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## EXECUTIVE SUMMARY

The Town of East Gwillimbury retained GENIVAR Ontario Inc. to prepare a Town-wide Water and Wastewater Master Plan in order to assist with the identification of the anticipated water and wastewater infrastructure that would be required to service the Town to the projected ultimate buildout of the municipality. The Master Plan has been developed including the requirement that all Town areas, except for the in rural areas, must be provided with full municipal services. The actual time frame that will be required to reach ultimate buildout is not known at present, as it will depend on the growth rates that occur, but the target residential and employment population projections used in the study of 150,000 and 75,000 respectively, represent the ultimate growth scenario developed to date for the Town.

The Central Growth Area (CGA) component of the Town which is comprised of the Holland Landing, Sharon, Queensville, Green Lane West and Whitebelt areas is projected to include an ultimate buildout residential population of approximately 138,000 and an employment population of approximately 70,000. In order to reach the 70,000 employment population level, an urban expansion into the Greenbelt will be required. The projected population for the Mount Albert and rural areas of the Town comprise the populations beyond the CGA amounts indicated (i.e. approximately 12,000 and 5,000 respectively).

The land areas available in the CGA to accommodate the projected growth have been determined and include previously identified OPA approved growth areas, intensification within existing community areas and development of the “whitebelt lands”. The “whitebelt lands” are those lands within the CGA that are located outside of the existing community area boundaries and that have been identified as areas for future growth.

The Central Growth Area does not include the Mount Albert community or the rural areas of East Gwillimbury. The Mount Albert area is anticipated to grow to a maximum residential population of approximately 6,000 and an employment population of approximately 1,300. The rural areas will not be provided with water and wastewater services although minor population growth will occur in those areas to totals of approximately 6,000 and 4,000 respectively.

The purpose of the Master Plan is to identify the water distribution and the wastewater collection systems which will become the responsibility of the Town and that will be necessary to accommodate the projected ultimate buildout population. The Master Plan will also provide conceptual plans for the ultimate water distribution and wastewater collection system configurations so that as growth occurs over time, the appropriate infrastructure can be installed to facilitate the long-term development of the Town. The Master Plan servicing configurations will reflect the Master and Functional Servicing Plans completed previously while addressing the identified additional development areas and population.

The study area for the Water and Wastewater Master Plan does not encompass the entire land area of the Town of East Gwillimbury as a considerable component of the Town is located within the Oak Ridges Moraine and the Provincial Greenbelt areas and thus, are not available for growth. A Central Growth Area has been identified by the Town that includes the major areas within the Town that are available for urban growth and that are outside of the Moraine and Greenbelt zones. The CGA is the major focus of the Master Plan as it will contain the majority

of the growth expected to occur within the Town. The study area also considers potential future servicing of adjacent Greenbelt lands along Woodbine Avenue.

The Town of East Gwillimbury has developed population projections for the anticipated ultimate growth scenario for the Town based on the requirements included within recent provincial legislation including the related intensification proposals. The projected populations have been discussed with, and generally agreed to, by the Region of York as a reasonable expectation of the growth that could take place within the Town.

The residential and employment projections for the Central Growth Area have been apportioned across the land areas included in the CGA that are available for development. The projections have also been apportioned based on anticipated land use at a macro level to identify the anticipated location of the expected residential and employment population.

## ES-1 WATER SYSTEM

The anticipated total demands for both the proposed water and wastewater systems will be determined based on the population served along with the per capita usage of water, and the resultant per capita production of wastewater, by that population.

Due to the anticipated significant increase in overall density within the CGA, it is expected that the per capita use of water and thus, the resultant per capita production of wastewater, will be lower than at present. Further, the density increases will result in smaller average lot sizes than presently exist in the Town involving lower lawn watering, etc. requirements.

In addition, with the ongoing implementation of water conserving plumbing fixtures that use significantly less water than those installed in the past, and with the majority of the homes and businesses in the CGA to be built in the future, most buildings located in the CGA at ultimate buildout will contain water saving fixtures. As growth takes place, it is also expected that further increases in the water saving capability of fixtures will occur over time.

Significant components included in the determination of the sizing of both water distribution and wastewater collection systems are the various flow and infiltration related factors that are applied to the average day volumes calculated using the per capita and area demands. The flow factors are employed to address the variation in flows that occur during the various times of the day and, to reflect the actual usage patterns. The infiltration factor addresses the potential for infiltration of groundwater into the wastewater system which can occur at pipe joint, etc. locations.

The existing water supply for the Holland Landing, Sharon and Queensville areas of the Central Growth Area is provided by groundwater wells located in Queensville and Holland Landing. The Queensville well supply is delivered to Queensville, Sharon and Holland Landing via 500 and 600 mm diameter transmission mains along Queensville Sideroad and Leslie Street respectively which also presently accommodates the flow produced by the Queensville wells that is directed to the Town of Newmarket system.

The Holland Landing and Sharon areas include relatively large local water distribution systems while the Queensville distribution system is smaller and primarily serves the localized Leslie Street/Queensville Sideroad area. The local distribution systems are generally composed of watermains sized between 150 and 250 mm in diameter and are capable of providing both domestic and fire flows to the serviced areas.

A recently completed agreement between East Gwillimbury and the Town of Newmarket will result in the existing Newmarket watermains located in the Yonge/Green Lane area within East Gwillimbury on both the east and west sides of Yonge Street becoming the property of East Gwillimbury. With the installation of water meters on both the east and west watermains, the Town of East Gwillimbury will become responsible for all water system customers located within East Gwillimbury in the Yonge/Green Lane area.

Existing elevated water storage facilities are located within both the Holland Landing and Sharon systems to provide emergency, peak and fire flows to the systems.

The existing Mount Albert water system is served by groundwater wells located within Mount Albert, existing water storage facilities within the Town and a large, existing water distribution network composed of watermains sized from 150 mm to 350 mm in diameter. The wells and water storage facilities are operated by the Region of York while the distribution system is operated by the Town.

With the revised anticipated ultimate growth population of 138,000 residential and 70,000 employment in the CGA area versus the previously expected OPA approved population of approximately 57,000 and 19,000 respectively, the previous water supply proposal will not be sufficient. As a result, it is anticipated that additional water supply will be provided to the Central Growth Area by increasing the volume of water supplied from Lake Ontario via the Region's water system to the south. It is anticipated that this required flow will be supplied into the existing three (3) East Gwillimbury pressure districts via the appropriate corresponding pressure district systems that exist in Newmarket to the south by the extension of transmission mains north to East Gwillimbury.

The existing Town water storage facilities that serve the residential and employment populations in Holland Landing and Sharon will not be sufficient to accommodate the proposed growth of the Town's CGA. The existing water storage available in Mount Albert should be suitable to service anticipated growth.

The proposed water storage capacity must meet the MOE requirements for peak equalization, fire and emergency uses. The determination of the various components that compose the storage requirement is based on maximum day demands and fire flow rates. The expansion of the storage component can be accomplished on a phased basis as the population grows in order to provide the appropriate level of storage over time.

The proposed storage needs can be provided via an increase in the number of elevated storage tanks within the Town, via in-ground storage facilities with pumping or by a combination of both methods. In this way, a phased installation of the required storage can occur with the ultimate storage needs addressed via a combination of elevated and in-ground storage.

The proposed water distribution network was modeled using the WaterCAD software program to analyze system conditions. The pipe segment sizes were modified and adjusted through an iterative process to develop an efficient system that could provide the requisite water demands while providing appropriate system pressures under all demand scenarios reviewed. We also attempted to ensure that the pipe sizes identified were not over, or under, sized resulting in extremely low, or high, friction losses respectively within segments that would signify a less than efficient segment design.

The proposed system generally matches the system expectations as previously identified in the Master and Functional Servicing Plans completed to date for the various OPA approved community areas of the CGA, but also reflects the considerably larger projected population levels now proposed for the Town.

The construction of new facilities, along with expansion of existing facilities, by the Region of York will be necessary in order to provide the required water supply to the Central Growth Area. The details of the required facilities and the timing of their installation will be addressed within the Water & Wastewater Master Plan update being completed by the Region.

The ongoing Region of York update to its Water & Wastewater Master Plan will determine the infrastructure needs to accommodate the expected increases in population for the entire Region including that identified for East Gwillimbury. The completion of that document, expected in 2009, will follow completion of this Master Plan and may result in changes to the Regional water supply assumptions and the installation schedule included within this document. This Master Plan may require adjustment to modify the assumptions included within the document following completion of the Region's Master Plan update.

## ES-2 WASTEWATER SYSTEM

The existing municipal wastewater collection facilities in the Central Growth Area are limited to the Holland Landing system along with, two (2) localized systems in the Yonge Street/Green Lane and the Leslie Street/Green Lane areas. The Yonge Street/ Green Lane area is served by a Region of York trunk sewer on Green Lane and the Leslie Street/Green Lane area is served by the Town of Newmarket system on a temporary basis and is subject to an existing agreement in place between East Gwillimbury and Newmarket.

The Holland Landing system directs flow to a central Region of York pump station located on Bradford Street at the Holland River. The station pumps effluent via a forcemain to sewage lagoons that are located north of Doane Road and east of Yonge Street for treatment.

The existing Green Lane trunk sewer and the Bradford Street pump station, forcemain and treatment lagoons in Holland Landing are Region of York facilities. The remaining wastewater collection system components are Town of East Gwillimbury facilities that include sewers sized from 150 mm to 375 mm in diameter along with, small wastewater pump stations servicing localized areas of Holland Landing.

The future fully developed Town of East Gwillimbury is intended to be entirely serviced by municipal wastewater collection systems at ultimate buildout except for the rural population that will remain on private systems. All new development to take place in the CGA and Mount Albert must be provided with approved municipal collection systems. In addition, the proposed collection systems are to be sized to permit the connection in the future of all concentrated existing areas presently served with private services, as appropriate. All existing unserved areas within the CGA are anticipated to be provided with access to municipal wastewater collection systems in the future.

The proposed collection systems will be comprised of gravity sewers, pump stations and forcemains that will collect the wastewater flows and direct the flow to the Region of York's wastewater system and treatment facilities. There will not be any wastewater treatment facilities

located within the Central Growth Area once the existing Holland Landing lagoons are decommissioned as presently proposed.

In order to determine the size and location of the required wastewater trunk sewers, the projected population and land use, road network, per capita demands and flow factor data were employed. The topographic conditions of the CGA were examined to delineate the major wastewater drainage areas. These drainage areas were then analyzed to determine the most appropriate sewer corridors in order to direct the flows in the most efficient manner to outlet to the Regional system.

