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Long Term Water Project
Master Plan Update
Regional Municipality of York
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Executive Summary

The Master Plan is a long-range plan that integrates infrastructure requirements for existing and future land use with environmental assessment planning principles. It is the most appropriate tool to examine the Region's water infrastructure system in order to outline a framework for planning for subsequent projects. The purpose of the Master Plan Update is to help to coordinate growth expectations and water service improvements throughout the Region through to 2036. The Master Plan Update examined each water system, and recommends appropriate long-term water infrastructure improvements for the Region's capital program.

The following table shows the anticipated population growth in the Region to 2026. Total population is expected to exceed 1.4- million by 2036.

Water System	Service Area	2006	2011	2016	2021	2026
YWS ¹	Aurora	48,184	54,898	62,623	68,632	74,635
	Holland Landing	12,478	11,585	14,325	15,310	15,060
	Queensville/Sharon	4,800	9,967	15,725	24,990	34,416
	Markham	267,247	292,647	301,168	323,234	345,487
	Newmarket	79,000	87,000	91,000	95,000	98,000
	Richmond Hill	170,822	195,077	204,000	212,000	219,000
	Vaughan	255,975	296,163	274,657	298,796	321,769
GWS ²	Keswick	26,219	29,888	35,479	41,697	47,699
	Lakeshore	2,926	2,901	2,832	2,792	4,068
	Sutton	7,764	10,365	13,030	14,509	14,328
SAT ³	Mount Albert	4,442	5,095	5,679	5,550	5,459
	King City	6,004	7,200	10,013	11,843	12,500
	Nobleton	3,583	5,075	5,832	6,484	7,493
	Schomberg	2,521	2,514	2,510	2,476	3,301
	Kleinburg	4,067	4,898	3,943	3,856	5,909
	Ballantrae	6,389	6,547	6,455	6,301	6,194
	Stouffville	12,148	16,245	20,447	23,694	26,312
UN ⁴		37,160	38,653	37,281	37,838	38,370
Grand Total		951,728	1,076,719	1,107,000	1,195,002	1,280,000

¹ York Water System

² Georgina Water System

³ Satellite Systems

⁴ Not serviced by a Regional water system

The Master Plan examined 5 alternative solutions to respond to the growth requirements of each water service area:

- Do Nothing
- Limit Community Growth
- Reduce Water Use
- Expand Existing Water Supply System
- Integrate Water Supply System with adjacent system(s)

Both the *Do Nothing*, and the *Limit Community Growth* alternatives were not considered acceptable solutions because they would have significant impacts on the growth potential of the Region and therefore are contrary to the Regional Official Plan. The *Reduce Water Use* alternative is already being implemented through the Water For Tomorrow Program, but would not be capable of meeting future demands in and of itself. *Expand Existing Water Supply System* would mean increasing outside pumping capacity, water treatment capacity, additional groundwater capacity, and/or expanding transmission facilities. This option will achieve the desired water demands required by the Region.

The Region currently provides water service to the following general service areas:

- York Water System
- Yonge Street Aquifer System—integrated with the York Water System
- Georgina Water System
- Satellite Systems, including: Mount Albert, King City, Nobleton, Schomberg, Ballantrae, and Stouffville

Public and Agency Consultation was an important element of the Master Plan Update. It allowed the general public and relevant agencies to provide input to the master planning study. A notice was placed in a local newspaper on June 9, 2002 to allow the public to be aware of the commencement of this study. Two Public Information Centres took place, the first on February 11, 2003 and the second on September 16, 2003. These Information Centres allowed the public to view information and ask the staff and the consultant team, questions pertaining to the ongoing study.

The recommended long-term infrastructure program is estimated to cost more than \$470- million, and is summarized in the following table:

Water System	Supply & Treatment	Pumping Stations	Watermains	Storage Facilities	Decommission	Grand Total
York Water System	\$1,100,000	\$42,079,000	\$228,013,000	\$24,586,000	\$850,000	\$296,628,000
Yonge St. Aquifer System	\$28,307,000		\$51,696,000	\$5,777,000	\$300,000	\$86,080,000
Georgina Water System	\$4,320,000		\$22,670,000	\$2,499,000	\$200,000	\$29,689,000
Satellite Systems	\$28,550,000	\$2,160,000	\$10,891,000	\$17,015,000		\$58,616,000
Grand Total	\$62,277,000	\$44,239,000	\$313,270,000	\$49,877,000	\$1,350,000	\$471,013,000

1 Introduction

1.1 Background

In July 1997, the Long Term Water Project Master Plan was completed by United Utilities Canada Limited for York Region to identify the Region's strategy to meet projected water demands to 2031. The Master Plan was undertaken in accordance with the Municipal Class Environmental Assessment (Class EA) guidelines for Water and Wastewater Projects. The Master Plan identified four (4) primary activities for the recommended long-term water supply solution.

1.1.1 Expand water supply from the City of Toronto

The first activity involved the continuation of the expansion of water supplies from Metro Toronto up to 259 ML/d—the anticipated average day demand of the York Water system or a max day limit of 440 ML/d, until about 2004. During this time it was intended that the Region would undertake a modeling and optimization study in cooperation with the City of Toronto using state of the art computer analysis involving genetic algorithms to optimize the infrastructure and capital and operating cost requirements for the increased supply from Toronto.

The hydraulic model optimization was undertaken jointly with the City of Toronto to identify long-term infrastructure requirements to service growth to 2031 in Toronto and York Region. The results of this study have identified the optimal transmission capacity that could be transferred from both Toronto and Peel to York Region, and the various infrastructure improvements that would be necessary to achieve this.

1.1.2 Implement Water Use Efficiency Program

The second activity was a water-use efficiency program designed to achieve up to 19 ML/d in maximum day water savings in the Region by 2006. The “Water for Tomorrow” program is an aggressive four-part effort, including residential and industrial retrofits; industrial, commercial and institutional water audits; a leakage reduction program; and broad-based public education. The first stage of the program is nearing completion and it is expected to meet or exceed the target savings.

1.1.3 Construct Lake Simcoe Water Treatment Facility

The third activity was the construction of a new water treatment facility in the Town Georgina—to replace the existing Sutton Filtration Plant and provide the long-term water supply requirements for Sutton, Keswick and the lakeshore area. Construction of the works began in May 2001, and the new facility was commissioned in Fall 2003. To be expanded in phases, the ultimate capacity of the facility will be 50 ML/d.

1.1.4 Construct new supply from Lake Ontario

The fourth activity was to develop a new a supply from Lake Ontario, and the Lake Ontario supply via Durham West was identified as the preferred solution, based on a comprehensive comparative evaluation of fourteen (14) new supply options to York Region. Due to the scope,

magnitude and inter-jurisdictional nature of the proposed undertaking, it was determined that an Individual Environmental Assessment (Individual EA) would be completed.

In March 2001, the Environmental Assessment (EA) Report for the proposed “Lake Ontario Water Supply via Durham West” was submitted to the Minister of the Environment for review under the *Environmental Assessment Act*.

1.2 Rationale for Master Plan Update

The Master Plan is a long-range plan that integrates infrastructure requirements for existing and future land use with environmental assessment planning principles. It is the most appropriate tool to examine the Region’s water infrastructure system in order to outline a framework for planning for subsequent projects. The Master Plan Update will help to coordinate growth expectations and water service improvements throughout the Region. The Master Plan Update must examine each water service area in each area municipality, to recommend long-term water infrastructure improvements for the Region’s capital program.

Master Plans for infrastructure projects are typically updated every five years to ensure the infrastructure program remains consistent with the changing needs of the community served. This is especially relevant to this Master Plan Update due to the number of significant changes experienced in York Region since 1997.

1.2.1 York/Peel Water Supply Agreement

During the course of the Environmental Assessment for the Durham West solution, Peel Region completed its own water and wastewater Master Plan. Their Plan concluded that additional water supply would be required earlier than originally anticipated. As a result, it was concluded that development of an interregional supply with York—previously considered to be too costly, because of the timing difference between York’s needs and Peel’s needs—might now be mutually beneficial.

In December 1999, York and Peel Regional Councils authorized staff to commence negotiation of a potential cooperative water supply agreement as an alternative to the Durham West supply. In June 2001, York Region and Peel Region staff concluded their discussion concerning the principles of an interregional water supply agreement, and it was recommended that York Region enter into a servicing partnership with Peel Region for its long-term water supply requirements. In December 2001, York Council authorized staff to formally withdraw the Durham West EA from further consideration for approval by the Minister of the Environment, given that execution of the agreement for long-term water supply from Peel Region was imminent. York Region and Peel Region signed the York-Peel Water Supply Agreement on February 14, 2002.

The Master Plan Update must ensure that appropriate Regional infrastructure is planned and in place to accommodate the additional water supply provided by Peel Region, providing critical input to the Region’s capital program.

1.2.2 Toronto/York Joint Optimization Study

The Joint Optimization Study recommends a long-term servicing strategy for the York Water System, including the optimal mix of supply from Toronto and Peel, as well as infrastructure requirements for 2011 and 2031. The Master Plan must identify the timing and phasing of specific works required to implement the results of the Joint Optimization Study and incorporate same within the Region's capital program.

1.2.3 Updated Population Forecast

An updated 2026 planning forecast has recently been prepared by the Regional Planning Department. Based on this forecast, an estimate can also be provided to the year 2036 for the purpose of planning infrastructure improvements. This approach is similar to that adopted for the 1997 Master Plan. Proceeding with the Master Plan Update for the Long Term Water Project Master Plan in coordination with updated population and employment forecasts in the Regional Official Plan will ensure that long term infrastructure planning is synchronized with projected servicing requirements.

1.2.4 Oak Ridges Moraine Conservation Plan

The Oak Ridges Moraine Conservation Plan will result in growth being displaced to other parts of the Region. The Master Plan must examine the impacts on water supply infrastructure in a Regional context.

1.2.5 Possible extension of York Water System to other communities

Subsequent to the approval of the Regional Official Plan in 1994, Secondary Plans for the communities of Stouffville, Holland Landing, Kleinburg, Queensville and Sharon were approved. Extending the integrated water system to service the anticipated and approved growth in these areas may be appropriate. The Master Plan must evaluate the impacts of such extensions and ensure the infrastructure program accommodates the recommended improvements.

1.3 Master Planning under the EA Process

As a guiding approach to determine the preferred long term water supply, the Master Planning process, as outlined in the Municipal Engineers Association Class Environmental Assessment (Class EA) document, was adopted. The wide geographic area for potential project works and the length of the planning period (to 2036) suggest the Master Planning process is appropriate for the planning of this project.

