



## REGIONAL MUNICIPALITY OF WATERLOO

### COUNCIL REPORT

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**TO:** Regional Chair Ken Seiling and Members of Regional Council

**DATE:** May 10, 2000

**SUBJECT: RECOMMENDATIONS ON THE LONG TERM WATER STRATEGY**

**RECOMMENDATION:**

THAT the Regional Municipality of Waterloo take the following action regarding the Long Term Water Strategy:

- a) approve the Long Term Water Strategy as a Master Plan under the Class Environmental Assessment process;
- b) approve the Long Term Water Strategy, including:
  - the immediate construction of a 5 MIGD ASR facility,
  - an additional 5 MIGD ASR facility in 2007,
  - 5 MIGD of additional groundwater in 2018,
  - immediately pursue acquisition of a water taking permit, land for treatment and transmission facilities and other approvals/consultations/notifications necessary for the construction of a Great Lakes pipeline,
  - construction of a displacement pipeline in 2035,
  - continued use of groundwater to meet the requirements of the rural water supply systems,as the Region's Water Supply Master Plan;
- c) direct staff to develop a twenty year water capital program starting with the 2001 budget;
- d) direct staff to develop a financing plan based on the rates outlined in report E-00-027 and report back during the 2001 budget preparation process;
- e) endorse the collection of at least 50% of the capital cost of the displacement pipeline in the 15 years prior to the start of construction;
- f) endorse continued implementation of the Water Efficiency Master Plan as an essential element of the Region's Water Supply Master Plan, and direct staff and the Water Efficiency Advisory Committee to develop enhancements to the water efficiency program including increasing funding for the program as part of the 2001 budget;
- g) endorse continued implementation of the Region's Water Resources Protection

- Strategy, including the water level monitoring and reporting programs, as an essential element of the Region's Water Supply Master Plan;
- h) direct staff to continue working with the Grand River Conservation Authority and municipalities within the Grand River watershed to appropriately address issues of watershed sustainability;
  - i) direct staff to provide annual reviews of progress on the Region's Water Supply Master Plan;
  - j) direct staff to complete a comprehensive review of the Region's Water Supply Master Plan every five years in accordance with Section 10.1.1 of the Regional Official Policies Plan.

### **SUMMARY:**

The Long Term Water Strategy (LTWS) was initiated in 1991 to select a water supply option to serve the Region of Waterloo to the year 2041. Since 1991 a large number of alternative water supply options have been reviewed and evaluated leading to the identification of a preferred option. The "Strategic Plan" option, as described below, is the preferred water supply option.

The "Strategic Plan" includes the construction of a 10 million imperial gallon per day (MIGD) Aquifer Storage and Recovery (ASR) facility early in the planning period (2001-2007), 3 to 5 MIGD of new groundwater supplies in the middle of the planning period (by 2018), and construction of a displacement pipeline to either Lake Huron or Lake Erie late in the planning period (approximately 2035).

The Strategic Plan represents a long range highly flexible water supply strategy for the Region. It offers the Region a number of significant benefits including: making efficient use of existing water supply infrastructure; best use of local water resources; deferring the need for significant capital expenditures; and providing the flexibility to adapt to changing water demands in the future.

A number of issues were raised by Council and delegations at a Public Meeting of Regional Council held on April 26, 2000. These issues included costing, impacts of groundwater takings, water conservation and community growth. These issues have been addressed by the LTWS directly, or by other Regional programs and policies.

Once the "Strategic Plan" is approved as the Region's Water Supply Master Plan, implementation of the various components of the plan, including the design and construction of a 5 MIGD ASR facility, and acquisition of water taking permits for a Great Lakes source, will begin immediately.

## **REPORT:**

### **Background**

The Long Term Water Strategy (LTWS) began in 1991 with the purpose of selecting a water supply option to serve the Region of Waterloo for the next 50 years (to the year 2041). Phases I and II of the study considered population projections, water demands, and water efficiency initiatives for the 50 year study period, and water quality, quantity, reliability, environmental impacts and costs for a number of water supply options including: groundwater, aquifer recharge, Great Lakes pipelines and additional Grand River supplies. At the completion of Phase I, the Grand River options were eliminated from further consideration. Phase II of the study considered the remaining options in greater detail and included a Peer Review as a validation of the study process and direction. In 1996 the study was put on hold so that a field pilot test of the Aquifer Storage and Recovery (ASR) option could be completed at the Mannheim Water Treatment Plant site. Following successful completion of the pilot test in 1998, Phase III of the LTWS was commenced to complete the process of selecting a preferred water supply option.

Phase III of the LTWS began in March 1999 to review and update the work completed in Phases I and II. Phase III also incorporated new data that had become available since the completion of Phase II, including the results of the ASR Pilot Test, new hydrogeological data, Provincial policy changes, and an update of all costing to 1999 dollars.

Phase III involved the study of 33 potential water supply options. Following completion of the technical review and update of the options, the 33 were short-listed in a qualitative exercise to 16 remaining options. The 17 eliminated options were Great Lakes pipelines that were essentially duplicates of other pipeline alternatives. The remaining 16 options were evaluated by Regional staff, the Public Advisory Committee (PAC) and the Project Team using a quantitative evaluation model based on 10 criteria.

Phase III of the LTWS included an extensive public consultation program. A PAC representing a broad spectrum of viewpoints provided input on all aspects of the study. The Project Team provided overall direction to the project and included Regional Council and GRCA representation. Membership of the PAC and Project Team are summarized in Appendix <A & B'.

The Phase III public involvement process also included 6 Public Information Centres, one Public Meeting of Regional Council, numerous presentations to various groups including local municipal councils, a special edition of Environews, newspaper articles and newspaper and radio advertisements of the many public forums. Appendix <C' includes a complete listing of public contact points.

The evaluation process resulted in two water supply options being ranked the highest. These two water supply options are:

- a) Combined 10 MIGD Aquifer Storage and Recovery (ASR) and 10 MIGD Groundwater option, constructed in stages from 2001 to 2030;
- b) Lake Huron or Lake Erie 70 MIGD Displacement pipeline to be completed in 2018.

From these two highest ranked options a third option was developed that combined the advantages and mitigated the weaknesses of the two options to formulate a "Strategic Plan".

The "Strategic Plan" was evaluated based on the same criteria applied to all of the other short-listed options. It scored the highest of all options. The "Strategic Plan" was presented along the ASR/Groundwater and Displacement Pipeline options at two Public Information Centres held in mid February 2000 as the LTWS preliminary preferred options.

Following a qualitative review of the evaluations and the comments received at the PIC's, the Project Team and PAC both selected the "Strategic Plan" as the Region's preferred long term water supply option. The "Strategic Plan" was perceived at the PIC's as a practical solution to the Region's long term water needs.