The CGA was divided into eleven (11) major drainage areas that addressed all existing and potential developed areas including the “whitebelt”, the present OPA approved lands and that accommodated the ultimate projected residential and employment populations. As with the water system, the facilities analyzed involved the trunk facilities only as the planning detail has not been developed sufficiently to address the system at the local level. As the Master Servicing and Functional Servicing Plans are prepared for the proposed development areas over time, the details of the local systems will be defined. During that stage, the system proposals identified in this Master Plan will require adjustment/modification to address the details available at that time.

As noted previously, the wastewater collection system necessary to serve the CGA will direct all flows to the Region of York’s collection and treatment system. At present, the Region system is not sized to accommodate the ultimate buildout population of the CGA and will require expansion to address the flows.

The Region has completed an environmental assessment for the York Durham Sewage System (YDSS) Extension project that will provide an ability for the initial development areas of the CGA to connect to a Regional facility south of the CGA (Newmarket Pump Station). This will also permit the decommissioning of the existing Holland Landing lagoons and the redirection of the Bradford Street pump station forcemain to the new YDSS Extension gravity wastewater main on 2<sup>nd</sup> Concession.

The YDSS Extension pump station is expected to be constructed in phases as it will take many years for the CGA to achieve buildout. The first phase is expected to be on-line during 2009 and at present, there is a limit of approximately 15,000 people that can be added to the existing Newmarket Pump Station via this system, in addition to, the Bradford Street pump station flow, prior to the provision of a second wastewater route from East Gwillimbury to the YDSS south of Newmarket. The limit will be a cap on the amount of CGA development possible until the new route, or expansion of the existing system, is completed.

The second route required for the Regional wastewater collection system south from East Gwillimbury may be the Upper York Sanitary System trunk system referenced in the Region’s 2004 Master Plan update or, some other satisfactory route as determined by the Region of York.

### ES-3 INTERIM GROWTH SCENARIOS, YEAR 2015 AND YEAR 2031

The Year 2015 scenario represents the first major stage of new development of the Central Growth Area. This first stage would involve the development of lands to accommodate the initial 15,000 person contribution to the existing Region of York downstream system that is available prior to the provision of a second route for the wastewater flow from East Gwillimbury or, some form of expansion of the existing Regional system to the south is complete. The second route

could be the Upper York Sanitary System route previously contemplated within the Region's existing wastewater master plan.

As employment lands are not considered within the allocation process for water and wastewater services by the Region of York, we have assumed that the 15,000 population limitation is related to residential uses only and will not restrict the development of employment lands subject to adequate actual physical capacity being available in the Regional systems to accommodate the employment lands.

The growth in Mount Albert during this period is expected to be relatively minor and should require only extensions to existing systems.

The Year 2031 scenario would represent the second major stage of new development within the Central Growth Area with approximately a 20 year horizon from the present. Year 2031 has also been a commonly used horizon date in other area studies including the Town's Official Plan process and the existing Regional Water & Wastewater Master Plan.

In order for growth to continue beyond 2015, a second wastewater route from East Gwillimbury must be provided by the Region either via a new system (such as the previously noted Upper York Sanitary System route) or expansion of the existing system. As a result, we can assume that if development can occur during the 2016-2031 period, there will not be any limit on the pace of growth as there was for the period prior to 2015, as the second route will be available.

Of the CGA amounts, the residential and employment populations as of 2015 will be approximately 28,000 and 10,000 respectively, leaving a growth potential of 48,000 in residential uses and 30,000 in employment during the 2016 - 2031 period. This equals an average annual growth of approximately 3,000 residential persons and approximately 1,875 employees per year.

#### ES-4 SYSTEM COSTS

The conceptual cost required to construct the systems to ultimate buildout of the Central Growth Area will be substantial. It is important to note that the costs indicated are order of magnitude only and, have not been subject to a rigorous cost estimation exercise.

The costs required for the significant amount of Regional infrastructure necessary to facilitate the servicing of the Central Growth Area is not included within the costs presented as these facilities will be the responsibility of the Region.

Several of the trunk water distribution and wastewater collection projects identified via the Master Plan are facilities that will serve both existing and growth related populations; are located within existing Town/Region road allowances; will serve multiple property ownerships; could be considered as being of Town-wide significance; are of a significant size; and/or, serve a significant amount of population. As a result, a number of the proposed infrastructure items identified have been included within the Town's Development Charge Bylaw update completed recently in order to reflect their importance, facilitate their installation and ensure the efficient development of the Central Growth Area.

## ES-5 SYSTEM SUSTAINABILITY

The proposed water distribution system concept developed has considered the sustainability of the ultimate buildout scenario by minimizing material and operational costs, disruption, transportation and fossil fuel use needed to create and maintain the system.

The determination of the ultimate system required for the full growth scenario of the Central Growth Area permits the installation of the correct sized infrastructure initially preventing the requirement to return to replace the facilities at a later date to increase capacity as the area grows. This will result in a major reduction in the transportation, fuel, etc. required over time for the construction process.

As with the water distribution system, the wastewater collection system concept developed involved the consideration of the sustainability of the system over time.

The system has been conceived to provide the maximum amount of gravity sewer and the elimination of potential pump stations, where possible. This will result in a significant reduction over the Central Growth Area's development of the need for transportation, manufacturing, fossil fuels, etc. The reductions will be further realized as the replacement and reconstruction needs for pump stations with a 20 – 50 year life span are significantly greater than that for the 100 year life span of sewers. In addition, the fuel and electricity use at pump stations is not required for gravity sewers.

Finally, the proposed pump station facilities should be designed to meet the appropriate LEED standard and include solar, LED, etc. power/lighting where possible.

# 1. INTRODUCTION

## 1.1 PURPOSE

The Town of East Gwillimbury retained GENIVAR Ontario Inc. to prepare a Town-wide Water and Wastewater Master Plan in order to assist with the identification of the anticipated water and wastewater infrastructure that would be required to service the Town to the projected ultimate buildout of the municipality. The actual time frame that will be required to reach ultimate buildout is not known at present, as it will depend on the growth rates that occur, but the target residential and employment population projections used in the study of 150,000 and 75,000 respectively, represent the ultimate growth scenario developed to date for the Town.

The Central Growth Area (CGA) component of the Town which is comprised of the Holland Landing, Sharon, Queensville, Green Lane West and Whitebelt areas is projected to include an ultimate buildout residential population of approximately 138,000 and an employment population of approximately 70,000. In order to reach the 70,000 employment population level, an urban expansion into the Greenbelt will be required. The projected population for the Mount Albert and rural areas of the Town comprise the populations beyond the CGA amounts indicated (i.e approximately 12,000 and 5,000 respectively).

The land areas available in the CGA to accommodate the projected growth have been determined and include previously identified OPA approved growth areas, intensification within existing community areas and development of the “whitebelt lands”. The “whitebelt lands” are those lands within the CGA that are located outside of the existing community area boundaries and that have been identified as areas for future growth.

The Central Growth Area does not include the Mount Albert community or the rural areas of East Gwillimbury. The Mount Albert area is anticipated to grow to a maximum residential population of approximately 6,000 and an employment population of approximately 1,300. The rural areas will not be provided with water and wastewater services although minor population growth will occur in those areas to totals of approximately 6,000 and 4,000 respectively.

The purpose of the Master Plan is to identify the water distribution and the wastewater collection systems which will become the responsibility of the Town and that will be necessary to accommodate the projected ultimate buildout population. The Master Plan will also provide conceptual plans for the ultimate water distribution and wastewater collection system configurations so that as growth occurs over time, the appropriate infrastructure can be installed to facilitate the long-term development of the Town. The Master Plan servicing configurations will reflect the Master and Functional Servicing Plans completed previously while addressing the identified additional development areas and population.

## 1.2 OBJECTIVES

The major objectives of the Water and Wastewater Master Plan are:

- Identify appropriate water and wastewater per capita demands for the systems;
- Identify the anticipated total system demands based upon the projected ultimate buildout population for residential and employment land uses as provided by the Town;

- Determine the trunk water distribution infrastructure necessary to serve the proposed ultimate population;
- Determine the trunk wastewater collection infrastructure necessary to serve the proposed ultimate population;
- Identify conceptual sizing for the required trunk water distribution and wastewater collection systems to accommodate the proposed ultimate growth;
- Determine conceptual cost estimates for the proposed infrastructure;
- Determine the proposed system components that could be considered Regional infrastructure;
- Determine the proposed system components that could be included within the Town's Development Charge Bylaw.

The above noted objectives are addressed in the following sections of the Master Plan and will result in the identification of the major components of the water and wastewater systems required to serve the ultimate buildout population. The Master Plan will also provide information related to two (2) interim growth scenarios for Year 2015 and Year 2031 for the CGA based on assumptions of the rate of growth as provided by the Town.

It should be noted that the Region of York is presently completing a water and wastewater master plan for the Region that includes the Town of East Gwillimbury. Should the plan, that is not anticipated to be complete until 2009, result in Regional water supply and/or wastewater collection systems that differ from the assumptions contained within this Master Plan, adjustments to the Town's plan will be necessary to accommodate the details of the Region's proposals.

## 2. STUDY AREA & EXISTING POPULATION

### 2.1 STUDY AREA

The study area for the Water and Wastewater Master Plan does not encompass the entire land area of the Town of East Gwillimbury as a considerable component of the Town is located within the Oak Ridges Moraine and the Provincial Greenbelt areas and thus, are not available for growth. A Central Growth Area has been identified by the Town that includes the major areas within the Town that are available for urban growth and that are outside of the Moraine and Greenbelt zones. The CGA is the major focus of the Master Plan as it will contain the majority of the growth expected to occur within the Town. The study area also considers potential future servicing of some Greenbelt lands along Woodbine Avenue.

The Central Growth Area is generally bounded by the Town of Newmarket to the south, Woodbine Avenue to the east, the future Bradford Bypass highway location to the north and Regional Road No. 1 (Yonge Street) and Bathurst Street to the west. There are also minor areas located beyond the described general CGA boundaries and an illustration of the CGA is presented in **Figure 1**.

It is important to note that there will also be limited growth occurring within the Mount Albert community area and the rural areas of the Town. However, this growth will not be served by the major water and wastewater infrastructure required to serve the Central Growth Area but will be addressed locally in the case of Mount Albert, or not serviced with communal systems at all, as is the case for the rural areas.

### 2.2 EXISTING RESIDENTIAL & EMPLOYMENT POPULATION

The existing residential and employment population in the Town of East Gwillimbury is composed of the Holland Landing, Sharon, Queensville, Green Lane, Mount Albert and rural populations as presented in **Table 1**. The location of the existing community areas within the CGA are shown in **Figure 2**.

The population amounts shown are based on data provided by the Town and the traffic zones shown in **Figure 3** and the population tables included in **Appendix E**.

