

Clause 12 in Report No. 11 of Committee of the Whole was adopted by the Council of The Regional Municipality of York at its meeting held on June 25, 2015 with the following amendment to recommendation 2:

2. The Broadband Advisory Task Force be comprised of the following members:

Mayor Altmann  
Mayor Dawe  
Mayor Hackson  
Regional Councillor Jones  
Mayor Pellegrini  
Mayor Quirk  
Regional Councillor Rosati  
Mayor Scarpitti  
Mayor Van Bynen

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York Region Broadband Strategy Update and  
Advisory Task Force Terms of Reference and Structure

Committee of the Whole recommends adoption of the recommendations in the report dated May 22, 2015 from the Commissioner of Corporate Services and Chief Planner with the following amendments to recommendation 1:

1. Council endorse the proposed Broadband Advisory Task Force Terms of Reference and structure as outlined in this report (Attachment 1) with the following amendments:
  - a) Term of Membership - The Advisory Task Force term is anticipated to be between 18 and 24 months subject to further review
  - b) Responsibilities - Add “review and refine specific goals, outcomes and timelines for the implementation of the Regional Ultra High Speed Broadband Strategy”
  - c) Meeting Logistics – The Advisory Task Force will meet quarterly or as determined by the Task Force members
  - d) Meeting Logistics – The inaugural meeting will be scheduled as late as Q3 2015 or as determined by a majority based on the availability of Task Force members

## 1. Recommendations

It is recommended that:

1. Council endorse the proposed Broadband Advisory Task Force Terms of Reference and structure as outlined in this report. (Attachment 1)
2. Regional Council appoint the Broadband Advisory Task Force members.
3. The Regional Clerk circulate a copy of this report to the local municipalities.

## 2. Purpose

This report updates Council on activities relating to the York Region Broadband Strategy and seeks Council approval of a proposed Advisory Task Force Terms of Reference and structure to support staff in the delivery of the broadband strategy (Attachment 1).

## 3. Background

The Region's Economic Development Action Plan highlighted the need for improved broadband connectivity

Broadband is generally defined as a high-capacity information transmission technique using a wide range of frequencies, which enables multiple messages

to be communicated simultaneously. Broadband can be accessed through wired or wireless transmission technology. This is in contrast to the first generation dial-up Internet, where one was unable to access the Internet and use the telephone at the same time. Broadband Internet access first became widely available across North America in the mid to late-1990s.

Initially, Broadband was characterized by a minimum download speed of 256 Kilobits per second (Kbps), however as technology improved this threshold has been revised numerous times over the past two decades. In January of 2015, the United States Federal Communications Commission (FCC) updated the definition of Broadband by stipulating a minimum download speed of 25 Megabits per second (Mbps) and minimum upload speed of 3 Mbps.

The need to increase high-speed broadband connectivity throughout York Region was identified as a key priority in the Region's *Economic Development*

*Action Plan* approved by Regional Council in December 2012. The York Region Economic Development Action Plan further highlighted a Transformational goal: “Provide Connectivity Infrastructure to Support Innovation.”

The York Region Broadband Strategy Report was adopted by Regional Council on May 15, 2014

On May 15, 2014 Regional Council adopted the York Region Broadband Strategy report, which provided recommendations for improving access to high-speed Internet connectivity for residents, businesses and institutions throughout York Region. An electronic version of the final Broadband Strategy is posted on the York.ca and InvestinYork.ca websites, and hard copies have been distributed to the local municipalities. Hard copies of the Strategy are also included in the Committee Agenda package.

The strategy was organized via the following objectives and associated implementation priorities:

**Objectives:**

- Encourage investments that will provide higher connectivity speeds within York Region
- Create an environment that facilitates open, competitive and innovative services and applications
- Maximize the efficient investment of both public and private sector funding to improve connectivity throughout York Region

**Implementation Priorities:**

- Education and Advocacy Priorities
- Municipal Process Priorities
- Infrastructure Investment Priorities

A broad range of connectivity-related initiatives are outlined in the York Region Broadband Strategy

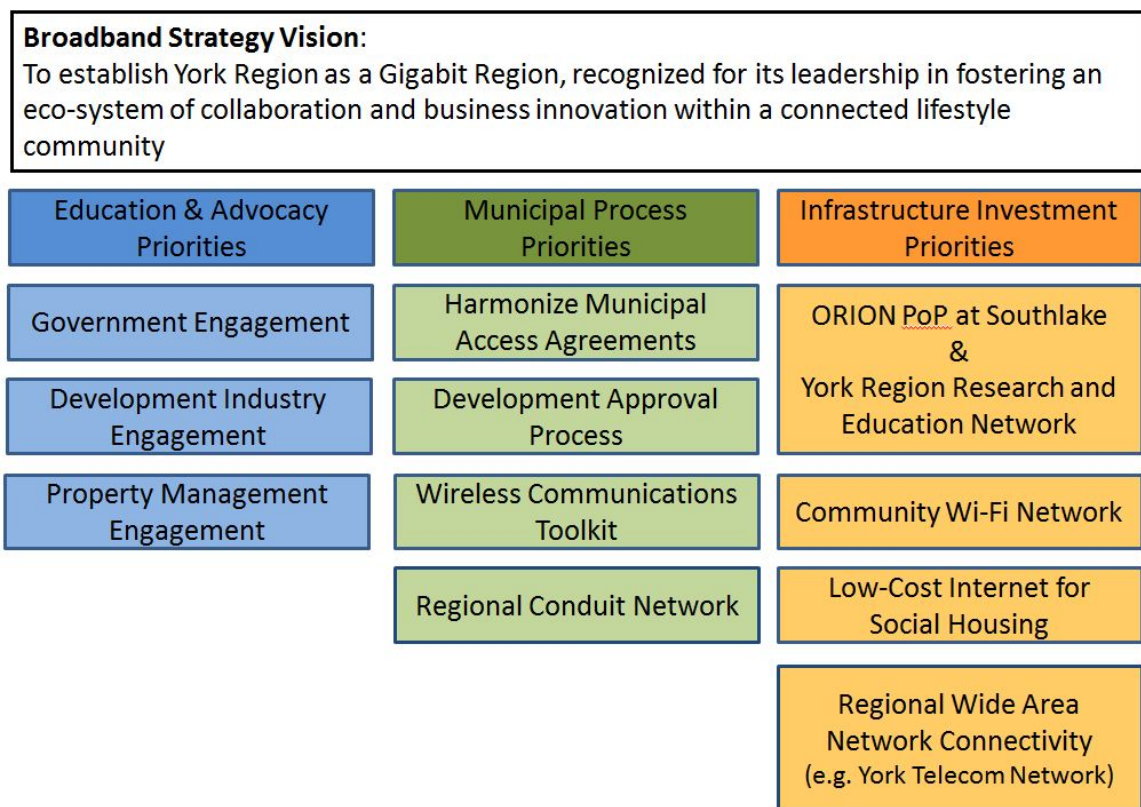
The Broadband Strategy covers a diverse range of initiatives that collectively contribute to achieving the goal of establishing York Region as a Gigabit Region including, but not limited to:

York Region Broadband Update and Advisory Task Force  
 Terms of Reference and Structure

- Developing tools to help local municipalities formulate policy language and access agreements that support and assist with attraction of broadband infrastructure investments
- Working with Municipalities, Universities, Schools and Hospitals (MUSH) sector stakeholders to improve research and education capabilities throughout the Region
- Engaging public and private sector stakeholders to investigate opportunities for partnerships that promote Broadband development and access for residents, businesses and institutions

Figure 1 illustrates the vision and scope of the York Region Broadband Strategy as captured in the May 15, 2014 report.

**Figure 1**  
**York Region Broadband Strategy Overview**



The York Telecom Network is one of many components included in the Broadband Strategy

The York Telecom Network (YTN) is a York Region owned and operated dark fibre-optic infrastructure asset. It was originally started in 2002 as a means of connecting Regional Offices to each other. The YTN is one of many components included in the Broadband Strategy.

When the York Region Broadband Strategy and report were developed, it was assumed that the YTN would be an asset that could be leveraged to assist in delivering some of the strategy's objectives. However, a review of the YTN was initiated by the Region to determine the optimal business model. As a result, all new initiatives involving the YTN have been suspended, pending the outcome of the review that is currently underway.

A report including an update on timelines and expected outcomes of the YTN review will be presented to Committee of the Whole by the IT Services Branch on June 18, 2015. This will be followed by a second report in early 2016 that will include recommendations to Council regarding the future of the YTN.

#### 4. Analysis and Options

A variety of initiatives have been launched to deliver the strategy

In delivering the York Region Broadband Strategy, staff has led and supported a number of initiatives. Tables 1 and 2 list and provide the status of these initiatives.

**Table 1**

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**Completed Broadband Initiatives**

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**Education & Advocacy Priorities**

- Digital Canada 150 Strategy “Connecting Canadians” Fund Program facilitation
  - In August 2014, Staff facilitated a “Connecting Canadians” Fund program information session to share information on available opportunities from this federal program – resulting in a letter of support request from Vianet for a development in Whitchurch-Stouffville in January 2015

**Municipal Process Priorities**

- Broadband-oriented Working Groups
  - Throughout 2014 staff led the development of working groups focused on opportunities to improve Broadband access in the following areas:
    - Planning Policy Language
    - Wireless Connectivity
    - Employment Areas
    - Centres and Corridors/Intelligent Communities
    - Municipal Conduit Network Development
- Connected Communities Seminar
  - In November 2014, Cisco Canada was invited to present an overview of connected communities initiatives from around the globe and provide a context for an outcomes-oriented approach for Broadband deployment for York Region

**Infrastructure Investment Priorities**

- ORION Point of Presence (PoP) at Southlake Regional Health Centre
    - Throughout 2014, staff worked with ORION, Southlake, and York University to facilitate the installation of an ORION PoP at Southlake and its connection to York University – which was completed in February 2015
  - Developed scope-of-work for Wireless Connectivity Toolkit
    - Regional staff collaborated with staff from all nine local municipalities to develop a scope-of-work which will form an RFP to develop a best-practices resource to assist municipalities in attracting and processing wireless communications infrastructure investment applications
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**Table 2**

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**Ongoing Broadband Initiatives**

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**Education & Advocacy Priorities**

- York Region Broadband and Innovation Summit
  - Slated to take place in October 2015
- York Region Research and Education Network
  - Working with ORION and MUSH sector stakeholders to facilitate the development of a York Region Research and Education Network

**Municipal Process Priorities**

- Planning and Policy Language Tool
  - Slated for completion in Q3-2015
- Wireless Connectivity Toolkit
  - Slated for delivery in Q4-2015

**Infrastructure Investment Priorities**

- ORION PoP Media Event at Southlake
    - Staff are working with ORION, Southlake, Town of Newmarket and other stakeholders to announce the installation of the ORION PoP – will take place in Q2-2015
  - Transit Public Wi-Fi Pilot Project
    - Working with Transit and IT Services staff to develop and launch a Public Wi-Fi pilot project at various transit terminals across York Region's centres and corridors
  - Ongoing engagement with Local Municipalities and Internet Service Providers (ISPs) on various development opportunities throughout York Region
- 

Staff have been tasked with recommending a governance model to guide the delivery of the Broadband Strategy

The May 2014 Broadband Strategy Report suggested that a York Region Broadband Steering Committee be formed to provide guidance on delivery of strategy objectives and help to ensure these objectives are met in an inclusive manner that accounts for the needs of the various stakeholders across York Region.

## York Region Broadband Update and Advisory Task Force Terms of Reference and Structure

Staff examined several steering committee models that were established in other jurisdictions to support broadband-oriented initiatives. These include:

- Coquitlam Optical Network (QNet)
- City of Calgary Fibre, Cable, Duct and Wireless (FCDW) Committee
- City of Chattanooga Electric Power Board (EPB)
- Eastern Ontario Regional Network (EORN)
- SouthWestern Integrated Fibre Technology (SWIFT)

These committees were all tasked to either manage municipal or build a regional fibre network.

For additional context, staff also examined the governance models of the following groups and initiatives:

- The suggested Steering Committee structure included in the Broadband Strategy document (attached to the May 15, 2014 York Region Broadband Strategy report)
- The existing York Region Agricultural Advisory Liaison Group
- The approved structure for the York Region Transportation Master Plan Advisory Task Force

Staff recommends the formation of a limited-term Advisory Task Force to guide the implementation of the Broadband Strategy

Through continued discussion and review, staff recommends that a limited-term Advisory Task Force of 18 to 24 months would provide the most efficient and effective mechanism to facilitate Regional Council's involvement in the implementation of the York Region Broadband Strategy. This structure will also assist in soliciting and managing engagement from local municipalities and other stakeholders while ensuring consistency with other similar Regional working groups.

Staff recommends that the Broadband Advisory Task Force have a similar structure as the Transportation Master Plan Advisory Task Force. The suggested composition includes:

- Chair of the Planning and Economic Development Committee
- Regional Council representative from each local municipality



## York Region Broadband Update and Advisory Task Force Terms of Reference and Structure

The Advisory Task Force would also include, in a supporting role, staff representation from:

- Transportation Services
- Community and Health Services
- Environmental Services
- Corporate Services
- Finance
- York Region Rapid Transit Corporation
- York Regional Police

Terms of Reference itemizing the proposed Advisory Task Force membership, responsibilities, processes and logistical information is provided in Attachment 1.

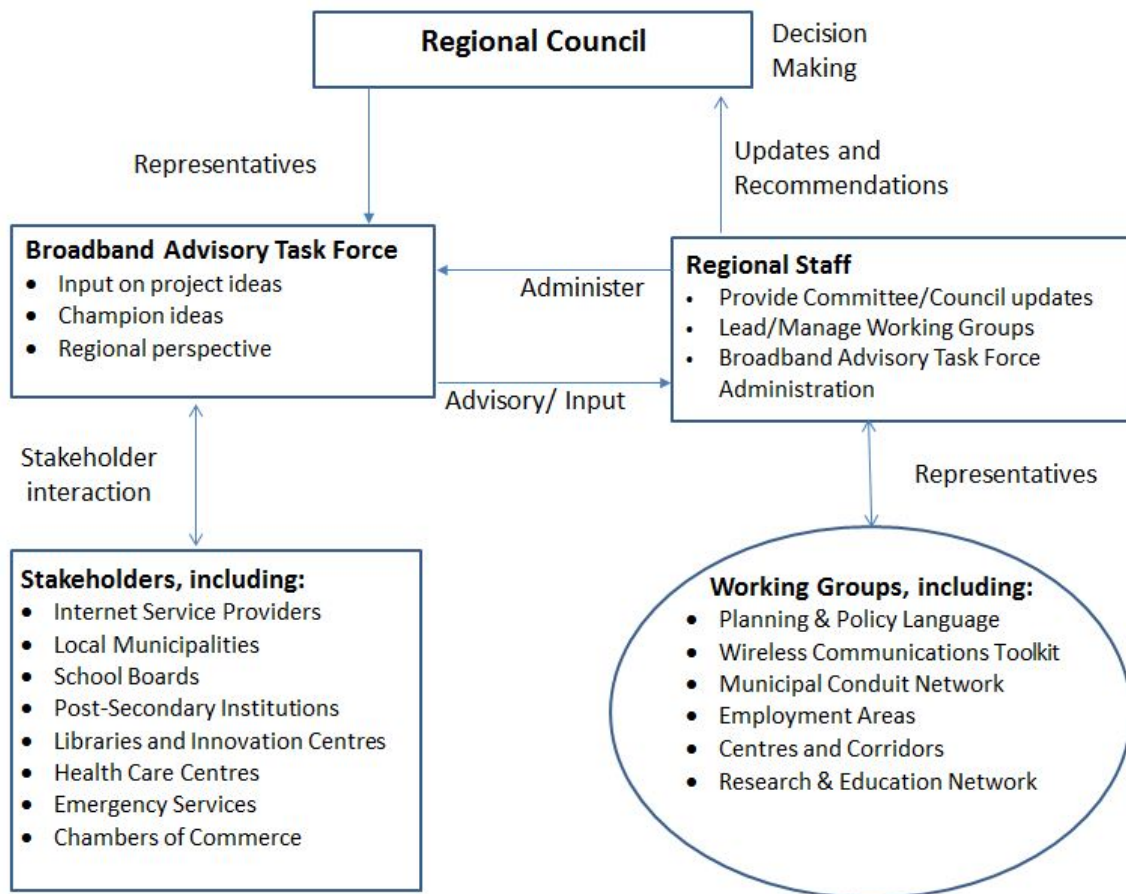
The role of the Broadband Advisory Task Force is to support York Region staff in the delivery of various aspects of the Broadband Strategy

The Broadband Advisory Task Force will be a resource that can:

- Champion high-speed broadband connectivity across the region
- Interface with and consult with stakeholders
- Provide feedback and input into policy development as required

Regional staff will seek input from the Broadband Advisory Task Force as initiatives move forward. Figure 2 illustrates the Advisory Task Force Relationship model.

**Figure 2**  
**York Region Broadband Advisory Task Force Relationship Model**



Staff will leverage the Advisory Task Force as a resource to gather industry insight, input on policy and to engage stakeholders. As initiatives and opportunities arise, staff will form and lead the activities of working groups.

Link to key Council-approved plans

Broadband-related initiatives support the *York Region Official Plan* objective “To encourage and accommodate economic Activities that diversify and strengthen the Region’s economic base, employment opportunities for residents and competitive advantage for its businesses”.

Regional Council has approved a number of strategic documents that provide clear direction regarding Economic Development within the current term of Council and beyond. The Economic Vitality section (Chapter 4) of the *York Region Official Plan – 2010*, Objective 3 of the Strategic Priority Area to Strengthen the Region’s Economy in the *2015 to 2019 Strategic Plan*, and the *Vision 2051* goal of fostering an Innovation Economy each highlight the

importance of economic development and high-speed broadband connectivity as essential infrastructure for York Region's economy.

## 5. Financial Implications

Resources allocated to the development of the York Region Broadband Advisory Task Force and the execution of the various elements of the York Region Broadband Strategy will be implemented primarily through the budget of the Planning and Economic Development Branch, in partnership with other departments, local economic development offices and external program delivery partners.

## 6. Local Municipal Impact

The York Region Broadband Strategy was initiated and funded in partnership with all nine local municipalities. Ongoing participation by and partnerships with and amongst the local municipalities are critical to the execution of the Strategy and will continue to be key in successfully identifying and implementing broadband-related priorities for their respective communities.

## 7. Conclusion

There is a need to enable greater high-speed broadband connectivity throughout York Region to support innovation and other activities. Through the Economic Development Action Plan and the Broadband Strategy, the Region has identified the opportunities to advance the growth of this medium and have commenced a variety of initiatives to address this need.

The formation of a Broadband Advisory Task Force will support staff efforts to deliver on the broadband strategy recommendations by acting as a resource to provide input on policy, interface with stakeholders, and assist in gathering industry insight.

For more information on this report, please contact Doug Lindeblom, Director, Economic Strategy at ext. 71503.

The Senior Management Group has reviewed this report.

Attachment (1)

Accessible formats or communication supports are available upon request.

# Draft Terms of Reference

## Council Advisory Task Force: Regional Broadband

<b>Purpose</b>	<b>What will the Regional Broadband Advisory Task Force do and why?</b>
<p>The Regional Broadband Advisory Task Force is an advisory body of Council to provide feedback to York Region staff in the development of tools, policies and working groups to advance the goals of the York Region Broadband Strategy.</p>	
<b>Background</b>	<b>Why was it created?</b>
<p>The York Region Broadband Strategy was developed to identify connectivity issues and opportunities throughout York Region and to provide a framework for addressing the connectivity needs of the Region’s residents, businesses and institutions.</p> <p>The key Priority Areas requiring consideration by the Advisory Task Force will include:</p> <ul style="list-style-type: none"> <li>• Education and Advocacy</li> <li>• Municipal Process</li> <li>• Infrastructure Investment</li> </ul>	
<b>Composition</b>	<b>Who is on the Regional Broadband Advisory Task Force ?</b>
<p>The composition of the Regional Broadband Advisory Task Force is to be determined by York Region Council.</p> <p>Suggestions include:</p> <ul style="list-style-type: none"> <li>• Chair of the Planning and Economic Development Committee (PEDC)</li> <li>• A Regional Council representative from each local municipality</li> </ul> <p>The Advisory Task Force will be supported by representatives from senior management and the following departments and services:</p> <ul style="list-style-type: none"> <li>• Transportation Services</li> <li>• Community and Health Services</li> <li>• Environmental Services</li> <li>• Corporate Services</li> <li>• Finance</li> <li>• York Region Rapid Transit Corporation</li> <li>• York Regional Police</li> </ul>	

<b>Term of Membership</b>	<b>How long is the commitment for the Regional Broadband Advisory Task Force?</b>
The Advisory Task Force term is anticipated to be between 18 and 24 months.	
<b>Decision-Making</b>	<b>How does the Regional Broadband Advisory Task Force make decisions?</b>
The Advisory Task Force is an advisory body to Regional staff. Decisions will be made by Regional Council.	
<b>Responsibilities</b>	<b>How will the Regional Broadband Advisory Task Force work together to meet its purpose?</b>
<p>Advisory Task Force members will attend meetings and provide support to staff by:</p> <ul style="list-style-type: none"> <li>• championing high-speed broadband connectivity across the Region,</li> <li>• consulting with stakeholders,</li> <li>• providing feedback and input regarding policy development.</li> </ul>	
<b>Meeting Logistics</b>	<b>When does the Regional Broadband Advisory Task Force meet?</b>
<p>The Advisory Task Force will meet quarterly to review and discuss issues and action items pertaining to the execution of the York Region Broadband Strategy.</p> <p>The proposed meeting schedule is as follows:</p> <p>Inaugural Meeting – Q3 2015: Overview of the Broadband Strategy and identification of key actions under each Priority Area</p> <p>Subsequent Meetings – Quarterly from Q4 2015 to the end of the Advisory Task Force Term: Broadband Strategy project updates, opportunities and discussion</p> <p>Meetings of the Advisory Task Force will be approximately two hours in length.</p>	
	<b>What needs to be done and by whom?</b>
<ul style="list-style-type: none"> <li>• The Regional Clerk, in consultation with the Planning and Economic Development Branch will solicit agenda items and prepare meeting agendas and minutes.</li> <li>• Planning and Economic Development Branch staff will be responsible for meeting-related activities, including: <ul style="list-style-type: none"> <li>– workplan development, monitoring, maintenance and reporting</li> <li>– activities to support completion of deliverables of the Advisory Task Force</li> <li>– overall administration of the Advisory Task Force</li> </ul> </li> <li>• Regional Broadband Advisory Task Force input will guide staff recommendations and be integrated into Regional staff work plans and reports to Council, as appropriate.</li> </ul>	

May, 2014

YORK REGION  
**Broadband  
STRATEGY**

Establishing York Region as a 21st Century, Knowledge-Based Community





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# Executive Summary

The York Region *Economic Development Action Plan* identified the need to “Provide connectivity infrastructure to support innovation” as critical to supporting existing business growth and attracting investment, given that cost-effective high-speed connectivity is a requirement to achieve sustainable long-term development for York Region.

The importance of cost-effective, high-speed connectivity to a community’s economy cannot be underestimated – especially in a community like York Region with a large, educated population, growing immigrant and youth populations and diverse economy. High-speed connectivity provides the glue linking York Region’s residents and businesses to global opportunities for business, research, education and entertainment.

The challenge within York Region is not access to high-speed connectivity itself, but access to high-speed connectivity that is cost-effective across the entire Region. There is connectivity in all parts of the Region, however it is not always available at the speed and price point to make the Region competitive with other jurisdictions.

It is also not an issue of urban versus rural, as both geographies have specific challenges requiring improved connectivity if they are going to assist the Region in competing for business growth and skilled labour. For instance, while the Region’s Centres and Corridors do have access to high-speed connectivity, they do not have the same access to high-speeds at the low price point available to other major downtown centres. In the Region’s rural communities, residents and businesses face high costs for connectivity, putting them at a disadvantage in relation to urban residents, as they are limited by cost in their ability to access business, research and education resources.

As a partnership of municipalities, there are things York Region and its municipal partners can do to improve connectivity. While there is a place for public investment in connectivity infrastructure, there are other more practical and low-cost actions municipalities can undertake to improve connectivity. Some focus on advocating for improved connectivity with public and private sector stakeholders – such as engaging the development community in ensuring low-cost high-speed connectivity is available in their projects. Other actions focus on improving municipal approval processes and taking advantage of municipal investments in infrastructure – such as leveraging road re-construction projects to install fibre conduit that can be leased to telecommunications companies serving residents and businesses.

There is a place for public sector investments. There are public infrastructure projects that can pay social and economic development dividends, such as developing a Regional Research and Education Network for facilitating collaboration and joint service delivery among the Region’s education, research and public sector stakeholders. There may also be the need in some instances for public sector investment in connectivity for residents and businesses in areas that the private sector will not invest, given limited or possible non-existent returns.

York Region offers something many other communities who are investing public dollars in connectivity do not; growth in both its residential population and business community.

Telecommunication companies understand York Region is growing and areas within the community present great opportunities for returns. Working with these private sector stakeholders to help make their investments in York Region easier is a way the Region can speed up improvements in connectivity.

Overall, there is no single solution to improving connectivity for the Region's residents, businesses and public sector – nor is there one solution for a given municipality. There are many solutions dependent on location, land-use, demographics and business community make-up. In some areas of a community, the private sector can be depended upon to make the requisite investments, while in other parts of that same community, the Region and its local, provincial and federal partners, may need to play a role in ensuring the community has the connectivity at the speed and price-point that will make it – and York Region – globally competitive.

# Introduction: Setting the Context

The York Region Economic Development Action Plan was approved by York Regional Council in December 2012, and identified as its number two goal: “Provide Connectivity Infrastructure to Support Innovation.” This was identified as a transformational goal, critical to supporting existing business growth and to attract and expand research functions within the Region.

The Economic Development Action Plan called for an assessment of bandwidth capabilities across the Region and the development of a strategy for improving connectivity, while embracing connected community initiatives to support the expansion of education, research, business and government service applications across an improved broadband network within the Region.

To address this need, in collaboration with its nine municipal partners, the Region has completed this document, the York Region Broadband Strategy. The Strategy provides an overview of the connectivity challenges within the Region, while providing a road map for improving connectivity to meet the needs of the Region’s residents, businesses and public sector service providers.

In relation to other municipalities in Ontario, broadband Internet connectivity speeds in some locations of York Region are very good; however, in relation to other provinces and countries, the Region and the province as a whole can be seen to be lacking. According to the Ookla Net Index, Canada ranks 22nd for the average cost of an Internet connection (at \$54), but only 33rd when it comes to available speeds, in relation to the 64 countries for which data is collected.<sup>1</sup>

There is also a disparity between the service levels and costs within York Region, with urban locations having higher available connection speeds than rural communities who pay more for slower speed service. While recognizing that low population density contributes immensely to the cost of providing connectivity, addressing these disparities locally, as well as in relation to other communities globally, is an important priority to support and promote economic development across the Region.

## Importance of a York Region Broadband Strategy

Given the Region must compete on a global scale for both residents and business investment, it is important for the Region to address the growing gap between connectivity speeds and costs throughout the community, as it has the potential to fall behind other jurisdictions globally. The following are some challenges the Region faces if it does not address its connectivity divide:

- **Population Growth / Demographic Distribution** – while York Region is experiencing population growth, this growth could be demographically skewed between areas that are well serviced with broadband connectivity, where a younger demographic and immigrant population might locate, to those that are not well-serviced, where an older, less-technologically savvy population may locate. By providing similar broadband connectivity opportunities across the Region this potential skewing of the demographic divide could be reduced.
- **Business Investment** – similar to the urban and rural / north and south divide identified, the lack of available broadband connectivity in some northern urban and rural communities could result in less business investment in those areas, reducing economic growth, or concentrating it in areas of the Region with better connectivity speeds and connection costs.

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Equitable access and high-speed connectivity is a requirement to achieve sustainable long-term development for the Region.

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<sup>1</sup> Ookla Net Index OECD Comparison - <http://www.netindex.com/download/1,8/OECD/>

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Access to high-speed connectivity at competitive price points is necessary for the Region to compete with both local and global jurisdictions for investments

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- **Post-Secondary Research** – the Region has identified increasing post-secondary research opportunities as an economic development goal; however, post-secondary research requires broadband connectivity and access to the Ontario Research and Innovation Optical Network (ORION). Without these connections, high-value research in the post-secondary community is not likely to occur.
- **E-Governance and Community Service Delivery** – access to broadband connectivity provides the opportunity for municipalities and other public service providers, such as hospitals, to deliver services in a virtual fashion that improves delivery, while reducing costs. Increasingly, leading edge communities and institutions are using these applications to reduce their costs and to attract new business investment and make their communities more attractive for existing and prospective residents. Without similar investments in the broadband infrastructure allowing these applications to exist, the Region will fall behind its competitors in the global marketplace.

To understand the importance of high-speed connectivity to the Region from an economic development perspective, it is important to note that communities are attracting new investments, retaining and growing existing businesses, and facilitating research and collaboration as a result of the availability of high-speed broadband accessibility. For instance, The Region’s Centres and Corridors will compete with Waterfront Toronto and other global centres for office employment and knowledge workers. Whereas these centres provide ultra-high-speed connectivity infrastructure, the Region’s Centres and Corridors do not.

The Region competes globally for business investment and against communities that have broadband infrastructure, providing 100 to 1,000 times the speeds available in some places within York Region. If the Region aspires to lead and attract global talent and investment, it must look at ways to improve and provide critical high-speed broadband infrastructure across the community. As an example, Table 1 provides an overview of communities that have facilitated investments in high-speed connectivity and compete with the Region for investment.

**Table 1 - Available Connectivity Speeds in Competing Cities**

Location	Available Business Speed	Available Residential Speed
Waterfront Toronto - Toronto, Ontario	10 Gbps	250 Mbps
Olds, Alberta	1 Gbps	1Gbps
Stratford, Ontario	1 Gbps	50 Gbps
Kansas City, Kansas	10 Gbps	1 Gbps
Austin, Texas (2014)	1 Gbps	1 Gbps

# A Broadband Vision for York Region: Building the Foundation

## Broadband Connectivity Defined

The Organisation for Economic Co-Operation and Development (OECD) has defined broadband connectivity as a service providing at least 256 Kbps download speeds.<sup>2</sup> This definition is dated and while this does provide connectivity, it does not meet the needs of the current applications being used for research, education, economic development and personal use. With the exponential growth in services and especially in video enabled applications, this definition can support the rapidly evolving demand within the Region.

In order to provide a starting point for the *York Region Broadband Strategy*, when referring to broadband, the definition for the community as follows:

## York Region Broadband Strategy Vision

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### Broadband Defined:

A speed which enables users to successfully use as many and all applications they may want – business, entertainment, health/medical, and education, through a network.

Today that may require 10Mbps per person. Soon, it will be closer to 50 Mbps and long term up to 250 Mbps.

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Residents and business across York Region understand the importance of connectivity in order to support their jobs and businesses, provide education and health services and fulfill entertainment opportunities. However, many recognize the connectivity they require to satisfy these various needs is not always available today – and the connectivity requirements will only grow as more and more services and tools move online. As such, the vision for the *York Region Broadband Strategy* is as follows:

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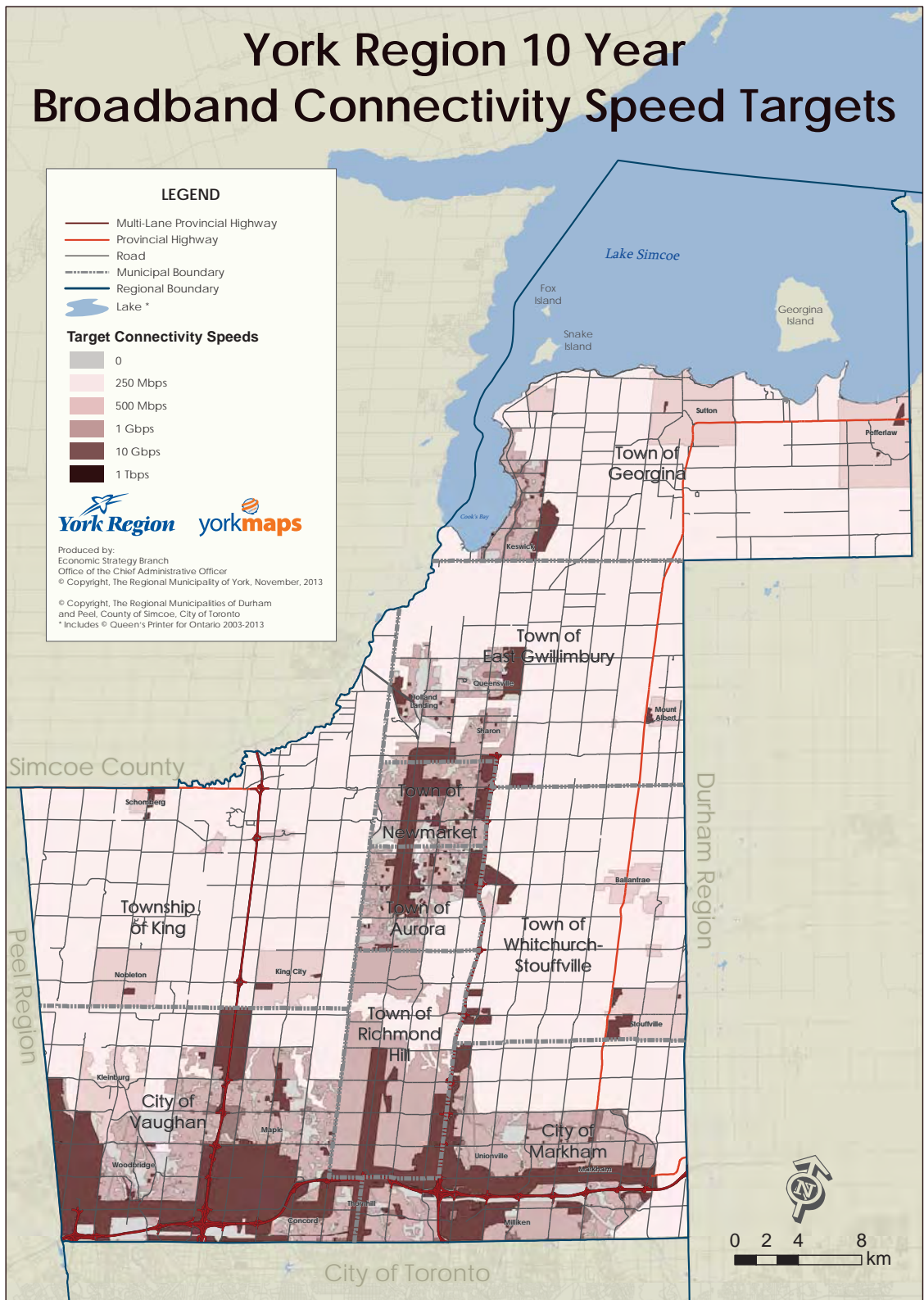
### York Region Broadband Vision:

To establish York Region as a Gigabit Region, recognized for its leadership in fostering an eco-system of collaboration and business innovation within a connected lifestyle community.

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<sup>2</sup> OECD Broadband Subscription Criteria, 2010  
<http://www.oecd.org/sti/broadband/oecdbroadbandsubscribercriteria2010.htm>

Figure 1 - York Region 10 Year Broadband Connectivity Speed Targets



## York Region Broadband Strategy Objectives

In order to realize this vision, York Region and its local municipal partners will need to work with the private sector to help realize the following objectives:

- Encourage investments that will provide higher connectivity speeds to 100 per cent of the homes and businesses within York Region
- Create an environment facilitating open, competitive and innovative services and applications
- Maximize the efficient investment of both public and private sector funding to improve connectivity throughout York Region

## York Region Broadband Strategy Targets

To assist the Region in meeting its vision, broadband connectivity speed targets have been set. The connectivity speed targets are identified as the ideal speeds to help facilitate economic development and improve quality of life while realizing the objectives identified as part of this strategy.

The targets have been established based on land-use classifications, as well as by type of institution, such as municipal operations or schools.

They take into consideration expected service functionality, increased user base as well as technology evolution paths and the cost to implement.

The targets include the speed and technology requirements for the mid-term (five years) and long-term (10 years) and are presented on a map of the Region in Figure 1. The targets for land-use classifications are highlighted in Table 2 and those for public facilities in Table 3.

**Table 2 - Connectivity Target by Land-Use Classification for York Region**

Land Use Type	5 Year Target		10 Year Target	
	Upload	Download	Upload	Download
Regional Centres and Corridors	10 Gbps	10 Gbps	1 Tbps	1 Tbps
Employment and Institutional Lands	10 Gbps	10 Gbps	1 Tbps	1 Tbps
Urban Residential	500 Mbps	500 Mbps	1 Gbps	1 Gbps
Urban Commercial	1 Gbps	1 Gbps	10 Gbps	10 Gbps
Towns and Villages	50 Mbps	250 Mbps	100 Mbps	500 Mbps
Rural Areas	50 Mbps	100 Mbps	50 Mbps	250 Mbps

These targets were developed based on community consultation as well as the current and planned availability of infrastructure as estimated by the Region and service providers.

It is envisioned that these targets will be realized via investments from the private sector as a result of increased consumer need, improvements in municipal processes, and improved coordination of infrastructure investments. The targets are the ideal and are not meant to set the expectation that the Region or its local municipalities are going to invest to provide connectivity to the target speeds in the event that the private sector does not realize those targets across all parts of the Region.



**Table 3 - Connectivity Targets by Public Sector Facility Type**

Facility Type	5 Year Target		10 Year Target	
	Upload	Download	Upload	Download
Schools	10 Gbps	10 Gbps	1 Tbps	1 Tbps
School Board Offices	100 Gbps	100 Gbps	1 Tbps	1 Tbps
Post-Secondary	100 Gbps	100 Gbps	1 Tbps	1 Tbps
Libraries	10 Gbps	10 Mbps	1Tbps	1 Tbps
Municipal Administration	10 Gbps	10 Gbps	1 Tbps	1 Tbps
Municipal Operations	500 Mbps	500 Mbps	1 Gbps	1 Gbps
Municipal Recreation Facilities	500 Mbps	500 Mbps	1 Gbps	1 Gbps
Police Stations	10 Gbps	10 Gbps	1 Tbps	1 Tbps
Fire Stations - Urban	10 Gbps	10 Gbps	1 Tbps	1 Tbps
Fire Stations - Rural	50 Mbps	250 Mbps	100 Mbps	500 Mbps
EMS - Urban	10 Gbps	10 Gbps	1 Tbps	1 Tbps
EMS - Rural	50 Mbps	250 Gbps	1 Gbps	10 Gbps
Medical - Hospitals	100 Gbps	100 Gbps	1 Tbps	1Tbps
Medical - Clinics	1 Gbps	1 Gbps	100 Gbps	100 Gbps
Medical - Labs	10 Gbps	10 Gbps	1 Tbps	1 Tbps
Medical - Long Term Care	1 Gbps	1 Gbps	100 Gbps	100 Gbps
Transit - Go Stations	1 Gbps	1 Gbps	10 Gbps	10 Gbps
Transit - York Region Transit Hubs	1 Gbps	1 Gbps	10 Gbps	10 Gbps
Courts	1 Gbps	1 Gbps	100 Gbps	100 Gbps
Social Housing	1 Gbps	1 Gbps	10 Gbps	10 Gbps
Research & Development Hubs	100 Gbps	100 Gbps	1 Tbps	1 Tbps

York Region is working with service providers to ensure they are aware of the strong demand for connectivity and attractive market that this demand presents to them. By providing the carriers with useful market research, including demographics and connectivity targets, the Region is encouraging carriers to provide the connectivity services required by businesses, institutions and residents in the community.

To understand the magnitude of the proposed increases in connectivity, Table 4 provides an overview of current connectivity speeds available for residents within the Region versus the identified targets.

**Table 4 - Current Residential Connectivity Speeds Versus 10 Year Target**

Speeds	Today	Tomorrow
Urban Residential	1.5 to 150 Mbps	1 Gbps
Rural Residential	1.5 to 30 Mbps	250 to 500 Mbps

# Current Challenges: Realities of Connectivity Today in York Region

To better understand connectivity within York Region, an analysis was completed on current service levels throughout the community. This was completed in collaboration with private sector service providers, as well as through engaging end-user groups, such as residents, businesses and public sector agencies.

## Current Service Level Analysis Findings

Within York Region, there are more than 100 Internet service providers, delivering connectivity to the Region's residents, businesses, public and non-profit sectors. These providers use a range of technologies, including wired, wireless and satellite.

Generally, wired technologies provide greater connectivity speeds at a lower cost, followed by wireless and satellite technologies, which offer lower connectivity speeds typically at a higher price. Depending on a resident's or business' location within the Region, they may be able to be serviced by one or more of these technologies.

Within the Region's urban areas, residents generally have access to good connectivity through wired technologies, while in the Region's rural areas, towns and villages, service is available through wireless technologies. Generally, connectivity is available within all locations throughout the Region; however, it is not always available at the speed and price-point to make the Region globally competitive.

## Business Services

Within the Region's main urban corridors, there tends to be availability of high-speed service options and access to fibre-based service for businesses. It should be noted that the industry standard for fibre is for a business customer to incur some or all of the capital cost for infrastructure from their building to the service provider's closest access point. In some cases, where the customer is close enough to the access point (<1 km), the service provider will incur the capital cost if the customer signs a multi-year contract.

However, some businesses do not purchase fibre optic services even when the fibre runs close to their site. There appears to be two reasons for this – the initial capital cost of the connection, as it may be too expensive, even though they may be a stable and profitable company; and the monthly fee, as fibre-based services can be high if there isn't much competition.

Business Internet and data services are not regulated and are competitive. Research shows, however, the monthly fee for services can vary from \$600-\$10,000 or more, depending on the speed of connection. Often the lower costs are only available to businesses that have multiple connections and longer contract terms. The general price for a single business for a burstable\* 100 Mbps symmetrical service (same speed download and upload) can be as high as \$900-\$1,200+/month. This represents a price of approximately \$4.5-\$6/Mbps (where the Mbps are the addition of download speed and upload speed). As service speeds increase, so do the prices. A dedicated service can cost as much as \$2,300/month for 100 Mbps (representing a cost of approximately \$11.5/Mbps). Many smaller businesses are expecting a price closer to \$500/month for 100Mbps (\$2.5/Mbps). This misalignment of customer price expectation and affordability versus market price has deterred many businesses from buying fibre-based services or high-end business services.

