



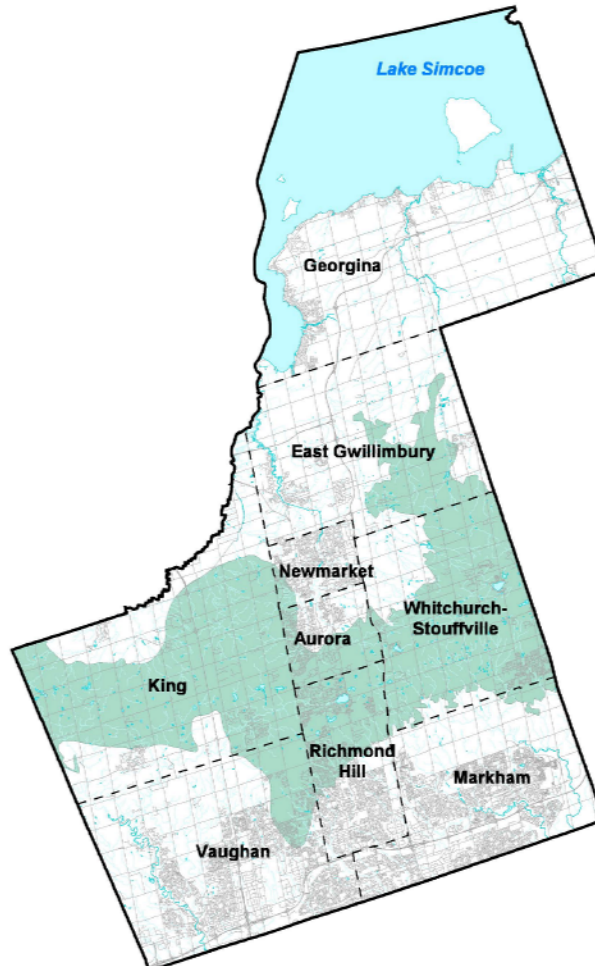
COUNCIL ATTACHMENT 1

Regional Municipality of York



Working Paper Policy and Criteria Water and Wastewater Master Plan Update

August 2008





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August 26, 2008

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**Re: Water & Wastewater Master Plan
Working Paper - Policy and Criteria**

Dear Dr. Hatami:

We are pleased to submit our working paper on Policy and Criteria for the Water and Wastewater Master Plan Update. This report documents current Provincial and Regional policies which affect the Master Plan and water and wastewater criteria for the assessment of the systems.

Yours truly,

GENIVAR Ontario Inc.

Stan C. Holden, P.Eng.
Project Manager

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c. George Zukovs XCG Consultants

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Appendix C	Committee Report, Proposed Regional Policies for the Jurisdiction of Water and Wastewater Infrastructure, Approved Regional Council September 21, 2006
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1. Introduction

The intent of this working paper is to review and document the existing water and wastewater policies, Regional responsibilities, and system criteria for consideration in the Master Plan update. During the review process if the policies or criteria are considered no longer valid or out-of-date for the current situation then the appropriate modifications will be recommended. For the purposes of this report, policies are considered to be documents which indicate the responsibilities of the Region with respect to water and wastewater servicing, criterion contain the parameters used to design the Regional system infrastructure components.

Current Regional policies and jurisdiction requirements will be further reviewed throughout the master planning process. Recommendations beyond those stated in this report may arise as the policies are applied. The recommendations presented in this report will be incorporated in the Master Plan report, along with any additional findings encountered during the process. This report and any future recommendations will be presented to Regional Council for their consideration.

Within the report the existing policies are stated in their original form with recommendations for modifications or developing entirely new policies. The unit rate criteria were recalculated for the Master Plan, other criteria will be reviewed and recommendations will be included if required.

The sources of information include previous Region documents, Regional staff and the consulting team. The information contained in this report was presented to Regional staff and discussed at two workshops held on January 23, 2007 and on August 7, 2007. Comments received at the workshop have been considered in the preparation of this working paper.

