficiency. | Included as a recommendation. |
| Any feedback on any other aspect of the | Composting Tollets – would like to see a rebate for residents. Programs should focus on | Health risk concerns remain Incorporated. |

Table 5: Community Liaison Committee #4 Question and Answer Summary



| Question | Summary of Responses | Action Taken |
|----------|--|--|
| WESU? | magnitude of savings. | however even though indirect programs have unquantifiable savings, there are still water savings. |
| | Allow for more research and innovation. | Noted, however must balance research with cost effective measures. |
| | Use more programs that are easily implementable. | To be considered. |
| | Prove the ability to detect leaks in PVC, improve detection. | To be considered. |
| | Make sure Guelph is always progressing, keep cognisant of the amount of water available to Guelph. | Represented by Research Programs. |
| | Considers renters and students an untapped market for water efficiency and awareness campaign. | Multi-residential Programs, Public Awareness Programs. |
| | Perhaps look into an "unplug" incentive for water softeners. | To be considered. |
| | Ensure execution of programs are administered in such a way to alleviate the burden of participation as much as possible. | To be considered. |
| | Potential for an energy manager – water component. | To be considered. |
| | Continue to look for Government funding. | To be considered. |

There was an open discussion regarding what flush volume toilet should be rebated for the revised Royal Flush Program, i.e., 4.0 litres versus 4.8 litres.

- There were concerns of potential free ridership.
- There were concern regarding product availability and whether the program will result in a market shift or frustration of residents trying to participate.



• There was some discussion of the possibility of different rebate levels being available for 4.8- and 4.0litre toilets, however City staff expressed concerns of resident confusion.

Participants indicated a preference for a final Community Liaison Committee meeting to discuss the final Water Efficiency Strategy Update report and recommendations. This meeting was scheduled for early May.

2.5 **Community Liaison Committee Meeting #5**

The final Community Liaison Meeting was held on May 5, 2016. The purpose of this meeting was to review the draft final report before presenting to City Council. The Project Team presented the Draft Water Efficiency Strategy.

After the presentation there was a discussion regarding future constraints for growth and development in the City of Guelph and whether the main future constraint will come from water or wastewater. It was discussed how the Speed River, the receiving body for Guelph wastewater, may be a potential future constraint if changes are made in the future regarding the volume or quality (chemistry) of wastewater that can be discharged into the river. The potential impact of decreasing flow rates to successfully transport waste through the City's wastewater infrastructure was discussed but was not seen as a major issue at this time; this issue was, however, included in the strategy update as a research project. As for water supply, the reduction in peak demand and the City's work on asset management has improved the horizon for meeting Guelph's long-term development and growth needs.

The following are questions/comments from the Community Liaison Committee members and responses by the Project Team and City Staff in addition to actions taken.

| Торіс | Comments/Suggestions | Action Taken |
|------------------|---|--------------------------------|
| | Useful in reaching a broader audience. | N/A |
| | Consider reducing metrics used to convey | Considered. |
| Summany Document | volume of water, perhaps average annual | |
| Summary Document | water use. | |
| | Include from full draft report the comparative | Included comparisons and |
| | average litres per capita water use and | timelines. |
| | timelines for programs. Remove cost details. | |
| | Include City staffing and administrative costs. | Included staff costs. |
| | District metered areas implementation/capital | Included development |
| Costing | cost should be removed from financial analysis | charges in analysis to provide |
| | in 2017. | a more complete financial |
| | | picture. |
| | Concern over missing 2006 value for residential | Provided an estimate of the |
| Data | litres per capita per day. | 2006 value. |
| | Include percentage breakdown of direct and | Considered. |

Table 6: Community Liaison Committee #5 Question and Answer Summary



| Торіс | Comments/Suggestions | Action Taken |
|-------------------|--|--|
| | indirect water savings. | |
| | Explain the increase in water use in 2010. | Provided explanation. |
| | Include more programs for the industrial, commercial and institutional sector. | The Project Team explained that the proposed Water Smart Business Program is a versatile program that has the potential to capture all water saving projects. |
| | Use a differential rebate for toilets (\$75 rebate for 4L) to encourage a shift in marketplace. | Included \$75 rebate for 4 L toilets in the Blue Built Home Program. |
| Programs | Re-word the Royal Flush Program description to reduce confusion. Consider providing more detail for the research programs | Removed the year of home built from the description. Considered. |
| | Consider how appliances that have an embedded softener could be included. | To be considered. |
| | Move up the timeline for implementation of the Cooling Tower Program. | To be considered. |
| | Include a program that analyzes why people take long showers and solutions to address this. | To be considered in future research programs. |
| | Water efficiency program should focus on youth education. Also on long-term industrial interest in a sustainable community. | Considered. |
| | No specific mention of green roof water collection for toilet flushing. | No action taken. Falls within rainwater collection and greywater reuse programs. |
| Other Suggestions | Water pricing should be mentioned as a tool for water conservation. | Included discussion of water rates study in Final Report. |
| | Consider the inclusion of natural systems in municipal infrastructure valuation. | Considered. |
| | Include water re-use education now for potential future implementation. | To be considered for Public Education Program. |
| | Consider opportunities to cross-promote rebate programs for energy and water efficiency. | To be considered. |

Final comments and suggestions were focused on presenting the Water Efficiency Strategy to City Council. The following suggestions were noted:



- Emphasize the need for water efficiency programs in providing time for finding and developing future water supplies.
- Prepare an explanation for Council of why the City should continue to implement water efficiency programs in light of the naturally occurring savings that are being realized due to the ongoing improvements in the efficiency of plumbing fixtures and appliances available in the marketplace. While relying on naturally occurring savings may reduce program costs in the short-term, having to "ramp up" programs again at some time in the future may result in greater expenditures over the long-term.
- Prepare the present value for each program since Council may decide to select priority programs instead of all programs at one time.



3.0 PUBLIC CONSULTATION

Three open houses were hosted so that the Project Team could receive public concerns and suggestions throughout the project. These consultations went beyond a process of presentation and feedback and were used as a chance to sustain Guelph's established pride in environmental awareness, create new excitement, secure valuable insights and ideas and encourage public support and commitment.

The following Open House documents are available on the City of Guelph's website under "Plans and Strategies", "Water Efficiency Strategy" and "Engagement" (<u>http://guelph.ca/plans-and-strategies/water-efficiency-strategy/</u>):

- Open House Information Boards; and
- Open House Questions and Answers.

Advertisements, survey results, and miscellaneous comments are located in Appendix B for reference and Mindmixer Reports are located in Appendix C.

3.1 **Open House #1**

The first Open House was held on June 23, 2015 from 7:00 pm until 9:00 pm at Guelph's City Hall in Meeting Room C. This Open House was intended to capture the community's general feelings towards water and to gain some insight into potential future programming to be considered in the Water Efficiency Strategy Development.

There were 7 community members present.

The Project Team set-up four technical boards which covered the following topics:

- Water Efficiency Strategy Update
 - o Mission Statement
 - o Goals and Objectives
 - o Outcomes
 - Community Open House
 - Water Efficiency Strategy Update Process
- Guelph's Achievements
 - Water Use and Community Growth
 - o Net Present Value of Water and Wastewater Infrastructure Costs
 - Water Use Goal Progress
- Current Programs
 - Outside Water Use Program
 - o Home Visits
 - Water Conservation Rebate Programs
 - o Blue Built Home Water Efficiency Standards and Rebate Program
- Current Programs (Continued)
 - o Water Smart Business (Industrial/Commercial/Institutional)



- o Water Conservation and Efficiency Public Advisory Committee
- Resources for Youth
- Water Loss Management

A list of questions, concerns and comments proposed by residents are summarized below:

- Grey water should be used in toilets
- Carbon filter or other water purification should be used instead of bottled water
- More information needs to be provided about repurposing cisterns in older homes
- There should be rebates/awards to encourage rain gardens
- Biowales instead of sewers
 - o Use infiltration not reduction
 - Use underground cisterns for rain capture
 - Construct wetlands to treat water on site
- Concerns over maintaining ecosystem integrity during development of the old jail area of York Road
- Suggest implementing "water efficient" landscaping
- Implement unique elements that identify different neighborhoods or water capture techniques
- Develop educational signage for water conserving infrastructure (e.g., biowales, rain gardens, water cisterns)
- There should be mandatory water conservation polices built into new homes.
- Paving alternatives (porous pavements)
- Change City bylaws to make it easier to implement water saving strategies
- Implement water consumption monitoring during summer months.
- Water billing
- Keep trail unpaved
- Provide examples of water efficient landscaping around the City
- Use biowales not sewers
- Use wetlands at storm water pipe discharge into rivers

Table 6 summarizes the results of the Interactive Display where residents could place stickers and comments indicated which incentives they supported.

Table 7: Sticker Engagement

| Category | Specific Example | Total Number of Stickers | Additional Comments |
|--------------------|------------------|-----------------------------|---------------------|
| Appliance Fixtures | N/A | 1 | N/A |
| Cistern | N/A | | N/A |
| Green Roof | N/A | 1 | N/A |
| Greywater Reuse | N/A | | N/A |
| Irrigation System | N/A | 4 | N/A |
| Leak Detection | N/A | | N/A |



| Category | Specific Example | Total Number of Stickers | Additional Comments |
|----------------|---|-----------------------------|----------------------------------|
| Native Plants | N/A | 2 | Less annuals and more perennials |
| Rain Barrel | Community rain water harvesting systems | 3 | Good idea for new developments |
| Infrastructure | Storm water collection boulevard / reuse system, water collection boulevard | 6 | Better design for city streets |

MindMixer is an online tool used by the City of Guelph to solicit feedback from residents that are unable to attend scheduled community events. The first round of MindMixer captured comments until August 19, 2015. Fourteen residents participated in the Water Efficiency Strategy MindMixer where participants were asked to respond with ideas or comments to the following question:

What does water conservation mean to you? If you could make one BIG change at home to save water, not worrying about cost or difficulty, what would it be? What small or easy change could you make to save more water at home today? What ideas do you have for conservation initiatives that the City could include as part of its program? Share things you have done, want to do, or things that other cities do. Think about both at-home initiatives as well as City projects.

There were 14 ideas and 6 comments recorded. The most popular ideas were:

- Use Treated Wastewater Effluent
- Rainwater capture in Condos
- Grey water reuse systems
- Dishwasher rebate

3.2 **Open House #2**

The second Open House was conducted in a different manner than the first Open house in an effort to increase resident participation. In lieu of a second Open House, People in Places Events were held during the summer (2015) at various events, including Jazz Festival, VegFest, Village Fall Fair, and Run for the Cure. At such events members of the project team asked the public to rank criteria on a scale of 1 to 5 to determine what was important to them for future water efficiency programming. These criteria were:

- 1) Minimize Costs to the City
- 2) Reduce water use as a part of new growth
- 3) Reduce water use to existing buildings
- 4) Similar the Guelph economy
- 5) The technology is proven and easily implemented in the City of Guelph
- 6) Develop/pilot new technologies to save water

Table 7 summarizes the date and time of each event.



Table 8: Open House #2 Events

| Event | Location | Date | Duration |
|-------------------|------------------------------|--------------------------------------|--------------|
| Jazz Festival | Markey Square | September 19 th , 2015 | 2 pm – 8 pm |
| VegFest | Guelph Youth Music Center | September 20 th , 2015 | 11 am – 5 pm |
| Village Fall Fair | Margaret Green Park | September 26 th , 2015 | 11 am – 2 pm |
| Run for the Cure | St. Georges Square | October 4 th , 2015 | 11 am – 2 pm |

Table 8 quantifies the feedback received at the Jazz Festival and the Vegfest events. The results identified that reducing water use in existing buildings and developing/piloting new technologies to save water were more important criteria for water efficiency measures than minimizing the costs to the City.

Table 9: Evaluation Criteria Survey Results for Jazz Festival and Vegfest Events

| Criteria Surveyed | Level of Importance | | | | Total | Total Score | | |
|--|---------------------|----|----|----|-------|-------------|-----------|-----|
| | 1 | 2 | 3 | 4 | 5 | N/A | Residents | |
| Minimize costs to City. | 9 | 13 | 31 | 24 | 5 | 0 | 82 | 249 |
| Reduce water use as part of new growth. | 0 | 2 | 7 | 32 | 40 | 1 | 82 | 353 |
| Reduce water use in existing buildings. | 0 | 2 | 10 | 40 | 28 | 2 | 82 | 334 |
| Stimulate the Guelph economy. | 5 | 8 | 27 | 22 | 18 | 2 | 82 | 280 |
| The technology is proven and easily implementable in the City of Guelph. | 1 | 7 | 19 | 27 | 27 | 1 | 82 | 315 |
| Develop/pilot new technologies to save water. | 1 | 3 | 5 | 25 | 47 | 1 | 82 | 357 |

The MindMixer online forum was boosted by an advertised link via the City's Facebook page. The advertised link contributed to an additional 29 MindMixer completed surveys. Community members were allowed to select either "I love it!", "I like it!", "It's OK", or "Neutral" – these selections were scored as 3, 2, 1 and 0 stars respectively. Results for MindMixer feedback represent the total amount of stars received for each criteria and are shown in Table 2. A total of 113 community members completed the online survey.

Table 9 also summarizes the results from community engagement at the Jazz Festival, Vegfest, Village Fair and Run for the Cure events. There were 122 residents surveyed at these events between September 19th and October 4th, 2015. Total score for each criteria for all events is the summation of the total scores for each individual event. Scores were calculated as identified above. This exercise confirmed that these criteria are not considered to be equally important by the community and that the evaluation process would benefit from developing a specific weighting score for each criteria.



| | Jazz Festival & Vegfest | Village Fair | Run for the Cure | MindMixer | Total | | |
|---|----------------------------|-----------------|---------------------|-----------|-------|--|--|
| Criteria Surveyed | Residents Surveyed | | | | | | |
| | 82 | 12 | 28 | 113 | 235 | | |
| | | | Total Scores | | | | |
| Minimize costs to City. | 249 | 37 | 92 | 11 | 389 | | |
| Reduce water use as part of new growth. | 353 | 47 | 105 | 44 | 549 | | |
| Reduce water use in existing buildings. | 334 | 37 | 89 | 38 | 498 | | |
| Stimulate the Guelph economy. | 280 | 21 | 102 | 23 | 426 | | |
| The technology is proven and easily | 315 | 27 | 91 | 40 | 473 | | |
| implementable in the City of Guelph. | | | | | | | |
| Develop/pilot new technologies to save | 357 | 21 | 117 | 29 | 524 | | |
| water. | | | | | | | |

Table 10: Evaluation Criteria Total Scores, Community Engagement Results

3.3 **Open House 3**

The third Open House was held on March 1, 2016 at the Guelph City Hall in Room 112 from 7:30 pm until 9:00 pm. The purpose of this meeting was to gain feedback on the proposed draft water efficiency programming.

This event accompanied an ice-skating event in an effort to engage residents. Unfortunately, there was a large snow storm on this day which may have impacted the number of residents that attended.

Other events that were attended include:

- City Hall March 4th
- Wacky Water Week Events March 14th to 18th
- H2O Go Event March 19th

All these events were used to gain feedback on the poster boards and receive survey results. A number of poster boards were set up summarizing:

- Water Efficiency Strategy Update,
- Current Water Use and Targets,
- Water Efficiency Strategy Update Proposed Programs.

Event attendees were asked a series of questions as part of a survey. The results are summarized below.

This Open House kicked off a month of public engagement where the project team, project boards and surveys travelled to various City Venues (City Hall and the West End Rec Centre) and the H2O Go Festival. The MindMixer activity in March received 12 additional response from a Facebook post boost. The results from MindMixer have been included in the numbers and comments from the Open House.



3.3.1 eMERGE Survey Results

Have you heard about eMERGE?

Yes – 31 No – 28

Have you participated in the eMERGE Program?

Yes – 13

No – 44

One person indicated they were a volunteer with eMERGE and another indicated that they have participated in a similar program for Enbridge.

What did you find most useful about the program?

- The young man who came was very knowledgeable
- They helped with Royal Flush application
- Provided expert advice
- Indicated my furnace needed a tune-up
- The energy audit aspect and installation

What would you say are the benefits to participating?

- Awareness of products
- Integrated platform
- Learn about areas I do not know about
- Free lightbulbs

How could this program be improved?

- With more funding, if more could be done at the time of the visit, i.e., replace taps, sometimes there are too many barriers to complete.
- Follow-up
- More partnerships

Why have you not participated to date?

- Have not heard of program
- Small house, already frugal
- Landlord has to authorize visits to house
- Enbridge did one

What do you see as being challenging or difficult about participating in the program?

- Changing your ways
- Time to invest
- Not being the owner of the place; people not having the disposition to go through the visit



- Lack of announcements
- Apathy
- Need permission

What would encourage you to participate in the future?

- More time
- Personal awareness and commitment
- Ease of access
- Understanding the issue

On a scale of 0 to 4 (Where 0 is not likely at all and 4 is very likely), how likely would you be to participate in the future in a program that offers free home visits and a retrofit package?

- 0-3 residents
- 1-2 residents
- 2-4 residents
- 3 3 residents
- 4 8 residents

3.3.2 Healthy Landscapes Survey Results

Have you heard about the Healthy Landscapes program before today?

Yes – 27 No – 29

Have you participated in the Healthy Landscapes program?

Yes – 12

No – 21

If you participated in the Healthy Landscapes Program, what did you find most useful? What would you say are the benefits to participating? How could the program be improved?

- Helpful to have someone walk through yard with suggestions
- Too much information
- Very helpful
- More focus on what you can do to reduce run-off and rain garden information

Why have you not participated to date?

- Live in apartment/condo (no lawn)
- Wasn't aware program existed
- Don't use outdoor water / garden



What do you see as being a challenge or difficult about participating in a program that offers free home visits and advice to reduce outdoor water?

- Changing ways
- Additional info I don't already have

What would encourage you to participate in the future?

- If I used outside water
- Knowing about native plants which can be planted outside
- Ease of access
- Uneasy about strangers entering home city logos should be somewhere

On a scale of 0 to 4 (where 0 is not likely at all and 4 is very likely), how likely would you be to participate in the future in a program that offers free home visits and advice to reduce outside water use?

- 0 7 residents
- 1 2 residents
- 2 3 residents
- 3 3 residents
- 4 5 residents

3.3.3 Royal Flush Toilet Rebate Program Survey Results

Have you heard about the Royal Flush Toilet Rebate program?

Yes – 34

No – 24

What did you find most useful about the program?

- Ease of application
- Double check for efficiency
- City staff very helpful

What would you say are the benefits in a program that offers a rebate to buy a new water efficient toilet and replace your old one?

• If you happen to be renovating/replacing it's a benefit. Won't replace otherwise (75\$ isn't much). Plumber also informed him that a 3 litres toilet isn't enough water to flush waste all way to sewer mains, better to put bricks in tank.

How could the program be improved?

- I rent so the savings are not passed to me directly just the right thing to do
- Adjust rebates based on how expensive toilet is
- Ability to apply online



Why have you not participated to date?

- Have not heard of program
- Don't own just rent/lease

What do you see as being challenging or difficult about participating in a program that offers a rebate to buy a new water efficient toilet and replace your old one?

- It sounds easy
- Live in apartment / didn't hear about program
- Publicity
- Knowledge and feeling the need to replace

What would encourage you to participate in the future?

• If I had permission to change the toilet

On a scale of 0 to 4 (where 0 is not likely at all and 4 is very likely), how likely would you be to participate in the future in a program that offers a rebate to buy a new water efficient toilet and replace your old one?

- 0 6 residents
- 1 0 residents
- 2 1 resident
- 3 6 residents
- 4 7 residents

What are the best ways we can tell you about these and other water conservation programs offered by the City?

Email: 20 Phone: 3 Facebook: 13 Twitter: 6 City Website: 13 Guelph Tribute: 16 Online news sites: 4 Local Radio: 6 Printed information delivered to home: 13 Signs in neighbourhood: 5 Door-to-door visits: 3



4.0 SUMMARY OF PUBLIC CONSULTATION EVENTS

The Water Efficiency Strategy Update engagement process involved community consultation on the strategy development process and key deliverables through various meetings and events. The public initially provided direction for future programming by describing what water means to them, what programs they would like evaluated, and what criteria are important to use when evaluating programs. The public then gave insight into possible adjustments and timeline requirements of the draft proposed programs. The Water Efficiency Strategy Update's recommended programs are, in part, a result of the Guelph community's ideas and feedback because this feedback has been incorporated into the Update at every step of the process.



Appendix A – Evaluation of Conservation Rate Structures

CITY OF GUELPH

Evaluation of Conservation Rate structures

May 2016

Fortin Associates: Mike Fortin

TABLE OF CONTENTS

| 1. IN | ITRODUCTION | 1 |
|--------|---|----|
| 2. A | NALYSIS OF WATER DEMAND | 1 |
| 2.1. | Summary Statistics by Customer Class | 2 |
| 2.1.1. | Residential | 2 |
| 2.1.2. | Multi-Residential | 3 |
| 2.1.3. | Industrial-Commercial-Institutional | 3 |
| 2.2. | Determinants of Water Demand | 4 |
| 2.2.1. | Residential Demand | 5 |
| 2.2.2. | ICI and Multi-Residential Demand | 6 |
| 3. R | ATE STRUCTURE ANALYSIS | 7 |
| 3.1. | Introduction | 7 |
| 3.2. | Alternative Rate structures | 7 |
| 3.3. | Rate Setting Principles and Objectives1 | 1 |
| 3.4. | Comparing Rate Structures1 | 2 |
| 3.5. | Impact of Alternative Volumetric Rate Structures on Demand1 | .5 |
| 3.5.1. | Option: IBR/UR1 | .5 |
| 3.5.2. | Option: SR/UR1 | .7 |
| 3.5.3. | Option: EU/UR1 | .8 |
| 3.5.4. | Option: IBR/IBR1 | 9 |
| 3.5.5. | Option: IBR/HBR2 | 0 |
| 3.6. | Discussion2 | .1 |
| Appen | dix A MPAC PROPERTY CODES2 | .3 |
| Appen | dix B DATA ANALYSIS AND DEMAND CURVE ESTIMATION2 | .6 |
| Ove | rview | .6 |
| Trea | tment of Customer Data2 | .6 |
| D | ata Screening2 | .6 |
| R | esidential2 | 9 |

| Multi-Residential | |
|---|----|
| Industrial-Commercial-Institutional | |
| DEMAND CURVE ESTIMATION | 34 |
| Introduction | 34 |
| Approach to Estimating Demand Curves for Guelph | 35 |
| Residential Demand | |
| ICI and Multi-Residential Demand | 42 |
| Appendix C MODELLING THE IMPACT OF CONSERVATION RATES | 44 |
| Overview | 44 |
| Treatment of Demand | 44 |
| Treatment of Price and Demand | 44 |
| Alternative Rate Scenarios | 45 |

1. INTRODUCTION

This report provides a review and evaluation of conservation oriented water rate structures in support of ongoing work on a water conservation and efficiency master plan update. The analysis documented here is based on the detailed analysis of water use data for Guelph waterworks customers from 2006 to 2014. The report presents descriptive statistics on metered customer water demands, documents an analysis of the determinants of water demand including the water rate and identifies and evaluates alternative rate structures based on information on customer demand in Guelph. Recommendations are made regarding the use of a conservation oriented rate structure.

The report is divided into two major parts: the first documents the statistical analysis of water demand, the second presents the analysis of alternative rate structures.

2. ANALYSIS OF WATER DEMAND

The data used for this study is the customer water meter data assembled by City of Guelph staff (FILE GU850_AddFinal_160202.xlsx). This is a rich data base with detailed multi-year information on customer water usage. The information accessed for this study includes:

- monthly or bimonthly consumption data for 38,529 customer accounts over the period 2006 14,
- meter size,
- customer location at the level of 'Dissemination Area' polygons used by Statistics Canada for Census reporting,
- customer participation in the various City water conservation and efficiency programs, and
- Property Codes and other property descriptors from the Municipal Property Assessment Corporation (MPAC).

Consumption data were available on a monthly or bimonthly basis. Initially the data was screened to remove customers for which the data were incomplete (missing months or years), discontinuous (break in the monthly or bimonthly readings) or of questionable quality (e.g. zero readings, readings that prevented a clear distinction between summer and winter periods). The analysis only included customers classified as residential, multi-residential, commercial, industrial or institutional based on MPAC land use codes. Properties coded as vacant land or farm were not included.¹

Customer data were aggregated into peak and off-peak seasons for the analysis. The summer or peak season was assumed to extend from May to September, and the winter season from October to April. Summer excess use was estimated as the difference between the average monthly demand for the summer and winter seasons. All consumption values are expressed as cubic meters of water per customer per month. Winter demand is assumed to represent indoor water use and excess summer demand is assumed to represent outdoor water use. Average seasonal and annual consumption figures for the full time period, 2006 – 14, were estimated for each customer from the annual data.

¹ See Appendix 1 for MPAC codes and aggregations made for this study.

Water use statistics by class of customer are summarized in Table 1 and Table 2. Consumption figures by detailed sub-class are provided in Appendix B. Measures of variability of consumption within these classes are provided in Table 3.

2.1. Summary Statistics by Customer Class 2

2.1.1. Residential

The residential class includes single detached, duplex and townhouse structures. Summary statistics for the class are presented in Table A2 and Figure 1.

| Table 1 | Residential Customer Water Use, 2006 – 2014 | | | |
|---------|---|--------------|--------|-------------------------|
| | Indoor (winter) | Summer total | Annual | Outdoor (summer excess) |
| Mean | 17.30 | 20.38 | 18.84 | 3.70 |
| Max | 56.02 | 74.78 | 62.78 | 68.22 |
| Min | 2.09 | 1.70 | 1.93 | -37.69 |

Summer use exceeds winter use on average but not all accounts use more water in the summer. In fact, 18.9% of residential customers actually use less in the summer resulting in negative values for excess summer use. This may indicate households occupied by students or accounts where outdoor water use is minimal and where total use is zero during a summer vacation period. A positive skew in water use among customers is evident in Figure 1 showing the average water use and customer counts for successive blocks of consumption each representing 20% of total water use.





Note: each block accounts for 20% of total residential consumption. Values are 2006-14 averages.

Water use trends were evaluated from 2006 to 2014. Results reveal declining water use with the annual decline representing 3.1% of average annual demand.

² More detailed results are provided in Appendix B.

2.1.2. Multi-Residential

Statistics for multi-res customers are summarized in Table A4, Figure A4 and Figure A5. In contrast to the residential class, this class has a much larger variation in water use due to the range in size and number of apartment units in each building. In fact, 2% of the largest customers account for 22% of demand in this class.

| Table 2 | Multi-Residential Customer Water Use, 2006 - 2014 | | | |
|---------|---|-------------|---------|-------------------------|
| | Indoor (winter) | Sumer total | Annual | Outdoor (summer excess) |
| Mean | 169.8 | 172.5 | 171.1 | 3.23 |
| Max | 3,608.0 | 3,989.9 | 3,798.9 | 509.9 |
| Min | 3.6 | 3.4 | 3.5 | -307.1 |



Figure 2 Annual Average Multi-Residential Water Use by Consumption Block

Note: each block accounts for 20% of total residential consumption. Values are 2006-14 averages.