\*Burstable indicates that within the core of the network connection there is a maximum speed which tends to be less than the stated access connection e.g. 20Mbps instead of 100Mbps (access connection speed).

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Connectivity is available within York Region - but it is not always available at the speed and price-point that makes communities globally competitive.

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Some of the Region’s employment lands lack adequate fibre connectivity due to the high-cost of infrastructure.

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It was also discovered that in some areas there is no fibre access point close to employment/commercial lands. Lastly, it appears that in some areas where a provider could reach a business, the building owner, who is renting to tenants, will not allow access to that provider. The provider to which the building owner is allowing access may not offer the services their tenants’ desire.

Providers in the Region do offer some services that businesses can access at a lower cost, but most are not symmetrical, nor can they offer the speeds, or growth in speed, available on fibre. It should be noted that, for the most part, the providers offer bandwidth and managed services and do not offer dark fibre (i.e. uncommitted fibre) for lease.

## Residential Services

### Urban Residential

Within the Region’s residential areas, available services vary from approximately 15 Mbps download to approximately 175 Mbps download. The main service providers are Bell and Rogers and both have a variety of infrastructure ranging from Fibre-to-the-Node (FTTN) to Fibre-to-the-Address (FTTA). The FTFA is available only in newer housing developments.

Both of these providers have plans to continue the rollout of their higher platform services (50 Mbps -200 Mbps) currently to approximately the end of 2015. Their concentration is in areas where there is a higher concentration of homes/businesses and where they may be triggered to do construction/alterations. Essentially, if there is a road re-construction or an infrastructure project impacting their network, private sector service providers use it as a trigger for capital expenditures and often do upgrades. Examples of pricing from the two major wired carriers are listed below – Bell information is provided in Table 5 and Rogers in Table 6. New residential areas tend to get the most up-to-date connectivity infrastructure. The challenge is upgrading existing residential areas to the same service levels.

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New residential areas tend to get the most up-to-date connectivity infrastructure. - The challenge is upgrading existing residential areas to the same service levels.

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**Table 5 - Available Bell Wired Packages<sup>3</sup>**

Package Down/Up	5 Mbps/ 1 Mbps	15 Mbps/ 10 Mbps	25 Mbps/ 10 Mbps	50 Mbps/ 10 Mbps	175 Mbps/ 175 Mbps
Monthly fee <sup>4</sup>	\$39.95	\$49.95	\$57.95	\$82.95	\$149.95
\$/Mbps <sup>4</sup>	\$6.65	\$2.00	\$1.66	\$1.38	\$0.43

<sup>3</sup>There are different usage caps (amount of overall bandwidth transfer per month allowed without extra fees, measured in GigaBytes per month). Generally the more capacity/speed you have the more usage and thus the caps increase with the speed packages.

<sup>4</sup>Prices taken from www.bell.ca on July 21, 2013. Prices may not be current and may be subject to special conditions not indicated in this report.

**Table 6 - Available Rogers Wired Package<sup>3</sup>**

Package Down/Up	6 Mbps/ 256 Kbps	25 Mbps/ 2 Mbps	35 Mbps/ 3 Mbps	45 Mbps/ 4 Mbps	150 Mbps/ 10 Mbps
Monthly fee <sup>5</sup>	\$39.95	\$49.95	\$57.95	\$82.95	\$149.95
\$/Mbps <sup>4</sup>	\$6.65	\$2.00	\$1.66	\$1.38	\$0.43

Note that the average price per Mbps of (download+upload) for residential services is much lower than for business services. Businesses tend to receive service that is a direct and dedicated connection to the Internet, which means their connection is not shared (or aggregated until the signal meets the backbone network) and tends to be of a better quality. Residential services (other than the FTTA 175 Mbps mentioned above) on FTTN are aggregated – a number of users are aggregated at that node in the neighbourhood and share the bandwidth from that point to the home and then through the rest of the network.

### Rural Residential

For other areas, such as towns and villages, the main service providers will also upgrade their infrastructure over time to provide higher grade services. Service providers consider a density of homes in the minimum range of 15 to 20 households per km<sup>2</sup> as candidates for FTTN type services. In some cases, higher density is required. This is because more densely populated areas hold the highest revenue opportunity, while cost per km<sup>2</sup> does not vary as significantly with density. The main triggers are concentration of homes and infrastructure construction activities. The area of service will be focused where household densities are the highest, normally in the centre of town. As the concentration decreases, the likelihood of infrastructure placement decreases. Thus, the homes that are farther from the centre of town may not receive service or as high a speed service.

Rural residential areas, where densities are typically in the range of five to 15 households per km<sup>2</sup>, are very expensive to service, as they require a very high capital investment with very low revenue potential. The primary technologies that have been used to service these areas are fixed wireless, mobile wireless and satellite.

Generally, the price point for these wireless and satellite services is higher per Mbps versus the other residential examples shown here. The reason for this is that there are fewer users sharing the infrastructure costs and thus, in order to meet an expected return on investment they need higher pricing. Fixed wireless pricing varies, as illustrated by Tables 7 through 9. Note that the price per Mbps is three times or more than the price for typical wired services utilizing FTTN or FTTA infrastructure.

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Due to low densities, rural residential areas are the most challenged areas in the Region for high speed and low-cost connectivity.

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<sup>3</sup>Prices taken from www.rogers.com on July 21, 2013. Prices may not be current and may be subject to special conditions not indicated in this report.

**Table 7 - Provider W Available Fixed Wireless Packages**

Package Down/Up	1.5 Mbps/ 256 Kbps
Monthly fee	\$49.95
\$/Mbps	\$28.54

**Table 8 - Provider X Available Fixed Wireless Packages**

Package Down/Up	1.5 Mbps/ 256 Kbps	5 Mbps/ 512 Kbps	7 Mbps/ 512 Kbps
Monthly fee	\$39.99	\$49.99	\$59.99
\$/Mbps	\$22.85	\$9.07	\$7.99

**Table 9 - Provider Y Available Fixed Wireless Packages**

Package Down/Up	1.5 Mbps/ 500 Kbps	3 Mbps/ 600 Kbps	5 Mbps/ 800 Kbps
Monthly fee	\$49.99	\$54.99	\$64.99
\$/Mbps	\$24.99	\$15.28	\$11.21

Areas with a household density of below approximately five homes per km<sup>2</sup> have even fewer providers that offer service. In places where this level of density is widespread and wireless signals do not reach, the last option is satellite services. In York Region the main satellite Internet service provider is Xplornet Communications Inc. They offer a variety of packages that are similar to their wireless packages in speed and usage.

**Table 10 - Available Xplornet Satellite Packages**

Package Down/Up	1.5 Mbps/ 700 Kbps	5 Mbps/ 1 Mbps	10 Mbps/ 1 Mbps
Monthly fee	\$44.99	\$64.99	\$84.99
\$/Mbps	\$20.45	\$10.83	\$7.72

The entire Region has access to 4G High Speed Packet Access (HSPA) service – essentially cell phone connectivity. The speed varies as mobile connections are not engineered or designed the way that fixed networks are. These networks were originally designed for voice services and data / Internet was secondary. While the theoretical maximum speed of 4G HSPA is 42Mbps, most users experience 7-14 Mbps.<sup>6</sup> A user in their home or office may notice that the

<sup>6</sup>From [www.bell.ca/mobility](http://www.bell.ca/mobility).

speed varies based on time of day, month and other factors that can impact the number of simultaneous users on the network (power outages, festivals, major events, etc.). Some areas can access the newest mobility technology called Long Term Evolution (LTE). Typical LTE user speeds are 12-25 Mbps. For the purposes of this comparison, Table 11 and Table 12 highlight prices for usage - the amount of total data downloaded and uploaded over a month.

**Table 11 - Available Mobile Packages**

Package	2 GB	6 GB	10 GB	15 GB
Monthly <sup>7</sup>	\$45.00	\$70.00	\$85.00	\$105.00
\$/Mbps (using the typical quoted)	\$3.21 - \$6.43	\$5.00 - 10.00	\$6.07 - \$12.14	\$7.50 - \$15.00
LTE \$/Mbps (using the typical quoted)	\$1.80 - \$3.75	\$2.80 - 5.83	\$3.40 - \$7.08	\$4.20 - \$8.75

**Table 12 - Available Mobile Packages**

Package	5 GB	10 GB	20 GB
Monthly <sup>8</sup>	\$60.00	\$75.00	\$90.00
\$/Mbps (using the typical quoted)	\$4.29 - \$8.57	\$5.35 - 10.71	\$6.43 - \$12.86
LTE \$/Mbps (using the typical quoted)	\$2.40 - \$5.00	\$3.00 - 6.25	\$3.60 - \$7.50

It is notable that industry information indicates that wired household average data usage is approximately 20 GB per month in Canada. This would make the \$85 satellite package the best alternative to replace a wired connection. This would make the pricing per Mbps higher than the lowest end wired connections. This again demonstrates that rural users are paying a higher price for comparable or less service than urban users.

<sup>7</sup>Available package prices on July 19, 2013.

<sup>8</sup>Available package prices on July 19, 2013.

# Realizing The Vision: Implementation Priorities

Through the consultation process, there were a number of strategies and priority initiatives that were identified to improve connectivity within York Region. Strategies for assisting the Region meet its connectivity goals and objectives were grouped into the following categories:

- Education and Advocacy Priorities – these are actions focused on educating public and private sector stakeholders on the importance and potential uses of high-speed connectivity
- Municipal Process Priors – these are actions focused on improving municipal processes to facilitate investments in connectivity
- Infrastructure Investment Priorities – these are actions focused on making investments in improved connectivity and cover both public and private sector initiatives

## Education and Advocacy Priorities

The education and advocacy-related priorities are identified as low-cost options for improving connectivity. Developing relationships and communicating the importance of high-speed connectivity is a requirement in order to facilitate investments in broadband infrastructure. The priorities highlighted in Table 13 focus on communicating with different organizations and government bodies on the importance of broadband infrastructure for economic development, community service delivery and quality of life.

**Table 13 - Education and Advocacy Implementation Activities**

Priority	High Level Description	Issue(s) Addressed	Timeline/Priority
<b>Government Engagement</b>	Engage upper levels of government on the importance of broadband investments within York Region.	Ensures government partners understand the importance of high-speed connectivity to York Region's economy.	Immediate and Ongoing.  Priority – High.
<b>Development Industry Engagement</b>	Engage commercial, industrial and residential development industry stakeholders to recognize the importance of connectivity and develop strategies for improvement.	Raises awareness in the development industry of the importance of high-speed connectivity for the Region's economy and the competitiveness of their lands.	Immediate and Ongoing.  Priority – High.
<b>Property Management Engagement</b>	Engage commercial and industrial property management firms on the impact of connectivity on their ability to attract and retain tenants.	Raises awareness in the development industry of the importance of high-speed connectivity for the Region's economy and the competitiveness of their buildings.	Immediate and Ongoing.  Priority – High.

<b>Business Service Portal</b>	Develop a business service portal so that businesses can identify which employment areas have connectivity. This could include a comment repository to provide more detailed data – such as, owner will not allow access, no fibre present, too far/too costly to bring fibre, etc.	Informs businesses on where appropriate services exist to ensure they make the right decision. By providing visibility to available connectivity, it will encourage properties without good connectivity to improve in order to compete for tenants.	3 – 5 years. Priority – Medium.
<b>Residential Services Portal</b>	Develop a residential service portal so that residents can determine which providers are available at their address and at what speeds and cost.	Informs residents of their options for making decisions related to home purchases. By providing visibility to available connectivity, it will encourage properties without good connectivity to improve in order to compete for tenants.	3 – 5 years. Priority – Low.

A detailed overview of the specific implementation priorities can be found in Appendix 3 – Detailed Implementation Strategies.



## Municipal Process Priorities

The municipal process priorities focus on regulatory and planning processes that can be leveraged to improve connectivity within a community. While generally lower-cost options, these processes often involve overcoming organizational inertia, or developing new standards associated with development and infrastructure deployment. These priorities are presented in Table 14.

**Table 14 - Municipal Process Priorities**

Priority	High Level Description	Issue(s) Addressed	Timeline/Priority
<b>Harmonize Municipal Access Agreements</b>	Harmonize process for municipal access agreements to support fibre investments.	Lowers the cost of investment providing options for existing service providers and opening the market for smaller service providers.	1 – 2 years. Priority – High.
<b>Wireless Tower Master Plan</b>	Develop a wireless tower master plan focused on increasing wireless connectivity and co-ordinating private and public sector tower investment.	Aims to improve rural connectivity, while reducing tension during the tower placement process.	1 – 2 years. Priority – High.
<b>Include Fibre Conduit in Development Approval Process</b>	Mandate installation of fibre conduit in new developments.	Ensures services can be obtained at minimal cost and delay, without requiring new construction.	1 – 2 years. Priority – High.
<b>Include Fibre Conduit in Road Construction Projects</b>	Develop a policy that includes installation of fibre conduit as part of all road (re)construction projects.	Ensures services can be obtained at minimal cost and delay, without requiring new construction.	1 – 2 years. Priority – High.
<b>Shared Fibre Conduit Builds</b>	Develop a process for co-ordinating the construction of fibre conduit as part of all arterial and collector road (re)construction projects.	Ensures services can be obtained at minimal cost and delay, without requiring new construction.	1 – 2 years. Priority – High.
<b>York Region Municipal Conduit Utility</b>	Develop an inter-municipal authority to build and manage fibre conduit for leasing to service providers.	Ensures services can be obtained at minimal cost and delay, without requiring new construction.	1 – 2 years. Priority – High.

A detailed overview of the specific implementation priorities can be found in Appendix 3 – Detailed Implementation Strategies.

## Infrastructure Investment Priorities

Ultimately, the goal of the strategy is to encourage investments in infrastructure that can improve connectivity within the Region. While education and advocacy, as well as municipal processes, can assist in driving this forward, ultimately the success of the strategy depends on realizing investments from both private and public sector stakeholders in the Region's connectivity.

A range of infrastructure investments have been identified and can be split into two categories – municipal investment priorities and private sector investment priorities. The municipal investment priorities are identified as key actions where it will take a municipal lead to realize the opportunity; while the private sector investment priorities are actions where service providers are best positioned to realize the opportunity, but potentially with the assistance of various levels of government.

Overall, the objective is to ensure that public and private sector investments are efficiently deployed in the areas where they can result in the most improvement. The first priority generally is to direct private capital to areas where it will naturally flow, while making certain public funds are directed to investments where the return for the private sector is not great enough, or there is an important public benefit to be realized.

## Municipal Investment Priorities

The identified municipal investment priorities in Table 15 are focused improving opportunities for implementing e-governance solutions, encouraging research and education collaboration, and providing community connectivity to improve access to digital technologies. These are all priorities where there is a great benefit to the public – from both a public service delivery standpoint, as well as an economic development stimulator.

There may be an interest from private sector service providers to assist in these projects and they should be explored; however, private sector investment should not be seen as the requirement in realizing these opportunities, given the public benefit that can be realized from municipal investments in these priorities.

**Table 15 - Municipal Process Priorities**

Priority	High Level Description	Issue(s) Addressed	Timeline/Priority
<b>York Telecom Network</b>	<p>Develop the YTN to meet the Region's WAN requirements, while making available dark fibre to the Region's local municipalities and broader public service partners. To support private sector investments, also consider utilizing the YTN to:</p> <ul style="list-style-type: none"> <li>- Lease dark fibre to private sector providers</li> <li>- Complete shared builds with private sector providers</li> <li>- Consider fibre swaps with private sector providers.</li> </ul>	<p>Reduces the Region's WAN costs, while providing interconnectivity between the Region and its public sector partners. Leveraging YTN builds to encourage private sector providers to make investments in the Region will help reduce the Region's costs, but also improve available services for businesses and residents.</p>	<p>Approval of the YTN Complete Plan and Begin Implementation - 1 – 2 years.</p> <p>Priority – High.</p>
<b>Ontario Research and Innovation Optical Network Point-of-Presence</b>	<p>Establish an ORION POP at Southlake Regional Health Centre in Newmarket in order to service research and collaboration opportunities in the northern part of the Region.</p>	<p>Provides a lower cost option for connecting research assets in the Region to the ORION network. Facilitates opportunities to integrate research, content sharing and education opportunities across a range of Regional stakeholders.</p>	<p>1 – 2 years.</p> <p>Priority – High.</p>
<b>York Region Research and Education Network</b>	<p>Develop a York Region Research and Education Network directly connecting the Region's education and research facilities.</p>	<p>Provides an opportunity to facilitate research and innovation among key Regional education and research organizations.</p>	<p>2 – 3 years.</p> <p>Priority – High.</p>
<b>York Region Research and Education Network + Internet</b>	<p>Utilizing the assets associated with the York Region Research and Education Network, develop a shared Internet service to reduce the cost and increase speed availabilities at client facilities.</p>	<p>Provide improved connectivity at a reduced cost, while increasing the ability of those on the network to collaborate and share services.</p>	<p>3 – 5 years.</p> <p>Priority – Medium.</p>
<b>Community WiFi Network</b>	<p>Develop a Regional brand and policy to promote community WiFi availability across the Region's local municipalities.</p>	<p>Provides seamless WiFi connectivity across the Region.</p>	<p>3 – 5 years.</p> <p>Priority – Medium.</p>
<b>Low-Cost Internet for Social Housing</b>	<p>Develop low-cost Internet accessibility at the Region's stock of social housing facilities.</p>	<p>Provides ability for connected wellness programming, while providing accessibility to economic opportunities via the Internet.</p>	<p>3 – 5 years.</p> <p>Priority – Medium.</p>

A detailed overview of the specific implementation priorities can be found in Appendix 3 – Detailed Implementation Strategies.

## Private Sector Provider Investment Priorities

The identified private sector provider investment priorities are focused on improving connectivity to realize the targets set for the Region's businesses and residents in their various land-use categories. Those land-use categories, as shown in Figure 2, have been organized according to:

- Regional Centres and Corridors
- Employment and Institutional Lands
- Urban Residential
- Urban Commercial
- Towns and Villages
- Rural Areas

Within each of these land-uses, planned new developments and existing developments must be addressed separately. Each situation presents its own unique challenges and will require a range of potential actions in order to realize the Region's connectivity targets.

## New Development Areas

With the Region expecting to add another half million residents over the next 20 years, its new development areas should be targeted to ensure they will meet the connectivity needs of that future population. In order to achieve this, there a number of strategies that can be employed, including:

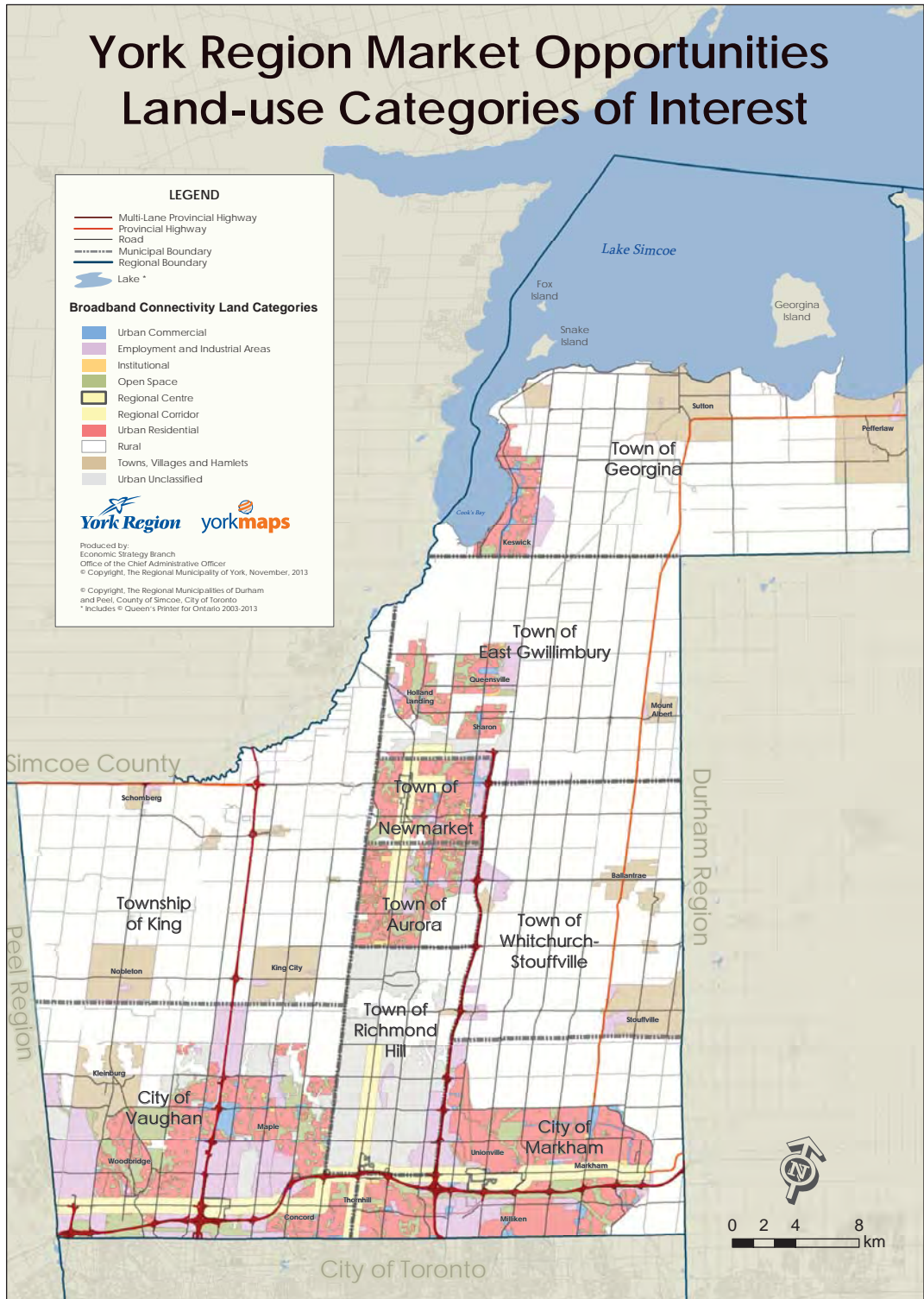
- **Development Standards** – require the installation of fibre optic conduit as part of the development approval process
- **Site Plan/Building Code** – ensure new buildings have the ability to accept connectivity both internally and from the street, as well as can support in-building wireless connectivity
- **Developer Engagement** – engage development companies on importance of connectivity and explore opportunities to meet or exceed Regional speed targets
- **Service Provider Engagement** – engage service providers on new development areas and explore opportunities to meet or exceed Regional speed targets

In the case of most new developments, all four of the identified strategies will need to be employed.

## Existing Developed Areas

Areas already developed pose the biggest challenge for reaching the Region's connectivity targets. However, there are various strategies that can be employed depending on the level of interest of private sector service providers and the municipality.

Figure 2 - York Region Market Opportunities Land-use Categories of Interest



Generally, in these retrofit situations, there are three scenarios that can be explored:

- **Option #1 – Private Sector** – engage private sector to make the necessary investments in the defined area (see Appendix 4 – Implementation Strategies by Municipality and Appendix 5 – York Region’s Market Opportunity for areas that determine where the private sector will most likely invest)
- **Option #2 – Public-Private Partnership** – if private sector is not willing to be the sole investor in projects required to reach the Region’s targets, explore public-private partnership opportunities for defined areas (see Appendix 6 – Business Models for Connectivity to explore potential governance and business models)
- **Option #3 – Municipal/Non-Profit** – if private sector has no interest in investing in certain projects, municipalities can lead projects on their own (see Appendix 6 – Business Models for Connectivity to explore potential governance and business models)

When considering the options above, it is important to ensure the most efficient deployment of funding for connectivity. There are limited capital dollars available to public and private sector organizations, thus it is important to ensure that funding for public and private sector initiatives does not flow to the same areas, as this would be a waste of public resources that could be better directed to underserved areas in the Region.

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There is not one simple solution for improving connectivity across the Region – nor is there one solution for each municipality. Improved connectivity that ensures the most efficient deployment of investment will take advantage of a range of strategies depending on the municipality, land-use and part of the community.

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Given the approach above, it will be important to have ongoing engagement with private sector service providers and to provide them with detailed market information that can help them direct their investment dollars most efficiently. Helping reveal new market opportunities through information sharing will be one way to get more private capital into the Region, while avoiding the need to potentially tap public sector resources.

Table 16 provides an overview of infrastructure investment activities and strategies for engaging the private sector in these land-use categories. A more detailed overview of these strategies can be reviewed in in Appendix 3 – Detailed Implementation Strategies.

**Table 16 - Infrastructure Investment Activities - Private Sector Investments**

<b>Priority</b>	<b>High Level Description</b>	<b>Timeline/Priority</b>
<b>Regional Centres and Corridors</b>	Set the development context for Gigabit communities in the Region's Centres and Corridors by integrating into the development standards and engaging private sector service providers.	1 – 2 years. Priority – High.
<b>Urban Commercial - Existing</b>	Engage property management firms on strategies for improved connectivity within their commercial areas.	Ongoing. Priority – Medium.
<b>Urban Commercial - New</b>	Engage property development firms on importance of connectivity and integrate into development standards.	Ongoing. Priority – High.
<b>Employment and Institutional Lands - Existing</b>	Engage tenants, property owners and property management firms on strategies for improving connectivity.	Ongoing. Priority – High.
<b>Employment and Institutional Lands - New</b>	Engage property development firms on importance of connectivity and integrate into development standards.	3 – 5 years. Priority – Medium.
<b>Urban Residential - Existing</b>	Engage service providers to discuss opportunities for infrastructure and technology upgrades in order to realize the Region's connectivity targets.	Ongoing. Priority – Medium.
<b>Urban Residential - New</b>	Engage developers and service providers on new development areas to ensure they can meet the Region's connectivity targets.	Ongoing. Priority – Medium.
<b>Towns and Villages - Existing Built Areas</b>	Engage developers and service providers on new development areas to ensure they can meet the Region's connectivity targets.	Ongoing. Priority – Medium.
<b>Towns and Villages – Newly Built Areas</b>	Engage developers and service providers on new development areas to ensure they can meet the Region's connectivity targets.	Ongoing. Priority – Medium.
<b>Rural Areas</b>	Engage service providers to discuss opportunities for infrastructure and technology upgrades in order to realize the Region's connectivity targets.	Ongoing. Priority – High.

A detailed overview of the specific implementation priorities can be found in Appendix 3 – Detailed Implementation Strategies.



# Mobilizing Resources: Turning Ideas into Action

Implementation of the York Region Broadband Strategy will require collaboration among the Region's internal departments, its municipal partners, and an array of private sector relationships, including interested Internet service providers. It will require a range of resources and ongoing leadership from the Region in order to realize the targets and economic opportunities that have been identified.

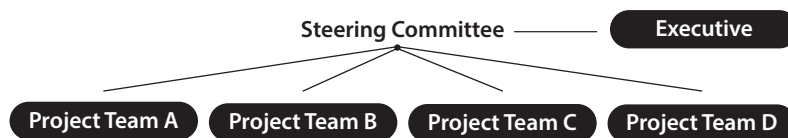
## Governance

It is recommended that a steering committee of key stakeholders be established to guide and report on the implementation of the York Region Broadband Strategy. This steering committee would then be supported by various action-orientated project teams comprised of required stakeholders focusing on implementation initiatives for specific municipal priorities or broader Regional priorities.

The proposed approach would allow the steering committee to work together towards common targets defined in the strategy, allowing for collaboration and information sharing, while allowing each municipality to employ its preferred approaches to its identified projects.

The Region's role in the implementation of the Broadband Strategy will be to provide leadership in the management of the proposed steering committee and associated project teams, while guiding the implementation of the various project opportunities identified in partnership with its municipal and private sector stakeholders.

**Figure 3 - Proposed Governance Structure**



## Steering Committee Composition and Mandate

The steering committee's mandate would be to:

- Oversee the development, implementation and management of the York Region Broadband Strategy
- Identifying, facilitating, initiating and directing resources to project teams to implement projects and programs identified through stakeholder consultation
- Champion high-speed broadband connectivity infrastructure investments in York Region
- Provide a Regional perspective in the areas of federal, provincial and municipal policy and program development as it pertains to high-speed broadband connectivity



The steering committee could consist of 23 voting members representing the Region's various municipal and broader community interests. It would include the following representation:

- Municipalities
  - » Each local municipality will have one representative, either an elected official or a member of the senior management team
  - » One elected official from York Region Council
  - » Chief Administrative Officer of York Region
- Federal and provincial governments
  - » One member of provincial parliament and one member of parliament or senior staff representatives from the provincial and federal governments will be invited
- Research, education and health
  - » One member from each of the Region's school boards for a total of two representatives
  - » One representative from a post-secondary institution
  - » One representative from the Region's hospitals
- Community-at-large
  - » Five community members will be drawn from York Region and may include business community or not-for-profit representatives

A chair and vice-chair will be elected by members of the steering committee. Their role will be to provide leadership in the implementation of the Broadband Strategy and act as a primary spokesperson for the initiative.

### **Executive Committee Composition and Mandate**

An executive committee reporting to the steering committee will be established and comprised of five members, including the chair and vice chair of the steering committee, and three members nominated by the steering committee.

The executive committee will advise staff and monitor priorities to ensure the goals of the Broadband Strategy are being achieved. The responsibilities of the Executive Committee will include:

- Act as spokespersons for the York Region Broadband Strategy
- Provide recommendations on programs and projects approved as objectives by the steering committee
- Act as a sounding board for staff to advance activities between steering committee meetings

### **Project Teams Composition and Mandate**

The project teams will be task-orientated and based on the priorities of the steering committee and the York Region Broadband Strategy. The project teams will be organized around themes and priorities from the strategy. They will be comprised of both steering committee members and/or non-members who have a particular expertise critical to the task at hand.

The purpose of the project teams will be to drive implementation of the identified priority and bring together the necessary resources and representatives from the public and private sectors. Potential project teams may include:

- **Rural Connectivity** – this project team would include municipalities with an interest in improving rural connectivity
- **Centres and Corridors** – this project team would focus on developing a co-ordinated strategy for connectivity in the Region’s Centres and Corridors
- **York Region Research and Education Network** – this project team would include key education and research stakeholders, working together on establishing a network and facilitating collaboration
- **Development Standards** – this project team would bring together municipalities to collaborate on an approach to development standards and municipal conduit
- **York Telecom Network (YTN)** – this project team would focus on the build out of the YTN across the Region

These groups would exist for as long as the project required – some might end quickly based upon the priority, while others may turn into longer term project teams that continue to collaborate on a specific priority from the strategy, such as the YTN. Regardless of their lifespan, the purpose of the project teams will be to drive implementation and bring together the required stakeholders and partners to make the identified priority a reality.

## Staff Support

Each municipality will be requested to designate a staff member to liaise with the steering committee. Additional staff from various departments may be appointed to participate on project teams as required.

York Region will provide a staff member to support the steering committee, executive committee and project teams. They will provide facilitation, project management and co-ordination and administrative support.

## Staffing Resources

To support the implementation of the York Region Broadband Strategy, it is recommended that a project manager be designated to co-ordinate and manage the initiatives identified in the strategy and the supporting governance structure. The project manager would be responsible for:

- Managing and co-ordinating the steering committee, executive committee and associated project teams
- Co-ordinating activities with associated departments of the Region and its partner local municipalities (IT, Economic Development, Planning, etc.)
- Project managing the implementation priorities as directed by the steering committee
- Liaising with public and private sector stakeholders in order to drive implementation of the Broadband Strategy

- Identifying additional resources, such as funding sources and consultants, to assist in implementation
- Documenting progress and project reporting

It may be necessary to hire external consultants to support specific projects, as knowledge of the industry and technology may be valuable to the ultimate success.

# APPENDICES

## Appendix 1 - York Region Broadband Strategy Process

To complete the York Region Broadband Strategy a visioning and needs analysis was conducted to gather the objectives of the community and the current state of connectivity. Consultation meetings were completed with a range of stakeholders, including:

- **Municipalities** – all nine local municipalities and York Region
- **Internet Service Providers** – a number of private sector service providers in the Region
- **Education** – York Region District School Board, York Catholic District School Board and Seneca College
- **Healthcare** – Southlake Regional Health Centre, Mackenzie Health, Markham Stouffville Hospital, Central Community Care Access, York Region Public Health and Central Local Health Integration Network
- **First Responders** – including all local municipal Fire Departments, York Regional Police, the Ontario Provincial Police and Emergency Medical Services
- **Business Community** – all nine Chambers of Commerce and the Board of Trade were engaged, as were 65 businesses through three public consultation sessions and 45 through an online survey
- **Residents** – 72 residents provided input through an online survey

An analysis of available services was conducted for the various Regional geographic elements, such as urban areas, Centres and Corridors, transit corridors, planned commercial and residential areas, rural areas, towns and villages. Information from carriers and residents and businesses was used to determine the current level of service. Goals for service in the coming five and 10 years have been established through consultations with community members and carriers. These goals take into consideration capital spending cycles, technology evolution and factors that impact network business cases.

Discussions were held with carriers to help them understand the connectivity requirements of the various areas and interest groups in York Region and the business opportunities available to them. Bell, Rogers, Cogeco, Vianet, Xplornet and Terago participated in these meetings.

This in-depth consultation and research process provided excellent insight into the needs and goals of the community, the current state of connectivity and the gaps to be addressed. It has provided a solid information base in support of the York Region Broadband Strategy.

## Appendix 2 - Connectivity Trends

The telecommunications industry is evolving rapidly. Though the details can be difficult to predict, there are observed trends on which the Region can rely to direct development to ensure that future connectivity needs are met. These trends are in the areas of advancing technologies, the nature of Internet Service Providers (ISPs) and the demands of end users and their communities.

### 1. APPLICATION TRENDS

The power of broadband infrastructure is realized in the types of applications enabled as a result of investments in connectivity. Globally, communities are embracing online service applications generating unprecedented volumes of traffic on their networks. For optimum performance of these services, networks with adequate bandwidth and capacity are required.

As well as the increase in bandwidth driven by these changing applications, there is a growing requirement for symmetry in network connections. In the recent past, a ratio of roughly 10:1, where a connection of 10 Mbps down and 1 Mbps up, served the requirements of most data applications. Now, video conferencing and network-based applications drive a requirement for more symmetrical connections. A 2:1 ratio is more appropriate for many current applications.

### MUNICIPAL SERVICE APPLICATION TRENDS

Increasingly municipalities are embracing connectivity to improve their service delivery options to meet the needs of both internal and external stakeholders.

#### INTERNAL MUNICIPAL CLIENT SERVICE APPLICATIONS

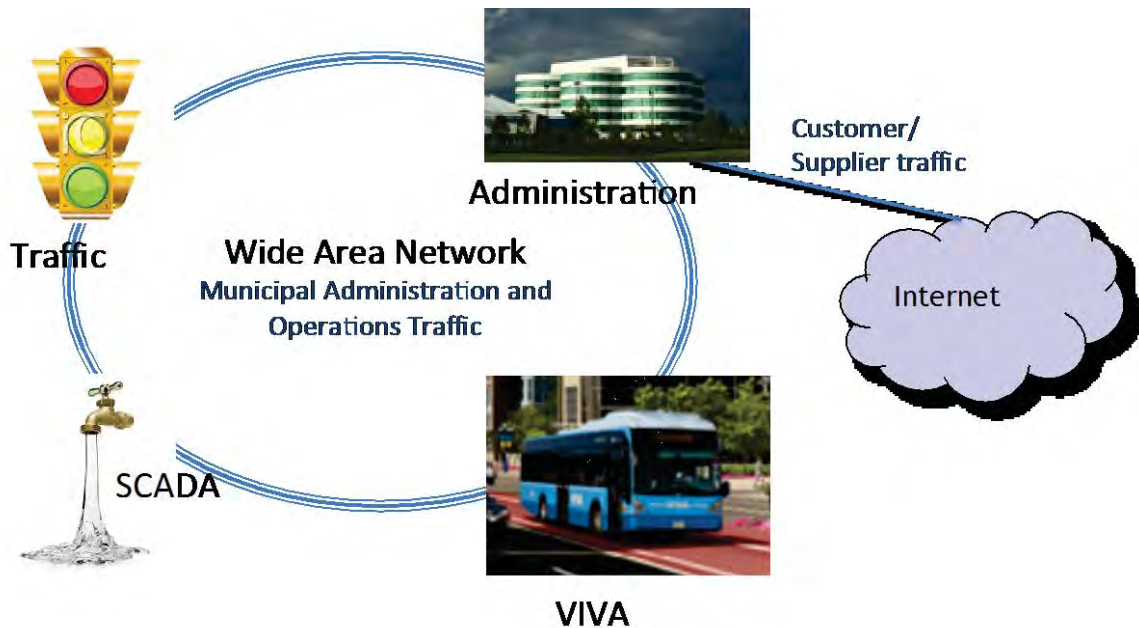
The control and management of municipal services, as highlighted in Figure 1 is increasingly being centralized and requires data connectivity between operational sites, infrastructure asset locations and control centres. This can involve administrative and operations functions that rely on a Wide Area Network (WAN) and customer/supplier interactions supported by the Internet.

All of this data relies not only on connectivity, but also on data centres requiring constant communications among a number of locations. This type of traffic and connectivity is driving the need for greater speeds and capacity in municipal networks. Some of this traffic is being driven by municipal applications that include:

- **Traffic Signals** – programmed and managed remotely from an operation centre and require real-time connectivity
- **Video Surveillance** – cameras at major intersections and municipal facilities add to the data requirements of connectivity
- **Pervasive Video** – municipalities are increasing their use of video for collaboration, communications, training, citizen interaction, security management and entertainment
- **Transit Stops and Stations** – to provide real-time travel data, connectivity is required along transit stops and stations
- **Geographic Information Systems** – these visual, data intensive systems provide mapping and data analysis tools to inform decision making and require high-speeds of connectivity to be useful in the field

- **Smart City Platforms** –adoption of information technologies and applications for real-time monitoring and management of municipal infrastructure and service systems is increasingly being embraced by municipal departments
- **Field Operations** – increasingly municipal staff need real-time access to data in the field to complete their jobs of updating, accessing or creating information; these requirements range from public health staff needing access to client records, to public works staff needing to update infrastructure related information
- **Facility and Operations Management** – increasingly municipalities are embracing Internet Protocol (IP) for their street lights, facility operations and just about anything that requires a plug-load; real-time data connections allow municipalities to better manage and reduce energy consumption by these devices
- **Web-Based Applications** – web-based applications and backups, including cloud services, are being adopted by municipalities as a way to reduce costs and increase collaboration opportunities

Figure 1 - Municipal Services and Operations Managed in a Network



In communities where there are opportunities for collaboration and the economic rationale for action, municipalities may share the delivery of services in order to streamline costs and maximize benefit. For instance, instead of having multiple data centres or traffic management centres, municipalities may pool their resources and work from an inter-municipal cloud to deliver these services.

#### EXTERNAL MUNICIPAL CLIENT SERVICE APPLICATIONS

There is a growing trend toward e-government services. This is driven by the client need for services “everywhere, all the time” and by the municipal requirement to streamline operations to improve service levels and manage costs.

Residents need to be able to access information about government services online. The full gamut of government services is being provided online in a growing number of communities, as residents are increasingly expecting this level of service.