Some of these policies apply specifically to maps or features of the Regional Official Plan (ROP) and therefore have not been carried forward to this document. The recommended policies documented here have been modified to represent the principals of the original policies without specific reference to communities, areas or maps.

2. Policy

The Regional Policies on Water and Wastewater are documented in Chapter 6, Section 6.7 Water and Sewer Strategies of the Regional Official Plan (ROP) 1996. A copy of Section 6.7 is included in Appendix A. The section outlines 22 policies of Council with the objective of providing adequate water and sanitary sewer services to residents and businesses.

Table 2.1 presents the policies that were considered and discussed in the workshop with the Region on January 23, 2007.

It is understood that the recommended policies presented in Table 2.1 will be further developed/modified and additional policies added when the final Master Plan document is prepared. Should the Region proceed with a new ROP or an amendment to the ROP then the recommended policies would be put forth to Council for adoption.

Table 2-1 – Recommended Water & Wastewater Policies

Policy Area	Policy Statement based on ROP (1996)
General	To provide adequate water and sewage treatment capacity to the Urban Areas.
General	Development within and expansion to towns and villages will occur on the basis of full municipal water and wastewater treatment services where such facilities currently exist.
General	Continue to negotiate arrangements with other partners, public and/or private, for the provision of water and wastewater sewer service for the Region.
General	That long-term water supply and sewage treatment strategies will be prepared for adoption by Regional Council to coordinate the supplies of these services with the phased development of the Regional structure.
General	The construction or expansion of partial services be prohibited in the Oak Ridges Moraine Conservation Plan area unless deemed necessary to address a serious health or environmental concern.
General	That water rates are generally based on full cost recovery of the enhancement, operation, maintenance, and rehabilitation/replacement of the water and wastewater systems. (Subsequently Bill 175 (2002) requires Full Cost Recovery)
General	That primary components of the water and wastewater systems be sized to provide flexibility to accommodate future changes in flow demand due to assumption/criteria changes, flow diversion and system network modification
General	Additional policies related to sustainable infrastructure be considered
Water	It is generally the Region's intent to supply major urbanized areas with water from the Great Lakes, thus freeing up groundwater resources for agricultural, rural and recreational uses and optimizing emergent flow into creeks, streams and rivers with consideration to Great Lakes Charter.
Water	Allocation, reallocation and phasing of water services will be completed in cooperation with the area municipalities as part of the community building process.
Water	Carefully monitor the Region's well water systems to ensure acceptable quality and quantity while not depleting the supply below the aquifer's sustainable level.
Water	To pursue, in cooperation with area municipalities, water conservation and demand reduction strategies designed to improve the efficiency of the Region's systems.
Wastewater	To investigate methods of improving capacity of stand-alone sewage treatment plants within the assimilation capacity of receiving streams, rivers and lakes.
Wastewater	To ensure the protection of source water for water supply systems restriction on the location and operation of private sewage systems, maintenance yards, and other potential source of contamination will be implemented by the Region under the Clean Water Act.

3. Responsibility

The Municipal Act, 2001 establishes the responsibilities for the upper-tier (Region) and the lower-tier (area municipality) of a two-tier system. The relevant sections of the Municipal Act are included in Appendix B.

Based on the table in Clause 11 the responsibility is as follows:

Jurisdiction	Part	Assigned	Exclusive or Non Exclusive
Public Utilities	Sewage Treatment	York	Non Exclusive
	Collection of Sanitary Sewage	York	Non Exclusive
	Water Production, Treatment and Storage	York	Exclusive
	Water Distribution	York	Non Exclusive

The Regional Municipality of York is responsible for water supply, production, treatment, storage and trunk distribution. York Region is the wholesale supplier of water to the nine area municipalities. The area municipalities are the retail suppliers of water to the consumer and are responsible for their own distribution networks. The area municipalities are responsible for the collection of the wastewater from the consumer and conveyance to the Regional System.