The Master Planning process, together with its relationship to the Class EA process is shown in Appendix A. Although it is intended that the Master Plan Update will satisfy Phase 1 and Phase 2 of the Class EA process, implementation of specific projects identified in the Master Plan will require completion of the applicable Environmental Assessment schedule under the Class EA process:

- Schedule “A” Projects are limited in scale and have minimal adverse environmental impacts. These projects also include normal or emergency operational and maintenance activities. These projects are pre-approved and may proceed immediately to construction.
- Schedule “B” Projects have the potential for some adverse environmental impacts and are approved following screening by the public and government review agencies. These projects require completion of Phases 1 and 2 of the planning process.
- Schedule “C” Projects are more complex and have the potential for significant environmental impacts. These projects are subject to the full Class EA process (Stages 1-4) including filing of an Environmental Study Report (ESR).

An Individual Environmental Assessment may be required for very complex projects with significant environmental impacts. Schedule “B” and Schedule “C” projects may also be elevated to an Individual EA via a Part II Order, requiring the proponent to comply with Part II of the EA Act.

2 Project Objectives

2.1 Problem Identification

Pursuant to Policy 6.7 of the Regional Official Plan Office Consolidation (November 2002) it is the Region's objective to provide water (and sanitary) services to residents and businesses; that development within and expansion to towns and villages occurs on the basis of full municipal water (and sewage) treatment services where such facilities currently exist. Furthermore, the Regional Official Plan requires that a long-term water supply strategy shall be prepared to coordinate the supply of water services with the phased development of the regional structure identified in the Official Plan. The long-term water strategy must be based on the Plan and will serve as the foundation for detailed servicing plans for urban areas and towns, and will include:

- An evaluation of existing infrastructure
- A needs analysis based on a long-term (30-40 year) planning horizon
- An investigation of alternatives
- A feasibility and cost analysis
- An implementation and phasing plan

The ROP provides the structure and vision for growth in the Region, which is expected to reach almost 1.3-million people by 2026. Significant infrastructure expansion will be required to provide municipal water services for such growth.

2.2 Project Objectives

2.2.1 Secure water supplies to support growth effectively

It is an objective of the Master Plan to define the water infrastructure required to service anticipated growth in the Region in an efficient and cost-effective manner. While population and employment forecasts provide the guidelines to calculate water capacity and servicing requirements, careful staging and phasing of the water infrastructure program is required to accommodate growth in a timely manner while avoiding over-commitment of expensive capital works.

2.2.2 Protect the Environment

It is an objective of the Master Plan to ensure the existing natural environment is capable of meeting the needs of the present without compromising the ability of future generations to meet their own needs. In developing the long term water strategy, the Region must be sensitive to the environment and must meet or exceed all relevant guidelines, policies and standards, including those pertaining to groundwater resources and the Oak Ridges Moraine.

2.2.3 Rate Stability and Cost Minimization

It is an objective of the Master Plan to maintain water rate stability through the implementation of the projects identified in the long term water program. This objective will be accomplished by minimizing cost and optimizing delivery of works to correspond to anticipated population and employment growth.

3 Existing Conditions

3.1 Population and Employment

On May 15, 2001, Statistics Canada conducted the Census of Population to develop a statistical portrait of Canada and its people. The census is considered a reliable source for describing the characteristics of Canada's people, dwellings and agricultural operations. Table 3.1 shows a summary of population and employment for each Area Municipality in York Region as at 2001 pursuant to the census.

Table 3.1: Summary of 2001 Population and Employment

Area Municipality	Population	Employment
Aurora	41,650	16,000
East Gwillimbury	21,272	5,000
Georgina	40,986	8,000
King	19,211	6,000
Markham	217,120	119,000
Newmarket	68,207	33,000
Richmond Hill	137,843	59,000
Vaughan	190,537	132,000
Whitchurch-Stouffville	22,825	8,000
York Total	759,651	386,000

3.2 Existing Water Systems

Two water filtration plants and eight groundwater-based systems, together with an integrated system shared with the City of Toronto, provide water supply in the Region of York. In 2001 York delivered more than 100-million m³ of potable water across the Region with approximately 80% from Lake Ontario to the south urban area. Water service areas in the Region are generally defined as the York Water System, the Yonge Street Aquifer System (integrated with the York Water System), the Georgina Water System, and Satellite Systems.

3.2.1 York Water System

The York Water System (YWS) receives water from the City of Toronto to serve Markham, Richmond Hill and Vaughan, from PD4 in Woodbridge to PD7 in Maple and PD9 in Richmond Hill. Some districts having the same top water level (TWL) are not interconnected and others have localized intermediate zones—therefore there are actually 12 service areas within the six pressure districts (PD4 to PD9). The addition of Aurora and Newmarket to the YWS will add another 7 pressure districts to the integrated system. Appendix B (Figure B.1) shows details of the existing York Water System, including the integrated Yonge Street Aquifer System.

Water supply from the City of Toronto is governed generally by the agreement between the City and the Region dated September 1998. The agreement includes projected flow rates at each of the twelve existing interconnection points (Table 3.2). The original agreement provided for a maximum flow rate of 440.4 ML/d, but is subject to ongoing negotiation with the City of Toronto expected to be completed in 2004. The City has recently agreed to provide an additional 20 ML/d (for a total of 460 ML/d) under the terms of the existing agreement.

Table 3.2: Existing and Projected Max Day Flows through Metering Points (ML/d)

Meter No.	Location	PD	1998 ML/d	1999 ML/d	2000 ML/d	2001 ML/d	2002 ML/d	2003 ML/d	2004 ML/d
1	Adesso Drive	PD5W	20.7	21.4	22.0	22.5	22.9	23.2	23.3
2	Bathurst/Steeles	PD5	15.9	10.4	11.1	11.8	12.5	1.2	(11.4)
3	Bayview PS	PD6	107.4	111.2	121.5	132.2	133.8	141.3	147.2
4	Dufferin/Steeles	PD5	-	22.4	23.9	25.4	26.9	28.4	29.9
5	Islington/Steeles	PD4W	15.5	15.5	15.3	15.0	14.6	14.0	13.2
6	Keele/Steeles	PD5	47.4	51.7	56.2	60.8	65.5	70.3	73.9
7	McCowan/Steeles	PD5	33.2	33.7	34.0	34.0	33.8	33.3	35.0
8	Milliken PS PD5	PD5	19.6	21.0	22.4	23.9	25.4	50.4	77.7
9	Milliken PS PD6S	PD5M	18.6	20.1	21.5	23.0	24.5	26.0	27.4
10	Thornhill PS	PD5	13.1	14.0	15.0	15.9	26.3	37.8	50.2
11	Willowdale/Highland	PD5	(1.3)	(7.9)	(8.5)	(9.0)	(9.6)	(19.9)	(31.3)
12	Woodbine/Steeles	PD5	17.6	16.6	17.7	18.8	19.9	13.0	5.3
Total			307.7	330.1	352.1	374.3	396.5	419.0	440.4

Source: Toronto/York Water Supply Agreement, September 1998

In conjunction with this Master Plan Update and the Joint Optimization Study it was determined that Toronto would be able to supply an additional 10 ML/d to York in 2003 and a cumulative 20 ML/d to York in 2004 by implementing minor enhancements to the Keele pumping station and the Kennedy pumping station.

Woodbridge PD4 is integrated with the Toronto PD4W system to the south and supplied directly by Toronto through a single watermain on Islington Avenue. Storage is provided at the West Woodbridge Elevated Tank. The service area is the old Woodbridge community and is generally mature. The supply capacity to Woodbridge PD4 is 13.2 ML/d.

East Woodbridge PD5 is supplied directly from Toronto from the Keele PD5 PS. Isolated from York PD5 to the east; the service area lies generally between Pine Valley and Weston Road from Steeles Avenue to Langstaff Road. Although storage at the East Woodbridge Elevated Tank is less than the service area requires, supply from Toronto is available at a rate greater than maximum day demand. The supply capacity to East Woodbridge PD5 is 23.3 ML/d.

York PD5 is integrated with the Toronto system south of Steeles Ave. and supplied directly by Toronto-owned pumping stations in York and by 8 supply points generally along Steeles Ave. Thornhill and Milliken Pumping Stations are located in York but owned and operated by Toronto. York PD5 serves southern Vaughan and Markham generally along Steeles Avenue

from Dufferin Street to Ninth Line. The supply capacity to York PD5 is 155.4 ML/d. York PD5 also provides water to Markham PD6 and PD6 through a series of pumping stations.

Vaughan PD6 is supplied from Toronto Keele PD6 PS and is integrated with Richmond Hill PD6 and Markham PD6. The service area is mainly industrial/commercial, and it lies generally between Weston Road and Bathurst Street, from Steeles Avenue to Rutherford Road. The supply capacity to Vaughan PD6 is 84.1 ML/d. Vaughan PD6 also provides water to Vaughan PD7.

Richmond Hill PD6 is supplied by the Bayview PS and is interconnected with both Vaughan PD6 and Markham PD6. The service area is bounded approximately by Hwy 7, Major Mackenzie Drive, Bathurst Street and Hwy 404. The service area supplies Buttonville PD6S through a PRV near Hwy 7 and Hwy 404 and supply also extends east of Hwy 404 along 16th Ave. to serve a residential area in West Markham (PD6M). The supply capacity to Richmond Hill PD6 147.2 ML/d. Richmond Hill PD6 also provides water to Richmond Hill PD7 and supply to Buttonville PD6S.

Buttonville PD6S is a reduced pressure zone between PD6 and PD5 supplied from the Bayview PS through the Richmond Hill PD6 system. The service area generally bounded by Hwy 7, 16th Ave., Hwy 404 and Warden Avenue.

Milliken PD5M is supplied by the Milliken PD5M PS, which is part of the Milliken PD5 PS owned and operated by Toronto. The system services an isolated mature area in Markham south of 14th Avenue from Warden to McCowan, north of Steeles Avenue. The supply capacity to Milliken PD5M from the City of Toronto is 27.4 ML/d.

Markham PD6 is supplied from York PD5 through the Markham PD6 PS. It services most of the area north of 16th Avenue and is interconnected with Richmond Hill PD6 and Vaughan PD6. Markham PD6M is an intermediate zone where the top water level of the district is about 20 m lower than Markham PD6. It is serviced via pressure reducing valves from Markham PD6. McCowan Avenue, 16th Avenue, 9th Line, Hwy 7 and Church Street bound the service area generally. The firm capacity of the Markham PS is 64.1 ML/d.

Maple PD7 is supplied from Vaughan PD6 through the Maple PD7 PS to supply the local community of Maple. The service area generally lies along Keele Street north of Rutherford Road. The City of Vaughan operates a local booster PS (PD8) to supply industrial development in the northern area of Maple. The supply capacity to Maple PD7 is 21.6 ML/d.

Richmond Hill PD7 is supplied from Richmond Hill PD6 through the Richmond Hill PD7 PS. The system supplies the local area of Richmond Hill north of Major Mackenzie Drive from Bathurst Street to east of Bayview Avenue. The supply capacity to Richmond Hill PD7 is 27.4 ML/d. Richmond Hill PD7 also provides water to Richmond Hill PD8. Richmond Hill PD7 is interconnected to Vaughan PD7.

