



City of Guelph

ENVIRONMENTAL SERVICES

Report:

TO: Planning, Environment & Transportation Committee

DATE: September 11, 2006

SUBJECT: Water Supply Master Plan – Short-Term Implementation Plan

RECOMMENDATION:

“THAT the Water Supply Master Plan be approved in principle, excluding a Great Lakes Surface Water Supply;

AND THAT, prior to any consideration of a Great Lakes Surface Water Supply, staff report back with more information”,

AND THAT, the Implementation Strategy for the year 2006 outlined in Appendix “A” in this report be approved.

SUMMARY:

In accordance with the Environmental Assessment Act, Council approval of the Water Supply Master Plan is required in order to implement the further work required on the individual water supply projects recommended in the Master Plan.

Under a Council resolution, the Water Supply Master Plan (WSMP) was initiated in the fall of 2004. The City retained the consulting team of Earth Tech, Lura, Lotowater and C.N.Watson to complete the study.

The City of Guelph’s WSMP presents a number of options that will enable Guelph to maintain a consistent and reliable water supply as the City grows over the next 50 years (i.e. to 2054). The plan’s overriding objective is to allow Guelph to maximize its water supply, while ensuring the City’s quality of life and protection of the environment. It also provides a framework for the provision of additional water supplies, as these are needed both to ensure supply for growth and the reliability of the current system for existing customers.

Future Council decisions related to the WSMP (see "**Implementation Plan**"; page 6) will be affected by the current City's Growth Management Study, which will explore options and capacity for growth and provide for community input. The Growth Management Study will identify and analyze the factors that will shape Guelph's future growth and will recommend appropriate municipal initiatives to achieve the desired future.

Options studied in the plan include:

- **Careful conservation and demand** management of the existing supply, with targets for this conservation; for example a 15% reduction in current usage by 2017 and a 20% reduction by 2025.
- Making full use of existing, sustainable supply from **groundwater sources within the City**, such as current and new wells, and the treatment of other wells that might be brought on line to supplement supply.
- In consultation and with concurrence from the County and Townships, develop additional **groundwater sources from outside the City**, for example using existing test wells or new wells within the County, to the southeast and southwest of Guelph or in the area of Guelph Lake.
- Careful examination and development of **Local Surface Water Alternatives** which could include new surface water treatment plants, or the construction of an Aquifer Storage Recovery (ASR) System adjacent to the Eramosa River and Guelph Lake.
- Joint or cooperative development with other municipalities of a **Great Lakes Pipeline**, and the sharing of the subsequent supply that would be created.

The WSMP project was not intended to review water distribution and underground infrastructure requirements. The Master Servicing and System Optimization Study being undertaken by Engineering Services is considering future underground infrastructure requirements.

A draft summary report of the project was produced in February, 2006 (available on the City's web site) and presented to regulatory agencies, adjacent municipalities and the public in March. A workshop was held with City Council in April, 2006 to brief Council on the details of the draft Water Supply Master Plan. A draft final WSMP has been prepared and will be finalized upon acceptance by City Council. Copies of the draft final WSMP are available for viewing at the City Clerk's office, and are available to Council on request.

This report provides a summary of the WSMP to advise Council of the short-term implementation plan. The short-term implementation plan (Appendix A and B) will further evaluate and implement conservation programs to reduce demand, and identify and evaluate local groundwater resources to supplement the current water supply system. Appendix B includes a brief description of the various alternatives that will be further investigated during the short-term implementation plan. Costs in Appendix B include estimated costs for full implementation to the

end of the 50 year plan. Not all of these projects may reach full implementation. While other mid- and long-term supply alternatives (see Appendix C) have been considered in the WSMP, there is insufficient information to fully evaluate the feasibility, costs or environmental impacts of these alternatives and therefore the WSMP recommends additional investigation and evaluation as the next step.

BACKGROUND:

In summary, the Master Plan consisted of the following components:

Public Consultation/Communication: Consultation with the public and communication of the water supply alternatives and implications were critical components of the WSMP. Stakeholders in Guelph and the surrounding municipalities were encouraged to contribute to the WSMP and to provide input on the supply alternatives and the future direction of the City's water supply. A WSMP Public Advisory Committee (PAC) with broad representation from stakeholders was established to provide support and advice to the WSMP Project Team. The PAC was comprised of representatives from the community (business, industry, developers, and agriculture), adjacent municipalities, members of the public as well as members of Council. The project team held:

- Three meetings of the PAC;
- Two Agency/Municipality workshops composed of representatives from the Grand River Conservation Authority (GRCA), provincial Ministry of the Environment (MOE), provincial Ministry of Natural Resources (MNR) and adjacent municipalities;
- Two additional workshops for City Council and for City/Adjacent Municipalities to brief councils on the findings of the project;
- Two public meetings for the general public were held, one at the outset of the project and one near completion. Both were very well attended with a high level of participation and numerous written comments;

Water Supply Demand Forecasts: The demand forecasts for the planning period considered population growth and the effectiveness of conservation programs and the reduction of unaccounted for water (UFW) system losses as they relate to demand.