The Regional Municipality of York has been responsible for treatment of wastewater but this is not exclusively their responsibility under the Municipal Act (Clause 11).

The City of Toronto and Peel Region provide water supply to the southern portion of York Region and are responsible for treatment. The City of Toronto provides emergency overflow for wastewater and Peel Region accepts wastewater from the Humber Pumping Station.

4. Jurisdiction

The Region of York has established policies on the jurisdiction or ownership of water and wastewater infrastructure. The policies have been reviewed by the area municipalities (lower-tier) and approved by Regional Council on September 21, 2006. A copy of the Council report is included as Appendix C.

Water

The key sections of the report are as follows:

The Region has an established policy on the Jurisdiction of Regional Water Infrastructure. The policy defines that the Master Planning process shall determine the jurisdiction of existing and new infrastructure.

Regional jurisdictional criteria are as follows:

1. **Treatment** of water including wells.
2. **Pumping** of water either;
 - a. Directly to regional storage facilities; or
 - b. To a Regional system and which is of sufficient capacity to be considered Regional in the context of the community profile and the master plan.
3. **Storage of water**, which is of sufficient capacity to be considered regional in the context of the community profile and the master Plan.
4. **Metering** to determine inter-municipal flow and other flow information necessary to support the management of the Regional system.
5. **Conveyance** systems in form of watermains whose primary purpose is to transmit water to the distribution system of a local area municipality. These watermains do not have service connections (to a private property), or fire hydrants along their length and:
 - a. Provide a link between a supply source that is outside a municipally approved urban area/town/village boundary and an appropriate location within the local municipal

distribution system; or

- b. Provide a link between a supply point at the Regional boundary to a Regional facility; or
 - c. Provide a metered interconnection between local municipalities; or
 - d. Are necessary to allow a service area to be in a desired Regional pressure district; or
 - e. Are necessary to service more than one municipality; and
 - f. In all cases of sufficient capacity to be considered Regional in the context of the community profile and the master plan.
6. **Control and data** for the Regional SCADA system.
7. **Interconnectivity** between Regional facilities where appropriate and supported through the master plan.

Infrastructure that meets this criteria but that is not currently identified in the Master Plan will be reviewed during the periodic Master Plan updates to ensure appropriate Regional context is considered in the decision making process.

The Region should consider additional jurisdictional issues as follows:

Boundary Control between pressure districts or pressure zones should be determined by the Region in consultation with local municipalities. The Region should have input to the equipment (gate valve, check valve, pressure reducing valve) used to create the separation of the zones. Furthermore the boundaries should not change without consultation and approval of the Region.

It was agreed at the workshop that the Region would follow up on the jurisdictional issue of Boundary Control when the recommended policies of the Master Plan are identified.

Wastewater

The Region has an established policy on the Jurisdiction of Regional wastewater infrastructure. The policy defines that the Master Plan process shall determine the jurisdiction of existing and new infrastructure.

Regional jurisdictional criteria are as follows:

- 1. **Treatment** of wastewater prior to discharge to the natural environment.
- 2. **Pumping** of wastewater either;
 - a. Directly to a treatment facility; or (see below)
 - b. To a Regional system and which is of sufficient capacity to be considered Regional in the context of the community profile and the Master Plan.
- 3. **Flow equalization** for the purpose of increasing pumping efficiency and security and typically located adjacent to Regional pumping facilities (not to include oversized sewers primarily intended for conveyance unless the sewer meets Regional criteria).

4. **Metering** to determine inter-municipal flow and other flow information necessary in support of managing the Regional system.
5. **Conveyance** systems:
 - a. That do not have service connections, or;
 - b. Are necessary to service more than one municipality; or
 - c. That terminate at a local treatment facility; and
 - d. In all cases of sufficient capacity to be considered Regional in the context of the community profile and the Master Plan.
6. **Interconnectivity** between Regional facilities where appropriate and supported through the Master Plan.