Results of the analysis of water use trends indicate annual decline representing 3.1% of average annual demand. However, demand is increasing for 27% of customers.

2.1.3. Industrial-Commercial-Institutional

Statistics for ICI customers are summarized in Table 3 and Figure 3. The skewed distribution of customers is even more pronounced in the ICI class than in the previous classes due to the diverse nature and size of customers in this class. On average commercial customers are understandably smaller than other ICI customers, while industrial and institutional customers are similar.

| Table 3 | ICI Customer Water Use, 2006 - 2014 | | | |
|-------------------------------|-------------------------------------|-------------|------------------|-------------------------|
| | Indoor (winter) | Sumer total | Annual | Outdoor (summer excess) |
| All ICI (769 observations) | | | | |
| Mean | 402.6 | 422.5 | 412.6 | 23.8 |
| Max | 80,807.1 | 68,730.4 | 74,768.8 | 5,563.5 |
| Min | 1.0 | 1.3 | 1.2 | -14,492.0 |
| Commercial (437 observations) | | | | |
| Mean | 137.3 | 153.5 | 145.4 | 19.5 |
| Max | 4,314.8 | 6,946.2 | 5 <i>,</i> 630.5 | 3,157.7 |

| | Indoor (winter) | Sumer total | Annual | Outdoor (summer excess) |
|---------------------------------|-----------------|-------------|----------|-------------------------|
| Min | 1.0 | 1.3 | 1.2 | -401.8 |
| Industrial (237 observations) | | | | |
| Mean | 570.8 | 653.6 | 612.2 | 99.4 |
| Max | 34,705.0 | 37,394.4 | 36,049.7 | 5,563.5 |
| Min | 2.5 | 2.7 | 2.6 | -277.9 |
| Institutional (95 observations) | | | | |
| Mean | 1,203.8 | 1,083.3 | 1,143.6 | -144.7 |
| Max | 80,807.1 | 68,730.4 | 74,768.8 | 954.0 |
| Min | 3.0 | 4.3 | 3.7 | -14,492.0 |

Table 3ICI Customer Water Use, 2006 - 2014

Water demand for two categories of customers, each accounting for 50% of demand, are shown in the following graphs. Just 1% of the largest customers account for 50% of demand.





Note: each block accounts for 50% of total residential consumption. Values are 2006-14 averages.

Results of the analysis of water use trends show an average decline in demand of 1.7% of average annual demand. Demand is increasing for 38% of customers. Declining demand for ICI customers will reflect improving water use efficiency as well as general economic conditions.

2.2. Determinants of Water Demand

Determinants of demand are those factors that have an impact on the amount of water that a customer uses, for example the size of a household or the output of an industrial enterprise. The evaluation of determinants of demand is a statistical exercise that tests the degree to which differences in alternative factors or 'explanatory variables' seem to correlate with differences in the amount of water used, where the observed differences occur from one customer to the next and from one year to the next. This analysis starts with a long list of explanatory variables which is progressively whittled down by eliminating variables that perform poorly in explaining customer demands. The analysis completed for Guelph is documented in detail in Appendix B. Results of the analysis are summarized below.

2.2.1. Residential Demand

The analysis of residential water demand considered indoor use and excess summer use separately. The analysis was based on the customer meter reading data, MPAC housing characteristics for individual customers and additional data from the 2011 Census on household characteristics that is aggregated by neighbourhood.

The following observations can be made about the determinants of indoor water use based on the analysis:

- The price of water has a negative impact on indoor water use. A 10% increase in the price of water reduces indoor water use on average by about 3%.
- The Royal Flush Rebate (RF) program and the Smart Wash Washing Machine Rebate (SW) program have both had a significant and lasting impact on indoor water use. Program participation by a household results in a permanent reduction in water use of about 9.6 lpcd (0.76 m3/mo) for the RF program and 4.0 lpcd (0.32 m3/mo) for the SW program.³
- Increasing household income has a small negative impact on water use, reflecting perhaps the improved capacity to upgrade water using appliances to more efficient but expensive models.
- A higher level of education tends to reduce demand. This may reflect an improved capacity to comprehend and respond to WCE initiatives.
- Demand increases as house floor area increases. Since larger households will tend to live in larger homes, this result probably reflects the impact of the number of persons in a household on indoor demand.
- Demand in townhouses and gated community households is significantly lower than the average. Both townhouses and gated community households may have fewer persons per household and the later group of households are relatively new in Guelph and may use newer and more water efficient appliances.

The analysis of determinants for outdoor water focused on factors more relevant to that type of use. Results of the analysis include:

- The impact of price is likely small. Results of the analysis were inconclusive but suggest a sensitivity to price that is less than a third of the sensitivity of indoor use to price.
- The Healthy Landscape Assessment Program has a significant and lasting impact on outdoor water use for participants amounting to about 0.5 m3/mo.
- The application of lawn watering restrictions in the summer reduces demand by an average of about 2 m3/mo.
- The amount of precipitation and the number of dry days over the summer period are major determinants of demand for outdoor water. One additional dry day increases outdoor use by an average of 0.06 m3/mo.
- As with indoor demand, demand declines as household income increases.

³ Assumes 2.6 persons per household (Statistics Canada, 2011 Census data for Guelph).
• Newer homes and those with smaller floor areas use less water perhaps because of a correlation between these factors and lot size.

2.2.2. ICI and Multi-Residential Demand

The analysis of ICI and multi-residential water demand focused on annual demand. Unlike the residential customers, very little information was available for these classes of customers. Moreover, these customers are far more heterogeneous than residential customers.

Price and customer class were the only factors that were considered. Price appears to be a significant determinant of demand with results suggesting that a 10% increase in price reduces demand by 5% on average. This result may exaggerate the impact of price in that the analysis attributes any decline in water demand to price alone ignoring the impact of factors such as the economic cycle on demand which would have reduced demand in 2009.

3. RATE STRUCTURE ANALYSIS

3.1. Introduction

This section of the report documents the analysis of the use of the water rate to promote water conservation. Alternative rate structures are introduced and described, their expected impacts on water demand are presented and recommendations made based on a comparative analysis of the alternatives.

3.2. Alternative Rate structures

The focus of the analysis is the volumetric rate charged against metered water use. The discussion of rate structures however covers the fundamentals of water and wastewater rate structures to give the reader more insight into the process of rate structure design.

Alternative structures for fixed and volumetric charges are presented below. These are the charges that in combination form the rate structure.

| FIXED CHARGES | - Charges levied in each billing period that do not vary with the amount of water used. |
|---------------|--|
| Meter Charge | A fixed charge that varies with meter size. The charge is used to recover costs that vary with meter |
| | size, for example, costs for metering and service laterals. Water system fire protection capacity |
| | costs are also often included in the fixed charge. Meter charges for large industrial meters are |
| | typically over a hundred times greater than the charge for a residential meter. Generally, charges |
| | that vary by meter size are the fairest type of fixed charge. |
| Uniform fixed | A fixed charge that is the same for all customers. It is suited to recovery of costs such as billing and |
| charge | collecting that do not vary with volume. A single fixed charge is easy to administer since tracking of |
| | a customer's meter size is not necessary. |
| Fixture | A fixed charge in each billing period that varies with the number of fixtures or with other attributes |
| Charge | of the customer's premises. This is an older form of flat rate charge used where customers were |
| | not metered. It uses proxy measures like fixtures that are assumed to be correlated with water use |
| | to align the customer charges with customer water usage. |
| Minimum Bill | A minimum charge per billing period that is levied even if no water is used. The volumetric |
| | consumption charge kicks in on any water used in excess of the consumption allowance associated |
| | with the minimum bill. A minimum bill should be sufficiently low such that only a small percentage |
| | of customers pay only the minimum bill. Otherwise, the minimum bill functions like a flat rate |
| | charge. |
| Demand | A conservation oriented fixed charge per billing period that is based on the customer's peak |
| Charge | demand observed over one or more past billing periods. The measure of peak demand can be |
| | maximum month, week or day. For a retail rate, maximum month demand in the previous year is |
| | an appropriate measure of peak demand. The measure of peak demand for a customer remains |
| | constant for the billing year. This charge is common for electricity sales but not for water at the |
| | retail level. |
| | The use of a demand charge is rare at the retail level. Anglian Water in the UK imposes a demand |
| | charge on large business customers. They explain their demand charge as follows: |
| | "The maximum daily demand charge will be based on the maximum daily volume of water that you |
| | are likely to use. The charge will be fixed for the year, subject to an agreement that you will not take |
| | any water above this level without prior written consent from Anglian Water Business. If you exceed |
| | this volume in any 24-hour period, the Maximum Daily Demand charge will be adjusted accordingly |

Table 4 Types of Charges for Water and Wastewater Services

| Table 4 | Types of Charges for Water and Wastewater Services | | | | | | | |
|----------------|--|---|--|--|--|--|--|--|
| | and the new charge shall apply for the following 12 months. It is important that we agree an | | | | | | | |
| | accurate Maximum Daily Demand figure, as going over this level will mean a rise in charges, and no | | | | | | | |
| | guarantee we'll be able to maintain this level of supply." | | | | | | | |
| | (http://www.anglianwater.co.uk/business/your-account/tariffs/charges-explained/) | | | | | | | |
| VARIABLE CHAR | RGES - Charges that vary with the amount of service or volume demanded. The charge per cubic | | | | | | | |
| meter of water | consumed may be constant or change as the volume | of water consumed increases. | | | | | | |
| Uniform rate | A volumetric rate applied to all water used in the bi | illing period. All customers therefore pay the | | | | | | |
| (UR) | same amount for each cubic meter of water used. T | This is the simplest format for a volumetric rate | | | | | | |
| | structure and is currently used by Guelph for both v | water and wastewater. | | | | | | |
| Declining | The declining block rate is a traditional rate structur | re once used in Guelph. The volumetric charge | | | | | | |
| block rate | decreases in steps as usage increases. In a typical de | esign, the consumption limits for the first block | | | | | | |
| (DBR) | are set to encompass the largest amount that a cus | stomer in a single-family dwelling might use. The | | | | | | |
| | upper consumption limits for the 2nd block encomp | pass the consumption of most medium size ICI | | | | | | |
| | customers, and the 3rd and subsequent blocks cove | er larger ICI users. Costs of building and | | | | | | |
| | operating the excess system capacity needed to | Declining Block Rate - Durham WS | | | | | | |
| | satisfy peak demands are allocated primarily to | \$1.00 | | | | | | |
| | residential customers through the first block | \$0.90 45 4,500 \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ | | | | | | |
| | charge as it is the excess summer use of these | \$0.70 | | | | | | |
| | customers that is usually the primary cause of | 50.60 \$ \$0.50 | | | | | | |
| | peak demands. The rate design is therefore | ≥ \$0.40 ℃ \$0.30 | | | | | | |
| | cost-based. The declining block rate structure | \$0.20 | | | | | | |
| | has fallen out of favor in many quarters because | \$0.00 | | | | | | |
| | it is not seen to promote water conservation. | 1 10 100 1000 10000 | | | | | | |
| Increasing | This structure uses a volumetric charge that increas | ses in discrete steps as the volume consumed | | | | | | |
| block rate | increases. In this case, the block steps are sized to in | nclude types of use for the residential customer. | | | | | | |
| (IBR) | For instance, the first block limit for monthly water | use could be set at a level representing basic | | | | | | |
| | indoor households needs, the second would captur | e average residential monthly use and the third | | | | | | |
| | would capture outdoor residential use. This structu | re is often used only for residential customers | | | | | | |
| | since the high rate of the final block is hard to justif | fy for large non-residential customers. The | | | | | | |
| | differential in the charge from one block to the next | t should be designed to give a strong incentive | | | | | | |
| | to the customer to conserve water; for example, rate | te differentials between the blocks of 5%, 10% | | | | | | |
| | or even 25% are not really large enough to make a r | noticeable difference on the typical residential | | | | | | |
| | water bill. | | | | | | | |
| | While industry can often achieve considerable | Increasing Block Rate - Barrie WS | | | | | | |
| | savings from water efficiency measures it is not | 90 90 | | | | | | |
| | typically a discretionary use in the way that lawn | E \$3.50 60 | | | | | | |
| | watering is. Targeting this type of use with a high | b \$2.50 | | | | | | |
| | volumetric charge is therefore not likely to be | | | | | | | |
| | equitable, nor is it justified on the basis of | 5 \$1.00 | | | | | | |
| | underlying cost structures for water supply | Ŭ \$0.50 | | | | | | |
| | operations. | 0 20 40 60 80 100 120 | | | | | | |
| I | | | | | | | | |

| Table 4 | Types of Charges for Water and Wastewater Services | | | | | | |
|----------------|--|--|--|--|--|--|--|
| Inverted U or | This structure is a hybrid of the increasing and decreasing block rates. It combines a fixed charge | | | | | | |
| "Hump- | with volumetric charge that increases in Hump back Rate - London WS | | | | | | |
| backed" rate | discrete steps as the volume consumed \$3.00 25.35 | | | | | | |
| (HBR) | increases up to a limit beyond which the rate දි \$2.50 | | | | | | |
| | falls back down. Like the increasing block rate, | | | | | | |
| | the successive rising block steps are sized to 🙀 🚛 🚛 | | | | | | |
| | cover the indoor and outdoor use of residential | | | | | | |
| | customers. The highest price block captures 👸 50.50 | | | | | | |
| | high volume residential demand. Successive | | | | | | |
| | blocks beyond this high price block target non- | | | | | | |
| | residential demand at a lower price. | | | | | | |
| Seasonal | Any rate structure with volumetric charges that are higher on all consumption during the peak | | | | | | |
| rates | season. The off-peak season or base charge applies to water consumed during the remainder of the | | | | | | |
| | year. Seasonal charges are used in situations where seasonal demands are specifically targeted by | | | | | | |
| | conservation efforts. The rationale for a seasonal charge is that peak demands require over sizing | | | | | | |
| | of supply facilities relative to the capacity required to meet demand for the remainder of the year. | | | | | | |
| | With a seasonal charge, the extra costs of this excess capacity are recovered directly from that | | | | | | |
| | component of demand that causes those costs. Seasonal rates can be added to other rate | | | | | | |
| | structures. | | | | | | |
| Excess use | The excess use rate charge is a high volumetric charge applied to all demand during the peak water | | | | | | |
| rate | demand season in excess of a threshold. The threshold equals average off-peak season | | | | | | |
| | consumption or a modest multiple of this amount, for example 1.2 times winter demand. A base | | | | | | |
| | charge applies to all of a customer's off-peak season consumption and to peak season consumption | | | | | | |
| | that is below the threshold. | | | | | | |
| | The differential between the peak season and off peak season charge must be large so customers | | | | | | |
| | notice the difference and have a strong incentive to save water. Fairfax County, Virginia, where the | | | | | | |
| | excess use charge was first introduced in the 1980's still uses this rate structure today and has a | | | | | | |
| | differential of 150% between the excess use and base volumetric charges. Provisions are often | | | | | | |
| | made to deal fairly with seasonal customers such as nurseries. | | | | | | |
| Drought rate | A volumetric charge that is increased during a drought. This is an emergency rate that is used to | | | | | | |
| | reinforce bans on water use and to mitigate the revenue loss cause by a watering ban. | | | | | | |
| Lifeline rates | Subsidized rates on a minimum volume of water for basic residential needs—a form of assistance | | | | | | |
| | to low income households. Lifeline rates are easily incorporated into increasing or decreasing block | | | | | | |
| | rate structures. | | | | | | |
| Water Budget | Water budget rate structures are a variant of the increasing block rate structure in which the | | | | | | |
| Rates | amount of water in each block is tailored to the needs of each specific customer. This requires that | | | | | | |
| | the utility set standards representing efficient water use that are applied to each customer based | | | | | | |
| | on the specific circumstances of that customer. For instance, the block limits might take into | | | | | | |
| | account the size of the customer's lot, landscaping, expected precipitation and the number of | | | | | | |
| | persons in the household. In contrast, the traditional increasing block rate design uses the same | | | | | | |
| | block limits for all customers. | | | | | | |
| | In the middle of a six-year drought (1987-93) the Irvine Ranch Water District in California | | | | | | |
| | introduced increasing block water rates. This rate structure evolved into a five-tier water budget | | | | | | |
| | rate for residential customers with individual customer water allocations that determine limits for | | | | | | |

| Table 4 | Types of Charges for Water and Wastewater Services | | | | | | |
|---------|---|--|--|--|--|--|--|
| | the 'low volume', 'base', 'inefficient' and 'wasteful' rates. The wasteful rate applies to consumption | | | | | | |
| | exceeding 131% of the customer's base allocation and is almost 9 times the base rate. The consultant had the opportunity to witness the use of water budget rates for ICI customers in | | | | | | |
| | | | | | | | |
| | major cities in China in the 1990's. In these cities individual water use quotas were based on | | | | | | |
| | historic usage or industry water use standards. The charges for over quota consumption were very | | | | | | |
| | high, for example in a City called Zhangjiakou the charge was 100% of the base water tariff when | | | | | | |
| | water use was 0% to 5% over the quota escalating to 20 times the water tariff when water use was | | | | | | |
| | 95% over quota. | | | | | | |

Different formulations of fixed and volumetric charges are used to achieve different objectives depending on their format and design. At its simplest, the rate structure uses only a uniform volumetric rate with no fixed charge, such as is found in Peel Region. More commonly, municipalities use more complex rate structures with a fixed meter charge and a declining block, uniform or increasing block volumetric rate. One rate structure may apply to water and another to wastewater or a municipality may have just one integrated rate structure to recover costs for both systems. Some municipalities use one rate structure for residential customers and a second for ICI customers.

The current use of rate structures in 41 cities in Ontario are shown in Figure 4. The uniform rate is by far the most common volumetric rate structure in use today. The average combined water plus wastewater rate for this sample of municipalities is about \$3 per cubic meter.⁴



Figure 4 Rate Structures Used in Ontario, 2015

NOTE: WS=water supply, WW=wastewater, UR=uniform rate, IBR=increasing block rate, HBR=hump back rate, DBR=declining block rate

⁴ Rates data for Ontario municipalities were compiled for this study. The plotted rates incorporate amounts such as capital surcharges into the rate levels. The WW rate structure for five municipalities that use a percentage markup on the water bill is shown as the same rate structure as is used for water. The primary data is available upon request from the author.





NOTE: Average of 41 municipalities, Acronyms as above.

3.3. Rate Setting Principles and Objectives

Table 5 defines principles for rate design and discusses them in the context of the current study. These principles are the basis for a criteria based evaluation of rate structures completed below.

| PRINCIPLE | DEFINITION | COMMENT |
|---------------|------------------------------------|--|
| Water | Promote a level of water | A water conservation rate should give customers an effective |
| efficiency | conservation that supports the | economic incentive to reduce revenue and non-revenue water. |
| | most cost-effective delivery of | Efficiency is not achieved if the costs of implementing a new rate |
| | natural resources without undue | structure outweigh the economic, social and environmental |
| | impact on customers. | benefits. |
| Equity | Use water rates and other service | At a retail level, equity is assessed based on the cost of servicing |
| | charges to recover costs from | classes of customers. At the wholesale level, the assessment can |
| | each customer in proportion to | be based on individual customers. Equity requires that charges |
| | the cost of servicing that | paid by each customer be proportional to the service utilization |
| | customer. | by each customer so that the rate structure does not |
| | | inadvertently entail cross subsidies among customers. |
| Affordability | All customers can afford the cost | The issue of affordability concerns the economic condition of |
| | of water required for basic living | poor households and not of non-residential or ICI water |
| | regardless of economic | customers. It is of concern because the impacts of new rate |
| | circumstance. | structures are not evenly spread. Some people pay more when |
| | | rate structure change, while others end up paying less. |
| Full cost | Revenues from water rates and | Rate levels are based on the revenue required to cover costs. |
| recovery | other service charges recover all | The revenue target limits what can be done with the rate |
| | of the costs of the water system | structure. For instance, the volumetric charge cannot be |
| | (operations, maintenance, | increased to an arbitrarily high level just to conserve water since |
| | finance) | this would likely mean that too much revenue would be |
| | | generated. |

 Table 5
 Principles and Objectives for Rate Setting

| PRINCIPLE | DEFINITION | COMMENT |
|----------------|------------------------------------|---|
| Economic | The cost of water should not | The cost of water service is a small part of the cost of most |
| impact | prohibit economic growth that is | businesses so that the loss of enterprises is not usually a |
| | compatible with the capacity to | concern. But certain rate structures can result in a significant |
| | service that growth and it should | increase in the water bill for large users. |
| | not cause the failure or departure | |
| | of existing business. | |
| Public | Customers must have a basic | The perception and understanding of customers will determine |
| understanding | understanding of how a rate | how they respond to a new rate structure. If they don't |
| | structure works and how it | understand a new rate structure, they may not respond as |
| | affects their water bill. | expected. |
| Public | New rates must at least avoid | Public resistance to changes in rates is common. But when |
| acceptance | widespread public disapproval | changes are justified, education and promotion will usually |
| | and should meet with the general | overcome this resistance. |
| | approval of most customers. | |
| Technical | Metering, reporting, billing and | New rate structures must be technically feasible before even |
| feasibility | other requirements for | being considered. Feasibility may be a function of the availability |
| | implementing and administering | and cost of metering technology. |
| | a new rate structure must be | |
| | achievable. | |
| Administrative | Implementing and administering | Changing the rate structure is not a cost free action. It may |
| ease | a new rate structure should not | require changes in meter reading and billing operations or new |
| | place an inordinate burden on | billing software. At the very least, staff time and resources are |
| | administrative resources nor | required to promote the change with the public and to respond |
| | impose a high cost. | to questions and complaints. |
| Minimum | Sources of financial risk | In the context of rate setting, financial risk depends on the |
| financial risk | associated with factors such as | relative reliance on fixed charges, volumetric charges on base |
| | revenue variability and revenue | demand and volumetric charges on excess summer demand. |
| | loss should be minimized. | Rate structures that promote water conservation can make the |
| | | water and sewer department more dependent on summer water |
| | | sales for revenues. Since these sales are more variable than |
| | | winter sales, the change can affect the variability of revenues. |

Table 5 Principles and Objectives for Rate Setting

NOTE: Security of supply was initially included as an objective of rate design but in the context of rates it is simply a reiteration of the water efficiency objective so was dropped.

3.4. Comparing Rate Structures

The comparative analysis focusses on the volumetric rate structures described above except for the following structures:

| Declining Block | No longer accepted as a legitimate structure to promote water conservation. |
|-----------------|---|
| Lifeline rates | Not intended to promote water conservation. |
| Drought Rates | An option that is used in emergency drought situations only. |

All rate structures considered here are assumed to include a meter charge.

A preliminary descriptive evaluation is presented in Table 6 followed by the results of a ranking exercise based on the principles defined Table 5.

| Rate | PROS* | CONS* |
|--|---|---|
| Uniform rate (UR) | Simple, easy to understand Easy to implement and administer Highest revenue stability of the volumetric rates considered here | Does not create a strong, targeted incentive for conservation, for instance on summer use More difficult to achieve affordability for low income households Less equitable from a cost of service perspective |
| Increasing block rate (IBR) | Can create a strong incentive for conservation targeted to excess summer use or large customers 1st block can be designed to assure affordability for low income households Can be equitable from a cost of service perspective | Challenging to design properly Complex, customer may not understand Increases revenue volatility by increasing reliance on more variable summer demand Requires more public engagement to build awareness and understanding Not generally equitable if applied to ICI customers |
| Inverted U or "Hump- backed" rate (HBR) | Can create a strong and targeted incentive for conservation 1st block can be designed to assure affordability for low income households Improved equity for ICI customers Can be equitable from a cost of service perspective | Challenging to design properly Complex, customer may not understand Increases revenue volatility by increasing reliance on variable summer demand Requires more public engagement to build awareness and understanding |
| Seasonal rates (SR) | Relatively simple, easier to understand Relatively easy to implement and administer Can create a strong and targeted incentive for conservation Equitable from a cost of service perspective | Challenging to design properly Requires frequent meter reading (monthly preferred) Increases revenue volatility by increasing reliance on variable summer demand Requires more public engagement to build awareness and understanding More difficult to achieve affordability for low income households |
| Excess use rate (EU) | Can create a strong and targeted incentive for conservation Equitable from a cost of service perspective | Challenging to design properly Highly complex, customer may not understand Requires frequent meter reading to measure summer use accurately Some increase in revenue variability by increasing reliance on excess summer demand More difficult to achieve affordability for low income households |
| Water Budget Rates | High degree of customer engagement promotes awareness and efficacy Can create a strong and targeted incentive for conservation Can be designed to assure affordability for low income households | Very challenging to design properly Highly complex, customer may not understand Administratively onerous to implement and maintain due to detailed customer information requirements Requires extensive public engagement to build awareness and understanding |

 Table 6
 Comparison of Conservation Oriented Volumetric Charges

| Improved equity when applied to | - Inequitable, can result in larger allocations to |
|---|--|
| large ICI customers | inefficient users than efficient users and water bills |
| | for small users that exceed those for large users. |
| | Lower income households on small lots may |
| | subsidize the water use of wealthier households on |
| | large suburban lots** |
| | - Supports large lot size leading to lower density |
| | development with higher infrastructure and energy |
| | costs |
| | - Increases revenue volatility by increasing reliance |
| | on variable summer demand |

 Table 6
 Comparison of Conservation Oriented Volumetric Charges

* Based in part on AWWA, 2012. <u>M1 Principles of Water Rates, Fees and Charges</u>, 6th Edition.