Report E-00-027, presented to Regional Council at a Public Meeting of Council held on April 26, 2000, is included in Appendix 'F' and provides the details of the three preliminary preferred options.

### **The Preferred Option**

The "Strategic Plan" includes the following elements:

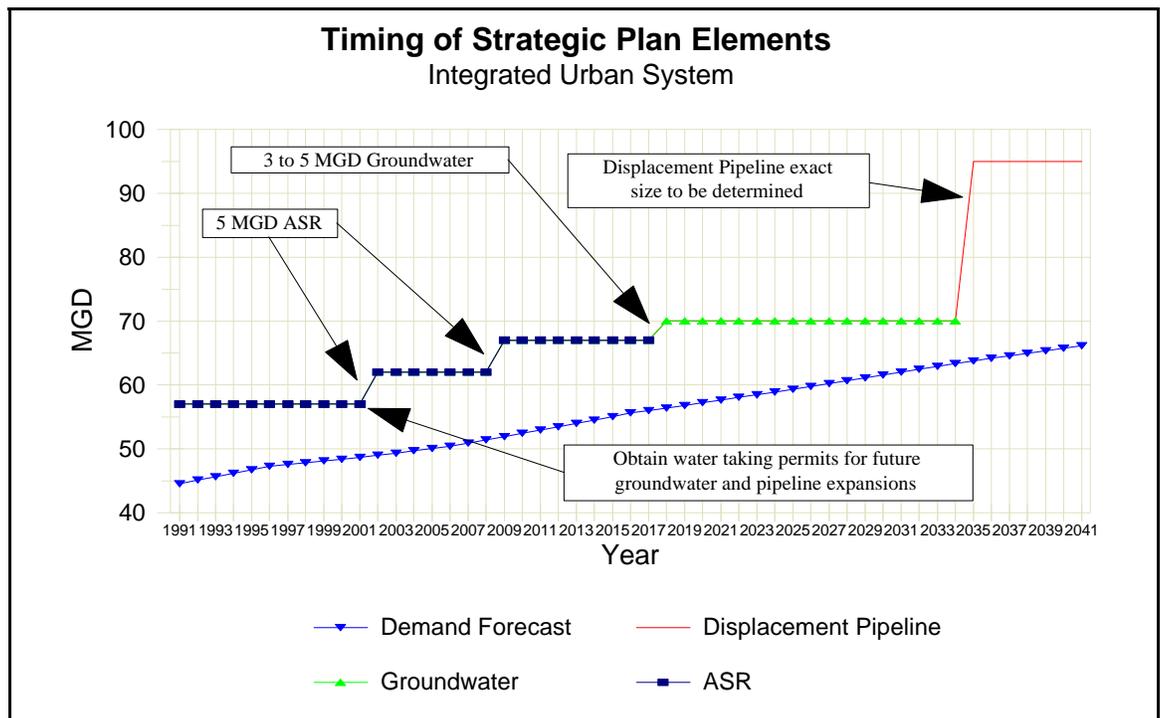
- the construction of a 10 million imperial gallon per day (MIGD) ASR facility early in the planning period (2001 - 2007);
- the development of up to 5 MIGD of new groundwater sources in the middle of the planning period (by 2018);
- the construction of a displacement pipeline to either Lake Huron or Lake Erie late in the planning period (approximately 2035).

Lake Huron will be pursued as the preferred water source for the displacement pipeline. This is based on a public perception that water quality in Huron is better than Erie. Technical evaluations of treated water from either lake shows essentially the same water quality. The Ministry of Natural Resources (MNR) has indicated that they are opposed to the Region taking water from Lake Huron and transferring it to Lake Erie. Should Region staff be unable obtain the necessary approvals for taking water from Lake Huron, the Region would then pursue Lake Erie as a water source. The MNR would not oppose the Region taking water from Lake Erie.

Some of the advantages of the "Strategic Plan" option include the following:

- It makes efficient use of recently constructed water supply infrastructure, including the Mannheim Water Treatment Plant, and the Cambridge East iron removal plants. These facilities would be used for the next 35 years before being replaced by a pipeline supply source;
- Large capital expenditures and the associated rate impacts are delayed in the "Strategic Plan". This provides benefits not only to the existing user rate payers, but allows the development of a long term financing plan to minimize future rate impacts;
- It has the flexibility to adapt to changes in future water demands. Changes in water demands could be caused by a number of different factors including increases or decreases in the rate of growth, limits on growth, climate changes, and increased or decreased water use efficiency. By changing the timing of implementation of the components of the "Strategic Plan", it is possible to meet future challenges;
- The plan takes a long term view of the Region's water supply, potentially assuring the Region's water supply well past 2041.

The timing for implementation of the components of the Water Supply Master Plan (WSMP) are illustrated in Figure 1.



The capital cost of the "Strategic Plan" is estimated to be about \$500 to \$540 million, depending on the lake source, and the net present value of the plan is \$600 million.

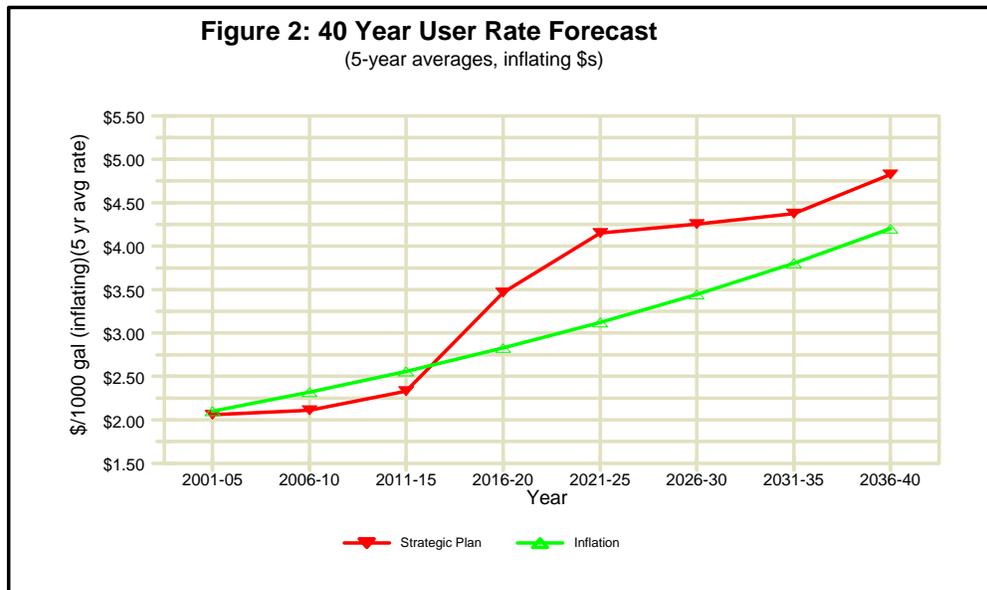
**User Rate Impacts of the "Strategic Plan"**

The table below provides a comparison of the short term (10 year) user rates and household impacts for the "Strategic Plan", as well as the current 10 year rate forecast and the inflationary trend line. The rates expressed in the table are **wholesale rates** only for the year indicated. The household impact is calculated based on the current wholesale user rate forecast.