**Table 1 Existing Residential and Employment Population**

Community	Residential	Employment
Holland Landing	8,900	1,240
Sharon	2,900	320
Queensville	730	150
Green Lane	0	1,580
Mount Albert	3,400	530
Rural	6,000	2,080
<b>Totals</b>	<b>21,930</b>	<b>5,900</b>

**Note: Populations shown are based on Town data and an estimated distribution of traffic zone populations over the various community areas.**

The populations identified in **Table 1** are not all presently serviced with municipal water and/or wastewater systems and the estimated serviced population for each system is shown in **Table 2**.

**Table 2 Estimated Existing Serviced Population**

Community	Water System		Wastewater System	
	Residential	Employment	Residential	Employment
Holland Landing	8,900	1,240	4,500	1,000
Sharon	2,900	320	Nil	Nil
Queensville	730	150	Nil	Nil
Green Lane	0	1,580	Nil	1,580
Mount Albert	3,400	530	3,400	530
Rural	Nil	Nil	Nil	Nil
<b>Totals</b>	<b>15,930</b>	<b>3,820</b>	<b>7,900</b>	<b>3,110</b>

**Note:** Serviced populations shown are based upon Town data and an estimated distribution of traffic zone populations over the various community areas.

### 3. POPULATION PROJECTIONS & SYSTEM DEMANDS

#### 3.1 RESIDENTIAL & EMPLOYMENT POPULATION PROJECTIONS

The Town of East Gwillimbury has developed population projections for the anticipated ultimate growth scenario for the Town based on the requirements included within recent provincial legislation including the related intensification proposals. The projected populations have been discussed with, and generally agreed to, by the Region of York as a reasonable expectation of the growth that could take place within the Town.

The residential and employment projections for the Central Growth Area have been apportioned across the land areas included in the CGA that are available for development. The projections have also been apportioned based on anticipated land use at a macro level to identify the anticipated location of the expected residential and employment population.

**Table 3** indicates the projected residential and employment population for the ultimate buildout scenario for the Town. The projected population includes both the present community area lands plus, the addition of the “whitebelt” areas that are adjacent to each community. The totals shown are approximations based on the total populations of 150,000 residential and 75,000 employment as identified in the Official Plan process to date along with, the population as identified for the East Gwillimbury Traffic Zone areas as shown in **Figure 3** and **Appendix E**. The populations shown in **Table 3** for the CGA (total minus the Mount Albert and rural areas) reflects the approximate total populations for the CGA of 138,000 and 70,000 indicated previously.

**Table 3** Projected Residential & Employment Population at Ultimate Buildout

Community	Residential	Employment
Central Growth Area	138,000	69,750
Mount Albert	6,000	1,250
Rural	6,000	4,000
<b>Totals</b>	<b>150,000</b>	<b>75,000</b>

In addition to identifying the size of the population to be served, the expected location of the population must be known in order to determine the sizing of the specific infrastructure required.

**Figure 3** and **Appendix E** provide information regarding the anticipated distribution of the ultimate buildout residential and employment population within the CGA via the use of traffic zone population estimates. The distribution was provided by the Town and has been used to determine the infrastructure required within the Central Growth Area.

#### 3.2 PROPOSED WATER & WASTEWATER SYSTEMS – DEMAND CRITERIA

The anticipated total demands for both the proposed water and wastewater systems will be determined based on the population served along with the per capita usage of water, and the resultant per capita production of wastewater, by that population. The previous section identified the ultimate population totals that are to be serviced by the systems. In addition, the data presented in **Figure 3** and **Appendix E** illustrates the distribution of that population across the CGA by land use.

The next parameter to be determined in order to complete the servicing review is the per capita design criteria to be employed to calculate the total water supply required and wastewater effluent to be produced. In addition, the criteria will be employed to determine the water and wastewater flows within localized zones of the CGA to identify the trunk infrastructure required to service the population in those zones. As the Mount Albert area population growth is expected to be modest, it is not anticipated that any new trunk watermains or wastewater mains will be required within Mount Albert.

The Town presently employs the per capita demands identified in **Table 4** for the design of water and wastewater systems.

**Table 4 Existing Per Capita Water & Wastewater Design Criteria**

Land Use	Water	Wastewater
Residential	450 L/c/d	450 L/c/d
Industrial	35,000 L/h/d	35,000 L/h/d
Commercial	28,000 L/h/d	28,000 L/h/d
Institutional	18,000 L/h/d	18,000 L/h/d

Due to the anticipated significant increase in overall density within the CGA, it is expected that the per capita use of water and thus, the resultant per capita production of wastewater, will be lower than at present. Further, the density increases will result in smaller average lot sizes than presently exist in the Town involving lower lawn watering, etc. requirements.

In addition, with the ongoing implementation of water conserving plumbing fixtures that use significantly less water than those installed in the past, and with the majority of the homes and businesses in the CGA to be built in the future, most buildings located in the CGA at ultimate buildout will contain water saving fixtures. As growth takes place, it is also expected that further increases in the water saving capability of fixtures will occur over time.

The combination of these factors has led many municipalities to reduce the previously used water and wastewater per capita guideline of 450 L/capita/day as suggested by the Ministry of the Environment (MOE). In fact, the Region of York presently uses residential per capita rates of 278 L/capita/day, the Town of Markham uses 365 L/capita/day while the Region of Peel employs a per capita rate of approximately 300 L/capita/day.

As a result, we believe that the present residential per capita rates employed by the Town of East Gwillimbury should be reduced in order to implement efficiently sized water and wastewater systems. After reviewing the water and wastewater reductions expected now and into the future as noted above, along with the per capita rates presently employed by other GTA municipalities, we would propose the below noted per capita rates as presented in **Table 5** for use in the design of all new water distribution and wastewater collection system components within the Town. Although the Mount Albert area will not experience the same degree of growth as the Central Growth Area, the use of the modified per capita amounts would also be considered appropriate for new development that occurs within Mount Albert.

**Table 5 Proposed Per Capita Water & Wastewater Design Criteria**

Land Use	Water	Wastewater
Residential	350 L/c/d	350 L/c/d
Industrial	35,000 L/h/d	35,000 L/h/d
Commercial	28,000 L/h/d	28,000 L/h/d
Institutional	18,000 L/h/d	18,000 L/h/d

The use of the suggested reduced per capita residential demands will reflect the state of building construction today, the increased density to be developed within new development areas and the general understanding of the public today related to the need to, and benefits of, reducing their individual water use resulting in a more sustainable community.

As the land use assignment employed for the Master Plan has been at a macro level to date due to the present early stage of the overall planning process, we would suggest retaining the existing industrial/commercial/institutional rates identified in **Tables 4 and 5** along with, an average population of 50 persons/ha for all employment areas. In addition, due to the early stage of growth, we would suggest that all infrastructure be designed employing the industrial rate for all employment areas. In this way, conservative demand scenarios will be developed as the suggested industrial rate exceeds both the commercial and institutional rates. This will result in a degree of excess capacity in the systems to accommodate additional, or adjustments to, population/land use assignment and contribution in the future.

### 3.3 PROPOSED WATER & WASTEWATER SYSTEMS – FLOW FACTORS

Significant components included in the determination of the sizing of both water distribution and wastewater collection systems are the various flow and infiltration related factors that are applied to the average day volumes calculated using the per capita and area demands. The flow factors are employed to address the variation in flows that occur during the various times of the day and, to reflect the actual usage patterns. The infiltration factor addresses the potential for infiltration of groundwater into the wastewater system which can occur at pipe joint, etc. locations.

The peak flow factors involved are based on population for both the water and wastewater systems. Following review of the MOE guidelines and the peaking factors used by other Region of York local municipalities, and to include a degree of flexibility in the system due to the early stage of growth, we have selected a peaking factor of 2.75 for the ultimate buildout water distribution system. The maximum day and minimum hour flow factors for the water system were reviewed in a similar way and the factors chosen for these scenarios were 2.0 and 0.70 respectively. As the system develops over time, adjustments to these factors can be made to reflect the actual population growth and water use that occurs.

The wastewater system peak flow factor will be determined based on drainage area population and the well known Harmon Formula. A wastewater system infiltration allowance of 0.286 L/sec/ha is proposed to be employed as the infiltration factor for the design of the wastewater collection system.

The above noted peak, maximum day, minimum hour and infiltration parameters will be used along with the calculated average day flow to determine the conceptual size of the water and wastewater infrastructure required to service the ultimate buildout scenario of the CGA. As the

Mount Albert area is not expected to require new trunk facilities, the pipe systems required to address the anticipated growth in Mount Albert have not been addressed in the Master Plan. The same maximum day, peak, etc. factors noted above can be used as appropriate during the design of the local system extensions that will be required over time in Mount Albert to accommodate growth.

### 3.4 PROPOSED WATER & WASTEWATER SYSTEMS – TOTAL DEMAND PROJECTIONS

With the population size and distribution, land use, per capita and flow parameters identified, the overall water system demand from, and the wastewater collection system contribution to, the Region of York's systems by the CGA can be identified. As the Mount Albert systems are stand alone systems, the Master Plan has not specifically reviewed the overall demand projections for Mount Albert.

The proposed CGA water and wastewater service areas have been determined based on geographical and topographical conditions and are not based on the existing or future community area boundaries.

The proposed water and wastewater system details presented in Sections 4 and 5 of the Master Plan have been developed using the demand parameters noted previously plus, topographic conditions, proposed and existing road networks, etc. in order to determine the infrastructure location and sizing necessary to address the needs of the CGA.

As the Region of York's water and wastewater master plan is currently being updated, accommodation in the Regional plan of the anticipated CGA total demands would be appropriate.

## 4. WATER DISTRIBUTION SYSTEM

### 4.1 EXISTING WATER SYSTEMS

The existing water supply for the Holland Landing, Sharon and Queensville areas of the Central Growth Area is provided by groundwater wells located in Queensville and Holland Landing. The Queensville well supply is delivered to Queensville, Sharon and Holland Landing via 500 and 600 mm diameter transmission mains along Queensville Sideroad and Leslie Street respectively which also presently accommodates the flow produced by the Queensville wells that is directed to the Town of Newmarket system.

In addition, there is a 450 mm diameter trunk watermain on Mount Albert Road which connects to the Leslie Street transmission main and supplies water from the Queensville wells to the Holland Landing system in addition to, the supply from the local Holland Landing wells.

The Holland Landing and Sharon areas include relatively large local water distribution systems while the Queensville distribution system is smaller and primarily serves the localized Leslie Street/Queensville Sideroad area. The local distribution systems are generally composed of watermains sized between 150 and 250 mm in diameter and are capable of providing both domestic and fire flows to the serviced areas.

There are also two localized water distribution systems in the Yonge Street/Green Lane and the Leslie Street/Green Lane areas that are presently supplied via the Town of Newmarket water distribution system as per agreements in place between Newmarket and East Gwillimbury.