- **E-Government** – municipalities are starting to embrace online voting for elections and community questions
- **Council Engagement** - the ability to watch council and committee meetings at home via video coverage is growing in municipalities as bandwidth and video technologies become more affordable
- **Municipal Applications** – the ability to generate and submit applications for a range of municipal services, whether they be planning applications and building permits, to submitting a business license, is of growing interest
- **Open Data** – interest in open data and geographic information systems that can assist residents in completing applications for approval or conducting research for community projects is of growing interest and will require increased bandwidth
- **Online Invoicing and Payments** – while invoicing for property taxes is available online in some municipalities, there is interest in supporting other online payments and invoicing for program fees, application costs and bylaw fines
- **Problem Reporting and Requests** – a range of information requests and problem reporting options, such as pothole repair and garbage pick-up, are moving online
- **Recreation** – some communities are embracing video as a tool to deliver recreation services in the home to residents
- **Social Housing** – some communities have embraced high-speed connectivity at a subsidized price for their social housing stock as way to encourage community engagement and new economic opportunities
- **Public WiFi Networks** – municipalities are increasingly providing access to free public WiFi at their facilities

## ECONOMIC DEVELOPMENT

The availability of ultra-high-speed connectivity is increasingly being used to promote economic development in communities. Opportunities that some communities have embraced include:

- **Business Incubators** – developing research and business incubators supporting researching and commercialization of new technologies and processes
- **High Tech Business Parks** – developing new business parks with state-of-the-art connectivity made available to companies
- **Community Test Labs** – utilizing their high-speed networks, municipalities are enticing high tech businesses to invest in their communities by offering their networks, businesses and residents as a place for firms to test new technologies and services

In addition, the changing nature of work as a result of technology is having an impact on connectivity. Some of the trends in applications include:

- **Telework and Work-At-Home** – knowledge based companies and offices are accelerating their telework programs to enhance recruitment and retention by improving work-life balance and in some cases, to decrease real estate costs; teleworkers access voice, video, and data services over the network, all of which increase traffic



- **Pervasive Video** – there is increasing use of video for collaboration, communication, training, client interaction, security management, and entertainment, within the private sector
- **Big Data** – companies throughout the world are accessing increasingly large image files and unstructured “Big Data” for analysis and market development, requiring increasingly large speed and capacity of connectivity
- **Network** – web-based applications and backups, including cloud services, are moving functionality from the desktop to the network; this is a great benefit to businesses as they gain capacity and flexibility and do not require IT support required with locally hosted applications

## EDUCATION AND RESEARCH

Access to high-speed connectivity is a prerequisite for facilitating education and research opportunities within a community. From grade school through post-secondary education, the pervasiveness of connected devices is exploding exponentially and the demand for more online education, collaboration and research tools is becoming an expectation by students. There are a number of technological and application related trends within this community, including:

- **Hybrid Learning Environments** – increasingly educators are embracing hybrid learning environments that leverage online video and resources to complement one-on-one student teacher interaction
- **Bring-Your-Own-Device** – within York Region there is a movement to bring-your-own-device learning, whereby students are expected to bring their own tablet or laptop to facilitate their learning experience; this approach is driving the need for greater connectivity speeds as these devices are all connected to the network and leverage online collaboration and research tools to complete their daily school functions
- **Virtual Education** – there are more and more opportunities for online learning through local and international education services, while connected networks also support the ability for local education and research institutions to share and deliver content to residents in a virtual environment
- **Big Data** - scientists and businesses throughout the world are accessing ever larger image files and unstructured “Big Data” for analysis, requiring increasingly large speed and capacity of connectivity
- **Libraries** – are rapidly moving online and serving as physical access points for residents to gain online access. Beyond moving to greater availability of e-content, libraries are also providing space for clients to make their own projects, ranging from multi-media development to 3D printing. With greater Internet demands and the need to move larger amounts of data associated with creating multi-media projects, the connectivity demands of libraries are increasing

## HEALTHCARE

While healthcare facilities and practitioners are requiring greater connectivity speeds in order to facilitate e-health records access, analysis and research, the interest in community care is driving the need for connectivity within homes. Applications that are driving the need for improved connectivity include:

- **E-Health Records** – there is a movement to push more health records online and increase the integration of records among various service providers and their patients in order to ensure more efficient care; this move will result in greater amounts of data and the need for improved connectivity for those accessing and analyzing the data
- **Community Outreach** – there is a growing interest in greater connectivity for health workers in the field, ranging from public health staff to nurses, who may require real-time access to update and create patient records
- **Connected Wellness** – in order to reduce costs and provide easier access to medical assistance, hospitals and health delivery organizations are looking at ways to provide in-home monitoring and healthcare; this type of care requires good connectivity in the home for those requiring care
- **Tele-Presence Health Systems** – in order to service rural areas and distribute access to healthcare within the community, some providers are delivering specialist care using ultra-high-definition tele-presence health systems that can be deployed around a community

## FIRST RESPONDERS

Emergency services are experiencing a growing need to access high-speed, high-capacity connectivity, both from their fixed office locations and on a mobile basis. For mobile data connectivity, emergency service providers tend to use their own private networks. This provides them with clear channels, an important capability, as public channels tend to be incapacitated by congestion at times of crisis. For fixed connectivity to first responders' facilities, high-capacity, high-speed connections are required to support the use of video and network based applications. Some of the changes and application trends that are being witnessed include:

- **Police Services** - are experiencing greater requirements for broadband connections to police stations and mobile connectivity for applications such as:
  - **Video** – while video within vehicles is already pervasive, moving this video to real-time connectivity is of interest to assist in officer safety and would require high-capacity data networks; moving to the next realm, officers in the future may also look to have video cameras attached to their uniforms, and thus increasing the amount of data available
  - **Predictive Analytics** – utilizing data from past events in order to help prevent crimes is increasingly being adopted and is a data intensive application
  - **In-Vehicle Applications** – connectivity within vehicles is a pre-requisite for accessing records and completing reports, but with improved connectivity and real-time access, more applications can be moved out of the office into vehicles, such as analyzing video for facial recognition
- **Fire Services** – are experiencing greater requirements for broadband connections to fire stations and mobile connectivity for applications such as:
  - **GIS Data** – there is an interest in real-time access to geographic information system databases to assist with responding to and planning for emergencies; this requires good mobile connectivity
  - **Vehicle-Station Connections** – ensuring a smooth transmission from connectivity within stations to mobile networks is required in order to receive data pertinent to the emergency they are responding to
  - **Inspections** – as part of their fire prevention and planning activities, departments complete inspections of buildings and plan responses to potential fires; the ability to

generate these reports and access them in real-time will require improved mobile connectivity

- **Paramedics** – while paramedics maintain records on clients they have served, they need access to those records when on a repeat call, and mobile connectivity to hospitals so that they can share information between each other and notify them of their arrival; all of this requires greater mobile connectivity and integration of patient data points

## ULTRA-FAST RESIDENTIAL ACCESS

Many communities are looking to develop ultra-fast fibre networks in residential areas. For instance, Google has built an ultra-fast network in Kansas City, and a second ultra-fast network is planned for Austin, Texas in 2014. These networks deliver speeds of up to 1 Gigabit per second, which are significantly higher than the 150 Mbps available in some of York Region's residential urban areas.

*Case Study – Kansas City, Kansas – See Appendix 7 – Case Studies.*

In Kansas City and Austin, local governments expedited the permitting process, gave Google rights-of-way access at little to no cost, and allowed Google to build-out selectively, in neighborhoods where consumers committed to purchase the service. AT&T has said it too has plans to build an extremely high-speed fibre-optic network in Austin. However, it would proceed with the project only if Austin authorities gave it the same terms as Google.

Closer to home in Canada, Olds, Alberta has built a Fibre-to-the-Address (FTTA) network delivering 1 Gigabit to the home services. The Town and its Economic Development Agency (The Olds Institute) pursued grants and loans to fund this network build. Earlier in 2013, they started offering Internet and broadcast television services to the residents.

## 2. BROADBAND INFRASTRUCTURE TRENDS

There are many different technologies that can support broadband services. For the purposes of this strategy, they have been categorized as wired, wireless and satellite. The differences between these technologies impact the capital cost and service offerings that a provider can deliver.

Providers structure their service offerings based on a business case analysis that consists of the following elements:

- Capital cost to deploy a network
- Ongoing operations cost to support users and infrastructure
- Revenue it is expected to generate

Factors including the service mix (businesses, residential and different packages), market size, market share they can capture, competition and use of existing capital infrastructure all influence business case decisions. The population density in areas to be served affects the potential revenue generation and the capital investment to be made in the area and thus can have a significant impact on the provider's choice of technology.

Technology selection can also impact a provider's capital budget. Some technologies are much higher cost per home passed (or per km covered) than others. Given that providers have a limited capital budget they make decisions within the constraints of those budgets. The selection of a technology

option can limit the potential service offerings a provider can make. A wireless service cannot provide the same speeds or in some cases speed guarantee that a wired technology might. Thus, some areas may not have the flexibility for as many options based on the factors that contribute to the technology selection and the overall business case, such as household density and competitive position.

It is important to recognize the need for speed and capacity is driven by the exponentially increasing use of devices and computing in an evolving world. The reliance on computing devices as a means of communication, business transactions, education and entertainment, is placing a growing pressure on communications infrastructure to keep pace.

With the increasing demand for computing and data communications, an evolution in networking has occurred. The migration from connected (circuit switched and virtual circuit switched) to connectionless technology supports higher capacity and higher speed networks and has contributed to cost reductions that have enabled a reduction in the cost of transmission per megabit over the last 10 years.

Connectionless networking takes a signal and divides it into packets that can be sent along different routes and re-assembled at the receiving end. Network equipment has evolved to better support data services as well as becoming predominately Internet Protocol (IP). This impacts providers by requiring them to eventually add or replace equipment to use this means of transmission. While this enables new services it also causes carriers to be running multiple networks and operational systems concurrently which can be very expensive.

## WIRED TECHNOLOGIES

This is a general category that includes traditional wires such as copper and coaxial cable (referred to as co-ax) as well as fibre optic cable. Wired solutions are the most common and easily recognized solutions to consumers and businesses. This is because their foundation is in traditional service industries with decades of utilization and acceptance – essentially telephony and television.

However, even in these traditional industries the wires did not always reach everywhere. For most of Ontario and York Region, telephone lines have been provided to all homes. Prior to 1994, Bell Canada was mandated to provide this infrastructure and service to all homes. In 1994, the industry commenced a de-regulation process where this mandate was altered. Co-incidentally, this timeframe also represented the emergence of the general Internet and the recognition that a future set of services would exist.

Over time, advancements in technology, such as fibre optic cable evolved to replace the older forms of cable in telephone and television networks. Fibre offers providers the ability to carry significantly more data over their networks. For most service providers (often referred to as carriers) the initial use of fibre was for data traffic between different aggregation points – between cities or towns. As technology evolved and service demand increased fibre became an infrastructure to provide service to large businesses and users with high volume data demands. Now, in the 21<sup>st</sup> Century, fibre to all buildings (including to the home) is a technology option that is financially viable in certain areas.

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## FIBRE-TO-THE-ADDRESS

Fibre-to-the-Address (FTTA) is a term that describes a network that has a fibre connection that starts at the provider's "office" (a location with the main electronic equipment) to a single address (home or business). In these scenarios the light waves transmit data from the office to the end user's location. The limit of capacity or speed a user can receive is based primarily on the level of the electronic equipment that sends the signal over the fibre. Current equipment can provide speeds up to multiple Gigabits per second. The next evolution will be Terabits per second.

The implementation of Wavelength Division Multiplexing (WDM) has increased network scalability. This technology divides the light signal used on a fibre optic cable by breaking it down into a spectrum of different colours (like a rainbow). Each colour is then used as a separate transmission path. This technology enables a single fibre optic cable to transmit up to 160 times more signals than previously possible. This allows for dramatic expansion of existing and future fibre cable capacity to support increasing traffic demand.

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## FIBRE-TO-THE-NODE

Fibre-to-the-Node (FTTN) is a slightly different scenario. The fibre cable extends from the office to an electronic hub (node) located in an area where there are multiple buildings. From that node to the individual buildings, the provider uses either an existing copper or coax cable to terminate the service. This provides that ability to have much higher capacity Internet services transmitting the signal from the office over copper/co-ax. However, the physical properties of copper and co-ax do not enable as much capacity as fibre and thus fibre provides the highest level of capacity/speed to a building.

Wired technologies currently have the longest lifecycle for replacement, with fibre providing the best value for dollar invested over time. While the electronic equipment will continue to evolve, it is not likely in the next 30 years that we will see obsolescence of fibre cables, although the quality may improve. Many providers are now placing fibre to the building as their base technology in all new-build scenarios. Unfortunately, replacing or overbuilding existing infrastructure is a very expensive endeavor and requires large capital investments and the potential of large revenue returns.

## WIRELESS TECHNOLOGIES

Wireless technology has been used for telecommunications in Canada since the 1950s. Today there are three forms of wireless telecommunications technologies – fixed, mobile and WiFi/in-building.

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## FIXED WIRELESS

Fixed wireless refers to technology that uses airwaves (called spectrum) to transmit the signals between two antennas that are not moving. The antennas are often located on towers or buildings (commercial or residential). For business, the services are called point-to-point and the transmission is from one antenna to another, servicing one customer. These systems commenced deployment in the 1990s as service options to areas where neither fibre nor copper was available, or as a more cost-effective option. The cost of placing towers and antennas can be significantly lower than placing fibre, especially buried fibre, and requires less negotiation of right-of-ways and permits. These towers are often no higher than 45m and many times less than 30m.

In the early 2000 timeframe, advancements were made in wireless, enabled systems called point-to-multipoint. These systems offered a cost-effective mechanism for reaching residential users as a single transmission antenna could often support up to 100 homes. Again, this technology was much more cost-effective on a per household/connection basis versus fibre or FTTN deployments.

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## MOBILE

In addition to fixed wireless, there is also mobile wireless. This technology is based on cell phone technology. The same spectrum and antennas transmitting voice to cell phones can be used to transmit data. This has resulted in new cell infrastructure to support these new service options existing with the advent of smart phones. Where cell phone reach can be achieved, often there is an option to use mobile data for access.

When users require access to information from more than one location (office or home), the demand for mobile services rises significantly. While more expensive than other options, this remains a high demand service and demand is rising dramatically year over year. In some cases, younger generations are opting to only have a cell phone and no landline or wired telephone line to their home. While some predict a similar trend for computing/portable tablets, it is more likely that a fixed connection to office and home will remain. This is because portable devices can be operated in WiFi mode, taking advantage of in-building wireless. Since, it is cheaper to have a fixed/wired connection to the home, data charges can be avoided while using the WiFi network. This also leads to an increasing demand for WiFi or in building wireless networks.

It is important to note that mobile data tends to have a higher price point per unit of speed versus wired and fixed wireless options.

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## WIFI/IN-BUILDING

WiFi and in-building connectivity use similar technologies to provide access to a network - either within a building (home, office, library, school, etc.) or in an area around or near a building. WiFi networks use the same technologies that in-building transmission use (although in-building is often used in the commercial industry to transmit signals across larger buildings/campuses).

WiFi is used to connect many users who may not have a fixed location/desk within in a building or for distribution of network signal around a home for all family members. This provides flexibility in where devices/computers can be used within a location. Typically the WiFi is connected to a fixed/wired connection from the building to the Internet. This is because wired connections tend to have dramatically more capacity at a lower price point than wireless. Spectrum is a finite resource with a specified allocation that can only support a specific number of simultaneous connections.

WiFi has been used in some areas to provide community networks that can be accessed by a set of homes or businesses within a confined geographic area, where buildings and users are concentrated. The antenna is normally located on one of the buildings. Such systems tend to have limited capacity per user as they are not intended to replace wired networks offering higher speeds.

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## ISSUES WITH WIRELESS

All wireless technology is sensitive to tree coverage (i.e. having many trees and tall trees especially coniferous based) and distance. The higher the service speed the closer one needs to be to the transmitter. The ability to support higher capacity decreases with the distance from the antenna/radio. This is in part driving a recent proliferation of towers from cell phone companies as they expand with the newest technology.

Trees are obstacles and unfortunately, there is little technology can do to alter the penetration issues. While new technology may penetrate trees better (lower frequencies penetrate tree coverage more significantly than higher frequencies) the speed and quality of a connection may still be limited.

In addition, wireless transmission is also impacted by terrain. Signals do not scatter vertically as they do horizontally. Thus, areas that are lower, or dip suddenly may not be able to acquire or maintain a signal despite being within the distance range of a tower. This is problematic as it creates “holes”, which are not cost-effective to cover, generally requiring an additional tower to “reflect” the signal from a different angle.

Wireless signals are also sensitive to rain, with a dynamic known as fade margin. Essentially, the signal decreases in heavy rain or snow. The impact of this varies with transmission frequency. With a shift to using predominately, licensed frequencies, this issue has not been overwhelming to network providers. This is because licensed frequencies can transmit at a higher power that strengthens signal transmission.

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## SATELLITE

It is important to also mention satellite as a delivery option. In the late 1990s, it was recognized that current technology would not be cost-effective or timely for all regions of Canada. A large investment was made in building and launching satellites that could support two-way communications and deliver Internet and telephony to many rural and remote users. The use of satellite technology requires a satellite in space, but also a ground station. Typically, ground stations are not located in the region to which the satellite broadcasts. This allows re-use of common frequency and enables more bandwidth to cover an area.

Due to the slow progress of wired solutions and the fact that wireless was evolving and required new infrastructure, satellite technologies became an option to many more Canadians than anticipated. This caused an exceptionally high level of network congestion that in turn, decreased user performance and satisfaction.

New High Throughput Satellites have been developed and launched into US orbits. These satellites can service many of the southern portions of Canada. Evolution of satellites to use spot beam technology (concentrating a signal to a particular geographic area and allocating a defined capacity) and their ground stations enabling caching has greatly enhanced user experiences. While there is still a physical limitation known as bent arm (the time it takes of a signal to travel from user home to satellite and back to the ground), this can be masked from impacting user experience in many services. Some services that are particularly sensitive to time lags/latency may require future enhancements.



### 3. INTERNET SERVICE PROVIDER TRENDS

Service providers in Canada and specifically York Region are undergoing dramatic changes. The trends are towards converged services (telephone, Internet and television) and an increase in services that deliver to a mobile market (cell phones and WiFi). In fact, these trends are occurring as a result of the demands of the user market place that is focused on an exponentially increasing use of electronic devices and the desire to have service everywhere.

Historically, service providers offered services that were a core competency supported by their network infrastructure. For instance, telephone companies originated with copper cable networks to provide voice services. Cable companies delivered cable television on networks primarily based on coaxial cables. In the past 20 years these networks have been evolving to support advanced services such as Internet.

Since networks originally offered one service (phone or television) there was little competition between different types of providers. Also, telephone services operated under an umbrella of monopoly until the mid-1990s.

With the advent of Internet services, providers pursued technology development that would leverage their existing asset base to meet user needs. This has resulted in network evolution to deploy FTTN. The impetus for using these networks is that the largest components of costs involved in placing networks are labour, rights-of-way and restoration of surfaces. Since the cable is often already connected to a home, the costs associated with those segments can be avoided. This saves on the overall investment and results in a more suitable business case for providers.

As mentioned, fibre can be brought all the way to a home or building (FTTA). In new build scenarios since the highest costs are in labour etc. it is just as cost effective to use fibre as it is to use the alternative co-ax or copper cables. In addition, fibre can support higher speed service options and has a long lifecycle to support future services. It is anticipated that fibre will be the cable for the remainder of the 21<sup>st</sup> Century, as copper was the cable medium of the 20<sup>th</sup> Century. Also since fibre uses light as its “medium” to transport signals/data it is not evident that an alternative will be found in the near future.

Over the past decade, service providers have added IP into their service sets for both business and residential customers. For business, providers have used different scenarios but in recent years the focus has been to offer a set of managed services related to bandwidth capacities (often referred to as speed). While an option for the purchase of dark fibre (i.e. uncommitted fibre) had been available previously, this seems in many cases to not be a standard option any longer. Managed services enable providers to monitor traffic and offer different service level agreement options based on customers’ needs and willingness to pay.

With advancements such as Wavelength-Division Multiplexing (WDM), carriers are able to expand their capacity significantly. The newest sets of services for businesses are to purchase a wavelength (their own colour stream). In residential, the service providers are focused on delivering multiple and bundled services to users, the main focus being to offer triple play – telephone, Internet and television. With this focus, there is an increasing demand for providers to upgrade or enhance residential networks to support these service options. Traditional telephone networks can support some Internet options, but in order to support television, they require FTTN and FTFA. Cable



companies need enhancements in their electronics and FTTN systems to support voice and Internet in addition to their traditional television services.

It is important to understand service providers are moving into an era of converged services. This is in part an evolution of traditional technology to an IP-based technology infrastructure. Using IP as the base system protocol, it is equally as possible to offer voice as it is television. This transition of network infrastructure/technology requires time and capital dollars. Providers have a limited amount of capital to spend every year and their planning focuses those dollars into areas where they believe that a high demand will yield: 1) best revenue; and 2) best competitive positioning. This results in services and infrastructure being focused on more densely populated areas. That being said, with limited capital and time only so many areas/neighbourhoods can be addressed in a given year.

With the deployment of new infrastructure from traditional providers being slower than market demands, other technologies have been introduced. These technologies are predominately wireless and can be found in urban and rural areas.

The ability to purchase and install fixed wireless equipment inexpensively lead to the creation of many new ISPs in the early 2000s. These ISPs typically operate in smaller and more rural communities, as the ability to compete with wired solutions is limited. Generally, the price structure is at a higher cost per Mbps than wired services. This can often be attributed to economies of scale – their networks are much smaller and still require ongoing maintenance and operational costs. So despite being less capital intensive, these operators cannot often maintain pace with capacity upgrades that occur with the larger providers.

In the past decade there has also been a rise in mobile data services and providers. While the main providers are the traditional cell phone companies, new players have been given opportunity to enter the market and compete. Tremendous evolution has occurred in this technology that has spurred new investments on behalf of the providers to add new network infrastructure to support higher speed services. In fact, cell providers (which are in most cases related/owned by a wired carrier) believe that new cellular data platforms are their best rural service option.

It is important to also mention satellite as a delivery option. Satellite is the last option for providing Internet services. In 2012, a Canadian provider with their US partners started the launch and implementation of two new satellites to deliver connectivity to rural and remote Canadians. These satellites are now capable of supporting users with services of up to 10 Mbps download and at a consumer price point that five years ago supported 1 Mbps. This is an exceptional step forward and demonstrates satellite can be a viable solution for some areas and customers.

Thus, the service provider industry has evolved to having multiple options with multiple technology platforms. While advancements are being made in all the technologies, these focus primarily on increasing speed/capacity to meet the rising demands of services and users and not on altering the base technology (fibre, antennas/radios and satellites).

York Region is comprised of many different areas – urban, towns and rural/agricultural. Like many areas of Ontario, the Region's citizens will need to rely on all the potential technology options and a variety of providers to meet the diverse needs of users and geography. This strategy outlines speed targets for different areas of the Region and directs activities for working with providers in the future to help achieve those targets.

## Appendix 3 - Detailed Implementation Strategies

The following provides an overview of the detailed strategies for each of the implementation opportunities that have been identified.

### 1. EDUCATION AND ADVOCACY ACTIVITIES

The education and advocacy-related actions are identified as low-cost options for improving connectivity. Developing relationships and communicating the importance of high-speed connectivity is a requirement in order to facilitate investments in broadband infrastructure. The required focus is on communicating with different organizations and government bodies on the importance of broadband infrastructure for economic development, community service delivery and quality of life.

#### ENGAGEMENT UPPER LEVELS OF GOVERNMENT

Informing other levels of government about the importance of connectivity for York Region and the presence of service gaps may be something new for the municipality; however, it is an important step in developing government engagement in a process for improvement. Other communities who are competing for government funding are already engaging in these activities. York Region is often seen as a “have” municipality because of its size and growth. However, the connectivity challenges some areas within the Region experience are similar to other communities in Canada and therefore should be highlighted when possible. Ensuring other levels of government fully understand the impact of insufficient connectivity services to York Region’s ability to grow its residential and business base will be important in ensuring the Region can realize potential government funding investments.

#### ENGAGE DEVELOPMENT INDUSTRY

Beyond engaging the various levels of government, there is also a need to engage the development community and property managers on the importance of connectivity to the Region’s growth and the competitiveness of their developments. The discussion needs to start at the beginning of the development phases in order to ensure new serviced lands have connectivity, but also so that the buildings constructed on these sites can accept connectivity from the streets. Furthermore, there is a need to work with property management firms and developers to improve connectivity in existing business parks, so that these areas can continue to be competitive over the long-term.

*Land values and occupancy will be driven by availability of connectivity – the greater the connectivity, the greater potential for high value uses.*

An important component in ensuring good connectivity is available across the Region’s employment lands and residential areas, is providing quality information on the availability of high-speed services. One way to do this would be to develop online portals where businesses and residents can check to see what types of services are available by address. By providing this information, it will not only help residents and businesses make locational decisions, but also encourage development companies and property management firms to make investments in connectivity into their properties.

## 2. MUNICIPAL PROCESS ACTIVITIES

The municipal process activities focus on regulatory processes that can be aligned to improve connectivity within a community. While generally lower-cost options, these processes often involve overcoming organizational inertia.

### HARMONIZE MUNICIPAL ACCESS AGREEMENTS

One of the biggest issues to address, is that of municipal rights-of-way and their corresponding access agreements. While there is often blame put on ISPs for not providing greater connectivity for residents and businesses, municipalities and utilities can also play a role in discouraging investment. For instance, a burdensome approval process for accessing municipal rights-of-way can discourage investment.

*The development of Google's Gigabit Communities benefited from a streamlined municipal right-of-way access agreement.*

Within York Region an Internet service provider may need to deal with three or more organizations, starting with the local municipality, then the Region (if their build includes Regional roads) and local utilities. The more municipalities the build involves, the greater the number of agreements required. Streamlining the approval process and harmonizing requirements and remediation fees would help make this process more predictable and encourage greater investment.

### WIRELESS TOWER MASTER PLAN

Realizing improved connectivity in the Region's rural community will rely on investments in wireless technologies. When this is combined with the increasing need to meet consumer and business needs for wireless service in urban areas, there will be a need for even greater investments in wireless infrastructure.

Given the political challenges associated with wireless tower placement and the concerns of both residents and businesses, the Region should work with its municipal partners and the main telecommunications firms to develop a Wireless Tower Master Plan.

*Realizing investments in wireless tower infrastructure is critical to improving connectivity in the Region's rural areas.*

A Wireless Tower Master Plan would analyze current demand for wireless services within the community, set a vision for improved service based upon the targets identified in this strategy, and develop a plan for realizing these targets through shared investments in wireless infrastructure.

The plan would incorporate land-use planning strategies with industry-accepted radio frequency engineer standards to create a planning tool that could complement zoning regulations. The general goal would be to reduce tower deployments by sharing infrastructure, while increasing the level of service throughout the Region.

## INCLUDE FIBRE CONDUIT IN DEVELOPMENT APPROVAL PROCESS

Generally the development process requires the installation of infrastructure later assumed by the municipality; however, in the Region's employment and commercial lands, this infrastructure does not often include broadband connectivity in the form of fibre conduit. This lack of connectivity infrastructure makes it hard for businesses within these areas to affordably acquire wired connectivity, such as FTTA.

One way to reduce the costs for businesses within new employment and commercial areas is to mandate the installation of fibre optic conduit as part of the development process. By requiring conduit installation that is later assumed by the municipality, it makes it much easier for service providers to run fibre to businesses within these locations, reducing the cost by an average of 80 per cent and significantly reducing deployment time.

*The development approval process is the ideal time to consider connectivity needs within a new community.*

Within residential areas, there will typically be one or two service providers who each use their own conduit. Much like employment lands, this means that competitors have to install their own conduit. In order to encourage more competition in available services and at different price points, municipalities could also require the installation of fibre conduit in new residential developments and then make this available to a range of interested service providers.

The Region should engage its local municipal partners in developing a policy framework for requiring the installation of fibre conduit in new development areas. There will also be a need to develop a policy framework for managing this infrastructure asset and a cost-structure for its ongoing maintenance and administration.

## INCLUDE FIBRE CONDUIT IN ROAD CONSTRUCTION PROJECTS

A policy requiring the installation of fibre conduit as part of all arterial and collector road (re)-construction will decrease costs associated with municipal access agreements and upfront construction and shorten project timelines. By developing this type of conduit policy, the Region and its local municipal partners will enable providers to effectively and affordably connect businesses and residents. By removing barriers, the Region will not only encourage investments from larger service providers, but also create the ability for smaller service providers to enter the market, generating competition that could lower costs and increase innovation.

*By leasing conduit instead of constructing it themselves, service providers can reduce their cost of laying fibre by up to 80 per cent.*

There will be additional infrastructure costs associated with providing this asset; however, if it is completed as part of planned construction projects, the costs will be minimal and recoverable by leasing the available conduit to service providers. Similar to the process of assuming fibre conduit from development projects, the Region will need to engage its local municipal partners in developing a policy framework for managing this infrastructure asset and a cost-structure for its ongoing maintenance and administration. (*This is discussed under York Region Municipal Conduit Utility*).

## SHARED FIBRE CONDUIT BUILDS

Another option complementing the idea of including fibre conduit as part of construction projects is also doing shared fibre conduit builds. While some service providers will have an interest in leasing available conduit, others may only have an interest in owning their own conduit. By aligning construction schedules and capital investments, the Region and its local municipal partners could speed up improved connectivity as part of their road (re)construction projects.

## YORK REGION MUNICIPAL CONDUIT UTILITY

If the Region and its local municipal partners pursue a process to ensure development approval processes require the installation of fibre conduit and includes conduit construction as part of their road (re)construction process, asset management will be required. This could take the form of an inter-municipal conduit utility that is either managed by the Region on behalf of the local municipal partners, or as a new non-for-profit municipal utility that includes all 10 municipal governments as shareholders.

*In Montreal where municipal conduit is available, connections can happen within 30 days, as opposed to at least 180 days within the GTA.*

The goal of the management authority would be to maximize the availability of fibre conduit, while ensuring service providers using it are helping the Region meet its connectivity goals. Like other municipalities who make conduit available, municipalities would be able to mandate the use of this conduit, which would help maintain the life cycle of their road assets.

*Case Study - Montreal, Quebec and Burlington, Ontario - See Appendix 7 - Case Studies.*

## 3. INFRASTRUCTURE INVESTMENT ACTIVITIES

The goal of this strategy is to realize investments in infrastructure that improve connectivity within the Region. The following are the detailed strategies for realizing public and private sector investments.

## MUNICIPAL INFRASTRUCTURE INVESTMENTS

### YORK TELECOM NETWORK OVERVIEW

The York Telecom Network (YTN) is a dark fibre Wide Area Network (WAN), owned and operated by York Region. The YTN provides some of the connections on York Region's WAN supporting data communications among its many Regional facilities. Currently, a majority of connections within the WAN are leased from third party carriers such as Bell and Rogers. As the need for greater capacity and speed in the WAN grows, the cost of operating that network is increasing rapidly.

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## YORK TELECOM NETWORK BUSINESS PLAN

York Region will be completing an analysis to determine the extent to which migrating its WAN connections from third-party carriers to the YTN will reduce its data communications costs and improve the capability of the WAN.

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*Case Studies – Regional Networks – See Appendix 7 – Case Studies.*

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## YTN AS TRANSFORMATIONAL MUNICIPAL ASSET

The YTN provides an opportunity to support both the Region’s municipal operations, and act as a transformational asset that can support greater collaboration among broader public sector stakeholders.

For the Region’s municipal operations, YTN fibre could support very high-speed, high-capacity connections to York Region facilities, enabling them to leverage their connectivity to conduct business in a more efficient, effective and productive way. This means that operationally, the connectivity provided by the YTN could facilitate greater monitoring and managing of data in real-time, facilitate collaboration among facilities and encourage the delivery of more virtual government services, all without the constraint of network congestion.

Beyond providing greater service at a lower cost to the Region, the YTN could also be leveraged for a number of broader public sector and economic development goals.

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## SERVE ADDITIONAL MUNICIPAL AND BROADER PUBLIC SECTOR CUSTOMERS

As the footprint of YTN grows to meet the increasing networking requirements of the Region, it may pass under-served local municipal facilities and broader public sector organizations. Through the consultation process for the strategy, improved connectivity at higher speeds was identified by all of the Region’s local municipal partners and a number of its public sector partners.

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*The York Telecom Network offers an opportunity to facilitate collaboration and e-government solutions among municipal partners.*

In relation to potentially utilizing the YTN to realize that improved connectivity, eight of the Region’s nine local municipal partners were interested in opportunities to use the YTN for their own operations; while both school boards and the Region’s hospitals also voiced interest.

If the existing YTN planned build route passes local municipal and BPS facilities, the Region could consider leasing any available dark fibre to these clients. By doing this, the Region will be able to generate revenue to offset its costs, but also expand the ability to network and develop shared services with its local municipal and BPS partners.

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## OFFER DARK FIBRE TO THIRD-PARTY CARRIERS

As the YTN is built, there may be surplus fibre strands not required by the Region or its local municipal and BPS customers. This fibre could be leased to third-party carriers looking to enhance or build their service within the Region.

Utilizing YTN dark fibre has been raised in discussions with a number of third-party carriers. Both large and smaller Internet service providers have shown an interest in the potential of leasing YTN fibre if it is available. There are a number of benefits that could be realized as a result of this opportunity:

- **Recoup Regional Costs** – leasing available fibre would help reduce the Region’s costs for both capital investments and operating costs
- **Serve New Areas** – YTN fibre may service community areas that current providers had not planned to service, thus the YTN could be leveraged to provide service to new residential and business areas within the Region
- **Increase Competition** – capital cost of building a fibre network is a large barrier to competition; by providing the ability lease existing and available fibre infrastructure, this barrier can be reduced, providing new entrants an opportunity to compete

A connectivity policy would need to be developed to govern how fibre would be leased to third party carriers. For instance, any leasing of dark fibre should be aligned with helping the Region meet its connectivity goals and provide benefit the Region’s residents and businesses.

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## JOINT BUILDS WITH THIRD-PARTY CARRIERS

As the YTN is built, there may be opportunities to leverage the Region’s planned build route to include third-party carriers as part of the build. Under this approach, the Region would offer third-party providers the opportunity to share in the cost of the construction project in exchange for being able to add additional fibre to the proposed project.

This opportunity has been discussed with a number of third-party carriers and there is an interest. Given that the YTN tends to focus on main roads, the opportunity is that third-party providers could then leverage this backbone build to provide fibre into the neighbouring employment areas and subdivisions that the YTN passes.

There are a number of benefits to be realized as a result of this opportunity:

- **Recoup Regional Costs** – sharing the build cost with service providers could help reduce the Region’s capital costs
- **Serve New Areas** – YTN build path could be leveraged to provide service to residential and business areas within the Region
- **Increase Competition** – capital cost of building a fibre network is a large barrier to competition; by providing the ability to share YTN builds this barrier can be reduced, providing new entrants an opportunity to compete
- **Fibre Swap Opportunities** – this opportunity engages providers to share or swap fibres in different areas; a provider would have access to un-used YTN fibre, in exchange for providing YTN access to fibres they have along a different route. This enables an overall



lower capital cost as it prevents overbuilds in main corridors and opens up alternative corridors

A connectivity policy would need to be developed to govern how third-party providers would be engaged in joint builds, as well as to ensure they use this new infrastructure to help meet the Region's connectivity goals. This will be important to ensure the YTN is leveraged to benefit the Region's residents and businesses.

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## ONTARIO RESEARCH AND INNOVATION OPTICAL NETWORK POINT-OF-PRESENCE

The Ontario Research and Innovation Optical Network (ORION) is a high-speed broadband network facilitating research among secondary and post-secondary schools, research institutions and private sector partners. It is a pre-requisite for high-value, post-secondary research.

Currently the closest Point-of-Presence (POP) to connect to the ORION network is at York University in Toronto. Given that connecting to the ORION network requires a direct fibre connection to the nearest POP, this makes accessing ORION costly for institutions in the northern part of York Region. For instance, the lack of a local POP has been a limiting factor on the amount and type of research undertaken at Southlake Regional Health Centre.

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*Establishing an ORION POP within the Region is critical to assisting local organizations with research and development initiatives.*

With the Region's investments in the YTN, a local POP could be established at Southlake Regional Health Centre. This would require the YTN to be extended beyond its current route to York University, an incremental fibre run of approximately 4 kilometres in length.

Once connected at York University, the existing YTN network and fibre connection at Southlake Regional Health Centre would provide the opportunity to establish the proposed POP, and facilitate connections to the ORION network for local schools, libraries and research institutions located in the northern and central portions of York Region.

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## YORK REGION RESEARCH AND EDUCATION NETWORK

The enhancement of research and education opportunities, and providing greater connectivity to the Region's economic assets, are two of the main goals in the Region's Economic Development Action Plan. By leveraging the YTN and ORION, the Region could create a Regional research and education network that would facilitate research and collaboration within the Region, but also between local organizations and those in the broader ORION and Canadian networks.

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*Creating a platform for facilitating education and research collaboration can help spur innovation and economic development in the Region.*

Developing such a research network would support the Region's school boards, post-secondary institutions, libraries, hospitals and research related facilities. By connecting all of these organizations via ORION, it would help facilitate a range of new opportunities, including:



- **Shared Content** – connecting the various institutions together through the ORION network, would enable the institutions to share education resources; libraries could share and pool e-subscriptions and content, making them available to residents throughout the Region
- **Video Conferencing Network** – with all of the institutions connected, a state-of-the-art video conferencing network could be deployed at all of the participating customers, enabling inter-organization collaboration, as well as providing video conferencing services to the public (via libraries)
- **E-education Services** – by accessing the ORION network, there are a range of e-education and collaboration services that participants can access for their organizations
- **No-Cost Traffic** – members of the network can share information at no-cost, thus reducing the price of communication. In addition, members would have access to the Canadian research network and its members at no-cost, facilitating research and information exchange to a broad network at no-cost. Most importantly, traffic to major sites and cloud applications, like Google and Microsoft would travel at no-cost as a result of ORION peering agreements
- **Disaster Recovery** – utilizing the network, municipalities and other organizations can do disaster recovery for each other with no-cost on the data traffic
- **Private Sector Research** – for private sector customers that do research with any of the customers, the research network would provide greater integration and connectivity to support their research projects

*Case Studies – London, Ontario and Windsor, Ontario Regional Networks – See Appendix 7 – Case Studies.*

## YORK REGION RESEARCH AND EDUCATION NETWORK + INTERNET

Once established, the York Region Research and Education Network could be leveraged to provide shared Internet access among network users. Currently organizations within York Region have a limited number of Internet service providers to choose from.

The local connection point to the Internet is located at Front Street in Toronto. Organizations with a connection to this facility have the ability to negotiate with a greater number of ISPs than what is available in York Region. However, as a result of utilizing the ORION network to collaborate, users can also use ORION's connection to the Front Street Internet point-of-presence to open up the number of ISPs with whom they can purchase services. This can result in a cost reduction of up to 80%.

*A direct connection to Front Street in Toronto could reduce Internet costs by up to 80% for those interested in aggregating their Internet connection.*

Beyond getting a greater pool of companies willing to provide Internet connectivity, by combining their Internet connections, organizations can level out their demand to take advantage of peaks and valleys in Internet consumption. For instance, while local schools will have heavy usage during the day, it will be lower in the evenings. This means their usage could be picked up by local libraries that will have heavier traffic in the evenings. As the network is established, opportunities for combining Internet traffic into a shared system should be explored. Some potential scenarios include:

- **Aggregated Library Traffic** – all of the Region’s nine municipal library systems could combine their Internet traffic; this would require one library to take on the role of managing the connection and billing requirements, but could reduce the costs for all involved
- **Aggregated Municipal Traffic** – all of the Region’s nine municipalities could combine their Internet traffic; this would also require one organization to manage the system, but would reduce costs for all involved

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## COMMUNITY WIFI NETWORK

Most of the Region’s local municipalities are developing public WiFi networks for their residents and visitors. This offers an opportunity to collaborate on this approach and develop an overall branding and marketing campaign to highlight the availability of WiFi connectivity across the Region. Taking this approach offers the opportunity to highlight the high-tech capabilities of the Region’s municipalities, while providing the assurance to residents and visitors that wherever they go within the Region, they will be able to find available WiFi. The facilities that should host publically available WiFi include:

- |                                      |                                  |
|--------------------------------------|----------------------------------|
| • Municipal administration buildings | • Libraries                      |
| • Community centres                  | • Historic downtowns             |
| • Recreation facilities              | • Regional Centres and Corridors |
| • Sports fields                      | • York Region Transit Hubs       |

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*Case Study – Stratford, Ontario – See Appendix 7 – Case Studies.*

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## LOW-COST INTERNET FOR SOCIAL HOUSING

Developing a low-cost Internet solution for the Region’s social housing stock will help ensure “have-nots” within the community have access to connectivity, online resources and economic opportunities. Given that the Region’s housing stock is skewed to an older demographic, improved connectivity in social housing could provide a perfect platform for connected wellness applications that are of interest to the Region’s hospitals. Just as important, access to connectivity will help younger residents’ access economic opportunities that are available via the Internet.

## PRIVATE SECTOR INVESTMENT PRIORITIES

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### NEW DEVELOPMENT AREAS

With the Region expecting to add another half million residents over the next 20 years, new development areas should be targeted to ensure they will meet the connectivity needs of that future population. In order to achieve this, there a number of strategies that should be employed, including:

- **Development Standards** – require the installation of fibre optic conduit as part of the development approval process
- **Site Plan / Building Code** – ensure new buildings have the ability to accept connectivity both internally and from the street, as well as supporting in-building wireless connectivity

- **Developer Engagement** – engage development companies on importance of connectivity and explore opportunities to meet or exceed Regional speed targets
- **Service Provider Engagement** – engage service providers on new development areas and explore opportunities to meet or exceed Regional speed targets

In the case of most new developments, all four of the identified strategies will need to be employed.

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## ALREADY DEVELOPED AREAS

Areas already developed pose the biggest challenge for reaching the Region’s connectivity targets; however, there are various strategies that can be employed depending on the level of interest of private sector service providers and the municipality.

Generally, in these retrofit situations, there are three scenarios that can be explored:

- **Option #1 – Private Sector** – engage private sector to make the necessary investments in the defined area
- **Option #2 – Public-Private Partnership** – if private sector is not willing to be the sole investor in projects required to reach the Region’s targets, explore public-private partnership opportunities for defined areas
- **Option #3 – Municipal / Non-Profit** – if private sector has no interest in investing in certain projects, municipalities can lead projects on their own

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## REGIONAL CENTRES AND CORRIDORS

The Region’s Centres and Corridors are identified as important areas for high-density mixed-use development and commercial office development. These include ambitious plans to develop four new downtown centres linked along the corridors of Yonge Street and Hwy. 7.

These areas will compete with other mixed-use centres and employment areas across the GTA and globally for residents and office employment. In order to ensure they can compete and attract the type of growth the Region is anticipating, developing these areas as Gigabit Communities will be an important part in differentiating them as an investment opportunity for residents and businesses.

*Providing ultra-high-speed connectivity in the Region’s Centres and Corridors will contribute to their success in attracting residents and employers.*

In order to address this opportunity, the Region will need to work with its local municipalities to incorporate connectivity into the development standards for the Centres and Corridors, while engaging private sector developers and service providers on strategies for connectivity within these areas.

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## EMPLOYMENT AND INSTITUTIONAL LANDS

Employment and Institutional Lands represent another important segment for the Region. With the forecasted dramatic growth in the Region these areas will need to be available to accommodate job

growth and investment. Given the expected land use, they will generally require more complex connectivity services that have a higher revenue contribution.

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*Ensuring the Region's businesses have a range of connectivity solutions available to them at competitive price points will assist in growing the Region's economy.*

Many service providers rely on market mix - combinations of residential, business and institutional customers to produce best revenue and financial sustainability. The challenge with this land use type is the split between existing and new. Existing areas that are underserved compared to the Region's targets will need additional infrastructure added. This can be costly and in some cases impossible for businesses to pursue.

Strategies associated with engaging building owners, developers and providers are proposed to assist in creating opportunities to address the needs and deployment of additional infrastructure. For new areas, strategies related to ensuring adequate infrastructure is placed during development can assist in lowering costs for providers. In addition, engaging providers during planning stages can provide opportunities for partnerships or for providers to offer solutions at their costs.

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## URBAN COMMERCIAL

Urban commercial lands have the similar challenges to employment lands. However, in some instances the area defined is much smaller. Many of the Region's commercial areas are either adjacent to residential areas, or along major highways or arterial roads, places that are generally well serviced by connectivity. This creates good synergy for the service providers.