	<b>2001 user rate /1000 gal</b>	<b>2001 average household impact (\$/year)</b>	<b>2001 household increase over current rate forecast (\$/year)</b>	<b>2009 user rate /1000 gal</b>	<b>2009 average household impact (\$/year)</b>	<b>2009 household increase over current rate forecast (\$/year)</b>
<b>Current user rate forecast</b>	\$2.02	\$96.25	----	\$2.06	\$98.16	----
<b>Inflation (2%/yr)</b>	\$2.06	\$98.16	\$1.91	\$2.41	\$114.84	\$16.68
<b>Strategic Plan</b>	\$2.06	\$98.16	\$1.91	\$2.08	\$99.11	\$0.95

The "Strategic Plan" option requires only modest rate increases during the 10 year forecast and defers significant rate increases until after 2015, when rates increase by approximately 85% over 10 years with inflationary increases after that. The projected rate in 2041, in inflating dollars, is estimated to be approximately \$4.75/1000 gal.

Figure 2 shows the 40 year user rate forecast for the "Strategic Plan" option.



The Regional Development Charge (RDC) will pay approximately 25% of the capital cost of the option, with increases in the rate not occurring until after 2015. RDC rates and how funds are collected for this and other major projects will be reviewed in detail during the next by-law review in 2004.

### **Issues From the April 26, 2000 Public Meeting**

A public meeting of Regional Council on April 26, 2000 was held to present the draft recommendations of the LTWS. A staff presentation outlined the process and results of the LTWS evaluations. A number of delegations spoke on various issues related to the LTWS and Council raised some questions on certain aspects of the study. The issues and questions raised are summarized below, along with an explanation of how these issues have been addressed in the LTWS.

### **Cost Estimates**

The costing for the options studied were, for the most part, developed during Phase I of the study. The capital costs were developed by the consultants engaged to study each of the four options; aquifer recharge, groundwater, Grand River, and Great Lakes pipelines. These costs were developed based on standard engineering and financial practice. Phase II of the LTWS reviewed and updated the costs for the remaining options. A peer review of the study was also undertaken during Phase II and included a review of the costing for each of the options. In Phase III, all costs were reviewed once again, in many cases by different engineers, and were updated to 1999 dollars. Conservative contingencies (on the order of 30%) have been added to the capital costs for each option. The cost estimates, including contingencies, for the strategic plan are summarized in Appendix 'D'.

All costing and financial analysis data have been reviewed by staff from the Region's Engineering and Finance Departments, as well as the LTWS Project Team and Public Advisory Committee.

### **Impacts of Groundwater Takings**

An integral component of the Water Supply Master Plan (WSMP) is the continued commitment to protection of the Region's local water resources, both surface and groundwater. Included in the programs for resource protection are groundwater level monitoring programs. These programs establish a baseline for groundwater levels under the influence of municipal pumping and ensure that Regional water takings do not lower the levels of groundwater to the point where there might be negative impacts on other users.

The locations the Region is currently monitoring are attached as Appendix "E-1". The water level monitoring program being undertaken is quite extensive and typically shows stable aquifer levels. A representative graph of historical water levels at the Wilmot Centre well fields is attached as Appendix 'E-2'. Results from the water level monitoring program indicate that the Region is not mining the groundwater and that current water takings are sustainable.

The groundwater component of the WSMP involves developing an additional 3 to 5 MIGD of groundwater in approximately 2018 to supplement the ASR system. It is intended that this groundwater would be found in those areas identified as potential new groundwater development areas that are located within or close to the urban areas. The development of these new groundwater supply areas would include extensive testing, as well as monitoring programs to ensure no negative impacts to other groundwater users as a result of Regional water takings.

None of the potential new groundwater development areas are located in Wilmot Township.

### **Water Conservation**

As with resource protection, water use efficiency is an integral component of the LTWS. The water demand projections developed for the LTWS rely on at least a 10% reduction in current water usage, resulting from the implementation of the Water Efficiency Master Plan (WEMP), in order to meet the future supply targets. The WEMP commits the Region to long term implementation of various water efficiency initiatives, including the Toilet Replacement Program, industrial audits, education programs and studying the option of 'buying back' capacity from businesses and industry before any major infrastructure expansions to increase supply are undertaken.

At previous public information centres and again at the public meeting on April 26, 2000, members of the public raised concerns that the Region was not doing enough to promote water efficiency. As a result of these comments and to re-affirm the Region's commitment to water efficiency, the Project Team is recommending an increase in funding to water efficiency and the use of these funds to promote new water efficiency initiatives. Staff will work with the Water Efficiency Advisory Committee (WEAC) to review new water efficiency initiatives and appropriate funding levels and report back to Council as part of the 2001 budget process.

### **Growth Policies**

The LTWS has been undertaken in accordance with the various policies set forth in the Regional Official Policies Plan (ROPP). The water demand projections were developed directly from the population projections to 2016 contained in the ROPP. Projections beyond 2016 were developed based on extrapolations of the ROPP projections.

### **Project Team - Final Recommendations**

Following the April 26, 2000 Council meeting the Project Team met and reviewed the LTWS recommendations and considered the issues raised at the meeting. A small number of revisions were made to the report recommendations based on comments received at the public meeting. These revisions are:

- direct staff and the WEAC to develop an enhanced water efficiency effort including increased funding;
- endorse the collection of "at least" 50% of the capital cost of the displacement pipeline prior to construction;
- endorse the Region's continued efforts with the GRCA to address the issues of sustainable development within the Grand River watershed.

The Project Team reviewed, made minor changes, and finally supported the LTWS recommendations as presented in this report.

### **Next Steps**

Following approval of the WSMP as a Master Plan under the Class Environmental Assessment Process, a number of actions will be taking to immediately implement the plan:

- development of a 20 year capital program for water,
- pursue a water taking permit for Lake Huron,
- develop enhancements to the water efficiency program,
- acquire lands for treatment facilities and pipeline alignment once a water taking permit is received,
- begin design and construction of a 5 MIGD ASR facility, with operation to begin in 2002/2003,
- initiate a groundwater exploration program in 2003.

The LTWS Project Team and PAC will meet in the late spring to discuss implementation of the plan and to establish the appropriate supporting structure to oversee and manage implementation.

### **CORPORATE STRATEGIC PLAN:**

The Long Term Water Strategy supports the Strategic Plan goal "to create and support a climate that encourages economic prosperity".