Richmond Hill PD8 is supplied from Richmond Hill PD7 through the North Richmond Hill PD8 PS. The system supplies a local area in north Richmond Hill and an isolated residential area in Vaughan west of Bathurst Street and north of Elgin Mills Road. The supply capacity to

Richmond Hill PD8 is 14.7 ML/d. Richmond Hill PD8 also provides water to Richmond Hill PD9.

Richmond Hill PD9 is supplied from Richmond Hill PD8 through the Jefferson PD9 PS, serving the community of Oak Ridges. The firm pumping capacity of the Richmond Hill PD9 PS is 35.3 ML/d.

3.2.2 Peel Water Supply Agreement

The York-Peel Water Supply Agreement was negotiated in 2001 and signed in February 2002. The agreement includes a schedule of flows required by York, originally developed in November 1999 for the “Durham West” long term water supply solution. The agreement provides for annual increments in flow starting with 5.3 ML/d in 2004 up to a maximum of 388.3 ML/d in 2031 (see Table 3.3) to supplement the York Water system

Table 3.3: Agreed Flows and Timing from Peel Water System

Year	2004	2005	2006	2011	2016	2021	2026	2031
ML/d	5.3	19.4	33.6	133.9	210.5	272.0	324.6	388.3

Discussions continue with Peel Region to explore opportunities to increase or advance delivery of water supply according to York’s overall requirements.

3.2.3 Yonge Street Aquifer System

The Yonge Street Aquifer System is an integrated groundwater based system that serves the communities of Aurora and Newmarket, as well as the communities of Queensville, Sharon and Holland Landing in the Town of East Gwillimbury (see also Appendix B, Figure B.1). The Yonge Street Aquifer System is connected to the York Water System by a watermain connecting the Aurora Central zone and Richmond Hill PD9. Since November 2002, about 20% of Aurora’s water supply has been provided from the York Water System.

Water supply from the Yonge Street Aquifer System is governed generally by the 2002 Permit to take Water (Table 3.4) which includes maximum abstraction rates for each municipal well in the aquifer complex. The permit also includes special conditions relating not only to individual maximum pumping rates, but also yearly average pumping rates, peak daily pumping rates and simultaneous pumping rates.

Table 3.4: Yonge Street Aquifer Well Characteristics and Capacities

Area	Well	Pressure District	PTTW (ML/d)	Firm Capacity (ML/d)
Aurora	1	AC	3.27	3.27
	2	AC	5.89	7.78
	3	AC	5.24	5.89
	4	AC	7.85	7.78
	5	AC	5.89	5.88
	6	AC	3.46	3.46
Newmarket	1	NC	2.29	2.30
	2	NC	4.58	4.60
	11	Not used	2.29	
	13	NC	5.89	5.90
	14	NC	2.29	2.60
	15	NC	3.27	3.30
	16	NC	5.63	5.60
	9	Not used	0.79	
Sharon/Queensville	1	SQ/NE	6.54	6.50
	2	SQ/NE	6.54	6.50
	3	SQ/NE	6.54	6.50
	4	SQ/NE	6.54	6.50
Holland Landing	1	SQ/NE	2.29	2.29
	2	SQ/NE	3.60	3.60
TOTAL			90.71	86.49

Source: Permit To Take Water (PTTW)

Although the permitted capacity of the Yonge Street Aquifer System is about 90 ML/d, operational and hydrogeological constraints limit groundwater taking to about 69 ML/d. Furthermore, it is anticipated that long-term withdrawals from the Yonge Street Aquifer may be restricted pending results of the Region-wide hydrogeological assessment.

For the purposes of this assessment, it was assumed that a total of 69 ML/d is available from the Yonge Street Aquifer System for the immediate future, which is about 20% less than what the PTTW allows.

Aurora Central (AC) is supplied by 6 municipal wells: 5 generally located along Yonge Street between Wellington Road and St. Johns Sideroad with the 6th along Bayview Avenue. The assumed supply capacity of the Aurora wells is 25.28 ML/d (including expected PTTW reduction.)

Aurora South (AS) is supplied from the Central Zone through the Ridge Road PS, which is located at the Ridge Road Reservoir. Storage is provided by the South West Elevated Tank, which has the highest TWL in the York Water System.

Aurora West (AW) is supplied from the Central Zone through the Orchard Heights Pumping Station. The zone is located along Bathurst Street, east of Bathurst St to mid-concession. Storage is provided by the North West Elevated Tank, which is on the same site as the Orchard Heights PS.

Aurora East (AE) is a new zone supplied from the Central Zone through the new Aurora pumping station. Water demand in this area is expected to begin in 2004.

Newmarket Central (NC) is supplied by 6 municipal wells: 5 generally located along Yonge St. between Mulock Drive and Davis Drive with the 6th along Bayview Ave. The zone generally covers the centre of Newmarket from west of Leslie Street to mid-concession between Yonge and Bathurst St. Supply is also provided from the Queensville wells, via the NE zone. The assumed supply capacity of the Newmarket wells is 19.17 ML/d (including expected PTTW reduction, and excluding wells currently not in use.)

Newmarket West (NW) is supplied by the Central Zone through the Kirby Booster Pumping Station (Glenway). The zone is isolated from south of Mulock Drive and Green Lane west of Yonge Street to Bathurst Street.

Newmarket East (NE) is supplied by the Sharon/Queensville system of 4 municipal wells through the trunk watermain along Leslie Street. Formerly supplied by the Central Zone through the Davis Drive Booster Pumping Station, the zone is located between Highway 404 to west of Leslie Street.

Holland Landing is serviced primarily by 2 municipal wells located in the community. The system is integrated with the Yonge Street Aquifer System via a watermain along Mount Albert Road.

Sharon and Queensville are serviced by 2 municipal wells located near the intersection of Leslie Street and Doane Road, and 2 municipal wells located near the intersection of Woodbine Avenue and Queensville Sideroad. The system is interconnected to the Newmarket East zone via watermains along Queensville Sideroad and Leslie Street.

3.2.4 Georgina Water Supply System

Keswick: The Keswick Water Treatment Plant, constructed in 1983, is a conventional treatment facility located in the community of Keswick. The raw water intake extends 365 metres into Cook's Bay to draw water from a depth of approximately 8.5 metres. The capacity of the treatment facility is 15.6 ML/d. There are two storage facilities servicing the community, providing 10.3 ML total storage.

Sutton: The Sutton Water Treatment Plant, constructed in 1957, is a conventional treatment facility located in the community of Sutton. The raw water intake extends 180 metres into Lake Simcoe off Jackson's Point to draw water from a depth of approximately 4 metres. The Sutton WTP will be decommissioned following construction and commissioning of the Georgina water supply facility in 2003. The Sutton elevated tank provides 2.7 ML storage capacity to the community.

Georgina Water Treatment Plant: The Region has completed the first phase of construction of a new membrane filtration facility on the south shore of Lake Simcoe between the communities of Keswick and Sutton. The ultimate design capacity of the facility will be 47.0 ML/d and it is intended that it will provide municipal water supply to Keswick and Sutton as well as the lakeshore community. Phase 1 of the construction will provide capacity of 18.8 ML/d in 2004.

The Georgina Water System is shown in Appendix B, Figure B.2.

3.2.5 Satellite Systems

In addition to the York Water System and the Yonge Street Aquifer System, the Region owns and operates a number of satellite systems to service communities around the Region. The well capacity of each of the systems is shown in Table 3.5.

Table 3.5: Satellite Communities, Existing System Capacity

Area Municipality	Service Area	Well Capacity (ML/d)	Serviceable Population
East Gwillimbury	Mount Albert	4.35	2,800
King	King City	3.93	4,800
	Nobleton	3.93	4,800
	Schomberg	3.93	2,500
Vaughan	Kleinburg	4.23	4,000
Whitchurch-Stouffville	Ballantrae	5.23	3,660
	Stouffville	13.91	18,000

Mount Albert: The Mount Albert water supply system is comprised of two municipal wells and a 0.9 ML elevated tank. This system can produce a maximum flow rate of 6.52 ML/d. The PTTW allows a maximum withdrawal of 4.3 ML/d (Appendix B, Figure B.3.1).

King City: The King City Water Supply System serves the community of King City by means of two pumping stations and a 2.7 ML elevated tank. The Well No. 3 and Well No. 4 pumphouses have one production well each. The pumphouses operate alternately to supply water to the system based on tank level. This system is equipped to produce a maximum flow rate of 3.93 ML/d (Appendix B, Figure B.3.2).

Nobleton: The Nobleton Supply System consists of two pumping stations and a 2.0 ML elevated tank. Well No. 2 and Well No. 3 pumphouses have one production well each. This system is permitted and equipped to produce a maximum flow rate of 3.93 ML/d (Appendix B, Figure B.3.3).

Schomberg: The Schomberg Water Supply System is comprised of two pumphouses and a 1.5 ML elevated tank. The Well No. 2 and Well No. 3 pumphouses have one production well each. The pumphouses operate alternately to supply water to the system based on reservoir level. This system can produce a maximum flow rate of 3.93 ML/d (Appendix B, Figure B.3.4).

Kleinburg: The Kleinburg Supply System consists of two pumping stations and a 2 ML elevated tank. Well No. 2 and Well No. 3 pumphouses have one production well each. This system is equipped to produce a maximum flow rate of 4.23 ML/d (Appendix B, Figure B.3.5).

Ballantrae: The communities of Ballantrae and Musselman's Lake are serviced by two groundwater production wells and an elevated storage tank with 2.76 ML capacity. This system is subject to a temporary (three year) permit that restricts flow to 4.32 ML/d from the two wells. A hydrogeological study will be undertaken to determine impacts on the local aquifer in order to obtain a permanent increase (Appendix B, Figure B.3.6).

Stouffville: York Region operates five municipal wells to service the community of Stouffville. There is also one 3.4 ML elevated tank and one 5.1 ML reservoir servicing the community. The Region operates a small booster pumping station adjacent to the reservoir which supplies water to approximately 19 commercial and residential users in the Highway #48 / Bloomington area. This system can produce a maximum flow rate of 13.91 ML/d (Appendix B, Figure B.3.7).

3.2.6 Population and Employment by Water Service Area

Water service areas in York Region do not correspond directly with municipal boundaries. The York Water System provides water service to five area municipalities; the Georgina Water System will provide integrated water service to three communities within the Georgina municipal boundary; and the Satellite Systems operate as autonomous systems in other areas of the Region. Additionally, a number of residents in the Region continue to maintain private water supply systems, for which the Region has no authority or responsibility. In order to evaluate requirements for each of the Region owned and operated water systems, population and employment—and subsequently water demands—for the Area Municipalities have been combined or sub-divided into water service areas, as summarized in Table 3.6.