** J. Beecher, 2012. The ironic economics and equity of water budget rates, Journal AWWA 104:2 p 41-41

| RATING CRITERIA | Water efficiency | Equity | Affordability ^a | Full cost recovery ^b | Economic impact ° | Public understanding | Public acceptance | Technical feasibility | Administrative ease | Minimum financial risk | Residential rating ^d | ICI rating ^d | Overall rating ^d | Weighted rating ^e |
|--|----------------------------------|------------------------------------|---------------------------------------|--|---|---|-------------------------------------|--|-----------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
| Rate structure | | | Re | sident | ial ratin | <u>я / ICI</u> | ratin | g | | | Av | erage | ratin | g |
| nate stracture | | | | Sideile | annaem | 87 10 | | <u> </u> | | | | er age | | -0 |
| Uniform rate | 0/0 | 0/1 | 0/na | 2/2 | na/1 | 2/2 | 2/2 | 2/2 | 2/2 | 2/2 | 1.3 | 1.6 | 1.4 | 1.1 |
| Uniform rate Increasing block rate | 0/0 2/2 | 0/1 1/-2 | 0/na 1/na | 2/2 2/2 2/2 | na/1 na/-1 | 2/2 1/2 | 2/2 1/-2 | 2/2 2/2 | 2/2 1/1 | 2/2 1/1 | 1.3 1.3 | 1.6 0.6 | 1.4 0.9 | 1.1 0.8 |
| Uniform rate Increasing block rate Hump back rate | 0/0 2/2 0/-1 | 0/1 1/-2 1/2 | 0/na 1/na 1/na | 2/2 2/2 2/2 2/2 | na/1 na/-1 na/2 | 2/2 1/2 1/2 | 2/2 1/-2 1/2 | 2/2 2/2 2/2 2/2 | 2/2 1/1 1/1 | 2/2 1/1 1/1 | 1.3 1.3 1.1 | 1.6 0.6 1.4 | 1.4 0.9 1.3 | 1.1 0.8 1.1 |
| Uniform rate Increasing block rate Hump back rate Seasonal rates | 0/0 2/2 0/-1 1/0 | 0/1 1/-2 1/2 1/-1 | 0/na 1/na 1/na -1/na | 2/2 2/2 2/2 2/2 2/2 | na/1 na/-1 na/2 na/-1 | 2/2 1/2 1/2 1/2 1/2 | 2/2 1/-2 1/2 -1/-1 | 2/2 2/2 2/2 2/2 1/1 | 2/2 1/1 1/1 1/1 | 2/2 1/1 1/1 1/1 | 1.3 1.3 1.1 0.7 | 1.6 0.6 1.4 0.4 | 1.4 0.9 1.3 0.6 | 1.1 0.8 1.1 0.4 |
| Uniform rate Increasing block rate Hump back rate Seasonal rates Excess use rate | 0/0 2/2 0/-1 1/0 1/0 | 0/1 1/-2 1/2 1/-1 1/-1 | 0/na 1/na 1/na -1/na 0/na | 2/2 2/2 2/2 2/2 2/2 2/2 | na/1 na/-1 na/2 na/-1 na/-1 | 2/2 1/2 1/2 1/2 1/2 -1/2 | 2/2 1/-2 1/2 -1/-1 1/-1 | 2/2 2/2 2/2 2/2 1/1 0/0 | 2/2 1/1 1/1 1/1 -1/-1 | 2/2 1/1 1/1 1/1 1/1 | 1.3 1.3 1.1 0.7 0.4 | 1.6 0.6 1.4 0.4 0.1 | 1.4 0.9 1.3 0.6 0.3 | 1.1 0.8 1.1 0.4 0.5 |

Table 7Rating of Conservation Oriented Volumetric Charges on a Scale from -2 to +2

a. Concerns household poverty and is not applicable to ICI

b. Full cost recovery is possible with every rate structure provided rates levels are set based on costs

c. Concerns enterprise wellbeing and growth so is not applicable to Residential customers.

d. Simple average of rating.

e. Uses the following weights to emphasize primary objectives (alternative weightings were tested with similar outcomes).

| Weight 1 1 1 0 1 1 0 0 | 0 |) |
|--|---|---|
|--|---|---|

The table above provides a qualitative rating reflecting the discussion of pros and cons in Table 6. The rate structures are evaluated separately for residential and ICI customers since they affect each group differently. The overall score suggests that the uniform rate is a preferred option although a hump back rate is very close in rating. A combination of the increasing block rate for residential plus a uniform rate for ICI customers would have a rating equal to that of the uniform rate applied to all customers.

The next section provides a quantitative assessment of the impact of alternative rate structures on water demand.

3.5. Impact of Alternative Volumetric Rate Structures on Demand

This section summarizes the analysis of impacts on water demand.⁵ The analysis considers the implementation of the following rate structures:

| Option | Residential rate | ICI rate |
|---------|-------------------------|------------------|
| IBR/UR | Increasing block | uniform |
| SR/UR | Seasonal | uniform |
| EU/UR | Excess use | uniform |
| IBR/IBR | Increasing block | Increasing block |
| IBR/HBR | Increasing block | Hump back |

The residential rate applies to single detached and townhouse accounts and the ICI rate applies to multiresidential and ICI accounts. The alternative rate structures are not applied to the sewer rate which is a uniform rate.

Rates that are not subject to quantitative analysis include the uniform rate and the water budget rate. The first is the existing base case against which other rates are compared. Water budget rates are not evaluated since the analysis here deals only with representative customers by class whereas the unique feature of the water budget rate is its capacity to differentiate individual customers.

3.5.1. Option: IBR/UR

The following rate scenarios are tested:

| | Residential Block range | Differential over 2 nd Block Rate | | | |
|-----------|-------------------------|--|------------|-----------------|--|
| | (m3/month) | Moderate | Aggressive | Very aggressive | |
| 1st block | 0 to 15 | 67% | 67% | 67% | |
| 2nd bock | 15 to 22 | 100% | 100% | 100% | |
| 3rd block | >22 | 200% | 300% | 500% | |

The first block captures the smallest customers responsible for the lowest 20% of demand while the second block accounts for middle range customers who, combined with the smallest customers, account for 60% of total residential demand. The rates for these two blocks are the same in all scenarios with the second block charge being only 33% higher than the first. The third block for customers consuming more than 22 cubic meters a month targets the top 40% of customers with high rates.

Results of the analysis indicate the reductions in demand for this option are less than 1% for even the very aggressive scenario (Figure 6) despite the high 3rd block rate (Figure 7) and the increase in the annual cost of water and wastewater for large households (Table 8). This outcome reflects the rather low responsiveness on residential demand to price as well as the fact that 1st and 2nd block rates must fall to maintain revenue neutrality. With these lower initial rates, the average cost of water does not increase nearly as much as suggested by the multiplier on the 3rd block.

⁵ See Appendix C for a description of the methodology used for this analysis.









| | Existing | Moderate | Aggressive | Very aggressive | | | |
|-------------------|----------|----------|------------|-----------------|--|--|--|
| Average Household | \$940 | \$939 | \$937 | \$934 | | | |
| Large Household | \$1,550 | \$1,747 | \$1,823 | \$1,867 | | | |

| Table 8 | Impact of Option IB | R/UR on Annual | WS + WW Bills |
|---------|---------------------|----------------|---------------|
| | impact of option ib | | |

3.5.2. Option: SR/UR

The following summer rate differentials over the winter rate were tested:

| Moderate | Aggressive | Very aggressive |
|----------|------------|-----------------|
| 200% | 300% | 500% |

Results of the analysis, shown in Figure 8, Figure 9, and Table 9, indicate a weaker annual response of demand to the seasonal charge than the increasing block charge with the maximum annual reduction at only 0.14%. While the summer charge for water has increased, the average annual increase is very small due to the lower winter rate. Increases in the water rate are also dampened by the fixed charge and the sewer rate which do not change.





Figure 8 Reduction in Demand with Option SR/UR

Figure 9 Volumetric Rates with Option SR/UR

| Table 9 | Impact of O | ption SR/UR on | Annual WS + | WW Bills |
|---------|-------------|----------------|-------------|----------|
|---------|-------------|----------------|-------------|----------|

| | Existing | Moderate | Aggressive | Very aggressive |
|-------------------|----------|----------|------------|-----------------|
| Average Household | \$940 | \$1,035 | \$1,035 | \$1,034 |
| Large Household | \$1,550 | \$1,551 | \$1,552 | \$1,552 |

3.5.3. Option: EU/UR

The following summer excess use rate differentials were tested assuming these apply to any summer demand in excess of winter use:

| Moderate | Aggressive | Very aggressive |
|----------|------------|-----------------|
| 200% | 300% | 500% |

The reductions in demand with this scenario is very modest since the high rate applies to a small portion of demand (Figure 10, Figure 11 and Table 10).



Figure 10 Reduction in Demand with Option EU/UR



| Figure 11 | Volumetric Rates with Option EU/UR |
|-----------|------------------------------------|
|-----------|------------------------------------|

| Table 10 | Impact of Option SR/UR on Annual WS + WW Bills |
|----------|--|
|----------|--|

| | Existing | Moderate | Aggressive | Very aggressive |
|-------------------|----------|----------|------------|-----------------|
| Average Household | \$940 | \$1,035 | \$1,035 | \$1,034 |
| Large Household | \$1,550 | \$1,551 | \$1,552 | \$1,552 |

3.5.4. Option: IBR/IBR

| | Block range (m3/month) | | | Differential over 2 nd Block Rate | | |
|-----------|------------------------|-----------|--------------|--|------------|-----------------|
| | Residential | Multi-Res | ICI | Moderate | Aggressive | Very aggressive |
| 1st block | 0 to 15 | 0 to 50 | 0 to 100 | 67% | 67% | 67% |
| 2nd bock | 15 to 22 | 50 to 800 | 100 to 5,400 | 100% | 100% | 100% |
| 3rd block | >22 | > 800 | > 5,400 | 150% | 200% | 300% |

The following summer IBR differentials were tested in this scenario:

This rate option appears to be the most effective option for reducing demand (Figure 12). Its impact reflects the relatively high responsiveness assumed for ICI customers and the large rate impact faced by a relatively small number of very large customers. (Figure 13 and Table 11).



Figure 12 Reduction in Demand with Option IBR/IBR



Figure 13 Volumetric Rates with Option IBR/IBR

| | Existing | Moderate | Aggressive | Very aggressive |
|-------------------|-----------|-----------|------------|-----------------|
| Average Household | \$940 | \$883 | \$871 | \$859 |
| Large Household | \$1,550 | \$1,596 | \$1,631 | \$1,694 |
| Average ICI | \$15,010 | \$15,460 | \$15,532 | \$15,400 |
| Large ICI* | \$644,559 | \$707,880 | \$725,545 | \$733,630 |

| Table 11 Im | npact of Option | IBR/IBR on Ann | ual WS + WW Bills |
|-------------|-----------------|----------------|-------------------|
|-------------|-----------------|----------------|-------------------|

* Average of the 28 largest ICI accounts responsible for 60% of ICI water use

3.5.5. Option: IBR/HBR

The following summer IBR differentials were tested in this scenario:

| | Block range (m3/month) | | | Differential over 2 nd Block Rate | | |
|-----------|-----------------------------|-----------|--------------|--|------------|-----------------|
| | Residential | Multi-Res | ICI | Moderate | Aggressive | Very aggressive |
| 1st block | 0 to 15 | 0 to 50 | 0 to 100 | 67% | 67% | 67% |
| 2nd bock | 15 to 22 | 50 to 800 | 100 to 5,400 | 100% | 100% | 100% |
| | <u>```</u> | > 200 | > E 400 | RES - 200% | RES - 300% | RES - 500% |
| 3rd block | 3rd block >22 > 800 > 5,400 | ICI – 80% | ICI – 80% | ICI – 80% | | |

The reductions in demand with this scenario is modest but superior to options that retain a UR structure for the ICI sector (Figure 14). This occurs because the 2nd block rate must increase for everyone to offset large revenue losses associated with the lower rate on the 3rd ICI block (Figure 15 and Table 12).





Figure 14 Reduction in Demand with Option IBR/HBR

Figure 15 Volumetric Rates with Option IBR/HBR

| | Existing | Moderate | Aggressive | Very aggressive |
|-------------------|-----------|-----------|------------|-----------------|
| Average Household | \$940 | \$932 | \$943 | \$952 |
| Large Household | \$1,550 | \$1,736 | \$1,832 | \$1,860 |
| Average ICI | \$15,010 | \$14,893 | \$14,776 | \$14,649 |
| Large ICI* | \$644,559 | \$650,185 | \$644,824 | \$638,827 |

Table 12 Impact of Option IBR/HBR on Annual WS + WW Bills

* Average of the 28 largest ICI accounts responsible for 60% of ICI water use

3.6. Discussion

Five alternative rate structures were evaluated: a uniform rate, an increasing block rate, a humpback rate, a seasonal rate, an excess use rate and a water budget rate. The advantages and disadvantages of each were outlined. Quantitative tests were completed for five rate structures using detailed customer demand data.

The outcome of the qualitative rating analysis of alternative rate structures indicates that preferred options include a uniform rate followed closely by a hump back rate or a combination of the increasing block rate for residential plus a uniform rate for ICI customers. The residential increasing block structure has the advantage of being amenable to design for affordability using a lifeline structure.

Other rate structures may be too complex for many customers to fully understand. The complexity of certain structures, especially the water budget rate, would pose an unwieldy administrative burden.

The quantitative analysis considered charges within each rate structure that target specific segments of demand such as summer use or the excess use of large users within a class. Scenarios tested for each rate structure ranged from moderate to very aggressive. For example, the very aggressive scenario for the seasonal rate assumed that the volumetric rate charged for water used in the summer was five

times the winter rate. Most of the tested scenarios had a modest impact on demand that would fall within the expected year-to-year variability of demand.

The most effective scenario, the very aggressive increasing block rate scenario applied to both residential and ICI customers, yielded an estimated reduction in average annual demand of 6%. Given the wide diversity of ICI and multi-residential customers, it is difficult to design this rate structure—or for that matter, any of the any of the conservation rate structures—in a manner that assures a reasonable degree of equity in the treatment of these customers. For this reason, it is preferable to retain a uniform rate structure for non-residential customers.

In light of the limited expected impact of the most conservation rate structures and issues with equity we do not advise the implementation of conservation-based rates at this time.

Appendix A MPAC PROPERTY CODES

| Source: http:/ | /www.mpac.ca/ | property | owners/how/ | property | code | inventory | asp. |
|----------------|---|-----------|-------------|-----------|--------|-----------|------|
| Jource. mup./ | / ••••••••••••••••••••••••••••••••••••• | property_ | | property_ | _couc_ | inventory | ·usp |

| CLASS | CODE | DESCRIPTION |
|-------------|------|---|
| VACANT LAND | 100 | Vacant residential land not on water |
| | 103 | Municipal park (excludes Provincial parks, Federal parks, campgrounds) |
| | 105 | Vacant commercial land |
| | 106 | Vacant industrial land |
| | 112 | Multi-residential vacant land |
| | 113 | Condominium development land - residential (vacant lot) |
| | 125 | Residential development land. |
| | 127 | Townhouse block - freehold units |
| | 134 | Land designated and zoned for open space |
| FARM | 221 | Farm with residence - with commercial/industrial operation |
| | 260 | Vacant residential/commercial/ industrial land owned by a non-farmer with a portion being farmed |
| | 261 | Land owned by a non-farmer improved with a non-farm residence with a portion being farmed |
| RESIDENTIAL | 301 | Single family detached (not on water) |
| | 202 | More than one structure used for residential purposes with at least one of the structures |
| | 502 | occupied permanently |
| | 303 | Residence with a commercial unit |
| | 304 | Residence with a commercial/industrial use building |
| | 305 | Link home – are homes linked together at the footing or foundation by a wall above or below grade. |
| | 307 | Community lifestyle (not a mobile home park) – Typically, a gated community. The site is |
| | 200 | typically under single ownership. Typically, people own the structure. |
| | 509 | Freehold Towilliouse/Row house – hore than two units in a row with separate ownership |
| | 311 | ownership. |
| MULTI-RES | 322 | Semi-detached residence with both units under one ownership – two residential homes sharing a common center wall. |
| | 332 | Typically a Duplex – residential structure with two self-contained units. |
| | 333 | Residential property with three self-contained units |
| | 334 | Residential property with four self-contained units |
| | 335 | Residential property with five self-contained units |
| | 336 | Residential property with six self-contained units |
| | 340 | Multi-residential, with 7 or more self-contained units (excludes row-housing) |
| | 341 | Multi-residential, with 7 or more self-contained residential units, with small commercial unit(s) |
| | 352 | Row housing, with seven or more units under single ownership |
| | 360 | Rooming or boarding house – rental by room/bedroom , tenant(s) share a kitchen, bathroom and living quarters. |
| | 365 | Group Home as defined in Claus 240(1) of the Municipal Act, 2001 – a residence licensed or funded under a federal or provincial statute for the accommodation of three to ten persons, exclusive of staff, living under supervision in a single housekeeping unit and who, by reason of their emotional, mental, social or physical condition or legal status, require a group living arrangement for their well being. |
| | 369 | Vacant land condominium (residential - improved) – condo plan registered against the land. |
| | 370 | Residential Condominium Unit |
| | 372 | Life Lease - Return on Invest. Property where occupants can receive either a guaranteed return or a market value based return on the investment. Typically, represented by Fixed Value, Indexed-Based, or Market Value Life Lease Types. |
| | 374 | Cooperative housing - non-equity – Non-equity Co-op corporations are not owned by individual shareholders, the shares are often owned by groups such as unions or non-profit organizations which provide housing to the people they serve. The members who occupy the co-operative |

| CLASS | CODE | DESCRIPTION |
|------------|--|---|
| | | building do not hold equity in the corporation. Members are charged housing costs as a result of |
| | | occupying a unit. |
| | 377 | Condominium parking space/unit – separately deeded. |
| | Residential Leasehold Condominium Corporation – single ownership of the development wh | |
| | 576 | the units are leased. |
| COMMERCIAL | 400 | Small Office building (generally single tenant or owner occupied under 7,500 s.f.) |
| | 401 | Small Medical/dental building (generally single tenant or owner occupied under 7,500 s.f.) |
| | 402 | Large office building (generally multi - tenanted, over 7,500 s.f.) |
| | 403 | Large medical/dental building (generally multi - tenanted over 7,500 s.f.) |
| | 405 | Office use converted from house |
| | 406 | Retail use converted from house |
| | 408 | Freestanding Beer Store or LCBO - not associated with power or shopping centre |
| | 409 | Retail - one storey, generally over 10,000 s.f. |
| | 410 | Retail - one storey, generally under 10,000 s.f. |
| | 411 | Restaurant - conventional |
| | 412 | Restaurant - fast food |
| | 413 | Restaurant - conventional, national chain |
| - | 414 | Restaurant - fast food, national chain |
| - | 415 | Cinema/movie house/drive-in |
| | 416 | Concert hall/live theatre |
| | 420 | Automotive fuel station with or without service facilities |
| | 421 | Specialty automotive shop/auto repair/ collision service/car or truck wash |
| | 422 | Auto dealership |
| | 423 | Auto dealership - independent dealer or used vehicles |
| | | Neighbourhood shopping centre - with more than two stores attached, under one ownership. |
| | 425 | with anchor - generally less than 150.000 s.f. |
| | | Big box shopping/power centre greater than 100.000 s.f. with 2 or more main anchors such as |
| | 427 | discount or grocery stores with a collection of box or strip stores and in a commercial |
| | | concentration concept |
| - | 428 | Regional shopping centre |
| - | 429 | Community shopping centre |
| | 420 | Neighbourhood shopping centre - with more than 2 stores attached, under one ownership, |
| | 430 | without anchor - generally less than 150,000 s.f. |
| | 422 | Banks and similar financial institutions, including credit unions - typically single tenanted, |
| | 432 | generally less than 7,500 s.f. |
| | 422 | Banks and similar financial institutions, including credit unions - typically multi tenanted, |
| | 433 | generally greater than 7,500 s.f. |
| | 434 | Freestanding supermarket |
| | 435 | Large retail building centre, generally greater than 30,000 s.f. |
| | 436 | Freestanding large retail store, national chain - generally greater than 30,000 s.f. |
| | 438 | Neighbourhood shopping centre with offices above |
| | 441 | Tavern/public house/small hotel |
| | 444 | Full service hotel |
| | 445 | Limited service hotel |
| | 450 | Motel |
| | 471 | Retail or office with residential unit(s) above or behind - less than 10,000 s.f. gross building area |
| | 471 | (GBA), street or onsite parking, with 6 or less apartments, older downtown core |
| | 472 | Retail or office with residential unit(s) above or behind - greater than 10,000 s.f. GBA, street or |
| | 472 | onsite parking, with 7 or more apartments, older downtown core |
| | 473 | Retail with more than one non-retail use |
| | 475 | Commercial condominium |
| | 477 | Retail with office(s) - less than 10,000 s.f., GBA with offices above |
| | 478 | Retail with office(s) - greater than 10,000 s.f., GBA with offices above |
| | 480 | Surface parking lot - excludes parking facilities that are used in conjunction with another property |
| | 481 | Parking garage - excludes parking facilities that are used in conjunction with another property |

| CLASS | CODE | DESCRIPTION |
|---------------|------|--|
| | 482 | Surface parking lot - used in conjunction with another property |
| | 490 | Golf course |
| | 495 | Communication towers - with or without secondary communication structures |
| | 496 | Communication buildings |
| INDUSTRIAL | 510 | Heavy manufacturing (non-automotive) |
| | 513 | Steel mill |
| | 517 | Specialty steel production (mini-mills) |
| | 520 | Standard industrial properties not specifically identified by other industrial Property Codes |
| | 521 | Distillery/brewery |
| | 530 | Warehousing |
| | 531 | Mini-warehousing |
| | 540 | Other industrial (all other types not specifically defined) |
| | 553 | Bulk oil/fuel distribution terminal |
| | 558 | Hydro One Transformer Station |
| | 575 | Industrial condominium |
| | 580 | Industrial mall |
| | 590 | Water treatment/filtration/water towers/pumping station |
| | 592 | Dump/transfer station/incineration plant/landfill |
| INSTITUTIONAL | 601 | Post secondary education - university, community college, etc |
| | 602 | Multiple occupancy educational institutional residence located on or off campus |
| | 605 | School (elementary or secondary, including private) |
| | 608 | Day Care |
| | 611 | Other institutional residence |
| | 621 | Hospital, private or public |
| | 624 | Retirement/nursing home (combined) |
| | 625 | Nursing home |
| | 626 | Old age/retirement home |
| | 627 | Other health care facility |
| | 631 | Provincial correctional facility |
| | 700 | Place of worship - with a clergy residence |
| | 701 | Place of Worship - without a clergy residence |
| | 705 | Funeral Home |
| | 710 | Recreational sport club - non commercial (excludes golf clubs and ski resorts) |
| | 720 | Commercial sport complex |
| | 721 | Non-commercial sports complex |
| | 730 | Museum and/or art gallery |
| | 731 | Library and/or literary institutions |
| | 735 | Assembly hall, community hall |
| | 736 | Clubs - private, fraternal |
| | 749 | Public transportation - other |
| | 750 | Scientific, pharmaceutical, medical research facility (structures predominantly other than office) |
| | 761 | Armoury |
| | 805 | Post office or depot |
| | 810 | Fire Hall |
| | 815 | Police Station |

Appendix B DATA ANALYSIS AND DEMAND CURVE ESTIMATION

Overview

The rates analysis in this report is based on local customer data which was used to identify factors driving demand and to estimate the price elasticity of demand. The analysis was completed separately for the following customer classes: residential, multi-residential (multi-res) and Industrial-Commercial-Institutional (ICI). In keeping with the design of water conservation and efficiency (WCE) programs, which target separate components of demand, residential customer demand is further divided into base

indoor use and excess summer use. Excess summer use is assumed to occur in the period from May 1st to September 30th, and is the water consumed in excess of indoor use during this period.

This appendix documents the analysis of customer data and the estimation of customer demand curves. The following section describes the source and treatment of data as well as summary statistics by customer class. The next section documents the statistical analysis undertaken to develop demand curves by customer class and the resulting demand elasticities. What is a Demand Curve? A basic economic premise is that customers reduce their demand for water as the price of water increases because the increasing price gives the water customer an incentive to conserve water.

A demand curve is a mathematical expression that describes in a quantitative manner how price affects demand, for example: Water used = a - b X (price of water)

In this equation, 'water used' is the customers metered water use and price is the water rate paid by the customer. They are called 'variables'. The terms, 'a' and 'b' are constant numerical coefficients. A demand curve normally includes a number of other variables that describe additional factors affecting demand such as the size of a family.

Price elasticity measures the sensitivity of demand to price and is closely related the coefficient 'b' in the demand curve.