### **FINANCIAL IMPLICATIONS:**

The "Strategic Plan" option will result in rate increases of approximately 2% in 2001 and a further 1% increase in 2002. This would result in a wholesale water rate of \$2.08 per 1000 gallons in 2002 which would remain constant until 2009. Rate impacts after 2009 would be considered during the preparation of a 20 year capital forecast for water supply. These projected rate impacts would be reviewed during the 2001 budget process. It should be noted that the wholesale rate for wastewater is projected to decrease in 2001, offsetting the water rate increase resulting from implementation of the "Strategic Plan" as the Region's Water Supply Master Plan.

A 20 year water capital program will be presented during the 2001 budget process. The rate impacts of the WSMP over the initial 20 year period will be identified in detail during that process.

The "Strategic Plan" option will result in moderate upward pressure on the water portion of the RDC rate in the next revision of the by-law in 2004. The water portion of the RDC rate could increase 60% to 80% in approximately 2015. The RDC rate impacts will be reviewed during the preparation of the next RDC by-law.

By collecting at least 50% of the cost of the displacement pipeline in the fifteen years prior to the start of construction, the impact of financing the pipeline is spread over a longer period of time, reducing the impact on rates and the amount of financing required is also reduced.

An enhanced water efficiency program will put upward pressure on the water rate both because of the funds required to implement new initiatives, and due to resulting decreases in water revenues. Staff and the WEAC will review alternative strategies, funding levels, and rate impacts and will recommend appropriate enhancements to the water efficiency program as part of the 2001 budget.

**OTHER DEPARTMENT CONSIDERATIONS:**

The Planning and Culture and Finance Departments are represented on the LTWS Project Team.

**PREPARED BY:** *S. Clarke*, Technologist I, LTWS Project Coordinator

**APPROVED BY:** *M.L. Murray*, M.Eng., P.Eng., Commissioner of Engineering and Public Works

**Region of Waterloo Long Term Water Strategy (LTWS) Study  
Phase III Public Advisory Committee (PAC)**

<b>Name</b>	<b>Representing</b>
Ms. Susan Bryant	Township of Woolwich
Councillor Dusan Cizman	Township of Wellesley
Mr. Ron Donaldson	Ecologic & Environmental Advisory Committee (EEAC)
Mr. Mark Dorfman	Waterloo Region Planners
Mr. Ken Hunsberger	Waterloo Federation of Agriculture
Mr. Bill McGregor	K-W Chamber of Commerce
Mr. Jack Michels	Township of Wilmot
Dr. Jim Robinson	University of Waterloo
Mr. Bruce Scheifele	Waterloo Region Homebuilders Association
Mr. Dave Smyth	City of Cambridge
Mr. George Stormont	City of Kitchener
Colin Walke/Ryan McNally	Waterloo Public Interest Research Group (WPIRG)
Mr. Jim Walter	Waterloo Region Labour Council

**Region of Waterloo Long Term Water Strategy (LTWS) Study**

**Phase III Project Team**

<b>Name</b>	<b>Representing</b>
Bill Brodribb	Engineering - Design & Construction
Scott Clarke	Engineering - Water Services
Ron Donaldson	LTWS Public Advisory Committee
Ted Fairless	Regional Council
Tom Galloway	Regional Council
Larry Kotseff	Planning & Culture
Stefan Loker	Finance
Jack Michels	LTWS Public Advisory Committee
Lorrie Minshall	Grand River Conservation Authority
Mike Murray	Engineering
Thomas Schmidt	Engineering - Water Services
Ken Seiling	Regional Council
Ralph Shantz	Regional Council
Bill Strauss	Regional Council

**Long Term Water Strategy Study  
Phase III Public Contact Points**

<b>Date</b>	<b>Event</b>
January 20, 1999	Report and presentation to Regional Council
April 7, 1999	Report and presentation to Regional Council
August 31, 1999	Public Advisory Committee meeting
September 22, 1999	Public Advisory Committee meeting
September 28, 1999	Public Information Centre - Cambridge City Hall
September 30, 1999	Public Information Centre - Regional Headquarters, Kitchener
November 4, 1999	Public Advisory Committee meeting
November 24, 1999	Report and presentation to Regional Council
November 30, 1999	Public Information Centre - Fairview Park Mall, Kitchener
December 2, 1999	Public Information Centre - Cambridge Centre Mall
December 15, 1999	Public Advisory Committee meeting
January 12, 2000	Report and presentation to Regional Council
January 17, 2000	Public Advisory Committee meeting
February 6, 2000	Report and presentation to Regional Council
February 15, 2000	Public Information Centre - Fairview Park Mall, Kitchener
February 17, 2000	Public Information Centre - Cambridge Centre Mall
March 9, 2000	Public Advisory Committee meeting
April 26, 2000	Report and presentation to Regional Council
May 10, 2000	Report and presentation to Regional Council
May 18, 2000	Public Advisory Committee meeting

News releases and newspaper and radio advertisements were made prior to the Public Information Centres and the Public Meeting.

In addition to the above noted public contact points, Regional staff made numerous presentations on the LTWS to a number of groups, including the Chambers of Commerce, GRCA Board, various service clubs, and high school and university students. A special issue of Environews was published in March 2000 that was devoted almost entirely to the LTWS and the options and evaluations, and the opportunities for public involvement in the study.

Additionally, the LTWS maintained a public mailing list of 259 individuals, businesses and organizations. Mailings were made to all of the individuals on the mail list advising them of the public information centres and the April and May 2000 Regional Council meetings.



## REGIONAL MUNICIPALITY OF WATERLOO

### COUNCIL REPORT

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**TO:** Regional Chair Ken Seiling and Members of Regional Council

**DATE:** April 26, 2000

**SUBJECT: DRAFT RECOMMENDATIONS ON THE LONG TERM WATER STRATEGY**

**RECOMMENDATION:**

For information only.

**SUMMARY:**

This report is being presented for information as part of a public meeting on April 26, 2000 for Regional Council to hear public input on the Long Term Water Strategy.

The Long Term Water Strategy (LTWS) began in 1991 to re-assess and review the Region's options for providing water supply to the year 2041. Three phases of the study undertaken since 1991 progressively focused the review and have resulted in the identification of a preferred water supply option.

Comments received at the various public forums held for the LTWS identified a number of issues that have been considered in developing the preferred option. These issues include resource protection, growth, water conservation, cost, environmental impacts, water quality and security of supply.

The preferred water supply option is a "Strategic Plan" that involves:

- the construction of a 10 million imperial gallon per day (MIGD) ASR facility early in the planning period;
- the development of up to 5 MIGD of new groundwater sources in the middle of the planning period;
- the construction of a displacement pipeline to either Lake Huron or Lake Erie late in the planning period.