Table 3.6: Summary of 2001 Population and Employment by Water Service Area

Water System	Service Area	2001 Population	2001 Employment
YWS ⁵	Aurora	41,062	15,352
	Holland Landing	8,853	2,064
	Queensville/Sharon	4,370	957
	Markham	214,944	117,643
	Newmarket	68,207	33,000
	Richmond Hill	137,133	58,319
	Vaughan	185,637	129,950
GWS ⁶	Keswick	21,786	4,454
	Lakeshore	3,376	416
	Sutton	7,500	1,854
SAT ⁷	Mount Albert	3,345	586
	King City	4,948	916
	Nobleton	3,490	934
	Schomberg	1,684	1,169
	Kleinburg	3,192	764
	Ballantrae	3,201	460
	Stouffville	12,215	3,785
UN ⁸		34,708	13,379
Grand Total		759,651	386,000

3.3 Natural Environment

A sustainable natural environment is capable of meeting the needs of the present without compromising the ability of future generations to meet their own needs. The Region's natural environment includes a number of wetlands, forests, lakes, river systems and landscape features—including the Oak Ridges Moraine.

A review of the existing condition of the natural environment was undertaken, based primarily on a review of existing data sources, to define what environmental features may be affected by the water supply alternatives, and to identify major constraint areas. Because the Master Plan addresses strategic water supply issues, site specific environmental details are not provided, relying instead on detail to be provided, where required, during subsequent implementation of individual Class Environmental Assessments.

⁵ York Water System

⁶ Georgina Water System

⁷ Satellite Systems

⁸ Not serviced by a Regional water system

3.3.1 Regional Greenlands System

The Regional Greenlands System, reproduced from the Regional Official Plan in Appendix C (Map 4), is an essential structural component of the Region, composed of natural areas and connecting links. It includes complex surface and subsurface water systems, and plant and animal communities which extend beyond local municipal and regional boundaries; and it is an important ingredient for York's quality of life and economic prosperity.

It is the policy of the Region to protect and encourage the restoration of the Regional Greenlands System, and to coordinate efforts in managing and improving its ecological sustainability. Any activity that results in an overall negative effect on the environmental functions, attributes or linkages of the Regional Greenlands System will not be supported.

3.3.2 Land

The natural environmental features of the Region are identifiable land and water areas that provide habitat for a variety of plant and animal species. Many of these areas, such as large upland forest areas, play an important role in the hydrological cycle or in the regulation of microclimate. Other features are landforms that help to define the environmental character of the Region.

Environmental Policy Areas identified in Regional Official Plan include Environmentally Significant Areas, Life Science Areas of Natural and Scientific Interest, and Habitats of Vulnerable, Threatened or Endangered Species. Environmentally Significant Areas (ESAs) contain distinctive or unusual features, perform a key ecological function and/or provide habitat for significant plant and/or animal species. Life Science Areas of Natural and Scientific Interest (ANSIs) are areas of land and/or water containing natural landscapes or features that have been identified by the Ministry of Natural Resources as having natural heritage, scientific study or educational values requiring protection. Within the Region of York there are areas, primarily within ESAs and ANSIs, that provide habitat for plant and animal species that are vulnerable, threatened or endangered within the Region, Ontario or Canada. The policies of this Plan protect these habitats or communities, which helps to ensure that the biological diversity of the Region is not diminished. Habitats of Vulnerable, Threatened or Endangered Species together with ESAs and ANSIs are reproduced from the Regional Official Plan in Appendix C (Map 2).

3.3.3 Wetlands

Wetlands are essential natural elements of the regional ecosystem, providing environmental, economic and social benefits. Among other functions, wetlands control and store surface water to assist in flood control and groundwater recharge. Wetlands also act as sediment traps to improve water quality and act as habitat for a wide variety of plant and animal species. The Provincial Wetland Policy Statement protects significant wetlands and encourages the conservation of other wetlands. Significant wetlands have been reproduced from the Regional Official Plan in Appendix C (Map 2).

3.3.4 Water

Water systems in the Region include underground aquifers and water table systems as well as rivers, streams, ponds, wetlands and lakes. The groundwater and surface water systems are

important regional resources. Not only does groundwater supply drinking water but it also provides significant quantities of cool water to the Region's streams and rivers. Water systems are also important for recreation, agriculture and industrial purposes. In discussing surface water systems, both water quantity and water quality issues are significant. The Region's water system is a significant long-term renewable resource provided it is managed and conserved. The Region is continuing, through other studies and hydrogeological assessments, to identify headwater areas and develop a better understanding of their functions, interactions and sensitivities. It is the Region's objective to maintain and improve water quality and flow of lakes, rivers, streams and groundwater and to protect headwater areas from land use that may have the potential to contaminate downstream water systems.

3.3.5 Oak Ridges Moraine

The Oak Ridges Moraine is an east-west ridge of rolling topography, natural areas and kettle lakes that is the source for the Region's rivers, including the Rouge, Humber, Don, Schomberg, Holland and Black Rivers. The Moraine extends 160 kilometres (100 miles) from the Niagara Escarpment in Peel Region through Durham Region to Lake Scugog and the Ganaraska Forest. The Oak Ridges Moraine is a sensitive ecosystem requiring protection, management and enhancement for the benefit of existing and future generations. The Moraine covers more than 50,000 hectares—about 28 percent—of the Region's land area, and it provides a wide range of environmental, social and economic benefits and functions that contribute to the quality of life and economic prospects of the Region.

Under the Oak Ridges Moraine Conservation Act, 2001, the *Oak Ridges Moraine Conservation Plan* was developed by the Ontario Government in consultation with the public and stakeholders to provide land use and resource management direction for the 190,000 hectares of land and water within the Oak Ridges Moraine (ORMP, 2001). The Moraine is recognized for its unique concentration of environmental, geological, and hydrological attributes that make it an essential ecosystem to south-central Ontario. In recognition of these attributes, the ecologically based *Oak Ridges Moraine Conservation Plan (ORMCP)* divides the Moraine into four land use designations:

Natural Core Areas – The Natural Core Areas comprise 38% of the land area of the Moraine. This designation provides protection for lands with the greatest concentration of key natural heritage features critical to maintaining the integrity of the Moraine as a whole. The ORMCP currently allows only existing uses and very restricted new uses within the Natural Core Areas.

Natural Linkage Areas – The Natural Linkage Areas comprise 24% of the land area of the Moraine. This designation provides protection for the critical natural and open space linkages. The ORMCP allows only the uses that are allowed with the Natural Core Areas plus some aggregate resource operations.

Countryside Areas – Countryside Areas comprise approximately 30% of the land area of the Moraine. Countryside Areas provide an agricultural and rural transition and buffer to Natural Core and Linkage Areas. Prime agricultural areas as well as natural features are protected from development.

Settlement Areas – Settlement Areas reflect a range of existing communities planned by municipalities to reflect community needs and values. Urban areas and development as set out in municipal official plans are allowed under the designation.

The designations set out above provide a means of guiding development and allowing only those types of development that maintain, restore, or improve the ecological and hydrological integrity of the Oak Ridges Moraine.

3.4 Socio-economic and Cultural Environment

The Region is a combination of many communities, including small hamlets or villages, mid-sized towns, long-existing agriculture-based communities, seasonal recreational communities and urban neighbourhoods both long-established and new. The socio-economic and cultural environment has been reviewed to ensure community impacts are considered in a regional context in the development and evaluation of alternatives.

3.4.1 Cultural Heritage

York Region has a rich *cultural heritage*. This legacy is evident in buildings such as the Sharon Temple, Hillary House in Aurora and Newmarket's Quaker Meeting House, and any of the 277 identified heritage properties in York Region. York's history is also reflected in heritage streetscapes like old Unionville and Yonge Street in downtown Richmond Hill as well as other resources such as waterways, rail lines and aboriginal lands. Guidelines and criteria established by the Ministry of Culture, Tourism and Recreation are used to identify, interpret and preserve the features, structures, and archaeological resources relevant and significant to York's cultural heritage.

3.4.2 Community Building

Communities are a fundamental building block of the regional culture. Much more than the architecture of buildings and the design of neighbourhoods, communities are places where people interact, learn, work, play and reside. Complete communities are healthy communities that incorporate principles of safety, accessibility, adequate human services and choice for all citizens. Communities are places that protect and enhance the natural environment and foster economic vitality. Community boundaries are identified in the Regional Official Plan (Appendix C, Map 5) which also provides the context for delivery of water services.

3.4.3 Agricultural

Agriculture is an important part of the regional economy, providing jobs and agricultural products. Agriculture is the predominant use of land in the rural areas of York. Approximately 45% of the Region is farm area, 40% is rural and natural area and 15% is urban development. The Agriculture Policy Area (Appendix C, Map 6) comprises primarily Canada Land Inventory soil classifications 1 to 4 and farmed organic soils used for market gardening. Although some of the existing farmland will be required to accommodate growth anticipated by this Plan, it is important to protect the remaining farmland in the rural portions of the Region because of their importance to the Region's economy and as a source of food. The Regional Official Plan focuses the majority of growth in urban areas and establishes agriculture as the primary use on Class 1 - 4 lands.

3.4.4 Rural

The Rural Policy Area comprises lands generally categorized as Class 5, 6 or 7 lands by the Canada Land Inventory, in terms of agricultural capability. Although the actual agricultural capability is generally lower than in the Agricultural Policy Area, viable farms and businesses, such as equestrian facilities and golf courses, exist within the Rural Policy Area. The Rural Policy Area also contains many areas of environmental significance, including large portions of the Oak Ridges Moraine. Small settlement areas may be found throughout the Rural Policy Area. Generally, development is limited in the Rural Policy Area in order to retain its rural character.

3.4.5 Mineral Aggregate Resources

The Region has a number of significant sand and gravel resources (Appendix C, Map 7). Most of these areas are located in the Oak Ridges Moraine area. It is important that these resources be protected so that they can be used to build the roads and buildings that will be needed to accommodate expected growth. It is recognized that existing development in those areas may preclude the extraction of aggregates. It is equally important that these resources are extracted in an environmentally sensitive way and that exhausted pits and quarries be rehabilitated to uses compatible with agriculture, rural or green space areas.

3.4.6 Estate Residential Development

Estate residential development is generally intended to provide an alternative form of housing to what is typically found in more urbanized or built-up areas of the Region. Although these developments have high assessment yield, the total cost and ramifications over the long term is also potentially high. It is intended that estate residential housing will constitute a limited portion of the total housing stock within the Region. Estate residential developments is typically permitted only if it retains the rural character of the area, preserves the natural environment and minimizes the impact on existing or potential agricultural operations. Because of the large lots, exclusive housing and secluded nature of these types of developments, the number of developments is typically limited, and usually proceeds with private water (and wastewater) servicing.