Treatment of Customer Data

Data Screening

Individual customer meter reading data provided by the City of Guelph was used in the demand curve analysis. The customer data set includes monthly or bimonthly meter readings spanning the period 2006 to 2014 for 38,529 customer accounts. Variables from this data set that were used in the analysis are identified in **Table A2** below. Address and other data allowing identification of an individual customer was removed from datasets for purposes of the analysis to protect personal privacy.

| Column Name | Description |
|----------------|---|
| GuelphUniqueID | Unique identifier for each row of data |
| UnitCat | Count of units per parcel. Calculated by removing unit numbers and |
| onitent | summarizing by street address |
| | Statistics Canada Dissemination Area ID appended via spatial join form the 2011 |
| | Dissemination block shapefile. The Dissemination Area ID is an 8 digit code |
| | structured as follows: |
| DAUDZUII | Province – first 2 digits (35 for Ontario) |
| | City – next 2 digits (23 for Guelph) |
| | Dissemination Area - Final 4 digits. |

| Column Name | Description |
|-------------------------|---|
| | Statistics Canada Dissemination Area ID appended via spatial join form the 2006 |
| DAUID2000 | Dissemination block shapefile |
| X0i_MeterSize | Size of water meter. W010 – 5/8"; W020 – ¾"; W030 – 1"; W040 – 1 ½"; W050 |
| (for i = 06 to 14) | – 2"; W060 - 3"; W070 – 4"; W080 – 6"; W090 – 8"; W100 – 10 |
| VO: Dif TatCana Manthly | Column showing the difference between "Total Actual Consumption" and the |
| | sum of the monthly totals for year 'i'. Calculated to flag discrepancies where |
| (for i = 06 to 11) | negative values haven't been accounted for in the monthly data. |
| X0i Jan M3 | , |
| to X0i Dec M3 | Water consumption in cubic meters for the indicated month in year 'i' |
| (for i = 06 to 14) | |
| x0i RF | (0.1) Index indicating participation by customer in Royal Flush Toilet Rebate |
| (for i = 03 to 14) | Program for year 'i' |
| x0i BBH | (0.1) Index indicating participation by customer in Blue Built Homes Program |
| (for i = 11 to 14) | for year 'i' |
| | (0.1) Index indicating participation by customer in Floor Drain Retrofit Rebate |
| (for i = 10 to 12) | Program for year 'i' |
| (1011-101012) | (0.1) Index indicating participation by customer in Grey Water Reuse Rebate |
| (for i = 00 to 11) | Drogram for yoar (i' |
| | (0.1) Index indicating participation by systematic Home Hymidifier Drogram |
| (for i = 10 to 14) | for yoar 'i' |
| (1011 = 10 to 14) | 101 year 1 |
| XUI_HLA | (0,1) Index indicating participation by customer in Healthy Landscape |
| (for i = 08 to 14) | Assessment Retrotit Rebate Program for year in |
| x0i_SW | (0,1) Index indicating participation by customer in Smart Wash Washing |
| (for i = 08 to 14) | Machine Rebate Retrofit Rebate Program for year 1 |
| STRU Full Storevs | The number of storey(s) above grade, excluding the basement level. A full |
| , | upper storey refers to an exterior wall height of five and one half feet or more. |
| STRU Year Blt | The year the structure was built. This should be the year the main structure was |
| | built, or the year the only structure on the property was built. |
| | The adjusted date of construction taking into account any renovations and |
| STRU_EFF_Year | additions to the property. If there are multiple structures built over multiple |
| | different years, this is the year the most recent structure was built. |
| SUM STRU Total Area | Total area in square feet (not including the basement area) of all structures on |
| | the property. Renovations, additions etc. are included. |
| SUNA STRU Rodrooms | Total number of bedrooms of all structures on the property. Renovations, |
| SOM_STRO_BEDTOOTIS | additions etc. are included. |
| | Total number of full bathrooms of all structures on the property. Renovations, |
| SUM_STRU_Full_Baths | additions etc. are included. Full Bathroom: Three or more fixtures and includes |
| | a shower stall or bathtub. |
| | Total number of half Bathrooms of all structures on the property. Renovations, |
| SUM STRU Half Baths | additions etc. are included. Half Bathroom: Two fixtures in any combination, |
| | typically a toilet and sink. |
| | Property Code from 2013 MPAC data with blanks filled in using 2012 property |
| PropCde2013 | codes |
| | Property Code from 2014 MPAC data with blanks filled in using 2013 property |
| PropCde2014 | codes |
| | |

 Table A1
 Variables in the Customer Data Set

Data screening was undertaken to eliminate customers for which data were incomplete or potentially inaccurate. The screening employed the following tests of data integrity:

| Screen | Customers | Description | | | | |
|--------------------|---------------------|--|--|--|--|--|
| Reading | All | The variable, 'X0i_Dif_TotCons_Monthly' = 0 for all available years indicating | | | | |
| discrepancy | | no discrepancy between monthly readings and total annual consumption. | | | | |
| MPAC code | All | MPAC property classification codes available in 2013 or 2014 | | | | |
| DA code | residential | The dissemination area (DA) code was available using variable 'DAUID2011', or | | | | |
| | | 'DAUID2006' if 'DAUID2011' was blank. This code allowed matching of | | | | |
| | | customer data to census data provided at the level of the dissemination area. | | | | |
| | | Dissemination areas are a small contiguous and relatively homogenous areas | | | | |
| | | defined by Statistics Canada that cover the entire City area and that each have | | | | |
| | | a population of approximately 600 persons and 260 dwelling units. | | | | |
| Meter size | residential | Meter size had to be 5/8 or 3/4 inches. | | | | |
| Meter | Residential | Non-zero meter readings within all years of record were available for the | | | | |
| Readings | | following 6 months: February, April, June, August, October and December. | | | | |
| - | | This screen assured more accurate estimates of excess summer use by | | | | |
| | | avoiding the inclusion of March and April water consumption in the summer | | | | |
| | | period demand for each customer. The rational for this screen derives from a | | | | |
| | | comparison of monthly averages estimated for each year for excess summer | | | | |
| | | water use. The tests compared averages for the entire set of residential | | | | |
| | | customers, and for customers with readings starting in January or in | | | | |
| | | ebruary.* For all years except 2008, averages for reads starting in January | | | | |
| | | ind February were significantly different from the overall average and the | | | | |
| | | verage of reads starting in February exceeded the average of reads starting in | | | | |
| | | January. When reads start in January, the reading in May, depending on | | | | |
| | | timing of the reading within the month, will include April and possibly March | | | | |
| | | water consumption, indicative of indoor use only. This will depress the | | | | |
| | | estimate of summer and excess summer demand. | | | | |
| | ICI and | Non-zero meter readings within all years of record were available for at least 6 | | | | |
| | multi-res | months. A more stringent test based on excess summer use was not used for | | | | |
| | | these customer classes since they do not have high summer demands (see | | | | |
| | | results by class below) | | | | |
| | Note that th | e screen on available meter readings effectively eliminates customers with zero | | | | |
| | or minimal r | eads and also eliminates accounts that appear to have started, ended or | | | | |
| | changed har | nds within the period of record when those changes resulted in gaps in readings. | | | | |
| * Results of t-tes | sts on excess sum | mer use are shown below. For a two tailed test, 90% and 95% confidence limits are respectively | | | | |
| 1.645 and 1.960 | . Negative results | or the Jan. tests indicate that the Jan. average is less than the averages for Feb. and all customers. | | | | |
| lan, start comr | pared to all custor | $\begin{array}{c ccccccccccccccccccccccccccccccccccc$ | | | | |
| Feb. start com | pared to all custo | mers 1.83 5.48 -0.66 7.90 5.26 5.21 57.65 4.20 51.56 | | | | |
| Jan. start comp | pared to Feb. star | t -2.49 -8.05 0.90 -11.65 -7.93 -7.41 -50.92 -6.61 -43.53 | | | | |
| The assignme | ant of custom | pers to customer classes was based on MPAC codes for 2013 and 2014 MP | | | | |

Table A2Data Screening Tests

The assignment of customers to customer classes was based on MPAC codes for 2013 and 2014. MPAC coding by class is shown in the following table along with counts of total customers and of customers used in the analysis:

| Customer Class | MPAC codes included in | Count of all | Count of customers |
|----------------|------------------------|--------------|--------------------|
| | Class* | customers | after screening |
| Residential | 305, 307, 309, 311 | 28,800 | 4,411 |
| Multi-res | 322 to 378 | 2,500 | 786 |
| Commercial | 400 to 499 | 1,200 | 437 |
| Industrial | 500 to 599 | 500 | 237 |
| Institutional | >599 | 270 | 95 |

* MPAC codes are defined in Appendix A - MPAC PROPERTY CODES

Summary statistics for each customer class are provided in following sections.

Residential

The residential class includes single detached (SDET), duplex and townhouse structures. Summary statistics for the entire class and for two sub-classes, SDET plus duplex, and townhouses, are presented in Table A3. Statistics for the entire class are shown on four graphs following this table.

| Table A3 | Residential Customer Water Use, 2006 - 2014 | | | | | | | | |
|-----------------|---|----------|-------------|--------|--------|--|--|--|--|
| | | Indoor | ndoor Sumer | | Summer | | | | |
| | | (winter) | total | Annual | Excess | | | | |
| All Residential | (4,411 observations) | | | | | | | | |
| Mean | | 17.30 | 20.38 | 18.84 | 3.70 | | | | |
| Stdev | | 7.28 | 8.53 | 7.49 | 6.24 | | | | |
| Max | | 56.02 | 74.78 | 62.78 | 68.22 | | | | |
| Min | | 2.09 | 1.70 | 1.93 | -37.69 | | | | |
| Townhouse (42 | 3 observations) | | | | | | | | |
| Mean | | 11.10 | 17.82 | 14.46 | 8.07 | | | | |
| Stdev | | 5.30 | 7.03 | 5.46 | 7.16 | | | | |
| Max | | 35.80 | 45.07 | 40.44 | 34.36 | | | | |
| Min | | 2.22 | 3.00 | 4.28 | -9.60 | | | | |
| t-score | e comparison to 'All' * | -24.06 | -7.50 | -16.50 | 12.54 | | | | |
| SDET & Duplex | (3,988 observations) | | | | | | | | |
| Mean | | 17.95 | 20.65 | 19.30 | 3.24 | | | | |
| Stdev | | 7.15 | 8.63 | 7.53 | 5.95 | | | | |
| Max | | 56.02 | 74.78 | 62.78 | 68.22 | | | | |
| Min | | 2.09 | 1.70 | 1.93 | -37.69 | | | | |
| t-score | e comparison to 'All' * | 5.81 | 1.99 | 3.90 | -4.92 | | | | |

* All significant at a 95% level of confidence.

These data reveal that water use by townhouse accounts is significantly lower than for other residential

accounts. It is also evident that not all accounts use more water in the summer. In fact, 18.9% of residential customers actually use less in the summer. This may indicate accounts occupied by students or accounts where outdoor water use is minimal and is zero during a summer vacation period when household members are away.

> Figure A1 Box and whisper Plot of Residential Consumption, 2006 - 2014



The box and whisper plot illustrates the positive skew in the water use data, a feature that is more clearly presented in the next three graphs based on water use data ordered by the amount of water used and the average water use and customer counts for successive blocks of consumption each representing 20% of total water use.



Figure A2 Annual Average Residential Water Use Ranked by Amount od Water Used, 2006 - 2014



Figure A3 Annual Average Residential Water Use by Consumption Block

a) Average water use by customer block

b) Customer count by customer block

Note: each block accounts for 20% of total residential consumption. Values are 2006-14 averages.

Water use trends were evaluated using the slope coefficients derived by regressing monthly average water use for each customer from 2006 to 2014 against a linear time trend (see example in figure).

Results of this analysis are provided in Table A4 using units converted to litres per capita per day per year (lpcd/year).⁶ In all cases, declines have been greater for large users in the highest block. This outcome may be overstated if the largest users happen to comprise larger households while the smallest users in the lowest block comprise many single person households. The annual decline represents 3.1% of average annual demand.



| Table A4 Annual | Annual Decline in Residential Water Use (lpcd/year) | | | | | | | |
|-------------------------------|---|--------|--------|------------|--|--|--|--|
| Consumption Block | Indoor | Summer | Annual | Excess use | | | | |
| Lowest 20% of demand | -3.31 | -6.61 | -4.96 | -3.96 | | | | |
| 2 nd 20% of demand | -4.20 | -7.84 | -6.02 | -4.37 | | | | |
| 3 rd 20% of demand | -5.33 | -10.12 | -7.72 | -5.76 | | | | |
| 4 th 20% of demand | -7.59 | -12.64 | -10.12 | -6.06 | | | | |
| Highest 20% of demand | -9.60 | -16.54 | -13.07 | -8.33 | | | | |
| All Customers | -5.23 | -9.56 | -7.40 | -5.19 | | | | |

Multi-Residential

Statistics for multi-res customers are summarized in Table A5, Figure A4 and Figure A5. In contrast to the residential class, this class has a much larger variation in water use due to the range in size and number of apartment units in each building. In fact, 2% of the largest customers account for 22% of demand in this class.

| Table A5 | Multi-Residential Customer Water Use, 2006 - 2014 | | | | | | | |
|----------|--|------------------|----------|---------|--|--|--|--|
| | Indoor (winter) | Summer Excess | | | | | | |
| Mean | 169.76 | 172.45 | 171.10 | 3.23 | | | | |
| Stdev | 353.95 | 363.32 | 358.25 | 41.67 | | | | |
| Max | 3,607.98 | 3,989.91 | 3,798.94 | 509.91 | | | | |
| Min | 3.61 | 3.41 | 3.51 | -307.13 | | | | |

Note: 787 observations

Figure A4Annual Average Multi-Residential Water Use Ranked byAmount od Water Used, 2006 - 2014

⁶ Assumes a mean household size of 2.6 persons (Statistics Canada, 2011 Census data for Guelph).



Figure A5 Annual Average Multi-Residential Water Use by Consumption Block

a) Average water use by customer block

b) Customer count by customer block

Note: each block accounts for 20% of total residential consumption. Values are 2006-14 averages.

Results of the analysis of water use trends are provided in Table A6. Units in this case are m3 per month per year. In most cases save one, declines are negative and are greater for large users. The annual decline represents 3.1% of average annual demand. Demand is increasing for 27% of customers.

| Table A6 | Annual Dec | line in Multi | -Residential | Water Use (| m3/mo/year) |
|-------------------------------|-------------|---------------|--------------|-------------|-------------|
| Consum | otion Block | Indoor | Summer | Annual | Excess use |
| Lowest 20 | % of demand | -1.39 | -1.45 | -1.42 | -0.07 |
| 2 nd 20% | of demand | -14.29 | -13.89 | -14.09 | 0.48 |
| 3 rd 20% of demand | | -25.50 | -30.52 | -28.01 | -6.03 |
| 4 th 20% | of demand | -51.69 | -55.62 | -53.65 | -4.72 |
| Highest 20 | % of demand | -46.31 | -53.18 | -49.75 | -8.24 |
| All Cu | stomers | -5.87 | -6.34 | -6.10 | -0.57 |

Industrial-Commercial-Institutional

Statistics for ICI customers are summarized in Table A7, 0and Figure A7. The skewed distribution of customers is even more pronounced in the ICI class than in the previous classes due to the diverse nature and size of customers in this class.

On average, commercial customers are understandably smaller than other ICI customers, while industrial and institutional customers are statistically similar (see t-scores).

| Table A7 | ICI Customer Water Use, | 2006 - 2014 |
|----------|-------------------------|-------------|
| | | |

| | Indoor | Sumer | | Summer |
|-------------------------------|----------|----------|----------|-----------|
| | indoor | Junei | Annual | Jummer |
| | (winter) | total | | Excess |
| All ICI (769 observations) | | | | |
| Mean | 402.6 | 422.5 | 412.6 | 23.8 |
| Stdev | 3,308.7 | 3,042.7 | 3,168.6 | 600.8 |
| Max | 80,807.1 | 68,730.4 | 74,768.8 | 5,563.5 |
| Min | 1.0 | 1.3 | 1.2 | -14,492.0 |
| Commercial (437 observations) | | | | |
| Mean | 137.3 | 153.5 | 145.4 | 19.5 |
| Stdev | 323.3 | 418.9 | 367.6 | 166.6 |
| Max | 4,314.8 | 6,946.2 | 5,630.5 | 3,157.7 |

| | | - | | - |
|---------------------------------|----------|----------|----------|-----------|
| | Indoor | Sumer | Annual | Summer |
| | (winter) | total | Annuar | Excess |
| Min | 1.0 | 1.3 | 1.2 | -401.8 |
| t-score comparison to 'All' * | -17.2 | -13.4 | -15.2 | -0.5 |
| Industrial (237 observations) | | | | |
| Mean | 570.8 | 653.6 | 612.2 | 99.4 |
| Stdev | 2,742.8 | 3,072.2 | 2,905.8 | 461.4 |
| Max | 34,705.0 | 37,394.4 | 36,049.7 | 5,563.5 |
| Min | 2.5 | 2.7 | 2.6 | -277.9 |
| t-score comparison to 'All' * | 0.9 | 1.2 | 1.1 | 2.5 |
| Institutional (95 observations) | | | | |
| Mean | 1,203.8 | 1,083.3 | 1,143.6 | -144.7 |
| Stdev | 8,308.0 | 7,086.5 | 7,696.2 | 1,497.6 |
| Max | 80,807.1 | 68,730.4 | 74,768.8 | 954.0 |
| Min | 3.0 | 4.3 | 3.7 | -14,492.0 |
| t-score comparison to 'All' * | 1.0 | 0.9 | 1.0 | -2.0 |



* All significant at a 95% level of confidence.





Only two blocks of customers, each accounting for 50% of demand, are used in the following graphs contrasting large and small users.⁷ Just 1% of the largest customers account for 50% of demand.





Note: each block accounts for 50% of total residential consumption. Values are 2006-14 averages.

⁷ This is done to maintain the confidentiality of individual customers.

Results of the analysis of water use trends are provided in Table A8. Units are m3 per month per year. An average decline in demand is the case for both small and large users, and demand is actually increasing for 38% of customers. The annual decline represents 1.7% of average annual demand. Declining demand for ICI customers will reflect improving water use efficiency as well as general economic conditions.

| Table A8 | Annual Decline in Residential Water Use (m3/mo/year) | | | | | | | | |
|-------------|--|--------|--------|--------|------------|--|--|--|--|
| Consump | tion Block | Indoor | Summer | Annual | Excess use | | | | |
| Lowest 50% | 6 of demand | -2.6 | -4.8 | -2.9 | -2.6 | | | | |
| Highest 50% | 6 of demand | -341.9 | -404.8 | -648.5 | -75.6 | | | | |
| All Cus | tomers | -5.7 | -8.4 | -7.1 | -3.3 | | | | |

DEMAND CURVE ESTIMATION

Introduction

A basic economic premise is that customers reduce their demand for water as the price of water increases because the increasing price gives the water customer an incentive to conserve water. The price that customers respond to is the total price including the water rate plus any wastewater rate or surcharge. It is normally assumed that customers respond to the volumetric price on the utility bill. However, in the case of bills for water and wastewater services, residential customers usually do not know the volumetric price. They will only be aware of the total amount of the bill, and, may often not even know this amount if these services are billed on a combined utility bill, with electricity as is the case in Guelph. Under these circumstances, it is appropriate to assume that customers are responding to the average price.

The strength of the relationship between the price of water and the demand for water is measured using a value called the price elasticity of demand or just elasticity.⁸ Because customers use less water as price increases, elasticity is a negative number. Estimates of price elasticity usually lie between -0.05 to - 1.0. This number is a ratio of the percentage change in demand and the percentage change in price that causes the change in demand. The mathematical expression for elasticity is:

Elasticity = (Percent change in demand) ÷ (Percent change in price)

(Change in water demand)
 (Original Water demand)
 (Original price)

The change in demand motivated by a given price change is calculated as follows:

Percent change in demand = (Price elasticity of demand) x (Percent change in price)

For example, assume the price elasticity of demand for a commodity is -1.0. If the price increases by 10%, then the change in demand is:

(-1.0) x (10%) = -10%

⁸ There are also elasticities to measure the response of demand to increases in household income, population growth, etc. Here, the term is only used to refer to price elasticity.

If elasticity is -0.2, demand changes by:

(-0.2) x (10%) = -2%.

Price is however only one determinant of demand. For demand measured at the level of an individual household, other determinants might include number of persons living in the house, household income, etc. The full demand curve is therefore an equation like the following:

Demand = a + b X (price) + c X (income) + d X (household size).

In this equation, a, b, c, and d are coefficients that must be estimated. Elasticity in turn is estimated from b, the coefficient on price.

Approach to Estimating Demand Curves for Guelph

Regression analysis is used to estimate the coefficients and determine their statistical significance in a demand curve. The original approach to regression, and the one many may be familiar with as a function in EXCEL, is referred as 'ordinary least squares' (OLS) regression. In the current study, OLS regression is inappropriate because of the structure of the data. This data combines cross-sectional (XSEC) and time series (TSER) information. Cross-sectional data is the data corresponding to individual customers and that varies within a year, such as the type of house, SDET, duplex or townhouse, in the residential data. The time series data are data that vary from one year to the next such as the price of water. The data structure appears as follows:

| Variable (type) | Water use (XSEC & TSER) | Price (TSER) | Other variable (XSEC) | Other variable (TSER) |
|-----------------|-------------------------|--------------|-----------------------|-----------------------|
| Customer | | | | |
| А | QA, year 1 | Pyear 1 | XA | Vyear 1 |
| А | QA, year 2 | Pyear 2 | X _A | Vyear 2 |
| А | QA, year n | $P_{year}n$ | XA | Vyear n |
| В | QB, year 1 | Pyear 1 | XB | Vyear 1 |
| В | QB, year 2 | Pyear 2 | XB | Vyear 2 |
| В | Q B, year n | $P_{year}n$ | XB | Vyear n |
| С | Q _C , year 1 | Pyear 1 | Xc | Vyear 1 |
| С | QC, year 2 | Pyear 2 | Xc | Vyear 2 |
| C | Qc, year n | Pyear n | Xc | Vyear n |

This type of data is called 'panel' data, and in our case it is a 'balanced' panel since for every customer there is complete TSER data for each year in the sample. The appropriate regression estimator for panel data is called generalized least squares (GLS) regression. A further complication concerns whether the constant term, shown as the coefficient 'a', in the above equation, varies by customer (a fixed effects GLS model) or is constant (a random effects GLS model). In the current case we assume a random effects model. The statistical significance or 'goodness of fit' of the overall regression equation is measured by the 'correlation coefficient' or R². Values of R² in demand curve studies using individual customer data are typically quite low since there are so many determinants of a customer's water demand that cannot be known. Regardless, the individual 'explanatory' variables on the right hand side of the demand curve equation can be significant determinants of customer demand as indicated by the goodness of fit



Figure A8 Alternative Functional Forms for a Demand Curve

| Table A5 | Function | | |
|---------------------|--|----------------------------|--|
| Type of Function | Functional form* | Elasticity | Comment |
| Linear | Q = a - m x P | <u>- <i>m</i> x P</u> Q | Elasticity increases as price increases (i.e. customers are more responsive to price at very high prices) and decreases with higher Q. Can produce erroneous estimates of negative demand at high prices. |
| Log- Linear | ln(Q) = a - m x P | - <i>m</i> x P | Elasticity increases as price increases. Estimated demand is virtually zero but never negative at high prices. Demand reaches an upper limit at a zero price. |
| Linear- | Q = | <u>- m</u> | Elasticity decreases with higher Q. Can produce erroneous estimates |
| Log | <i>a - m</i> x ln(P) | Q | of negative demand at very high prices. |
| Log-Log | ln(Q) = <i>a</i> - <i>m</i> x ln(P) | - <i>m</i> | Elasticity is constant. Estimated demand is never negative at high prices but can stay unrealistically high at very high prices. Demand keeps increasing at lower prices and does not reach an upper limit at a zero price. |

| Table A9 | Functional Forms of the Demand Curve |
|----------|--------------------------------------|

* Q = water demand, P = water price, a and m are coefficients

The process of estimating a demand curve entails testing alternative combinations of explanatory variables. Typically this starts with a long list of explanatory variables which is progressively whittled down by eliminating variables that are statistically insignificant, that have coefficients that are unstable, varying widely from one test to another, or with coefficients of the wrong sign (e.g. the price coefficient should be negative). A final selection of the preferred demand curve is based on the level of significance of explanatory variables and the overall goodness of fit as measured by R².

Residential Demand

The analysis of residential water demand considered indoor use and excess summer use separately with a demand curve estimated for each component of demand. The analysis used the customer meter reading data and data on MPAC housing characteristics described above as well as additional data on household characteristics based on the 2011 Census. These data are described in the following table.

| Variable | Descriptio | on / Cor | nment | | | | | | | | Source |
|-------------|-------------|--------------------|---------------------|---------------|----------------------|-------------------|--------------|-----------|------------|------|-------------------------|
| WATER DEM | IAND | | | | | | | | | | |
| INDOOR | The custo | mer's ir | ndoor w | ater use | e estima | nted as t | he mea | n of wat | er mete | er (| Guelph meter data, |
| | readings i | n the w | inter pe | eriod (Ja | n. to Ap | oril, Nov | and De | c.). | | ` | variable X0i_mo_M3 |
| | UNITS : Cu | ubic me | ters per | r month | | | | | | | |
| EXCESS | The custo | mer's e | xcess sı | ummer o | outdoor | ່ water ເ | use estir | nated a | s the | | Guelph meter data, |
| | mean of v | vater m | eter rea | adings ir | n the su | mmer p | eriod (A | pril to C | Oct.) less | s١ | variable X0i_mo_M3 |
| | the mean | of read | ings in t | the wint | er perio | od (Jan. | to April, | Nov. ar | nd Dec.) |). | |
| | UNITS: Cu | bic met | ers per | month. | Only in | cludes o | ustome | rs with | positive | 2 | |
| | excess use | e values | , assum | ing that | t the cu | stomer l | nas a ne | gligible | demano | d | |
| | for outdo | or wate | r if exce | ess uses | is zero (| or negat | ive. | | | | |
| PARTICIPATI | ON IN WCE | PROGE | RAMS | | | | | | | | |
| RFi | Participat | ed in ye | ar i in t | he Roya | l Flush ⁻ | Toilet Re | ebate pr | ogram. | | 0 | Guelph meter data, |
| | | | | | | | | | | ; | x0i_RF, x0i_HLA, and |
| HLAi | Participat | ed in ye | ar i in t | he Heal | thy Land | dscape A | Assessm | ent Pro | gram. | | x0i_SW |
| SWi | Participat | ed in ye | ar i in t | he Smar | rt Wash | Washin | g Machi | ne Reba | ate | | (participation in other |
| | Program. | | | | | | | | | | low to be included) |
| | UNITS: Pro | ogram p | participa | ation in | year i = | 1 and 0 | otherw | ise, e.g. | for | | iow to be meladedy |
| | participat | ion in 2 | 010: | | | | | | | 1 | |
| | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | | |
| | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | | |
| | This varia | ble test | s if part | ticipatio | n has o | nly a ter | nporary | , one ye | ear, | | |
| | impact on | demar | id. | | | | | | | | - |
| CUMRFI | Current o | r past p | articipa | tion in y | ear i in | the Roy | al Flush | Toilet F | lebate | 0 | Guelph meter data, |
| | program. | | | | | +1 11- | - 14 - 1 - | | | | xul_RF, xul_HLA, and |
| CUMITLAI | Current of | r past p | articipa | tion in y | ear i in | , the He | aithy La | indscap | e | 2 | x0I_SVV |
| CLINACIAN | Assessme | nt Prog | ram. | tion in s | | the Cm | x+ \A/ach | N/achi | | | |
| CUIVISVVI | Machina I | r past p Pobato | articipa Drogran | | earim | the sma | art vvasi | i washi | ng | | |
| | | | Program | i. | voaria | nd thore | oftor - | 1 and 0 | | | |
| | otherwise | ogrann p | r partic | ination | year rai in 2010 | | aiter – | I and U | | | |
| | 2006 | 2007 | 2008 | 2000 | 2010 | 2011 | 2012 | 2012 | 2014 | 1 | |
| | 2000 | 2007 | 2008 | 2009 | 1 | 1 | 1 | 2013 | 1 | | |
| | This varial | U bla tast | if part | 0 icinatio | <u> </u> | ± acting in | T nnact o | n dema | nd | 1 | |
| | norsisting | hevon | tho vo | ar of na | rticinati | iasting ii ion | iipact o | ii ueina | nu | | |
| HOUSEHOLD | | DRS FR | | | Δ | 011. | | | | | |
| FLOORS | The numb | er of st | orev(s) | above g | rade II | NITS: in | teger (1 | 2 3) | | | Guelph meter data |
| 120010 | The numb | | 0109(3) | 000108 | 1000.0 | N 10. 11 | 10801 (1 | ,2,3) | | | STRU Full Storeys |
| YRBLT | The year t | he stru | cture w | as built | UNITS | integer | (1870 + | 0 2006) | | | Guelph meter data |
| | ine year t | ine stru | | as sunt. | | meger | 10/01 | 2000) | | | STRU Year Blt |
| EFFYRBLT | The adjust | ted date | e of con | structio | n accou | inting fo | r renov | ations a | nd | | Guelph meter data |
| | additions. | UNITS: | integer | · (1890 t | :0 2014 |) | | | | | STRU EFF Year |