Ongoing water use efficiency, as described in the Water Efficiency Master Plan, and water resource protection, as described in the Water Resources Protection Strategy, are essential elements of the Water Supply Master Plan.

Based on extensive evaluation and public consultation, the Project Team and Public Advisory Committee (PAC) are proposing the following draft recommendations. Pending comments received at the April 26 meeting, final recommendations will be presented to Council at a subsequent meeting. The recommendations are:

THAT the Regional Municipality of Waterloo take the following action regarding the Long Term Water Strategy:

- c) approve the Long Term Water Strategy as a Master Plan under the Class Environmental Assessment process;
- d) approve the Long Term Water Strategy, including:
  - the immediate construction of a 5 MIGD ASR facility,
  - an additional 5 MIGD ASR facility in 2007,
  - 5 MIGD of additional groundwater in 2018,
  - immediately pursue acquisition of a water taking permit, land for treatment and transmission facilities and other approvals/consultations/notifications necessary for the construction of a Great Lakes pipeline,
  - construction of a displacement pipeline in 2035,
  - continued use of groundwater to meet the requirements of the rural water supply systems,as the Region's Water Supply Master Plan;
- c) direct staff to develop a twenty year water capital program starting with the 2001 budget;
- d) direct staff to develop a financing plan based on the rates outlined in report E-00-027 and report back during the 2001 budget preparation process;
- e) endorse the collection of 50% of the capital cost of the displacement pipeline in the 15 years prior to the start of construction;
- f) endorse continued implementation of the Water Efficiency Master Plan as an essential element of the Region's Water Supply Master Plan;
- g) endorse continued implementation of the Region's Water Resources Protection Strategy, including the water level monitoring and reporting programs, as an essential element of the Region's Water Supply Master Plan;
- h) direct staff to provide annual reviews of progress on the Region's Water Supply Master Plan;
- i) direct staff to complete a comprehensive review of the Region's Water Supply Master Plan every five years in accordance with Section 10.1.1 of the Regional Official Policies Plan.

## **REPORT:**

### **Background**

The Long Term Water Strategy (LTWS) began in 1991 with the purpose of selecting a water supply option to serve the Region of Waterloo for the next 50 years (to the year 2041). Phases I and II of the study considered population projections, water demands, and water efficiency initiatives for the 50 year study period, and water quality, quantity, reliability, environmental impacts and costs for a number of water supply options including: groundwater, aquifer recharge, Great Lakes pipelines and additional Grand River supplies. At the completion of Phase I, the Grand River options were eliminated from further consideration. Phase II of the study considered the remaining options in greater detail and included a Peer Review as a validation of the study process and direction. In 1996 the study was put on hold so that a field pilot test of the Aquifer Storage and Recovery (ASR) option could be completed at the Mannheim Water Treatment Plant site. Following successful completion of the pilot test in 1998, Phase III of the LTWS was commenced to complete the process of selecting a preferred water supply option.

Phase III of the LTWS began in March 1999 to review and update the work completed in Phases I and II. Phase III also incorporated new data that had become available since the completion of Phase II, including the results of the ASR Pilot Test, new hydrogeological data, Provincial policy changes, and an update of all costing to 1999 dollars.

Phase III involved the study of 33 potential water supply options. Following completion of the technical review and update of the options, the 33 were short-listed in a qualitative exercise to 16 remaining options. The 17 eliminated options were Great Lakes pipelines that were essentially duplicates of other pipeline alternatives.

The remaining 16 options fell into four main categories:

- Groundwater-based options (2 options)
- ASR-based options (3 options)
- Supplemental pipeline options (6 options)
- Displacement pipeline options (5 options)

Each of these categories includes traditional and security philosophies for supply. The traditional supply philosophy considers adding only sufficient capacity to meet the 2041 demands, and the additional capacity is added just in advance of water demands equaling supply capacity.

The security supply philosophy establishes a 10 MIGD buffer capacity in addition to the capacity needed to meet future demands. The buffer capacity is constructed early in the planning period (ie. immediately), and provides additional system capacity to replace any potential loss of source due to factors such as major mechanical failure or source contamination. Construction of additional water supply facilities is timed to maintain at least the 10 MIGD buffer.

All options include water efficiency and source water quality protection as key elements.

The 16 short-listed options were evaluated by Regional staff, the Public Advisory Committee (PAC) and the Project Team using a quantitative evaluation model based on 10 criteria. The 10 criteria are described in Table 1, attached.

### **The Preliminary Preferred Alternatives**

The evaluation process resulted in two water supply options being ranked the highest. These two water supply options are:

- Combined 10 MIGD Aquifer Storage and Recovery (ASR) and 10 MIGD Groundwater option, constructed in stages from 2001 to 2030;
- Lake Huron or Lake Erie 70 MIGD Displacement pipeline to be completed in 2018.

Tables 2 and 3 in Appendix <A' provide a comparison of the advantages and disadvantages of each of the two highest ranked options, based on the application of the evaluation criteria by the Project Team and the PAC.

Both Lake Huron and Lake Erie are suggested as possible water sources for a displacement pipeline. Based on the information collected at the Public Information Centres and a telephone survey, the majority of the public would prefer a Lake Huron water source even if the cost is higher because of perceptions of better water quality. From a treated water perspective both water sources are equal.

In discussions with the Ministry of Natural Resources (MNR), it became evident that the MNR would not support water takings from Lake Huron if the water was not returned to Lake Huron. The Region's proposal would take water from Lake Huron and transfer it to Lake Erie. The displacement pipeline option suggests that the Region would first pursue a Lake Huron option (as desired by the public) and if unsuccessful in obtaining regulatory approvals then a Lake Erie pipeline would be pursued.

From these two highest ranked options a third option was developed that combined the advantages and mitigated the weaknesses of the two options to formulate a "Strategic Plan". This "Strategic Plan" includes the following elements:

1. Implement a security ASR option (10 MIGD capacity) including finding an additional 3 to 5 MIGD of Groundwater supplies.
2. Propose a Lake Huron or Lake Erie displacement pipeline (nominal 95 MIGD exact size to be determined) scheduled for implementation in 2035.

Some of the advantages of the "Strategic Plan" option include the following:

- It makes efficient use of recently constructed water supply infrastructure, including the Mannheim Water Treatment Plant, and the Cambridge East iron removal plants. These facilities would be used for the next 35 years before being replaced by a pipeline supply source;

- Large capital expenditures and the associated rate impacts are delayed in the "Strategic Plan". This provides benefits not only to the existing user rate payers, but allows the development of a long term financing plan to minimize future rate impacts;
- It has the flexibility to adapt to changes in future water demands. Changes in water demands could be caused by a number of different factors including increases or decreases in the rate of growth, limits on growth, climate changes, and increased or decreased water use efficiency. By changing the timing of implementation of the components of the "Strategic Plan", it is possible to meet future challenges;
- The plan takes a long term view of the Region's water supply, potentially assuring the Region's water supply well past 2041.