An agreement in place between the two (2) Towns will result in the existing Newmarket watermains located in the Yonge/Green Lane area and within East Gwillimbury on both the east and west sides of Yonge Street becoming the property of East Gwillimbury. With the installation of water meters on both the east and west side watermains, the Town of East Gwillimbury will become responsible for all water system customers located within East Gwillimbury in the Yonge/Green Lane area.

Existing elevated water storage facilities are located within both the Holland Landing and Sharon systems to provide emergency, peak and fire flows to the systems.

The Queensville wells and the transmission main along Queensville Sideroad and Leslie Street connecting the wells to the Town of Newmarket system are Region of York facilities. The Mount Albert Road trunk watermain from Leslie Street to Holland Landing is also a Regional facility.

The remainder of the water supply and distribution system components are operated by the Town of East Gwillimbury except for the two (2) noted Green Lane locations that were previously operated by the Town of Newmarket. The Yonge/Green Lane situation has recently changed as noted resulting in the Yonge Street watermains within East Gwillimbury now falling under the ownership of East Gwillimbury.

The existing Mount Albert water system is served by groundwater wells located within Mount Albert, existing water storage facilities within the Town and a large, existing water distribution network composed of watermains sized from 150 mm to 350 mm in diameter. The wells and water storage facilities are operated by the Region of York while the distribution system is operated by the Town.

Water system plans located in **Appendix A** illustrate details of the existing water supply, storage and distribution systems within the Holland Landing, Sharon and Queensville areas of the Central Growth Area along with, the Mount Albert area.

## 4.2 PROPOSED WATER SUPPLY SYSTEM

As noted, the Town of East Gwillimbury's existing water supply is provided by a combination of the Region of York's system, local Town systems and the Town of Newmarket system. As the CGA experiences significant growth in the future leading to the projected ultimate buildout condition, the existing water supply will require significant expansion to accommodate the growth. To date, the anticipated growth to the approved Official Plan Amendment (OPA) population of approximately 68,000 residential and 21,000 employment was to be accommodated by redirecting flow from the Region's Queensville wells to satisfy the CGA demand. The water supply expansion required to service the Mount Albert portion of the growth was to be addressed via expansion of the existing supply system.

The redirection of the existing Queensville well supply from the Town of Newmarket to East Gwillimbury by retaining the groundwater in East Gwillimbury was proposed to be replaced in Newmarket by water supply directed from Lake Ontario to Newmarket.

With the revised ultimate growth populations of 138,000 residential and 70,000 employment in the CGA area versus the previously expected OPA approved population of approximately 57,000 and 19,000 respectively, this previous water supply proposal will not be sufficient. As a result, it is anticipated that additional water supply will be provided to the Central Growth Area by increasing the volume of water supplied from Lake Ontario via the Region's water system to the south. It is anticipated that this required flow will be supplied into the existing three (3) East Gwillimbury pressure districts via the appropriate corresponding pressure district systems that exist in Newmarket to the south by the extension of transmission mains north to East Gwillimbury.

The water supply system design assumptions made for the ultimate buildout of the Town have included:

- The total CGA water supply required will be partially provided by the existing Queensville and Holland Landing groundwater wells with the balance of the supply being provided via the Region of York supply system to the south involving water supplied from Lake Ontario;
- Water supply to be directed to the CGA distribution system will be supplied via three (3) pressure districts. The districts will be supplied by the Queensville wells, the Leslie Street transmission main and a proposed Woodbine Avenue transmission main in the east; the Leslie Street transmission main and a proposed Yonge Street transmission main in the central area; and, a proposed Bathurst Street transmission main in the southwest area. The volume and pressure conditions required at each of the supply points for the ultimate growth of the CGA must be provided by the Region of York's system;
- Water supply in Mount Albert will be provided by the existing groundwater well with growth accommodated via expansion to the existing system;
- New Regional trunk watermains will be added to provide the required water supply to/within the CGA;

- New Regional water storage facilities within the Town will meet MOE guidelines to provide adequate emergency, balancing and fire flow volumes; and
- The existing Region of York 10 Year Capital Plan includes proposals for the installation of two (2) new elevated water storage tanks within the Queensville area along with the decommissioning of the existing elevated tank located in Sharon and the replacement of the existing elevated tank in Holland Landing located in the 2<sup>nd</sup> Concession/Mount Albert Road area. Additional discussion related to water storage requirements is included in Section 4.3.

Due to the minimum and maximum pressure conditions under which water distribution systems must operate in order to provide a safe and efficient service to the public as identified in Section 4.4, pressure districts must be defined within distribution systems where supply conditions, topography or system pressure loss situations will result in the minimum and/or maximum pressure conditions not being met.

In the Town of East Gwillimbury, topographical changes that occur across the CGA result in pressure zones being required in order to address the pressure changes between the high and low elevation locations. For example, areas in the southwest and northeast areas of the CGA range up to an elevation of 290+ m whereas, areas along the Holland River range between 220 – 230 m in elevation. This 60 – 70 m elevation difference results in excessive pressures in the lower areas if the minimum and maximum pressure ranges are met in the higher elevation zones when both areas are included within the same pressure district.

As a result, the CGA will be divided into three separate pressure districts to maintain system pressures in all areas that match the required system pressure range. **Table 6** provides a general description of the three pressure districts including the service elevation ranges that match the existing Region service ranges for the corresponding Newmarket districts. **Figure 4** illustrates the conceptual geographical location of the districts. Each of the districts is supplied by at least one transmission main extending service north from the corresponding adjacent pressure district (East, Central and West) located in the Town of Newmarket to the south.

**Table 6 Proposed CGA Pressure Districts**

Pressure District	Location	Regional Supply System	Service Range
East	<ul style="list-style-type: none"> <li>◆ Lands east of Leslie Street</li> <li>◆ Lands west of Leslie Street above 258 m contour</li> </ul>	Queensville wells & Newmarket East district	258 – 288 m
Central	◆ Lands below 258 m contour west of Leslie Street and below 273.5 m contour east of Yonge Street	Queensville wells & Newmarket East & Central districts	243.5 – 273.5 m
West	◆ Lands above 273.5 m contour east and west of Yonge Street	Newmarket West district	280 - 310

The expected Regional supply from the Queensville wells and the Newmarket East District to the Central District will require pressure reducing valves on the watermains providing the flow from the east to ensure that the Central District pressures meet the maximum system pressure design criterion.

For the purposes of the Master Plan, we have assumed that the ultimate water supply required will be available from the Region's system to serve the Central Growth Area and will be generally provided as follows:

#### A. East Pressure District

- Located north of Davis Drive and Green Lane and east of 2<sup>nd</sup> Concession except in the Green Lane/2<sup>nd</sup> Concession area;
- Located generally above the 258 m contour;
- Supply will be provided by the existing Queensville wells plus, the existing 500 and 600 mm transmission main on Queensville Sideroad and Leslie Street respectively;
- Additional supply will be provided from the Newmarket East Pressure District via a change from the existing southerly flow to a northerly direction in the existing 600 mm transmission main on Leslie Street to provide supply from the Regional system in Newmarket;
- Additional supply will also be provided via installation of a new 300 to 500 mm diameter transmission main on Woodbine Avenue extending from the existing 500 mm transmission main located on Woodbine Avenue at Bales Drive north to Queensville Sideroad; and
- Due to low surface elevations in a localized area in the northwest area of the East District, a minor sub-district labelled *East 'A'* will be required. Pressure reducing valves will be required on the watermains contributing flow to this area from the main East District area to control maximum pressure in the area.

#### B. Central Pressure District

- Located north of the Town of Newmarket, west of 2<sup>nd</sup> Concession (including the 2<sup>nd</sup> Concession/Green Lane area not in the East District) and east of Yonge Street;
- Located generally below the 273.5 m contour;
- Supply will be provided by the existing Holland Landing wells and the existing 450 mm diameter Mount Albert Road watermain that includes a pressure reducing valve (PRV) at 2<sup>nd</sup> Concession;
- Additional supply will be provided by the existing East Pressure District 600 mm transmission main on Leslie Street via a connection to a proposed 500 mm watermain on Green Lane extending between Leslie Street and Yonge Street. A PRV will be installed on the Green Lane watermain west of Leslie Street to control maximum pressure in the Central District. A dedicated central district watermain may be developed on Leslie Street as the Regional system grows which may require adjustment to the system in this area;
- Additional supply will also be provided by the installation of a new 500 mm diameter watermain on Yonge Street extending north to the proposed 500 mm diameter watermain on Green Lane from the existing Regional London Road elevated water storage tank located in Newmarket. With the execution of a recent agreement between East Gwillimbury and Newmarket regarding the transfer of ownership of a portion of the existing watermains on Yonge Street to East Gwillimbury, this may eliminate the need for a new watermain on Yonge Street if the existing east side watermain supplied by the London Road storage facility becomes a Regional facility as the overall system

develops in the area. The watermain will be a Town responsibility in the interim and the cost of the water crossing the boundary into East Gwillimbury as recorded by a meter at the municipal boundary will be paid by the Town of East Gwillimbury directly to the Region of York; and

- Due to the service range of the Central District, pressure reducing valves will be required on some of the watermains feeding into the existing area of Holland Landing (on 2<sup>nd</sup> Concession and Doane Road) which operates with a lower top water level of 290.5 m. The pressure reducing valves will permit flow from the Central and East Districts to supplement the existing Holland Landing supply while accommodating its existing lower top water level by creating a sub-district within the Central District named *Central 'A'*. The Central District will serve the Green Lane area to the east of Yonge Street within its proposed service range.

### C. West Pressure District

- Located north of the Town of Newmarket, west of Yonge Street and east of Bathurst Street;
- Located generally above the 273.5 m contour;
- Supply will be provided by the installation of a new 500 mm diameter watermain on Bathurst Street from the Regional watermain on Bathurst Street at Woodspring Avenue in Newmarket extending north to, and east along Green Lane to connect to an existing 400mm main west of Yonge Street;
- The execution of an agreement between East Gwillimbury and Newmarket includes the transfer of a portion of the existing watermain located on the west side of Yonge Street in 2009 to East Gwillimbury and will provide a loop connection into the West District via Yonge Street. The inclusion of a meter at the municipal boundary will record the water flow into East Gwillimbury; and
- The new Harvest Hills development located west of Yonge Street and south of Green Lane within the West District will also be served via a connection to the Newmarket system on Woodspring Avenue until such time as the Yonge Street west watermain is transferred to East Gwillimbury.

The above noted existing and future Regional water supply systems have been assumed to be capable of providing the required water volumes at the appropriate pressures to adequately serve the Central Growth Area, up to and including, the ultimate buildout condition.

The boundaries of the three (3) pressure districts and the two (2) sub-districts discussed above are presented in **Figure 4**.