 Table A10
 Residential Demand Curve Variables

| AREA Total area not including the basement area of all structures on the property. UNITS: square feet Guelph meter data, SUM_STRU_Total Area BDRMS Total number of bedrooms of all structures on the property. UNITS: integer (1,2,3.) Guelph meter data, SUM_STRU_Pul_Baths BTRM1 Total number of full bathrooms of all structures on the property. UNITS: integer (1,2,3.) Guelph meter data, SUM_STRU_Pul_Baths SINGDET Type of household structure: homes linked together at the footing or foundation by a wall above or below grade (MPAC code 305) PropCde2013 and PropCde2013 and PropCde2014 GATE Type of household structure: Community lifestyle, typically, a gated community (MPAC code 307) PropCde2014 ROW Type of household structure: Semi-detached residential (MPAC code 311). UNITS: For all these variables, 1 if the structure is the type indicated and 0 otherwise. Statistics Canada, 2011 POUPLEX Type of household structure: Semi-detached residential (MPAC code 311). Statistics Canada, 2011 FAMSZ Number of census family persons occupying a private dwelling. A household is a group of two or more persons living in the same dwelling and related to each ther by blod, marriage, common-law, adoption or a foster relationship. Statistics Canada, 2011 UNITS: average value by census dissemination area (21.0) Number of persons in a household occupying a private dwelling. A household is a person or a group of persons, related or unrela | Variable | Description / Comment | Source | | | |
|--|-----------|--|-------------------------|--|--|--|
| property. UNITS: square feet SUM_STRU_Total_Area BDRMS Total number of bedrooms of all structures on the property. UNITS: integer (1,2,3.) Guelph meter data, SUM_STRU_Bedrooms BTHRM1 Total number of full bathrooms of all structures on the property. Guelph meter data, SUM_STRU_Full_Baths SINGDET Type of household structure: inpres linked together at the footing or foundation by a wall above or below grade (MPAC code 301) Guelph meter data, PropCde2013 and PropCde2013 and PropCde2014 GATE Type of household structure: Community lifestyle, typically, a gated community (MPAC code 307) PropCde2014 ROW Type of household structure: Freehold Townhouse/Row house (MPAC code 309) Code 309) PropCde2014 DUPLEX Type of household structure: Semi-detached residential (MPAC code 311). Statistics Canada, 2011 Census family is group of two or more persons living in the same dwelling and related to each other by blood, marriage, common-law, adoption or a foster relationship. Statistics Canada, 2011 UNITS: average value by census dissemination area (21.0) Number of persons in a household occupying a private dwelling. A household is a person or a group of persons, related or unrelated, who occupy the same dwelling. Statistics Canada, 2011 INMMG Proportion of persons living with non-relatives only in the population. Statistics Canada, 2011 NO | AREA | Total area not including the basement area of all structures on the | Guelph meter data, | | | |
| BDRMS Total number of beforoms of all structures on the property. UNITS: integer (1,2,3.) Guelph meter data, SUM_STRU_Bedrooms BTHRM1 Total number of full bathrooms of all structures on the property. UNITS: integer (1,2,3.) Guelph meter data, SUM_STRU_Bedrooms BTHRM1 Type of household structure: single detached (MPAC code 301) Guelph meter data, SUM_STRU_Full_Baths LINK Type of household structure: community lifestyle, typically, a gated community (MPAC code 307). Guelph meter data, SUM_STRU_Full_Baths ROW Type of household structure: Community lifestyle, typically, a gated community (MPAC code 307). PropCde2014 DUPLEX Type of household structure: Semi-detached residential (MPAC code 311). Vertice of household structure: Semi-detached residential (MPAC code 311). UNITS: ror all these variables, 1 if the structure is the type indicated and 0 otherwise. Statistics Canada, 2011 FAMSZ Number of census family persons occupying a private dwelling. A census family is a group of two or more persons living in the same dwelling and related to each other by blood, marriage, common-law, adoption or a foster relationship. Statistics Canada, 2011 UNITS: average value by census dissemination area (≥1.0) Statistics Canada, 2011 IMMG Proportion of persons living alone persons, related or unrelated, who occup the same dwelling. Statistitis Canada, 2011 | | property. UNITS: square feet | SUM_STRU_Total_Area | | | |
| Integer (1,2,3) SUM_STRU_Bedrooms BTHRM1 Total number of full bathrooms of all structures on the property. Guelph meter data, SUM_STRU_Full_Baths SINGDET Type of household structure: single detached (MPAC code 301). Guelph meter data, Yrop of household structure: homes linked together at the footing or foundation by a wall above or below grade (MPAC code 305). Guelph meter data, PropCde2013 and PropCde2013 and PropCde2013 and PropCde2014 RATE Type of household structure: community (IMPAC code 307). Fund (MPAC code 307). ROW Type of household structure: Semi-detached residential (MPAC code 311). UNITS: For all these variables, 1 if the structure is the type indicated and 0 otherwise. HOUSEHOLD DESCRIPTORS FROM 2011 CENSUS DATA Statistics Canada, 2011 Census family is a group of two or more persons living in the same dwelling and related to each other by blod, marriage, common-law, adoption or a foster relationship. Statistics Canada, 2011 Census UNITS: average value by census dissemination area (21.0) Number of persons in a household occupying a private dwelling. A household is a person or a group of persons, related or unrelated, who occupy the same dwelling. Statistics Canada, 2011 Census NOREL Proportion of immigrants and non-permanent residents in the population. UNITS: average value by census dissemination area (0.0 to 1.0) This variable tests whether there are cultural factors that influence water demand. Statistics Canada, 2011 Census | BDRMS | Total number of bedrooms of all structures on the property. UNITS: | Guelph meter data, | | | |
| BTHRN1 Total number of full bathrooms of all structures on the property. UNITS: integer (1,2,3,) Guelph meter data, SUM_STRU_Full_Baths SINGDET Type of household structure: iongle detached (MPAC code 301) Guelph meter data, PropCde2013 and PropCde2013 and PropCde2014 GATE Type of household structure: Community lifestyle, typically, a gated community (MPAC code 307) PropCde2014 ROW Type of household structure: Community lifestyle, typically, a gated community (MPAC code 307) PropCde2014 DUPLEX Type of household structure: Semi-detached residential (MPAC code 311). UNITS: For all these variables, 1 if the structure is the type indicated and 0 otherwise. Statistics Canada, 2011 FAMSZ Number of census family persons occupying a private dwelling. A census family is a group of two or more persons living in the same dwelling and related to each other by blod, marriage, common-law, adoption or a foster relationship. Statistics Canada, 2011 HSHLSZ Number of persons in a household occupying a private dwelling. A household is a person or a group of persons, related or unrelated, who occupy the same dwelling. Statistics Canada, 2011 UNITS: average value by census dissemination area (21.0) Statistics Canada, 2011 IMMG Proportion of persons living with non-relatives only in the population. UNITS: average value by census dissemination area (0.0 to 1.0) Statistics Canada, 2011 This vari | | integer (1,2,3) | SUM_STRU_Bedrooms | | | |
| UNITS: integer (1,2,3.) SUM_STUFull_Baths SINGDET Type of household structure: nomes linked together at the footing or foundation by a wall above or below grade (MPAC code 305) PropCde2013 and PropCde2013 and PropCde2014 GATE Type of household structure: community lifestyle, typically, a gated community (MPAC code 307) PropCde2014 ROW Type of household structure: Semi-detached residential (MPAC code 311). PropCde2014 DUPLEX Type of household structure: Semi-detached residential (MPAC code 311). Statistics Canada, 2011 MOUSEHOLD DESCRIPTORS FROM 2011 CENSUS DATA FAMSZ Statistics Canada, 2011 FAMSZ Number of census family persons occupying a private dwelling. A census family is a group of two or more persons living in the same dwelling and related to each other by blood, marriage, common-law, adoption or a foster relationship. Statistics Canada, 2011 UNITS: average value by census dissemination area (21.0) INTS: average value by census dissemination area (0.0 to 1.0) Statistics Canada, 2011 This variable tests whether three are cultural factors that influence water demand. Statistics Canada, 2011 Census NOREL Proportion of persons living alone to ccupied dwellings and tests whether this factor influences water demand. Statistics Canada, 2011 Census NOREL Proportion of persons living al | BTHRM1 | Total number of full bathrooms of all structures on the property. | Guelph meter data, | | | |
| SINGDET Type of household structure: single detached (MPAC code 301) Guelph meter data, PropCde2013 and PropCde2013 and PropCde2014 GATE Type of household structure: Freehold Townhouse/Row house (MPAC code 309) Type of household structure: Semi-detached residential (MPAC code 301) Type of household structure: Semi-detached residential (MPAC code 301) HOUSEHOLD DESCRIPTORS FROM 2011 CENSUS DATA Statistics Canada, 2011 Census family persons occupying a private dwelling. A census family is a group of two or more persons living in the same dwelling and related to each other by blood, marriage, common-law, adoption or a foster relationship. UNITS: average value by census dissemination area (21.0) Statistics Canada, 2011 Census HSHLSZ Number of persons in a household occupying a private dwelling. A cocupy the same dwelling. UNITS: average value by census dissemination area (21.0) Statistics Canada, 2011 Census IMMG Proportion of immigrants and non-permanent residents in the population. UNITS: average value by census dissemination area (0.0 to 1.0) This variable tests whether three are cultural factors that influence water demand. Statistics Canada, 2011 Census NOREL Proportion of persons living with non-relatives only in the population. UNITS: average value by census dissemination area (0.0 to 1.0) This variable tests whether single person households | | UNITS: integer (1,2,3) | SUM_STRU_Full_Baths | | | |
| LINK Type of household structure: homes linked together at the footing or foundation by a wall above or below grade (MPAC code 305) PropCde2013 and PropCde2014 GATE Type of household structure: Community lifestyle, typically, a gated community (MPAC code 307) PropCde2014 ROW Type of household structure: Semi-detached residential (MPAC code 311). PropCde2014 DUPLEX Type of household structure: Semi-detached residential (MPAC code 311). Statistics Canada, 2011 HOUSEHOLD DESCRIPTORS FROM 2011 CENSUS DATA FAMSZ Number of census family persons occupying a private dwelling. A census family is a group of two or more persons living in the same dwelling and related to each other by blood, marriage, common-law, adoption or a foster relationship. Statistics Canada, 2011 UNITS: average value by census dissemination area (21.0) Statistics Canada, 2011 Census IMMG Proportion of migrarts and non-permanent residents in the population. UNITS: average value by census dissemination area (0.0 to 1.0) This variable tests whether threre are cultural factors that influence water demand. Statistics Canada, 2011 NOREL Proportion of persons living with non-relatives only in the population. UNITS: average value by census dissemination area (0.0 to 1.0) This variable tests whether single person households have a substantively different water demand profile. Statistics Canada, 2011 NOREL Proportion of the total population in private h | SINGDET | Type of household structure: single detached (MPAC code 301) | Guelph meter data, | | | |
| foundation by a wall above or below grade (MPAC code 305) PropCde2014 GATE Type of household structure: Community lifestyle, typically, a gated community (MPAC code 307) PropCde2014 ROW Type of household structure: Semi-detached residential (MPAC code 311), UNITS: For all these variables, 1 if the structure is the type indicated and 0 otherwise. PropCde2014 HOUSEHOLD DESCRIPTORS FROM 2011 CENSUS DATA Statistics Canada, 2011 Census family is a group of two or more persons living in the same dwelling and related to each other by blood, marriage, common-law, adoption or a foster relationship. Statistics Canada, 2011 UNITS: average value by census dissemination area (21.0) Statistics Canada, 2011 Census family is a group of persons, related or unrelated, who occupy the same dwelling. A household is a person or a group of persons, related or unrelated, who occup the same due by census dissemination area (21.0) Statistics Canada, 2011 IMMG Proportion of immigrants and non-permanent residents in the population. UNITS: average value by census dissemination area (0.0 to 1.0) Statistics Canada, 2011 Census NOREL Proportion of persons living with non-relatives only in the population. UNITS: average value by census dissemination area (0.0 to 1.0) Statistics Canada, 2011 This variable is a proxy measure of student occupied dwellings and tests whether this factor influences water demand. Statistics Canada, 2011 NOREL Pr | LINK | Type of household structure: homes linked together at the footing or | PropCde2013 and | | | |
| GATE community (MPAC code 307) Type of household structure: Freehold Townhouse/Row house (MPAC code 309) DUPLEX Type of household structure: Semi-detached residential (MPAC code 311). UNITS: For all these variables, 1 if the structure is the type indicated and 0 otherwise. Statistics Canada, 2011 HOUSEHOLD DESCRIPTORS FROM 2011 CENSUS DATA Statistics Canada, 2011 FAMSZ Number of census family persons occupying a private dwelling. A census family is a group of two or more persons living in the same dwelling and related to each other by blood, marriage, common-law, adoption or a foster relationship. Statistics Canada, 2011 UNITS: average value by census dissemination area (>1.0) Minde persons in a household occupying a private dwelling. A household is a person or a group of persons, related or unrelated, who occupy the same dwelling. Statistics Canada, 2011 UNITS: average value by census dissemination area (>1.0) Statistics Canada, 2011 Census IMMG Proportion of immigrants and non-permanent residents in the population. UNITS: average value by census dissemination area (>0.0 to 1.0) Statistics Canada, 2011 Census NOREL Proportion of persons living with non-relatives only in the population. UNITS: average value by census dissemination area (0.0 to 1.0) Statistics Canada, 2011 Census ALONE Proportion of persons living alone in the population. UNITS: average value by census dissemination area | | foundation by a wall above or below grade (MPAC code 305) | PropCde2014 | | | |
| community (MPAC code 307) Type of household structure: Freehold Townhouse/Row house (MPAC code 330) DUPLEX Type of household structure: Semi-detached residential (MPAC code 311). UNITS: For all these variables, 1 if the structure is the type indicated and 0 otherwise. Statistics Canada, 2011 FAMSZ Number of census family persons occupying a private dwelling. A census family is a group of two or more persons living in the same dwelling and related to each other by blood, marriage, common-law, adoption or a foster relationship. Statistics Canada, 2011 UNITS: average value by census dissemination area (>1.0) Statistics Canada, 2011 Census HSHLSZ Number of persons in a household occupying a private dwelling. A household is a person or a group of persons, related or unrelated, who occupy the same dwelling. Statistics Canada, 2011 IMMG Proportion of immigrants and non-permanent residents in the population. UNITS: average value by census dissemination area (0.0 to 1.0) Statistics Canada, 2011 INS ariable tests whether there are cultural factors that influence water demand. Statistics Canada, 2011 NOREL Proportion of persons living with non-relatives only in the population. UNITS: average value by census dissemination area (0.0 to 1.0) This variable tests whether single person households have a substantively different water demand profile. Statistics Canada, 2011 ALONE Proportion of persons living alone in the population. UNITS: average value by | GATE | Type of household structure: Community lifestyle, typically, a gated | | | | |
| ROW Type of household structure: Freehold Townhouse/Row house (MPAC code 309) DUPLEX Type of household structure: Semi-detached residential (MPAC code 311). UNITS: For all these variables, 1 if the structure is the type indicated and 0 otherwise. Statistics Canada, 2011 HOUSEHOLD DESCRIPTORS FROM 2011 CENSUS DATA Statistics Canada, 2011 FAMSZ Number of census family persons occupying a private dwelling. A census family is a group of two or more persons living in the same dwelling and related to each other by blood, marriage, common-law, adoption or a foster relationship. Statistics Canada, 2011 UNITS: average value by census dissemination area (21.0) Mumber of persons in a household occupying a private dwelling. A household is a person or a group of persons, related or unrelated, who occupy the same dwelling. Statistics Canada, 2011 UMITS: average value by census dissemination area (21.0) Statistics Canada, 2011 IMMG Proportion of immigrants and non-permanent residents in the population. UNITS: average value by census dissemination area (0.0 to 1.0) Statistics Canada, 2011 NOREL Proportion of persons living with non-relatives only in the population. UNITS: average value by census dissemination area (0.0 to 1.0) Statistics Canada, 2011 This variable is a proxy measure of student occupied dwellings and tests whether this factor influences water demand. Statistics Canada, 2011 ALONE Propo | | community (MPAC code 307) | | | | |
| Code 309) DUPLEX Type of household structure: Semi-detached residential (MPAC code 311). UNITS: For all these variables, 1 if the structure is the type indicated and 0 otherwise. Statistics Canada, 2011 FAMSZ Number of census family persons occupying a private dwelling. A census family is a group of two or more persons living in the same dwelling and related to each other by blood, marriage, common-law, adoption or a foster relationship. Statistics Canada, 2011 HSHLSZ Number of persons in a household occupying a private dwelling. A household is a person or a group of persons, related or unrelated, who occupy the same dwelling. Statistics Canada, 2011 IMMG Proportion of immigrants and non-permanent residents in the population. UNITS: average value by census dissemination area (≥1.0) Statistics Canada, 2011 IMMG Proportion of persons living with non-relatives only in the population. UNITS: average value by census dissemination area (≥0.0 to 1.0) Statistics Canada, 2011 NOREL Proportion of persons living with non-relatives only in the population. UNITS: average value by census dissemination area (0.0 to 1.0) Statistics Canada, 2011 This variable is a proxy measure of student occupied dwellings and tests whether this factor influences water demand. Statistics Canada, 2011 ALONE Proportion of persons living alone in the population. UNITS: average value by census dissemination area (0.0 to 1.0) Statistics Canada, 2011 | ROW | Type of household structure: Freehold Townhouse/Row house (MPAC | | | | |
| DUPLEX Type of household structure: Semi-detached residential (MPAC code 311). UNITS: For all these variables, 1 if the structure is the type indicated and 0 otherwise. Statistics Canada, 2011 HOUSEHOLD DESCRIPTORS FROM 2011 CENSUS DATA Statistics Canada, 2011 FAMSZ Number of census family persons occupying a private dwelling. A census family is a group of two or more persons living in the same dwelling and related to each other by blood, marriage, common-law, adoption or a foster relationship. Statistics Canada, 2011 UNITS: average value by census dissemination area (21.0) Number of persons in a household occupying a private dwelling. A household is a person or a group of persons, related or unrelated, who occupy the same dwelling. Statistics Canada, 2011 UNITS: average value by census dissemination area (21.0) Statistics Canada, 2011 IMMG Proportion of immigrants and non-permanent residents in the population. UNITS: average value by census dissemination area (0.0 to 1.0) Statistics Canada, 2011 NOREL Proportion of persons living with non-relatives only in the population. Statistics Canada, 2011 NUNTS: average value by census dissemination area (0.0 to 1.0) Statistics Canada, 2011 Census NOREL Proportion of persons living alone in the population. UNITS: average value by census dissemination area (0.0 to 1.0) Statistics Canada, 2011 This variable tests whether single p | | code 309) | | | | |
| 311). UNITS: For all these variables, 1 if the structure is the type indicated and 0 otherwise. HOUSEHOLD DESCRIPTORS FROM 2011 CENSUS DATA Statistics Canada, 2011 Census family persons occupying a private dwelling. A census family per sons occupying a private dwelling. A census family per sons of two or more persons living in the same dwelling and related to each other by blood, marriage, common-law, adoption or a foster relationship. Statistics Canada, 2011 Census HSHLSZ Number of persons in a household occupying a private dwelling. A household is a person or a group of persons, related or unrelated, who occupy the same dwelling. Statistics Canada, 2011 Census IMMG Proportion of immigrants and non-permanent residents in the population. UNITS: average value by census dissemination area (21.0) Statistics Canada, 2011 Census INMMG Proportion of persons living with non-relatives only in the population. Statistics Canada, 2011 Census NOREL Proportion of persons living with non-relatives only in the population. Statistics Canada, 2011 Census NOREL Proportion of persons living alone in the population. UNITS: average value by census dissemination area (0.0 to 1.0) Statistics Canada, 2011 Census ALONE Proportion of persons living alone in the population. UNITS: average value by census dister demand. Statistics Canada, 2011 Census NOENG Proportion of the total population in private households have a substantively different water demand profile. Statistics Canada, 2011 Cen | DUPLEX | Type of household structure: Semi-detached residential (MPAC code | | | | |
| UNITS: For all these variables, 1 if the structure is the type indicated and 0 otherwise. Statistics Canada, 2011 HOUSEHOLD DESCRIPTORS FROM 2011 CENSUS DATA Statistics Canada, 2011 FAMSZ Number of census family persons occupying a private dwelling. A census family is a group of two or more persons living in the same dwelling and related to each other by blood, marriage, common-law, adoption or a foster relationship. UNITS: average value by census dissemination area (≥1.0) Statistics Canada, 2011 HSHLSZ Number of persons in a household occupying a private dwelling. A household is a person or a group of persons, related or unrelated, who occupy the same dwelling. UNITS: average value by census dissemination area (≥1.0) Statistics Canada, 2011 IMMG Proportion of immigrants and non-permanent residents in the population. UNITS: average value by census dissemination area (0.0 to 1.0) Statistics Canada, 2011 This variable tests whether there are cultural factors that influence water demand. Statistics Canada, 2011 NOREL Proportion of persons living with non-relatives only in the population. UNITS: average value by census dissemination area (0.0 to 1.0) Statistics Canada, 2011 This variable tests whether single person households have a substantively different water demand profile. Statistics Canada, 2011 NOENG Proportion of the total population in private households where non- official languages are spoken. UNITS: average value by census dissemination area (0.0 to 1.0) Statistics | | 311). | | | | |
| Image: Properties of the statistics of the | | UNITS: For all these variables, 1 if the structure is the type indicated and | | | | |
| HOUSEHOLD DESCRIPTORS FROM 2011 CENSUS DATAFAMSZNumber of census family persons occupying a private dwelling. A census family is a group of two or more persons living in the same dwelling and related to each other by blood, marriage, common-law, adoption or a foster relationship. UNITS: average value by census dissemination area (≥1.0)Statistics Canada, 2011 CensusHSHLSZNumber of persons in a household occupying a private dwelling. A household is a person or a group of persons, related or unrelated, who occupy the same dwelling. UNITS: average value by census dissemination area (≥1.0)Statistics Canada, 2011 CensusIMMGProportion of immigrants and non-permanent residents in the population. UNITS: average value by census dissemination area (0.0 to 1.0) This variable tests whether there are cultural factors that influence water demand.Statistics Canada, 2011 CensusNORELProportion of persons living with non-relatives only in the population. UNITS: average value by census dissemination area (0.0 to 1.0) This variable tests whether there are cultural factors that influence water demand.Statistics Canada, 2011 CensusALONEProportion of persons living alone in the population. UNITS: average value by census dissemination area (0.0 to 1.0) This variable tests whether single person households have a substantively different water demand profile.Statistics Canada, 2011 CensusNOENGProportion of the total population in private households where non- official languages are spoken. UNITS: average value by census dissemination area (0.0 to 1.0) This variable tests whether there are language factors that influence water demand.Statistics Canada, 2011 CensusNOENG <td< td=""><td></td><td>0 otherwise.</td><td></td></td<> | | 0 otherwise. | | | | |
| FAMSZNumber of census family persons occupying a private dwelling. A census family is a group of two or more persons living in the same dwelling and related to each other by blood, marriage, common-law, adoption or a foster relationship. UNITS: average value by census dissemination area (≥1.0)Statistics Canada, 2011 CensusHSHLSZNumber of persons in a household occupying a private dwelling. A household is a person or a group of persons, related or unrelated, who occupy the same dwelling. UNITS: average value by census dissemination area (≥1.0)Statistics Canada, 2011 CensusIMMGProportion of immigrants and non-permanent residents in the population. UNITS: average value by census dissemination area (0.0 to 1.0) This variable tests whether there are cultural factors that influence water demand.Statistics Canada, 2011 CensusNORELProportion of persons living with non-relatives only in the population. UNITS: average value by census dissemination area (0.0 to 1.0) This variable is a proxy measure of student occupied dwellings and tests whether this factor influences water demand.Statistics Canada, 2011 CensusALONEProportion of persons living alone in the population. UNITS: average value by census dissemination area (0.0 to 1.0) This variable tests whether single person households have a substantively different water demand profile.Statistics Canada, 2011 CensusNOENGProportion of the total population in private households where non- official languages are spoken. UNITS: average value by census dissemination area (0.0 to 1.0) This variable tests whether there are language factors that influence water demand.Statistics Canada, 2011 Notional Household SurveyNOENGProportion of | HOUSEHOLD | DESCRIPTORS FROM 2011 CENSUS DATA | ſ | | | |
| census family is a group of two or more persons living in the same dwelling and related to each other by blood, marriage, common-law, adoption or a foster relationship. UNITS: average value by census dissemination area (≥1.0)CensusHSHLSZNumber of persons in a household occupying a private dwelling. A household is a person or a group of persons, related or unrelated, who occupy the same dwelling. UNITS: average value by census dissemination area (≥1.0)Statistics Canada, 2011 CensusIMMGProportion of immigrants and non-permanent residents in the population. UNITS: average value by census dissemination area (0.0 to 1.0) This variable tests whether there are cultural factors that influence water demand.Statistics Canada, 2011 CensusNORELProportion of persons living with non-relatives only in the population. UNITS: average value by census dissemination area (0.0 to 1.0) This variable is a proxy measure of student occupied dwellings and tests whether this factor influences water demand.Statistics Canada, 2011 CensusALONEProportion of persons living alone in the population. UNITS: average value by census dissemination area (0.0 to 1.0) This variable tests whether single person households have a substantively different water demand profile.Statistics Canada, 2011 CensusNOENGProportion of the total population in private households where non- official languages are spoken. UNITS: average value by census dissemination area (0.0 to 1.0) This variable tests whether there are language factors that influence water demand.Statistics Canada, 2011 Notional Household SurveyNOEDUProportion of the total population holding no certificate, diploma or degree.Statistics Canada, 2011 Nationa | FAMSZ | Number of census family persons occupying a private dwelling. A | Statistics Canada, 2011 | | | |
| dwelling and related to each other by blood, marriage, common-law, adoption or a foster relationship. Viiit S: average value by census dissemination area (≥1.0) HSHLSZ Number of persons in a household occupying a private dwelling. A household is a person or a group of persons, related or unrelated, who occupy the same dwelling. Statistics Canada, 2011 IMMG Proportion of immigrants and non-permanent residents in the population. UNITS: average value by census dissemination area (≥1.0) Statistics Canada, 2011 IMMG Proportion of persons living with non-relatives only in the population. Statistics Canada, 2011 INOREL Proportion of persons living with non-relatives only in the population. Statistics Canada, 2011 INOREL Proportion of persons living with non-relatives only in the population. Statistics Canada, 2011 ALONE Proportion of persons living alone in the population. UNITS: average value by census dissemination area (0.0 to 1.0) Statistics Canada, 2011 This variable tests whether single person households have a substantively different water demand profile. Statistics Canada, 2011 NOENG Proportion of the total population in private households where non-official languages are spoken. UNITS: average value by census dissemination area (0.0 to 1.0) Statistics Canada, 2011 NENG Proportion of the total population holding no certificate, diploma or degree. Statistics Canada, 2011 NOEDU | | census family is a group of two or more persons living in the same | Census | | | |
| adoption or a foster relationship. UNITS: average value by census dissemination area (≥1.0) HSHLSZ Number of persons in a household occupying a private dwelling. A household is a person or a group of persons, related or unrelated, who occupy the same dwelling. Statistics Canada, 2011 IMMG Proportion of immigrants and non-permanent residents in the population. UNITS: average value by census dissemination area (≥1.0) Statistics Canada, 2011 IMMG Proportion of immigrants and non-permanent residents in the population. UNITS: average value by census dissemination area (0.0 to 1.0) Statistics Canada, 2011 This variable tests whether there are cultural factors that influence water demand. Statistics Canada, 2011 NOREL Proportion of persons living with non-relatives only in the population. UNITS: average value by census dissemination area (0.0 to 1.0) Statistics Canada, 2011 This variable is a proxy measure of student occupied dwellings and tests whether this factor influences water demand. Statistics Canada, 2011 ALONE Proportion of persons living alone in the population. UNITS: average value by census dissemination area (0.0 to 1.0) Census This variable tests whether single person households have a substantively different water demand profile. Statistics Canada, 2011 NOENG Proportion of the total population in private households where non-official languages are spoken. UNITS: average value by census dissemination area (0.0 to 1.0) Statistics Canada, | | dwelling and related to each other by blood, marriage, common-law, | | | | |
| UNITS: average value by census dissemination area (21.0)Statistics Canada, 2011HSHLSZNumber of persons in a household occupying a private dwelling. A household is a person or a group of persons, related or unrelated, who occupy the same dwelling. UNITS: average value by census dissemination area (≥1.0)Statistics Canada, 2011 CensusIMMGProportion of immigrants and non-permanent residents in the population. UNITS: average value by census dissemination area (0.0 to 1.0) This variable tests whether there are cultural factors that influence water demand.Statistics Canada, 2011 CensusNORELProportion of persons living with non-relatives only in the population. UNITS: average value by census dissemination area (0.0 to 1.0) This variable is a proxy measure of student occupied dwellings and tests whether this factor influences water demand.Statistics Canada, 2011 CensusALONEProportion of persons living alone in the population. UNITS: average value by census dissemination area (0.0 to 1.0) This variable tests whether single person households have a substantively different water demand profile.Statistics Canada, 2011 CensusNOENGProportion of the total population in private households where non- official languages are spoken. UNITS: average value by census dissemination area (0.0 to 1.0) This variable tests whether there are language factors that influence water demand.Statistics Canada, 2011 CensusNOEDUProportion of the total population holding no certificate, diploma or degree.Statistics Canada, 2011 National Household Survey | | adoption or a foster relationship. | | | | |
| HSHLSZNumber of persons in a household occupying a private dwelling. A household is a person or a group of persons, related or unrelated, who occupy the same dwelling. UNITS: average value by census dissemination area (≥1.0)Statistics Canada, 2011 CensusIMMGProportion of immigrants and non-permanent residents in the population. UNITS: average value by census dissemination area (0.0 to 1.0) This variable tests whether there are cultural factors that influence water demand.Statistics Canada, 2011 CensusNORELProportion of persons living with non-relatives only in the population. UNITS: average value by census dissemination area (0.0 to 1.0) This variable is a proxy measure of student occupied dwellings and tests whether this factor influences water demand.Statistics Canada, 2011 CensusALONEProportion of persons living alone in the population. UNITS: average value by census dissemination area (0.0 to 1.0) This variable tests whether single person households have a substantively different water demand profile.Statistics Canada, 2011 CensusNOENGProportion of the total population in private households where non- official languages are spoken. UNITS: average value by census dissemination area (0.0 to 1.0) This variable tests whether there are language factors that influence water demand.Statistics Canada, 2011 National Household SurveyNOEDUProportion of the total population holding no certificate, diploma or degree.Statistics Canada, 2011 National Household Survey | | UNITS: average value by census dissemination area (≥1.0) | | | | |
| Image: A construction of the total population of the total population holding a certificate, diploma or degree. Census Census Census Census Census Census Census Census Census IMMG Proportion of immigrants and non-permanent residents in the population. UNITS: average value by census dissemination area (0.0 to 1.0) Statistics Canada, 2011 This variable tests whether there are cultural factors that influence water demand. Statistics Canada, 2011 NOREL Proportion of persons living with non-relatives only in the population. UNITS: average value by census dissemination area (0.0 to 1.0) This variable is a proxy measure of student occupied dwellings and tests whether this factor influences water demand. Statistics Canada, 2011 ALONE Proportion of persons living alone in the population. UNITS: average value by census dissemination area (0.0 to 1.0) Census This variable tests whether single person households have a substantively different water demand profile. Statistics Canada, 2011 NOENG Proportion of the total population in private households where non-official languages are spoken. UNITS: average value by census Statistics Canada, 2011 NOEDU Proportion of the total population holding no certificate, diploma or degree. Statistics Canada, 2011 REDU Proportion of the total p | HSHLSZ | Number of persons in a household occupying a private dwelling. A | Statistics Canada, 2011 | | | |
| occupy the same dwelling. UNITS: average value by census dissemination area (≥1.0)Statistics Canada, 2011IMMGProportion of immigrants and non-permanent residents in the population. UNITS: average value by census dissemination area (0.0 to 1.0) This variable tests whether there are cultural factors that influence water demand.Statistics Canada, 2011 CensusNORELProportion of persons living with non-relatives only in the population. UNITS: average value by census dissemination area (0.0 to 1.0) This variable is a proxy measure of student occupied dwellings and tests whether this factor influences water demand.Statistics Canada, 2011 CensusALONEProportion of persons living alone in the population. UNITS: average value by census dissemination area (0.0 to 1.0) This variable tests whether single person households have a substantively different water demand profile.Statistics Canada, 2011 CensusNOENGProportion of the total population in private households where non- official languages are spoken. UNITS: average value by census dissemination area (0.0 to 1.0) This variable tests whether there are language factors that influence water demand.Statistics Canada, 2011 National Household SurveyNOEDUProportion of the total population holding no certificate, diploma or degree.Statistics Canada, 2011 National Household Survey | | household is a person or a group of persons, related or unrelated, who | Census | | | |
| IMMGUNITS: average value by census dissemination area (≥1.0)Statistics Canada, 2011IMMGProportion of immigrants and non-permanent residents in the population. UNITS: average value by census dissemination area (0.0 to 1.0) This variable tests whether there are cultural factors that influence water demand.Statistics Canada, 2011 CensusNORELProportion of persons living with non-relatives only in the population. UNITS: average value by census dissemination area (0.0 to 1.0) This variable is a proxy measure of student occupied dwellings and tests whether this factor influences water demand.Statistics Canada, 2011 CensusALONEProportion of persons living alone in the population. UNITS: average value by census dissemination area (0.0 to 1.0) This variable tests whether single person households have a substantively different water demand profile.Statistics Canada, 2011 CensusNOENGProportion of the total population in private households where non- official languages are spoken. UNITS: average value by census dissemination area (0.0 to 1.0) This variable tests whether there are language factors that influence water demand.Statistics Canada, 2011 National Household SurveyNOEDUProportion of the total population holding no certificate, diploma or degree.Statistics Canada, 2011 National Household Survey | | occupy the same dwelling. | | | | |
| IMMGProportion of immigrants and non-permanent residents in the population. UNITS: average value by census dissemination area (0.0 to 1.0) This variable tests whether there are cultural factors that influence water demand.Statistics Canada, 2011 CensusNORELProportion of persons living with non-relatives only in the population. UNITS: average value by census dissemination area (0.0 to 1.0) This variable is a proxy measure of student occupied dwellings and tests whether this factor influences water demand.Statistics Canada, 2011 CensusALONEProportion of persons living alone in the population. UNITS: average value by census dissemination area (0.0 to 1.0) This variable tests whether single person households have a substantively different water demand profile.Statistics Canada, 2011 CensusNOENGProportion of the total population in private households where non- official languages are spoken. UNITS: average value by census dissemination area (0.0 to 1.0) This variable tests whether three are language factors that influence water demand.Statistics Canada, 2011 National Household SurveyNOEDUProportion of the total population holding no certificate, diploma or degree.Statistics Canada, 2011 CensusNOEDUProportion of the total population holding a certificate, diploma or degree.Statistics Canada, 2011 Census | | UNITS: average value by census dissemination area (\geq 1.0) | | | | |
| population. UNITS: average value by census dissemination area (0.0 to 1.0) This variable tests whether there are cultural factors that influence water demand.CensusNORELProportion of persons living with non-relatives only in the population. UNITS: average value by census dissemination area (0.0 to 1.0) This variable is a proxy measure of student occupied dwellings and tests whether this factor influences water demand.Statistics Canada, 2011 CensusALONEProportion of persons living alone in the population. UNITS: average value by census dissemination area (0.0 to 1.0) This variable tests whether single person households have a substantively different water demand profile.Statistics Canada, 2011 CensusNOENGProportion of the total population in private households where non- official languages are spoken. UNITS: average value by census dissemination area (0.0 to 1.0) This variable tests whether there are language factors that influence water demand.Statistics Canada, 2011 National Household SurveyNOEDUProportion of the total population holding no certificate, diploma or degree.Statistics Canada, 2011 National Household Survey | IMMG | Proportion of immigrants and non-permanent residents in the | Statistics Canada, 2011 | | | |
| 1.0)This variable tests whether there are cultural factors that influence water demand.Statistics Canada, 2011NORELProportion of persons living with non-relatives only in the population. UNITS: average value by census dissemination area (0.0 to 1.0) This variable is a proxy measure of student occupied dwellings and tests whether this factor influences water demand.Statistics Canada, 2011 CensusALONEProportion of persons living alone in the population. UNITS: average value by census dissemination area (0.0 to 1.0) This variable tests whether single person households have a substantively different water demand profile.Statistics Canada, 2011 CensusNOENGProportion of the total population in private households where non- official languages are spoken. UNITS: average value by census dissemination area (0.0 to 1.0) This variable tests whether there are language factors that influence water demand.Statistics Canada, 2011 CensusNOEDUProportion of the total population holding no certificate, diploma or degree.Statistics Canada, 2011 National Household Survey | | population. UNITS: average value by census dissemination area (0.0 to | Census | | | |
| Inits variable tests whether there are cultural factors that influence water demand.Statistics Canada, 2011 CensusNORELProportion of persons living with non-relatives only in the population. UNITS: average value by census dissemination area (0.0 to 1.0) This variable is a proxy measure of student occupied dwellings and tests whether this factor influences water demand.Statistics Canada, 2011 CensusALONEProportion of persons living alone in the population. UNITS: average value by census dissemination area (0.0 to 1.0) This variable tests whether single person households have a substantively different water demand profile.Statistics Canada, 2011 CensusNOENGProportion of the total population in private households where non- official languages are spoken. UNITS: average value by census dissemination area (0.0 to 1.0) This variable tests whether there are language factors that influence water demand.Statistics Canada, 2011 National Household SurveyNOEDUProportion of the total population holding no certificate, diploma or degree.Statistics Canada, 2011 National Household Survey | | 1.U) | | | | |
| NORELProportion of persons living with non-relatives only in the population. UNITS: average value by census dissemination area (0.0 to 1.0) This variable is a proxy measure of student occupied dwellings and tests whether this factor influences water demand.Statistics Canada, 2011 CensusALONEProportion of persons living alone in the population. UNITS: average value by census dissemination area (0.0 to 1.0) This variable tests whether single person households have a substantively different water demand profile.Statistics Canada, 2011 CensusNOENGProportion of the total population in private households where non- official languages are spoken. UNITS: average value by census dissemination area (0.0 to 1.0) This variable tests whether there are language factors that influence water demand.Statistics Canada, 2011 National Household SurveyNOEDUProportion of the total population holding no certificate, diploma or degree.Statistics Canada, 2011 National Household Survey | | This variable tests whether there are cultural factors that influence | | | | |
| NORELProportion of persons invitig with home relatives only in the population. UNITS: average value by census dissemination area (0.0 to 1.0) This variable is a proxy measure of student occupied dwellings and tests whether this factor influences water demand.Statistics Canada, 2011 CensusALONEProportion of persons living alone in the population. UNITS: average value by census dissemination area (0.0 to 1.0) This variable tests whether single person households have a substantively different water demand profile.Statistics Canada, 2011 CensusNOENGProportion of the total population in private households where non- official languages are spoken. UNITS: average value by census dissemination area (0.0 to 1.0) This variable tests whether there are language factors that influence water demand.Statistics Canada, 2011 National Household SurveyNOEDUProportion of the total population holding no certificate, diploma or degree.Statistics Canada, 2011 National Household Survey | NOREL | Brenertien of persons living with nen relatives only in the penulation | Statistics Canada 2011 | | | |
| ONTEXOuterists are regretated by census dissemination area (0.0 to 1.0)CensusThis variable is a proxy measure of student occupied dwellings and tests whether this factor influences water demand.Statistics Canada, 2011ALONEProportion of persons living alone in the population. UNITS: average value by census dissemination area (0.0 to 1.0) This variable tests whether single person households have a substantively different water demand profile.Statistics Canada, 2011 CensusNOENGProportion of the total population in private households where non- official languages are spoken. UNITS: average value by census dissemination area (0.0 to 1.0) This variable tests whether there are language factors that influence water demand.Statistics Canada, 2011 National Household SurveyNOEDUProportion of the total population holding no certificate, diploma or degree.Statistics Canada, 2011 National Household Survey | NOREL | HNUTS: average value by consus discomination area (0.0 to 1.0) | Consus | | | |
| ALONEProportion of persons living alone in the population. UNITS: average value by census dissemination area (0.0 to 1.0) This variable tests whether single person households have a substantively different water demand profile.Statistics Canada, 2011 CensusNOENGProportion of the total population in private households where non- official languages are spoken. UNITS: average value by census dissemination area (0.0 to 1.0) This variable tests whether there are language factors that influence water demand.Statistics Canada, 2011 CensusNOEDUProportion of the total population holding no certificate, diploma or degree.Statistics Canada, 2011 National Household Survey | | This variable is a prove measure of student occupied dwellings and tests | Census | | | |
| ALONEProportion of persons living alone in the population. UNITS: average value by census dissemination area (0.0 to 1.0) This variable tests whether single person households have a substantively different water demand profile.Statistics Canada, 2011 CensusNOENGProportion of the total population in private households where non- official languages are spoken. UNITS: average value by census dissemination area (0.0 to 1.0) This variable tests whether there are language factors that influence water demand.Statistics Canada, 2011 National Household SurveyNOEDUProportion of the total population holding no certificate, diploma or degree.Statistics Canada, 2011 National Household Survey | | whether this factor influences water demand | | | | |
| NOENC Proportion of persons ining alone in the population. of this, average Statistics canada, 2011 value by census dissemination area (0.0 to 1.0) Census This variable tests whether single person households have a substantively different water demand profile. Census NOENG Proportion of the total population in private households where non-official languages are spoken. UNITS: average value by census dissemination area (0.0 to 1.0) Statistics Canada, 2011 National Household Survey This variable tests whether there are language factors that influence water demand. Statistics Canada, 2011 NOEDU Proportion of the total population holding no certificate, diploma or degree. Statistics Canada, 2011 GREDU Proportion of the total population holding a certificate, diploma or degree. Survey | | Proportion of persons living alone in the population LINITS: average | Statistics Canada 2011 | | | |
| Value by census dissemination area (0.0 to 1.0)CensusThis variable tests whether single person households have a substantively different water demand profile.Statistics Canada, 2011NOENGProportion of the total population in private households where non- official languages are spoken. UNITS: average value by census dissemination area (0.0 to 1.0)Statistics Canada, 2011 National Household SurveyNOENGProportion of the total population holding no certificate, diploma or degree.Statistics Canada, 2011 National Household SurveyNOEDUProportion of the total population holding a certificate, diploma or degree.Statistics Canada, 2011 National Household Survey | ALONE | value by consus discomination area (0.0 to 1.0) | Consus | | | |
| Initial variable tests whether single person nouserious nate a substantively different water demand profile. NOENG Proportion of the total population in private households where non- official languages are spoken. UNITS: average value by census dissemination area (0.0 to 1.0) Statistics Canada, 2011 National Household Survey This variable tests whether there are language factors that influence water demand. Statistics Canada, 2011 National Household Survey NOEDU Proportion of the total population holding no certificate, diploma or degree. Statistics Canada, 2011 National Household Survey GREDU Proportion of the total population holding a certificate, diploma or degree. Survey | | This variable tests whether single person households have a | Census | | | |
| NOENG Proportion of the total population in private households where non- official languages are spoken. UNITS: average value by census dissemination area (0.0 to 1.0) This variable tests whether there are language factors that influence water demand. Statistics Canada, 2011 National Household Survey NOEDU Proportion of the total population holding no certificate, diploma or degree. Statistics Canada, 2011 National Household GREDU Proportion of the total population holding a certificate, diploma or degree. Survey | | substantively different water demand profile | | | | |
| NOEDU Proportion of the total population in private industribute whether industribute whether there are language factors that influence water demand. National Household NOEDU Proportion of the total population holding no certificate, diploma or degree. Statistics canada, 2011 GREDU Proportion of the total population holding a certificate, diploma or degree. Statistics Canada, 2011 | NOENG | Proportion of the total population in private households where non- | Statistics Canada 2011 | | | |
| Initial languages are sponent of the state of vertices of v | NOLING | official languages are spoken UNITS: average value by census | National Household | | | |
| This variable tests whether there are language factors that influence water demand. Statistics Canada, 2011 NOEDU Proportion of the total population holding no certificate, diploma or degree. Statistics Canada, 2011 GREDU Proportion of the total population holding a certificate, diploma or degree. Survey | | dissemination area (0.0 to 1.0) | Survey | | | |
| water demand. water demand. NOEDU Proportion of the total population holding no certificate, diploma or degree. Statistics Canada, 2011 GREDU Proportion of the total population holding a certificate, diploma or degree. Survey | | This variable tests whether there are language factors that influence | | | | |
| NOEDU Proportion of the total population holding no certificate, diploma or degree. Statistics Canada, 2011 GREDU Proportion of the total population holding a certificate, diploma or degree. Survey | | water demand. | | | | |
| degree. National Household GREDU Proportion of the total population holding a certificate, diploma or degree. Survey | NOEDU | Proportion of the total population holding no certificate, diploma or | Statistics Canada. 2011 | | | |
| GREDU Proportion of the total population holding a certificate, diploma or Survey degree. | | degree. | National Household | | | |
| degree. | GREDU | Proportion of the total population holding a certificate, diploma or | Survey | | | |
| | _ | degree. | | | | |