Infrastructure that meets this criteria but that is not currently identified in the Master Plan will be reviewed during the periodic master plan updates to ensure appropriate Regional context is considered in the decision making process.

The Region should consider a change to the pumping station criteria as follows: “Directly to the treatment facility” should be removed since there are situations where pumping facilities are too small to be considered regional in the context of the community profile and the Master Plan.. Each pumping station should be considered based on “b” only.

5. Water Criteria

The water system criteria established here is based on previous Master Plan documents and the recently developed as York Region design criteria. Changes to the criteria or conflict in the documentation were discussed at the workshop to reach agreement on these criteria.

The criteria will be used to assess the existing infrastructure and to plan new infrastructure in the Master Plan.

5.1 System Criteria

Water Demand Rates

The unit demand rates for population and employment are reassessed with each update of the Master Plan. In the recent update of the Master Plan in 2003 a detailed assessment was completed and used in the Master Plan. The unit demand rates for this Master Plan will be determined based on the following:

- The historical record of water consumption between 1996 and 2006 will be documented to determine combined and individual residential and employment unit consumption rates,
- The average rates for four years (2003 to 2006) will be established as the 2006 rate for the start of the projection,
- The unit rates will be reduced for the first 10 years (2009 to 2019) of the projection based on the projected water savings in the Water Efficiency Master Plan Update,

- The unit rates will remain constant after 2019 to end of the planning period, and
- The proposed unit rates will be reviewed with the Steering Committee before being adopted for the study.

A copy of the 2004 Master Plan rates for 2006 to 2036 is included in Appendix D.

It should be noted that these rates are used to analyze and size the Regional facilities. It is understood that unit rates and the maximum day factors for sizing the local municipal systems would be different. The criteria used by the local municipalities are included in Appendix D for comparison. A separate working paper will be prepared to document the unit rates (Unit Rates Working Paper) to be used.

Water Quality

- Treatment objectives for drinking water are, as a minimum, to meet the requirements established under The Province of Ontario, Safe Drinking Water Act.
- The need for iron removal of groundwater supplies was proposed in the previous master plan but should still be considered.
- The addition of fluoride should only be considered where requested.

Pressure Zones and Criteria

- Pressure zones are based on an elevation difference of about 30 metres which will produce an operating range of 275 to 700 kPa (40 to 100 PSI).
- MOE Guidelines identifies the operating range of 275 to 700 kPa.
- Minimum system pressure of 140 kPa at the location of a fire during maximum day conditions as per MOE Guidelines.

Water System Storage

An average day demand volume of storage should be considered in the larger pressure zones to provide additional security in the water supply system. This has been the practice in PD5 and PD6 of the York Water System. Based on the projected growth it is recommended that this be considered for PD7, PD9, and the communities of Aurora (3 zones), Newmarket (3 zones), and Holland Landing/Sharon/Queensville (likely 4 zones).

Infrastructure Sizing

The current Master Plan has forecasts based on 30%, 40%, and 50% intensification and an ultimate scenario (no boundary expansion). All scenarios have a horizon of 2051. It is recommended that the water and wastewater systems be planned for the worst case scenario.

While the system can be planned for a 45 to 50 year horizon, there are some key infrastructure that can be planned now for the potential of further expansion, if necessary. The Master Plan will determine the key infrastructure to be considered as follows:

Water Supply Systems

- Pumping stations that may be integral to further expansion will have all critical components for capacity increase (i.e. suction and discharge headers, supply and discharge watermains, pump bays, etc.) sized for the ultimate planning scenario.
- Watermains that may be integral to the system operation for security shall be identified for potential redundancy
- Ground storage reservoirs in pressure districts or zones where the potential for expansion exists shall make provisions for additional land and reservoir expansion.
- Water treatment plants in areas where the potential for further growth exists shall make provisions for additional land for the site and allow for the expansion of system processes.