4 Population Growth and Water Demand

4.1 Methodology

The methodology adopted for the water demand projection applies unit consumption rates and peaking factors based on historical statistics, and is illustrated in Figure 4.1

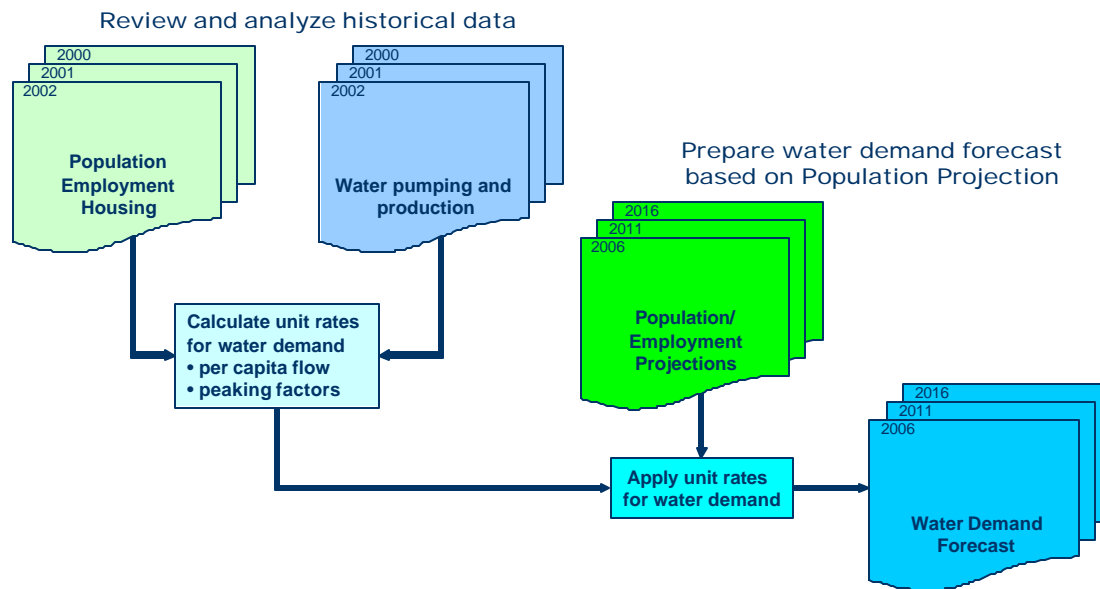


Figure 4.1: Water Demand Forecasting Methodology

4.2 Population and Employment Growth Forecast

Population and employment rates growth in the Region are defined in the Regional Official Plan (Office Consolidation November 2002).

The population and employment forecasts contained in the ROP are intended to be used as a guideline for growth in the Region. The forecasts are used to designate settlement and land use boundaries, to determine future transportation requirements, to calculate sewer and water capacity needs, to determine housing needs and associated land requirements, to estimate the need for social programs and new schools and to provide a basis for other service and program planning in the Region and by industry and business for investment decisions.

In preparing the forecasts, consideration was given to the York Region Vision 2026 document, which helps provide direction for the type of communities that will develop over the next 20 to 30 years. Due consideration was also given to the wide range of issues affecting growth throughout the entire Greater Toronto Area. Forecasts are shown in Table 4.1 and Table 4.2. These forecasts have been adjusted to account for serviced population/employment only.

Table 4.1: Population Growth by Water Service Area

System	Service Area	Sum of 2006	Sum of 2011	Sum of 2016	Sum of 2021	Sum of 2026
YWS	Aurora	48,184	54,898	62,623	68,632	74,635
	Holland Landing	12,478	11,585	14,325	15,310	15,060
	Queensville/Sharon	4,800	9,967	15,725	24,990	34,416
	Markham	267,247	292,647	301,168	323,234	345,487
	Newmarket	79,000	87,000	91,000	95,000	98,000
	Richmond Hill	170,822	195,077	204,000	212,000	219,000
	Vaughan	255,975	296,163	274,657	298,796	321,769
GWS	Keswick	26,219	29,888	35,479	41,697	47,699
	Lakeshore	2,926	2,901	2,832	2,792	4,068
	Sutton	7,764	10,365	13,030	14,509	14,328
SAT	Mount Albert	4,442	5,095	5,679	5,550	5,459
	King City	6,004	7,200	10,013	11,843	12,500
	Nobleton	3,583	5,075	5,832	6,484	7,493
	Schomberg	2,521	2,514	2,510	2,476	3,301
	Kleinburg	4,067	4,898	3,943	3,856	5,909
	Ballantrae	6,389	6,547	6,455	6,301	6,194
	Stouffville	12,148	16,245	20,447	23,694	26,312
UN		37,160	38,653	37,281	37,838	38,370
Grand Total		951,728	1,076,719	1,107,000	1,195,002	1,280,000

The Georgina Lakeshore area (about 7,000 existing population) includes a fringe area from Sutton and was assumed to become connected to the local municipal system by 2006. Total Population in the Region is expected to surpass 1.4- million by 2036.

Table 4.2: Employment Growth by Water Service Area

System	Service Area	Sum of 2006	Sum of 2011	Sum of 2016	Sum of 2021	Sum of 2026
YWS	Aurora	18,301	19,209	19,674	20,554	21,148
	Holland Landing	2,825	2,607	2,568	2,966	3,033
	Queensville/Sharon	946	3,134	5,989	9,663	13,463
	Markham	146,585	167,547	183,234	198,229	210,217
	Newmarket	37,000	41,000	43,000	45,000	46,000
	Richmond Hill	78,224	93,188	104,924	113,777	117,637
	Vaughan	148,898	169,666	185,671	199,674	212,433
GWS	Keswick	5,603	7,718	9,108	11,702	12,894
	Lakeshore	456	423	423	409	392
	Sutton	2,498	3,040	3,761	5,902	6,775
SAT	Mount Albert	1,302	1,386	1,458	1,448	1,473
	King City	1,335	1,745	3,493	4,186	4,899
	Nobleton	1,094	1,337	1,429	1,543	1,727
	Schomberg	1,322	1,441	1,501	1,501	1,554
	Kleinburg	810	971	967	966	1,206
	Ballantrae	699	1,093	1,527	1,804	2,047
	Stouffville	4,838	6,080	7,313	8,554	9,171
UN		15,264	18,416	23,961	27,123	29,932
Grand Total		468,000	540,000	600,000	655,000	696,000

Employment growth is expected to surpass 750,000 by 2036.

4.3 Water Conservation Program—Water for Tomorrow

4.3.1 Background

The Region's water conservation program—"Water for Tomorrow"—commenced on 01-July-1998 with a goal to save up to 19 million litres of water per day by June 30, 2006, with a budget of \$12.45-million.

The program's Scope of Work, included five distinctive activities:

- Residential/Commercial Retrofit Program
- Industrial/Institutional Audit Program
- Leakage Reduction Program
- Public Education
- Maintenance

As at June 2003, over 118,000 home visits have been completed with over 63,000 of those visits resulting in a retrofit of a toilet or showerhead. 10,400 high rise residential apartments, 14,200 commercial businesses and 180 schools have participated. In total, over 231,000 early-closing

toilet flappers and 99,000 water-saving showerheads have been installed since the start of the program.

To date, fifty industrial/institutional water audits have been completed and more than 1.4 million litres per day of potential water savings have been identified with paybacks usually less than two years. Three companies have implemented recommendations from the audit resulting in actual water savings of 426,000 litres per day.

Over 1,700 km of watermain has been tested in the municipalities of Aurora, Georgina, King, Richmond Hill, Vaughan, Newmarket, East Gwillimbury, Markham and Whitchurch-Stouffville. The leakage that has been identified and repaired represents over 2.39 million litres of water per day.

Public Education has been ongoing since 1998 with presentations, public displays and events, newspaper advertising, leaflet distribution and water bill bulletins twice per year. The award winning Student Education Program has been delivered to over 30,000 Grade 7 students in York Region. The teacher's manual and student activity books were recently updated, reprinted and distributed to all elementary schools.

Water for Tomorrow has demonstrated that water efficiency is an effective component of York Region's long term water supply strategy. Currently saving about 15.1 million litres of water per day, the project is well on its way to meeting or exceeding its objectives.

4.3.2 Maximum Day Demand Reduction Program

In 2001, the Maximum Day Demand Reduction Component was added to the *Water Use Efficiency Program*. This highly successful component is designed to educate York Region residents on the wise use of water during the summer months. Although this important component already helps to reduce the excessive demands on water supplies during hot, dry summer months, public education is deemed as a long-term investment with special focus on youth in York Region.

4.3.3 Program Recognition

Over the past five years, the Water for Tomorrow program has been recognized by a number of organizations:

- Residential/Commercial Retrofit Component received the Ontario Water Works Association Award of Excellence (May 2000).
- Student Education Component received the Water Environmental Federation Public Education Award (October 2000).
- Student Education Component received the Ontario Water Works Association Award of Excellence (May 2002).
- Student Education Component received Honourable Mention from Federation of Canadian Municipalities' Sustainable Communities Awards (May 2002).
- Water for Tomorrow recognized by World Water Forum in Kyoto, Japan (March 2003).

4.3.4 Future Program Activities

It is important to build on the success of the Program. Dry, hot summers and excessive demands continue to put pressure on the water supply system. Continuation of the *Water Use Efficiency Program* is required for the following reasons:

- Water use efficiency measures help to defer the need for major capital expenditures.
- Key review and approval agencies, such as the Ministry of Environment and the Ministry of Natural Resources, are reluctant to support new capital projects without a demonstrated commitment to water use efficiency by the proponent.
- Water use efficiency is a required component of Watershed Plans required under the Oak Ridges Moraine Conservation Plan.
- Water use efficiency is effectively a source of water supply similar to a water supply from a treatment plant. Maintenance is required to sustain the water savings from water efficiency, similar to the required maintenance to sustain the supply from a plant. To sustain the savings achieved during the six years of Water for Tomorrow, ongoing maintenance and education will be required.
- City of Toronto has recently launched a ten year \$74 million water efficiency initiative designed to save 266 million litres per day of water on peak day. As a major supplier of water to York Region, it will be their anticipation that we will continue to demonstrate leadership in the area of water efficiency.

The future of Water for Tomorrow lies mainly with education. Education will help sustain the savings made during the six years of the Water for Tomorrow program. In addition, education will provide additional savings. The American Water Works Association (AWWA) suggests that additional savings of 4 to 5% may be expected from ongoing awareness programs.

Water Efficient Landscape Audits, associated with the Summer Water Use Reduction component, are expected to provide reductions in peak day demand in excess of 200 litres per participating household. This is based on monitoring and evaluation studies completed on similar programs in the Regions of Durham and Halton.

It is anticipated that 14.5 million litres/day of additional water savings will be achieved by continuing audits and education, by 2008.

4.4 Historical Water Use

4.4.1 Water Demand Unit Rates

Historical average day water flows (average day and maximum day) for each service area in each water system are included in Appendix D. The average day water demand unit rate and maximum day peak factor are summarized in Table 4.3. These are equivalent unit rates, meaning they are inclusive of both population and employment demand.