For population estimates, the project team used the projections in the City's Development Charges Study (2004) to 2027. Beyond 2027, three possible growth scenarios to 2054 were identified – low (1.5%), medium (2.0%) and high (2.5%). The low range represents the population growth as proposed in the City's Official Plan which projects to the year 2021, while the high growth approximates the Provincial "Places to Grow" which projects to the year 2031. The demand forecasts project these growth rates to the year 2054 for the purposes of the 50 year master planning process.

Potential Areas of Additional Groundwater: From existing information, including the Water Resources Quadrant Studies and the Guelph-Puslinch

Groundwater Protection Study, the WSMP has identified areas of potential groundwater resources for future supply. These include:

- Treatment for existing wells – there are several wells within the City that currently have permits to take water but are not being used because of natural or man-made contaminants. This option will assess the feasibility of returning these wells to service using treatment systems. This option could potentially increase the City's water supply capacity by an additional 9,600 m³/day. There are, however, potential constraints on returning these wells to service including overall cost, impacts on surface water and wetlands and impacts on contaminated sites. Not all of the proposed capacity may be available.
- Optimize existing wells – there are existing wells (Downey Well, Membro Well and Water Street Well) that, with upgrades and/or modifications to improve overall performance, water quality and source security, may be able to yield more water. The WSMP also considers using a number of test wells that have been constructed in the past. This option could potentially increase the City's water supply capacity by an additional 16,500 to 37,000 m³/day. Additional investigations and studies (i.e. hydrogeological studies, long-term pumping tests and environmental impact studies) would be required to obtain regulatory approval for the additional capacity. Not all of the proposed capacity may be available.
- Installing new wells inside City boundaries - the Guelph-Puslinch Groundwater Flow Model was used to identify potential new wells inside the City boundaries. Implementing this option could potentially increase the City's water supply capacity by an additional 5,500 to 7,500 m³/day. Additional investigations and studies (i.e. hydrogeological studies, long-term pumping tests and environmental impact studies) would be required to obtain approval for the additional capacity. Not all of the proposed capacity may be available.
- Installing new wells outside of the City – the WSMP identifies that there is potential to take additional water from the Amabel aquifer, located under and near Guelph. Four possible areas have been identified but would require consultation with adjacent municipalities. Considerable hydrogeological investigations are required to confirm the available groundwater and associated environmental impacts, and to obtain regulatory approval for the additional capacity. This option could potentially increase the City's water supply capacity by an additional 11,700 to 20,700 m³/day. Not all of the proposed capacity may be available.

New Local Surface Water Supply: Two locations for additional surface water taking in the Guelph area were evaluated – the Guelph Lake reservoir and the Eramosa River. Two approaches were considered – a supply directly from the surface water all year around and an additional taking at times of high flows in the river. In the second approach, the City would take water at various times of

the year (i.e. high spring flows) and store it underground in the deep bedrock aquifer system. This approach is called Aquifer Storage Recovery (ASR) and has the advantage that potable water can be stored for extended periods of time. The water is taken from the aquifer through wells and disinfected before being distributed into the system. ASR has been widely implemented in the U.S. and Europe and most recently in the Region of Waterloo.

While additional investigation and consultation is required to determine the feasibility of this option, for Guelph Lake, there is potential to take an additional 27,119 m³/day, while the Eramosa River shows potential to take an additional 6,340 m³/day using ASR. Not all of the proposed capacity may be available.