Like employment lands, the challenge with this land use type is the split between existing and new. Existing areas that are underserved compared to the Region's targets will need additional infrastructure added. This can be costly and in some cases impossible for the businesses to pursue.

Strategies associated with engaging building owners, developers and providers are proposed to assist in creating opportunities to address the needs and deployment of additional infrastructure. For new areas, strategies related to ensuring adequate infrastructure is placed during development can assist in lowering costs for providers. In addition, engaging providers during planning stages can provide opportunities for partnerships or for providers to offer additional solutions at regular their costs.

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## URBAN RESIDENTIAL

York Region's urban residential areas have high household density and present service providers with great market potential and a strong business case. The expected take-rate and profitability for broadband in these areas is high due to the nature of the current infrastructure and the revenue potential. They are areas where competition tends to be high as multiple service providers are all trying to attract the customer. Due to the large number of customers, the infrastructure will need to have large capacity to meet the combined demand that can be created.

The challenge is in developing strategies that can serve the existing areas effectively. Existing areas have infrastructure in place and providers want to leverage those investments until they have a

satisfactory return on investment. The existing equipment may not be fully depreciated and may not have met ROI targets. However, in some areas, the current technology options cannot grow to meet the current targets, thus providers will need to be engaged by the municipalities, to discuss options and opportunities to create a network that will meet current service expectations.

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*New residential communities provide an opportunity to establish gigabit communities and increase the attractiveness of these communities to new residents.*

In new areas, providers are generally looking to install the latest available broadband infrastructure that would enable them to reach their connectivity targets. In order to push towards these targets and create competition, the Region can leverage the development approval process to include conduit that could be leased to multiple service providers. These new areas present an opportunity to engage both service providers and developers during the planning stages to help them offer high-end services and create a positive business case.

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## TOWNS AND VILLAGES – NEWLY BUILT AREAS

The land use category of towns and villages has a lower bandwidth target than urban residential. This is in part a reflection of the costs of technology and the evolution path from existing legacy infrastructure. Given that subscriber density in these areas is typically lower than in urban areas and that the growth rates are lower, the business case is not as strong or sustainable for all technology options.

As growth occurs in towns and villages, it is important to review possible opportunities for deployment of new communications infrastructure. This can open a door to enhance or expand services in the less attractive areas that may not be considered otherwise. For instance, if there is a need to add services to for a new housing subdivision and additional cable needs to be placed, discussions with providers might facilitate upgrades that can be made in conjunction with the new investments, making opportunities for retrofitting communities more attractive.

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*Newly built areas in towns and villages should be leveraged to improve service in older parts of the community.*

While these areas are attractive to service providers they are not the top priority. Service providers have a limited amount of capital to spend in a given year. With many competitive pressures and needs to add or upgrade infrastructure, providers cannot meet all of the demand and must prioritize their options.

Strategies for improving connectivity in these areas should focus on engaging providers to assess opportunities and characterize potential partnerships or alternate governance models that can assist in delivering the necessary infrastructure to support the areas. In some examples providers are willing to deploy the necessary infrastructure and offer services, if the homeowners contribute a minimum amount each. In other examples there may be a partnership set up with the municipality to contribute funds or purchase services for other facilities.

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## TOWNS AND VILLAGES – EXISTING AREAS

Many of the towns and villages in the Region are comprised of existing residential and commercial areas. These areas are often fully developed and there is little or no opportunity for new development adjacent to them. This lack of new development does not lend itself to the plan of working with providers through new build areas.

Residential lots in towns and villages are typically larger than in urban areas, resulting in lower household density. Household density is a key element in providers' business cases, as it is directly related to network cost and potential revenue. Areas with low densities are often not a high priority for service providers and in turn tend to have services that are at the low end of the service offering (five to 16 Mbps download versus 25-50 Mbps). These areas tend to wait longer for upgrades or enhancements as a result of their high cost/low revenue profile.

To encourage development in these areas, municipalities should engage service providers to help identify potential alternatives. There may be a range of opportunities, including:

- Leveraging municipal investments – a municipal building, school or business in town may require fibre service and, if built, it could be leveraged to service surrounding residential areas
- Public-Private Partnerships – public funding could be applied to retrofit neighbourhoods and provide improved service

Generally, when engaging service providers, the following questions should be asked:

- Do they require cash contribution?
- Where might funding come from?
- How can other activities be leveraged?
- What are options for public-private partnership?

Looking beyond wired solutions, municipalities could also consider wireless options. For wireless to reach consumers and offer higher speeds, more towers are generally required. Towns can assist in identifying land that towers can be placed upon (such as unused road allowances, fire halls, etc.) and work with the providers to help support them through the Industry Canada approval process. In addition, understanding potential issues that may arise from tower placement and having accurate data related to communications is another key areas where municipalities can assist.

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## RURAL AREAS

Rural areas present some the largest challenge for service providers. Since these areas tend to be very large and the potential number of clients low, it is hard to create a sustainable business case. This often leads to fewer technology choices, as the more expensive options do not generally support a positive business case. The strategy for rural areas is to engage providers to find solutions that can support necessary infrastructure, which might include a range of public-private partnership initiatives.

The key to the sustainable business case for service providers is the household density of an area. The density factor affects the cost and potential revenue available. Depending on household density, service to approximately 200 houses can require the same infrastructure cost as service to 20

households, but generate ten times the revenue. In addition, competition from other providers in an area lowers the overall potential market size and thus lowers potential revenue. The rural households (areas with density less than 350 households per km<sup>2</sup>) comprise 21 per cent of the total households of York Region.

One focus area would be to collaborate with private sector wireless service providers. Currently, there is unused spectrum in these areas that can provide reasonable levels of service (10 Mbps) at cost-effective prices to customers. There may be additional infrastructure investments required, however the total cost per customer tends to be less than for wired solutions.

The attractive spectrum ranges are 3.5 GHz and 700 MHz – both of which are licensed spectrums. Currently the 3.5 GHz belongs to the major carriers, however it is not being used in current deployments. The 3.5 GHz spectrum has been successfully deployed in fixed wireless implementations in many areas across Ontario offering customers packages from 1.5 Mbps to 10 Mbps. The fact that the spectrum is licensed allows for a signal that can be transmitted with significantly less interference than with license-exempt spectrum, thus providing a more effective service to end-users. Discussions with the carriers to assess the accessibility/use of this spectrum (either by them or another provider) should be pursued.

The 700 MHz spectrum is due to be auctioned in early 2014. The major carriers will have options to bid on two blocks and smaller providers have the option to bid on other block. This spectrum will be auctioned at the provincial level as dictated by Industry Canada. This means, whoever buys the spectrum buys the block(s) for the entire province. For example: if Carrier A buys a block they will own and control the use of that block for the entire province. This spectrum is particularly good for long distances and building penetration. This may be a more effective option for any player to reach more rural homes with a single tower, thus lowering the cost per user and minimizing the number of towers required. Discussions should be pursued prior to and after the auction to indicate to all buyers the importance of delivering reliable and predictable service to users as soon as possible. The service providers will have the option of holding the spectrum for up to seven years before they are legally required to use it. This means that rural areas could be left without solutions until later in the decade.

To assist in speeding up the implementation of wireless solutions to serve the Region's rural communities, municipalities should look to engage service providers in a dialogue on how this spectrum can be used and how municipalities can speed up the process. One way municipalities can assist is by making tower infrastructure development easier. To do this, the Region should consider developing a wireless tower master plan that can be used to manage tower investments, while ensuring community concerns are addressed.



## Appendix 4 - Implementation Strategies by Municipality

In order to serve the Region's residents and businesses, the ultimate goal for connectivity should be to provide fibre to as many addresses as possible throughout York Region. Fibre provides greatest potential for high-speed connectivity and can support changes in technology in transmission equipment.

However, FTTA may not always be financially feasible, especially in areas with low household densities. This analysis helps identify areas where the private sector may make investments of its own accord, while highlighting those areas that may require assistance from the public sector.

To better understand the potential costs and identify areas that might support FTTA, the following analysis explores the cost of deploying FTTA to existing housing stock, where in many instances there is already some form of Internet connectivity.

The cost to overlay infrastructure (new infrastructure built where older infrastructure already exists) is estimated at the Census Dissemination Area (DA) level, based on household density bands within each municipality. The cost per household passed of deploying FTTA increases as neighbourhood density decreases. This is because in very densely populated neighbourhoods, fewer kilometres of fibre are required to reach each address. This analysis is based on a cost model with the following assumptions:

- The cost to deploy fibre (buried in conduit) is \$125 per metre
- Fibre is deployed along all roads where services might be delivered
- Kilometres of road served is based on DA road length data (2006)
- This is an overlay network
- The cost of the fibre drop from the curb is not included in this cost estimate

Where household density is greater than 1,000 households per km<sup>2</sup>, the cost to deploy FTTA might be acceptable or nearly acceptable to service providers. The cost to deploy FTTA to all DAs in York Region, where population density exceeds 1,000 households per km<sup>2</sup> is estimated at \$109 million. If it is possible to demonstrate community demand, carriers might be convinced that they can achieve an acceptable return on investment and thus they might be willing to deploy FTTA. Carriers need confidence that there will be sufficient subscribers to justify deployment of infrastructure.

While carriers have not disclosed their actual business cases, it appears that in areas of 1,000 to 2,000 homes per km<sup>2</sup> (not necessarily including apartment buildings) carriers are using FTTN technologies to support broadband connectivity beyond 10 Mbps to the home. Densities greater than 2,000 homes per km<sup>2</sup> represent areas that, to date, may be amenable to an overbuild and thus FTTA might be financially feasible.

The next household density band examined is the 500 to 999 households per km<sup>2</sup> range. This is the largest density band in York Region. In this range, the density, and therefore cost per household, is not within a range where a provider would typically invest in FTTA. It is possible however, with some financial support and customer commitment, that providers may want to partner to provide FTTA services. The estimated cost to serve all households in DAs where household density is between 500 and 1,000 per km<sup>2</sup> is estimated at \$157 million.



The 350 to 499 households per km<sup>2</sup> band would be a “stretch” target. In most cases, the cost per household in this density range, would imply that significant financial assistance would be required and would not represent an area where providers would invest on their own. In special cases, for example, if a low density DA is surrounded by high density DAs, there might be situations where cost averaging or other financial methods could support deployment. The cost to serve all households in this band is estimated at \$44 million.

It is estimated that the cost to deploy FTTA to all households in York Region DAs where household density exceeds 350 per square kilometre would be \$309 million. Below 350 households per km<sup>2</sup>, there is generally not sufficient density to support FTTA.

As the situation in each municipality is unique, there will be specific considerations. For that reason, specific implementation approaches are examined for each municipality. In all scenarios, this is a high level analysis. Detailed plans, costing and discussions with carriers would be required before engaging in network deployment. The cost of FTTA deployment in each municipality is summarized in Table 1.

**Table 1 - Cost of FTTA Deployment by Municipality**

	Cost for Hshld Density >1000	% Hshlds Served	Avg Cost /Hshld	Cost for Hshld Density 500-999	% Hshlds Served	Avg Cost /Hshld	Cost for Hshld Density 350-499	% Hshlds Served	Avg Cost /Hshld
<b>Aurora</b>	\$3,632,417	19%	\$1,244	\$11,001,823	46%	\$1,533	\$2,117,543	7%	\$1,913
<b>King</b>	\$0	0%		\$274,757	2%	\$2,130	\$652,231	4%	\$2,480
<b>East Gwillimbury</b>	\$0	0%		\$1,583,142	15%	\$1,455	\$1,568,465	11%	\$1,867
<b>Georgina</b>	\$1,050,620	6%	\$1,157	\$7,264,568	33%	\$1,525	\$681,378	2%	\$2,621
<b>Markham</b>	\$36,474,164	41%	\$1,113	\$50,645,923	40%	\$1,588	\$15,794,132	9%	\$2,211
<b>Newmarket</b>	\$10,996,087	35%	\$1,324	\$17,415,055	50%	\$1,492	\$2,598,283	5%	\$2,328
<b>Richmond Hill</b>	\$20,833,265	37%	\$1,076	\$34,537,517	42%	\$1,568	\$9,679,842	8%	\$2,398
<b>Vaughan</b>	\$35,364,245	48%	\$976	\$31,174,652	30%	\$1,361	\$9,838,775	8%	\$1,698
<b>Whitchurch-Stouffville</b>	\$175,261	2%	\$932	\$2,685,802	17%	\$1,646	\$1,299,569	5%	\$2,579
<b>Total</b>	\$108,526,059		\$1,078	\$156,583,239		\$1,300	\$44,230,218		\$2,100

## AURORA

Aurora is a municipality of 15,462 households. Nineteen per cent of these households are in DAs where household density is greater than 1,000 per km<sup>2</sup>. The cost to provide FTTA to these households is estimated at \$3.6 million, or \$1,244 per household passed. This is an area that includes many multi-tenant buildings as well as businesses. It is an area where a carrier might be convinced that the investment should be made.

In the 500 to 1,000 households per km<sup>2</sup> band, there are 7,175 households, 46 per cent of Aurora households. The cost to deploy fibre to them is estimated at \$11 million, or \$1,533 per household passed. Though this will be more difficult, with some level of financial support, carriers may be convinced to provide FTTA here.

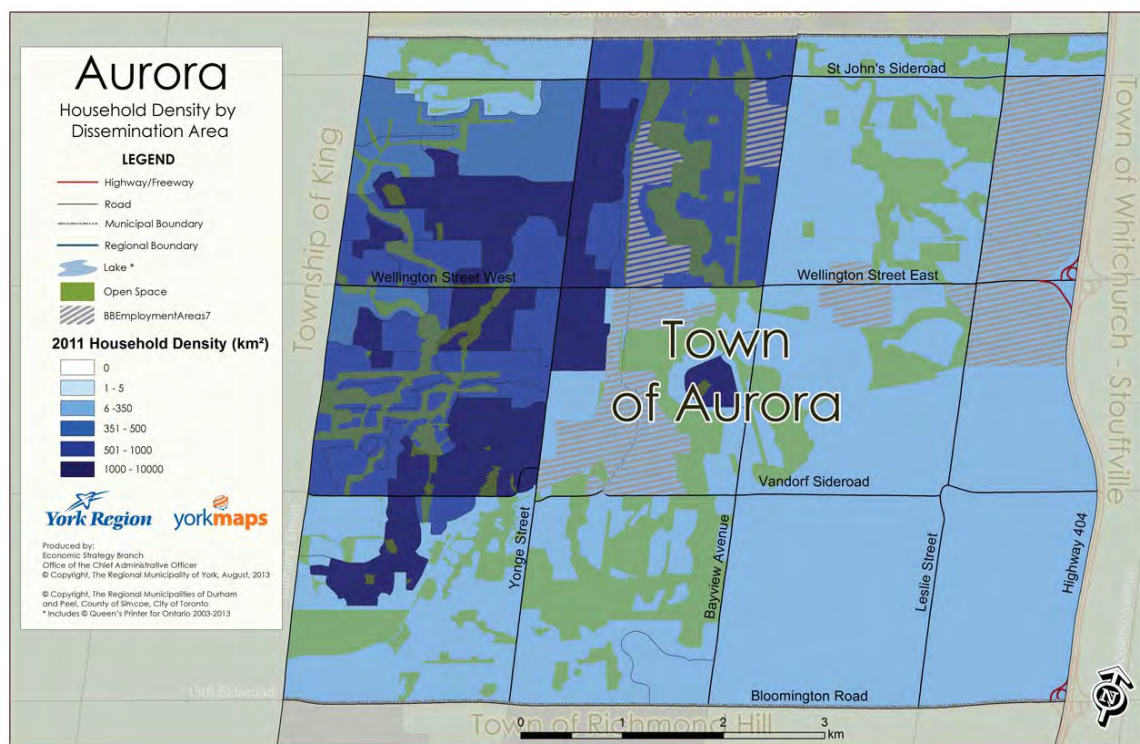
Only seven per cent of Aurora households are in the 350-499 households per km<sup>2</sup> band. The cost to deploy FTTA to these households is estimated at \$2.1 million or \$1,913 per household. Though this band would require the least investment of Aurora household density bands, the return on

investment would be lower due to the lower household density and the investment would be much more difficult to secure. A provider would likely not invest without financial support.

Consumer and business commitment to subscribe to fibre services can influence negotiations with service providers in a positive way. Municipal support in terms of access to rights of way, streamlined permitting and other support can also be helpful.

Aurora should consider engaging in discussions with service providers to assess the opportunities for FTTA to the homes above 1,000 per km<sup>2</sup>. Given that there are a number of proposed development projects in the area, there may be opportunity to leverage providers' activities to enable a higher deployment than the service provider may have considered, using their standard analysis – there is projected housing growth of 38 per cent. The categories of housing densities representing 500+ homes per km<sup>2</sup> also include approximately 49 per cent of Aurora's businesses.

Figure 2 - Aurora Household Density Analysis



Generally, the Town of Aurora should consider the following strategies for improving connectivity within its boundaries:

- Municipal Processes
  - Work with the Region and its other municipal partners on harmonizing municipal access agreements
  - Work with the Region and its other municipal partners on a Wireless Tower Master Plan
  - Update its planning policies and development approval process to include support for improved connectivity and including fibre conduit in developments
  - Implement a policy for installing fibre conduit as part of road re-construction processes

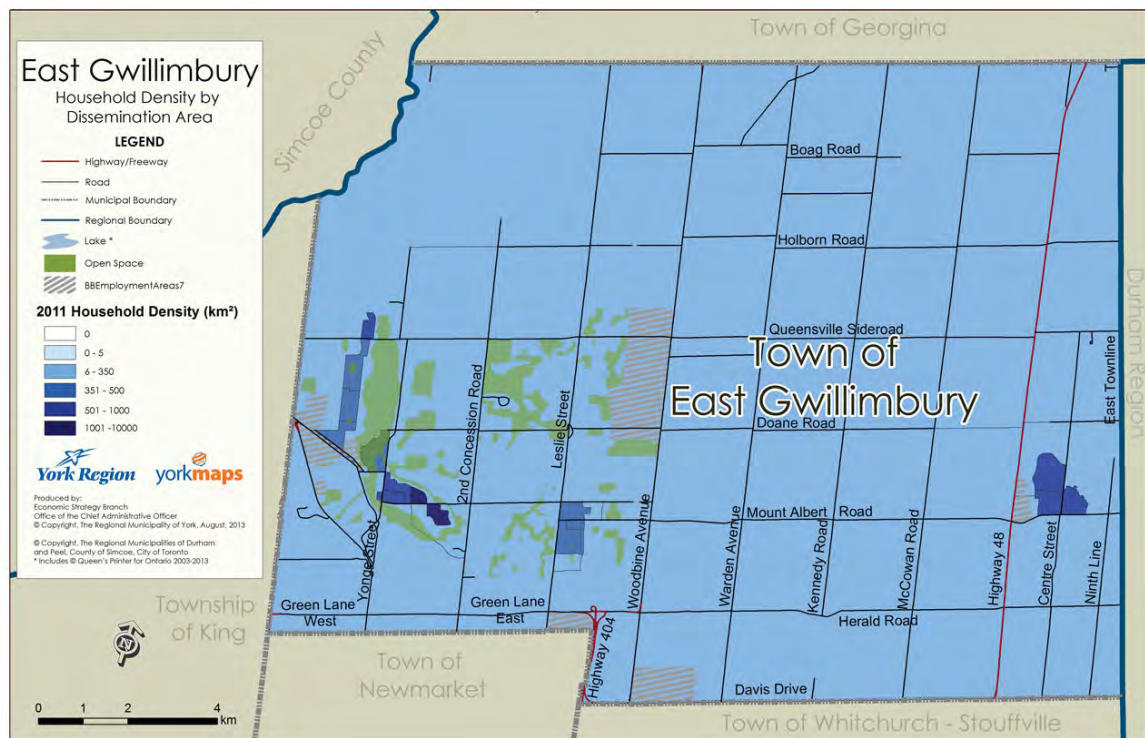
- Infrastructure Investments
  - Focus on developing a Gigabit Community along the Yonge Street Corridor
  - Collaborate with service providers/developers to ensure FTTA is realized in all new residential, commercial and employment area developments
  - Review status of service options for existing developed areas and work with service providers to explore service upgrade options
  - Pursue a WiFi strategy for public spaces

## EAST GWILLIMBURY

In East Gwillimbury 15 per cent of households are in the 500 to 1,000 households per km<sup>2</sup> range. This represents 1,088 households. The cost to deploy fibre to these households is estimated at \$1.6 million, or \$1,455 per household. It would be anticipated that a service provider might require financial assistance if they were to deploy FTTA to these households. There are no DA's in East Gwillimbury with household density greater than 1000 per km<sup>2</sup>.

In the 350 – 499 households per km<sup>2</sup> density range, there are 840 households. The cost to deploy FTTA to these is estimated at \$1.6 million, or \$1,867 per household. This would certainly be a stretch target and is not likely to be an area service providers would address without assistance or some form of partnership.

Figure 3 - East Gwillimbury Household Density Analysis



The DAs with household densities above 350 include approximately 24 per cent of the businesses within the municipality. Analyzing where businesses are and the option to service both business and households at the same time would be an important consideration. This may be an area where engaging citizens to pre-register for services and assess the desirability may be an approach for developing the implementation strategy.

East Gwillimbury is poised for dramatic growth. Regional forecasts predict a 270 per cent increase in housing stock between 2011 and 2031. This growth will have service providers placing new infrastructure. This could trigger changes to the existing infrastructure located along or adjacent to the path for new infrastructure. The municipality should consider extensive engagement with service providers to assess options to enhance the existing infrastructure. Included should be the discussion of wireless options for the more rural areas that are not part of the planned exponential growth.

Generally, the Town of East Gwillimbury should consider the following strategies for improving connectivity within its boundaries:

- Municipal Processes
  - Work with the Region and its other municipal partners on harmonizing municipal access agreements
  - Work with the Region and its other municipal partners on a Wireless Tower Master Plan
  - Update its planning policies and development approval process to include support for improved connectivity and including fibre conduit in developments
  - Implement a policy for installing fibre conduit as part of road re-construction processes
- Infrastructure Investments
  - Focus on developing a Gigabit Community along the Green Lane Corridor
  - Engage service providers on options for improving wireless connectivity in the community's rural areas
  - Collaborate with service providers/developers to ensure FTTA is realized in all new residential, commercial and employment area developments
  - Review status of service options for existing developed areas and work with service providers to explore service upgrade options
  - Pursue a WiFi strategy for public spaces

## GEORGINA

In Georgina, there are 908 households in the five DAs where population density exceeds 1,000 households per km<sup>2</sup>. Note that the size of each of these DAs is well under a km<sup>2</sup>. The cost to deploy FTTA to these households is estimated at \$1.1 million, or \$1,157 per household. Because of the very small size of the area to be served, it is unlikely that the municipality would find a service providers who would consider these areas feasible for FTTA deployment on the basis of household density.

In the 500 to 999 households per km<sup>2</sup> range, there are 4,765 households, or 33 per cent of Georgina households. The cost to deploy FTTA to these households is estimated at \$7.3 million, or \$1,525 per household. Discussions with service providers about FTTA in this larger area (all areas of density > 500 households per km<sup>2</sup>) may be fruitful and may require a commitment of financial assistance. The level of interest and commitment from residents to subscribe to the service would be an important factor in the deployment decision. These first two categories contain approximately 42 per cent of the businesses. Working with a provider to review options to service homes and businesses could improve their business case for deploying infrastructure. Engagement with citizens and businesses to help assess demand and their needs in this specific geographic area would be beneficial.

There are only two DAs in the 350-499 households per km<sup>2</sup> band. The cost to provide FTTA is estimated at \$681,000, or \$2,621 per household. It is unlikely that a service provider would be

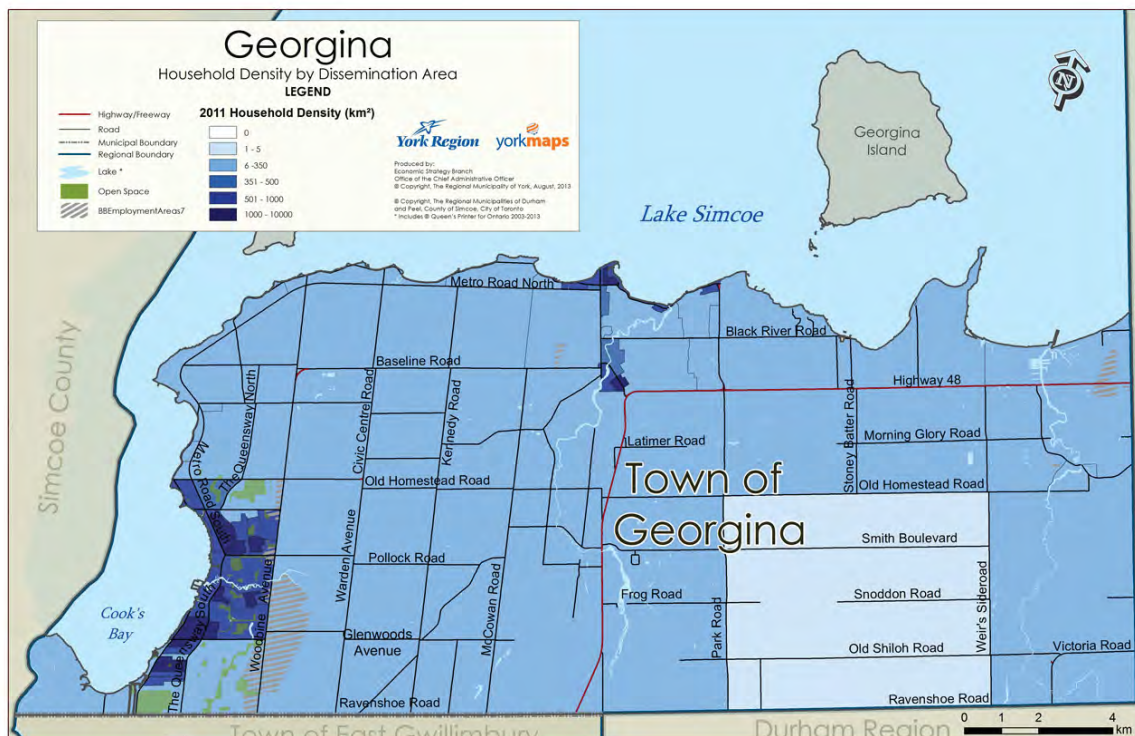


willing to provide FTTA to these DAs, unless perhaps, they are surrounded by higher density DAs. Even at that, it is likely that financial assistance would be likely required.

Georgina has an anticipated housing growth of 66 per cent over the next 30 years. While not as dramatic as East Gwillimbury, this is still significant growth along a similar corridor. Pursuing options with service providers to explore how this may support offering new infrastructure for homes and businesses would be of great benefit to the community.

In addition, Georgina has a large land mass that is rural and has less than 350 homes per km<sup>2</sup>. This area should be included in discussions with providers of wireless services and the options that may exist to offer reliable services to these areas.

Figure 4 - Georgina Household Density Analysis



Generally, the Town of Georgina should consider the following strategies for improving connectivity within its boundaries:

- Municipal Processes
  - Work with the Region and its other municipal partners on harmonizing municipal access agreements
  - Work with the Region and its other municipal partners on a Wireless Tower Master Plan
  - Update its planning policies and development approval process to include support for improved connectivity and including fibre conduit in developments
  - Implement a policy for installing fibre conduit as part of road re-construction processes
- Infrastructure Investments

- Consider a full technical evaluation of Georgina’s current wireless system and leverage for providing incremental services to the rural areas with wireless
- Engage service providers on options for improving wireless connectivity in the community’s rural areas
- Collaborate with service providers/developers to ensure FTTA is realized in all new residential, commercial and employment area developments
- Work with service providers to leverage investments to serve new developments in order to service existing neighbourhoods
- Review status of service options for existing developed areas and work with service providers to explore service upgrade options
- Pursue a WiFi strategy for public spaces

## KING

King Township is mostly rural with some towns where densities are greater. The most densely populated DA has 501 households per km<sup>2</sup>. The cost to serve this DA with FTTA is estimated at \$275,000 or \$2,130 per household. It is very unlikely at this density that a carrier would deploy FTTA without financial assistance. The situation is exacerbated by the fact that there is only one DA in this density range in King Township. As there would only be a small area served by fibre, backhaul costs would not be shared over a significant number of households, resulting in a higher overall project cost.

In King, there are two DAs in the 350 to 500 household per km<sup>2</sup> category. The cost to deploy FTTA to these two DAs is estimated at \$652,000 or \$2,480 per household. It is not likely that these areas would be attractive to service providers to make investments without assistance. These areas may be a target for FTTN, but they likely would not be a priority.

The towns/hamlets within King are the main areas to target for a FTTA solution. Ensuring revenue would be a top priority for any provider and it may be necessary to develop a citizen engagement strategy to assess the willingness to pay and pre-register for such a service.

Current data indicates that only four per cent of the businesses in King are within these same DAs and thus combining business and residential as target markets may not improve a service provider’s potential business case. While King has a forecast of tremendous housing growth, the density does not necessarily grow to a density that is cost effective for providers. However, if the growth areas are subdivisions, there is an opportunity to have the new homes served with a FTTA solution as the starting infrastructure.

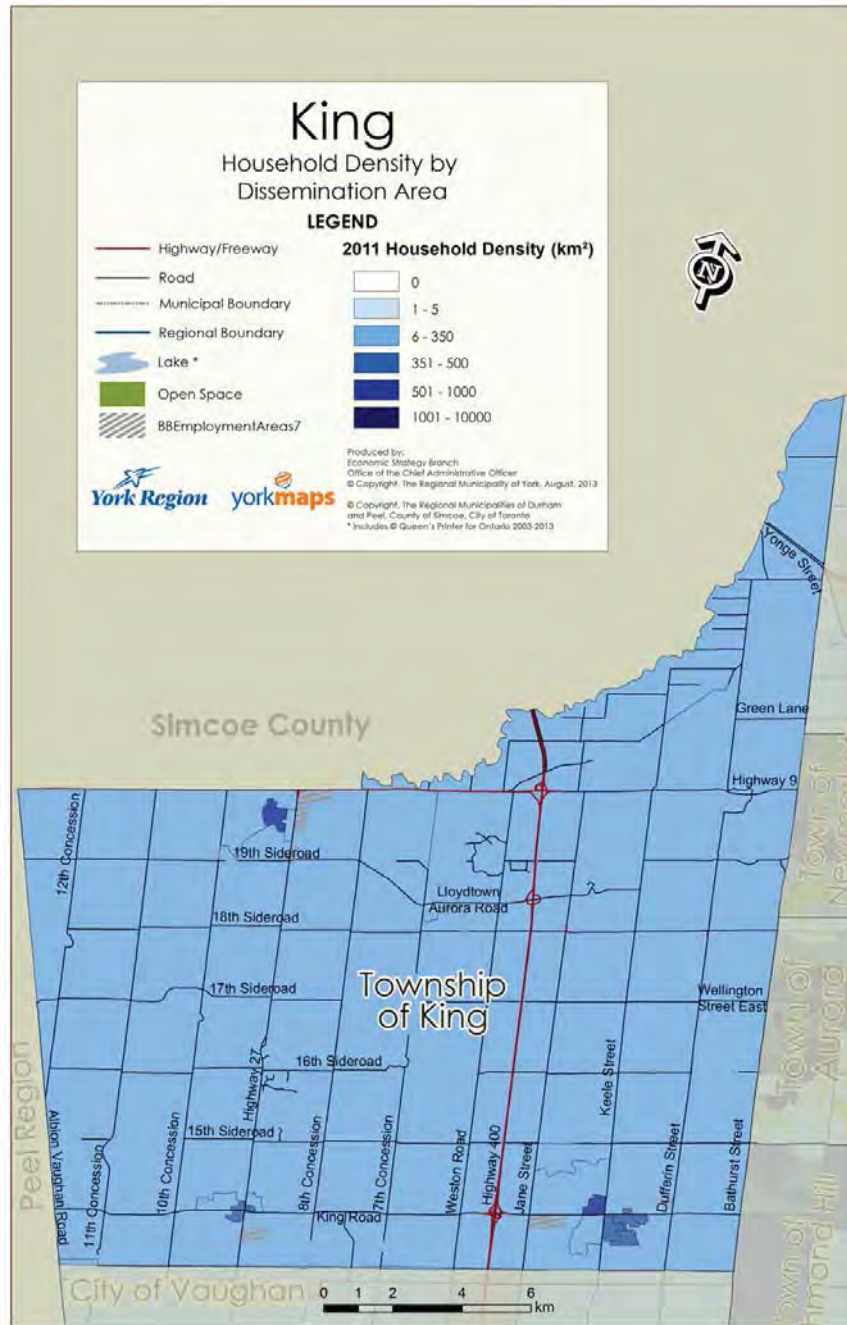
To service the lower density areas, those that are under 350 households per km<sup>2</sup>, there is a need to explore improved wireless connectivity. This will require engaging service providers in a discussion around available spectrum and the needs of the rural community for predictable and affordable service options.

Generally, the Township of King should consider the following strategies for improving connectivity within its boundaries:

- Municipal Processes
  - Work with the Region and its other municipal partners on harmonizing municipal access agreements

- Work with the Region and its other municipal partners on a Wireless Tower Master Plan
- Update its planning policies and development approval process to include support for improved connectivity and including fibre conduit in developments
- Implement a policy for installing fibre conduit as part of road re-construction processes

Figure 5 - King Household Density Analysis





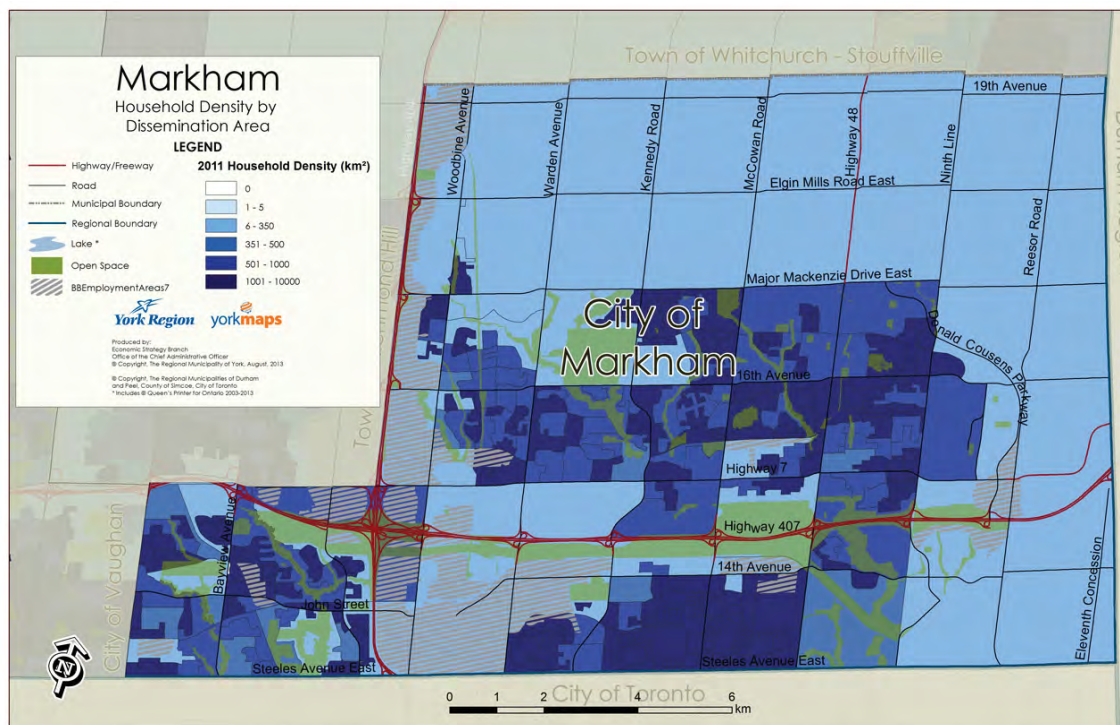
- Infrastructure Investments
  - Engage service providers on options for improving wireless connectivity in the community's rural areas
  - Collaborate with service providers/developers to ensure FTTA is realized in all new residential, commercial and employment area developments
  - Work with service providers to leverage investments to serve new developments in order to service existing neighbourhoods
  - Review status of service options for existing developed areas and work with service providers to explore service upgrade options
  - Pursue a WiFi strategy for public spaces

## MARKHAM

There are 80,291 households in Markham. It is a high density, urban city with a large concentration of multi-tenant buildings and businesses. As a result, the cost per household to provide FTTA is relatively low on a per household basis. The household density goes as high as 5,800 homes per km<sup>2</sup> and there are 179 DAs with density over 1,000. Of this density category, 44 per cent of the houses are in areas with density higher than 1,500 homes per km<sup>2</sup>.

There are 32,767 households in DAs with over 1,000 households per km<sup>2</sup>. The cost to deploy fibre to all these households is estimated at \$36 million or \$1,133 per household. It is expected that a service provider would agree to deploy FTTA to these households. Note however, this would be a large undertaking given the area to be covered and the infrastructure placement and thus would take some time to complete.

Figure 6 - Markham Household Density Analysis





There are 31,897 households in DAs with between 500 and 999 households per km<sup>2</sup>. It would cost an estimated \$51 million to serve these homes, a cost per household of \$1,588. The existence of businesses throughout many residential areas will add to the density of potential fibre customers. The deployment of FTTA in this density band in Markham could likely be negotiated with a service provider, possibly without the requirement for financial support.

In the 350 to 499 households per km<sup>2</sup> category, there are 7,145 households, representing nine per cent of households in Markham. The cost to deploy FTTA to these households is estimated at \$16 million, or \$2,211 per household. In this density range, it is expected that financial assistance would be required to produce an acceptable rate of return for a prospective service provider.

Markham also has planned growth, much of it in areas that are already dense. This presents the opportunity to have existing areas upgraded when new areas have infrastructure placed. These opportunities should be specifically explored with service providers to understand the potential and what issues may inhibit a service provider from proceeding.

Generally, the City of Markham should consider the following strategies for improving connectivity within its boundaries:

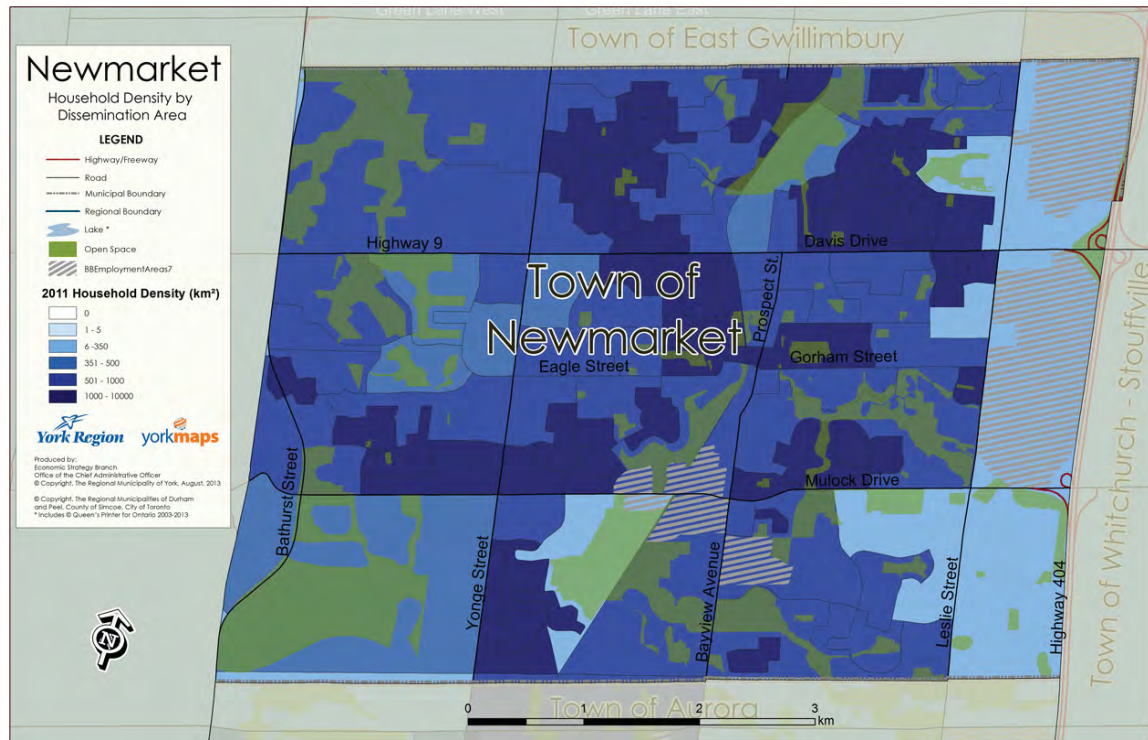
- Municipal Processes
  - Work with the Region and its other municipal partners on harmonizing municipal access agreements
  - Work with the Region and its other municipal partners on a Wireless Tower Master Plan
  - Update its planning policies and development approval process to include support for improved connectivity and including fibre conduit in developments
  - Implement a policy for installing fibre conduit as part of road re-construction processes
- Infrastructure Investments
  - Focus on developing a Gigabit Community in Markham Centre and along the Hwy. 7 Corridor
  - Engage service providers on options for improving wireless connectivity in the community's rural areas
  - Collaborate with service providers/developers to ensure FTTA is realized in all new residential, commercial and employment area developments
  - Work with service providers to leverage investments to serve new developments in order to service existing neighbourhoods
  - Review status of service options for existing developed areas and work with service providers to explore service upgrade options
  - Pursue a WiFi strategy for public spaces

## NEWMARKET

There are 23,484 households in Newmarket, 35 per cent (8,219) of which are in DAs with household density of greater than 1,000 per km<sup>2</sup>. The cost to deploy FTTA in this density band is estimated at \$11 million or \$1,324 per household. It is likely that a carrier would see a positive business case associated with overbuilding FTTA in these DA's. Certainly the case could be made, particularly if residents express significant interest in the service and a willingness to subscribe. This issue should be seriously discussed with interested ISPs.

The next household density band, 500 – 999 households per km<sup>2</sup>, includes 50 per cent of DAs in Newmarket, or 11,671 households. The cost to deploy FTTA to these households is estimated at \$17 million, or \$1,492 per household. Discussions with carriers about the possibility of deploying FTTA in these DAs should be pursued. However, it is anticipated that these densities would be less attractive and providers would likely be interested in some financial support.