The construction of new facilities, along with expansion of existing facilities, by the Region of York will be necessary in order to provide the required water supply to the Central Growth Area. The details of the required facilities and the timing of their installation will be addressed within the Water & Wastewater Master Plan update being completed by the Region.

The ongoing Region of York update to its Water & Wastewater Master Plan will determine the infrastructure needs to accommodate the expected increases in population for the entire Region including that identified for East Gwillimbury. The completion of that document, expected in 2009, will follow completion of this Master Plan and may result in changes to the Regional water

supply assumptions and the installation schedule included within this document. This Master Plan may require adjustment to modify the assumptions included within the document following completion of the Region’s Master Plan update.

### 4.3 PROPOSED REGIONAL WATER STORAGE FACILITIES

The existing Town water storage facilities that serve the residential and employment populations in Holland Landing and Sharon will not be sufficient to accommodate the proposed growth of the Town’s CGA. The existing water storage available in Mount Albert is expected to be suitable to service anticipated growth.

The proposed water storage capacity must meet the MOE requirements for peak equalization, fire and emergency uses. The determination of the various components that comprise the storage requirement is based on maximum day demands and fire flow rates. The expansion of the storage component can be accomplished on a phased basis as the population grows in order to provide the appropriate level of storage over time.

The Region’s Master Plan Update is expected to identify the storage requirement in East Gwillimbury on a Town wide basis versus on a pressure district basis. As a result, we have obtained a preliminary indication of the elevated storage to be identified in the Region’s master plan for the ultimate buildout in the CGA. Each of the three (3) pressure districts are expected to be provided with the required level of storage for the district determined by the Region and as identified in **Table 7**.

**Table 7 Regional Water Storage Requirements by Pressure District**

Pressure District	Region Fire Flow (l/sec)	Storage Volume (cu. m.)
East & East ‘A’	283	28,000
Central & Central ‘A’	283	10,000
West	283	7,600
<b>Total</b>		<b>45,600</b>

The proposed storage needs can be provided via an increase in the number of elevated storage tanks within the Town, via in-ground storage facilities with pumping or by a combination of both methods.

One advantage of the elevated storage type of facility is that they tend to be smaller and can be added easily in a phased manner to reflect relatively small population increases. At present, the Region has identified the need to install two (2) new elevated storage tanks within the Queensville area to address expected growth as defined within the approved OPA’s for Sharon and Queensville.

As storage is a Regional responsibility, the Region will identify within its ongoing Master Plan update the size, type and location of the necessary facilities to address the expanded storage needs. However, we would suggest the following phased scenario for the Region’s consideration:

- Proceed with the two (2) proposed elevated tanks in Queensville to address the initial stages of development in the Sharon and Queensville areas;

- Decommission the existing Sharon tank as proposed to occur in conjunction with the installation of the storage facilities noted above;
- Install an elevated storage facility in the general area of Woodbine Avenue and Green Lane;
- Install an elevated storage facility for the west district at a site located east of Yonge Street in the area of the existing high point of land approximately 600 m north of Green Lane;
- Install an elevated storage tank in the area of the high point of land in the southwest quadrant of the Doane Road/2<sup>nd</sup> Concession intersection to initially address the storage needs due to growth in Holland Landing, the southwest area of Queensville and the northwest area of Sharon;
- Decommission the existing elevated tank located on Hilltop Drive in the southeast area of Holland Landing in conjunction with installation of the Doane/2<sup>nd</sup> Concession facility;
- As growth continues to occur in the Queensville, Sharon and Green Lane areas consider replacing the above noted Doane/2<sup>nd</sup> Concession area elevated tank with a large in-ground reservoir with pumping capability in phases, if necessary, to serve the remaining storage needs of the ultimate buildout of the East and Central Districts.

In this way, a phased installation of the required storage can occur with the ultimate storage needs addressed via a combination of elevated and in-ground storage.

#### 4.4 PROPOSED WATER DISTRIBUTION SYSTEM MODEL & CRITERIA

The water distribution system that will be required to serve the ultimate buildout of the Town of East Gwillimbury will include a series of trunk watermains that will direct flows from the Region of York and Town supply locations along with, smaller distribution mains located within local areas. For the purposes of the Master Plan, we have included only the major trunk distribution mains within the network reviewed as the population distribution and land use data for the CGA is available at a macro level only at this time. As Master Servicing Plans (MSP) are completed for each of the Secondary Plan areas within the Town as the planning process proceeds, the water system must be reviewed at a more detailed level with the defined planning data. The recommendations included in this Master Plan may be adjusted at that time to reflect the MSP level system requirements.

As the growth expected in the Mount Albert area will not involve the installation of new trunk watermains to service the growth, a water model has not been completed for the Mount Albert water distribution system.

Based on the location of the expected CGA Region of York water supply points, the anticipated population and land use plus, the existing and anticipated major road network, a water distribution trunk network model employing the WaterCAD software program was developed that will generally represent the major distribution mains expected throughout the CGA. We have assumed that the smallest watermain to be included in the model would be 300 mm in diameter (except for localized 200 – 250 mm mains already included in the existing systems as trunk mains) with the largest anticipated to be 600 mm in diameter reflecting the size of the existing Leslie Street main.

It is important to note that the proposed watermain alignments considered within the model and as shown on **Figure 4** are concepts only and, will be further defined as development, future road locations and land uses are confirmed. The alignments shown represent one potential system configuration.

The WaterCAD software model has been chosen as the framework to model the Central Growth Area water system due to its capabilities, its availability and broad based usage plus, its suitability considering the data needs of the system.

The model has been developed to reflect the ultimate buildout of the CGA and as a result, provides a network that addresses the full growth scenario. This allows the system components to be sized to reflect the ultimate population and identify the required infrastructure that must be installed as the CGA grows. In this way, as growth proceeds, an appropriately sized water distribution system will be created to suit future requirements.

As noted above, the network included in the model contains the major distribution mains necessary and does not include the smaller distribution piping located in existing areas or that which will be required in localized areas as developments are constructed. As the actual road systems, land uses, local populations, etc. are not known at this time, these future local zones will need to be addressed as growth occurs and the data becomes available. The model can be updated by inputting the new data as it becomes available over time.

We have accommodated water service for all of the expected population within the model and have distributed it as anticipated by the Town. As a result, all major trunk distribution mains required to serve the CGA area have been identified.

The watermain network created follows existing roadways or anticipated major future arterial roads that are expected to be constructed as the Town develops. Nodes were identified throughout the pipe network within the model and appropriate water demands were assigned to the nodes to reflect the anticipated land use and population in the area as identified by the Town (see **Figure 3** and **Appendix E**). Other required attributes were identified for each node including an identifying number and elevation. For simplicity, we have assumed the watermain elevation at each node represents the top of the watermain located 2 m below the existing ground surface elevation at the node location.

The surface elevation at each node was interpolated from the 2002 topographical data for the CGA as supplied by the Town. It should be noted that the existing elevations will be changed in many areas during development which will impact the resultant watermain elevations used. This issue should be addressed during the completion of the Master Servicing Plans for the Secondary Plan areas as greater detail on the proposed grades become available.

Once the physical details and demand requirements of each node were identified, we estimated the required size of each of the various proposed pipe sections within the network based on engineering judgement, the location of the segment within the system and the demand requirements in the area.

The network was modeled using the WaterCAD software program to analyze system conditions. The pipe segment sizes were modified and adjusted through an iterative process to develop an efficient system that could provide the requisite water demands while providing appropriate system pressures under all demand scenarios reviewed. We also attempted to ensure that the pipe

sizes identified were not over, or under, sized resulting in extremely low, or high, friction losses respectively within segments that would signify a less than efficient segment design.

The water distribution system design criteria employed included:

- a. Minimum System Pressure**
  - 275 kPa (40psi) at peak hour demand conditions;
  - 140 kPa (20psi) at maximum day plus fire demand conditions.
- b. Maximum System Pressure**
  - 700 kPa (100psi).
- c. Per Capita Demands**
  - Residential – 350 L/capita/day;
  - Employment – 35 m<sup>3</sup>/ha/day, avg. 50 persons per ha.
- d. Demand Factors**
  - Peak = 2.75;
  - Max. Day = 2.00;
  - Min. Hour = 0.70;
  - Demand Factors were chosen based on pressure district versus Town-wide populations.
- e. Fire Flow Rate**
  - 200 L/sec. Employment areas;
  - 80 L/sec. Residential areas.

We have employed a 200 L/sec fire flow rate for industrial areas and an 80 L/sec rate in solely residential areas to differentiate these conditions. However, we have assumed that only a single fire will occur at a time as we believe that this more accurately reflects the expected condition versus the previous Town fire flow demand condition that included two (2) simultaneous fires of 200 L/sec and 80 L/sec respectively at separate locations.

The above noted design criteria have been employed in the model analyses to identify the conceptual water distribution system infrastructure required to serve the ultimate population growth projected for the Central Growth Area.

#### 4.5 WATER SYSTEM MODEL DEMAND SCENARIOS

The demand scenarios completed to analyze the water distribution system were:

- Minimum hour demand;
- Average day demand;
- Maximum day demand;
- Peak hour demand; and
- Maximum day plus fire demand.

The model results for the system configuration that was determined to best suit the ultimate growth projections for the CGA are located in **Appendix B**. The data provided includes the results for all five (5) of the demand scenarios employing the residential and employment population distribution developed by the Town, the assumed water supply conditions from the

Region of York system and the per capita demands and flow factors identified. The resultant system meets all required MOE minimum pressures during the peak hour and maximum day plus fire demand conditions. We simulated fire flow events at various locations throughout the CGA including the locations that were anticipated to be the most susceptible to the larger fire flow demand impacts.

The model included pressure reducing valves at appropriate locations such as at the pressure district boundaries between the major districts and sub-districts discussed previously.

The proposed system generally matches the system expectations as previously identified in the Master and Functional Servicing Plans completed to date for the various OPA approved community areas of the CGA, but also reflects the considerably larger projected population levels now proposed for the Town.

The model results indicate that the conceptual water distribution system as illustrated in **Figure 4** will adequately service the ultimate buildout residential and employment population projections for the Town of East Gwillimbury. The system illustrated indicates the infrastructure sizing necessary for the major distribution system components to be installed as development proceeds to ensure that twinning, expansions, etc. will not be required as the CGA develops over time. **Figure 4** also indicates the existing and proposed Regional infrastructure in the Central Growth Area but does not include all existing watermains or the expected future local systems.

**Table 8** provides a general view of the range of system pressures that will be available in the various geographical areas of the CGA following buildout.