 Table A10
 Residential Demand Curve Variables

| Variable | Description / Comment | Course |
|------------|--|---------------------------|
| variable | | Source |
| | UNITS: average value by census dissemination area (0.0 to 1.0) | |
| | These variables provide alternative tests regarding the impact of higher | |
| | education water demand. | |
| FAMINC | Median family income in 2011 adjusted to 2014 dollar values using the | Statistics Canada, 2011 |
| | Ontario measure of the All Goods Consumer Price Index. | National Household |
| HSHINC | Median household total income in 2011 adjusted to 2014 dollar values | Survey data |
| | using the Ontario measure of the All Goods Consumer Price Index. | If not available for a DA |
| PC_FINC | Per capita family income = FamInc ÷ FamSz | from the National |
| PC_HINC | Per capita household income = HshInc ÷ HshISz | Household survey, the |
| | UNITS: 2014 dollars | value reported for that |
| | These variables provide alternative measures of total income available | DA in the 2006 Census |
| | to persons in a household. | data was used. |
| OTHER VARI | ABLES | |
| PRICE | The volumetric charge applied to metered water for water and | Price data from City of |
| | wastewater services for each year from 2006 to 2014 adjusted to 2014 | Guelph staff |
| | dollar values using the Ontario measure of the All Goods Consumer | |
| | Price Index. | |
| | UNITS: 2014 dollars per cubic meter | |
| HOTDYS | Number of days when temperature exceeded 28°. UNITS: integer | Meteorological and |
| PRECIP | Total precipitation over the summer. UNITS: millimeters | water bylaw data |
| DRYDYS | Number of days in the summer when there was no precipitation. UNITS: | compiled by City of |
| | integer | Guelph staff |
| YELLOW | Number of days in the summer when a YELLOW water saving alert was | |
| | posted by the City. UNITS: integer | |
| RED | Number of days in the summer when a RED water saving alert was | |
| | posted by the City. UNITS: integer | |
| RY_IND | A (0,1) index with '1' indicating that a yellow or red alert was used in | |
| | year i and 'O' indicating no alert. | |
| | These variables test factors in the summer of each year from 2006 to | |
| | 2014 that may influence excess summer water use. The summer period | |
| | for these is May to Sept inclusive. | |
| | Meteorological data are based on averages of available daily data for | |
| | the following weather stations: Waterloo Wellington 2, Guelph | |
| | Turfgrass, Elora Rcs, and Region of Waterloo Int'l Airport. If no data was | |
| | available for a day, then an estimate was made as the average of data | |
| | from the preceding and proceeding days. | |

Final results for the evaluation of indoor water use, shown in Table A11, suggest that a number of quantifiable factors have a statistically significant impact on this component of demand, despite the inaccuracy introduced by applying dissemination area averages of household characteristics to all households in a dissemination area instead of household specific values. The following observations can be made based on these results:

- Price elasticity of demand for indoor water use is -0.31. This value falls within the range of estimates in the research literature. Given the functional form, elasticity can be assumed constant.
- The Royal Flush Rebate (RF) program and the Smart Wash Washing Machine Rebate (SW) program have both had a significant and lasting impact on indoor water use. Their coefficients imply that

program participation by a household results in a permanent reduction in water use of about 9.6 lpcd (0.76 m3/mo) for the RF program and 4.0 lpcd (0.32 m3/mo) for the SW program.⁹

- Increasing household income has a small negative impact on water use, reflecting perhaps the improved capacity to upgrade expensive water using appliances to more efficient models.
- A higher level of education tends to reduce demand. The relatively low correlation of education and income (0.2 to 0.3) suggests that the education variable is not merely duplicating the income effect but rather may capture an improved capacity to comprehend and respond to WCE initiatives.
- The presence of immigrants in a household tends to reduce demand. This result is difficult to interpret since it may reflect culturally mediated values and habits or it may capture an income effect (the correlation between IMMG and the income variables is 0.4 to 0.5).
- The significant positive impact of house floor area, L_AREA, probably reflects the impact of the number of persons in a household on indoor demand. This effect was not captured by either of the variables, HSHLSZ and FAMSZ, which had unstable and insignificant coefficients in tests.
- Demand in townhouses (ROW) and gated community households (GATE) is significantly lower than the average. Both townhouses and gated community households may have fewer persons per household and the later group of households are relatively new in Guelph and may use newer and more water efficient appliances.

| Dependent variable = Ln(Indoor) | | | | | | | |
|---------------------------------|-------------|--------|-----------|--|--|--|--|
| RHS Variable | Coefficient | Z | Pr(z >Z*) | | | | |
| CUMRF | -0.04373*** | -7.49 | 0.0 | | | | |
| CUMSW | -0.01851** | -1.97 | 0.0494 | | | | |
| Ln(PRICE) | -0.31097*** | -24.07 | 0.0 | | | | |
| Ln(PC_HINC) | -0.05746*** | -4.7 | 0.0 | | | | |
| IMMG | -0.23980*** | -8.57 | 0.0 | | | | |
| GREDU | -0.07213*** | -2.71 | 0.0067 | | | | |
| Ln(AREA) | 0.33767*** | 37.92 | 0.0 | | | | |
| ROW | -0.34610*** | -24.84 | 0.0 | | | | |
| GATE | -2.17709*** | -13.62 | 0.0 | | | | |
| Constant | 1.13790*** | 9.09 | 0.0 | | | | |

Table A11Final Demand Curve for Indoor Water Use

R² = 0.077222, N = 37,484

Note: ***, **, * ==> Significance at 1%, 5%, 10% level.

Ln(..) indicates the natural logarithm of the variable.

The demand curve for excess summer use proved more challenging to develop than that for indoor water use. Three demand curves are shown in Table A12 to illustrate the issues that arose in testing alternative combinations of variables. Results on the left side of the table, without a price variable, probably represent the best estimate of this demand curve while those to the right show the impact of including a price variable—the price coefficient switches from positive to negative, and from significant to not significant. The variability of the price coefficient contrasts with the relative stability of other coefficients. This suggests that price is not a significant determinant of outdoor water use. The reason for this is not clear but speculation suggests that: (i) the price is too low to have an impact since outdoor

⁹ Evaluated at the mean for indoor residential water use. Assumes 2.6 persons per household (Statistics Canada, 2011 Census data for Guelph).

water use is relatively small and thus relatively inexpensive; (ii) the long history of WCE programming and the policy of restrictions on lawn watering may overwhelm any price effect. Other observations that can be made based on these results include:

- If it is the case that price is significant but that the current data are not sufficiently detailed or accurate to estimate the price effect, it is likely that this effect is small. The negative price coefficient in the third regression equation implies an elasticity of -0.08 at an average level of demand.¹⁰
- The Healthy Landscape Assessment Program has a significant and lasting impact on outdoor water use for participants amounting to about 0.5 m3/mo.
- The application of lawn watering restrictions in a summer (RY_IND) reduces demand by an average of about 2 m3/mo.¹¹
- The amount of precipitation (mm) and the number of dry days both have a significant impact on demand. One additional dry day increases outdoor use by an average of 0.06 m3/mo.
- As with indoor demand, demand declines as household income increases.
- Newer homes (YRBLT) use less water perhaps because lot size is smaller in the new subdivisions.
- Homes with larger floor areas (AREA) use more outdoor water. Based on evidence from other regressions that are not shown, it appears that this result reflects the lower outdoor water use of townhouses which are smaller in size, and likely have smaller yards.
- The result for gated communities, indicating lower water use, is very robust and suggests quite a large impact. The reason for may lie in the fact that condominium corporation in these communities is generally responsible for yard maintenance and may be more water efficient in in this task.

| Dependent variable = EXCESS | | | | | | | | | |
|-----------------------------|------------------------|--------|------------------------|-------------|------------------------|---------------|-------------|--------|----------|
| | Without PRICE variable | | With PRICE variable #1 | | With PRICE variable #2 | | | | |
| | Coefficient | z | Pr(z>Z*) | Coefficient | z | Pr(z>Z*) | Coefficient | z | Pr(z>Z*) |
| CUMHLA | -0.46508* | -1.78 | 0.0746 | -0.50198* | -1.92 | 0.055 | -0.48972* | -1.87 | 0.0613 |
| Ln(PRICE) | na | | | 0.85307* | 1.85 | 0.0641 | -0.55101 | -0.99 | 0.3238 |
| PRECIP | -0.01497*** | -18.89 | 0.0 | -0.01672*** | -13.55 | 0.0 | -0.00948*** | -5.78 | 0.0 |
| DRYDYS | 0.06382*** | 9.29 | 0.0 | 0.05771*** | 7.58 | 0.0 | 0.06748*** | 8.45 | 0.0 |
| Ln(HSHINC) | -0.40605* | -1.80 | 0.0717 | -0.41136* | -1.82 | 0.0681 | na | | |
| YRBLT | -0.08726*** | -19.31 | 0.0 | -0.08723*** | -19.30 | 0.0 | -0.08660*** | -19.22 | 0.0 |
| GATE | -13.6090*** | -4.42 | 0.0 | -13.6196*** | 38.84 | 0.0 | -13.3054*** | 40.96 | 0.0 |
| Ln(AREA) | 7.4075*** | 38.86 | 0.0 | 7.4045*** | -4.42 | 0.0 | 7.2805*** | -4.33 | 0.0 |
| RY_IND | -1.7626*** | -8.01 | 0.0 | -2.0950*** | -7.37 | 0.0 | na | | |
| YELLOW | na | | | na | | | -0.01859*** | -5.14 | 0.0 |
| RED | na | | | na | | | 0.00743** | 2.3 | 0.0212 |
| Constant | 130.950*** | 14.04 | 0.0 | 131.925*** | 14.12 | 0.0 | 122.427*** | 13.74 | 0.0 |
| R ² / N | 0.112281 / 20,259 | | 0.112433 / 20 |),259 | | 0.111535 / 20 | ,259 | | |

Table A12Demand Curves for Outdoor Water Use

Note: ***, **, * ==> Significance at 1%, 5%, 10% level.

Ln(..) indicates the natural logarithm of the variable.

¹⁰ With the functional form of the EXCESS demand curves, elasticity falls as demand increases.