New Great Lakes Surface Water Supply: The Water Supply Master Plan also considered a Regional Surface Water Supply using Lake Erie as a water supply source. The water would be distributed by a pipeline from Lake Erie, originating at the Nanticoke Water Treatment Plant through the County of Haldimand and terminating at the Region of Waterloo. Other municipalities, including Guelph, could be connected to the pipeline. With a pipeline option, the City would have two choices: using the pipeline to supplement existing groundwater or using it to supply all of its water in the future. The Region of Waterloo has adopted this option as part of its Long Term Water Supply Strategy. It requires considerable additional investigation and consultation to determine feasibility, costs and environmental impacts, but could provide 120,000 to 210,000 m³/day. It may only be considered in the long-term under some of the high demand scenarios (e.g., Places to Grow) or if the local groundwater and/or local surface water options are limited by potential environmental impacts and regulatory approvals. The WSMP includes it as a security-of-supply option in the event that sufficient supplies are not available from existing or new local sources. There is currently insufficient information on a Great Lakes water source and staff is recommending that this option be excluded from the WSMP approval. Staff will provide Council with additional information as it becomes available.

IMPLEMENTATION PLAN:

Under the Environmental Assessment Act, Council approval of the WSMP is required in order to undertake further work required on the individual, short-term water supply projects in the WSMP.

The project team has developed a 50-year implementation plan to address future water supply in Guelph. This plan combines many of the alternatives identified above over three timeframes – short (2006 to 2010), medium (2011 to 2025) and long-term (2026 to 2054) – resulting in a series of phased recommendations.

Upon adoption by Council of the recommendations above, staff will proceed within the approved 2006 budget with the short-term recommendations, as described in Appendix B. The Short-Term Recommendations are primarily intended to implement the Water Conservation and Demand Management Alternative and the Additional Local Groundwater Alternatives. The Additional

Local Groundwater Alternatives require class environmental assessment (Class EA) projects involving environmental impact studies, further public input and regulatory review and further Council approval. Results of the short-term recommendations will be used to develop the mid- and long-term recommendations for the 50-year Plan. Potential mid- and long term alternatives are described in Appendix C.

The WSMP is intended to be updated every five years. The results of the short-term recommendations and the feasibility studies will be used to modify the WSMP as necessary and be reported back to Council. In the next revision, WSMP recommendations will be updated for consistency with recommendations of the Wastewater Master Plan and other related planning studies, including the Growth Management Study.

CORPORATE STRATEGIC PLAN:

This initiative is aligned with the following Strategic Directions:

1. To manage growth in a balanced, sustainable manner;
 - Establish an ongoing assessment of the City's infrastructure to ensure it is appropriate for current and anticipated growth;
 - Work with neighbouring municipalities and all levels of government on policy and direction;
 - Cooperate and partner with local agencies, service providers and clients on growth management issues.
2. To be strong environmental stewards;
 - Evaluate and implement proven and leading-edge environmental technologies and programs.

FINANCIAL IMPLICATIONS:

Upon adoption of the WSMP (excluding the Great Lakes Surface Water Supply), staff will proceed within the approved 2006 budget with the short-term recommendations, as outlined in Appendix A. The remainder of expenditures on the short-term recommendations (2007-2010) will be considered by Council during the 2007 budget process.

In addition, Class Environmental Assessment projects associated with the Additional Local Groundwater Alternatives under the short-term recommendations, will require further Council approval.

DEPARTMENTAL CONSULTATION:

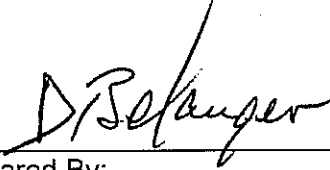
Development Planning and Engineering Services were members of the WSMP Project Team and have participated in the project since its inception.

COMMUNICATIONS:

The project has included a significant public consultation program (see above.)

ATTACHMENTS:

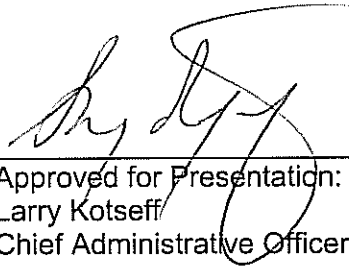
- Appendix "A" - WSMP Recommendations Cash Flow Summary
- Appendix "B" – Detailed Short-Term Implementation Plan
- Appendix "C" – Potential Mid- & Long-Term Recommendations



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APPENDIX "A"
Short Term Implementation to 2010