Figure 7 - Newmarket Household Density Analysis



These two categories also contain approximately 48 per cent of the overall businesses listed for the municipality. Approximately 33 per cent of the total businesses are in the employment lands that are DAs with no residential homes and thus have not been assessed in the costing indicated. With thorough analysis, if the business opportunities were assessed with the FTTA opportunities, they may create a good business case for a service provider to pursue.

In Newmarket, only five per cent of households are in DAs where household density falls between 350 and 499 per km<sup>2</sup>. The cost to deploy FTTA for these households is estimated at \$2.6 million or \$2,328 per household. It is likely that financial assistance would be required for a provider to deploy FTTA in these DAs.

Generally, the Town of Newmarket should consider the following strategies for improving connectivity within its boundaries:

- Municipal Processes
  - Work with the Region and its other municipal partners on harmonizing municipal access agreements
  - Work with the Region and its other municipal partners on a Wireless Tower Master Plan

- Update its planning policies and development approval process to include support for improved connectivity and including fibre conduit in developments
- Implement a policy for installing fibre conduit as part of road re-construction processes
- Infrastructure Investments
  - Focus on developing a Gigabit Community in Newmarket Centre and along the Davis Avenue and Yonge Street Corridors
  - Collaborate with service providers/developers to ensure FTTA is realized in all new residential, commercial and employment area developments
  - Work with service providers to leverage investments to serve new developments in order to service existing neighbourhoods
  - Review status of service options for existing developed areas and work with service providers to explore service upgrade options
  - Pursue a WiFi strategy for public spaces

## RICHMOND HILL

There are 52,063 households in Richmond Hill. 37 per cent of them or 19,365 households are in DAs with more than 1,000 households per km<sup>2</sup>. It is estimated that FTTA could be deployed to these households for \$21 million, or \$1,076 per household. This is likely within an acceptable range to service providers.

In the density range from 500 to 999 households per km<sup>2</sup>, there are 22,027 households. This is 42 per cent of Richmond Hill households. For an estimated \$35 million, these households could be served with FTTA service. This is \$1,568 per household. As this is an extended urban area that also has businesses in certain residential neighbourhoods, it is possible that a service provider might be able to justify the investment to deploy FTTA. Strong community commitment to subscribing to the service can provide support for the negotiation. In addition, this category alone contains 30 per cent of the businesses for the municipality.

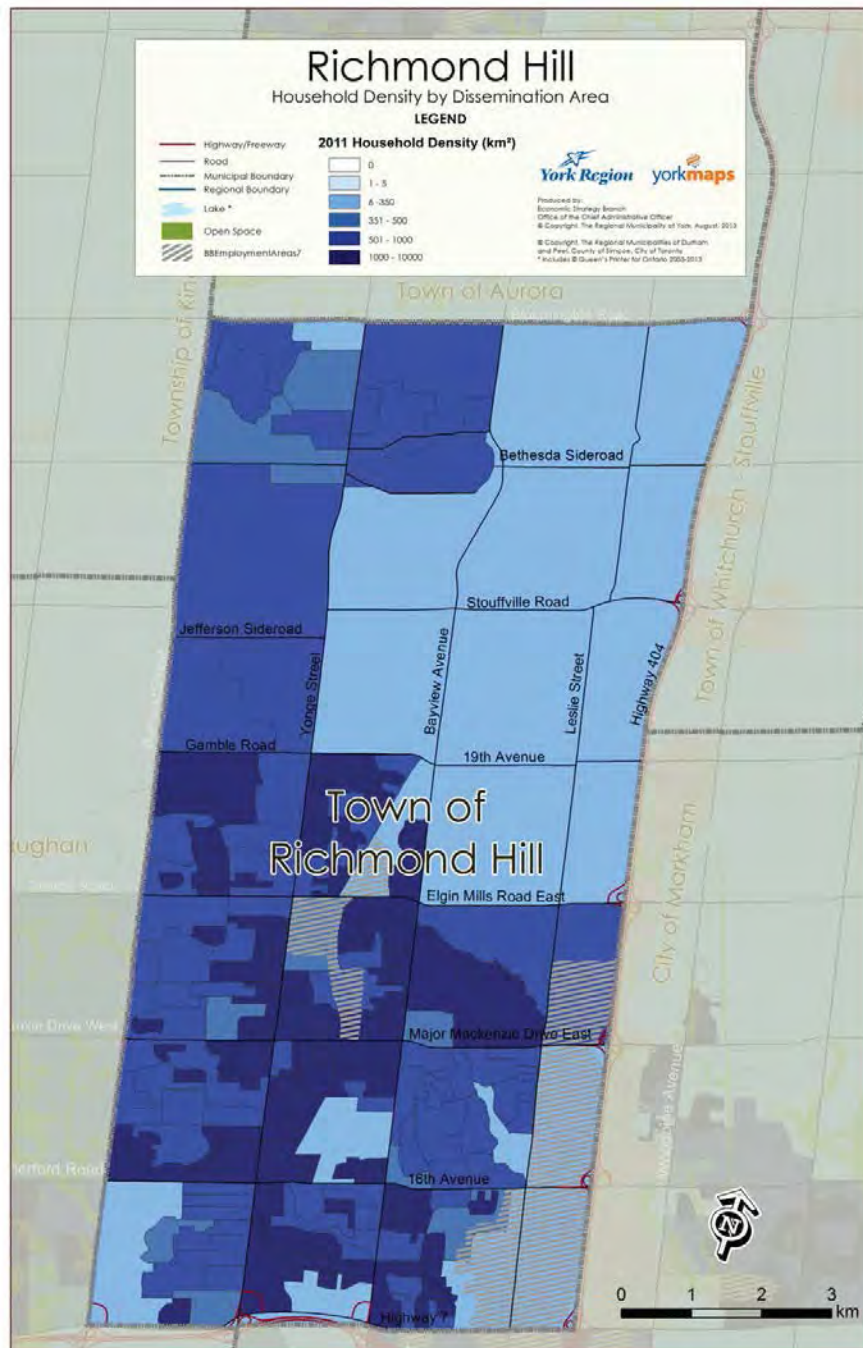
There are 4,037 households in DAs in the 350 to 499 household per km<sup>2</sup> density category. The cost to deploy FTTA to these households is estimated at \$10 million, or \$2,398 per household. As in other municipalities, it is likely that service to these households would require financial assistance.

It is recommended that any negotiations for FTTA connectivity include community commitments to subscribe to the service and municipal support in terms of access to rights of way, streamlined permitting and other support as can be provided.

Generally, the Town of Richmond Hill should consider the following strategies for improving connectivity within its boundaries:

- Municipal Processes
  - Work with the Region and its other municipal partners on harmonizing municipal access agreements
  - Work with the Region and its other municipal partners on a Wireless Tower Master Plan
  - Update its planning policies and development approval process to include support for improved connectivity and including fibre conduit in developments

Figure 8 - Richmond Hill Household Density Analysis



- Implement a policy for installing fibre conduit as part of road re-construction processes
- Infrastructure Investments
  - Focus on developing a Gigabit Community in Richmond Hill's centre and along the Hwy. 7 Corridor
  - Collaborate with service providers/developers to ensure FTTA is realized in all new residential, commercial and employment area developments

- Work with service providers to leverage investments to serve new developments in order to service existing neighbourhoods
- Review status of service options for existing developed areas and work with service providers to explore service upgrade options
- Pursue a WiFi strategy for public spaces.

## VAUGHAN

In Vaughan, there are a total of 75,284 households. Of these, 48%, 36,228 households, are in DAs with density of greater than 1,000 per km<sup>2</sup>. The cost to deploy FTTA to these homes is estimated at \$39 million, or \$976 per household. This estimated cost per household will most likely result in a rate of return on investment acceptable to service providers making deployment decisions. In this category 38 per cent of the houses (approximately 14,000) have densities above 1,500 homes per km<sup>2</sup>.

In the 500 to 999 households per km<sup>2</sup> range, there are 22,906 households. The cost to deploy FTTA to them is estimated at \$35 million, or \$1,361 per household. As there is a large concentration of high density housing in Vaughan, resulting in a relatively low cost per household, it is expected that carriers may be willing to deploy FTTA services in DAs in this density range.

The majority of businesses, 66 per cent, are located in the employment lands that have no residence. The main areas with the indicated residential densities contain only 22 per cent of all the businesses in the municipality.

In the 350 to 499 household per km<sup>2</sup> density range, there are 5,795 households. It would cost an estimated \$11 million to deploy FTTA to them, a cost of \$1,698 per household. It is possible that carriers may be interested in this type of deployment. It may require financial assistance, or possibly consumer commitments to subscribe and municipal support making the deployment as simple and quick as possible can help support the business case.

Vaughan is forecasted to have a 57 per cent housing growth, with increasing densities in some areas that are already reasonably dense. As indicated, growth represents an opportunity to discuss all aspects with a service provider as they may have to adjust or the opportunity to add infrastructure in existing locations along the way to reaching new areas.

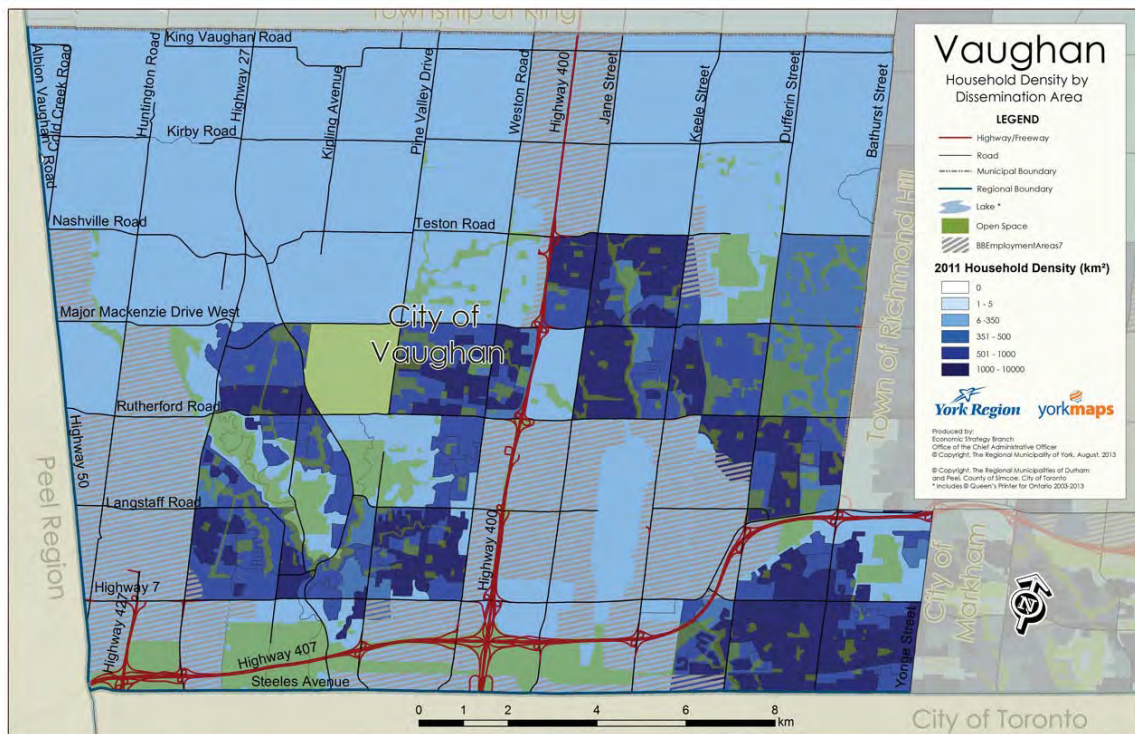
Generally, the City of Vaughan should consider the following strategies for improving connectivity within its boundaries:

- Municipal Processes
  - Work with the Region and its other municipal partners on harmonizing municipal access agreements
  - Work with the Region and its other municipal partners on a Wireless Tower Master Plan
  - Update its planning policies and development approval process to include support for improved connectivity and including fibre conduit in developments
  - Implement a policy for installing fibre conduit as part of road re-construction processes
- Infrastructure Investments



- Focus on developing a Gigabit Community in the Vaughan Metropolitan Centre and along the Hwy. 7 Corridor
- Engage service providers on options for improving wireless connectivity in the community's rural areas
- Collaborate with service providers/developers to ensure FTTA is realized in all new residential, commercial and employment area developments
- Work with service providers to leverage investments to serve new developments in order to service existing neighbourhoods
- Review status of service options for existing developed areas and work with service providers to explore service upgrade options
- Pursue a WiFi strategy for public spaces

Figure 9 - Vaughan Household Density Analysis



## WHITCHURCH-STOUFFVILLE

There are 9,384 households in Whitchurch-Stouffville. A single DA has a household density of greater than 1,000 per km<sup>2</sup>. The cost to serve that DA with FTTA is estimated at \$200,000. At 188 households in the DA, the cost per household would be \$932. This is a low cost per household; however, serving a single DA would be a challenge due to the small scale of deployment. Negotiations with a service provider might result in FTTA coverage, if they agreed to serve the households in the next density zone.

There are 1,632 households in the 500 to 1,000 per km<sup>2</sup> density category. The cost to deploy FTTA to these households is estimated at \$3 million, or \$1,646 per household. Financial assistance would likely be required by a provider as this number probably will not meet their threshold for their required rate of return.

There is only one DA in the 350 to 499 households per km<sup>2</sup> category. The cost to provide fibre to the household service to the 500 households in this DA is estimated at \$1.5 million. The \$2,952 cost per household passed is unlikely to result in coverage without financial assistance. This represents only five per cent of the total households of the municipality.

Figure 10 - Whitchurch-Stouffville Household Density Analysis



Whitchurch-Stouffville is also forecasted for significant housing growth with an increase of 75 per cent. Discussing this with service providers creates an opportunity to explore opportunities for

existing areas. The Town also includes a large rural/low housing density component. This area should be included in discussions of options with wireless providers.

Generally, the Town of Whitchurch-Stouffville should consider the following strategies for improving connectivity within its boundaries:

- Municipal Processes
  - Work with the Region and its other municipal partners on harmonizing municipal access agreements
  - Work with the Region and its other municipal partners on a Wireless Tower Master Plan
  - Update its planning policies and development approval process to include support for improved connectivity and including fibre conduit in developments
  - Implement a policy for installing fibre conduit as part of road re-construction processes
- Infrastructure Investments
  - Engage service providers on options for improving wireless connectivity in the community's rural areas
  - Collaborate with service providers/developers to ensure FTTA is realized in all new residential, commercial and employment area developments
  - Review status of service options for existing developed areas and work with service providers to explore service upgrade options
  - Pursue a WiFi strategy for public spaces

## SUMMARY

The deployment of overlay FTTA infrastructure in existing communities will likely be attractive to service providers where household density is high. As indicated in the above analysis, this could occur in areas where population density exceeds 1,000 households per km<sup>2</sup>. As the population density declines, more creative approaches to development, with financial assistance for deployment of infrastructure would likely be required. In these instances, assessing opportunities for public-private partnerships or other means of securing financial assistance will likely be necessary.



## Appendix 5 - York Region's Market Opportunity

This section provides an overview of the market opportunities available within York Region, as well as the priority focus areas for each of the Region's nine local municipalities. The private sector investment opportunities to service residents and businesses point to excellent market opportunities for third-party service providers in York Region.

### 1. YORK REGION RESIDENTIAL MARKET

The population of the Region is expected to grow from 1.075 million in 2011 to 1.5 million by 2031, an increase of 425,000 residents. The number of housing units in the Region is also expected to grow dramatically, from approximately 327,000 units to 507,000 units, an increase of 180,000 housing units. The growth in population and housing units is presented in Table 2. Locations where this population and household growth are forecasted within each local municipality are presented within the municipal market analysis portion of this section.

Table 2 - Growth in Population and Housing Units in York Region, 2011 to 2031

	2011		2021		2031		Growth (Units) (2011-2031)	
	Population	Housing Units	Population	Housing Units	Population	Housing Units	Population	Housing Units
<b>Aurora</b>	57,294	18,370	68,124	22,796	70,233	24,358	12,939	5,988
<b>East Gwillimbury</b>	26,325	8,480	48,135	16,688	86,533	31,194	60,208	22,714
<b>Georgina</b>	48,689	16,960	57,927	21,082	70,309	26,390	21,620	9,430
<b>King</b>	23,433	7,502	29,905	10,103	34,881	12,368	11,449	4,866
<b>Markham</b>	309,254	90,736	370,274	115,879	421,551	138,571	112,297	47,835
<b>Newmarket</b>	83,964	27,467	91,925	31,329	97,133	34,803	13,169	7,336
<b>Richmond Hill</b>	193,040	59,556	231,363	75,622	242,249	81,237	49,209	21,681
<b>Vaughan</b>	294,236	84,459	360,380	110,894	416,573	134,890	122,337	50,431
<b>Whitchurch-Stouffville</b>	38,652	13,256	55,771	20,177	60,576	23,001	21,924	9,745
<b>York Region</b>	<b>1,074,886</b>	<b>326,785</b>	<b>1,313,805</b>	<b>424,570</b>	<b>1,500,038</b>	<b>506,812</b>	<b>425,152</b>	<b>180,026</b>

There is a large market opportunity in providing connectivity to these new housing units to serve the growing population. Most of this new housing will be in new subdivisions, a small portion will be infill housing in existing areas and some will be in rural areas.

It is anticipated that housing developers will work with Internet service providers to deploy fibre to these new housing units. The cost to deploy fibre to new housing varies according to density (households per km<sup>2</sup>) and kilometres of fibre required to serve each community. It is estimated that when housing density is more than 1,000 households per km<sup>2</sup>, FTTA will be affordable at \$1,077 per household served. There are lower-density areas where the economics do not support this.

It is anticipated that there may be situations where upgraded connectivity to an existing neighbourhood would be necessary in order to support connectivity to a new development. In cases such as this, it is possible that the Region or local municipality might work with service providers and the developer to financially support this type of network upgrade.

## FIBRE OVERLAY TO EXISTING YORK REGION HOUSING

The opportunity to deploy FTTA networks to serve existing housing in York Region has been explored. There is a business opportunity to deploy fibre to households where density is high enough to support the cost through revenue generated. This analysis has been done on the basis of Statistics Canada census dissemination areas, by applying the estimated cost of fibre to the kilometres of roads in the dissemination area. The number of households in each dissemination area served (2006 Census) is used to estimate variable costs and revenues. The kilometre of road on which there are houses, in each dissemination area is used to estimate the km of fibre to be laid.

An estimated cash flow has been modeled for this business case. Assumptions are as follows:

- FTTA networks are deployed to all dissemination areas where the existing household density exceeds 500 households per km<sup>2</sup>
- Cost to lay fibre \$125 per metre
- Km of road served is based on DA road length data (2006)
- Cost of the fibre drop and Optical Line Terminal (OLT) \$650 / subscriber
- Monthly revenue from fibre services (Internet, phone and television) is \$160
- Total potential revenue is presented (100 per cent of served households subscribe to fibre immediately).

This is a high level analysis of a business case that will be shared by multiple service providers. Assumptions can be made about subscription rates, timing of subscribers and monthly fees, to derive expected revenue realized in a particular service provider's situation.

To deploy fibre to all households in a dissemination area where the household density is greater than 500 households per km<sup>2</sup>, the capital cost for the fibre network is estimated at \$265M. Once the fibre is in place, the cost to run the drop fibre from the road to the house and the Optical Line Terminal (OLT) for each subscriber is estimated at \$650 per subscriber. Assuming all households passed are subscribers, the cost of the drops and OLTs is estimated at \$133M, resulting in a total capital cost of \$398M. The analysis is presented in Table 3.

The total potential market for services is estimated assuming all households passed subscribe to the service. This will not occur, but it establishes the total potential market. At a rate of \$160 per month for Internet, voice and television services, the total potential market is \$392M per year.

If the subscription rate were 50 per cent, the cost of overlay fibre would remain the same, the cost of the fibre drop and OLT would decline by half to \$66M; the annual revenue would decline by half to \$196M or 59 per cent of total capital cost.

Table 3 - Estimated Cost for FTTA to Dissemination Areas with >500 Households

Municipality	Housing Units Passed w. Fibre	% of Total HH	Cost to Overlay for FTTH	Additional cost for drop & OLT \$650/HH	Total Cost	Annual Revenue Potential (\$160/month)	Annual Revenue as % of Capital Cost
Aurora	10,096	65%	\$14,634,239	\$6,562,400	\$21,196,639	\$19,384,320	
East Gwillimbury	1,088	15%	\$1,583,142	\$707,200	\$2,290,342	\$2,088,960	
Georgina	5,673	40%	\$8,315,188	\$3,687,450	\$12,002,638	\$10,892,160	
King	129	2%	\$274,757	\$83,859	\$358,607	\$247,680	
Markham	64,664	81%	\$87,120,088	\$42,031,600	\$129,151,688	\$124,154,880	
Newmarket	19,974	85%	\$28,411,142	\$12,983,100	\$41,394,242	\$38,350,080	
Richmond Hill	41,392	80%	\$55,370,782	\$26,904,800	\$82,275,582	\$79,472,640	
Vaughan	59,134	79%	\$66,538,897	\$38,437,100	\$104,975,997	\$113,537,280	
Whitchurch-Stouffville	1,820	19%	\$2,861,062	\$1,183,000	\$4,044,062	\$3,494,400	
<b>York Region</b>	<b>203,970</b>	<b>72%</b>	<b>\$265,109,298</b>	<b>\$132,580,500</b>	<b>\$397,689,798</b>	<b>\$391,622,400</b>	<b>98%</b>
<b>Subscription Rate</b>	50%		\$265,109,298	\$66,290,250	\$331,399,548	\$195,811,200	<b>59%</b>

## 2. YORK REGION BUSINESS MARKET

There are 28,000 businesses in York Region.<sup>1</sup> Approximately 15,000 of these are located in the employment and institutional areas identified in Figure 11 and the remaining 13,000 are in downtown areas or along commercial strips. Many, but certainly not all business, have access to adequate connectivity to meet their growing needs. York Region has an employment base of 521,000 jobs, which is expected to grow to 780,000 by 2031 according to the Provincial Growth Plan.<sup>2</sup> The Region is making an effort to ensure that approximately two thirds of these jobs are in the core economy of business services, manufacturing and related activities. This growth in employment will further add to the need for expanded connectivity.

There are opportunities to develop public WiFi hotspots in historic cores, Centres and Corridors, and at community centres in any of the York Region municipalities. Contractors may look to innovative means of financing this type of service. Financing through advertising or sponsorships have been successful in other cities.

The Region is fortunate to have four major 400 series highway corridors, providing high-value sites for a variety of employment-related uses. Sites in these corridors are expected to attract numerous businesses and will all be requiring fibre connectivity.

## 3. YORK REGION CENTRES AND CORRIDORS MARKET

In addition to the Region's designated employment areas, the Region has also identified its centres and corridors as locations for intensified mixed-use development that will bring together high-density residential development, commercial opportunities and office employment. These are

<sup>1</sup> York Region 2012 Employment Survey

<sup>2</sup> Growth Plan for the Greater Golden Horseshoe, 2006

ambitious plans to create four new downtown cores along the Regional corridors of Hwy. 7 and Yonge Street.

Table 4 provides an overview of the population and employment projections for the Region's Centres and Corridors.

Figure 11 – York Region Broadband Opportunities – Employment Areas



Given the nature of these communities as high-density residential and high-value employment areas, the cost of implementing connectivity should be reduced, and the Region is aiming to develop these as Gigabit Communities that will provide ultra-high speed connectivity to residents and businesses.

Table 4 - Population and Employment Projections for the Centres and Corridors

Regional Centre	Population	Employment	Forecast Horizon
<b>Markham Centre*</b>	41,000	39,000	Beyond 2031
<b>Newmarket Centre*</b>	24,500	24,200	Beyond 2031
<b>Richmond Hill Centre*</b>	16,000	16,000	2031
<b>Langstaff Gateway</b>	32,000	15,000	Beyond 2031
<b>Vaughan Metropolitan Centre*</b>	25,000	11,500	2031
<b>Total</b>	<b>138,500</b>	<b>105,700</b>	

*\*Final Secondary Plan approval pending*

#### 4. YORK REGION LOCAL MUNICIPAL MARKET OPPORTUNITIES

Within York Region there are nine distinct municipalities all of which have their own market opportunities and identified priorities. Taken together, they provide a powerful market story; however, individually they each have their unique opportunities.

##### TOWN OF AURORA

The Town of Aurora is a growing community featuring a number of investment opportunities. The map provided for in Figure 12 illustrates locations where new commercial, employment and residential developments will occur. There are large areas of approved urban residential developments, mostly between Wellington and St. John's Sideroad and significant unapproved residential developments, just south of St. John's Sideroad. There are opportunities for service providers to serve all these locations. There are areas set aside for both residential and commercial purposes, as yet unplanned. These will require fibre services when they are developed. It is expected planners and developers will be looking to work with service providers to ensure that the required level of connectivity is provided to these areas in order to meet the Region's speed targets.

##### RESIDENTIAL COMMUNITY OPPORTUNITIES

The Town of Aurora had a population of 57,294 as of 2011, and is expected to grow to 70,233 by 2031. This increase in population will be supported through the addition of 6,000 new housing units, as provided for in Table 21. Figure 13 highlights the municipality's traffic zones by population growth and highlights areas that will see an increase in housing units and populations through 2031.

##### BUSINESS COMMUNITY OPPORTUNITIES

Within Aurora there are approximately 512 businesses operating within the municipality's employment lands. The Town's employment lands and their employment make-up can be found in Table 22 and Figure 14.



Figure 12 - Aurora Market Opportunities

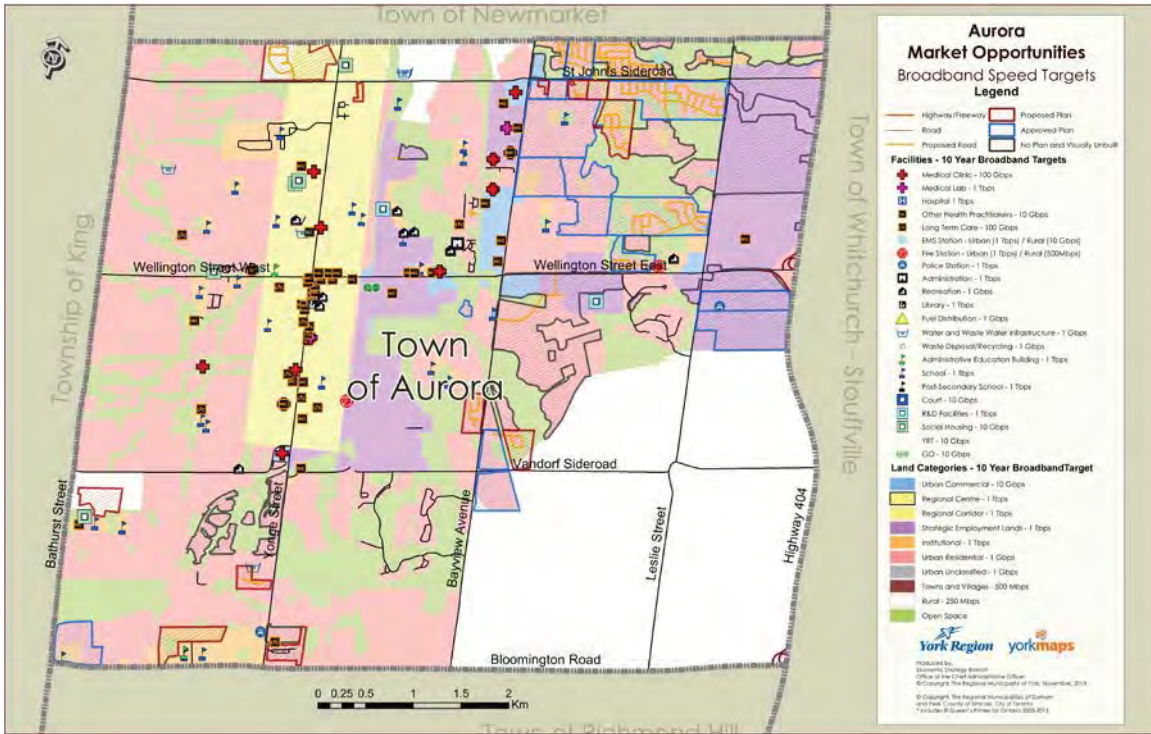


Figure 13 - Aurora Market Opportunities - Projected Households

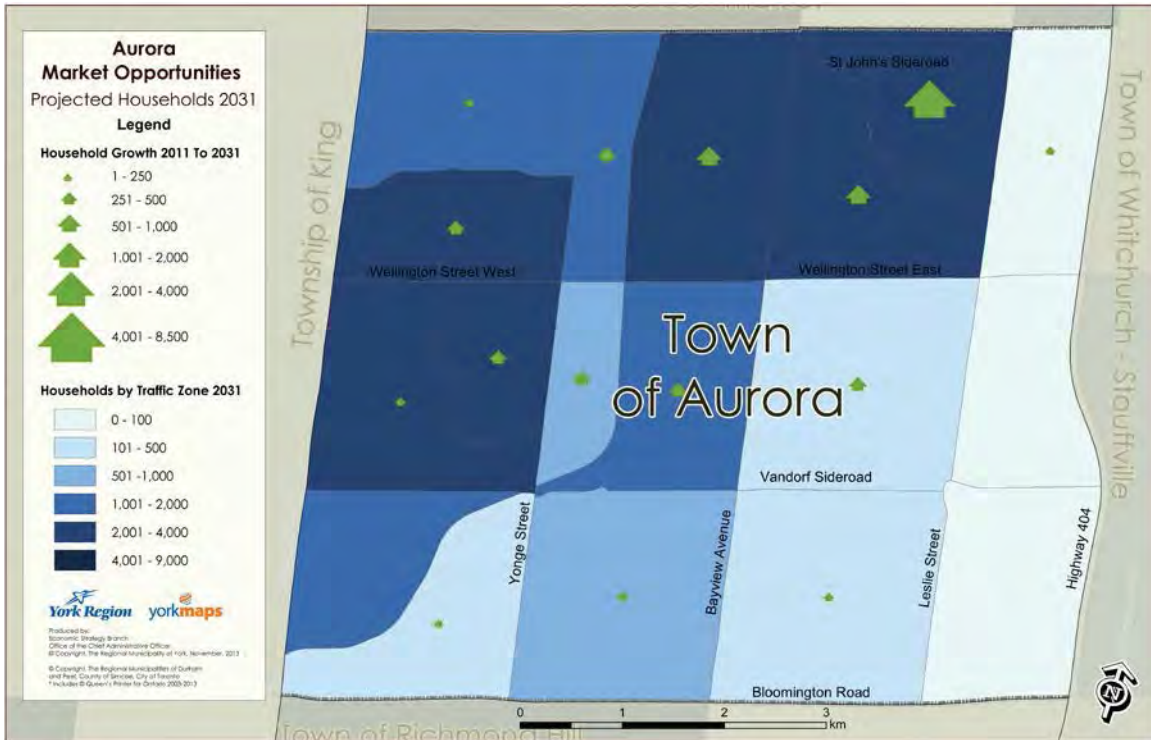


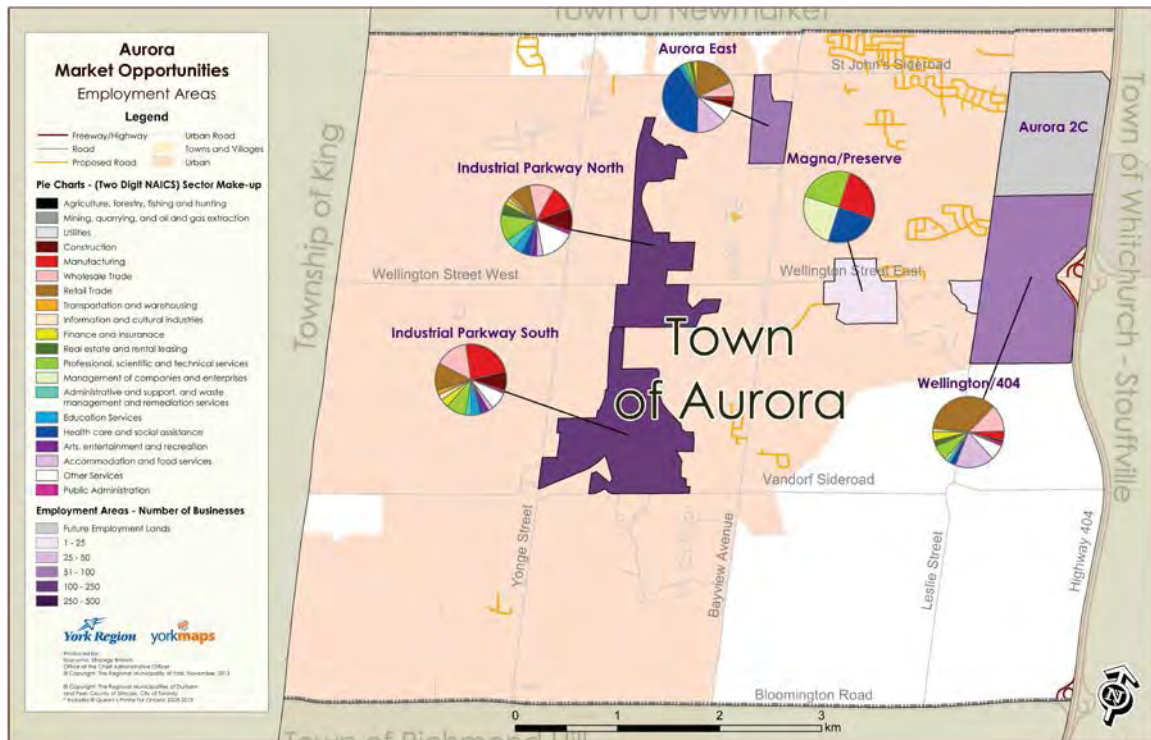
Table 5 - Aurora Population and Housing Units - 2011 to 2031

	2011		2021		2031	
	Population	Housing Units	Population	Housing Units	Population	Housing Units
<b>Aurora</b>	57,294	18,370	68,124	22,796	70,233	24,358

Table 6 - Aurora Employment Land Composition

Employment Area	# of Businesses	Top 3 Sectors by 2 Digit NAICS Code	# of Employees
<b>AURORA 2C</b>	0	Future Employment Area	0
<b>AURORA EAST</b>	59	Health Care and Social Assistance, Retail Trade and Accommodation and Food Services	375
<b>INDUSTRIAL PARKWAY NORTH</b>	141	Other Services, Professional Scientific and Technical Services and Manufacturing	2060
<b>INDUSTRIAL PARKWAY SOUTH</b>	235	Manufacturing, Wholesale Trade and Retail Trade	2828
<b>MAGNA/PRESERVE</b>	4	Manufacturing, Professional Scientific and Technical Services and Management of Companies	320
<b>WELLINGTON/404</b>	73	Retail Trade, Accommodation and Food Services and Wholesale Trade	2868
<b>Total</b>	512	Retail Trade, Manufacturing and Other Services	8451

Figure 14 - Aurora Market Opportunities - Employment Lands



## AURORA PRIORITY FOCUS AREAS

While the goal of improved connectivity across the community is of interest to Aurora, Table 23 provides their priority project focus areas.

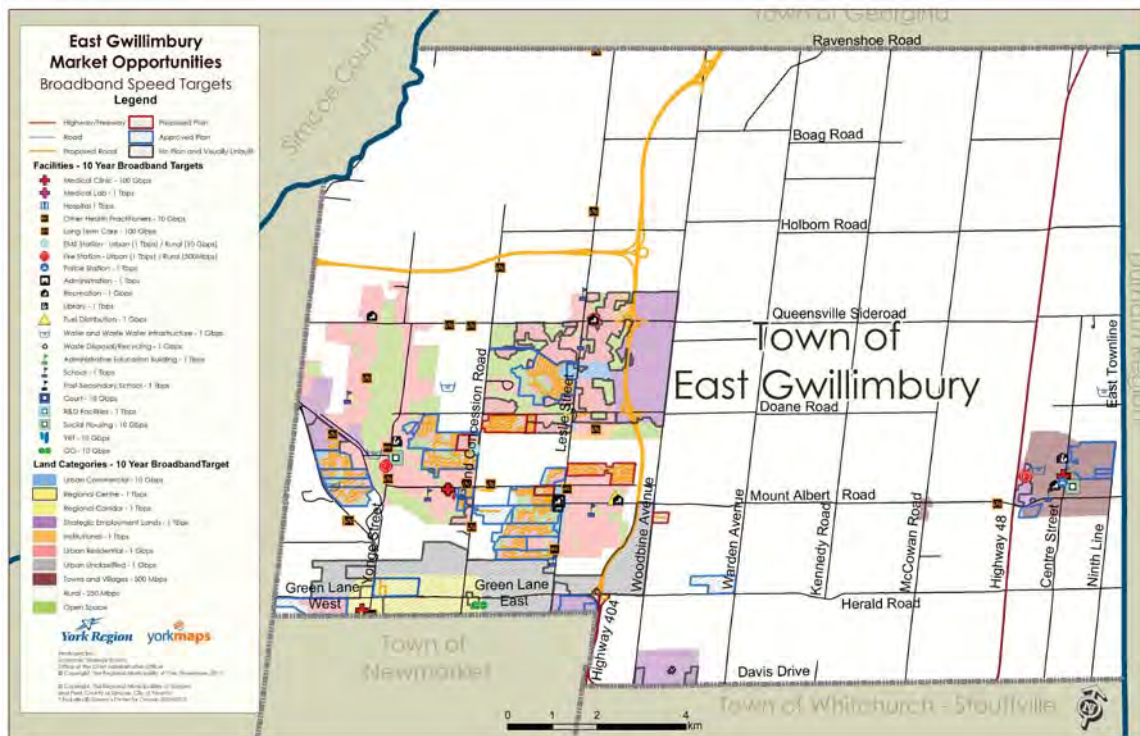
Table 7 - Aurora Priority Focus Areas

Project Priority	Overview
<b>New Residential Areas</b>	Engage development community and service providers on these opportunities and update development standards to set the framework.
<b>New Employment Areas</b>	Engage development community and service providers on these opportunities and update development standards to set the framework. Focus on 404 corridor.
<b>Public WiFi Network</b>	Develop public WiFi hotspots at community facilities and downtown core.

## TOWN OF EAST GWILLIMBURY

The Town of East Gwillimbury is a rural community with a rapidly growing population. The community is attracting new businesses and is supporting its active agricultural industry. Over the next 30 years, it is expected that there will be significant growth in the strategic employment lands within East Gwillimbury, particularly along the eastern and western edges of the municipality and along Woodbine Avenue and Green Lane. As illustrated on the map in Figure 18 there will also be growth in the Regional Centre along Green Lane. There is a large opportunity to support connectivity in the residential sector. There are also opportunities to support business communications.

Figure 15 - East Gwillimbury Market Opportunities





## RESIDENTIAL COMMUNITY OPPORTUNITIES

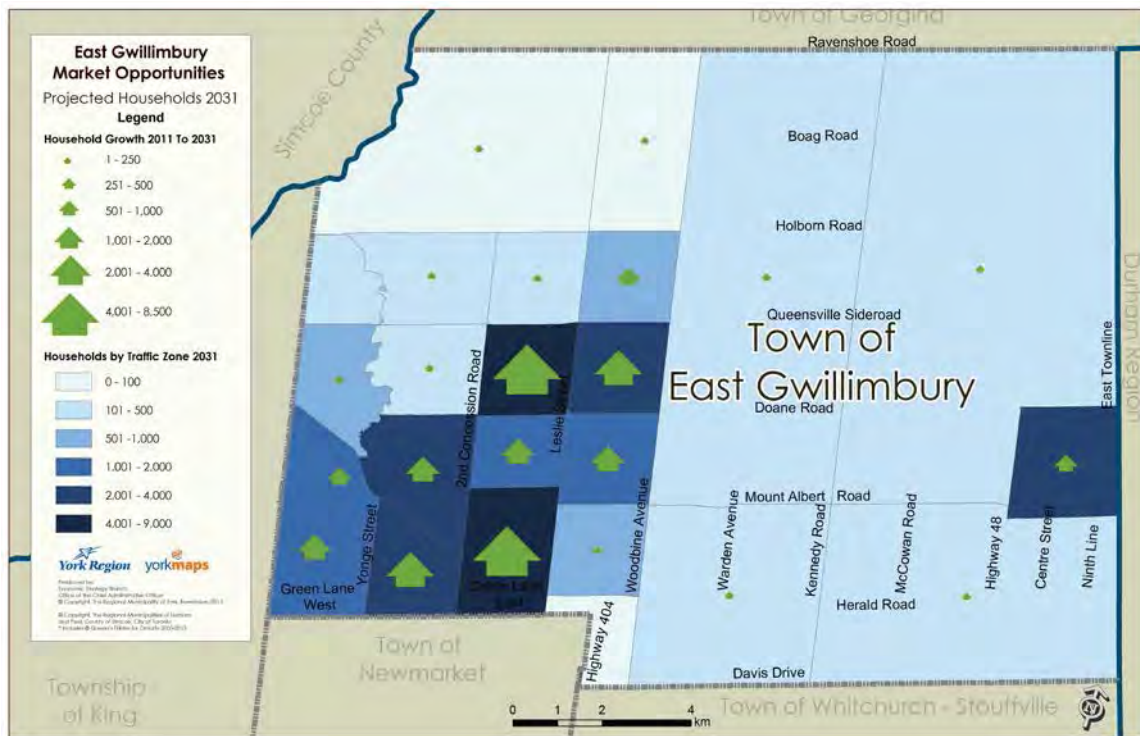
East Gwillimbury has a population of 26,325 as of 2011, and is expected to grow to 86,533 by 2031. This growth rate of 229 per cent is by far the highest in the Region. Approximately 60,000 new homes will require connectivity over this 20-year period.