Table 4.3: Historical Water Demand Unit Rates (m³/d)

Water System	Service Area	Unit Rate	1996	1997	1998	1999	2001	Average
YWS	Aurora	Ave Day lpcd	348	350	355	364	327	349
		Max Day PF		1.65	1.80	1.63	1.52	1.65
	Newmarket	Ave Day lpcd	337	343	345	345	330	340
		Max Day PF		1.27	1.46	1.51	1.30	1.39
	Holland Landing/ Queensville/ Sharon	Ave Day lpcd	233	241	251	245	232	240
		Max Day PF		2.09	2.16	2.14	2.03	2.11
	Vaughan	Ave Day lpcd		526	524	606	507	541
		Max Day PF		1.65	1.54	1.68	1.56	1.61
	Markham	Ave Day lpcd		373	406	395	385	390
		Max Day PF		1.65	1.54	1.68	1.56	1.61
	Richmond Hill	Ave Day lpcd		415	418	425	381	410
		Max Day PF		1.65	1.54	1.68	1.56	1.61
GWS	Keswick	Ave Day lpcd	294	294	272	279	290	286
		Max Day PF		2.28	1.95	2.01	1.85	2.02
	Sutton	Ave Day lpcd	270	264	264	276	262	267
		Max Day PF		1.84	1.88	1.59	1.70	1.75
SAT	Mount Albert	Ave Day lpcd	301	332	322	320	297	314
		Max Day PF	1.75	1.84	1.85	2.07	2.72	2.05
	King City	Ave Day lpcd	332	355	352	374	315	346
		Max Day PF		2.14	2.42	2.21	1.95	2.18
	Nobleton	Ave Day lpcd	295	300	318	341	300	311
		Max Day PF		2.19	2.20	2.24	2.52	2.29
	Schomberg	Ave Day lpcd	215	232	273	250	245	243
		Max Day PF		2.54	1.57	1.79	1.67	1.89
	Kleinburg	Ave Day lpcd	324	336	340	387	371	351
		Max Day PF		1.96	2.42	2.14	2.30	2.21
	Ballantrae	Ave Day lpcd		75	144	176	167	140
		Max Day PF		3.25	3.28	2.21	2.61	2.84
	Stouffville	Ave Day lpcd	358	354	375	377	356	364
		Max Day PF		1.59	1.68	1.56	1.65	1.62

4.5 Forecast Consumption Factors

4.5.1 Average Day Unit Rate

Unit consumption rates were projected into the future using IWR Main Water Demand Analysis Software to include the long-term effects of water conservation measures. The resultant projected unit rates for population growth are shown in Table 4.4.

Table 4.4: Projected Average Day Population Unit Rates (lpcd)

Water System	Service Area	2006	2011	2016	2021	2026	2031	2036
YWS	Aurora	260	258	252	250	247	244	241
	Holland Landing	193	190	187	185	184	182	181
	Queensville/Sharon	197	194	191	189	188	186	185
	Markham	285	282	278	274	273	270	270
	Newmarket	212	208	207	206	205	204	203
	Richmond Hill	300	295	291	288	287	284	282
	Vaughan	307	298	291	286	282	278	275
GWS	Keswick	323	324	321	315	312	299	295
	Lakeshore	276	280	282	283	284	287	283
	Sutton	351	338	300	245	234	226	223
SAT	Ballantrae	123	121	119	118	118	117	116
	King City	283	279	275	272	270	268	266
	Kleinburg	275	270	266	264	262	260	257
	Mount Albert	259	255	251	249	247	245	243
	Nobleton	242	238	235	232	231	229	227
	Schomberg	178	175	173	171	170	169	167
	Stouffville	274	270	266	264	262	260	257

The resultant projected unit rates for employment growth are shown in Table 4.5.

Table 4.5: Projected Average Day Employment Unit Rates (lpcd)

Water System	Service Area	2006	2011	2016	2021	2026	2031	2036
YWS	Aurora	218	214	213	212	211	210	209
	Holland Landing	183	179	177	176	175	174	173
	Queensville/Sharon	190	186	184	182	182	181	180
	Markham	173	170	169	167	167	166	166
	Newmarket	173	170	169	168	167	166	165
	Richmond Hill	232	228	227	226	225	223	222
	Vaughan	269	267	265	264	263	263	261
GWS	Keswick	309	309	308	302	300	289	285
	Lakeshore	269	273	276	277	279	282	278
	Sutton	319	306	273	223	214	207	204
SAT	Ballantrae	122	120	119	118	117	117	116
	King City	273	268	265	263	262	260	259
	Kleinburg	253	248	246	244	243	241	240
	Mount Albert	251	246	244	241	240	239	238
	Nobleton	222	218	216	214	213	212	210
	Schomberg	96	94	94	93	92	92	91
	Stouffville	238	234	231	229	228	227	226

4.5.2 Maximum Day Peaking Factors

Table 4.6 shows the maximum day peak factors used to develop the maximum day water demand projections for each service area. The design rate—used to develop the base long term water demand projection—is the most conservative, relating to the highest max day peak factor observed in recent history. The observed rate is the mean max day peak factor observed over recent history. The design rate and the observed rate were used to establish a range of anticipated water demand, particularly for the York Water System in the immediate future. In the absence of clear data to identify different max day peaking factors for population and employment unit rates, a common rate was applied to both population and employment average day demand.

Table 4.6: Maximum Day Peak Factors

Water System	Service Area	Design Peak Factor	Observed Mean Peak Factor
YWS	Aurora	1.800	1.648
	Holland Landing	2.160	2.107
	Queensville/Sharon	2.160	2.107
	Markham	1.800	1.609
	Newmarket	1.800	1.386
	Richmond Hill	1.800	1.609
	Vaughan	1.800	1.609
GWS	Keswick	2.300	2.024
	Lakeshore	2.300	2.024
	Sutton	2.300	1.754
SAT	Ballantrae	3.280	2.837
	King City	2.420	2.181
	Kleinburg	2.420	2.208
	Mount Albert	2.720	2.047
	Nobleton	2.520	2.288
	Schomberg	2.540	1.890
	Stouffville	1.680	1.617

4.6 Accelerated Growth Scenario

The Regional Planning Department in conjunction with local municipalities developed a high growth scenario to reflect the short term accelerated growth anticipated in certain areas of the Region (see Table 4.7). The accelerated population scenario represents about 68,000 persons greater than identified the Regional Official Plan projection by 2011 for the York Water System, and 11,755 persons greater than the ROP for Stouffville. These assumptions were used to prepare a corresponding water demand scenario which was subsequently used to determine the infrastructure program particularly for the York Water System.

Table 4.7: Short Term Accelerated Population Growth Scenario

Service Area	2006	2011
Aurora	49,000	56,100
Markham	269,380	296,100
Newmarket	79,000	87,000
Queensville, Sharon, Holland Landing	13,000	21,500
Richmond Hill	171,600	195,000
Vaughan	261,750	296,100
Stouffville	22,300	28,000

4.7 Water Demand Projection

The average day water demand projection was prepared using the following deterministic formula:

$$AveDay_{SA,T} = \sum_{PD} \sum_{TZ} Pop_{TZ} \times PopUnitRate_{SA,T} + \sum_{PD} \sum_{TZ} Emp_{TZ} \times EmpUnitRate_{SA,T}$$

In this formula:

- AveDay means average day demand
- SA means service area
- T means time, ie, for the given year
- PD means pressure district
- TZ means traffic zone
- Pop means population
- PopUnitRate means unit consumption rate for population growth
- Emp means employment
- EmpUnitRate means unit consumption rate for employment growth

The average day demand projection for each service area is shown in Table 4.8.

Table 4.8: Average Day Demand Projection (L/d)

Water System	Service Area	Sum of 2006	Sum of 2011	Sum of 2016	Sum of 2026	Sum of 2036
YWS	Aurora	16,538,076	18,698,974	21,183,578	25,219,395	26,529,253
	Holland Landing	2,919,813	2,662,414	3,131,550	3,298,663	6,475,015
	Queensville/Sharon	1,130,034	2,518,492	4,104,144	8,923,026	10,092,361
	Markham	101,474,802	111,023,473	114,677,465	129,248,994	144,323,180
	Newmarket	23,148,823	25,066,034	26,103,861	27,771,936	28,055,072
	Richmond Hill	69,333,667	78,688,987	83,095,470	89,253,446	90,303,148
	Vaughan	118,523,704	133,539,323	129,068,020	146,664,883	162,863,976
YWS Total		333,068,918	372,197,698	381,364,088	430,380,342	468,642,004
GWS	Keswick	10,172,323	12,053,569	14,171,641	18,723,953	21,876,278
	Lakeshore	945,026	941,406	927,590	1,297,711	1,691,409
	Sutton	3,524,219	4,430,076	4,932,938	4,808,182	4,682,475
GWS Total		14,641,567	17,425,051	20,032,170	24,829,846	28,250,162
SAT	Mount Albert	1,477,595	1,639,843	1,782,317	1,703,568	1,654,744
	King City	2,064,434	2,472,884	3,675,986	4,658,325	4,801,476
	Nobleton	1,109,684	1,499,056	1,676,321	2,096,829	2,312,894
	Schomberg	576,410	576,731	574,174	704,495	867,452
	Kleinburg	1,321,634	1,563,920	1,287,401	1,840,181	2,127,251
	Ballantrae	872,632	924,635	952,547	968,077	924,631
	Stouffville	4,947,481	6,267,480	7,584,734	9,410,126	10,443,214
SAT Total		12,369,871	14,944,549	17,533,480	21,381,601	23,131,661

The maximum day water demand projection was prepared using the following deterministic formula:

$$MaxDay_{SA,T} = \sum_{PD} \sum_{TZ} AveDay_{SA,T} \times PeakFactor_{SA}$$

In this formula:

- MaxDay means maximum day demand
- SA means service area
- T means time, ie, for the given year
- PD means pressure district
- TZ means traffic zone
- AveDay means average day demand
- PeakFactor means maximum day peaking factor (design rate)

The maximum day demand projection for each service area is shown in Table 4.9.

Table 4.9: Maximum Day Demand Projection (L/d)

Water System	Service Area	Sum of 2006	Sum of 2011	Sum of 2016	Sum of 2026	Sum of 2036
YWS	Aurora	29,768,537	33,658,154	38,130,441	45,394,911	47,752,655
	Holland Landing	6,306,795	5,750,815	6,764,149	7,125,113	13,986,032
	Queensville/Sharon	2,440,873	5,439,943	8,864,951	19,273,735	21,799,500
	Markham	182,654,643	199,842,252	206,419,436	232,648,189	259,781,724
	Newmarket	41,667,882	45,118,861	46,986,950	49,989,485	50,499,130
	Richmond Hill	124,800,600	141,640,177	149,571,846	160,656,202	162,545,666
	Vaughan	213,342,668	240,370,781	232,322,436	263,996,789	293,155,157
YWS Total		600,981,997	671,820,982	689,060,209	779,084,424	849,519,862
GWS	Keswick	23,396,343	27,723,208	32,594,775	43,065,093	50,315,439
	Lakeshore	2,173,559	2,165,234	2,133,457	2,984,734	3,890,241
	Sutton	8,105,703	10,189,176	11,345,758	11,058,819	10,769,693
GWS Total		33,675,605	40,077,617	46,073,990	57,108,646	64,975,373
SAT	Mount Albert	4,019,060	4,460,372	4,847,902	4,633,705	4,500,903
	King City	4,995,930	5,984,379	8,895,886	11,273,146	11,619,571
	Nobleton	2,796,403	3,777,621	4,224,330	5,284,010	5,828,492
	Schomberg	1,464,083	1,464,897	1,458,401	1,789,416	2,203,328
	Kleinburg	3,198,354	3,784,687	3,115,510	4,453,238	5,147,946
	Ballantrae	2,862,234	3,032,804	3,124,356	3,175,293	3,032,791
	Stouffville	8,311,769	10,529,366	12,742,353	15,809,011	17,544,599
SAT Total		27,647,832	33,034,126	38,408,737	46,417,820	49,877,631

5 Water System Requirements

This section documents the requirements for each water service area, including pressure, distribution system, storage, pumping stations, and treatment or supply capacity.