		Water Supply Master Plan Recommendations - Preliminary Summary				Total Cost
SHORT TERM RECOMMENDATIONS	remainder of 2006	2007	2008	2009	2010	
1. Water Conservation / Efficiency Implementation						
- Conservation effort (2)	\$175,000*	\$435,000	\$435,000	\$435,000	\$435,000	\$1,740,000
- Study costs		\$150,000				\$150,000
- Efficiency effort (2)		\$275,000	\$275,000	\$275,000	\$275,000	\$1,100,000
						\$0
2. Water/Sewer Rate Study (3)						
- Study costs		\$150,000				\$150,000
- Rate increase consumption reduction		Included above	To be determined (4)	To be determined (4)	To be determined (4)	\$0
3. Wastewater Reuse		Included above	Included above	Included above	Included above	\$0
Subtotal - Water Conservation & Demand Management (10% target by 2010)	\$175,000	\$1,010,000	\$710,000	\$710,000	\$710,000	\$3,140,000
4a. Arkell Wells Expansion	\$143,437	\$430,312	\$2,000,000	\$2,000,000	\$2,000,000	\$2,973,749
4b. Arkell Infiltration gallery - optimization (seasonal)		\$400,000	\$400,000	\$400,000	\$400,000	\$3,686,700
5. Confirm/increase existing well capacity (Membro/Downey)	\$62,500	\$187,500	\$500,000	\$607,500	\$1,278,750	\$2,636,250
6. Investigate / confirm treatment for the Edinburgh, Clyne, Sacco and Smallfield wells under existing permits, add complete the Scout Camp EA	\$125,000	\$375,000	\$1,000,000	\$3,877,875	\$6,500,000	\$11,877,875
7. Further investigations/Class EA's for the Logan, Fleming, Hauser and McCurdy existing wells	\$125,000	\$375,000	\$500,000	\$500,000	\$1,600,000	\$3,000,000
8. Further investigations/Class EA's for new wells in Gordon/Clair, Hanlon/Stone, and Speedvale/Edinburgh areas	\$154,063	\$462,188	\$2,211,250	\$1,479,000	\$543,750	\$4,850,251
Subtotal - Expand Existing Groundwater Supplies	\$610,000	\$1,830,000	\$6,611,250	\$6,484,375	\$13,409,200	\$28,924,925
9a. County/Watershed wide planning/consultation, including agencies		\$25,000	\$25,000	\$25,000	\$25,000	\$100,000
9b. Groundwater development outside City						
Subtotal - New Groundwater Supplies (outside City)	\$0	\$25,000	\$25,000	\$25,000	\$25,000	\$100,000
10. ASR Investigation/confirmation (at Guelph Lake)			\$150,000	\$150,000	\$150,000	\$450,000
Subtotal - New Local Surface Water Supplies	\$0	\$0	\$150,000	\$150,000	\$150,000	\$450,000
11. New Regional Surface Water Supply	\$0	\$0	\$0	\$0	\$0	\$0
Subtotal - New Regional Surface Water Supply	\$0	\$0	\$0	\$0	\$0	\$0
TOTALS	\$785,000	\$2,865,000	\$7,496,250	\$7,349,375	\$14,294,200	\$32,514,825

* Approximate remaining Conservation Budget from 2006 Waterworks/Wastewater Operations budget

(1) Includes 25% engineering and estimating contingencies in 2006 Dollars. Budget accuracy from +40% to -25%.

(2) As per Water Conservation and Efficiency Study Final Report (February 1999).

(3) As per Bill 175 Sustainable Water and Sewerage System Act requirements.

(4) Based on Water Supply Master Plan; Master Servicing System Optimization Study, Water Distribution/Storage and Wastewater Conveyances, Wastewater Treatment Master Plan, and Guelph-Pulhinch Groundwater Study outputs.

(5) As per Wastewater Treatment Master Plan outputs.

(6) City provided for Arkell Well.

APPENDIX "B"

DETAILED SHORT-TERM IMPLEMENTATION PLAN

The following provides the details and budget estimates of the short-term implementation plan. Budget amounts will be confirmed through the 2007 budget process:

Water Conservation and Demand Management:

- Consultant study to advance the 1999 Water Conservation and Efficiency Study, to update the proposed program (i.e. develop new 5-year plan) and cost estimates and to provide implementation support (i.e. implement education programs, ICI program, water audits, etc.). (Estimated Costs - \$150,000);
- Implement full Water Conservation and Efficiency Plan (residential and ICI toilet and washing machine replacement program, ICI water audits, public awareness/education program and UFW reduction program) (Estimated Costs - \$710,000 per year for five years);
- Undertake a Water/Sewer Rate Study in 2007 to address conservation rates and the financial plan aspects of Bill 175 (The Sustainable Water and Sewerage Systems Act) to reflect full cost pricing by approximately 2012 as per the Watertight Report. Concurrent Development Charge recalculation will be completed to reflect the outputs of this work and the Growth Management Strategy. (Estimated Costs - \$150,000)
- Confirm viability of wastewater reuse and related infrastructure needs and costs. This work and related costs are included in the ongoing Wastewater Treatment Master Plan.