Table 8 - East Gwillimbury Population and Housing Units - 2011 to 2031

	2011		2021		2031	
	Population	Housing Units	Population	Housing Units	Population	Housing Units
<b>East Gwillimbury</b>	26,325	8,480	48,135	16,688	86,533	31,194

Currently 77 per cent of the East Gwillimbury housing units have access to FTTN service. Some urban areas and all rural areas rely on wireless and satellite technology for connectivity. Fibre runs through the community, but is generally backbone and unavailable for address-based service. The opportunity from bringing improved connectivity to East Gwillimbury is great given the new development plans.

Figure 16 - East Gwillimbury Market Opportunities - Projected Households



## BUSINESS COMMUNITY OPPORTUNITIES

There are 270 businesses in East Gwillimbury. This number will increase significantly with growth in employment lands and in home-based businesses. The East Gwillimbury Official Plan forecasts 30,000 new jobs by 2031. With the proposed development of new employment lands bordering Highway 404, that area will require fibre connectivity. As indicated in Figure 19, there are also

growing employment lands along Davis Drive, Bales Drive and Green Lane, in Mount Albert and in Holland Landing; all of which should be fully served with fibre.

There is an opportunity for developers and service providers to co-operate in this rapidly growing area to provide fibre services.

Figure 17 - East Gwillimbury Market Opportunities - Employment Areas

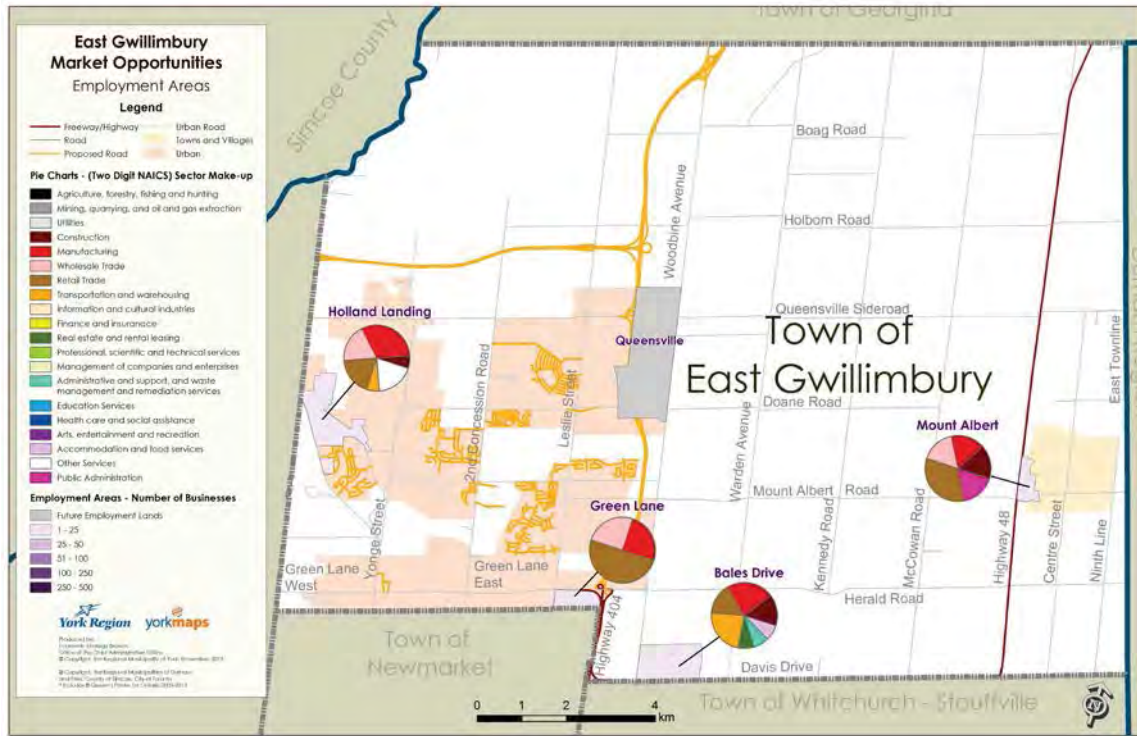


Table 9 - East Gwillimbury Employment Land Composition

Employment Area	# of Businesses	Top 3 Sectors by 2 Digit NAICS Code	# of Employees
Bales Drive	13	Manufacturing, Transportation and Warehousing & Construction	707
Green Lane	4	Retail Trade, Wholesale Trade and Manufacturing	289
Holland Landing	16	Manufacturing, Wholesale Trade and Retail Trade	430
Mount Albert	6	Retail Trade, Wholesale Trade, and Construction.	58
Queensville	0	Future Employment Area	0
<b>Total</b>	<b>39</b>	<b>Manufacturing, Retail Trade and Wholesale Trade</b>	<b>1484</b>

### EAST GWILLIMBURY PRIORITY FOCUS AREAS

While the goal of improved connectivity across the community is of interest to East Gwillimbury, Table 26 provides their priority project focus areas.

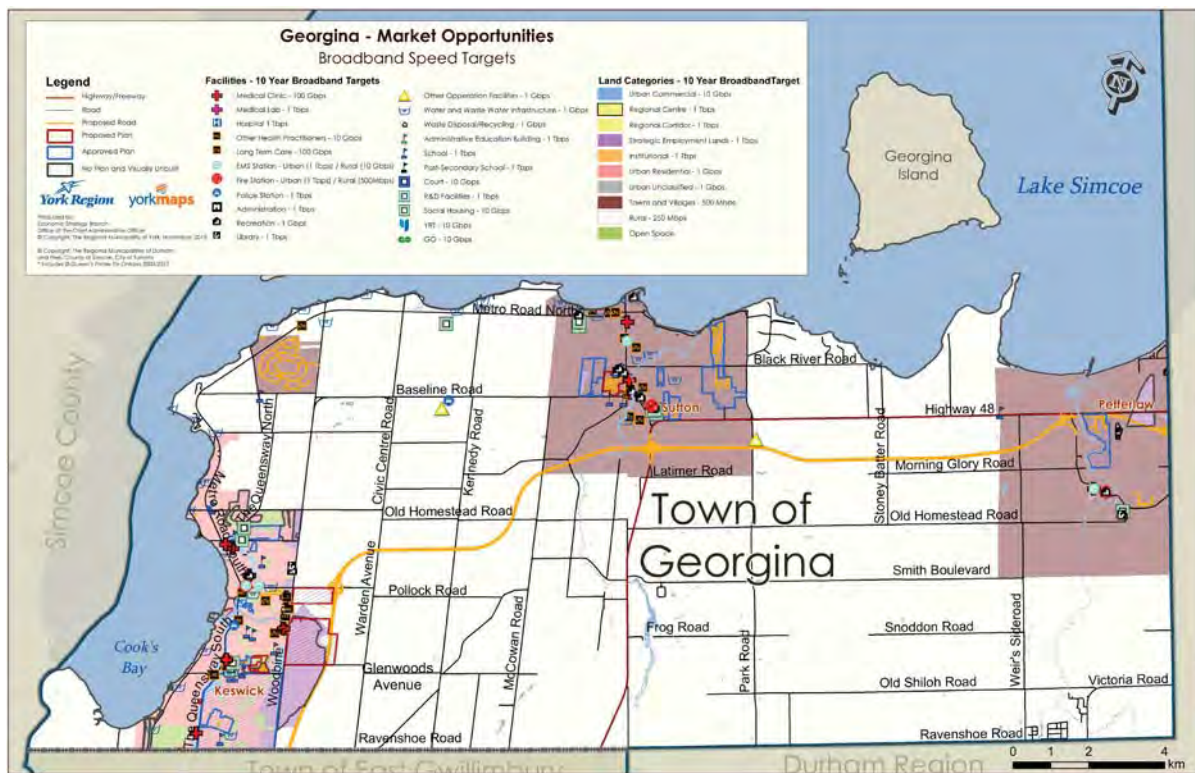
Table 10 - East Gwillimbury Priority Focus Areas

Project Priority	Overview
<b>New Residential Areas</b>	Engage development community and service providers on these opportunities and update development standards to set the framework.
<b>New Employment Areas</b>	Engage development community and service providers on these opportunities and update development standards to set the framework. Focus on 404 corridor and Davis Drive.
<b>Public WiFi Network</b>	Develop public WiFi hotspots at community facilities.
<b>Rural Areas</b>	Engage service providers in discussions on improving connectivity in under-served rural areas.
<b>Post-Secondary Education</b>	Ensure connectivity is established to support post-secondary education opportunities.

## TOWN OF GEORGINA

The Town of Georgina is a rural community bordering Lake Simcoe. New development is planned for the communities of Keswick, Sutton and Pefferlaw. There is significant farming and rural activity outside of Georgina’s villages. Figure 21 illustrates the areas where new commercial, employment and residential development will occur. There are approved residential developments in all three centres.

Figure 18 - Georgina Market Opportunities





## RESIDENTIAL COMMUNITY OPPORTUNITIES

The Town of Georgina had a population of 48,689 in 2011 and is expected to grow to 70,309 by 2031. This represents growth of 44 per cent over the 20 year period and an addition of 9,430 housing units. Currently, 77 per cent of Georgina households have access to FTTN service. Some urban areas and all rural areas rely on wireless and satellite technologies. Fibre runs through the community, but is generally backbone and unavailable for address based service. With more than 9,000 planned new housing units in Georgina and fibre backbone already in the community, there will be opportunities for developers and service providers to provide fibre service to these planned dwellings.

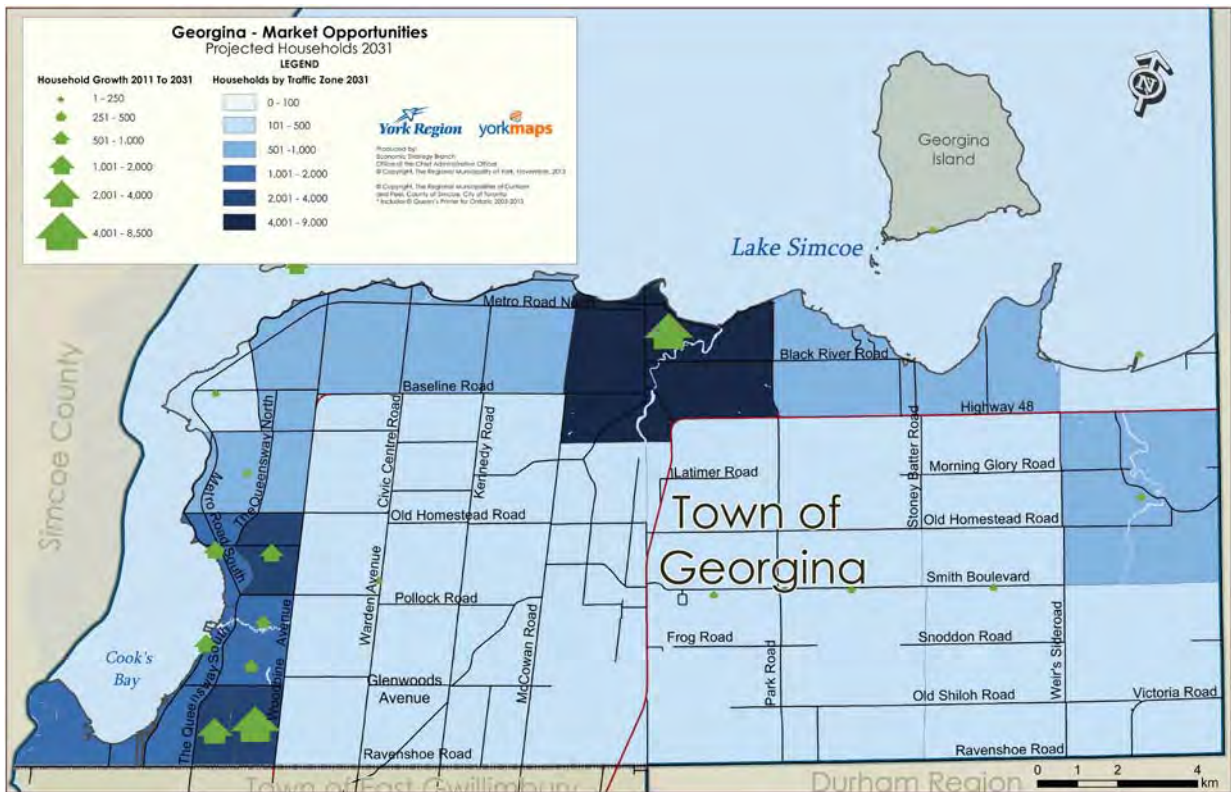
Table 11 - Georgina Population and Housing Units - 2011 to 2031

	2011		2021		2031	
	Population	Housing Units	Population	Housing Units	Population	Housing Units
<b>Georgina</b>	48,689	16,960	57,927	21,082	70,309	26,390

## BUSINESS COMMUNITY OPPORTUNITIES

There are 535 businesses in municipality of Georgina. Many of these are located within the villages. The vibrant farming community in Georgina also provides many business opportunities. Connectivity to both town and rural businesses represents opportunity for service providers and commercial developers.

Figure 19 - Georgina Market Opportunities - Projected Households



## GEORGINA PRIORITY FOCUS AREAS

While the goal of improved connectivity across the community is of interest to Georgina, Table 29 provides their priority project focus areas.

Figure 20 - Georgina Market Opportunities – Employment Areas



Table 12 - Georgina Employment Land Composition

Employment Area	# of Businesses	Top 3 Sectors by 2 Digit NAICS Code	# of Employees
<b>KESWICK BUSINESS PARK</b>	17	Other Services, Accommodation and Food Services and Retail Trade	187
<b>KESWICK WEST</b>	51	Retail Trade, Accommodation and Food Services and Health Care and Social Assistance	346
<b>PEFFERLAW</b>	3	Wholesale Trade, Retail Trade and Other Services	11
<b>SUTTON</b>	0	Future Employment Area	0
<b>Total</b>	71	Retail Trade - 19, Accommodation and Food Services - 14, Other Services - 13	544

Table 13 - Georgina Priority Focus Areas

Project Priority	Overview
<b>New Residential Areas</b>	Engage development community and service providers on these opportunities and update development standards to set the framework with a focus on Keswick and Sutton.
<b>New Employment Areas</b>	Engage development community and service providers on these opportunities and update development standards to set the framework

	with a focus on Keswick.
<b>Public WiFi Network</b>	Develop public WiFi hotspots at community facilities and downtown cores.
<b>Rural Areas</b>	Engage service providers in discussions on improving connectivity in under-serviced rural areas.

## TOWNSHIP OF KING

The Township of King, located on the western edge of York Region is a very progressive, economically active, rural community that includes the villages of King City, Nobleton and Schomberg. New commercial, employment and residential developments will occur in each of these areas, bringing market opportunities for service providers and developers.

## RESIDENTIAL COMMUNITY OPPORTUNITIES

The population in 2011 was 23,433 and is expected to grow by approximately 10,000 to reach 34,881 in 2031. An addition of 4,866 new housing units is expected over that same period. These figures are presented in Table 30. King Township has slightly more than 7,500 residences, and more than 1,700 home-based businesses. This indicates a very entrepreneurial community. In the community consultations held as part of this study, it was indicated that King residents want to be able to work from home to satisfy both home-based businesses and telecommuting for their employers.

Currently, an estimated 51 per cent of households have access to FTTN service. Some urban areas and all rural areas rely on wireless and satellite technologies. Fibre runs through the community, but is generally backbone and unavailable for address based service.

The very high rate of home-based business in King Township provides an impetus for better connectivity. Home-based businesses rely to a high degree on connectivity and generate economic benefits for the household and the community as a result of it.

As indicated on the map in Figure 24, new residential developments have been approved in King City, Nobleton and Schomberg. Additional residential developments are planned, but have not yet received approval.

Table 14 - King Population and Housing Units - 2011 to 2031

	2011		2021		2031	
	Population	Housing Units	Population	Housing Units	Population	Housing Units
<b>King</b>	23,433	7,502	29,905	10,103	34,881	12,368

## BUSINESS COMMUNITY OPPORTUNITIES

King businesses include Seneca College, Showa Canada Limited and BC Instruments (both in the advanced manufacturing sector) and Club Link Corporation. The Township also includes a successful agricultural community. New development will be focused in the Highway 400 and Jane area. Connectivity in this area is essential.

Table 15 - King Employment Land Composition

Employment Area	# of Businesses	Top 3 Sectors by 2 Digit NAICS Code	# of Employees
KING CITY	2	Construction and Manufacturing	314
NOBLETON	0	Future Employment Area	0
SCHOMBERG EMPLOYMENT AREA	26	Manufacturing, Construction and Wholesale Trade	636
<b>Total</b>	<b>28</b>	<b>Manufacturing - 7, Construction - 6, Wholesale Trade - 3</b>	<b>950</b>

Figure 21 - King Market Opportunities





Figure 22 - King Market Opportunities – Projected Households

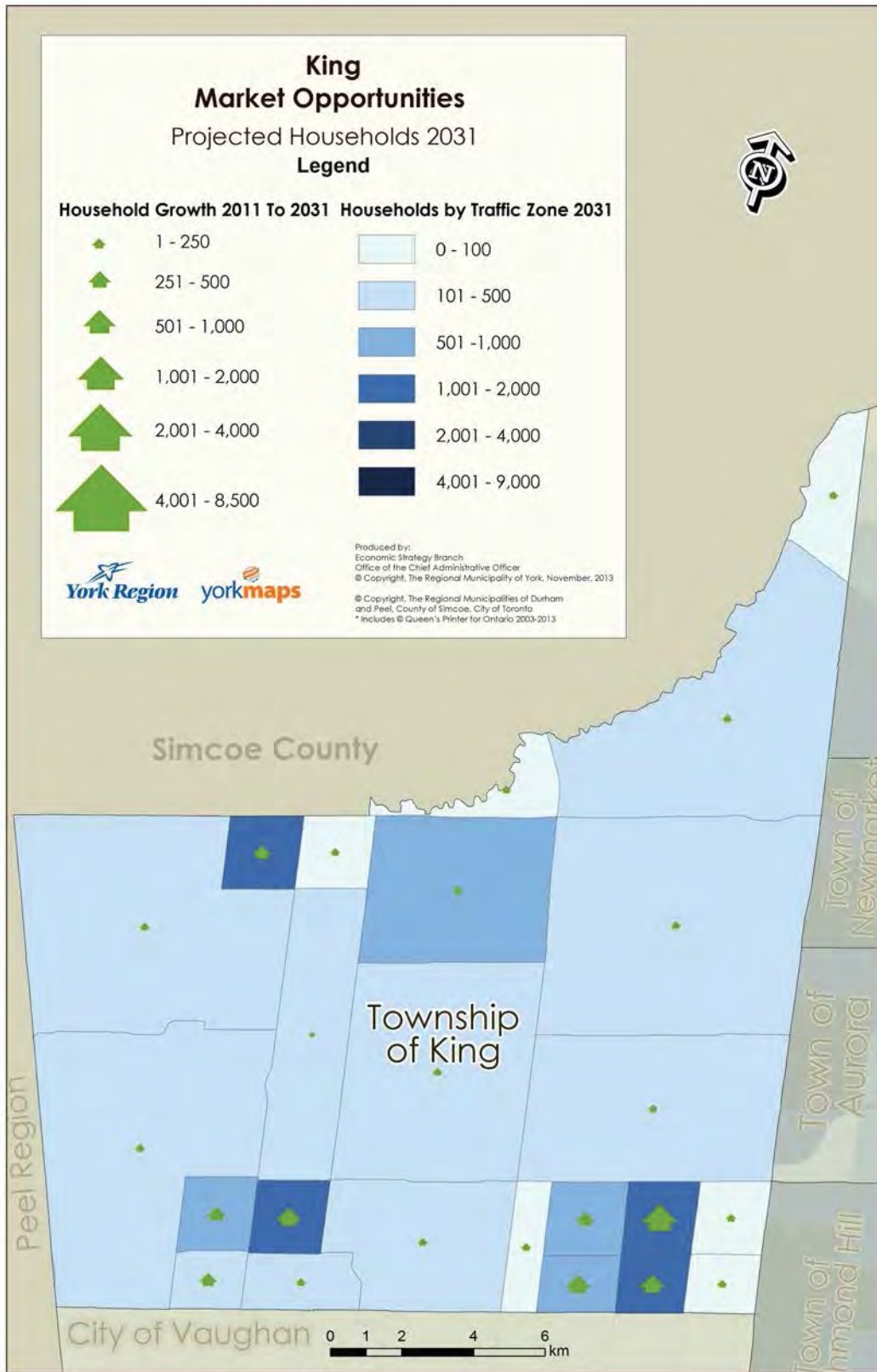




Figure 23 - King Market Opportunities - Employment Areas



## KING PRIORITY FOCUS AREAS

While the goal of improved connectivity across the community is of interest to King, Table 32 provides their priority project focus areas.

Table 16 - King Priority Focus Areas

Project Priority	Overview
<b>New Residential Areas</b>	Engage development community and service providers on these opportunities and update development standards to set the framework with a focus on King City, Nobleton and Schomberg.
<b>New Employment Areas</b>	Engage development community and service providers on these opportunities and update development standards to set the framework with a focus on Jane and Hwy. 400.
<b>Holland Marsh</b>	Determine approaches for increasing the availability and speed of connectivity within the Holland Marsh.
<b>Post-Secondary Education</b>	Ensure there is high-speed connectivity at post-secondary institutions within the municipality, including Seneca, Koffler and Muck Crops Research Centre.
<b>Public WiFi Network</b>	Develop public WiFi hotspots at community facilities and downtown cores.
<b>Rural Areas</b>	Engage service providers in discussions on improving connectivity in under-serviced rural areas.

## CITY OF MARKHAM

The City of Markham sits on the northern border of the City of Toronto. It is very well developed and provides services and opportunities on par with those in many areas of Toronto, including Waterfront Toronto. More than 400 corporate head offices and more than 900 high technology and life sciences companies are located in Markham.

## RESIDENTIAL COMMUNITY OPPORTUNITIES

The City of Markham has a population of 309,254 as of 2011 and is expected to grow to 421,551 by 2031. Corresponding to the population growth, there will be an increase of 47,835 housing units over the 20 year period, as presented in the Table 33.

Table 17 - Markham Population and Housing Units - 2011 to 2031

	2011		2021		2031	
	Population	Housing Units	Population	Housing Units	Population	Housing Units
<b>Markham</b>	309,254	90,736	370,274	115,879	421,551	138,571

Currently, service providers offer fibre to the node to 97 per cent of households in Markham, with new residential areas receiving FTTH services. There are opportunities for service providers to serve the planned growth of roughly 48,000 housing units with FTTH as these development areas come online.

Figure 24 - Markham Market Opportunities

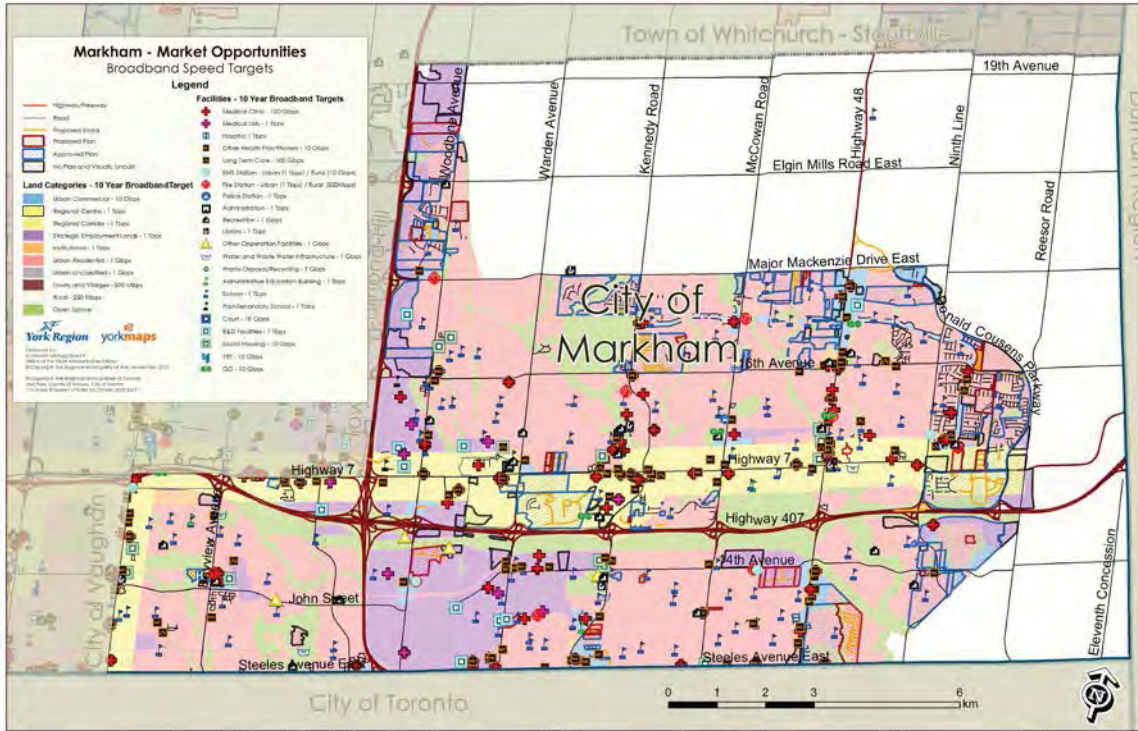


Figure 25 - Markham Market Opportunities - Projected Households

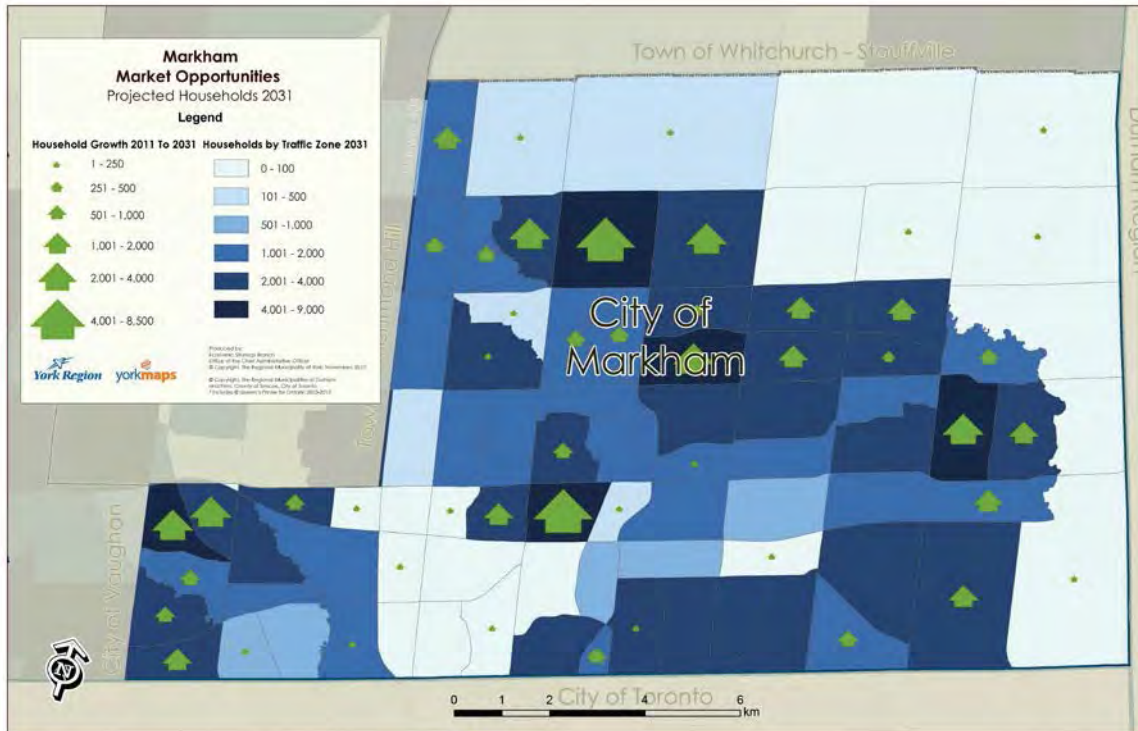
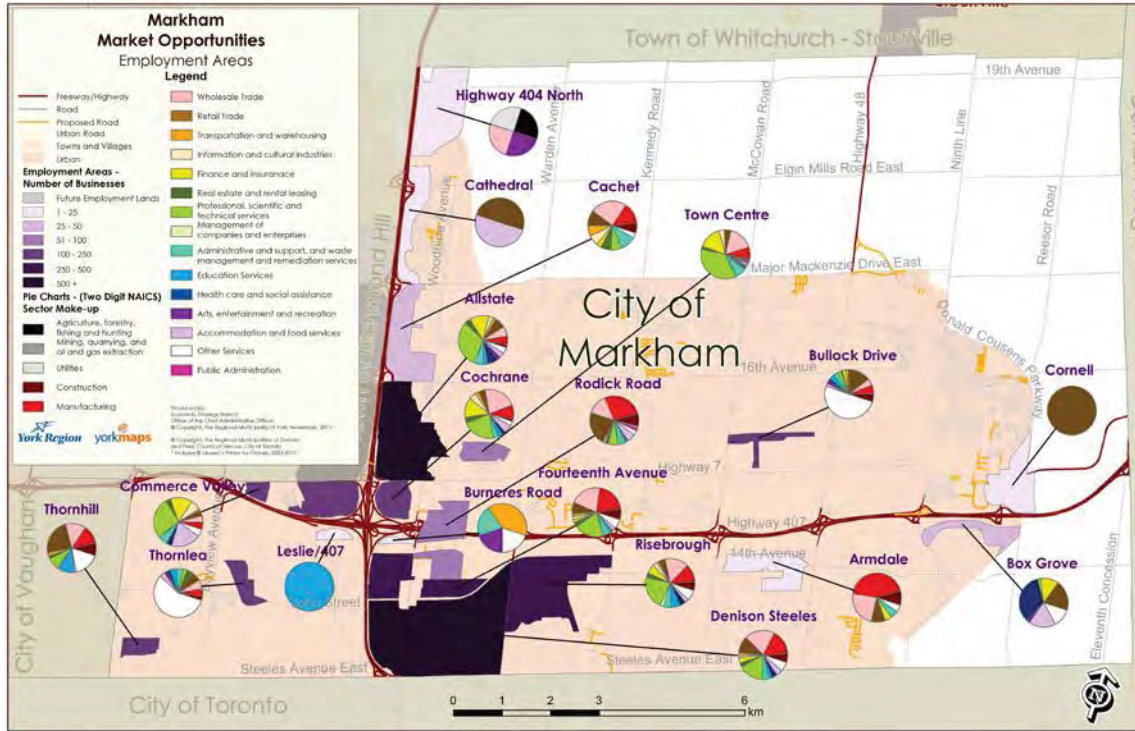




Figure 26 - Markham Market Opportunities – Employment Areas



**BUSINESS COMMUNITY OPPORTUNITIES**

There are planned business areas near Miliken and near Highway 7 and Woodbine. These will require full FTTA address services. Several smaller developments can also be identified on the map.

Currently, some businesses in Markham cannot get FTTN or FTTA connectivity and must use wireless solutions. There is an opportunity for service providers to improve on this service.

Markham’s employment lands and their employment make-up are identified in Table 34 and Figure 29.

Table 18 - Markham Employment Land Composition

Employment Area	# of Businesses	Top 3 Sectors by 2 Digit NAICS Code	# of Employees
<b>ALLSTATE</b>	567	Professional, scientific and technical services - 172, Retail Trade - 39, Health Care and Social Assistance - 39	10,163
<b>ARMDALE</b>	21	Manufacturing - 9, Wholesale Trade - 5, Construction - 2, Retail Trade - 2	7687
<b>BOX GROVE</b>	50	Health Care and Social Assistance - 17, Retail Trade - 10, Accommodation and Food Services - 9	432
<b>BULLOCK DRIVE</b>	174	Other Services - 88, Retail Trade - 26, Manufacturing - 10	718
<b>BURNCREST ROAD</b>	5	Transportation and Warehousing - 2, Administrative and Support, Waste Management and Remediation Services - 1, Other Services - 1, Arts Entertainment and Recreation - 1	453
<b>CACHET</b>	29	Wholesale Trade - 7, Manufacturing - 4, Retail Trade - 3	2532

Employment Area	# of Businesses	Top 3 Sectors by 2 Digit NAICS Code	# of Employees
CATHEDRAL	2	Retail Trade - 1, Accommodation and Food Services - 1	8
COCHRANE	130	Wholesale Trade - 28, Professional Scientific and Technical Services - 28, Finance and Insurance - 17	3,576
COMMERCE VALLEY/LEITCHCROFT	165	Professional, Scientific and Technical Services - 44, Accommodation and Food Services - 32, Finance and Insurance - 24	10,532
CORNELL	1	Retail Trade - 1	9
DENISON STEELES	2146	Wholesale Trade - 422, Manufacturing - 349, Professional, Scientific and Technical Services - 345	30,821
FOURTEENTH AVENUE	442	Wholesale Trade - 90, Manufacturing - 89, Professional, Scientific and Technical Services - 82	5,814
HIGHWAY 404 NORTH	4	Agriculture, Forestry, Fishing and Hunting - 1, Utilities - 1, Wholesale Trade - 1, Arts, Entertainment and Recreation - 1	351
LESLIE/407	1	Education Services - 1	129
RISEBROUGH	433	Professional Scientific and Technical Services - 93, Wholesale Trade - 67, Manufacturing - 51	11,292
RODICK ROAD	96	Manufacturing - 26, Retail Trade -21, Wholesale Trade - 13	1,847
THORNHILL	173	Retail Trade - 41, Other Services - 29, Wholesale Trade - 23	823
THORNLEA	117	Other Services - 66, Wholesale Trade - 7, Retail Trade - 7	740
TOWN CENTRE	91	Professional Scientific and Technical Services - 32, Wholesale Trade - 15, Finance and Insurance - 14	3,190
<b>Total</b>	<b>4647</b>	<b>Professional, Scientific and Technical Services - 825, Wholesale Trade - 730, Manufacturing -624</b>	<b>91,116</b>

## MARKHAM PRIORITY FOCUS AREAS

While the goal of improved connectivity across the community is of interest to Markham, Table 35 provides their priority project focus areas.

Table 19 - Markham Priority Focus Areas

Project Priority	Overview
<b>Markham Centre</b>	Develop and market Markham Centre as a Smart Gigabit Community.
<b>Gigabit Community</b>	Engage service providers on opportunities for retrofitting Markham as a Gigabit Community; if not able, look to alternative service models.
<b>Existing Employment Areas</b>	Engage property owners and service providers to discuss strategies for improving connectivity.
<b>New Employment Areas</b>	Engage development community and service providers on these opportunities and update development standards to set the framework. Focus on 404 the corridor.
<b>Public WiFi Network</b>	Develop public WiFi hotspots in historic core, Centres and Corridors, and at community centres.
<b>Smart City Platform</b>	Develop Markham as a connected community utilizing IT for managing infrastructure and quality of life.

## TOWN OF NEWMARKET

The Town of Newmarket is an urban community, home to more than 85,000 residents. The community has an engaged municipal and business leadership team focused on improving connectivity within the municipality in order to pursue innovative community connectivity applications.

## RESIDENTIAL COMMUNITY OPPORTUNITIES

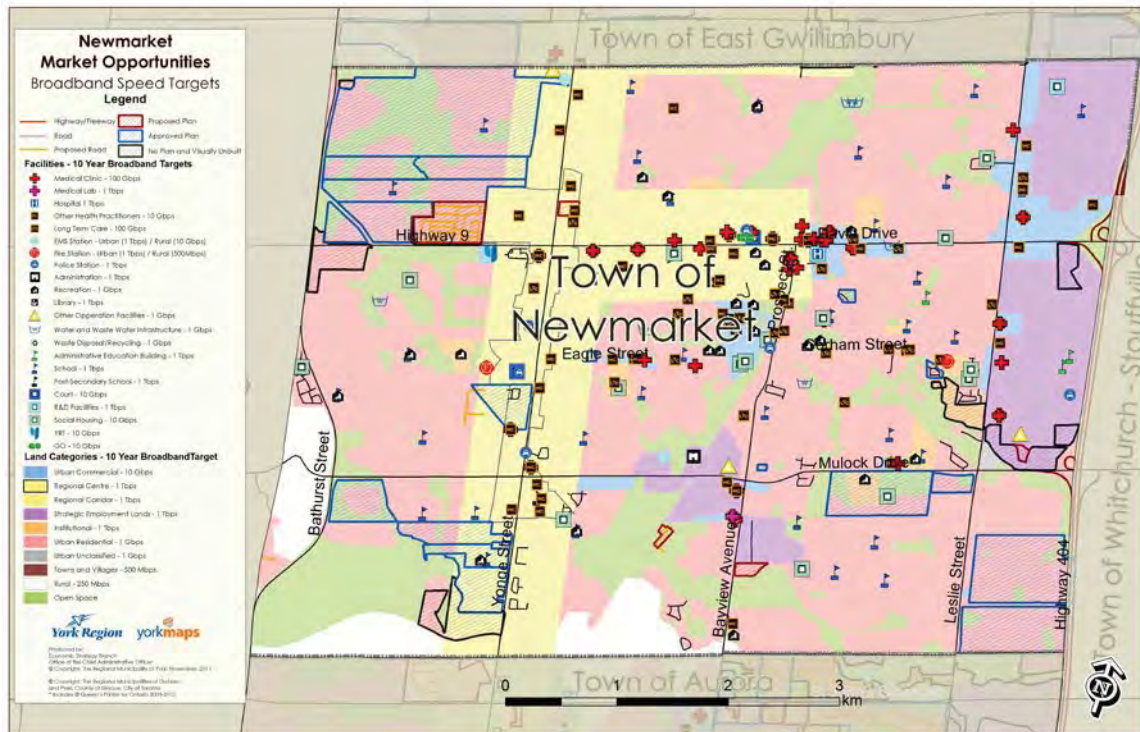
The town is expected to grow from a population of 83,964 in 2011 to 97,133 in 2031. The increase in population of 13,169 is expected to drive an increase of 7,336 housing units over the 20 year period, as indicated in Table 36.

Table 20 - Newmarket Population and Housing Units- 2011 to 2031

	2011		2021		2031	
	Population	Housing Units	Population	Housing Units	Population	Housing Units
<b>Newmarket</b>	83,964	27,467	91,925	31,329	97,133	34,803

Currently, 100 per cent of Newmarket’s housing units have access to FTTN connectivity with new housing having access to FTTH. Planned new housing will be expected to have access to FTTH service. There are opportunities for service providers and developers to co-operate to enable this type of service.

Figure 27 - Newmarket Market Opportunities



## BUSINESS COMMUNITY OPPORTUNITIES

Newmarket supports concentrated economic activity in the areas of advanced manufacturing, health sciences, and arts and culture. All of these economic clusters require a very high degree of connectivity.

Some employment areas in Newmarket cannot get FTTN or FTTA connectivity and must use wireless solutions. There is opportunity to bring FTTA to all remaining business locations within Newmarket. There is development planned along highway 404 and near the Mulock and Bayview intersection. Both these developments will provide opportunities to service providers and developers.

Table 21 - Newmarket Employment Land Composition

Employment Area	# of Businesses	Top 3 Sectors by 2 Digit NAICS Code	# of Employees
<b>BAYVIEW SOUTH</b>	6	Manufacturing - 6	1,578
<b>LESLIE DAVIS</b>	112	Manufacturing - 28, Wholesale Trade - 19, Professional, Scientific and Technical Services - 13	2,574
<b>LESLIE NORTH</b>	109	Manufacturing - 34, Wholesale Trade 29, Professional Scientific and Technical Services - 14	1,162
<b>LESLIE SOUTH</b>	271	Other Services - 51, Manufacturing - 50, Wholesale Trade - 30	4,312
<b>LESLIE/MULOCK</b>	13	Construction - 3, Manufacturing - 3, Wholesale Trade - 2	203
<b>MULOCK NORTH</b>	19	Health Care and Social Assistance - 4, Other Services - 4, Retail Trade - 3	444
<b>MULOCK SOUTHEAST</b>	92	Health Care and Social Assistance - 18, Retail Trade - 17, Other Services - 13	474
<b>MULOCK SOUTHWEST</b>	3	Retail Trade - 2, Manufacturing - 1	14
<b>Total</b>	625	Manufacturing - 128, Wholesale Trade - 82, Professional, Scientific and Technical Services -54	10,761

## NEWMARKET PRIORITY FOCUS AREAS

While the goal of improved connectivity across the community is of interest to Newmarket, Table 38 provides their priority project focus areas.

Table 22 - Newmarket Priority Focus Areas

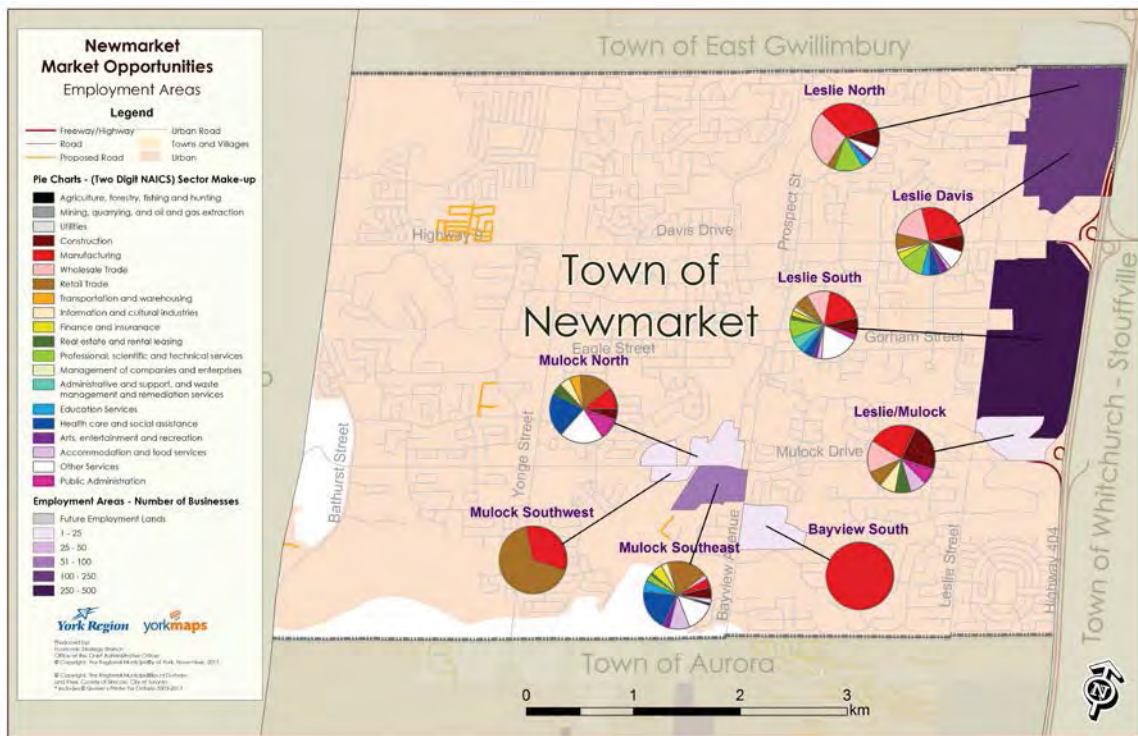
Project Priority	Overview
<b>Gigabit Centre &amp; Corridor</b>	Engage development community and service providers on this opportunity and update development standards to set the framework.
<b>Gigabit Community</b>	Engage service providers on opportunities for retrofitting Newmarket as a Gigabit Community; if not able, look to alternative service models.
<b>York Region E-ID Card</b>	Act as the initial pilot for the development of York Region E-ID Card.
<b>ORION Connection</b>	Host the ORION connection at Southlake Regional Hospital.
<b>Public WiFi Network</b>	Develop public WiFi hotspots in downtown core and at community centres.
<b>Existing Employment Areas</b>	Engage property owners and service providers to discuss strategies for improving connectivity.