**User Rate Impacts**

The estimated capital and operating costs and associated net present values for each of the options are summarized in Table 4 of Appendix <A'. Based on these costs, water user rate estimates were developed for each option.

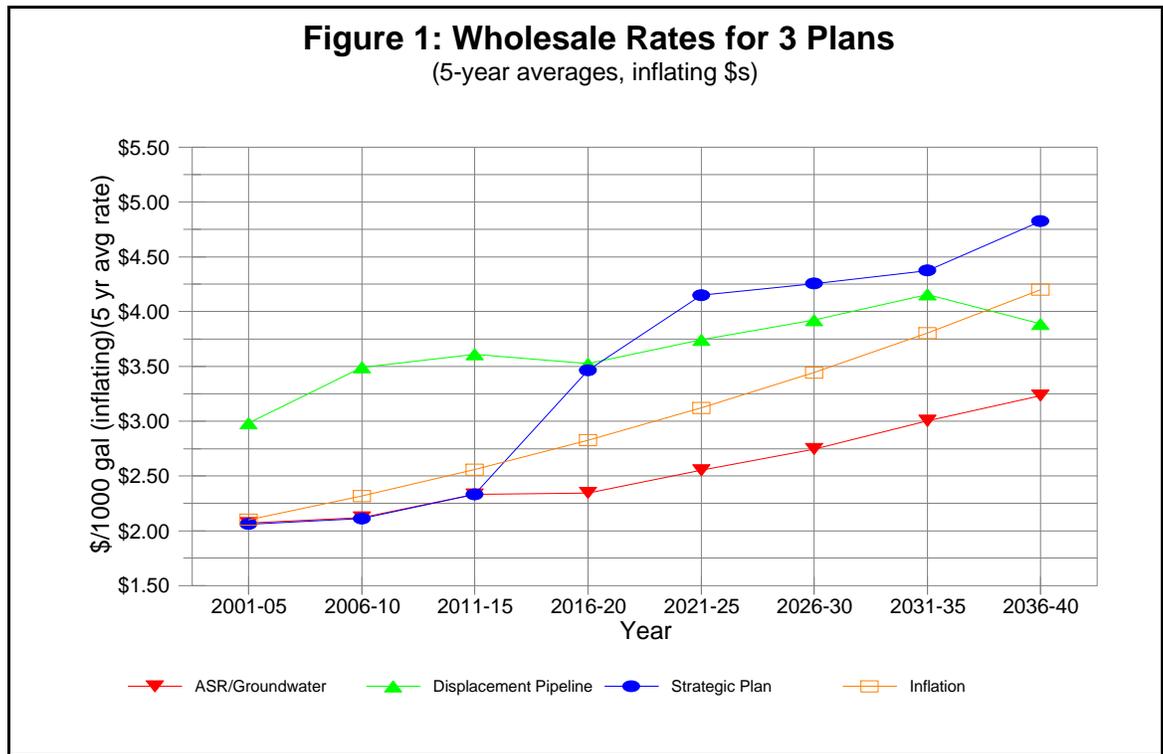
The table below provides a comparison of the short term (10 year) user rates and household impacts for each of the preliminary preferred options, as well as the current 10 year rate forecast and the inflationary trend line. The rates expressed in the table are **wholesale rates** only for the year indicated. The household impact is calculated based on the current wholesale user rate forecast.

<b>Option</b>	<b>2001 user rate /1000 gal</b>	<b>2001 average household impact (\$/year)</b>	<b>2001 household increase over current rate forecast (\$/year)</b>	<b>2009 user rate /1000 gal</b>	<b>2009 average household impact (\$/year)</b>	<b>2009 household increase over current rate forecast (\$/year)</b>
<b>Current user rate forecast</b>	\$2.02	\$96.25	----	\$2.06	\$98.16	----
<b>Inflation (2%/yr)</b>	\$2.06	\$98.16	\$1.91	\$2.41	\$114.84	\$16.68
<b>ASR/ Ground-water</b>	\$2.06	\$98.16	\$1.91	\$2.06	\$98.16	----
<b>Pipeline - 2018</b>	\$2.22	\$105.78	\$9.53	\$3.52	\$167.73	\$69.57
<b>Strategic Plan</b>	\$2.06	\$98.16	\$1.91	\$2.08	\$99.11	\$0.95

All three of the options will require increases in the Region's water user rates. The impacts in 2001 range from relatively small increases of 4 cents per thousand gallons for the ASR /Groundwater and "Strategic Plan" options to an increase of 20 cents per 1000 gallons for the displacement pipeline (2018) option. The ASR/Groundwater and "Strategic Plan" options will require only modest increases during the 10 year forecast. The displacement pipeline (2018) option will require rate increases of approximately 10% per year until a rate of \$3.52/1000 gallons is reached in 2009.

Figure 1 shows the long term (40 year) wholesale user rates in inflating dollars for each of the preliminary preferred options.

FIGURE 1.



Implementation of the ASR/Groundwater option results in rates that are lower than inflationary increases. The displacement pipeline (2018) option results in an immediate rate increase of approximately 75% with future rate increases at approximately the rate of inflation. The "Strategic Plan" defers significant rate increases until after 2015, and then rates increase by approximately 85% over 10 years with inflationary increases after that.

The Regional Development Charge pays for a portion of the capital cost of each option. A small percentage, approximately 13%, of ASR related capital costs are charged to the RDC rates. Groundwater expansions are 100% RDC funded, and the displacement pipelines are 25% RDC funded. RDC rates are impacted by a number of factors, including Development Charge legislation that limits what can be charged to the RDC. For all of the options, there would be no change to the current RDC rates until the RDC by-law is re-visited in 2004. The

ASR/Groundwater option would result in moderate increases in the RDC rate, similar to the user rate impacts. The displacement pipeline option would result in increases of 60% to 80% in the water portion of the RDC rate. The "Strategic Plan" option would result in increases similar to the displacement pipeline but the increases would not occur until approximately 2015. RDC rates will be reviewed in detail during the next by-law review in 2004

### **Presentation of the Preliminary Preferred Options and Public Comment**

These three options were presented as the preliminary preferred options to Council in February and at two Public Information Centres (PIC's) held on February 15 and 17, 2000 at Fairview Park Mall and Cambridge Centre respectively. All three options were presented as acceptable solutions to the Region's long term water supply needs, but the "Strategic Plan" was presented as the option favoured by Regional staff, the LTWS PAC and the Project Team. In addition to the PIC's, other forums such as the Region's web site and the March 2000 Environews generated considerable public comment. Staff have also made presentations to all area municipal Councils as well as to the Grand River Conservation Authority Board of Directors and the K-W Chamber of Commerce. From these public meetings and presentations, comments and concerns on a number of common issues were raised. These issues include:

- growth,
- water quality,
- water conservation,
- cost,
- security of supply,
- environmental impacts.