5.2 Facilities Criteria

Water Treatment Plants

- Water treatment plants shall provide maximum day demand of the system supplied.
- Standby power is required at water treatment plants.
- MOE Guidelines (latest version) should be used to size the treatment plants.

Wellhouses

- Standby power is required for all wellhouses
- Standby wells are required for firm capacity of system supply
- Maintenance of wells is required as the capacity of wells will deteriorate with time.
- Aquifer monitoring systems are required for all well systems.

Pumping Stations

- Capacity equal to the maximum day demand of the pressure district or greater if there is insufficient storage in the pressure district, and
- Firm capacity based on the largest pumping unit out of service, and
- Where more than one pumping station supplies a pressure district then firm capacity of supply to the zone is based on the largest pumping unit out of service, and
- Standby power is required for all pumping stations where there is insufficient storage or the facility supplies in excess of the maximum day demand.

Storage Facilities

- Storage facilities consist of in ground reservoirs, at grade tanks and elevated tanks.
- Storage calculation equation:

$$\text{Volume} = A+B+C$$

Where:

A = Balancing storage equal to 25% of maximum day demand

B = Fire storage (based on FUS and land use)

C = Emergency storage equal to 25% of A+B

Note: This equation is similar to the MOE Guideline, Appendix N.

- Fire storage for a pressure district is based on Fire Underwriter Survey 1999 (FUS) and land use designation

Land Use	Rate (L/ min)	Duration (hrs)
Residential (Low)	7,000	2
Residential (High)	10,000	2
Commercial	10,000	2
Industrial	17,000	3.5

- Pressure Districts with populations in excess of 250,000 people (residential plus employment) will consider the possibility of simultaneous fires in one area (FUS, 1996)
- Spatially extended pressure districts (i.e. PD5, PD6 and likely PD7) will consider multiple fire events.

Watermains

- Watermains are to be sized to handle maximum flow events of peak hour or maximum day plus fire.
- The 'C' factor for system modelling will be as follows:

Size (mm)	'C' Factor	MOE 'C' Factor
300-350	120	120
400-600	130	120
>600	140	130

Note: Region criteria does not consider a C Factor of 140

- The watermains should be designed to withstand maximum operating pressures plus transient pressures. When possible the supply system should be designed to minimize the possibility of surges within the system.
- The maximum design velocity for watermains will be 1.5 m/s.

6. Wastewater Criteria

6.1 System Criteria

YDSS System Criteria

Dry Weather Flow Generation

Dry weather wastewater generation rates will be calculated in a manner consistent with the water demand rates. As such, wastewater generation rates will be calculated for each YDSS community and calibrated based on existing flow data. Calculated rates will be input directly into the InfoWorks model. Dry weather flow peaking factors based upon MOE Design Guidelines currently used in the InfoWorks model will be utilized in the future.

Water conservation programs will be taken into account in the calculation of future dry weather flow generation rates. The Unit Rates Working Paper presents recommended water demand and wastewater generation rates considering the impact of the Region's Water Efficiency Plan.

Wet Weather Flow Generation

Existing wet weather flows will be generated for each pipe in the YDSS using the InfoWorks model of the YDSS system. The model consists of 2,950 subcatchments. The Fixed Runoff Percentage method has been used to generate an inflow response and the Groundwater Infiltration Module (GIM) has been used to generate an infiltration response. The GIM generates wet weather flow to the sanitary sewers system through infiltration from a soil storage reservoir. Model parameters within the Fixed Runoff Percentage module and the GIM have been adjusted through calibration to ensure that the InfoWorks model predicts peak wet weather flows and volumes in response to rainfall inputs within an acceptable tolerance.