**Table 8 Typical System Pressure Ranges at Buildout**

Location	Pressure Range (kPa)		
	Avg. Day	Peak Hour	MD + Fire (N96)
Holland Landing	430-700	395-590	410-640
Sharon	570-710	540-680	560-700
Queensville	370-670	360-665	355-670
Green Lane	420-695	400-670	410-670

N96 = Node number 96 in model network (200 L/sec fire flow)

The pressure ranges noted above are the minimum and maximum pressures that will typically exist throughout the ultimate system during the identified demand scenarios. The maximum static pressure that will exist in any location within the system will generally not exceed 700 kPa. There are local zones in the Holland River/Green Lane, South Sharon, Green Lane/Bathurst and North Holland Landing areas that include some marginally high static pressures in the model that will require a more detailed review at the design stage when elevations, demands, pipe sizes, etc. in the area are confirmed.

#### 4.6 HIGHWAY #404 WATERMAIN CROSSINGS

With the expansion of the Central Growth Area, there will be a need to install watermain crossings of the Highway #404 corridor to develop the overall system and service areas east of the proposed Highway #404 alignment. There may be a benefit to arranging advanced installation of the crossings along with the highway construction projects dependent upon the

size of the infrastructure and the time frame of the required servicing in order to minimize the cost of the construction of the municipal services.

We would expect the following watermain crossings of Highway #404 to be required during the time frames noted:

- 300 mm diameter watermain crossing at Farr Avenue, 2008 – 2015 period; and
- 300 mm diameter watermain crossing at Doane Road, 2008 - 2015 period.

As the watermains noted are relatively small, as the actual location of the required crossings could change (particularly at Doane Road) as designs are completed and, as the crossings are expected to be a small portion of a larger construction project, any cost benefit related to having the crossings pre-installed with the Highway #404 work would likely be limited. In addition, the pre-installed location would reduce the flexibility afforded by installing the watermain when required. As a result, we would suggest that the watermain crossings not be pre-installed with the Highway #404 works.

## 5. WASTEWATER COLLECTION SYSTEM

### 5.1 EXISTING WASTEWATER SYSTEMS

The existing municipal wastewater collection facilities in the Central Growth Area are limited to the Holland Landing system along with, two (2) localized systems in the Yonge Street/Green Lane and the Leslie Street/Green Lane areas. The Yonge Street/Green Lane area is served by a Region of York trunk sewer on Green Lane and the Leslie Street/Green Lane area is served by the Town of Newmarket system on a temporary basis and is subject to an existing agreement in place between East Gwillimbury and Newmarket.

The Holland Landing system directs flow to a central Region of York pump station located on Bradford Street at the Holland River. The station pumps effluent via a forcemain to sewage lagoons that are located north of Doane Road and east of Yonge Street for treatment.

The existing Green Lane trunk sewer and the Bradford Street pump station, forcemain and treatment lagoons in Holland Landing are Region of York facilities. The remaining wastewater collection system components are Town of East Gwillimbury facilities that include sewers sized from 150 mm to 375 mm in diameter along with, small wastewater pump stations servicing localized areas of Holland Landing.

The remainder of the Central Growth Area's existing population is addressed by private wastewater systems.

In the Mount Albert area, existing development is served via a local wastewater treatment plant and a sewer collection system that ranges in diameter from 200 to 300mm. The wastewater treatment plant is the responsibility of the Region while the Town is responsible for the wastewater collection system.

Wastewater system plans located in **Appendix A** illustrate the details of the existing wastewater collection, pumping and treatment systems within Holland Landing and Mount Albert.

### 5.2 PROPOSED WASTEWATER COLLECTION SYSTEM

The future fully developed Town of East Gwillimbury is intended to be entirely serviced by municipal wastewater collection systems at ultimate buildout except for the rural population that will remain on private systems. All new development to take place in the CGA and Mount Albert must be provided with approved municipal collection systems. In addition, the proposed collection systems are to be sized to permit the connection in the future of all concentrated existing areas presently served with private services, as appropriate. All existing unserved areas within the CGA are anticipated to be provided with access to municipal wastewater collection systems in the future.

The proposed collection systems will be comprised of gravity sewers, pump stations and forcemains that will collect the wastewater flows and direct the flow to the Region of York's wastewater system and treatment facilities. There will not be any wastewater treatment facilities located within the Central Growth Area once the existing Holland Landing lagoons are decommissioned as presently proposed.

The design criteria employed for conceptual design of the system has included:

- **Per capita demand, residential** = 350 L/sec;
- **Per ha. demand, employment** = 35,000 L/ha./day;
- **Peak flow factor** – Harmon Formula;
- **Infiltration allowance** – 0.286 L/sec/ha.

In order to determine the size and location of the required wastewater trunk sewers, the projected population and land use, road network, per capita demands and flow factor data were employed. The topographic conditions of the CGA were examined to delineate the major wastewater drainage areas. These drainage areas were then analyzed to determine the most appropriate sewer corridors in order to direct the flows in the most efficient manner to outlet to the Regional system.

It is important to note, as with the water system, that the proposed wastewater main alignments considered within the review and as shown in **Figure 5** for the ultimate buildout scenario are concepts only and will be further defined as development, future road locations, elevations and land uses are confirmed. The alignments shown represent one potential system configuration.

The CGA was divided into eleven (11) major drainage areas that addressed all existing and potential developed areas including the “whitebelt”, the present OPA approved lands and that accommodated the ultimate projected residential and employment populations. As with the water system, the facilities analyzed involved the trunk facilities only as the planning detail has not been developed sufficiently to address the system at the local level. As the Master Servicing and Functional Servicing Plans are prepared for the proposed development areas over time, the details of the local systems will be defined. During that stage, the system proposals identified in this Master Plan will require adjustment/modification to address the details available at that time.

The Mount Albert area is expected to experience a limited amount of growth and will not require the installation of new trunk wastewater mains to accommodate growth.

The major trunk systems developed for the CGA are expected to follow, wherever possible and where beneficial, the existing and/or expected road systems. In addition, the concept review was completed with the philosophy that the use of gravity systems should be employed wherever possible and pumping facilities minimized. This will help to address both long term operational and replacement costs and, to address the sustainability strategy of the Town of East Gwillimbury via the reduction of greenhouse gas emissions produced by the use of fossil fuels and electricity at pump stations. This will result in localized deep sewers (8-12m depth +/-) in a limited number of locations but will result in the concentration of flows to larger, more efficient pump station locations and/or the elimination of potential pump stations. We believe that in the long term, the maximization of gravity facilities and the elimination of unnecessary pump stations will provide a significant life cycle cost and environmental benefit.

The locations in which the deep gravity sewers are expected to be required include:

- Woodbine Avenue approximately 500m south of Green Lane;
- Woodbine Avenue approximately 600m north of Green Lane;
- Mount Albert Road approximately 200m west of Leslie Street; and

- New subdivision area west of North/South Collector Road west of Leslie Street and south of Mount Albert Road if the Sharon trunk does not follow the existing Hydro Corridor in the area.

In the locations noted where deep wastewater mains may be required, the Town may wish to install shallower local wastewater mains connected to the deep sewers to facilitate shallower individual house/building connections. The Town may also wish to review the locations of the deep sewers on a case by case basis during detailed design to determine if the installation of a pump station may be a better choice for that specific location. In any event, for large pump stations to be constructed in phases, the station forcemains shall be installed as twin forcemains to ensure adequate cleaning and turnover of effluent in the mains.

The major drainage areas were determined with the above philosophy in mind and it has resulted in an effective and efficient system that will provide satisfactory wastewater collection service to the entire CGA. In addition, the system proposed generally reflects the collection systems identified within the MSP's and FSP's developed previously for the approved OPA areas while reflecting the significant increase in the projected population and land area to be served by the system.

A significantly sized pump station, forcemain and trunk sewer combination is required to direct wastewater flows from east of Highway #404 in the Mount Albert Road area to the YDSS Extension. The present proposal indicates that wastewater flows east of Highway #404 and south from Doane Road would be directed to PS2 located on Woodbine Avenue. Flow from PS2 would be carried by forcemain across the Highway #404 corridor to connect to a gravity system directing flows to the YDSS Extension.

**Figure 5** indicates a conceptual alignment for the PS2 forcemain and gravity sewer east of Leslie Street across the lands presently known as the "Tribute" lands. The Town of East Gwillimbury believes this to be the best location for the forcemain/sewer alignment in this area. West of Leslie Street, the gravity sewer is shown to follow the existing hydro corridor south and west to connect to the YDSS Extension. This hydro corridor location is the Town's preferred alignment and would be the most cost effective location for the trunk sewer.

**Figure 5** illustrates the major components of the CGA wastewater collection system concept for the ultimate buildout scenario including major drainage areas, trunk gravity wastewater main and pump station locations plus, existing and proposed Regional facilities. Existing and proposed local systems have not been shown.

Should servicing of the unserviced Yonge Street area north of Doane Road proceed in the future, the existing sewers to which the flow will be contributed by PS13 must be reviewed to confirm capacity and to identify any system expansion required in the local area to accommodate the flows (from PS 13).

**Appendix C** provides the CGA wastewater collection system design sheets developed to support the concept. The design sheets provide detail related to population served, pipe size required, etc. for individual system components.

### 5.3 PROPOSED REGIONAL WASTEWATER COLLECTION SYSTEM

As noted previously, the wastewater collection system necessary to serve the CGA will direct all flows to the Region of York's collection and treatment system. At present, the Region system is not sized to accommodate the ultimate buildout population of the CGA and will require expansion to address the flows.

The Region has completed an environmental assessment for the York Durham Sewage System (YDSS) Extension project that will provide an ability for the initial development areas of the CGA to connect to a Regional facility south of the CGA (Newmarket Pump Station). This will also permit the decommissioning of the existing Holland Landing lagoons and the redirection of the Bradford Street pump station forcemain to the new YDSS Extension gravity wastewater main on 2<sup>nd</sup> Concession.

The proposed YDSS Extension will consist, in part, of a pump station constructed in the area of the Holland River at 2<sup>nd</sup> Concession with a forcemain to direct flows initially from the station to the existing Regional Newmarket Pump Station facility located south of Green Lane and east of 2<sup>nd</sup> Concession. The new station will be fed by the remainder of the YDSS Extension composed of a major gravity trunk wastewater main on 2<sup>nd</sup> Concession that will extend north from the station to the high point of land just north of Doane Road. North of the terminus of the gravity trunk, the YDSS Extension will include a pump station in the general 2<sup>nd</sup> Concession/Queensville Sideroad area and a second station located in the general area of Queensville Sideroad and the future Highway #404. Both pump stations will pump flow via forcemains on Queensville Sideroad and 2<sup>nd</sup> Concession as appropriate to discharge to the gravity wastewater main noted.

The majority of the Central Growth Area's wastewater flows will be directed via pump station or gravity sewer to this pump station facility on 2<sup>nd</sup> Concession (approx. 80% of CGA flow). The remaining drainage area in the southwest area of the CGA will direct flow to the existing Regional Green Lane trunk sewer. The sewer extends along Green Lane from Yone Street to 2<sup>nd</sup> Concession, south on 2<sup>nd</sup> Concession for approximately 300 m and then east via easements and a Holland River crossing to the Newmarket Pump Station.