### **Growth**

The impact of growth and how much growth is desirable were major concerns. Some members of the public felt that limiting growth would be an appropriate solution to the Region's long term water supply issues and that growth should not exceed the servicing ability of local resources. Others felt that services should be developed so that growth can be promoted. The public felt that which ever water supply solution was selected it had to be sustainable. Some members of the public were concerned that a displacement pipeline was not a sustainable option.

### **Water Quality**

Water quality was a major issue for many of the participants in the public process. Water quality concerns were important for all of the supply options. For options using ASR and groundwater, there were concerns that the current water quality be maintained or improved on. For the Lake Huron and Lake Erie pipeline options, concerns were raised that lake water in general is not a suitable source of good quality water. Most people felt that Lake Huron water was of much better quality than Lake Erie water and that Lake Erie was not an appropriate water source.

## **Water Conservation**

Water conservation was seen as an important part of any long term strategy. Many felt that while the Region has a good record of being water efficient, more could and should be done. Many expressed the feeling that more should be done to restrict outdoor water use and that the existing local municipal bylaws should be more aggressively enforced. Some felt that water rates should be increased to promote water efficiency.

## **Cost**

Though some people expressed concern with the costs associated with increasing water supply, especially the higher cost pipeline options, most understood the necessity of increasing rates to pay for greater security, reliability and the maintenance of a high level of water quality. A significant number of people stated that they felt that the cost of water was too low, and that the low cost encourages waste of the resource.

## **Security of Supply**

It was apparent from comments received at the Public Information Centres, as well as the results from the Consumer Research Survey, that security of supply is a very important issue in the minds of the public. Comments generally supported the need to have some surplus capacity available for emergency situations. It was considered essential that the Region develop a long term solution and not take a short term approach to water supply.

## **Environmental Impacts**

Environmental impacts related to the water supply options were consistently raised as a concern. Some members of the public were particularly concerned with the potential impact of new groundwater takings. Others were concerned that taking water from the Great Lakes would have major environmental impacts. Minimizing the environmental impact of implementing any of the options was important to the public.

## **The Preferred Water Supply Option**

Based on comments received at the PIC's as well as other forums for public comment on the LTWS, support for the options is essentially split, with equal support for the pipeline and local supply options. There is significant support for the "Strategic Plan", with many of the pipeline and local option proponents viewing it as a practical solution to the Region's water supply needs.

At meetings with the LTWS PAC and Project Teams in early March, comments received at the PIC's and through other forums such as the Region's web site and the March 2000 Environews were reviewed and considered. Following review and discussion of the three preliminary preferred options, both the PAC and the Project Team came to consensus that the "Strategic Plan" would be endorsed and put forward to Council as the preferred water supply

option. Some members of the committees expressed reservations regarding the proposed late timing of construction of the pipeline, but were still supportive of the plan in general.

As noted earlier, the strengths of the "Strategic Plan" are that it allows the Region to make the most of our existing local water resources and existing infrastructure early in the planning process, thereby delaying large expenditures and significant impacts on user rates. At the same time, the "Strategic Plan" recognizes that local water resources have a limited capacity to support growth beyond 2041. It provides time to secure very long term water rights for future supply and to formulate a financing strategy and build a reserve fund to pay for the displacement pipeline when it is needed. It also has the flexibility to react to changes in factors that may impact the timing of implementation of the plan components. An additional advantage is that the ASR facility, as long as it is maintained, can be used in conjunction with a Great Lakes pipeline to meet peak demands for many decades beyond the planning period.

### **The Draft LTWS Recommendations**

Based on extensive evaluation and public consultation, the Project Team and Public Advisory Committee (PAC) are proposing the following draft recommendations. Pending public comments received at the April 26 meeting, appropriate recommendations will be presented to Council at a subsequent meeting. The draft recommendations are:

THAT the Regional Municipality of Waterloo take the following action regarding the Long Term Water Strategy:

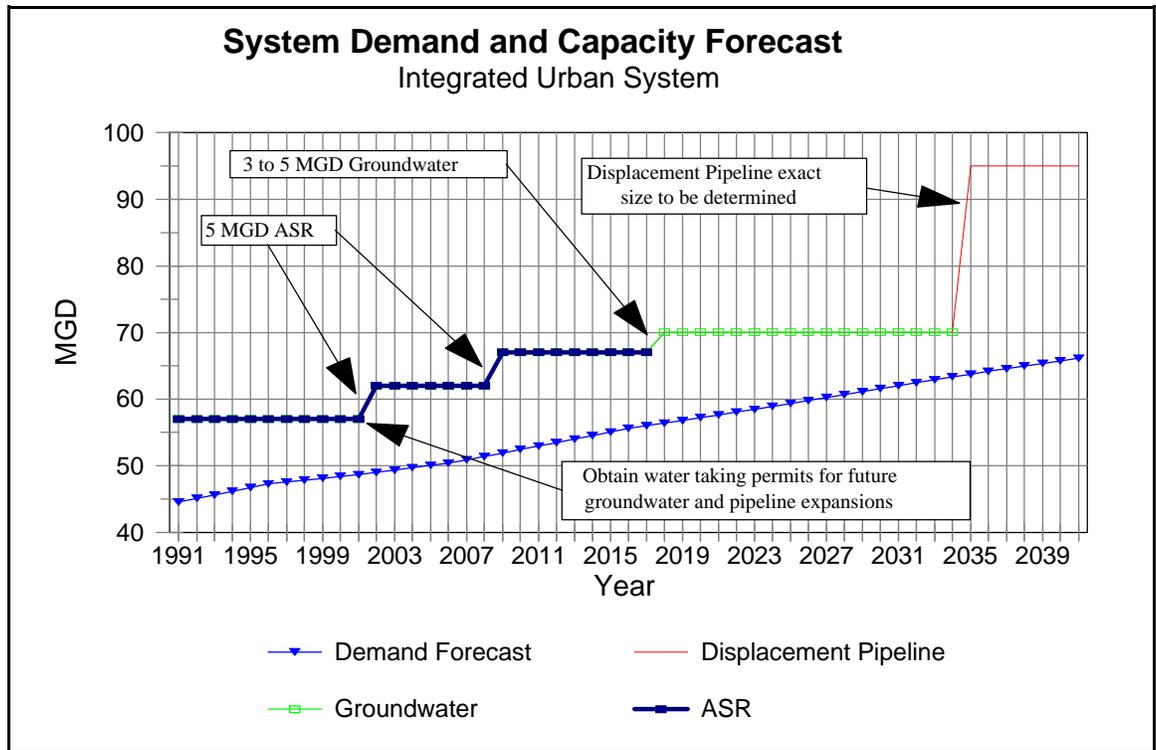
- a) approve the Long Term Water Strategy as a Master Plan under the Class Environmental Assessment process;
- b) approve the Long Term Water Strategy, including:
  - the immediate construction of a 5 MIGD ASR facility,
  - an additional 5 MIGD ASR facility in 2007,
  - 5 MIGD of additional groundwater in 2018,
  - immediately pursue acquisition of a water taking permit, land for treatment and transmission facilities and other approvals/consultations/notifications necessary for the construction of a Great Lakes pipeline
  - construction of a displacement pipeline in 2035
  - continued use of groundwater to meet the requirements of the rural water supply systems,as the Region's Water Supply Master Plan;
- c) direct staff to develop a twenty year water capital program starting with the 2001 budget;
- d) direct staff to develop a financing plan based on the rates outlined in report E-00-027 and report back during the 2001 budget preparation process;
- e) endorse the collection of 50% of the capital cost of the displacement pipeline in the 15 years prior to the start of construction;
- f) endorse continued implementation of the Water Efficiency Master Plan as an essential element of the Region's Water Supply Master Plan;