Figure 28 - Newmarket Market Opportunities – Projected Households



Figure 29 - Newmarket Market Opportunities – Employment Areas



## TOWN OF RICHMOND HILL

Richmond Hill has a diverse and thriving economy. Its wide array of industries enables Richmond Hill to endure and adapt to the cyclical nature of the economy. Richmond Hill is centrally located and provides the business community with access to the areas east, west, north and south of the GTA.

Figure 30 provides an overview of some of the market opportunities within Richmond Hill.

## RESIDENTIAL COMMUNITY OPPORTUNITIES

The population of Richmond Hill is expected to grow from 193,040 in 2011 to 242,249 by 2031. This growth represents a population increase of 49,209 over 20 years. This population growth will result in an increase of 21,681 housing units over the 20 year period, as presented in Table 39.

Table 23 - Richmond Hill Population and Housing Units - 2011 to 2031

	2011		2021		2031	
	Population	Housing Units	Population	Housing Units	Population	Housing Units
<b>Richmond Hill</b>	193,040	59,556	231,363	75,622	242,249	81,237

As illustrated in Figure 33, there are approved housing developments throughout Richmond Hill, but they are most concentrated in the northeast quadrant of the municipality.

Currently, 100 per cent of Richmond Hill's housing units have access to FTTN connectivity with new housing having access to FTTH. Planned new housing will be expected to have access to FTTH service. There are opportunities for service providers and developers to co-operate to enable this type of service.

## BUSINESS COMMUNITY OPPORTUNITIES

There are approved employment lands in Richmond Hill along Highway 404 and north east of Leslie Street and Major Mackenzie Drive. The Town's employment lands are detailed in Table 24. There are other planned, but not yet approved business lands along highway 404. These present market opportunities for service providers to meet the needs of businesses that will locate in these areas.

Table 24 - Richmond Hill Employment Land Composition

Employment Area	# of Businesses	Top 3 Sectors by 2 Digit NAICS Code	# of Employees
<b>BARKER BUSINESS PARK</b>	26	Professional, Scientific and Technical Services - 11, Wholesale Trade - 4, Manufacturing - 2, Finance and Insurance - 2	907
<b>BEAVER CREEK</b>	1490	Professional, Scientific and Technical Services - 338, Wholesale Trade - 266, Retail Trade - 166	18,429
<b>HEADFORD</b>	132	Professional, Scientific and Technical Services - 28, Accommodation and Food Services - 22, Wholesale Trade - 14	3,050
<b>NEWKIRK</b>	302	Manufacturing - 58, Other Services - 54, Retail Trade 33	4,160
<b>Total</b>	1950	Profession, Scientific and Technical Services - 402, Wholesale Trade - 274, Retail Trade - 205	26,546

## RICHMOND HILL PRIORITY FOCUS AREAS

While the goal of improved connectivity across the community is of interest to Richmond Hill, Table 41 provides their priority project focus areas.

Figure 30 - Richmond Hill Market Opportunities

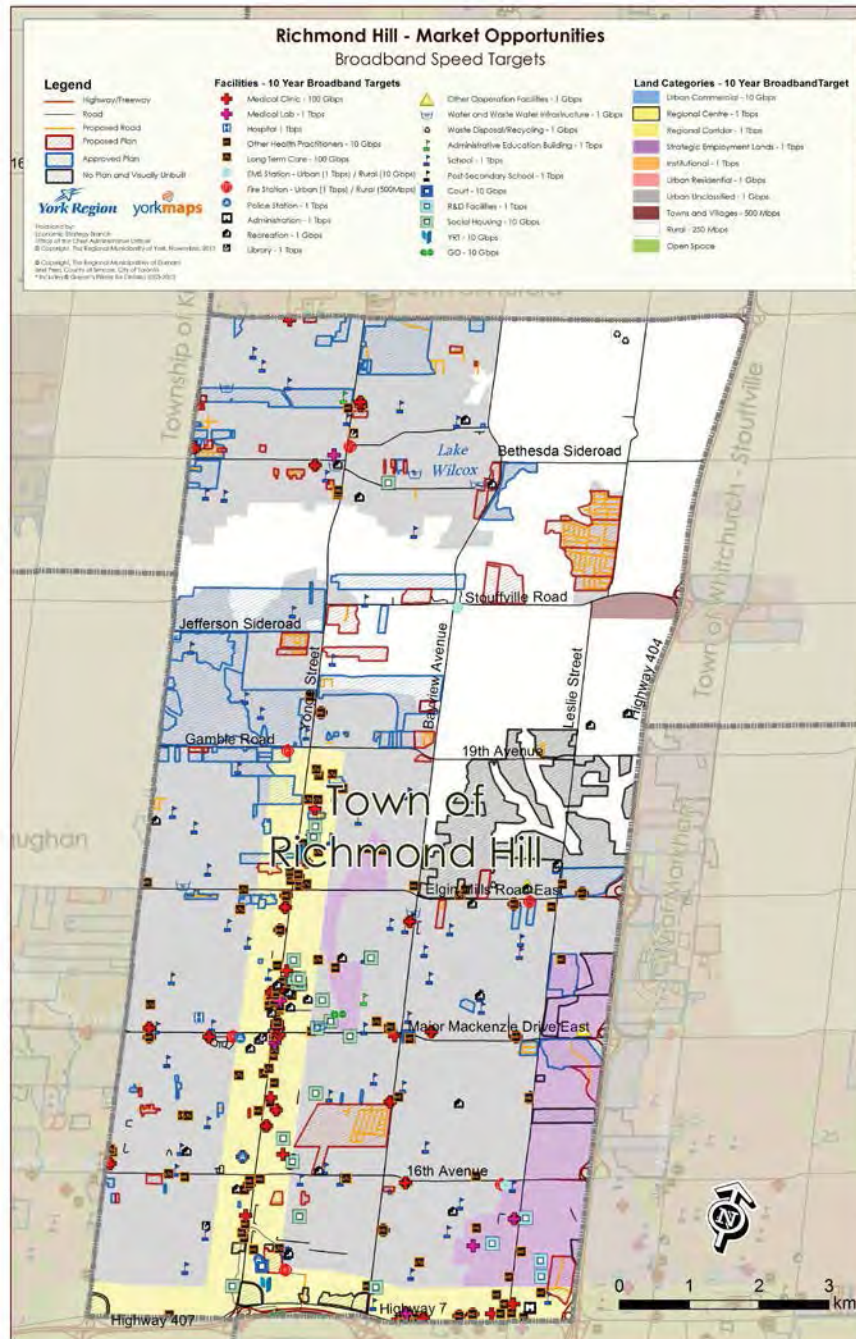




Figure 31 - Richmond Hill Market Opportunities – Projected Households

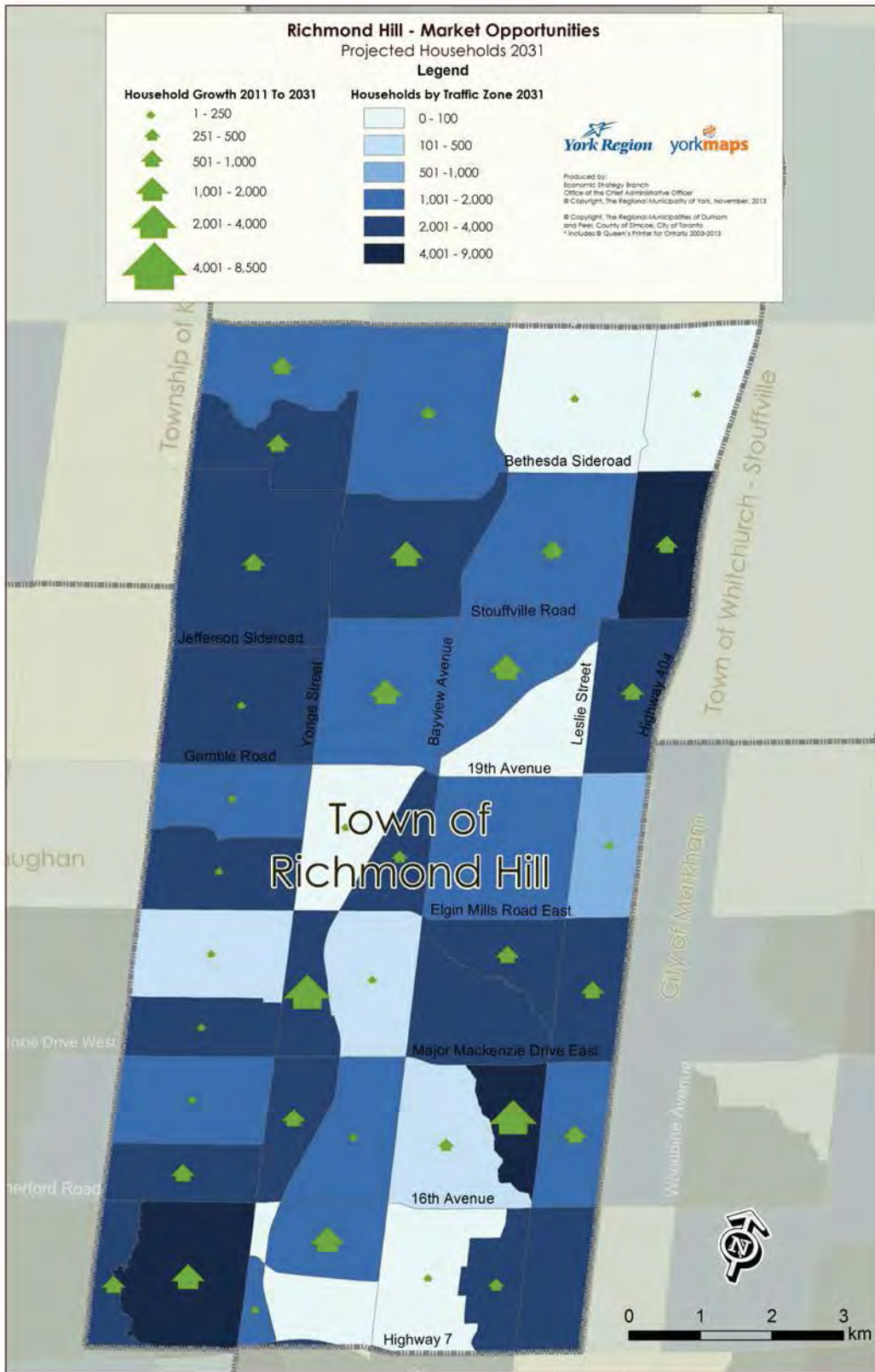


Figure 32 - Richmond Hill Market Opportunities - Employment Areas

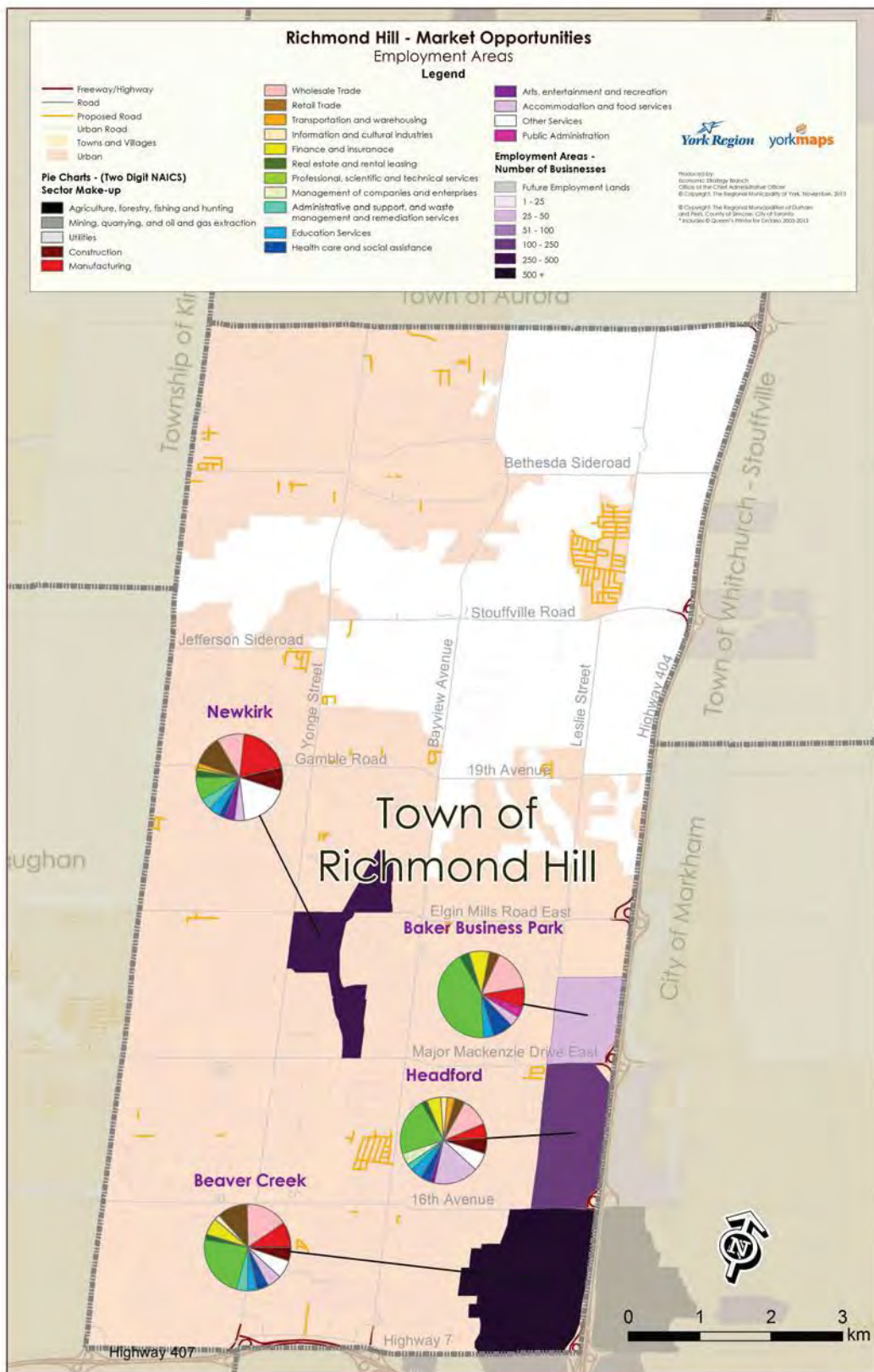


Table 25 - Richmond Hill Priority Focus Areas

Project Priority	Overview
<b>Gigabit Centre &amp; Corridor</b>	Engage development community and service providers on these opportunities and update development standards to set the framework.
<b>New Employment Areas</b>	Engage development community and service providers on these opportunities and update development standards to set the framework. Focus on: New lands along 404
<b>Existing Employment Areas</b>	Engage property owners and service providers to discuss strategies for improving connectivity.
<b>New Residential Areas</b>	Engage development community and service providers on these opportunities and update development standards to set the framework. Focus on: - Dunlap Observatory - Northwest of Elgin Mills and Leslie
<b>Public WiFi Network</b>	Develop public WiFi hotspots along Yonge and at community centres.

## CITY OF VAUGHAN

The City of Vaughan has a diverse economy and a growing residential community. There is an array of planned and future development areas for residential, employment and commercial lands in the northern and western portions of the community. The City of Vaughan also has an ambitious plan to develop the Vaughan Metropolitan Centre as its new downtown (Hwy. 7 and Jane Street), which will feature a subway connection into downtown Toronto.

## RESIDENTIAL COMMUNITY OPPORTUNITIES

The City of Vaughan is a rapidly growing urban community. It is expected to grow from a population of 294,236 in 2011 to 416,673 in 2031, an increase of 122,337 residents. An increase of 50,431 housing units is expected over the same period. New housing developments have been approved in Kleinberg, near Major Mackenzie Drive and Highway 400 and along Dufferin Avenue, as illustrated in Figure 36.

Currently, 96 per cent of Vaughan households have access to FTTN services. For new housing units, FTTA is expected. This rapid growth in housing units in Vaughan and the existing access to backhaul connectivity within the city provides good opportunities to service providers and developers who would like to deploy service here.

Table 26 - Vaughan Population and Housing Units - 2011 to 2031

	2011		2021		2031	
	Population	Housing Units	Population	Housing Units	Population	Housing Units
<b>Vaughan</b>	294,236	84,459	360,380	110,894	416,573	134,890



Figure 33 - Vaughan Market Opportunities

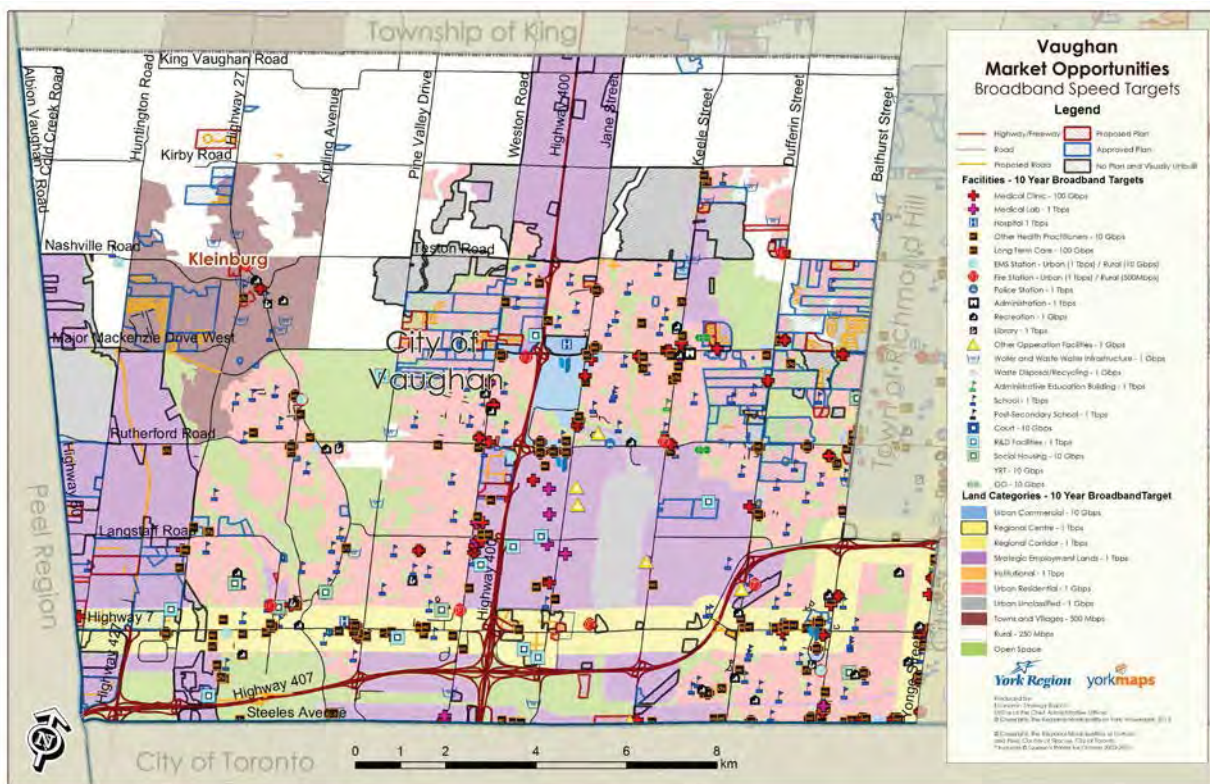
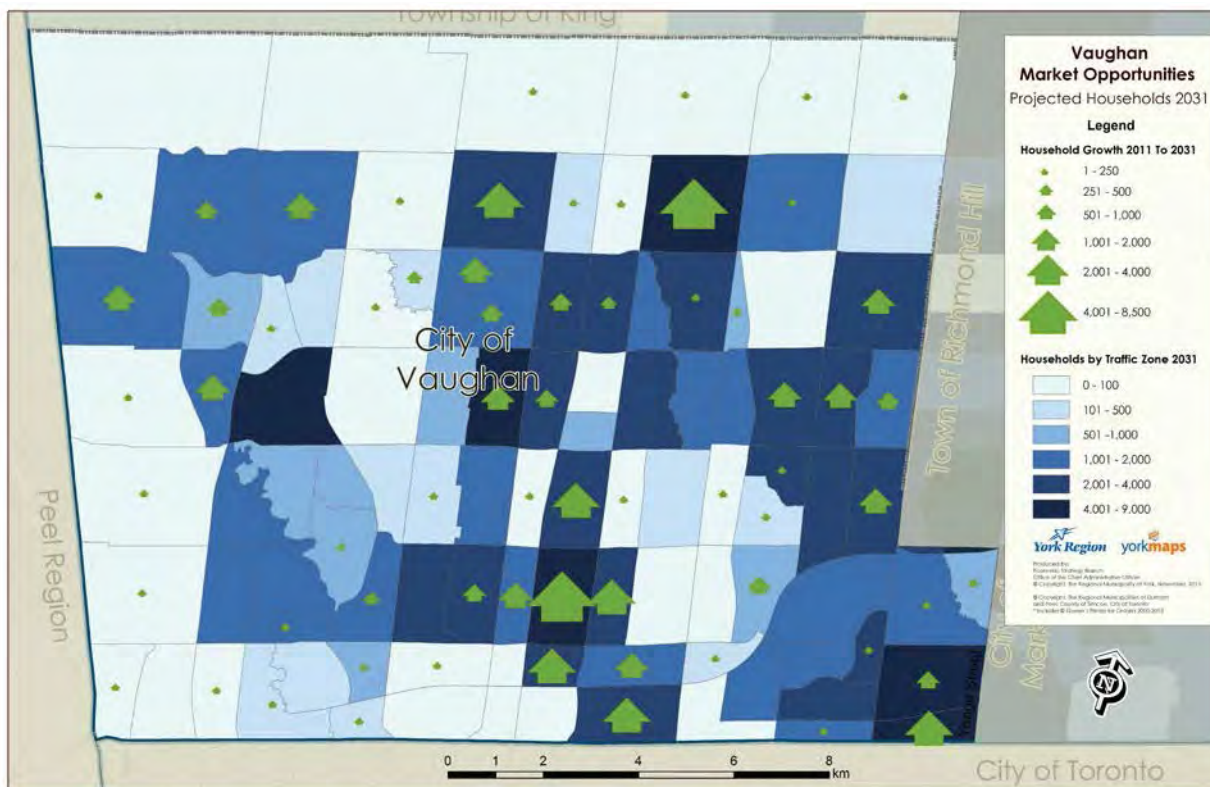


Figure 34 - Vaughan Market Opportunities - Projected Households



## BUSINESS COMMUNITY OPPORTUNITIES

Vaughan is an entrepreneurial business community with more than 9,500 businesses. Development lands have been approved in many parts of Vaughan. There are approved areas near Langstaff Road, along Highway 50, along Highway 400, on Keele Street and on Major Mackenzie Drive. See Table 43. The Vaughan Broadband Opportunities Map for more precise locations. These employment lands will all require FTTA, providing business opportunities for developers and service providers.

Figure 35 - Vaughan Market Opportunities – Employment Areas

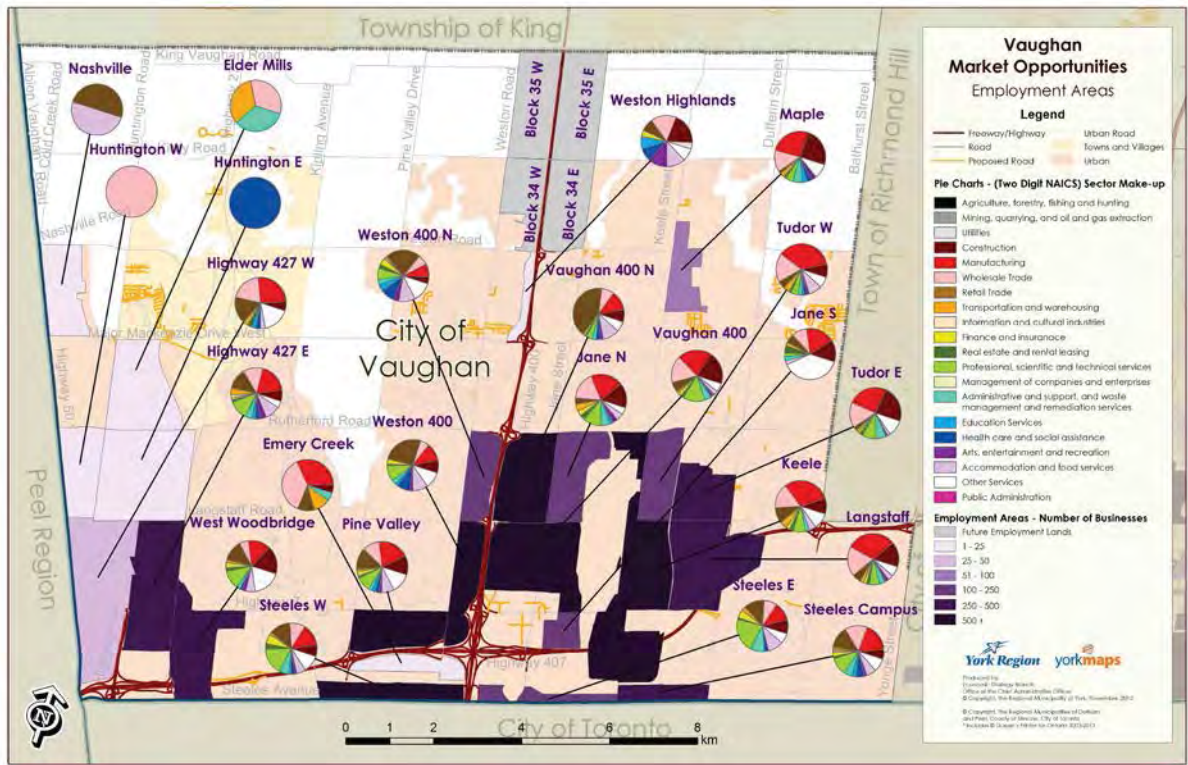




Table 27 - Vaughan Employment Land Composition

Employment Area	# of Businesses	Top 3 Sectors by 2 Digit NAICS Code	# of Employees
<b>BLOCK 34 EAST</b>	0	Future Employment Area	0
<b>BLOCK 34 WEST</b>	0	Future Employment Area	0
<b>BLOCK 35 EAST</b>	0	Future Employment Area	0
<b>BLOCK 35 WEST</b>	0	Future Employment Area	0
<b>ELDER MILLS</b>	3	Wholesale Trade - 1, Transportation and Warehousing - 1, Administrative and Support, Waste Management and Remediation Services - 1	479
<b>EMERY CREEK</b>	19	Wholesale Trade - 7, Manufacturing - 6, Retail Trade - 2, Transportation and Warehousing - 2	2,625
<b>HIGHWAY 427 EAST</b>	297	Manufacturing - 56, Retail Trade - 39, Wholesale Trade - 37	5,200
<b>HIGHWAY 427 WEST</b>	35	Manufacturing - 9, Wholesale Trade - 7, Retail Trade - 6, Other Services - 6	454
<b>HUNTINGTON EAST</b>	1	Health Care and Social Assistance - 1	8
<b>HUNTINGTON WEST</b>	1	Wholesale Trade - 1	4
<b>JANE NORTH</b>	227	Manufacturing - 46, Wholesale Trade - 39, Construction - 35	5,357
<b>JANE SOUTH</b>	190	Other Services - 71, Manufacturing - 34, Construction - 26	1795
<b>KEELE</b>	729	Manufacturing - 216, Wholesale Trade - 113, Other Services - 72	12,430
<b>LANGSTAFF</b>	408	Manufacturing - 124, Wholesale Trade - 75, Construction - 63	5,346
<b>MAPLE</b>	65	Manufacturing - 17, Construction - 16, Wholesale Trade - 9	993
<b>NASHVILLE</b>	2	Retail Trade - 1, Accommodation and Food Services - 1	7
<b>PINE VALLEY</b>	733	Manufacturing - 142, Retail Trade - 100, Other Services - 90	7,863
<b>STEELES CAMPUS</b>	330	Manufacturing - 60, Wholesale Trade - 47, Retail Trade - 46	3,491
<b>STEELES EAST</b>	158	Professional, Scientific and Technical Services - 33, Retail Trade - 20, Manufacturing - 18	3,106
<b>STEELES WEST</b>	566	Professional, Scientific and Technical Services - 95, Manufacturing 77, Retail Trade - 75	6,363
<b>TUDOR EAST</b>	353	Manufacturing - 86, Construction - 80, Wholesale Trade - 56	7,551
<b>TUDOR WEST</b>	147	Manufacturing - 53, Wholesale Trade - 26, Construction - 12	5,251
<b>VAUGHAN 400</b>	927	Manufacturing - 196, Construction 189, Wholesale Trade - 156	15,676
<b>VAUGHAN 400 NORTH</b>	722	Retail Trade - 293, Manufacturing - 87, Wholesale Trade - 56	8,276
<b>WEST WOODBRIDGE</b>	386	Construction - 68, Other Services - 67, Manufacturing - 53	4,102
<b>WESTON 400</b>	540	Retail Trade - 139, Manufacturing 59, Other Services - 55	5,365
<b>WESTON 400 NORTH</b>	184	Retail Trade - 40, Other Services - 23, Accommodation and Food Service - 19	2,141
<b>WESTON HIGHLANDS</b>	25	Construction - 5, Wholesale Trade - 4, Arts, Entertainment and Recreation - 3, Accommodation and Food Services - 3	716
<b>Total</b>	7048	Manufacturing - 1354, Retail Trade - 998, Wholesale Trade - 863	104,599

## VAUGHAN PRIORITY FOCUS AREAS

While the goal of improved connectivity across the community is of interest to Vaughan, Table 44 provides their priority project focus areas.

Table 28 - Vaughan Priority Focus Areas

Project Priority	Overview
<b>Gigabit Centre &amp; Corridor</b>	Engage development community and service providers on these opportunities and update development standards to set the framework.
<b>New Employment Areas</b>	Engage development community and service providers on these opportunities and update development standards to set the framework. Focus on Hwy. 400 and Vaughan Enterprise Zone.
<b>Existing Employment Areas</b>	Engage property owners and service providers to discuss strategies for improving connectivity.
<b>New Residential Areas</b>	Engage development community and service providers on these opportunities and update development standards to set the framework.
<b>Public WiFi Network</b>	Develop public WiFi hotspots in historic downtowns and community facilities.

## TOWN OF WHITCHURCH-STOUFFVILLE

The Town of Whitchurch-Stouffville is a mixed urban and rural community in York Region. The community supports knowledge-based industries, a thriving agricultural industry and a not-for-profit sector.

### RESIDENTIAL COMMUNITY OPPORTUNITIES

The population of Whitchurch-Stouffville is expected to increase from 38,662 to 60,676 between 2011 and 2031, resulting in an increase in population of 21,924 and 9,745 new housing units.

Table 29 - Whitchurch-Stouffville Population and Housing Units - 2011 to 2031

	2011		2021		2031	
	Population	Housing Units	Population	Housing Units	Population	Housing Units
<b>Whitchurch-Stouffville</b>	38,652	13,256	55,771	20,177	60,576	23,001

Currently 70 per cent of households in Whitchurch-Stouffville have access to FTTN service. Some urban areas and all rural areas rely on wireless and satellite solutions, albeit at higher costs for slower speeds. Fibre runs through the community, but is generally backbone and unavailable for address based service.

New residential development has been approved in Stouffville and in Ballantrae as illustrated in

Figure 36. These developments will provide opportunities for service providers and developers who will co-operate to deploy fibre to the address or node services.

## BUSINESS COMMUNITY OPPORTUNITIES

Development of employment lands in Stouffville and near Stouffville Road and Woodbine Avenue has been approved and there will be future development opportunities along the Hwy. 404 corridor.

Table 30 - Whitchurch-Stouffville Employment Land Composition

Employment Area	# of Businesses	Top 3 Sectors by 2 Digit NAICS Code	# of Employees
<b>CARDICO DRIVE</b>	41	Manufacturing - 13, Construction - 13, Mixed Use	806
<b>COMMUNITY OF STOUFFVILLE - EAST</b>	1	Health Care and Social Assistance - 1	8
<b>COMMUNITY OF STOUFFVILLE - EAST</b>	0	Employment Area	0
<b>COMMUNITY OF STOUFFVILLE - NORTH</b>	2	Retail Trade - 2	44
<b>COMMUNITY OF STOUFFVILLE - SOUTH</b>	124	Retail Trade - 20, Other Services - 19, Construction - 14	1,465
<b>GORMLEY</b>	28	Manufacturing - 9, Wholesale Trade - 5, Construction - 4	327
<b>VANDORF</b>	40	Manufacturing - 11, Construction - 10, Other Services - 5	542
<b>Total</b>	236	Manufacturing - 45, Construction - 38, Retail and Trade - 28	3192

Figure 36- Whitchurch-Stouffville Market Opportunities – Broadband Speed Targets

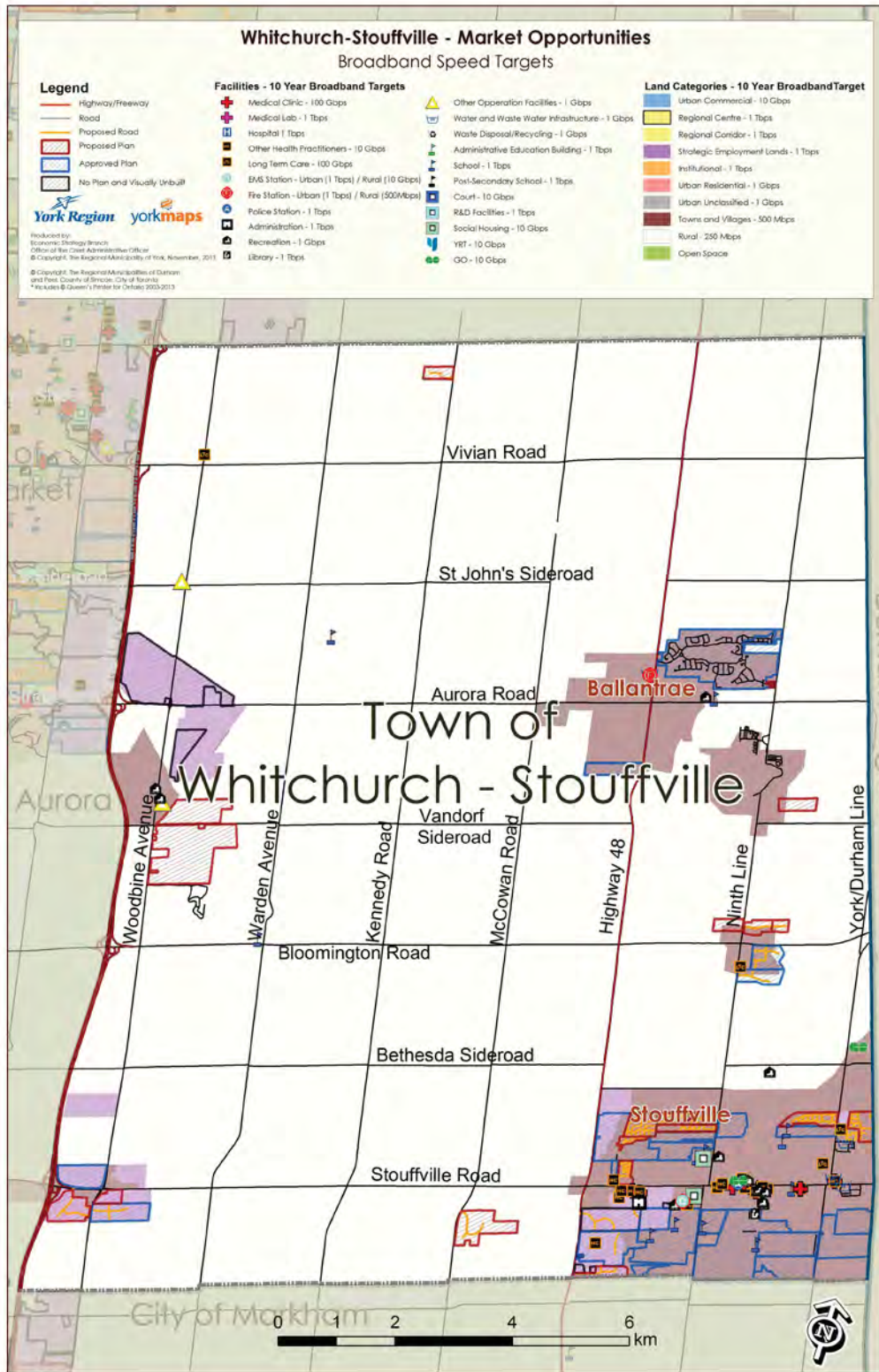




Figure 37 - Whitchurch-Stouffville Market Opportunities - Projected Households

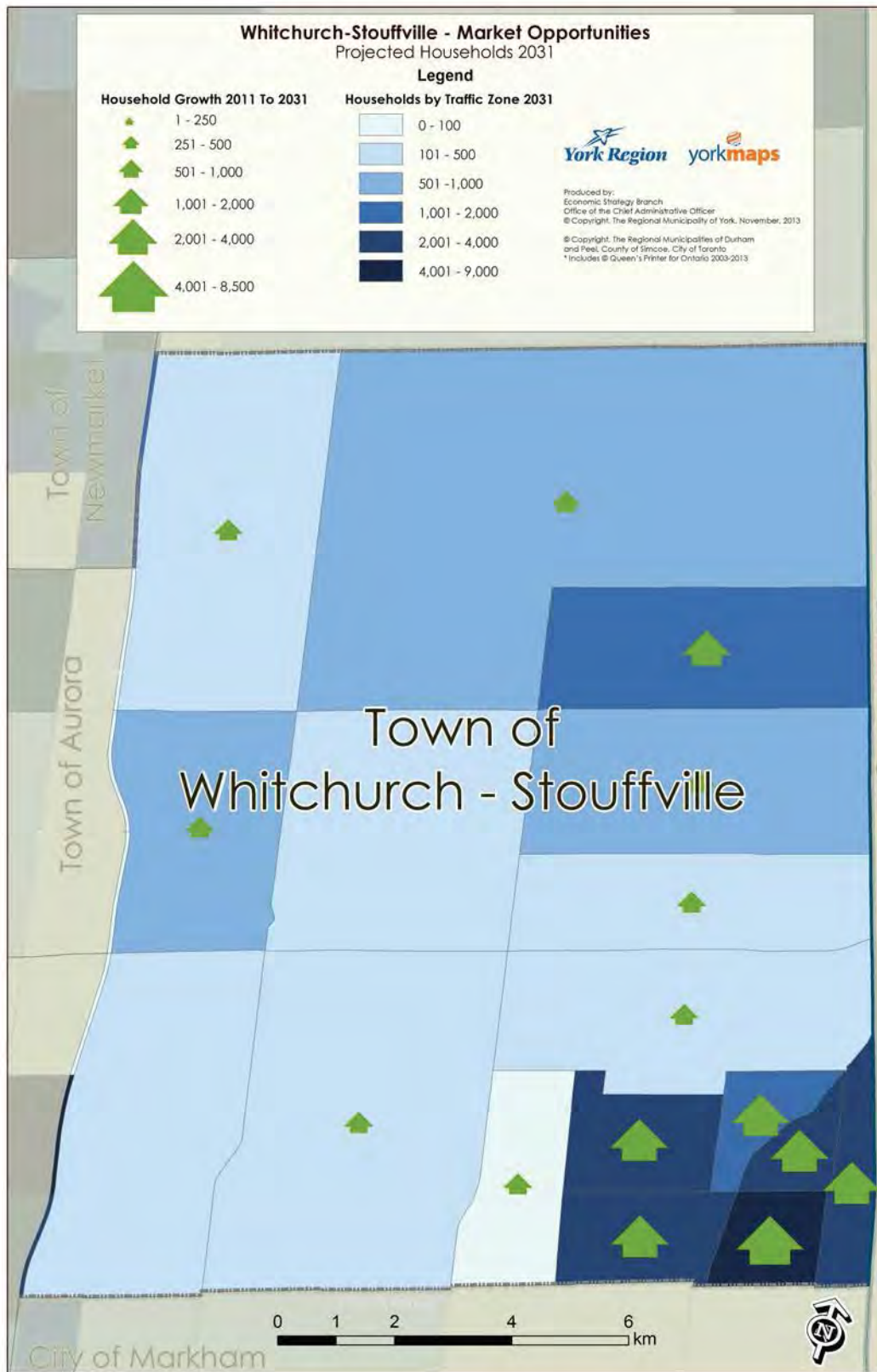
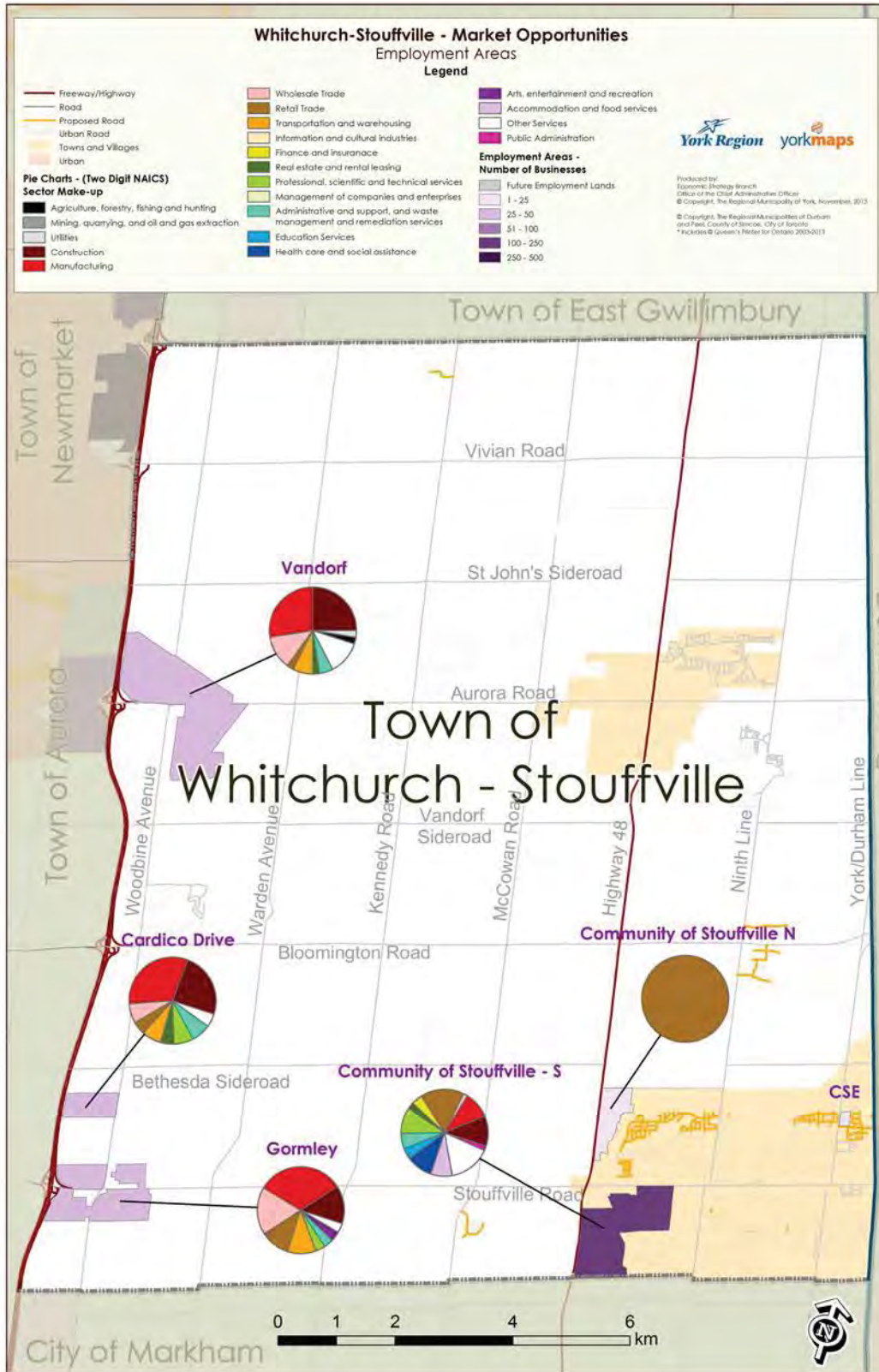


Figure 38 - Whitchurch-Stouffville Market Opportunities - Employment Areas



## WHITCHURCH-STOUFFVILLE PRIORITY FOCUS AREAS

While the goal of improved connectivity across the community is of interest to Whitchurch-Stouffville, Table 47 provides their priority project focus areas.