The YDSS Extension pump station is expected to be constructed in phases as it will take many years for the CGA to achieve buildout. The first phase could be on-line during 2009 and at present, there is a limit of approximately 15,000 people that can be added to the existing Newmarket Pump Station via this system, in addition to, the Bradford Street pump station flow prior to the provision of a second wastewater route from East Gwillimbury to the YDSS south of Newmarket. The limit will be a cap on the amount of CGA residential development possible until the new route, or expansion of the existing system, is completed.

The second route required for the Regional wastewater collection system south from East Gwillimbury may be the Upper York Sanitary System referenced in the Region's 2004 Master Plan update or, some other satisfactory route as determined by the Region of York.

The existing Green Lane trunk sewer can generally accommodate the proposed development in its drainage area with minor capacity shortfalls (15% and less) in several manhole to manhole sections and two (2) sections with more significant shortfalls (25% and 50%). As the population and land use details used are conceptual at this time, the sewer should be reviewed as the planning data is confirmed and the design process proceeds to confirm the actual flow

conditions. In the worst case, it would appear that two (2) to three (3) sections of the existing sewer may require reconstruction to address the capacity shortfalls (see **Appendix C**).

It should be noted that the existing Green Lane trunk sewer may be redirected from its existing alignment which directs flow to the Newmarket Pump Station. A potential option to redirect the flow from this sewer north to the new YDSS Extension pump station has been discussed to date. Should the redirection occur, a larger YDSS Extension pump station capability will be required.

Finally, a significant component of all wastewater flows contributed by the CGA areas south of Doane Road and east of 2<sup>nd</sup> Concession will be ultimately directed to the Hydro Corridor trunk sewer discussed in Section 5.2. Through discussion with the Region of York, it has been determined that the section of this trunk sewer west from Leslie Street to the YDSS Extension will be a Region of York trunk sewer. The jurisdiction related to the section of the system east from Leslie Street to, and including, PS2, is still the subject of Town/Region discussion.

The expected location of the YDSS Extension system including pump stations and forcemains are indicated in **Figure 5**. Also indicated in **Figure 5**, are the Bradford Street Pump Station and its proposed forcemain along with, the existing Green Lane trunk sewer. All proposed Town trunk facilities indicated in **Figure 5** will direct flow to the Regional system and the design sheets for the conceptual system are located in **Appendix C**.

#### 5.4 HIGHWAY #404 WASTEWATER MAIN CROSSINGS

With the expansion of the CGA there will be a need to install wastewater main crossings of the Highway #404 corridor to develop the overall system and service areas east of the proposed Highway #404 alignment. There may be a benefit to arranging advanced installation of the crossings along with the highway construction projects dependent upon the size of the infrastructure and the time frame for the required servicing in order to minimize the cost of the construction of the municipal services.

We would expect the following wastewater main crossings of Highway #404 to be required during the time frames noted:

- Twin 400 mm diameter wastewater forcemains crossing north of Farr Avenue, 2008-2015 period;
- 250 mm diameter wastewater main crossing south of Doane Road, 2008-2015 period; and
- Twin 300 mm diameter wastewater forcemains crossing at Queensville Sideroad, 2016-2031.

As the wastewater mains are relatively small, as the actual location of the required crossings could change (particularly the crossing south of Doane Road) as designs are completed and, as the crossings are expected to be a small portion of larger construction projects, any cost benefit related to having the crossings pre-installed with the Highway #404 work would likely be limited. In addition, the pre-installed location would reduce the flexibility afforded by installing the crossings when required. As a result, we would suggest that the wastewater main crossings not be pre-installed with the Highway #404 works.

## 6. INTERIM GROWTH SCENARIOS

### 6.1 YEAR 2015 SCENARIO

The Year 2015 scenario represents the first major stage of new development of the Central Growth Area. This first stage would involve the development of lands to accommodate the initial 15,000 residential contribution to the existing Region of York downstream system that is available prior to the provision of a second route for the wastewater flow from East Gwillimbury or, some form of expansion of the existing Regional system to the south is complete. The second route could be the Upper York Sanitary System route previously contemplated within the Region's existing wastewater master plan.

As employment lands are not considered within the allocation process for water and wastewater services by the Region of York, we have assumed that the 15,000 population limitation is related to residential uses only and will not restrict the development of employment lands subject to adequate actual physical capacity being available in the Regional systems to accommodate the employment lands involved.

It is anticipated that based on the need to finalize the planning process and install the first phase of the YDSS Extension northerly along 2<sup>nd</sup> Concession to accommodate development (except for areas along Green Lane West), that the major component of the first stage of development will be initiated during 2009 at the earliest.

Development expected to occur during this Year 2015 period (to a maximum of 15,000 people) as identified by the Town is noted below:

- 300 residential units/year in each of Holland Landing, Sharon and Queensville (3 persons /unit); and
- employment lands in each of the Green Lane and Highway #404 employment corridors.

If we assume that the first residential units arrive in 2010, then by 2015 a total of 5,400 residential units could be developed within the Holland Landing, Sharon and Queensville areas based on the above. This unit volume would represent a total population of 16,200 people that is within 10% of the 15,000 person limit. The actual unit numbers developed and the appropriate population per unit involved can be monitored over time as development occurs to confirm the actual population being contributed to the system.

The amount of employment land that can be developed during this period will be controlled by the location of the infrastructure installed and, the actual capacity of the downstream Regional wastewater system.

The above development pattern to 2015 would require, at a minimum, the installation of the trunk water distribution facilities shown in **Figure 6** and the trunk wastewater collection facilities shown in **Figure 7**.

The growth in Mount Albert during this period is expected to be relatively minor, and should require only extensions to existing systems. As trunk facilities will not be required, the service extensions in Mount Albert have not been shown in the above noted figures.

The proposed facilities from this period that have been included within the Town's Development Charge Bylaw update completed recently and their estimated costs are provided in Section 8.

## 6.2 YEAR 2031 SCENARIO

The Year 2031 scenario would represent the second major stage of new development within the Central Growth Area with approximately a 20 year horizon from the present. Year 2031 has also been a commonly used horizon date in other area studies including the Town's Official Plan process and the existing Regional Water & Wastewater Master Plan.

In order for growth to continue beyond 2015, a second wastewater route from East Gwillimbury must be provided by the Region either via a new system (such as the previously noted Upper YSS route) or expansion of the existing system. As a result, we can assume that if development can occur during the 2016-2031 period, there will not be any limit on the pace of growth as there was for the period prior to 2015, as the second route will be available.

The Town has identified in the Official Plan process that there is a potential for the residential population to reach 88,000 and the employment population to reach 45,000 by 2031. As the Mount Albert and rural populations are included within these values, we have assumed that the total residential and employment populations of the CGA will be approximately 76,000 and 42,000 respectively by 2031. Mount Albert and rural area growth will continue during this period and reach approximate populations of 12,000 and 3,000 respectively for residential and employment uses.

Of the CGA amounts, the residential and employment populations as of 2015 will be approximately 28,000 and 10,000 respectively, leaving a growth potential of 48,000 in residential uses and 30,000 in employment during the 2016 – 2031 period. This equals an average annual growth of approximately 3,000 residential persons and approximately 1,875 employees per year.

The CGA infrastructure facilities that would be required by 2031 would be as shown in **Figure 8** for the trunk water distribution system and **Figure 9** for the trunk wastewater collection system. Again, as the services required to address the Mount Albert area growth during this period would not include the addition of trunk facilities, the Mount Albert area is not included within the figures.

The proposed facilities for this period that have been included within the Town's Development Charge Bylaw update completed recently and their estimated costs are provided in Section 8.

## 7. CONCEPTUAL SYSTEM COSTS

### 7.1 WATER & WASTEWATER SYSTEM COSTS

The conceptual cost required to construct the systems to ultimate buildout of the Central Growth Area will be substantial. We have provided in **Table 9**, the anticipated conceptual costs for the construction of the water distribution and wastewater collection trunk systems by growth scenario to ultimate buildout. It is important to note that the costs indicated are order of magnitude only and, have not been subject to a rigorous cost estimation exercise. In addition, the costs included are for only those facilities included in **Figures 4 to 9** and **Appendix D** and do not include required local services in development areas. As the development proceeds and design reviews are completed at greater levels of detail, the estimated costs can be confirmed.

We have included a 25% engineering and contingency amount in the costs indicated. Costs for required land has not been included regarding the proposed wastewater pump stations. Additional detail regarding the cost estimates is presented in **Appendix D**.

The costs required for the significant amount of Regional infrastructure necessary to facilitate the servicing of the Central Growth Area is not included within the costs presented as these facilities will be the responsibility of the Region.

**Table 9** Town System Conceptual Costs Per Growth Scenario

<b>Growth Scenario</b>	<b>Water System</b>	<b>Wastewater System</b>
2008 - 2015	\$4,000,000	\$17,700,000
2016 - 2031	\$1,600,000	\$12,300,000
2032 - Ultimate Buildout	\$1,800,000	\$15,400,000
<b>Total</b>	<b>\$7,400,000</b>	<b>\$45,400,000</b>

Please note that the above costs, as further identified in **Appendix D**, also include costs associated with the proposed servicing of existing unserved developed areas within the CGA.

## 8. POTENTIAL TOWN DEVELOPMENT CHARGE PROJECTS

Several of the trunk water distribution and wastewater collection projects identified via the Master Plan are facilities that will serve both existing and growth related populations; are located within existing Town/Region road allowances; will serve multiple property ownerships; could be considered as being of Town-wide significance; are of a significant size; and/or, serve a significant amount of population. As a result, a number of the proposed infrastructure items identified have been included within the Town's Development Charge Bylaw update completed recently in order to reflect their importance, facilitate their installation and ensure the efficient development of the Central Growth Area.

We have listed below, by growth scenario to reflect the approximate project timing, the infrastructure items considered for inclusion within the Town's Development Charge Bylaw update. The items noted beyond 2031 will need to await a future bylaw update as they are too far into the future to be considered at this time. We have also provided an order of magnitude cost for the items that includes a 25% engineering and contingency amount to reflect the conceptual level of the estimates. These costs can be further refined and developed as the projects move forward and preliminary and detailed levels of design are completed. All costs are in 2008 dollars.

### 8.1 WATER DISTRIBUTION SYSTEM PROJECTS

The water distribution system projects as listed in **Table 10** have been included within the Town's recent Development Charge Bylaw or are recommended to be included in a future bylaw (2032 – Ultimate Buildout section). The general rationale for the inclusion of each project is indicated along with the conceptual cost.