¹¹ This result is not as clear when the number of days of restrictions are used in the regression (RED and YELLOW). Days of RED alert appear to actually increase demand, but this result is small.
ICI and Multi-Residential Demand

The analysis of non-residential data looked only at annual demand measured as m3/mo (variable ANN). Unlike the residential customer data base, very little data was available for non-residential customers. Apart from membership by customer class, PRICE was the only RHS variable that could be used for this analysis of demand. The following variables were crated to identify membership by customer class:¹²

| IND | Equals 1 if the customer is classified as industrial, zero otherwise |
|-------|---|
| INSTI | Equals 1 if the customer is classified as institutional, zero otherwise |
| MULTI | Equals 1 if the customer is classified as multi-residential, zero otherwise |

Attempts to estimate separate demand curves for industrial, commercial, institutional and multiresidential customers were not successful due to the smaller sample sizes and the heterogeneity of the customers. Regression tests therefore combined all of the data from each sector to derive a composite demand curve. The final curve is shown in Table A13. As expected, R² is very low. The price variable is significant and implies an elasticity of -0.53. The three variables, IND, INSTI and MULTI, are all significant and negative implying that on average customers in those sectors use less water than commercial customers.

| Dependent variable = Ln(ANN) | | | | | | | | | |
|------------------------------|-----------------------------------|--------|-----------|--|--|--|--|--|--|
| RHS Variable | Coefficient | Z | Pr(z >Z*) | | | | | | |
| Ln(PRICE) | 52873*** | -6.71 | 0.0 | | | | | | |
| IND | 37996*** | -5.95 | 0.0 | | | | | | |
| INSTI | 79208*** | -13.27 | 0.0 | | | | | | |
| MULTI | 63845*** | -11.17 | 0.0 | | | | | | |
| Constant | 4.95034*** | 48.95 | 0.0 | | | | | | |
| $P^2 = 0.017924$ N = | $P_{2}^{2} = 0.017824$ N = 12.005 | | | | | | | | |

 Table A13
 Final Demand Curve for ICI and Multi-Res Water Use

R² = 0.01/834, N = 13,995

Note: ***, **, * ==> Significance at 1%, 5%, 10% level.

Ln(..) indicates the natural logarithm of the variable.

Price and customer class were the only factors that were considered. Price appears to be a significant determinant of demand with results suggesting that a 10% increase in price reduces demand by 5% on average. This result may exaggerate the impact of price since the analysis attributes any decline in water demand to price alone ignoring the impact of factors such as the economic cycle on demand which would have reduced demand in 2009. Information in the following table suggest that the estimates elasticity is within the range of previous estimates for industrial demand but high for commercial and multi-residential demand.

Table A14 COMPILATION OF ESTIMATES OF ICI PRICE ELASTICITY

| Source | Elasticities | | |
|---|----------------------------|--|--|
| Cost Allocation and Rate Design for Water Utilities, 1991, National | Industrial: -0.50 to -0.80 | | |
| Regulatory Research Institute | | | |
| Evaluating Urban Water Conservation Programs, a Procedures Manual, | Commercial/ Industrial: | | |
| 1992, California Urban Water Agencies | -0.10 to -0.30 | | |

¹² When a zero/one variable is used in this way, there are always one less variables than there are categories to identify. For this reason there is no COMM variable.

| Source | Elasticities | | |
|---|---------------------|----------------|--|
| Designing, Evaluating and Implementing Conservation Rater Structures, | Multi-family reside | ential: | |
| 1997, California Urban Water Conservation Council | winter 0.00 to -0. | | |
| | summer | -0.05 to -0.20 | |
| Revenue Effects of Water Conservation and Conservation Pricing, 1994, | Commercial: | -0.1 to -0.4 | |
| National Regulatory Research Institute, and | Industrial: | -0.4 to -1.0 | |
| Urban Water Demand Management and Planning, 1998, Bauman, Boland | | | |
| and Hanemann. Mcgraw-Hill. | | | |

Table A14 COMPILATION OF ESTIMATES OF ICI PRICE ELASTICITY

Appendix C MODELLING THE IMPACT OF CONSERVATION RATES

Overview

An existing full-cost recovery conservation-oriented pricing model was previously developed in order to estimate the impacts of alternative rate structures on demand and customer water and sewer bills. This model was adapted for use in Guelph.¹³

The model adjusts demand of customers in response to changes in the average price of water and sewer services. The average price changes with a change in the rate structure. The level of charges within each rate structure that is considered in the analysis is adjusted so that total revenues remain unchanged.

Following sections explain the structure and logic of the model.

Treatment of Demand

Demand is disaggregated into four customer classes, residential, townhouse, multi-residential and industrial / commercial / institutional (ICI). It is also disaggregated by size of customer within these classes and by season. Customer size categories used in the analysis were be based on consumption quintiles. For a given class of customer, the total customer demand within each of the 5 quintiles represents 20% of the total amount of water used by that class. Thus the first quintile represents the total demand of the smallest customers while the fifth quintile is the demand of the largest customers in the class. The response of each of the resulting 20 (5 residential winter, 5 residential summer, 5 ICI winter, and 5 ICI summer) subcategories of demand to price was estimated separately.

The seasonal disaggregation assumes two distinct demand periods based on the monthly water sales reported in Appendix B. The winter demand represents the base component of demand that is assumed to be constant throughout the year. For residential demand, this is the indoor component of demand. The portion of the summer season demand that exceeds this base component is the excess summer use and represents water used for lawn and garden irrigation, additional indoor uses in the summer (e.g., more frequent showers), pool filling, and other summer uses.

Excess summer use is often largely residential since many ICI customers have a relatively uniform year around demand while the seasonal demand of some such as nurseries, which use more water in the summer, is offset by others such as factories with scheduled summer closures.

Treatment of Price and Demand

Customers are assumed to respond to the average volumetric price of water within the season rather than the marginal price. This assumption reflects evidence from household surveys that customers may be aware of their total water and sewer bill but not of the rate structure or the unit price of water.

¹³ New East Consulting Services Ltd., R.M. Loudon Ltd, M. Fortin, 2001. <u>Conservation Water Rate Study, Final Report</u>. Prepared for Capital Regional District, BC.; and M. Loudon, M. Fortin, 2001. <u>Water for Tomorrow, Study of the Use of Water Rates To</u> <u>Reduce Maximum Day Demand</u>, prepared for York Region

In the case of the single block rate (SBR) structure and seasonal rates, the average price of water is the single volumetric rate. In the case of block rate structures, the average price is estimated as the total volumetric charge for water used by an average customer within each sub-category of demand divided by that customer's demand.

Price elasticities of demand, based on the demand curve research reported in Appendix B, are as follows:

| | Residential | Townhouse | Multi-Res | ICI |
|------------|-------------|-----------|-----------|------|
| Base | 0.31 | 0.31 | 0.10 | 0.40 |
| Excess use | 0.08 | 0.08 | 0.20 | 0.40 |

Alternative Rate Scenarios

Tests of alternative rate structures are conducted by increasing components of the volumetric charge in a rate structure in order to elicit the desired conservation demand response. As noted above, the demand response is predicated on a negative price elasticity of demand for water. Arbitrarily large price increases could therefore be assumed in order to achieve any targeted reduction in demand. Such increases are not of course realistic since rates must reflect the value of providing the service and as such arbitrary rate increases not based on cost would be not be accepted by the public or politicians alike.

In our analysis revenue sufficiency is imposed as a constraint on changes in the rates in order to assure that postulated changes conform to political and fiscal realities. In effect, the revenue generated by existing or 'base case' rates is used as a revenue target that must be achieved but not exceeded by any alternative rate structure.¹⁴

When price elasticity lies between 0.0 and -1.0, as is the case for water demand in Guelph, an increase in price causes total revenue to increase. This is the case because the percentage drop in demand caused by the price increase is never as large in absolute terms as the percentage increase in price. Revenue growth caused by the increase in price therefore more than compensates for revenue loss caused by the drop in demand. For this reason, any increase in one component of a volumetric rate must be offset by a corresponding decrease in some other component of the rate structure to comply with the revenue constraint. For example, consider replacing an existing SBR structure with an EUR structure. Simply imposing an excess use charge on excess summer water demand that is some multiple, say 300%, of the SBR volumetric charge, without reducing the SBR volumetric charge will cause revenues to increase. In such a scenario, the volumetric charge on base demand is reduced until revenue equals the base case revenue. Each tested rate structure scenario therefore is designed to generate a predetermined revenue as it would in fact be in the annual rate setting exercise undertaken by municipal water and sewer departments.

¹⁴ With a seasonal rate, excess revenues during a hot and dry summer could be set aside in a rate stabilization reserve to apply for instance to revenue short falls in wet years. Since our modeling is based on an average year, such revenue shifting will not be considered.



Appendix B – Public Engagement Materials



WHAT DOES WATER MEAN TO YOU?



You've helped us become a leader—**thank you.**

As the largest city in Canada dependent on groundwater, there's more we need to do.

Help us continue to lead.

Please join us to share your ideas and vision for improving water efficiency in Guelph as we update our Water Efficiency Strategy to protect and sustain our water for today and for our future.

June 23 7–9 p.m. City Hall, 1 Carden Street

More information: guelph.ca/wesu Average daily water use



YOUR CITY-YOUR NEIGHBOURHOOD-YOUR HOME

GUELPH WATER

guelph.ca/ourstoconserve



Water Efficiency Strategy Update Comment Sheet

Thank you for coming out tonight and supporting the Guelph community in water efficiency and conservation. Your feedback will help to outline priorities and uncover new opportunities for future water efficiency programming. Let's continue to build on Guelph's success.

After completing the stations, please provide any additional comments or concerns you may have so that we may capture your viewpoint as accurately as possible.

Your participation is voluntary. All individual responses will be kept confidential and will be summarized in reports and the Strategy to reflect overall feedback received from the focus group as a whole. Personal information, as defined by Section 2 of the Municipal Freedom of Information and Protection of Privacy (MFIPPA) is collected under the authority of the Municipal Act, 2001, and in accordance with the provisions of the MFIPPA.

For more information about the project you can contact the Supervisor Water Efficiency, Emily Stahl:

T: 519.822.1260 ext. 3411 E: <u>emily.stahl@guelph.ca</u> For questions regarding the collection, use, and disclosure of this personal information please contact the Access, Privacy and Records Specialist, Jennifer Slater:

T 519-822-1260 x 2605 E jennifer.slater@guelph.ca



What does water mean to you?

1. What does water conservation mean to you? Share your thoughts in words, prose, drawings or pictures.

2. If you could make one BIG change at home to save water, not worrying about cost or difficulty, what would it be?

Share your ideas at guelph.ca/wesu

YOUR CITY-YOUR NEIGHBOURHOOD-YOUR HOME





3. What small or easy change could you make to save more water at home today?

4. What ideas do you have for conservation initiatives that the City could include as part of its program?

Share things you have done, want to do, or things that other cities do. Think about both at-home initiatives as well as City projects.



GUELPH WATER OURS TO CONSERVE



City of Guelph 2015 Water Efficiency Strategy Update Open House 1 Summary

| Date: | June 23, 2015 | Page: | 1 of 3 |
|-----------|--------------------|-------|--------------|
| Time: | 7:00 pm to 9:00 pm | File: | 75-41-151088 |
| Location: | Meeting Room C | | |

Purpose: Water Efficiency Strategy Update Study – Open House 1 Summary

| Attendance | There were 7 community members present. | | | | | | |
|------------------|--|--|--|--|--|--|--|
| Technical Boards | | | | | | | |
| 1. | Water Efficiency Strategy Update: | | | | | | |
| | - Mission Statement | | | | | | |
| | Goals and Objectives | | | | | | |
| | - Outcomes | | | | | | |
| | - Community Open House | | | | | | |
| | Water Efficiency Strategy Update Process | | | | | | |
| 2. | Guelph's Achievements | | | | | | |
| | Water Use and Community Growth | | | | | | |
| | Net Present Value of Water and Wastewater Infrastructure Costs | | | | | | |
| | - Water Use Goal Progress | | | | | | |
| 3. | Current Programs | | | | | | |
| | - Outside Water Use Program | | | | | | |
| | - Home Visits | | | | | | |
| | - Water Conservation Rebate Programs | | | | | | |
| | - Blue Built Home Water Efficiency Standards and Rebate Program | | | | | | |
| 4. | Current Programs | | | | | | |
| | - Water Smart Business: ICI | | | | | | |
| | - Water Conservation and Efficiency Public Advisory Committee | | | | | | |
| | - Resources for Youth | | | | | | |
| | - Water Loss Management | | | | | | |
| | Station 1 'Your Home' | | | | | | |
| Inside | - Grey water reuse/redirection | | | | | | |
| | • clean water not used in toilets | | | | | | |
| | - Carbon filter (i.e. Berkley brand) or other water purification system instead | | | | | | |
| | of bottled water | | | | | | |
| | - Older nomes with existing cisterns and repurposing them | | | | | | |
| | Invision of the second s | | | | | | |
| | nook it up to downspouts and re-use water for outdoor water use | | | | | | |
| | vvouid like more into on now to do this, who could install it, would pain the uncertainty of the second seco | | | | | | |
| | it was seen with sect effectiveness sets | | | | | | |
| | It was easy with cost effectiveness, etc. | | | | | | |
| Quitaida | Needs some research | | | | | | |
| Outside | - Rain Gardens Incentives | | | | | | |
| | | | | | | | |
| | O Awalus Bioswalos instead of sowers | | | | | | |
| | - DIUSWAIES ITISTEAU OF Severs | | | | | | |
| | | | | | | | |

| | - Underground cisterns for rain capture | | | | | | | | |
|--------------------------------|---|--|--|--|--|--|--|--|--|
| | Constructed wetlands to treat water on site | | | | | | | | |
| Station 2 'Your Neighbourhood' | | | | | | | | | |
| New | Am a very very concerned re: development of the old jail area of York | | | | | | | | |
| Development | Road | | | | | | | | |
| | How will 'developers' maintain current ecosystem? | | | | | | | | |
| | Will they destroy it for greed? | | | | | | | | |
| | Would like its environment kept for its natural habitat | | | | | | | | |
| | - Would be 'nice' for developers to do water efficient landscaping | | | | | | | | |
| | especially | | | | | | | | |
| | Guelph is experiencing <u>sooo</u> much development NSEW areas | | | | | | | | |
| Conoral | of Gueiph | | | | | | | | |
| General | - Genius loci – sense of place | | | | | | | | |
| | Unique elements that identify different heighbourhoods or water conture techniques | | | | | | | | |
| | Water capture techniques. | | | | | | | | |
| | - Educational /interpretive signage that explains what something is and why it is hopoficial (i.e. bioswales, rain gardens, water cistorns) | | | | | | | | |
| | with it is beneficial (i.e. bioswales, failt gardens, water cisterns) | | | | | | | | |
| | Stickers used to express opinion | | | | | | | | |
| | - 3 community rainwater baryesting systems | | | | | | | | |
| | Great idea for new developments which generally have lots of | | | | | | | | |
| | drainage problems also new developments need lots of | | | | | | | | |
| | water to establish new trees and gardens | | | | | | | | |
| | - 1 green roof representation | | | | | | | | |
| | - 1 storm water collection boulevard | | | | | | | | |
| | - 1 municipal storm water reuse | | | | | | | | |
| | Station 2 'Your City' | | | | | | | | |
| New | Requirements for new developments to integrate bioswales/rain | | | | | | | | |
| Development | capture upon development | | | | | | | | |
| | Mandatory policies for developers and new builders (greywater reuse, | | | | | | | | |
| | especially for flushing; rain water collection; green roofs) (another | | | | | | | | |
| | community member agreed) | | | | | | | | |
| | Developers should offer options that are not lawns and are more eco- | | | | | | | | |
| | friendly/water efficient | | | | | | | | |
| | Required green roofs in new industrial development | | | | | | | | |
| General | Alternatives to pavements so water recharges more and also more | | | | | | | | |
| | attractive and more amenable to water efficient plantings | | | | | | | | |
| | - Change city bylaws to make sustainability simpler (straw bale, | | | | | | | | |
| | composing tollers) | | | | | | | | |
| | - water consumption monitoring during summer months (compared to | | | | | | | | |
| | - Water hilling | | | | | | | | |
| | People should pay 3 times rate for water consumption when | | | | | | | | |
| | violating the Outdoor water use program (monitor water meter) | | | | | | | | |
| | - Keep trails throughout the City unpayed e.g. along the river | | | | | | | | |
| | - Set up examples of H ₂ O efficient landscaping at Arboretum for public | | | | | | | | |
| | to see | | | | | | | | |
| | Foster pride in the City's H₂O conservation record/efforts | | | | | | | | |
| | - A way to report water waste – an app? | | | | | | | | |
| | o i.e. dripping tap the business owner won't fix | | | | | | | | |





| Bioswales instead of sewers grey water reuse system and /or strategic use (i.e. clean water not used in toilets) Forest/prairie instead of lawn in industrial areas Wetlands at storm water pipe discharge into rivers |
|---|
| Stickers used to express opinion 1 community rainwater harvesting systems 2 water efficient landscaping/plants Less annuals and more perennials 1 composting toilet 2 storm water collection boulevard Better design for City streetscapes to keep trees healthy giving the roots more space for air and water Captures runoff and keeps it onsite 1 water efficient boulevards 1 municipal storm water reuse system |

This summary was prepared by:

Andrea Williams C3 Water Inc.

Date of Issue: March 29, 2016 AW/aw





Got ideas for making water conservation easier?



Your input is important, so we're coming to you!

JOIN US at the Water Wagon at these community events:

Guelph Jazz Festival Saturday, September 19 2–8 p.m. Vegfest Sunday, September 20 11 a.m.–5 p.m.

And stay tuned for more events and ways to participate!

For more information visit guelph.ca/wesu



The City of Guelph strives to be a leader in water conservation and efficiency. The criteria below will be used to evaluate the ideas for future programming. Please use a sticker 🥑 to show us how important the criteria is to you, where 1 is low and 5 is high.







WEIGH IN ON CRITERIA

WATER EFFICIENCY STRATEGY UPDATE



Stimulate the Guelph economy. For example, plumbers supplying City-subsidized toilets.



The technology is proven and easily implementable in the City of Guelph. For example, using products that are certified as water efficient and suitable to Guelph's climate.



Develop/pilot new technologies to save water. For example, researching new water softeners that use less water.









Demographics: 20-70 years old, residents of Guelph

| | | | | 1 | 2 | 3 | 4 | 5 N/A | Tot | al | | |
|--|-------------------------|--------------------------------------|---------------------------------|-----------------------------------|-------------------------|------------------------|-------------|-----------------------------------|-------------------------------|--------------------|-------------------|------------------------------|
| | | Minimiz | ze costs to City. | 9 | 13 | 31 | 24 | 5 | 0 | 82 | 249 | |
| | Re | duce water use as part | of new growth. | 0 | 2 | 7 | 32 | 40 | 1 | 82 | 353 | |
| | | Reduce water use in exi | isting buildings. | 0 | 2 | 10 | 40 | 28 | 2 | 82 | 334 | |
| | | Stimulate the Gu | elph economy. | 5 | 8 | 27 | 22 | 18 | 2 | 82 | 280 | |
| The technology is prover | n and easil | y implementable in the | City of Guelph. | 1 | 7 | 19 | 27 | 27 | 1 | 82 | 315 | |
| | Develop | /pilot new technologies | to save water. | 1 | 3 | 5 | 25 | 47 | 1 | 82 | 357 | |
| Develop/pilot new technologies to save wate | er. 1 2 3 4 | Reduce water use part of new grow | e as th. 1 2 3 4 | Reduce w existing 0 2 28 | ater use i buildings | in 1 2 3 4 | The teasily | technology implement of Gue | is prove able in t Iph. | en and the City | • 1 • 2 • 3 | Stimulate the Gu economy. |
| | 5 | | ■ 5 | | | ■ 5 | | 27 | | | • 4 • 5 | |

Criteria by Importance:

1. Develop/pilot new technologies to save water.

2. Reduce water use as part of new growth.

3. Reduce water use in existing buildings.

4. The technology is proven and easily implementable in the City of Guelph.

5. Stimulate the Guelph economy.



Demographics: Willow West Fall Village (http://www.westwillowvillage.ca/annual-fall-fair-celebrate/) Westwood School Area N/A Total Minimize costs to City. Reduce water use as part of new growth. Reduce water use in existing buildings. Stimulate the Guelph economy. The technology is proven and easily implementable in the City of Guelph. Develop/pilot new technologies to save water. The technology is proven and Develop/pilot new Reduce water use as Reduce water use in technologies to save water.





existing buildings.

■ 5





Criteria by Importance:

1. Develop/pilot new technologies to save water.

2. Reduce water use as part of new growth.

3. Reduce water use in existing buildings.

4. The technology is proven and easily implementable in the City of Guelph.

5. Stimulate the Guelph economy.

Demographics: Run for the Cure



Criteria by Importance:

1. Develop/pilot new technologies to save water.

2. Reduce water use as part of new growth.

3. Reduce water use in existing buildings.

4. The technology is proven and easily implementable in the City of Guelph.

5. Stimulate the Guelph economy.

| | 1 | 2 | 3 | 4 | 5 N/A | Tot | tal | Points |
|--|----|----|----|----|-------|-----|-----|--------|
| Minimize costs to City. | 11 | 16 | 36 | 38 | 15 | 6 | 122 | 378 |
| Reduce water use as part of new growth. | 0 | 10 | 13 | 39 | 58 | 2 | 122 | 505 |
| Reduce water use in existing buildings. | 3 | 6 | 18 | 54 | 35 | 6 | 122 | 460 |
| Stimulate the Guelph economy. | 5 | 14 | 37 | 31 | 27 | 8 | 122 | 403 |
| The technology is proven and easily implementable in the City of Guelph. | 3 | 8 | 26 | 44 | 32 | 9 | 122 | 433 |
| Develop/pilot new technologies to save water. | 5 | 7 | 9 | 36 | 61 | 4 | 122 | 495 |
| | | | | | | | | |



Criteria by Importance:

1. Develop/pilot new technologies to save water.

2. Reduce water use as part of new growth.

3. Reduce water use in existing buildings.

4. The technology is proven and easily implementable in the City of Guelph.

5. Stimulate the Guelph economy.



Let's talk water...on ice!



Join us for a skate and community conversation—with hot chocolate!-about how Guelph can continue to be a leader in water conservation.

Get some exercise, share your ideas about water use, and enter for a chance to win one of ten reusable water bottles. Your feedback will help shape our new Water Efficiency Strategy.

Tuesday, March 1 7-7:30 p.m. Skating at Market Square Rink

For more information and to register for the event, go to guelphwaterconversation.eventbrite.ca.

7:30-9 p.m. City Hall, Room 112 Conversation, cookies and hot chocolate

GUELPH WATER OURS TO CONSERVE

Can't make it out? Join the conversation online at guelph.ca/wesu.



Guelph Water Efficiency Strategy Update Community Survey – March 2016

The City of Guelph is now in the final stages of updating our Water Efficiency Strategy. The strategy will outline how Guelph can continue to be a leader in water conservation. Your feedback will help us plan and improve the water conservation programs we offer to City residents.

Completing our short survey will make you eligible to win a reusable water bottle. Please provide your contact information if you'd like to be eligible for the draw.

| Name: | | |
|-------------------|------|------|
| Address: | | |
| Postal Code: | | |
| Email or Phone #: | | |

Personal information is being collected in the Water Efficiency Strategy Update (WESU) survey. All personal information will be kept confidential and will only be used to administer the prize draw. Your participation is voluntary and providing personal information is not required to complete the survey.

Personal information is collected under the authority of the Municipal Act, and in accordance with the provisions of the Municipal Freedom of Information and Protection of Privacy (MFIPPA).

For more information about the Water Efficiency Strategy Update (WESU) survey you can contact Emily Stahl, Supervisor Water Efficiency.

T: 519-822-1260 x 3411 E: <u>emily.stahl@guelph.ca</u>

For questions regarding the collection, use, and disclosure of this personal information please contact the Program Manager, Information, Privacy and Elections.

T: 519-822-1260 x 2349

E: privacy@guelph.ca



1. eMERGE Home Visits

The eMERGE Home Visits program offers residents a one-hour in-home consultation and a free retrofit package to help make your home more water and energy efficient.

- a) Have you heard about the eMERGE Home Visits program before today? □ Yes □ No
- b) Have you participated in the eMERGE Home Visits program?
 □ Yes
 □ No
- IF YES...

What did you find most useful about the program?

What would you say are the benefits to participating in a program that offers free home visits and a retrofit package?

How could the program be improved?

I F NO...

Why have you not participated to date?

What do you see as being challenging or difficult about participating in a program that offers free home visits and a retrofit package?

What would encourage you to participate in the future?

c) On a scale of 0 to 4 (where 0 is not likely at all and 4 is very likely), how likely would you be to participate in the future in a program that offers free home visits and a retrofit package? (*Please circle your response*)

0 1 2 3 4 Not likely Very likely



2. Healthy Landscapes

The Healthy Landscapes program offers residents a free home visit to discuss ways to reduce outside water use.

- a) Have you heard about the Healthy Landscapes program before today? □ Yes □ No
- b) Have you participated in the Healthy Landscapes program?
 □ Yes
 □ No

IF YES...

What did you find most useful about the program?

What would you say are the benefits to participating in a program that offers free home visits and advice to reduce outside water use?

How could the program be improved?

IF NO...

Why have you not participated to date?

What do you see as being challenging or difficult about participating in a program that offers free home visits and advice to reduce outside water use?

What would encourage you to participate in the future?

c) On a scale of 0 to 4 (where 0 is not likely at all and 4 is very likely), how likely would you be to participate in the future in a program that offers free home visits and advice to reduce outside water use? (*Please circle your response*)

0 1 2 3 4 Not likely Very likely



3. Royal Flush Toilet Rebate

The Royal Flush Toilet Rebate program offers residents a \$75 rebate when you buy a new water efficient toilet and replace your old 13L flush toilet.

- a) Have you heard about the Royal Flush Toilet Rebate program before today? □ Yes □ No
- b) Have you participated in the Royal Flush Toilet Rebate program?
 □ Yes
 □ No

IF YES...

What did you find most useful about the program?

What would you say are the benefits to participating in a program that offers a rebate to buy a new water efficient toilet and replace your old one?

How could the program be improved?

I F NO...

Why have you not participated to date?

What do you see as being challenging or difficult about participating in a program that offers a rebate to buy a new water efficient toilet and replace your old one?