5.1 Design Criteria

5.1.1 Water Treatment and Supply

Water treatment and supply facilities are typically designed to satisfy maximum day demands, with peak demands (maximum hour) satisfied from system storage. Supply and treatment facilities are constructed in stages to coordinate increases in capacity with anticipated water demand. Under certain circumstances surplus storage can be used to offset supply requirements and vice versa.

5.1.2 Storage Facilities

The total required storage capacity of each pressure district or water service area is the sum of Fire Storage, Equalization Storage and Emergency Storage. The storage requirement criteria are shown in Table 5.1.

Table 5.1: Storage Requirements

Storage Component	Design Criteria
Fire Storage (A)	Large districts: 17,000 L/min for 3.5 hours Small districts: 10,000 L/min for 2 hours
Equalization Storage (B)	25% of the district maximum day demand (MOE guideline)
Emergency Storage (C)	25% of (A) + (B) (MOE guideline)

Large districts include those having population greater than about 25,000 persons. Coincident fires were included in the modeling evaluation: 1 fire for small systems, 2-3 fires for large systems.

Historically, York Region has adopted the MOE Design Guidelines for small systems, ie the satellite systems. In the York Water System, York has tried to maintain total storage available in a pressure district approximately equal to one average day's demand. For this Master Plan Update, new storage facilities have been identified and modeled using these general criteria.

Although the MOE guidelines generally provide for adequate storage requirements, an argument can be made that York Region should have additional system storage for significant events. The Region does not control the source of supply of water from Toronto and Peel. If Toronto were to lose one of their treatment plants then there would be an impact on supply to York. Conversely, if the Peel supply is lost then York has lost a significant portion of their supply source. To offset this loss of supply, should it occur, additional storage should be provided. It is recommended that a volume equal to one average day's demand be provided in each pressure district or service area in addition to fire storage requirements. Table 5.2 shows the additional storage recommended for each pressure district, as at 2036.

Table 5.2: Additional Storage Requirements

Service Area	Max Day Demand (ML/d)	Ave Day Demand (ML/d)	Emerg. Storage (ML)	Fire Storage (ML)	Total Storage (ML)	Current Storage Available (ML)	New Storage Proposed (ML)	Additional Storage Recommended (ML)
PD6	314	174	174	11	185	129	45	13
PD8	31	17	17	3.5	20.5	10	10	0
Aurora/ Newmarket	116	64	64	10	74	46	27	1
HL/Q/S	34.7	16.1	16.1	4.8	20.9	3*	16.8	4.1

Note: the existing 0.9 ML Sharon ET and 1.1 ML Holland Landing ET are inadequate in size to supply the communities and should be decommissioned in favour of a new, larger facility.

5.1.3 Pumping Stations

Pumping stations will be designed with a capacity equal to the maximum day capacity of the water supply system. Firm capacity of the facility will be based on the largest pumping unit out of operation. If a water service area is supplied by more than one pumping station, the firm capacity will be evaluated on a system basis—ie, considering the largest pump in the group of stations out of service. Because the water system generally has sufficient online floating storage standby power is not necessarily required in the pumping stations. Surge control if required can be provided through control valves and/or surge control tanks.

Pumping stations are typically constructed and expanded in increments of capacity to coincide with anticipated water demand. The building and services would be initially constructed to house the pumps, motors and other equipment for the ultimate capacity but only equipped for the initial capacity required.

5.1.4 Transmission

The minimum allowable pressure in any of the water service areas is 275 kPa (40 psi). The maximum allowable pressure is 700 kPa (100 psi). Under fire flow conditions, system pressure may fall below the minimum standard.

The maximum allowable velocity in watermains is 1.5 m/s. Although this guideline is appropriate for new watermains, pressure requirements usually govern the system.

5.1.5 Water Quality

Water Quality in Ontario is governed by the Ontario Drinking Water Standards (ODWS) which include the new regulations for disinfection. For the York Water System, water quality is guaranteed by the City of Toronto (and in future, the Region of Peel), although the Region remains responsible for quality delivered to the Area Municipality.

Raw water quality is generally good, whether sourced from Lake Ontario, Lake Simcoe or groundwater sources. Treated water quality consistently satisfies all existing water treatment regulations.

5.2 York Water System

5.2.1 Hydraulic Model Development

The York Water System is integrated with the City of Toronto. The joint system was modeled using H₂ONet hydraulic modeling software. The base model was that prepared for the Toronto-York Joint Optimization Study (JOS). In that study, the York model was extended to include Aurora and Newmarket as well as the demands of Holland Landing, Queensville and Sharon in the Town of East Gwillimbury. No additional calibration or field testing was undertaken for the Master Plan Update. A schematic of the existing system is shown in Appendix B (Figure B.1).

The model includes both Regional transmission mains as well as some local distribution mains. The mains are generally greater than 300 mm in diameter and considered important in the overall representation of the system. Valve positions and PRV settings were provided by the Region in the development of the JOS. Pump curves were entered in the H₂ONet model where available and pump control rules were provided by the Region. Well supplies in the Yonge Street Aquifer were included as negative demands at the appropriate nodal locations. Storage facilities were modeled as a single equivalent storage cell and were assumed to start at 70% full.

Maximum day demands were applied to all demand nodes for each scenario. A typical diurnal pattern was applied to define variation of demand anticipated over the maximum day.

Recommendations for water system infrastructure in York, including pumping, storage and transmission facilities, were determined by engineering analysis including review and rationalization of the JOS modeling results.

5.2.2 Toronto Supply

Based on the interim results from the Joint Optimization Study, the City of Toronto has agreed to provide an additional 20 ML/d to York in 2004, for a total of 460 ML/d under the current agreement.

5.2.3 Peel Supply

Supply from Peel was assumed to be available pursuant to the agreement, as shown in Table 5.3.

Table 5.3: Agreed Flows and Timing from Peel Water System

Year	2004	2005	2006	2016	2026	2031
ML/d	5.3	19.4	33.6	210.5	324.6	388.3

5.3 Georgina Water System

The Georgina Water Treatment Plant has been designed in stages to provide the long-term water demand for Keswick, Sutton and the lakeshore area. The Design Brief for the new facility (MacViro Consultants, August 2000) planned for initial capacity of 20.0 ML/d and subsequent phases of 10.0 ML/d in each of the years 2006, 2015 and 2022. Further review is required to consider the timing and sizing of the subsequent stages. The new facility replaces the ageing Sutton plant initially, with connections planned to integrate Keswick and the lakeshore area in

the near future. Additional storage is provided in the plant clearwell to satisfy current storage requirements. A schematic of the existing system is shown in Appendix B (Figure B.2).

5.4 Satellite Systems

The satellite systems were evaluated individually to determine water supply and storage requirements to satisfy anticipated water demand for planned growth. Where firm capacity does not already exist, recommendations are made to provide additional well or pumping capacity, in addition to growth requirements. Schematics of the existing systems are shown in Appendix B (Figures B.3.1-B.3.7).

It is expected that systems serviced by existing groundwater resources will continue to receive groundwater supplies, although groundwater systems proximate to a surface water system will be considered for connection as may be appropriate. Plans for these systems will be investigated in greater detail when Class EA's are completed in an appropriate timeframe for the undertaking.

6 Water System Alternative Solutions

This section documents generally the following alternative solutions identified to respond to the growth requirements for each water service area, ie to address the Problem Statement:

- Do Nothing
- Limit Community Growth
- Reduce Water Use
- Expand Existing Water Supply System
- Integrate Water Supply System with adjacent system(s)

6.1 Do Nothing

As indicated in the Class EA document, a solution that must be addressed is the ‘do nothing’ alternative. This alternative is important in that it provides a benchmark for what would occur should the proposed undertaking not proceed and provides a point of reference for the other alternatives.

“Do Nothing” means that no improvements or expansions would be undertaken for any of the Region’s water infrastructure in the affected service areas. This would have a significant impact on the growth potential for the service area and would be contrary to the Regional Official Plan. As such, the “Do Nothing” alternative is not an acceptable solution.

6.2 Limit Community Growth

The water supply requirements of a water service area can be minimized by limiting community growth. This alternative is contrary to the growth and development objectives of the Region and the Province, and in effect is the same as the “Do Nothing” alternative. As such, this alternative is not an acceptable solution.

6.3 Reduce Water Use

Reducing water use can have the same effect as increasing water supply in that each litre of water saved by an existing consumer can be made available for the growth needs of the community. The Region has already committed to continuing the Water for Tomorrow Program, expecting to save more than 33 ML/d by 2008. By so doing, this alternative is inherently included in the preferred solution, but it is incapable of meeting the total growth requirement for any service area. As such, one or more additional water supply solutions must be considered to satisfy the growth requirements in the Region.

6.4 Expand Existing Water Supply System

It is natural to consider extending the existing water supply system to accommodate the growth requirements of the community. To achieve this method, the following alternatives must be given proper consideration where appropriate and applicable:

- Increase supply capacity from external water providers (Toronto or Peel for the YWS)
- Increase water treatment capacity of existing lake based system (Georgina Water System)
- Provide additional groundwater capacity by developing new wells (satellite systems)
- Expand pumping and/or transmission facilities to reach growth areas

This solution can satisfy the water demand in every service area for the growth as identified in the Regional Official Plan. Should accelerated growth exceed the ROP approved growth, alternative solutions may need to be considered.

6.5 Integrate Water Supply System with adjacent system(s)

Although it is expected that systems serviced by existing groundwater resources will continue to receive groundwater supplies, satellite systems proximate to a surface water system will be considered for connection as may be appropriate.

7 Description of Preferred Solution

Pursuant to Section 6.1 it was determined that the *Do Nothing* alternative is contrary to the Regional Official Plan and is not an acceptable solution. Similarly, pursuant to Section 6.2, *Limiting Community Growth* is contrary to the growth and development objectives of the Region and it too is not an acceptable solution. The Region plans to continue to implement its “Water for Tomorrow” program thereby including *Reduced Water Use* in every solution.

Therefore, the viable alternatives that remain for each water service area include: expand existing water supply system; and/or integrate with adjacent system(s). Discussion follows hereunder for each of the major water service areas. Schematics of the recommended works are shown in Appendix F.