**Table 10 Potential Water Distribution System Development Charge Projects**

Project	Estimated Cost	Reason for Inclusion
<b>Year 2008 – 2015</b>		
<b>Doane Road Watermain</b> (Anchor Ct. to 2 <sup>nd</sup> Concession)	\$ 790,000	Existing road allowance location & population
<b>Sharon N/S Collector Watermain</b> (Green Lane to OPA South Limit, West of Leslie)	\$ 171,000	Town wide significance & multiple ownerships, section within OPA 122 by others.
<b>Farr Avenue Watermain</b> (Donlands to Woodbine)	\$ 500,000	Population served & multiple ownerships
<b>Existing Yonge Street East Watermain</b> (from Newmarket boundary to Green Lane)	\$ 773,000	Town wide significance, watermain transfer
<b>Existing Yonge Street West Watermain</b> (from Newmarket boundary to Green Lane)	\$ 794,400	Town wide significance, watermain transfer
<b>Holland Landing Road Watermain</b> (North of Bradford)	\$ 600,000	Existing road, multiple ownerships & existing population
<b>Subtotal</b>	<b>\$ 3,628,400</b>	

<b>Year 2016 – 2031</b>		
<b>New Doane Road Watermain</b> (2 <sup>nd</sup> Concession to Woodbine)	\$ 1,320,000	Town wide significance
<b>Sharon North/South Collector Watermain</b> (Mt. Albert to Future Doane)	\$ 270,000	Town wide significance and multiple ownerships
<b>Subtotal</b>	<b>\$ 1,590,000</b>	
<b>Total in Recent Bylaw</b>	<b>\$ 5,218,400</b>	
<b>Year 2032 - Ultimate Buildout</b>		
<b>2<sup>nd</sup> Concession Watermain</b> (Queensville S.R. to 1.4 km north)	\$ 560,000	Existing road & population served
<b>Leslie Street Watermain</b> (North of Queensville S.R)	\$ 240,000	Existing road & population served
<b>Subtotal</b>	<b>\$ 800,000</b>	
<b>GRAND TOTAL</b>	<b>\$ 6,018,400</b>	

## 8.2 WASTEWATER COLLECTION SYSTEM PROJECTS

The wastewater collection system projects listed in **Table 11** have been included within the Town’s recent Development Charge Bylaw or are recommended to be included in a future bylaw (2032 – Ultimate Buildout section). The general rationale for each inclusion of the project is indicated along with the conceptual cost.

**Table 11 Potential Wastewater Collection System Development Charge Projects**

Project	Estimated Cost	Reason for Inclusion
<b>Year 2008 – 2015</b>		
<b>Green Lane Sewer</b> (Yonge to 500 m west)	\$ 220,000	Existing road
<b>Yonge Street Sewer</b> (Green Lane to 600 m north)	\$ 270,000	Existing road
<b>N/S Sewer</b> (East of Yonge, N. from Green Lane)	\$ 275,000	Multiple ownerships
<b>Sharon Collector Sewer</b> (North of Farr, Donlands to Leslie)	\$ 1,400,000	Town wide significance, size and existing population
<b>Sharon Subtrunk Sewer</b> (Sharon Trunk Sewer to Leslie & on Leslie)	\$ 790,000	Multiple ownerships, size and existing population
<b>Woodbine Pump Station (PS2)</b> (First phase of station incl. FM to Donlands)	\$ 6,000,000	Population served and size
<b>Woodbine Avenue Sewer</b> (PS2 South to Green Lane and North of PS2)	\$ 5,230,000	Existing road, size and population served
<b>Holland Landing Pump Staion (PS14)</b> (Located North of Mt. Albert, West of 2 <sup>nd</sup> Conc. incl. FM)	\$ 650,000	Multiple ownerships

<b>Holland Landing Road Sewer</b> (North & South of Bradford)	\$ 310,000	Existing road & multiple ownerships
<b>Queensville Valley Subtrunk Sewer</b> (E. of Region PS7 @ 2 <sup>nd</sup> Conc. in valley)	\$ 610,000	Multiple ownerships
<b>South Sharon Collector Sewer</b> (YDSS south to Green Lane and east to Leslie)	\$ 1,800,000	Multiple ownerships, existing road and population
<b>Northeast Sharon Sewer</b> (West of #404 to PS2)	\$ 180,000	Multiple ownerships
<b>Subtotal</b>	<b>\$17,735,000</b>	
<b>Year 2016 – 2031</b>		
<b>Woodbine Pump Station (PS2)</b> (Second phase of station)	\$ 3,225,000	See Year 2008 - 2015
<b>Woodbine Avenue Sewer</b> (South of Green Lane to Bales Drive)	\$ 840,000	See Year 2008 - 2015
<b>Queensville Pump Station (PS4)</b> (Located west of Woodbine on Queensville S.R. incl. FM)	\$ 6,070,000	Multiple ownerships & size
<b>Queensville S. R. and Woodbine Sewers</b> (Woodbine & Q.S.R. sewers to PS4)	\$ 1,000,000	Existing road & multiple ownerships
<b>Queensville S.R. Sewer</b> (Leslie to Region PS5)	\$ 1,130,000	Existing road & existing population
<b>Subtotal</b>	<b>\$12,265,000</b>	
<b>Total in Recent Bylaw</b>	<b>\$30,000,000</b>	
<b>Year 2032 - Ultimate Buildout</b>		
<b>North End Sewers</b> (Area north of Queensville S.R. from Leslie to west of 2 <sup>nd</sup> Conc.)	\$ 1,180,000	Multiple ownerships
<b>2<sup>nd</sup> Conc. Pump Station (PS6)</b> (Located North of Queensville S. R. incl. FM)	\$ 5,750,000	Multiple ownerships
<b>Subtotal</b>	<b>\$ 6,930,000</b>	
<b>GRAND TOTAL</b>	<b>\$36,930,000</b>	

Note that the above water and wastewater totals do not include those cost items included in the **Appendix D** and **Table 9** that are not expected to be appropriate for inclusion within the Development Charge Bylaw update, or future bylaws, such as the facilities required to provide service within local proposed development areas or for the existing unserved developed areas within the CGA. In addition, land costs for the proposed wastewater pump stations have not been included.

## 9. ANTICIPATED REGIONAL INFRASTRUCTURE

Several components of the water & wastewater trunk systems identified for the Central Growth Area would fit within the description of Regional infrastructure and thus, should be the responsibility of the Region of York. Some of the items have been acknowledged to date such as the YDSS Extension system and the Hydro Corridor trunk sewer east to Leslie Street. Below is a listing by system of the facilities expected to be the responsibility of the Region of York (see **Figures 4 and 5**).

### 9.1 WATER DISTRIBUTION SYSTEM

The proposed CGA water distribution infrastructure items that are expected to be added to the Region of York facilities are:

- 500 mm diameter watermain on Yonge Street south of Green Lane (if required);
- 500 mm diameter watermain on Bathurst Street and Green Lane west of Yonge Street;
- 500 mm watermain on Green Lane from Yonge Street to Leslie Street;
- 400 mm watermain on Yonge Street from Green Lane north to proposed water storage facility;
- 400 mm diameter watermain on 2<sup>nd</sup> Concession north to proposed water storage facility at Doane Road;
- 300 mm diameter watermain on 2<sup>nd</sup> Concession from Doane Road to Queensville Sideroad;
- 300 mm diameter watermain on Queensville Sideroad from 2<sup>nd</sup> Concession to Leslie;
- 500 and 300 mm diameter watermain on Woodbine Avenue from Bales Drive to Queensville S.R.;
- Water storage facilities in Queensville (2 of), at Woodbine Avenue and Green Lane, at 2<sup>nd</sup> Concession & Doane Road and on Yonge Street; and
- Meter chambers as required along the East Gwillimbury/Newmarket municipal boundary.

### 9.2 WASTEWATER COLLECTION SYSTEM

The proposed CGA wastewater collection infrastructure items that are expected to be added to the Region of York facilities are:

- YDSS Extension including pump station on 2<sup>nd</sup> Concession at the Holland River, forcemain south from the 2<sup>nd</sup> Concession pump station, 1050 mm diameter gravity sewer on 2<sup>nd</sup> Concession, two (2) Queensville pump stations (PS 5 and 7) and their forcemains on Queensville Sideroad and 2<sup>nd</sup> Concession;
- 900 and 975 mm diameter gravity sewer east from 2<sup>nd</sup> Concession YDSS Extension sewer to Leslie Street;
- New forcemain from Bradford Street pump station to 2<sup>nd</sup> Concession via Olive Street and Mount Albert Road;
- Potential option of redirecting the existing Green Lane trunk sewer north to the YDSS Extension pump station.

## 10. SYSTEM SUSTAINABILITY

The Town of East Gwillimbury has developed water and wastewater rates for users that include the required replacement and rehabilitation costs as contained within the Sustainable Water & Sewage Systems Act, 2002.

### 10.1 WATER DISTRIBUTION SYSTEM

The proposed water distribution system concept developed has considered the sustainability of the ultimate buildout scenario by minimizing material and operational costs, disruption, transportation and fossil fuel use needed to create and maintain the system as noted below.

The determination of the ultimate system required for the full growth scenario of the Central Growth Area permits the installation of the correct sized infrastructure initially preventing the requirement to return to replace the facilities at a later date to increase capacity as the area grows. This will result in a major reduction in the transportation, fuel, etc. required over time for the construction process.

The use of elevated storage where, and for as long as, possible will result in the maximization of the use of gravity and a minimization of the pumping of water, both of which will reduce the use of fossil fuels by the system.

The choice of the right materials for the system such a polyvinyl chloride (PVC) pipes where possible will provide infrastructure resistant to corrosion and with a long service life. These attributes will reduce the amount of cleaning, replacement and construction required for the maintenance of the system over time, resulting in significant transportation, fuel use, etc. reductions.

### 10.2 WASTEWATER COLLECTION SYSTEM

As with the water distribution system, the wastewater collection system concept developed involved the consideration of the sustainability of the system over time.

The system has been conceived to provide the maximum amount of gravity sewer and the elimination of potential pump stations, where possible. This will result in a significant reduction over the Central Growth Area's development of the need for transportation, manufacturing, fossil fuels, etc. The reductions will be further realized as the replacement and reconstruction needs for pump stations with a 20 – 50 year life span are significantly greater than that for the 100 year life span of sewers. In addition, the fuel and electricity use at pump stations is not required for gravity sewers.

Where pump stations are unavoidable, we have endeavoured to concentrate large drainage areas at the stations resulting in more efficient, and fewer facilities. In addition, it is recommended that solar, LED, etc. systems be used for lighting/power where practical to further reduce electricity use.

As with the water system, the choice of long life PVC and concrete pipes for use in the wastewater collection system will provide the 100 year and longer life span desired and, reduce the greenhouse gas production associated with the replacement and reconstruction processes.