Expand Existing Groundwater Supply System:

- Complete the Arkell Class EA and bring this new water on line as soon as possible (Estimated Remaining Study Costs - \$36,250, Estimated Remaining Capital Costs \$2,600,000);
- Investigate the feasibility of optimizing the Arkell Glen Spring Collector and if feasible, reconstruct the Collector System (Study/ Investigation/ EA Costs - \$957,000, Total Estimated Capital Costs (if fully implemented) - \$10,300,000);
- Confirm and, if available, increase capacity of existing municipal wells (Membro, Downey, etc.). (Study/Investigation/EA Costs - \$677,900, Total Estimated Capital Costs (if fully implemented) - \$2,600,000);
- Investigate the treatability of the water and, if feasible and economical, initiate the required regulatory approvals and/or EA's for the Smallfield, Sacco, Clythe and/or Edinburgh wells. In addition, complete the previously initiated Scout Camp Class EA (Study/Investigation/EA Costs - \$2,791,300, Total Estimated Capital Costs (if fully implemented) - \$15,200,000);

APPENDIX "B"

- Further investigations including new or reconstructed test well and long-term pumping tests for the existing Logan, Fleming, Hauser and McCurdy test wells and, if feasible and economical, initiate EA's (Study/Investigation/EA Costs - \$2,743,400, Total Estimated Capital Costs (if fully implemented) - \$9,900,000)
- Further investigations including the construction of test wells, long term pumping tests and preliminary environmental impact assessments for new wells at Gordon/Clair, Hanlon/Stone and Speedvale/ Edinburgh areas and, if feasible and economical, initiate a Class EA (Study/Investigation/EA Costs - \$1,874,100, Total Estimated Capital Costs (if fully implemented) - \$6,200,000);
- Initiate discussions and studies with County, Township and Agencies to potentially expand the water supply system outside of the City and/or to initiate surface water supplies (Estimated Costs - \$100,000).

New Local Surface Water Supplies:

- Initiate technical feasibility study for local surface water and Aquifer Storage Recovery (Estimated Costs - \$450,000).

New Regional Surface Water Supply:

Staff to continue to obtain information. No funding or approvals are sought or required at this time.

Funding for Short-Term Recommendations:

Approved funding sources for the initial requirements of the short-term recommendations include the following:

- \$10,200,000 in the Waterworks capital budget and forecast for New Water Supply;
- \$2,800,000 remaining in the Arkeil New Water Supply capital budget; and
- \$356,700 per year in Waterworks and Wastewater operating budgets to partially fund the Water Conservation and Demand Management Program. Due to Development Charges legislation, water conservation and demand management options cannot be funded from development charges and must be funded from user rates.

All budget amounts for short-term recommendations will be confirmed through the 2007 budget process. Based on a preliminary cash flow projection (Appendix "A"), additional funds will be required in mid 2009. Future budget revisions will be completed in conjunction with the Water/Sewer Rate Study, the Wastewater Treatment Master Plan, the Master Servicing and Optimization Study, and the Development Charges review study.

APPENDIX "C"

POTENTIAL MID-TERM RECOMMENDATIONS – 2010 – 2025 (DEPENDENT ON RESULTS OF SHORT-TERM RECOMMENDATIONS):

1. Continue water conservation efforts with a goal to achieve 15% average day reduction;
2. Expand the existing water supply system by adding existing wells that require treatment upgrades, adding new wells inside the City boundaries, and adding new wells outside the City boundaries with approval from neighbouring municipalities; and,
3. Begin to put in place infrastructure to support new supplies – may include new groundwater and/or local surface water supplies, depending on results of feasibility studies and availability of groundwater sources.
4. There is currently insufficient information on a Great Lakes source and staff are not seeking approval at this time. Staff will provide additional information to Council as it becomes available.

POTENTIAL LONG-TERM RECOMMENDATIONS – 2025 – 2054:

The long-term measures depend on the decisions made in the next few years about growth and the future supplies of water for the City. Once these decisions are made, infrastructure improvements can begin during the mid-term phase to be ready for implementation in the longer term.

The alternatives and proposed implementation plan are recommendations put forward by the project team to the Guelph community. There will be opportunity for further input by the community and Council during the Class Environmental Assessment process for each water supply project.