7.1 York Water System

In addition to continuation of the “Water for Tomorrow” program, it was determined that an expansion of the existing water supply system was appropriate for the York Water System, including the new Peel Water Supply anticipated to be available by late 2004. The following items summarize the requirements by pressure district within the York Water System—including the integrated Yonge Street Aquifer System. Schematics of the recommended works, including phasing plans for 2006, 2011, 2016, 2026, and 2036 are shown in Appendix F (Figures F.1.2006-F.1.2036).

Woodbridge PD4

- No new works are proposed.

PD4 General

- East Markham trunk watermain from Ellesmere PS to PD6 at Hwy 7 and 10th Line.

Woodbridge PD5

- New ground storage in Kleinburg;
- New trunk watermain along Hwy 27 between Martingrove Rd to Kleinburg Reservoir;
- New PRV chamber – supply from York-Peel Feedermain.

PD5 General

- New trunk watermain along McCowan Rd. between Steeles Ave and 14th Ave;

Milliken PD6M

- No new works are proposed.

PD6 General

- PD6 will be supplied by Keele and Bayview PD6 pumping stations and two new supplies – Peel and East Markham.
- New ground storage in north Markham;
- New trunk watermain along McCowan Rd between Major Mackenzie Road to Stouffville Sdrd;
- New Markham East PS pumping from PD4 East Markham watermain to PD6;

- New York-Peel Feedermain from Peel Reservoir to PD6 in Vaughan;
- New Peel PD6 PS;
- Various watermains for system strengthening.

PD7 General

- New ground storage in Richmond Hill;
- New trunk watermain along Bayview between Elgin Mills to North Bayview Reservoir;
- Upgrades to South Maple and Richmond Hill PS;
- Various watermains for system strengthening.

PD8 General

- New ground storage (South Aurora) in Oak Ridges;
- New trunk watermain along Keele, Jefferson and Bathurst between Teston Rd to Break Tank;
- New Maple PS;
- Upgrade watermain along Bathurst from Gamble to Jefferson Reservoir;
- New PRV chamber from Aurora/Newmarket Feedermain.

PD9 General

- New elevated tank in Oak Ridges;
- Existing Oak Ridges standpipe replacement;
- Upgrade Jefferson PS;
- Various watermains for system strengthening.

Aurora Central

- New ground storage in Aurora;
- New trunk watermain along Bathurst from Break Pressure Tank to Orchard Heights Reservoir;
- Various watermains for system strengthening.

Aurora East

- New elevated tank in Aurora;
- New Aurora East PS;
- Various watermains for system strengthening.

Newmarket Central

- Various watermains for system strengthening.

Newmarket East

- New PRV chamber from Aurora East.

Newmarket West

- Orchard Heights PS upgrade;
- New trunk watermains between Northwest Tank and West Newmarket Reservoir.

Holland Landing

- New elevated tank;
- New trunk watermain on Mount Albert Sideroad between Leslie and 2nd Concession.

Sharon/Queensville

- New elevated tank;
- New trunk watermain between Leslie and Mount Albert;
- Various watermains for system strengthening.

Having been identified as priority projects—required for implementation as soon as possible—the Region is currently proceeding with the following projects:

- Aurora/Newmarket Water Supply Project
- Markham PD6 Reservoir and watermain
- Major Mackenzie/McNaughton PD6 watermain

7.2 Georgina Water System

In addition to continuation of the “Water for Tomorrow” program, it was determined that an expansion of the existing water supply system was appropriate for the Georgina Water System, including the phasing plan for the new Georgina Water Treatment Plant. The following additional infrastructure items are required to satisfy the growth requirements in the Town of Georgina:

- Georgina Water Treatment Plant expansion;
- New trunk watermain on Metro Road and Woodbine Avenue to connect the new treatment plant to the Keswick system;
- New Keswick elevated tank;
- New trunk watermains between elevated tank and system;
- Various watermains for system strengthening.

A schematic of the recommended works for the Georgina Water System is included in Appendix F (Figure F.2).

7.3 Satellite Systems

In addition to continuation of the “Water for Tomorrow” program, it is expected that systems serviced by existing groundwater resources will continue to receive groundwater supplies. Groundwater systems proximate to a surface water system will be considered for connection as may be appropriate. Plans for these systems will be investigated in greater detail when Class EA’s are completed in an appropriate timeframe for the undertaking. The following additional infrastructure items are required to satisfy the growth requirements in the Satellite Systems. Schematics of the recommended works for the Satellite Systems are included in Appendix F (Figures F.3.1-F.3.7).

Ansnoerveldt

- Communal system assumed recently by York Region and the Township of King
- Consists of two production wells, treatment facilities and a shallow concrete reservoir
- No improvements are planned for additional supply or storage for the Ansnoerveldt water supply system

Ballantrae

- New water supply (one well pair);
- New trunk watermain between new supply and Ballantrae.

King City

- New water supply (3 well pairs);
- New elevated tank;
- New trunk watermains between new water supply, elevated tank and King City.

Kleinburg

- New water supply (2 well pairs);
- New elevated tank;
- New trunk watermains between new water supply, elevated tank and Kleinburg.

Mount Albert

- New water supply (1 well pairs);
- New elevated tank;
- New trunk watermains between new water supply, elevated tank and Mount Albert.

Nobleton

- New water supply (2 well pairs);
- New elevated tank;
- New trunk watermains between new water supply, elevated tank and Nobleton.

Schomberg

- New water supply (1 well pairs);
- New trunk watermains between new water supply and Schomberg.

Stouffville

- New water supply (2 well pairs);
- New Zone 1 elevated tank;
- New Zone 2 elevated tank;
- New booster pumping station from Zone 2 to Zone 1;
- New Zone 2 pumping station from PD6 to Zone 2;
- New trunk watermains between water supply, storage, pumping stations and Stouffville.

7.4 Capital Cost and Phasing

A summary of the capital costs for the recommended works is shown in Table 7.1. Additional details on the cost and phasing of the recommended works to 2036 is included in Appendix G.

Table 7.1: Total Capital Cost of Recommended Works to 2036

Water System	Supply & Treatment	Pumping Stations	Watermains	Storage Facilities	Decommission	Grand Total
York Water System	\$1,100,000	\$42,079,000	\$226,381,000	\$24,586,000	\$850,000	\$294,996,000
Young St. Aquifer System	\$28,307,000		\$50,555,000	\$5,777,000		\$84,639,000
Georgina Water System	\$12,000,000		\$22,670,000	\$2,499,000	\$200,000	\$37,369,000
Satellite Systems	\$28,550,000	\$2,160,000	\$11,950,000	\$17,015,000	\$300,000	\$59,975,000
Grand Total	\$69,957,000	\$44,239,000	\$311,556,000	\$49,877,000	\$1,350,000	\$476,979,000

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8 Public and Agency Consultation

8.1 General

Public and Agency Consultation was an ongoing and important element of the Long Term Water Project Master Plan Update. The intent of the consultation program was to inform the public and relevant agencies of the master planning study and to solicit their input at key points. The main components of the consultation program were

- Notice of Project Initiation
- Public Information Centre No. 1
- Public Information Centre No. 2
- Meetings with Area Municipality Engineers and Planners

Appendix H contains copies of the public notices advertised for this project.

8.2 Notice of Study Commencement

The notice of study commencement was placed in local newspapers on June 9, 2002. This notice is consistent with the requirements of a Master Plan at the start of project and provides an opportunity for the public to be made aware of commencement of the study. The Notice described the purpose of the Master Plan, the need to identify and recommend water infrastructure projects required to satisfy growth in the Region to the year 2036. Interested parties were also invited to respond to have their names added to the study mailing list or to ask questions related to the project.

8.3 Public Information Centre No. 1

The notice for Public Information Centre #1 (PIC 1) was placed in local newspapers on February 4 and 9, 2003. The purpose of PIC 1 was to identify the issues pertaining to long term water supply in the Region, to provide information on the study and the alternatives being considered, and to receive comments from the public on the planned activities.

PIC 1 was held on February 11, 2003 from 4 pm to 8 pm at the Regional Administrative Centre in Newmarket. In total, 18 people identified themselves on the sign-in sheet, and two comment sheets were received. The PIC was organized as a drop-in centre where people could review a series of display panels outlining the study and the Class EA process, together with the alternatives being considered for long term water supply for the water services in the Region. Staff from the consultant team and York Region were available for discussions and/or to answer questions related to the study. A copy of the display panels was available for attendees to take away for further review, if necessary.

8.4 Public Information Centre No. 2

The notice for Public Information Centre #2 (PIC 2) was placed in local newspapers on September 11 and 14, 2003. The purpose of PIC 2 was to provide information on the study and the alternatives that were considered, to present the preferred solution for long term water supply for the Region, and to receive comments from the public.

PIC 2 was held on September 16, 2003 from 4pm to 8pm at the Regional Administrative Centre in Newmarket. In total, 21 people identified themselves on the sign-in sheet, and two comment sheets were received. The PIC was organized as a drop-in centre where people could review a series of display panels outlining the alternatives and the recommended solution for long term water supply for the Region. Staff from the consultant team and the Region were available for discussions and/or to answer questions related to the study. A copy of the display panels was available for attendees to take away for further review, if necessary.

9 Implementation Considerations

9.1 Class EA Process

This Master Plan defines a broad framework for delivery of the Region's long-term infrastructure program. Although it is intended to satisfy phases 1 and 2 of the Class EA process, it has completed only a high level assessment of environmental impacts and mitigating measures for the alternative solutions. Recognizing that implementation of the recommended solution, ie, construction and/or operation of recommended facilities may have environmental impact, the Region intends to complete a Class EA study for each project (or appropriate group of projects) identified in the recommended solution to document the net environmental impact at the appropriate level of detail.

9.2 York-Peel Water Supply Agreement

The York-Peel Water Supply Agreement, signed in February 2002 clearly documents the agreed flows from Peel to York together with the associated costs of works in Peel Region. Since the time of signing however, York has determined a need for additional supply due to accelerated demands in the short-term. Consequently, York continues to discuss and negotiate the potential to acquire additional flows from Peel in the short-term, together with the associated costs. Any changes that may occur as a result are not expected to have subsequent impact on the recommended long-term solution documented in this report.

9.3 Toronto-York Water Supply Agreement

The Toronto-York Water Supply Agreement documents flows to York from Toronto up to 2004. Over and above the existing 440 ML/d permitted under the agreement (maximum day flow) Toronto has agreed to provide an additional 20 ML/d in 2004. Additional capital works have been identified in the Toronto-York Joint Optimization Study and negotiation of costs for such works continues to be the subject of discussion with the City.

9.4 Master Plan Revisions and/or Review

The Class EA process requires the proponent to review its planning documents if five years lapse prior to implementation. As such the Region intends to review this Master Plan Update within five years. An intermediate update or amendment may be required to address matters that may arise following completion of this report. Such matters will be considered on a case-by-case basis to determine whether in intermediate review or amendment is required to satisfy the requirements of the Class EA process.