For new greenfield development areas, flow hydrographs will be developed that will have a peak flow rate of 0.28 L/s/ha. These flow hydrographs will be applied against the gross development areas including the roads and other land uses which may not be directly connected to the sanitary sewer system. This is a conservative assumption appropriate for master planning when land use information is conceptual in nature. The rate of 0.28 L/s/ha is the criteria currently recommended by the MOE Design Guidelines.

System Performance Analysis

To analyze system performance, the following criteria have been developed:

- The performance of the YDSS will be assessed with a calibrated InfoWorks model.
- As the YDSS receives significant wet weather inputs, it is necessary to select a return period to represent an acceptable level of service. A level of service of 25 years was selected for the YDSS for the Master Plan as the much of the infrastructure constructed in the last ten years has been sized to provide a 25 year level of service.
- A series of design storm distributions will be used to assess system performance with storm durations ranging from 3 to 12 hours. The selection of a range of design storm distributions will allow for consideration of the impact of storms of differing durations on the YDSS.
- Areal reduction factors will be applied to input rainfall to consider the impact of spatially variated rainfall on the performance of the YDSS. A study of spatial variation in rainfall data was completed for York Region in 2006 and recommended areal reduction factors of 0.86 (for areas of 250 km²) and 0.82 (for areas of 450 km²).

Additional detail on the approach for the system performance analysis can be found in the Model Improvements Working Paper.

Small Urban Systems Criteria

Dry Weather Flows

For the small urban systems, existing dry and future dry weather flows will be generated based on population projections and system specific criteria. Criteria utilized for the small urban systems was developed based on a review of existing Environmental Assessment (EA)

documents and dry weather flow generation rates developed and documented in the Unit Rates Working Paper. .

Wet Weather Flow Generation

For small urban systems, existing and future wet weather flows will be generated as follows using the area municipality infiltration rate as shown in Table 6.2. These values will be applied to gross development areas and will be used to generate peak flows to each facility.

Table 6-1 – Small Urban Systems Wet Weather Flow Generation Criteria

Area Municipality	Wet Weather Flow Generation Criteria
Town of Georgina (Keswick, Sutton)	0.21 L/s/ha
King Township (Schomberg, Nobleton)	0.2 L/s/ha
Town of East Gwillimbury (Mount Albert) ¹	0.28 L/s/ha
City of Vaughan (Kleinburg)	0.28 L/s/ha
Notes:	
1. MOE infiltration allowance assumed for the Town of East Gwillimbury.	

System Performance Analysis

To analyze satellite system performance, the following criteria have been developed:

- For the satellite systems, the capacity of Regional infrastructure will be compared against peak flows calculated in accordance with Tables 6.1 and 6.2.

Additional detail on the approach for the system performance analysis can be found in the Model Improvements Working Paper.

Wastewater Systems

- Trunk sewers should be designed to flow at 80% of full flow capacity, where appropriate, to permit flexibility in future changes in flow demand due to assumption/criteria changes, flow diversion and system network modifications.
- Sewers constructed in tunnel may be oversized due to the construction methodology. Large deep trunk sewers could be considered for online peak flow attenuation.
- Pumping station wet wells should be sized to allow for the attenuation peak flows and consider separating chambers to minimize maintenance in the initial years of operation.
- Sewage treatment plants in areas where the potential for further growth exists shall make provision for additional land for the site and allow for the expansion of system processes.

6.2 Facilities Criteria

The following facilities criteria are recommended:

- Trunk sewers should be sized to convey peak flow where the peak flow is calculated from the InfoWorks model. The InfoWorks model will predict the peak flow as a sum of

the dry weather and wet weather flows and will consider the dynamic routing effects of the collection system.

- Pumping stations should be sized to provide sufficient firm capacity to pump peak flow. The firm capacity of each pumping station is to be determined based on the largest pump out of service.
- The treatment plant design will follow MOE Design Guidelines. Treatment plants are to be sized to provide sufficient capacity to treat peak flows.