What would encourage you to participate in the future?

c) On a scale of 0 to 4 (where 0 is not likely at all and 4 is very likely), how likely would you be to participate in the future in a program that offers a rebate to buy a new water efficient toilet and replace your old one? (*Please circle your response*)

01234Not likelyVery likely



4. Getting the Word Out

What are the best ways we can tell you about these and other water conservation programs offered by the City? (*Please select the 3 best ways to communicate with you*)

🗆 Email

□ Telephone/cell phone

□ Facebook

□ Twitter

□ Information on City's website

Advertisement in the Guelph Tribune

Advertisements on local online news sites

□ Advertisements on local radio

□ Printed information delivered to your home

□ Signs posted in your neighbourhood and around the City

Door-to-door visits



| Have you heard about eMERGE Program? | Have you participated in the eMERGE Program? | What did you find most useful about the program? | What would you say are the benefits to participating? | How could this program be improved? | Why have you not parti |
|--------------------------------------|--|--|---|---|--|
| Yes | No, volunteer with eMerge | | | With more funding, if more could be done at the time of visit, i.e. replace tap, sometimes to many barriers to complete | |
| No Yes | No No | | | | Have not heard of progr Didn't own |
| No Yes | No No | | | | l didn't know it exsisted Small house, already frug |
| | | | | | |
| Νο | Νο | | | | |
| No | No | | | | Haven't heard/Apartmer |
| Νο | No | | | | New residents to Guelph therefore havent heard o |
| Yes | Yes | The young man who came was very knowledgable | Awareness of products | Followup/Comeback later | |
| No | No | | | | Would participate if I kno |
| No | No | | | | Landlord has to authroiz |
| Νο | Νο | | | | As I am new to the City (not heard of any of these |
| No | No | | | | Not from Guelph |
| Yes No | No No | | | | No reason, I should visit I will! I need it |
| Yes | Yes | Help with Royal Flush application | | | Unaware rent might no |
| Yes | No(other- Enbridge) | Expert advice | | | Enbridge did one |
| Yes No | Yes No | Furnice need a tuneup | an integrated platform | | Haven't heard of it |
| Yes | Yes | Energy audit aspect, Installtion | Areas I don't know about | More partnerships | |
| No | No | | | | Unaware |
| No | No | | | | Unaware |
| Yes | No | | | | Renter |

icipated to date? What do you see as being challending or difficult about participating in the program?

ram

ıgal

Changing your ways Time to invest

ent dweller

bh, Just bought condo, d of any programs

new about it

Not being the owner of the place; people not ize visits to the house having the disposition to go through the chat (and Canada), have the programs before Lack of announcments

t them

ot have access

Apathy

Permission

| What would encourage you to participate in the future? | On a scale of 0 to 4 (where 0 is not likely at all and 4 is very likely), how likely would you be to participate in the future in a program that offers free home visits and a retrofit package? | Have you heard about the Healthy Landscapes program before today? | Have you participated in What did you find most the Healthy Landscapes useful about the program? program? | What would you say are the benefits to participating in a program that offers free home visits and advice to reduce outside water use? | How could the program be improved? | Why have |
|--|---|--|---|---|--|-----------------------------------|
| | | No | | | | |
| | 1.5 (already have conservation measures) | No 4 No | no No | | | Live in apa Live in Cor |
| Not sure More time | | 3 No 3 No | No No | | | Didn't kno |
| | | | | | | |
| | 0 (because he is very conservative with water/energy | No | No | | | |
| Personal Awareness and commitment | | D No | No | | | |
| | | 4 Yes | No | | | Don't wate |
| | | 4 No | No | | | Don't use r |
| | | 4 No | No | | | I'm not int |
| | | 1 No | No | | | Being new |
| | | 0 No | No | | | Not from 0 |
| | | 4 No 4 No | No No | | | Not enoug |
| | 2(Already done) | 1 | | | | |
| | | → 2 No Yes No | No No No | | | Unaware Just signed Unaware |
| Ease of access | | 2 No | No | | | Unaware |
| | | 4 No | No | | | Unaware |
| Understanding of the issue | 2. | 5 Yes | No | | | No Lawn |

e you not participated to date?

artment ndo

wc

ter my lawn

much outdoor water

terested in gardening

v to Canada and Guelph

Guelph

gh lawn to notice

d up!

| What do you see as being challenging or difficult about participating in a program that offers free home visits and advice to reduce outside water use? | What would encourage you to participate in the future? | On a scale of 0 to 4 (where 0 is not likely at all and 4 is very likely), how likely would you be to participate in the future in a program that offers free home visits and advice to reduce outside water use? | Have you heard about the Royal Flush Toilet Rebate program before today? | Have you participated in the Royal Flush Toilet Rebate program? | What did you find mos useful about the program? | t What would you say participating in a pro rebate to buy a new and replace your old |
|--|--|--|--|--|---|---|
| | | | No | | | |
| | | 0 4 | No Yes | No No | | |
| Changing ways | If I used outside water | 2 2 | Yes | No | | |
| | | | | | | If you happen to be r it's a benefit-won't re isn't much). Plumber that a 3 L toilet isn't e |
| | | 3 | Yes | Yes | | bricks in tank. |
| | | 0 | No | No | | |
| | | 0 | No | No | | |
| | | 0 | Yes | No | | |
| | | 1 | Yes | No | | |
| | Knowing about native pla | in 1 | Yes | Νο | | |
| Same as previous | | 4 | Νο | No | | |
| | | 0 | No | No | | |
| | | 0 4 | Yes No | No No | | |
| | | 2 | Yes No | Yes No | Ease of application | |
| | | 3 4 | Yes | Yes | Double check for efficie | ncy! |
| | | 3 | No Yes | No No | | |
| Additional info I don't already have | Ease of access | 2 | Yes | No | | |
| | | 4 | No | No | | |
| | | 0 | Yes | No | | |

ogram that offers a water efficient toilet l one?

are the benefits to How could the program be improved?

rennovating/replacing eplace otherwise (75\$ r also informed him enough water to flush ver mains, better to put

I rent so the savings are not pa

| Why have you not participated to date? | What do you see as being challenging or difficult about participating in a program that offers a rebate to buy a new water efficient toilet and replace your old one? | What would encourage you to participate in the future? | On a scale of 0 to 4 (where 0 is not likely at all and 4 is very likely), how likely would you be to participate in the future in a program that offers a rebate to buy a new water efficient toilet and replace your old one? (Please circle your response) | What are the best ways we can tell you about these and other water conservation programs offered by the City? (Please select the 3 best ways to communicate with you) |
|--|--|---|---|---|
| Don't own/Have not heard of program Didn't own but did make landlord I don't supply my own toilet | Its sounds easy | If I could choose to replace toilet | 0 4 3 | Facebook, Twitter (monthly tips -nice graphics), Short funny videos (30s), No mailouts, ads in local coffee shops (targeting the converted), Student housing @ University, Sport Events Facebook, Twitter (younger generations), Door-to-door Information on City's website, Advertisement in Guelph Tribume, Advertisements on local radio |
| | Live in apartment/Didn't hear about program | | 0 | Go through the childrens curiculem so thay infrom parents via homework assignment If targeting apartment dweller/downtown folks use ads on hydropole |
| Changed my toilets without the | | | 0 | |
| rebates | | | 0 | Email, Canada Post |
| Installed low flush during renos, this was prior to program initiation | | | 4 | Information on City's Website, Advertisement in Guelph Tribune, Billboards in mall, more in south end |
| I don't know if the landlord has applied to this program | Not knowing that the program exists (Publicity) | | 4 | Facebook, Printed information delivered to your home, Signs posted in your neighbourhood and around the City |
| | | | 3 | Email, Telephone, Printed information delived to your home |
| Not from Guelph | | | 0 | delivered to your home, visit store |
| renovating | | | 3 4 | Visit Store Email, Visit eMerge Store, call eMerge directly |
| issed to me directly, just the right thi Unaware Unaware | ng Knowledge and feeling the need to replace | | 4 4 4 | Email, Printed information delivered to your home, signs posted in your neighbor hood and around the city Outreach/Events like this Information on City's website, Mail stuffers with bill |
| Unaware | | | 3 | Email, Telephone/Cell phone, contact you |
| New Home Haven't thought about it | | | 3 3 | Events like this (H2O Go) Events like this (H2O Go). We need more events in suburbs |
| Toilet is already efficient | | | 0 | (south side) |
| Renter | | Permission | 2 | delivered to your home, store front |



Appendix C – Mind Mixer Reports



Topic Name: Water Efficiency Strategy

Idea Title: Use Treated Wastewater Effluent

Idea Detail: Treated wastewater effluent can be used for many municipal operations in the City. Treated effluent is of a high enough quality that it currently is pumped into the Speed River. This effluent could otherwise be used for street sweeping, flushing storm and sanitary sewers, catch basins, dust control etc. instead of using municipal drinking water for these purposes.

Idea Author: Julie L

Number of Stars 17

Number of Comments 0

Idea Title: Rainwater capture in Condos

Idea Detail: Promote this idea to property mangers and condo boards to allow for rainwater to be captured to water our gardens :)

Idea Author: Emily S

Number of Stars 9

Number of Comments 1

Comment 1: This was a really cool initiative in Australia that could work well for condos: http://inhabitat.com/melbourne-water-encourages-australian-citizens-to-build-10000-raingardens/ | By Laura M

Idea Title: I would install a grey water systems!

Idea Detail: I would LOVE to have a grey water system so my shower water and sink water could be used to flush the toilet!

Idea Author: Rodrigo G

Number of Stars 8

Number of Comments 0



Idea Title: Grey Water Systems

Idea Detail: Change the "provincial" building code to include water conservation. Grey water systems, low flush toilets, rain capture systems for lawn watering etc.

Idea Author: Martin B

Number of Stars 8

Number of Comments 1

Comment 1: That would be amazing. They've come a long way with the toilet standards (I think they're down to 4.8L now? Or is it 6?). Maybe they can start building in bigger requirements (like greywater), before we get to the point where it's critical. I still can't believe we pee into drinkable water. | By Laura M

Idea Title: Dishwasher rebate

Idea Detail: More and more I read about how automatic dishwashers are more efficient than hand washing, provided you're using a water efficient, Energy Star model and running full loads. (See: http://www.treehugger.com/kitchen-design/built-in-dishwashers-vs-hand-washing-which-is-greener.html and http://www.davidsuzuki.org/what-you-can-do/queen-of-green/faqs/cleaning/Hand-washing-versus-dishwashers/).

Given this, the City might look at a new rebate program to replace old dishwashers, or as an incentive for those without them to buy their first. Seems like toilet rebates are on the decline with better building codes, so a dishwasher rebate could replace Royal Flush to reap some new water saving rewards. It could be run like the existing Smart Wash rebate as a Hydro/Guelph water joint rebate program since there are energy savings there too.

Idea Author: Laura M

Number of Stars 7

Number of Comments 0

Idea Title: rainbarrels and short showers

Idea Detail: Our rain barrel catches enough rain to water the front garden daily. Also we have an egg timer in the children's bathroom on a 4 minute setting. Teaching the kids at an early



age about water conservation. We have cut our consumption of water by approximately 20%.

Idea Author: michael H

Number of Stars 6

Number of Comments 0

Idea Title: Grey water tanks

Idea Detail: New houses should be built with grey water tanks and the plumbing necessary to re-use the water for exterior landscape watering.

Idea Author: Patti M

Number of Stars 6

Number of Comments 0

Idea Title: Guelph growth

Idea Detail: Guelph should not grow any larger than what the current local water table can handle. As a citizen here, I do not want water brought in from elsewhere, i.e. Lake Ontario. Great care should be taken that our water is not polluted with herbicides/pesticides and heavy metals.

Idea Author: Jo V

Number of Stars 5

Number of Comments 1

Comment 1: I believe that your opinion about not wanting to drink water from the great lakes is a common one in Guelph. That is why the option of building a Lake Erie pipeline was canceled during a previous Water Supply Master Plan (WSMP) and was not considered during the most recent WSMP. Unfortunately though, Guelph's growth has been dictated through the Ontario's Places to Grow Act. Perhaps the province needs to take into consideration the volume of drinking water supply required for a City to grow to such numbers. Or perhaps they did take that into consideration? | By Julie L

Idea Title: Rain Gardens





Idea Detail: I would love it if someone could help me learn how to plant a rain garden on my property.

Idea Author: Kelly G

Number of Stars 3

Number of Comments 0

Idea Title: I save my air conditioner water to put in rain barrels

Idea Detail: Saving water

Idea Author: Patricia B

Number of Stars 2

Number of Comments 1

Comment 1: I hadn't thought of that. What kind of plants do you water with it? Just decorative stuff or food as well? | By Laura M

Idea Title: Grey-water and rainwater capture and use

Idea Detail: My neighbour has a grey-water tank. It has it's problems, so without some help (financial and occasional technical check-ups), it's not easy to implement.

Rain barrels are OK, but the pressure is so low, so it takes a while to fill watering cans &etc. Building rickety platforms to hold the barrel higher is not a great idea (they're HEAVY). Appearance matters to some people too.

Idea Author: Peter J

Number of Stars 2

Number of Comments 0

Idea Title: Grey water system rebates

Idea Detail: I know that some homeowners install grey water systems to save on water usage



but I am not aware of any rebates offered from the city for this type of installation. Guelph offers the toilet rebate but perhaps grey water would help.

Idea Author: Aphra Z

Number of Comments 1

Comment 1: Guelph indeed has a greywater system rebate! Check it out: http://guelph.ca/living/environment/rebates/greywater-reuse-pilot/ | By Laura M

Idea Title: Overheard at Canada Day! - Water is....

Idea Detail: -Water is Life, Fun, sustainable life -Staying hydrated, drinking, survival -Swimming in clean lakes and rivers -Needed for survival of animals, fish and plants -hygiene and taking care of yourself -Helps grow mustaches -smart growth of communities to allow for groundwater recharge -Water is cold, refreshing and we cannot live without it - Keeping forests -Planting trees -swimming -use less water, don't pollute, water softener rebate - good to drink

Thank-you to everyone for your input!

Idea Author: Emily S

Number of Comments 1

Comment 1: Water is an undervalued commodity; this amazing life-giving resource is practically free! | By Laura M

Idea Title: Water Saving

Idea Detail: There's no need to water grass. All golf course should have a strict conservation/rain catchment system. More use of recycled grey water. Use rain barrels and lots of mulch.





Idea Author: Heather V

Number of Comments 0


Topic Name: Water Efficiency Strategy Update Program Criteria

Idea Title: Reduce water use as a part of new growth.

Idea Detail: For example, requiring ultra-low flush toilets in new construction.

Idea Author: Kelly G

Number of Stars 44

Number of Comments 6

Comment 1: The focus of new residential buildings in the City over the past few years seems to be medium and high density buildings. Focusing on water savings with these buildings, including rainwater harvesting, will see substantial savings. | By Julie L

Comment 2: Oh yes, Justine! Permeable driveway would be a great addition to new home building requirements!! | By Laura M

Comment 3: It is crucial for any new developments to be built with a gentle footprint in all areas. Water use is just one. | By Marion G

Comment 4: Guelph is well positioned to push for Ontario-wide change in this area since we are one of the key growth areas in the province. I think a focus on new builds should be the top priority. | By Marnie E

Comment 5: ...and permeable driveways / deeper topsoil replacement to minimize expensive runoff? And bonus points for green roofs? New housing is the opportunity to get it right! | By Justine D

Comment 6: Let's campaign to have the Ontario Building Code include proven water-efficient technology as part of new developments. | By Laura M

Idea Title: The technology is proven and easily implementable in the City.

Idea Detail: For example, using products that are certified as water efficient and suitable to Guelph's climate.

Idea Author: Kelly G

1



Number of Stars 40

Number of Comments 4

Comment 1: I agree. Drought stricken areas of the world are using innovative technologies and proving they work. We can learn from this and start by using these proven technologies. | By Julie L

Comment 2: I think it means things like WaterSense and MaP as far as certified. But there are other technologies (like grey water reuse and rainwater harvesting) that don't have certification but are proven tech. | By Laura M

Comment 3: Sounds good, but what are the criteria for the certification? Who decides and is it trustworthy? | By Aphra Z

Comment 4: Definitely. Let's ensure if we're promoting water conservation that we know the recommendation/technology works. | By Laura M

Idea Title: Reduce water use in existing buildings.

Idea Detail: For example, programs that encourage retrofitting with low fixtures and appliances.

Idea Author: Kelly G

Number of Stars 38

Number of Comments 6

Comment 1: I have an old house (circa 1890) and have been told a rainwater system likely isn't feasible for me. Disappointing. There may be hope for a greywater system though. | By Laura M

Comment 2: To add to justines comment... Homeowners might not be able to retrofit their homes but if commercial buildings were given subsidies for the installation of these technologies we would have a greater impact. | By Katharine M

Comment 3: The biggest water savings with retrofits in existing residential buildings would include installing rainwater harvesting and grey water reuse systems. These are huge projects and the payback period is longer than most homeowners are interested in, very few homeowners, if any would participate in these projects. I think that incentivizing these water saving systems in new builds would be a more successful route to take. | By Julie L



Comment 4: Some ideas on how that might work are things like rebates, credits, City bulk buys so residents can purchase things at lower costs. Does anyone have any other suggestions/ideas? | By Laura M

Comment 5: Great idea but again, how does it work? Where does the money come from to get this done? | By Aphra Z

Comment 6: Absolutely. Guelph is an old community and we've got a lot of old houses, buildings, infrastructure, etc. There's a lot that can be improved through retrofitting. | By Laura M

Idea Title: Develop/ pilot new technologies to save water.

Idea Detail: For example researching new water softeners that use less water.

Idea Author: Kelly G

Number of Stars 29

Number of Comments 5

Comment 1: Grey water recycling could be required for all new buildings in Guelph, residential and commercial. | By Patti M

Comment 2: Marion - the City already provides rebates for grey water reuse systems. Check out all the water conservation/efficiency rebates the City provides here: guelph.ca/ourstoconserve | By Julie L

Comment 3: Grey water recycling technologies are very important. Subsidizing these systems in homes, or research to help find more affordable technologies would be great. | By Marion G

Comment 4: We should get involved in finding a way to reduce water usage in reverse osmosis water systems. | By Aphra Z

Comment 5: Love innovation and Guelph is ahead of the pack so we may need to find new ways to save water, but I think the private sector should push innovation more and the City should focus on getting as many people to participate in proven conservation actions first. | By Laura M

Idea Title: Stimulate the economy in Guelph.





Idea Detail: For example, plumbers supplying City-subsidized toilets.

Idea Author: Kelly G

Number of Stars 23

Number of Comments 3

Comment 1: What about something like certifying local landscaping businesses as "Healthy Landscapes" partners? Then, local business is supported and the City's objectives get met too. | By Laura M

Comment 2: Sure, but what does that really mean? How does it work? | By Aphra Z

Comment 3: Supporting local business is awesome. Getting private contractors involved in water conservation is a great opportunity. | By Laura M

Idea Title: Minimize costs to the City

Idea Detail: For example, the cost to administer the program is less than or equal to the cost savings that the City will achieve by the program being implemented.

Idea Author: Kelly G

Number of Stars 11

Number of Comments 3

Comment 1: Investment is necessary for actual reductions in our water consumption. Minor changes will not be enough. Investment in new technologies instead of just the bare minimum in terms of water efficient sources and grey water recapture will get us ahead of the curve instead of having this same conversation in 10 years. | By Katharine M

Comment 2: Do you have a Dislike button? Trying to balance the books for a single program is myopic silo thinking. A city is far more organic and interconnected than that. Perhaps one program runs into the red, but creates greater health for its citizens. This means a different silo (our health system) gets the immediate economic benefit, but a healthy city is a desirable place to live, which means people & businesses thrive here and perhaps we weather downturns better than other places. Eventually the financial benefit comes back to us in property taxes. Don't be tricked into false economies. Life is not a simple spreadsheet. Use





the triple Bottom Line. | By Justine D

Comment 3: Because Guelph depends on a finite source, in some cases it may be in the City's best interest to consider options that cost slightly more than the actual value of savings. It would depend if they would truly help defer long term new supply or infrastructure costs in which case they may save future dollars and therefore be worthwhile. | By Laura M



Survey: Water Efficiency Strategy Update - March 2016

Question: Have you heard about the eMERGE Home Visits program?

Yes, I have heard of the program AND received a home visit! : 9

Yes, I have heard of it BUT never participated. : 12

No, I haven't heard of eMerge Home Visits. : 14

Question: If you received an eMerge Home Visit, what did you find useful about the visit? What would you say are the benefits to participating in a program that offers free home visits and a retrofit package? How could the program be improved?

confirmation that we were doing all that was possible at this point. I would have preferred to have the option to give back the air aerator for one sink tap as the water dribbled out after it was replaced with the emerge one. They had left with our old one when we discovered the problem.

Great experience overall.

It's a little uneasy when random people show up at your door with not a lot of good information to hand to you. It would be beneficial if the City logo was on something as well. Something official so homeowners are not weary of scams. They tested my water, but I still don't really know what the retrofit package entails.

My home is 9 years old and I had already received the Union Gas energy savings package and had my windows replaced before the warranty was up so there wasn't anything he could advise me on. I would like to have an energy report though similar to what Building Knowledge produces.

The tips on saving energy and free light bulbs.

The two workers were very diligent and gave us good advice on blocking drafts and lighting.

The visit was useful because it confirmed we were on the right track with all the changes we have made to reduce our carbon footprint .

Was good to see that all my taps, showers, and toilets were efficient and not





leaking.

Question: If you did not participate in the eMerge Home Visit program, why not? What do you see as being challenging or difficult about participating in a program that offers free home visits and a retrofit package? What would encourage you to participate?

n/a(2)

Never heard of it.

One of the things is that I rent and I know where I live is quite old and may need a lot of "work" that my landlord may not be willing to do. I also worry that he may even get mad if things are pointed out that should be done.

Rebates to make changes or evidence that I could save money.

Renting

The promotion. I have never heard about the program. If I had known about it, I for sure would have participated.

Was not aware of it.

Being very eco-minded and already looped in on programs related home improvement, lifestyle, transport and other green options I didn't feel I would benefit much from this; preaching to the converted and all. I have already done most of the things the home audit targets via other means. I am also already part of Project Neutral.

Didn't know about it

Have had home audits in the past. I don't think I would find out anything I don't already know.

Have not come across any information on this program.

Have not thought it would be useful to me.

I did an energy audit with Guelph Hydro, upgraded my toilet and washer outside of the programs.



I have not heard much about the program or the benefits of a home visit. Requires better advertising.

I haven't done this because I can never seem to get a round to it. I have gone on the site to book it and then I wonder if I will be prepared for a home visit at that time (house cleanliness, no other appointments etc.)

I haven't heard of it

I think a home energy audit is much more beneficial. If you could combine this with other efforts like water management, this would be a much better way to facilitate the program.

I was not aware of it. I would take part. I have participated in the Healthy Landscape visit though.

I was not aware of such program

It's a little uneasy when random people show up at your door with not a lot of good information to hand to you. It would be beneficial if the City logo was on something as well. Something official so homeowners are not weary of scams. They tested my water, but I still don't really know what the retrofit package entails.

Ive had a similar program visit before and our house has already done an energy audit, all they offered was pipe wrap and low energy lightbulbs

Question: Have you heard of the Healthy Landscapes Program?

Yes, I have heard of AND PARTICIPATED in the Healthy Lanscapes program : 12

Yes, I heard of the Healthy Landscapes program, BUT never participated : 12

No, I have not heard of the Healthy Landscapes program : 10

Question: If you participated in the Healthy Landscapes Program, what did you find most useful? What would you say are the benefits to participating? How could the program be improved?

n/a(2)



Really helpful as a new homeowner to have someone walk the yard with me and give me tips and suggestions, including where I could put a veggie garden and how to combat gout weed.

The ease of use and information. It covers a lot of information of non gardeners in a short amount of time making it a bit confusing.

The information sessions are a great forum to find out ways of managing my home landscapes more efficiently. The online resources are helpful as well.

The specific suggestions of what plants to buy. Also the guide is quite good.

didn't get much out of it, needed more concrete recommendations for plants and where to buy them

Growing on my lawn has improved it a lot. I like the clover

Home visit was very helpful in advising on drought resistant grass/plantings and maintenance of trees and shrubs.

I loved that she made a sketch for me with all the plants to get. And that there was a discount program with a few nurseries in town.

It was fine, but wasn't that informative overall. When I asked specific questions they didn't have the answers.

More information on rain garden design and technical details. More focus on what you can do on your property to reduce runoff.

Question: If you did not participate in the Healthy Landscapes Program, why not? What is challenging or difficult about participating in a program that offers free home visits and advice to reduce outside water use? What would encourage you to participate?

Already practice this form of gardening.

Condo does all garden mainetence

Could participae

Have never heard about it.



I do not have a yard

I don't know anything about this program

I have expertise in this area so no need

I have only just purchased my home last September and was focused on the interior needs first. I might sign up for a home visit this summer.

I just never think of them when planning and planting my garden.

I live in a Condo townhouse, so do not have a lot of landscape to deal with. You would be better to work with the Condo Board to assess our whole property.

I was too late to apply.

I will sign up this year. Just never thought about it before

I would like a home visit. We have several water barrels and two large tanks for holding the water. But interested in what else we can do there.

live in condo

Renting

WE ALREADY HAVE CONVERTED ALMOST OUR ENTIRE GARDEN AREA IN NATIVE GARDENS AND VEGETABLE GARDENS AS WELL AS HAVING AN EXTENSIVE RAINWATER COLLECTING SYSTEM

Question: Have you heard about the Royal Flush Toilet Rebate program?

Yes, I have heard of the Royal Flush Toilet Rebate AND I have participated! : 15

Yes, I have heard of the rebate, BUT never participated. : 16

No, I haven't heard of the Royal Flush Toilet Rebate : 5

Question: If you have received a toilet rebate, what did you find most useful about the program? How could the program be improved?



... well, saving on the price of a new toilet, and using less water (which also means saving on the water bill... what other benefits are there?

A good incentive that helps with the cost of toilet replacement. You could approve it by increasing the rebate based on the type and cost of the toilet. In our houses, we have to use a back flow toilet which costs \$500 to replace. Most toilets do not cost that much.

Ability to apply online would be a great option.

Being able to have the rebate applied at checkout was great.

Current program is good as is

Found it very useful especially city staff on-site to answer questions and complete info re rebate

It encouraged user to replace our toilets. We submitted 2 within the time frame the city deemed one expired. The city didn't reimburse us for the other and sent our application back in two packages so it was harder for us to reapply for the valid one. I was unhappy with how it was handled. The process was not easy.

it helped us to buy two low flow toilets

n/a

The rebate was easy to get. Don't keep raising water rates as we use less. This is counter productive to a "rebate" program.

Question: If you have not received a toilet rebate, why not? What is challenging or difficult about participating in a program that offers a rebate to buy a new water efficient toilet and replace your old one?What would encourage you to participate?

can't afford new toilet at this time

Do not qualify. Already have 6 litre toilets.

Had just purchased new (more efficient) prior to Royal flush

I am waiting until I redo the bathrooms but then I will take advantage of this





program for sure.

I don't know anything about this program

I have a fairly new home.

I tried to participate but was told my address had already received the rebate and so I wasn't eligible

If I knew my toilet was running and costing money I might replace it.

Knowing the details

n/a

Only one toilet in the house and it's efficient enough.

Previously rented where I had no authority to make improvements and recently purchased a house that already has a 6 LPF toilet.

Renting

The toilet I wanted to buy was not part of the program.

There already were efficient toilets in the house when I moved in

Toilets did not qualify

We already had changed our toilet to a newer efficient unit.APPLYING FOR THE REBATE WOULD NOT HAVE BEEN AN ISSUE AS i think the process is easy.

We got out water saver tank befor rebates came along

Question: What are the best ways we can tell you about these and other water conservation programs offered by the City? Pick your top 3 methods of communications

Email : 20

Telephone/cell phone : 3





Facebook: 13

Twitter: 6

Information on City's website : 13

Advertisement in the Guelph Tribune : 16

Advertisements on local online news sites : 4

Advertisements on local radio : 6

Printed information delivered to your home : 13

Signs posted in your neighbourhood and around the City : 5

Door-to-door visits : 3

Comments

Number of Comments 0