- g) endorse continued implementation of the Region’s Water Resources Protection including the water level monitoring and reporting programs, as an essential element of the Region’s Water Supply Master Plan;  
direct staff to provide annual reviews of progress on the Region’s Water Supply
- i) direct  
Plan every five years in accordance with Section 10.1.1 of the Regional Official

**The Water Supply Master Plan - Implementation Schedule**

The  
are illustrated in Figure 2.

FIGURE 2.



The demand forecast includes continued water efficiency initiatives as per the Water

**Next Steps**

Following the April 26  
made by the public. Staff will then present the final LTWS recommendations to Council at

Following approval of the WSMP recommendations, the process to acquire the necessary approvals to implement the plan will be put into motion.

The LTWS Project Team and PAC will meet in the late spring or early summer to discuss implementation of the plan and to establish the appropriate supporting structure to oversee and manage implementation.

**CORPORATE STRATEGIC PLAN:**

The Long Term Water Strategy supports the Strategic Plan goal “to create and support a climate that encourages economic prosperity”.

**FINANCIAL IMPLICATIONS:**

The "Strategic Plan" option will result in rate increases of approximately 2% in 2001 and a further 1% increase in 2002. This would result in a wholesale water rate of \$2.08 per 1000 gallons in 2002 which would remain constant until 2009. Rate impacts after 2009 would be considered during the preparation of a 20 year capital forecast for water supply. These projected rate impacts would be reviewed during the 2001 budget process.

A 20 year water capital program will be presented during the 2001 budget process. The rate impacts of the WSMP over the initial 20 year period will be identified in detail during that process.

The "Strategic Plan" option will result in moderate upward pressure on the water portion of the RDC rate in the next revision of the by-law in 2004. The water portion of the RDC rate could increase 60% to 80% in approximately 2015. The RDC rate impacts will be reviewed during the preparation of the next RDC by-law.

By collecting 50% of the cost of the displacement pipeline in the fifteen years prior to the start of construction, the impact of financing the pipeline is spread over a longer period of time, reducing the impact on rates and the amount of financing required is also reduced.

**OTHER DEPARTMENT CONSIDERATIONS:**

The Planning and Culture and Finance Departments are represented on the LTWS Project Team.

**PREPARED BY:** *S. Clarke*, Technologist I, LTWS Project Coordinator

**APPROVED BY:** *M.L. Murray*, M.Eng., P.Eng., Commissioner of Engineering and Public Works

TABLE 1. Evaluation Criteria

1. Water Quantity	Supply options must be capable of meeting 2041 water demands. Security vs. Traditional supply is evaluated under this criterion.
2. Treated Water Quality	Supply options must meet health-related Ontario Drinking Water Objectives. Water softness is scored within this criteria.
3. Reliability	The ability of a supply option to ensure uninterrupted water supply.
4. Environmental Impacts	The measure of short-term construction and long-term water taking impacts.
5. Public Perception	Community perception of the acceptability of each option.
6. Flexibility	The ability of a supply option to react to changes in demand.
7. Cost	The measure of capital, operations and maintenance costs, and net present value.
8. Implementation	An evaluation of potential difficulties with the environmental assessment, approvals, design, and ease of construction.
9. Sustainability	An assessment of the degree to which each option is sustainable.
10. Region Control	An assessment of Regional ownership, purchase or partnerships.

TABLE 2. Advantages and Disadvantages of ASR/Groundwater and Pipeline Options

<b>Aquifer, Storage and Recovery (ASR) 10 MGD plus 10 MGD of Groundwater</b>	
<b>Advantages</b>	<b>Disadvantages</b>
Reliable	Hard water - continued use of groundwater
Exceeds 2041 demands - Provides security of supply	Limits others use of groundwater - groundwater being used by the Region cannot be used by others
Low cost - Low capital cost and expenditures are distributed evenly throughout the planning period	Public perception regarding additional groundwater taking
Implementation is straight forward - No environmental assessments (EA) are required for ASR but new groundwater takings will require completion of EA and water taking permits	
Sustainable approach	

TABLE 3. Advantages and Disadvantages of the Displacement Pipeline Option

<b>Displacement pipeline to Lake Huron or Lake Erie (70 MGD in 2018)</b>	
<b>Advantages</b>	<b>Disadvantages</b>
Reliable	Public perception concerning water quality from Lake Erie is an issue
Exceeds 2041 demands - Provides security of supply	High cost - Displacement pipeline costs are relatively high
Soft water - Water from the Great Lakes is soft enough that water softeners are not required.	Implementation is difficult - will require significant effort to obtain regulatory approvals
Low environmental impact - Reduces the associated impacts	Less sustainable - Uses external resources
Groundwater use by others not limited	Less certain outcome - regulatory uncertainty especially with respect to obtaining water taking permits

TABLE 4. Capital, Operating and Net Present Value Cost Comparisons

Option	Capital Cost	Operating Cost	Net Present Value
ASR/Groundwater	\$72 million	\$0.4 million/yr, plus \$10 million /yr for the existing system	\$492 million
Displacement Pipeline - 2018 Lake Huron Lake Erie	\$478 million \$432 million	\$10 million/yr \$10 million/yr	\$700 million \$675 million
Strategic Plan ASR/Groundwater  Lake Huron Lake Erie	\$26 million  \$513 million \$467 million	<u>2000 to 2035</u> \$0.4 million/yr, plus \$10 million /yr for the existing system <u>after 2035</u> \$9.9 to \$10.4 million/yr \$9.9 to \$10.4 million/yr	\$566 to \$575 million (NPV's include ASR/GW component)

The costs shown in Table 4 are in 1999 dollars.