Table 31 - Whitchurch-Stouffville Priority Focus Areas

Project Priority	Overview
<b>New Residential Areas</b>	Engage development community and service providers on these opportunities and update development standards to set the framework.
<b>New Employment Areas</b>	Engage development community and service providers on these opportunities and update development standards to set the framework with a focus on the Hwy. 404 corridor.
<b>Public WiFi Network</b>	Develop public WiFi hotspots at community facilities and downtown Stouffville.
<b>Rural Areas</b>	Engage service providers in discussions on improving connectivity in under-serviced areas.
<b>Downtown Stouffville</b>	Enhance connectivity opportunities to support knowledge based companies within the downtown.
<b>Library / Research Opportunities</b>	Integrate planned library expansion into ORION network in order to take advantage of online education and research opportunities.

## Appendix 6 - Business Models for Connectivity

Connectivity can be provided to York Region communities under several potential business models. The most suitable approach will depend on the interests and needs of service providers and local municipalities. Given the diversity of interests and challenges within the Region, it is likely that a number of these approaches will be implemented across the Region in order to realize the identified connectivity targets.

While different network business models exist, the main focus is on the following three models as opportunities for municipalities within York Region:

- Service provider owned and operated
- Public-Private Partnerships
- Municipal owned and operated

A private company may invest in the network on their own, or with government support. In the case of public-private partnerships and municipal networks, government financial support is by definition, involved. In either case, it is important that the business model be developed in such a way that once the network and the business are operational, they generate sufficient revenue to support ongoing costs. In addition to the initial investment in fibre and electronics, there will be ongoing capital costs to expand the network as needed and to upgrade the electronic equipment to keep pace with rapidly evolving Internet technology. There will also be operating costs associated with the network.

Each model has advantages and disadvantages dependent on the situation and the perspective of consideration. Below is a description of each model and some highlighted risks.

### SERVICE PROVIDER OWNED AND OPERATED

Under this model, the service providers recognize the opportunity a community represents and makes the full financial investment to deploy the infrastructure. They own the network and are fully responsible for the operation and maintenance of the network and collect all the revenue. The network owner holds all the responsibility and risk. If too few subscribers connect or the service mix is significantly different from the forecast, then the provider will realize lower profit than projected and a lower rate of return. In some scenarios, if subscriber take rates are too low, then the ongoing maintenance costs can exceed the revenue and the network is operated at a loss. Risk is measured from the viewpoint of the provider only. The major risks are:

- Cost to implement significantly higher than forecasted
- Revenue realized is significantly lower than forecasted
- Technology obsolescence faster than expected
- Managing competitive position, which can result in lower revenue than forecasted

Since the provider is the sole party responsible for the network, they bear the responsibility of upgrading or renewing the network equipment as required to support more customers, to provide new service options or in response to technology obsolescence. Given the rapid rate of technical evolution, maintaining a leading edge network can be challenging, especially if the network is very

large. The following are examples where private companies have delivered fibre-based solutions to meet the needs of government and residents:

- Connecting BC – the British Columbia (BC) provincial government formed a long-term relationship with the incumbent provider Telus to enhance/upgrade broadband infrastructure in more rural areas of the province. In exchange, the BC government signed a contract for a significant portion of government services (voice, mobility and Internet) for a period of 10 years. A detailed case study can be found in Appendix 7 - Case Studies.
- New Brunswick – this is a private network built and owned by Bell Aliant at the cost of more than \$60M, where the government of New Brunswick provided a \$1M grant. Bell Aliant maintains full control over, and responsibility for, the network and operations. A detailed case study can be found in Appendix 7 - Case Studies.

## PUBLIC-PRIVATE PARTNERSHIPS

The use of Public-Private Partnerships (P3) to finance and operate infrastructure projects has become increasingly common. While many P3 projects have focused on hospitals, highways and other “bricks and mortar” infrastructure, some have also been used in broadband initiatives.

The main concept behind a P3 is for a public entity and the private sector to partner to deliver infrastructure to meet the objectives of the participating parties. For the private sector, the objective is to maximize value to shareholders. For the public sector, the goal will typically involve social or economic benefits. In many instances there are criteria for the partnerships to qualify for government contributions. If the goals of both parties can be achieved and there is a strong private sector business case, then often a relationship can be defined.

Typically in a P3, a government body or authority contracts with one or more private sector organizations. Often the private partners assume substantial financial, technical and operational risks associated with the project. The Eastern Ontario Regional Network (EORN) is a good example of a P3 model for improved broadband connectivity.

- Eastern Ontario Regional Network (EORN) – EORN is a para-municipal organization formed to implement a regional broadband network in eastern Ontario. Through federal and provincial infrastructure funding support, EORN formed partnerships with providers to build a fibre backbone throughout the region and to improve/add infrastructure to deliver services up to (or in excess) of 10Mbps to the home. EORN owns a portion of the infrastructure and is in partnership with private sector through until to 2024. A detailed case study can be found in Appendix 7 - Case Studies.

While the project risks in a P3 are similar to those in a service provider scenario, the difference is in how the partners share them. Some models have partners share costs evenly, while others have private sector incur the total costs. Some models allow private sector to be sole revenue receiving body while in others, revenue is shared. Different ways to consider this might be:

- One partner pays all capital, while the other partner(s) pay operating costs
- Partners share capital cost in some appropriate division, with one partner bearing all operating costs
- Partners share in capital and operating costs



Deciding on a model depends on the goals of each partner, their ability to raise or contribute capital funds, their ability to collect/benefit from revenue, etc. Private sector partners will invest if their profit targets are achievable. Public sector goals will typically be social benefits such as improving access to education and healthcare or ensuring conditions that will support existing businesses and the establishment of new ones, If a balance for both partners can be achieved, then a relationship can be established and a project completed.

The partnership agreement should include plans to deal with the following risks:

- Obsolescence of equipment – who is responsible for technology renewal?
- Revenues fall short of forecast – who is responsible for covering costs? How is this done?
- Changes in government or elections can impact the relationship and partnership

In order to realize a P3, funding has to be contributed by both partners. This means there is a need for the municipality involved to bring funding to the partnership. There are a number of options that could be explored by the partner municipality, including:

- Community Improvements – municipalities have the power to complete community improvements and distribute the cost equally among those benefiting via their property taxes; a potential scenario under this approach would include completing upgrades in a specific community and sharing the costs between the private sector service provider and local residents
- Government Grants – in other relationships, such as EORN, provincial and federal grant funding helped foster a P3 with service providers

## MUNICIPALLY-OWNED AND OPERATED

Under this model, the municipality owns and operates a network. Because infrastructure is a long-term investment providing ongoing value to the community, it is an appropriate municipal investment. There are different structures that have been adopted in cities across Canada. The following lists a few different places:

- Stratford, Ontario – the City of Stratford worked with its municipally-owned electric utility to build and operate a fibre and WiFi network. This network provides connectivity to support the utility’s business, but also provides connectivity to residents and businesses through a private sector service provider. A detailed case study can be found in Appendix 7 - Case Studies.
- Olds, Alberta – the Town of Olds established a for-profit company that used a loan from the municipality and a grant from the provincial government to build a FTTA network to service residents and businesses. A detailed case study can be found in Appendix 7 - Case Studies.
- Fredericton, New Brunswick - E-novations - A detailed case study can be found in Appendix 7 - Case Studies.

Each municipality makes decisions based on its unique objectives, tax base and other factors related to the need, outcome and financial requirements.

With municipally-owned networks, full responsibility for the infrastructure, its maintenance and renewal, lies with the municipality and not the private sector providers. Even in these examples where for-profit private sector partners may be responsible for delivering services, the municipality

still owns the infrastructure. While contractual obligations are typically not made public, it is expected that the municipality has some responsibility for ongoing contribution. This contribution may be financial, operational or fiduciary.

The challenge is that infrastructure requires maintenance and eventually renewal, especially in the case of electronics, where evolution will make initial investments obsolete. When assessing the municipalities' capital commitments, it is important that the plans include funds to refresh capital as required.

Some municipal services are provided through partnerships, where operational commitments are shared with the partner. An example of this is free WiFi across the municipality. While the private partner may have options to generate revenue, it is likely that the municipality would bear the costs of areas that are public (parks, community centres etc.) that they have elected to make accessible to all citizens.

Options for revenue-sharing may enable the municipality to realize a return on their investment. This can be done in a manner where they receive some contribution (financial, service commitments, etc.) from the provider that they have contracted the operations to.

The risks associated with municipally owned networks:

- Cost to implement higher than forecasted
- Revenue less than forecasted
- Capital renewal is earlier and costlier than expected
- Political climate – change in government could question value

## Appendix 7 - Case Studies

### 1. GIGABIT COMMUNITIES

The development of Gigabit Communities is a trend that is reshaping how communities think about connectivity. Gigabit communities can be developed by private sector service providers, or through public networks. Private service provider gigabit networks can be successful in high-density areas where there is a very high level of commitment to subscribe; while areas with lower densities may require public funding through P3s to make them successful. Table 398 provides an overview of Gigabit Communities highlighted as case studies in this Appendix.

Table 39 – Overview of Gigabit Communities

Gigabit Community	Key Market Factors	Service Offering	Network Ownership
<b>Kansas City</b>	Serve areas of highest density of pre-registration.	1 Gbps -US\$70 1 Gbps + TV – US\$120 Avg. service - US\$300 installation	Private
<b>Waterfront Toronto</b>	100% take rate – included in condo fees.	100 Mbps + Neighbourhood WIFI - \$60	Private
<b>Olds, Alberta</b>	Public Funding 8,235 residents (3400 homes passed) No. of businesses – N/A	Residential: 1 Gbps - \$57-\$90 Business: 1 Gbps - \$5000 100 Mbps - \$100	Public
<b>Vancouver, British Columbia</b>	Multi-tenant customers  OneGigabit contracts with building owner for multi-year period	1 Gbps - \$45 - \$65	Private

#### KANSAS CITY, KANSAS AND KANSAS CITY, MISSOURI

Google has deployed a residential gigabit network in Kansas City. In order to develop the project, Google engaged the community extensively before committing to construction. This included a neighbourhood competition to have pre-registrations completed, so that the network was built in parts of the community that had the highest potential number of users.

To help facilitate the investment in the network, the host municipality was also required to provide access to rights-of-way at little or no cost and expedite permit approvals, in order to ensure a timely build that minimized infrastructure costs.

The network supports Internet and digital television services. Gigabit Internet access is priced at \$70 per month. A digital TV and Internet package is \$120 per month and a five Mbps service is free with a one-time construction fee of \$300. As of April 2013, 4,000 subscribers are connected to the network.

Google has not revealed the cost of the network, but Verizon has reported that they have spent more than \$23B to extend fibre to approximately 17 million homes (US\$1,350 per home passed). Building on this project, Google has also committed to provide residential gigabit Internet in Austin, Texas and Provo, Utah.

## TORONTO, ONTARIO – WATERFRONT TORONTO

The Waterfront Toronto fibre network is being built and operated by Toronto-based telecommunications firm Beanfield Metroconnect in partnership with Waterfront Toronto.<sup>3</sup>

The network is being built without taxpayer dollars and Waterfront Toronto has facilitated an arrangement where private sector development partners and Beanfield Metroconnect will initially provide the upfront capital for building the network. The network will be in a new, very high-density mixed-use community, made up of high-rise condos and commercial space.

A minimum residential service take-rate is guaranteed, as residential condo fees include \$60/month for unlimited 100 Mbps Internet service (up and down), neighbourhood-wide WiFi and access to a community portal. Residents can also choose to purchase Beanfield's IPTV and phone package and/or Internet service of up to 250 Mbps up and down, at additional cost.

The fibre-optic broadband network will be available to affordable housing developments in the new waterfront communities. All residential units will be wired with the network and residents will have the option to buy the 100 Mbps Internet service for \$40 per month or a 10 Mbps symmetrical service for \$20 per month.

The network will have the capability of one Gbps service to every unit, at additional cost to the user, and can be adapted to supply 10 Gbps service in the future. Businesses will have access to one Gbps and 10 Gbps services.

## OLDS, ALBERTA – THE OLDS INSTITUTE

Olds, Alberta is a town located approximately 90 km north of Calgary with a population of 8,235. It is the home to Olds College, which is known for its agricultural and fashion retail programs. The town, Olds College and the Chamber of Commerce all collaborated to establish the Olds Institute as the town's private not-for-profit economic development agency.

In 2005, it was decided the town required improved communications infrastructure. The land area of Olds is 14.9km<sup>2</sup> with a population density of 554 per km<sup>2</sup>. After conducting several studies, talking to the local service providers and reviewing funding options, the Olds Institute and the town decided to build their own network. They founded a for-profit company and installed a FTTA network, completed in spring of 2013.

The network consists of buried and aerial fibre passing every home and business in Olds and connects to the Alberta Supernet. As no commercial Internet providers were willing to offer services on a network they had not built, The Olds Institute established their own ISP called O-Net. Services offered include Internet, telephone and HDTV/video.

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<sup>3</sup> From Waterfront Toronto website - [http://www.waterfronttoronto.ca/uploads/documents/waterfront\\_toronto\\_ultrabroadband\\_fact\\_sheet\\_june\\_5\\_1.pdf](http://www.waterfronttoronto.ca/uploads/documents/waterfront_toronto_ultrabroadband_fact_sheet_june_5_1.pdf)

O-Net service offers one Gbps symmetrical residential service at \$90/month (single play) as low as \$57/month when bundled. Business services of up to one Gbps are available for \$5,000 per month. 100 Mbps down/500 Mbps up with a phone line is available at \$100/month on a five year contract. The project includes a community facility at the library with a video-conference facility and 15 computers for public access.

The total project cost \$13M to \$14M. Funding included a \$2.5M grant from the Alberta government and a \$6M loan from the town of Olds. The cost to deploy O-Net was \$3.5M, \$4,000 per home passed.<sup>4</sup>

## VANCOUVER, BRITISH COLUMBIA

OneGigabit launched gigabit residential and commercial service on June 24, 2013. The firm is targeting entire apartment buildings, condominiums and small to medium businesses within 20 km of central Vancouver. Gigabit service will be priced at between \$45 and \$65 per month, with no data caps. Service contracts are between OneGigabit and building owners.

The network will use fibre optic cable and rooftop antennas with high-capacity, point-to-point microwave radio equipment. Building owners and OneGigabit will share the cost of deploying the fibre to the building. The fibre inside the building, which connects to each unit, will be paid for and owned by the building owner. OneGigabit will pay for and install networking equipment. Building owners would commit to a monthly fee per unit for suggested a period of time of three years. Though OneGigabit specializes in the retrofit and upgrade of older multiple-tenant building, they will also serve new buildings.

## 2. REGIONAL NETWORKS

Several regions in southern Ontario have established regional fibre optic networks to ensure the high speed, high-capacity communications required by their institutional and business organizations. Deployment of these networks was triggered by the need for service that was not being met by private carriers or by the prohibitively high pricing offered by private carriers.

### NIAGARA, ONTARIO – NIAGARA REGION BROADBAND NETWORK (NRBN)

#### Network Description

The NRBN fibre optic network serves more than 600 customers with 750 kilometres of fibre in the Niagara Region.

NRBN is a full service Data and Internet Provider with a fully redundant and secure network. They offer a variety of connectivity options including high availability Dedicated Internet Services, Point-to-Point, Point-to-Multi-Point, and Any-to-Any Data connectivity service options. Their Internet connectivity is from Internet Exchange Points at 151 Front St W, Toronto, Ontario and 350 Main St, Buffalo, New York. There are 8 POPs in their network.

At deployment, NRBN placed as much fibre as possible. This has paid off, as spare fibre is valuable for swapping and meeting future demand. NRBN is licensed by the CRTC as a non-dominant carrier.

<sup>4</sup> From - <http://www.cbc.ca/news/technology/small-alberta-town-gets-massive-1-000-mbps-broadband-boost-1.1382428>



<b>Network Ownership</b>	<p>NRBN is a private for-profit company. The shareholders are: Falls Hydro Holdings 37.5 per cent, Energy Services Niagara (Niagara on the Lake) 12.5 per cent, Grimsby Hydro Holdings 25 per cent, Port Colborne 25 per cent.</p> <p>At the time of network construction, Cygnal Technologies was also a partner who built and managed the network. In 2010, the four other partners bought out Cygnal for \$1.3million.</p>
<b>Network Cost and Financing</b>	<p>The network was built for \$13M in 2004. Partners contributed \$1.5M each and the balance was financed through an \$11.5M bank loan which will be paid off in 2014.</p> <p>MUSH (i.e. Municipalities, Universities, School Boards and Hospitals) sector customers signed a 10 year service contract. This was a factor in securing the loan. Municipalities backed the loan (6.5 per cent interest).</p> <p>The corporation pays dividends when they have excess cash and most shareholders have seen a full return on their investment.</p>
<b>Business Model</b>	<p>MUSH customers were not sufficient to support the network so the partners brought on Cygnal Technologies to serve private sector customers on the network and gave 30 per cent of revenue to NRBN. Points of interest in this model include:</p> <ul style="list-style-type: none"> <li>• Cygnal did network management, sales, etc</li> <li>• No NRBN staff for up to seven years</li> <li>• NRBN bought their network three years ago – 1.3 million to purchase</li> <li>• NRBN now has eight staff operating and managing the network</li> <li>• NRBN swapped fibre in order to build out the network – 50 and 60 km with Cogeco</li> </ul>
<b>Governance</b>	<p>NRBN is a private sector not-for-profit company owned by four shareholders who oversee the management of the company.</p>
<b>Customers</b>	<p>500 customers – <math>\frac{3}{4}</math> MUSH, <math>\frac{1}{4}</math> Private Sector New customers are accepted as long as they meet the hurdle rate.</p>
<b>Data Services</b>	<ul style="list-style-type: none"> <li>• NRBN does not sell dark fibre. Dark fibre provides all the risk without the upside. The margin is in providing the services.</li> <li>• Dedicated High Speed Internet</li> <li>• Layer 2 Ethernet, LAN, Private line, IPVPN</li> <li>• VOIP (white boxed)</li> <li>• Security</li> <li>• Custom Network Solutions</li> <li>• Wholesale to Rogers and Bell</li> </ul>

<b>Service Pricing</b>	<p><b>MUSH Customers</b></p> <ul style="list-style-type: none"> <li>MUSH customers pay mixed prices to get to the target price. Some connections subsidize others but the target price is 100 Mbps service \$810 per month plus last mile build. For instance: <ul style="list-style-type: none"> <li><b>Schools</b> - 100 Mbps -\$500 per month, \$3,000 to connect. But if they pay for new equipment, they get a Gigabit.</li> <li><b>Hospitals</b> - 1 Gigabit - \$895 per month (down from \$1395).</li> </ul> </li> </ul> <p><b>Private Sector Customers</b></p> <ul style="list-style-type: none"> <li>100 Mbps -\$895/ month + last mile build</li> </ul> <p>Pricing has declined as the bank loan has been paid down.</p>
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**WATERLOO, ONTARIO - WATERLOO REGION EDUCATION AND PUBLIC NETWORK (WREPNET)**

<b>Network Description</b>	<p>WREPnet is an aerial fibre optic network in Waterloo Region that connects the community’s school boards, municipal governments, public libraries, hospitals and Conestoga College with at least a Gbps connection (two Gbps to some data centre sites). The two school boards own 75 per cent of the network’s more than 250 site connections.</p>
<b>Network Ownership</b>	<p>The network is owned by Rogers Communications, but was originally built and operated by Hydro One (later acquired by Atria, later acquired by Rogers). Partners (The Region of Waterloo, the Waterloo School Boards, Cities of Kitchener, Waterloo and Cambridge, Conestoga College, Public Libraries) shared construction costs that were incremental to government grants received.</p> <p>An agreement for leasing network services was entered into by the partners and the network owner. This was a 20 year agreement, with price adjustments, at about the increase in the cost of living, occurring every five years. As of October 2013, there were two years left on the third five year term. This arrangement has been working well, however risk is introduced every time network ownership is changed.</p>
<b>Network Cost and Financing</b>	<p>The cost to construct the network was \$10M . The partners received a \$10M grant from the Ontario Ministry of Education and Training for the initial cost of the network and shared the balance of the cost of building the network.</p>

<b>Governance</b>	<p>WREPnet is governed by a Steering Committee with representation from all of the partners and is managed by the Business Planning Group, which also includes representatives from each partner.</p> <p>Partners share the cost of operating and maintaining the network. Costs associated with POPs and edge devices are jointly owned. Inside the edge devices, all equipment belongs to partner members. Each partner is responsible for its own Internet connections.</p> <p>All partners must attend governance meetings and vote on financial commitments for each organization. The Governance Model was established to facilitate business and technical planning processes and to ensure thorough participation of all WREPNet partners in the business decisions around defining, implementing and managing WREPNet.</p>
<b>Customers</b>	The partners are the network customers.
<b>Data Services</b>	WREPNet provides dark fibre connectivity. It does not provide shared data hosting, Internet access or other shared services.
<b>Service Pricing</b>	<ul style="list-style-type: none"> <li>• Lease payments of \$503 per connection to Rogers per month</li> <li>• Network operations of \$247 to Softchoice per month</li> </ul>

#### LONDON, ONTARIO – LONDON AND REGION GLOBAL NETWORK (LARGNET)

<b>Network Description</b>	LARGnet was established in 1993 as a community network connecting the University of Western Ontario, Fanshawe College and the London teaching hospitals in order to trial medical applications.
<b>Network Cost</b>	Initial investment was \$2.2M +
<b>Network Ownership</b>	LARGnet is an Ontario incorporated non-profit organization.

<b>Governance</b>	<p>LARGnet is an Ontario incorporated non-profit organization. Membership is open to any organization, public or private, in any sector (e.g. education, industry, government) subject to approval of the board of directors.</p> <p>Governance is provided through a Board of Directors comprised of up to 10 sponsoring members, two representatives from regular members and two individuals from the community at-large. Members are either regular or sponsoring. Sponsoring members are entitled to a seat on the Board of Directors and assume financial risk for LARGnet.</p> <p>LARGnet operates on a governance principle of local autonomy that seeks:</p> <ul style="list-style-type: none"> <li>• To facilitate the provision of a cost effective, secure, managed single source networking solution outside of LARGnet members' internal networks</li> <li>• To provide LARGnet's members with access, support and design assistance related to the Internet and other networks</li> <li>• To support members' use of the networks for the development of new applications</li> <li>• To encourage research into new uses and applications for high-speed computer networks that will benefit all communities represented by LARGnet members</li> </ul>
<b>Customers</b>	The partners are the network customers.
<b>Data Services</b>	<p>Services available to LARGnet partners include:</p> <ul style="list-style-type: none"> <li>• Low cost/high speed Internet transit</li> <li>• WAN services on LARGnet</li> <li>• Access to ORION and CANARIE</li> </ul>
<b>Service Pricing</b>	<p>Membership \$6,000 per year  Internet Transit \$15 per Mbps  LARGnet users pay for connections based on what the connection costs</p>

**WINDSOR-ESSEX, ONTARIO – WINDSOR-ESSEX DEVELOPMENT NETWORK (WEDNET)**

<b>Network Description</b>	<p>WEDNet is a shared regional and community network, involving partners from the education, health care, municipal and industrial sectors, both public and private. The objective of the network is to improve access to advanced applications across a major portion of southwestern Ontario.</p> <p>WEDNet members use Cogeco Cable Canada Inc. for access connectivity. The backbone network is on AT&amp;T Canada facilities. Selected participants in Connecting Windsor-Essex share in the support and utilization of WEDNet's network infrastructure.</p> <p>WEDNet is a fibre optic network with bandwidth in excess of gigabit speeds with connections to ORION and CANARIE. Private sector provider interfaces also connect to WEDnet in a shared services model for member organizations in Windsor-Essex.</p> <p>WEDNet is provisioned through private-public sector partnerships connecting 220 sites on fibre, at capacities of not less than 100 Mbps dedicated to each site. All of the rural municipalities of Windsor-Essex are connected to the regional-wide area network. Educational, research and government facilities are connected by national and provincial fibre networks. Windsor is partnering with Essex County and other</p>
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	communities to extend broadband to people in underserved rural areas.
<b>Network Ownership</b>	WEDNet is a co-operative network.
<b>Network Cost and Financing</b>	<p>Prior to 1996, WEDNet received funding from the Ontario Research and Innovation Optical Network (ORION) to connect to their network. In July 1996, they received funding from CANARIE for connectivity of a high-speed wide area network.</p> <p>In March 1997, WEDnet received more than \$2M funding from the Telecommunications Access Partnership (TAP) program of the Ontario Ministry of Energy Science and Technology and began to expand its services to those beyond the Windsor-Essex Community.</p> <p>In April 1998, WEDnet received additional CANARIE funding to establish a GigaPoP in Windsor.</p>
<b>Governance</b>	WEDNet is governed as a not for profit with the mandate to implement, evaluate and maintain an advanced high performance fibre network, in a public and private multi-sector joint venture.
<b>Customers</b>	WEDNet partners (education, health care, municipal and industrial organizations) are the network's customers.
<b>Data Services</b>	WEDnet connects customers to each other and to services on networks including the Internet. Services include ORION and CANARIE connections, access to the Shared Hierarchical Advanced Research Computer network cluster (SHARCnet), WAN services, video conferencing system access, access to the Ontario government's e-Health Internet services, dedicated connections to support medical school training, corporate Internet connections through Telus, Cogeco, Cogent, employee home Internet.
<b>Service Pricing</b>	<p>Consortium membership \$350</p> <p>Stakeholder pricing- dependent on individual connectivity needs</p> <p>Aggregated services are re-sold to members at cost.</p>

#### 4. MUNICIPAL COMMERCIAL NETWORKS

The example municipal networks highlighted below are examples of fibre networks built to support the commercial data requirements of their communities. These networks are designed to meet the needs of institutions (health care, education, government), businesses and residents that were not being met in an affordable way by the private sector.

##### EASTERN ONTARIO REGIONAL NETWORK (EORN)

The Eastern Ontario Regional Network (EORN), the result of a P3 agreement between public sector and private sector, was established by the Eastern Ontario Warden's Caucus (EOWC), which represents 13 county and single tier governments in Eastern Ontario.

Eastern Ontario Warden's Caucus (EOWC) was granted \$110M from federal and provincial governments, and contributed \$10 M of their own funds, for the deployment of a Gigabit Ethernet backbone network and to partner with service providers to deliver services of 10 Mbps or higher to homes and businesses.



Eastern Ontario Warden’s Caucus represents the rural areas of Eastern Ontario as the more urban centres are separate municipalities. The EOWC created the EORN project and pursued the funding as an economic development initiative. With so much of the rural region having poor connectivity (dial up and expensive, poor satellite service) it was imperative to initiate a change to attract and retain 21<sup>st</sup> century businesses.

Through a municipal procurement process, EORN contracted with Bell and Bell Aliant to build the 10 Gigabit Ethernet backbone network. The capital costs were shared by the partners. Bell/Bell Aliant are the service vendors and revenue collectors. Eastern Ontario Regional Network also received some in-kind contributions from Bell, some of which extend to 2024. In this particular arrangement the new infrastructure is co-owned by EORN and Bell/Bell Aliant for seven years. Then, the asset becomes solely owned by the private sector. However, there are contractual obligations associated with scaling and renewing the network until the 2024 completion. Because the providers collect all the revenue, they are also financially responsible for the equipment purchasing and installation costs over time.

These same types of conditions and arrangements exist with ISPs providing the access network. The initial capital is a shared cost (there are different percentage arrangements) where EORN owns 51 per cent of the new assets until 2017. During that period and afterwards for seven years, there are contractual obligations that the providers must meet related to scaling and growing components of the network and renewing capital.

The service providers assume a level of financial, technical and operational risk. Eastern Ontario Regional Network has committed the capital contributions but has also committed staff to support marketing and community awareness of the network and its capabilities. This includes economic development supported by the expanded network capabilities.

Eastern Ontario Regional Network has established new relationships with the participating service providers. This is assisting in sharing knowledge regarding technology options, network implementation issues and needs, and benefits of new technology and systems to community members. It is expected that there will be a long-term set of opportunities and results based on these new relationships and knowledge sharing.

<b>Network Description</b>	Eastern Ontario Regional Network is a network made up of a Gigabit Ethernet backbone supporting private carrier connectivity for residential, institutional and business subscribers in Rural Eastern Ontario communities
<b>Network Ownership</b>	The network assets are shared (49 per cent by the carriers/51 per cent by EORN) until 2017. In 2017, the assets are transferred to the carriers. There are contractual obligations that the providers must meet related to scaling and growing components of the network and renewing capital.
<b>Network Cost and Financing</b>	The network cost an estimated \$240M to deploy. Funding was provided by the federal and Ontario governments (\$110M), the Eastern Ontario Warden’s Caucus (\$10M) and private sector carriers (\$120M), including in-kind contributions.
<b>Governance</b>	Eastern Ontario Warden’s Caucus has responsibility for strategic goals of the network and accountability for the use of public funds.  Eastern Ontario Regional Network has responsibility for network construction

	and operations in accordance with specified requirements, and must ensure that specified economic and social outcomes are achieved.
<b>Customers</b>	Eastern Ontario Regional Network customers are the individual carrier's institutional, business and residential customers.
<b>Data Services</b>	Eastern Ontario Regional Network carriers provide Internet connectivity of 10 Mbps or more to their customers. They may offer lower bandwidth options, but must be able to provide a minimum of 10 Mbps per subscriber.
<b>Service Pricing</b>	Service pricing must be competitive with urban rates.

## STRATFORD, ONTARIO – RHYZOME NETWORKS

The network was launched in 1992, by the City-owned electric utility, Festival Hydro, as a backhaul for Stratford's utility data and to service large commercial operations in the area with fibre connections. In 2010, Stratford established an ISP, Rhyzome Networks, with a primary focus of providing business connectivity. They expanded the network to 70 km of optical fibre. At the same time the city deployed a wireless WiFi network offering free public service and home-based Internet for a fee. The fee services are offered by partner ISPs who use the infrastructure, but manage the service delivery function themselves.

Stratford has 100 per cent broadband coverage via WiFi. Furthermore, between Rhyzome's fibre and that of the other telecomm carriers, an estimated 90-95 per cent of businesses and homes are "passed" by fibre.

<b>Network Description</b>	<p>Fibre Optic and WiFi networks serving Stratford and six rural communities in southwest Ontario: St. Marys, Brussels, Dashwood, Hensall, Seaforth and Zurich.</p> <p>The fibre network consists of 70 km of buried optical fibre. The WiFi network consists of nodes mounted on utility poles throughout the city and backhauled over the fibre network.</p>
<b>Network Cost</b>	Festival Hydro invested \$1.2M to deploy the first 40 km of fibre.
<b>Network Ownership</b>	The network was transferred to Rhyzome Networks in 2010. Rhyzome Networks is fully owned by the City of Stratford. After the initial \$1.2M investment in the network by Festival Hydro, the network was established as a separate entity, owned by Rhyzome.
<b>Governance</b>	Rhyzome Networks owns and operates the fibre optic and WiFi data networks. Building the wireless network was a joint effort between Rhyzome and Festival Hydro

<b>Customers</b>	<ul style="list-style-type: none"> <li>• Festival Hydro uses the WiFi network to collect hourly time-of-use data from 18,000 residential and commercial electricity meters.</li> <li>• Municipal mobile workforce</li> <li>• Healthcare</li> <li>• Education</li> <li>• Business</li> <li>• Consumer</li> <li>• ISP (Rhyzome wholesales connectivity)</li> </ul>
<b>Data Services</b>	Dark Fibre, wholesale fibre connectivity, Rhyzome is exploring future opportunities related to data storage and cloud computing services.

## FREDERICTON, NEW BRUNSWICK – E-NOVATIONS

E-novations is a city-owned corporation, that was established in 2000 and is responsible for Fredericton's Community Network - a fibre optic and wireless data network serving Fredericton businesses, government and academic institutions with access to 100+ Mbps data connections and municipal public WiFi.

The company is a non-dominant carrier, commercial ISP that offers commercial Internet to Fredericton businesses at a 75 per cent price advantage over commercial rates available in Atlantic Canada beginning in fall 2013.

The E-novations Internet service, marketed under its GoFred brand name, is supported by 100-plus kilometres of fibre optic network and leveraging the wholesale buying power of its substantial existing customer base. GoFred contracts to purchase bulk Internet from national wholesalers at a very attractive rates and then passes those savings to the City's business community.

A one-time connection to GoFred can cost \$3,000-\$5,000, which is quickly offset by the huge reductions in rates. The City waives the connection fee to GoFred for incubators and accelerators of startup businesses, to support innovation.

E-novations has operated a free community WiFi network, Fred-eZone since 2003. Fred-eZone makes use of integrated traditional and wireless technologies to provide mobile high-speed Internet access in public areas. They have leveraged municipal infrastructure such as such as libraries, rinks, parking structures, water towers, traffic signals and streetlights to host Wi-Fi access points, with the City's fibre optic ring as a host network. As the ISP managing the Community Network, e-Novations makes available unused network capacity to the WiFi zone, so as to incur no incremental cost. WiFi service is available in high traffic areas: downtown and business corridors, public facilities and retail malls.

### Network Description

A fibre optic and wireless data network providing Fredericton businesses, government and academic institutions with access to 100+ Mbps data connectivity and municipal public WiFi.

The fibre network consists of 100 km of optical fibre deployed on public utility poles. The WiFi network consists of more than 120 nodes mounted on utility poles throughout the city and backhauled over the fibre network.

Sales of services on the community network are regulated by the CRTC, as Fred Fibre is licensed as a non-dominant carrier. As a non-dominant carrier, Fred

	Fibre and the community network only serve commercial customers.
<b>Network Cost and Financing</b>	Initial network cost is estimated at \$450,000. The community network and the E-Zone were funded by the City of Fredericton through a loan of \$65,000 to the E-novations company and a \$50,000 private loan. In-kind contributions from vendors totaled \$250,000 and included contributions from Cisco systems providing the wireless backhaul equipment. The labour of city employees made up the balance of the cost.
<b>Network Operating Cost</b>	The equivalent of one half to one full-time position is occupied with monitoring of the network and the direction of maintenance subcontractors. Costs for deployment and maintenance are rolled in to the city's telecommunication budget, which was significantly reduced by the creation of the community network. In 2013, E-novations contracted with Rogers to provide bandwidth at wholesale rates, as required.
<b>Network Ownership</b>	E-novations is owned by the City of Fredericton and is a holding company that owns FredFibre and Fred-eZone.
<b>Governance</b>	E-novations is a not for profit company managed by the city IT department and overseen by a board of directors.
<b>Customers</b>	Fibre network - Fredericton businesses, government and academic institutions. WiFi Network – the public.
<b>Service Pricing</b>	Start-up fee: \$3000 -\$5000 (Can be waived for incubators and accelerators). Monthly fees : 75 per cent of commercial rates. WiFi – Free in Fred-eZone.
<b>Data Services</b>	<ul style="list-style-type: none"> <li>• Wholesale bandwidth provided over the community ring</li> <li>• Internal and external data communications for the City of Fredericton</li> <li>• eZone – WiFi network at downtown business district, secondary business centres (box store parking lots along TransCanada highway, shopping malls) libraries, transportation hubs (airport, truck stops), cultural and recreational centres.</li> </ul> <p>Cloud Services – e-mail, desktop support, custom networks for the workspace. Dark fibre – customer managed</p>

## 5. PRIVATE COMMERCIAL NETWORKS

### BELL ALIANT – FREDERICTON AND ST. JOHN, FIBRE NETWORKS

Bell Aliant deployed a FTTH network, in 2010, to 70,000 homes and businesses in Fredericton and St. John, New Brunswick. Bell Aliant spent \$60 million and the Province of New Brunswick contributed \$1 million to the project. The network is virtually 100 per cent aerial build, which allowed for an affordable network for Bell Aliant, despite the low population density of the cities served.

Bell Aliant builds fibre networks in certain communities where they can secure access to aerial infrastructure that will meet their needs. The deployment resulted in job creation for local businesses and the infrastructure has supported ongoing economic development in the region. The network is fully owned and operated by Bell Aliant.

### TELUS- CONNECTING BC

Connecting BC is a 10-year strategic telecommunications services contract between TELUS and the Government of BC.

The agreement, signed on July 29, 2011, expands access to Internet services in rural and remote areas and expands access to cellular services along segments of provincial highways.

Under the agreement, TELUS will provide the following rural benefits:

- Maintain Internet gateways or points-of-presence in 119 central offices throughout the province
- Offer affordable wholesale Internet access for regional and local service providers, so they can continue to provide local coverage for rural and remote British Columbians
- Increase Internet speeds up to 10 times in many areas connected under a previous agreement between the province and TELUS. Increased Internet speeds assist regional and local Internet service providers to offer quality Internet experiences to business, schools and citizens.
- Work toward the goal to increase the current level of connectivity in the province from 93 per cent to 97 per cent through various programs and commitments such as the Deferral Account program managed by TELUS
- Work with the province and other partners on strategies to address the connectivity needs of the remaining three per cent of citizens who live in very remote areas that cannot be served by land-based systems
- Improve access to cellular services by installing more than 1,700 kilometres of new cellular services along sections of primary and secondary highways. As more than half of all 911 calls are currently made from cell phones, this expansion is a vital step forward for public safety

In addition to connecting communities, this agreement will result in operational efficiencies, streamlined service delivery and the creation of new services, saving the government, and British Columbians, time and money.

Specific highlights of the new Connecting B.C. Program include:

- Upgrading approximately 450 schools to high-speed fibre optic cables
- Providing more than 1,700 km of additional cellular coverage along primary and secondary highway segments throughout B.C
- Increasing Internet bandwidth connections for designated rural and remote communities

The network is fully owned and operated by Telus.

## 6. MANAGED MUNICIPAL CONDUIT

### MONTREAL, QUEBEC

La Commission de services électriques de Montréal (CSEM), a public-private agency manages the island's underground cable network. The CSEM was established in June 1910 to rid Montreal of the tangle of overhead electric, telephone and telegraph wires that were an eyesore and fire hazard to the city.

The CSEM manages and maintains a network of underground conduit that is 21,000 km long, on behalf of more than 80 companies. The buried conduit network is regulated by the City of Montreal. Requests to add conduit or cable are managed by the CSEM according to a prescribed application

process. The access to conduit enabled by the CSEM is reported by carriers to reduce the cost to install cable by up to 80 per cent and significantly reduces the time required for cable deployment projects.